

Climate change and changing attitudes : effect of negative emotion on information processing

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Climate change and changing attitudes

Effect of negative emotion on information processing

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Effect of negative emotion on information processing

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Eindhoven, October 1998

Contents

Acknowledgements	i
Chapter 1 Introduction	1
1.1 Climate change	1
1.2 Social dilemma	3
1.3 Stress	5
1.4 Risk perception	7
1.5 Public information	10
1.6 Theoretical perspectives on the role of negative emotion in persuasion	12
1.6.1 Affective perspective	13
1.6.2 Cognitive perspective	14
1.6.3 Critical examination of affective and cognitive perspectives	14
1.6.4 Dual-process perspective	16
1.6.5 Research on negative emotion and information processing	17
1.7 The present research	19
1.7.1 Conceptual model	19
1.7.2 General set-up of the experiments	21
1.8 Overview of this dissertation	22
Chapter 2 Effect of fear on elaboration: Consequences for attitude-behaviour relations	25
2.1 Introduction	25
2.2 Method	26
2.2.1 Design	26
2.2.2 Participants	26
2.2.3 Procedure	27
2.2.4 Stimulus materials	27
2.2.5 Measurements	29
2.3 Results	31
2.3.1 Effects on manipulation checks	31
2.3.2 Effects on dependent variables	32
2.4 Conclusions and discussion	37
Chapter 3 Effect of concern and fear on elaboration: Consequences for attitude stability	39
3.1 Introduction	39
3.2 Method	42
3.2.1 Design	42
3.2.2 Participants	43
3.2.3 Procedure	43
3.2.4 Stimulus materials	44
3.2.5 Measurements	47
3.3 Results	50
3.3.1 Effects on manipulation checks	50
3.3.2 Effects on dependent variables	53
3.4 Conclusions and discussion	65

Chapter 4	Effect of concern and fear on elaboration: Replication with other target-object . .	69
4.1	Introduction	69
4.2	Method	70
4.2.1	Design	70
4.2.2	Participants	71
4.2.3	Procedure	71
4.2.4	Stimulus materials	72
4.2.5	Measurements	72
4.3	Results	74
4.3.1	Effects on manipulation checks	74
4.3.2	Effects on dependent variables	77
4.4	Conclusions and discussion	81
Chapter 5	Relevance as a moderator of the relation between fear and elaboration	85
5.1	Introduction	85
5.2	Method	88
5.2.1	Design	88
5.2.2	Participants	88
5.2.3	Procedure	89
5.2.4	Stimulus materials	89
5.2.5	Measurements	91
5.3	Results	92
5.3.1	Effects on manipulation checks	92
5.3.2	Effects on dependent variables	94
5.4	Conclusions and discussion	99
Chapter 6	General conclusions and discussion	103
6.1	An overview of the fear levels induced in the four experiments	103
6.2	Effect of induced fear on systematic processing	105
6.3	Effect of pre-existing concern on systematic processing	107
6.4	Combined effects of pre-existing concern and induced fear on elaboration	108
6.5	Effects of negative emotion on attitude stability and attitude-behaviour relations	110
6.6	Possibility of a non-linear effect of negative emotion on elaboration	111
6.7	Assessing the extent of systematic processing	112
6.8	Manipulating fear	113
6.9	Manipulating argument strength	114
6.10	Integrating information elements during processing	115
6.11	Alternative methods to study the extent of systematic processing	116
6.12	The role of negative emotion in real-life communication settings	116
6.13	Implications for the practice of developing information campaigns	118
Samenvatting	119
Reference list	131
Appendix A	Arguments presented in Experiments 1 to 4	140
Appendix B	Knowledge effects of videos employed to manipulate fear	142
Appendix C	Major outcomes of analyses presented in this dissertation	146
Autobiographical note	147

Chapter 1

Introduction

"If we do not succeed in putting our message of urgency through to today's parents and decision makers, we risk undermining our children's fundamental right to a healthy, life-enhancing environment. Unless we are able to translate our words into a language that can reach the minds and hearts of people young and old, we shall not be able to undertake the extensive social changes needed to correct the course of development" (Brundtland, 1987, p. xiv). This dissertation is about reaching people's minds through their hearts, or about making people think by appealing to their emotions. Four experiments are presented, examining whether negative emotion increases the tendency to engage in systematic information processing. These experiments were carried out within the field of environmental communication, in particular communication about climate change and energy conservation.

Some basic information on climate change science and policy is provided at the beginning of this introductory chapter. Next, the psychological aspects of climate change are illuminated by framing the issue as a social dilemma. Following this we explore whether stress theory can be helpful in understanding how individual appraisals of climate change come about. Subsequently we describe major outcomes of research on public perceptions of climate change.

The emphasis then shifts to the use of public information as an instrument in climate change policy, in particular the use of fear appeals. Major theories and empirical findings are discussed regarding the relation between fear and persuasion. A clarification is given of the theoretical framework underlying the research presented in this dissertation. Based on this theoretical framework a conceptual model was developed and an experimental set-up was chosen, which are presented next. Finally, an overview is given of the remaining chapters of this dissertation.

1.1 Climate change

The climate changes continuously, but according to climate scientists it is now changing with unprecedented speed. Since the end of the nineteenth century the mean global temperature has increased by 0.3 to 0.6 °C. In addition, the global sea level has risen by 10

to 25 cm. Regional changes in temperature and precipitation are also evident. The balance of evidence suggests that there is a discernible human influence on the global climate. This conclusion was drawn by the Intergovernmental Panel on Climate Change (IPCC, 1996). The IPCC was established ten years ago to assess available scientific information on climate change, to estimate the environmental and socio-economic impacts of climate change, and to formulate response strategies. The assessment reports of the IPCC are written and reviewed by prominent scientists and other experts from all over the world. They are considered standard works of reference.

According to the IPCC the composition of the earth's atmosphere is changing due to human activities. Atmospheric concentrations of greenhouse gases have grown significantly. These gases tend to have a warming effect by absorbing infrared radiation from the earth's surface and then re-radiating it. Atmospheric concentrations of aerosols have generally grown as well. Aerosols are microscopic airborne particles that, on balance, tend to have a cooling effect. Although locally the cooling effect due to aerosols may be large enough to offset the warming effect due to greenhouse gases, this does not hold globally. Taking into account the effects of both greenhouse gases and aerosols, human interference is projected to increase the mean temperature on earth.

Nations from all over the world are taking counsel together on how to ameliorate climate change. Recently, the third Conference of the Parties in Kyoto has resulted in new agreements between industrialized nations to decrease their emissions of greenhouse gases (CoP 3, 1997). The Netherlands agreed to reduce their aggregate anthropogenic carbon dioxide (CO₂) equivalent emissions of greenhouse gases by at least 8 per cent below 1990 levels. This reduction should be realized between 2008 and 2012 and maintained thereafter.

As appears from the expression of reduction targets in CO₂ equivalents, one of the most important anthropogenic greenhouse gas is CO₂ (Fransen & Janssen, 1998). Emissions of CO₂ are mainly due to the combustion of fossil fuels for the generation of energy. The global demand for fossil fuels has grown for almost two centuries and is expected to continue to grow at least through the first half of the next century. Unless measures are taken this means that atmospheric concentrations of CO₂ will also continue to grow. Significant reductions in CO₂ emissions can be achieved by replacing current technology with more energy efficient technology and by switching to low-carbon fossil fuels and non-fossil fuels. In the longer term renewable energy sources such as solar, wind, and biomass technologies could meet a considerable part of the world's energy demand.

Although technological advancement is a prerequisite for realizing CO₂ emission reduction targets, it seems inevitable that technological measures to reduce fossil energy use are supplemented by behavioural measures, given various scenarios of population and economic growth (see IPCC, 1996). This is all the more so because the successful introduction of technological innovations depends on public acceptance (Costanzo, Archer, Aronson, & Pettigrew, 1986; de Loor, Midden, & Hisschemöller, 1992). In addition, the effectiveness of technologies in reducing energy consumption depends on how these technologies are used. Technological efficiency improvements often have smaller effects than expected because producers and consumers undo some of the savings by increasing comfort. This rebound effect appears for example in the automobile industry, where the increased fuel-efficiency is inadvertently compensated by the addition of air-conditioning and a preference for larger models (see also Stern, 1992).

As is formulated in a recent communiqué on climate change by the Dutch Ministry of Housing, Spatial Planning and the Environment (VROM): "The reduction of the emission of greenhouse gases requires changes in society. Societal changes go hand in hand with public support, and here that means accepting the seriousness of the situation, government intervention, outlines for policy, and the willingness to change behaviour. Information intended for consumers and other target groups plays an important role in this" (1996, p. 113). In the next section the behavioural aspects of environmental problems will be further elaborated.

1.2 Social dilemma

Environmental problems pre-eminently require a multidisciplinary approach, with different disciplines clarifying different aspects of environmental problems. Until recently, mainly the biological, technical and economic aspects of environmental problems have been illuminated. However, now the importance of psychological aspects is also widely recognized. When analysed from a psychological perspective, environmental problems can be conceived of as caused by behavioural choices (Midden, 1993; Midden & Weenig, 1990). It is these choices that hold the key to solving environmental problems. In analysing these choices it is important to distinguish between different societal roles people figure in, such as technical designer, political actor, and consumer. In this dissertation the focus is on the latter role. Consumers take decisions about purchasing, using, and discarding products. These

decisions all affect the environment, although consumers may not always be aware of it (Midden & Bartels, 1994).

Many societal problems like tax-fraud, over-fishing and over-population can be characterized as a social dilemma. This also applies to environmental problems such as climate change. A social dilemma is a group situation in which private interests are at odds with collective interests (van Lange, Liebrand, Messick, & Wilke, 1992). Each member of the group is tempted to act out of self-interest, to maximise personal outcomes. Each self-interested choice, however, creates negative outcomes for the group as a whole. When a large number of members make a selfish choice, the negative outcomes accumulate, creating a situation in which everybody would have been better off if they had decided not to act in their own private interest. Formally, a social dilemma is defined by three characteristics: (1) a noncooperative choice is always more profitable to the actor than a cooperative choice, regardless of the choices made by the others; (2) compared to a cooperative choice, a noncooperative choice is always harmful to others; and (3) the aggregate amount of harm done to others by a noncooperative choice is greater than the profit to the actor him or herself.

When making environmentally relevant behavioural choices, individuals are tempted to walk into four traps (Vlek & Keren, 1992). First, they are tempted to overweigh the expected benefits of a behavioural option relative to the expected costs. For example, with regard to car driving, research indicates that gains such as being able to leave whenever one likes are considered more important than losses such as financial expenses (Steg, 1996). This is referred to as the benefit-risk trap. Second, individuals are tempted to prefer small current benefits over larger benefits in the future, or to avoid short-term small losses even when this entails larger losses in the long run. For example, although the higher initial expense of energy-efficient light bulbs is compensated by a lower electricity bill, their price is a major reason for not purchasing them (van Vlimmeren, 1992). This is referred to as the temporal trap. The third temptation regards the tendency to prefer small local benefits over larger distant benefits, or to overweigh small local losses relative to larger distant losses. For example, research indicates that local environmental problems such as solid and chemical waste are mentioned more often as subject of concern than global problems such as stratospheric ozone depletion (Fischer, Morgan, Fischhoff, Nair, & Lave, 1991). This is referred to as the spatial trap. Fourth, individuals are tempted to prefer small personal benefits over larger collective benefits, or to overweigh small personal losses relative to larger collective losses. This is called the social trap. Together these traps imply that people

are tempted to maximize their own, short-term and local benefits while ignoring collective, long-term and global risks.

It has long been assumed that an individual's behaviour in a social dilemma situation is guided by the desire to profit as much as possible from a collective good. However, according to Wilke (1990) greed is not the only motive underlying an individual's decisions in a social dilemma. Two more motives are important as well: the equity motive and the efficiency motive. The equity motive refers to the desire that profits are distributed in a fair way among group members. The efficiency motive holds that individuals strive for a continued existence of a collective good. These latter two motives are assumed to restrain the tendency to maximise individual profits.

The efficiency motive implies that if individuals believe that the continued existence of a collective good is seriously threatened, they will aim to preserve it. Hence, if individuals believe that climate change seriously threatens conditions of life, they will be more likely to render support to mitigation policy. It therefore is important to gain insight into how individuals appraise climate change. To understand how individuals come to see a certain situation as a threat, we turn to stress theory.

1.3 Stress

“Stress...is the process of appraising events (as harmful, threatening, or challenging), of assessing potential responses, and of responding to those events; responses may include physiological, emotional, cognitive, and behavioral changes” (Taylor, 1986, p. 146). This definition reflects a typical psychological perspective on stress, in that it is based upon the assumption that it is not the situation itself that causes stress, but how it is interpreted (Meertens, van der Pligt, & Vlek, 1994).

According to psychological stress theory individuals engage in two appraisal processes when confronted with a potential stressor: a primary and a secondary appraisal process (Lazarus & Folkman, 1984). These appraisal processes eventually result in the subjective experience of stress.

The primary appraisal process refers to interpreting an event as (potentially) positive, neutral, or negative. When it is perceived as negative, it is further appraised as harmful, threatening, or challenging. The event is appraised as harmful to the extent that it already

has caused damage. It is appraised as threatening to the extent that future damage is expected as a consequence of the event. Finally, the event may also be appraised as challenging to the extent that it offers new possibilities.

The secondary appraisal process refers to assessing one's coping abilities and resources. It includes evaluating which coping strategies are available, whether or not they will be sufficient to meet the harm, threat, or challenge of the event, and whether or not one can successfully execute them.

The physiological consequence of stress is arousal, involving a series of nervous system and endocrinological reactions (Taylor, 1986). Potential cognitive consequences include outcomes of the appraisal processes and involuntary stress responses, like for example distractibility and inability to concentrate. Potential emotional consequences of stress include fear, anxiety, excitement, embarrassment, anger and depression. Potential behavioural consequences are almost limitless and depend upon the nature of the stressful event. Two general categories of behavioural responses are fight, that is confronting action against the stressor, and flight, that is withdrawal from the stressor.

Although the extent to which an event produces stress depends on how it is appraised by the individual, some events are more likely to produce stress than others. Paterson and Neufeld (1987) have outlined three necessary, and according to them sufficient, characteristics for an event to activate a stress process. First, the event must have some relation to at least one important goal and it must make attaining or maintaining the goal more difficult. This characteristic is referred to as event severity. For example, Kempton (1991) found that people attach great value to the well-being of future generations and particularly of their descendants. The attainment of this goal is potentially threatened by climate change. A second necessary characteristic identified by Paterson and Neufeld (1987) is event imminence: Stress will not occur unless the event is to some degree impending. A final necessary characteristic is event probability: A potential stressor must have some likelihood of occurring for stress to be produced.

Additional properties of events that make them potentially stressful have been discussed by Lazarus and Folkman (1984). Some of these properties are particularly relevant within the context of climate change. These are ambiguity, temporal uncertainty, and event uncertainty.

A situation is ambiguous to the extent that information necessary for appraisal is unclear or insufficient. Regarding climate change, the ambiguity is due to a great extent to the complexity of the issue. According to Lazarus and Folkman (1984) ambiguity can intensify

threat if there is some cue present signalling harm (e.g., any type of alarm or warning sign), or if an individual is predisposed to experience threat (e.g., because of high trait anxiety). Ambiguity can also reduce threat by allowing alternative interpretations of the meaning of the situation. In other words, ambiguity can be embraced to discount the threat's seriousness.

Temporal uncertainty means not knowing when an event is going to occur. Event uncertainty means not knowing whether an event is going to occur. Event uncertainty needs to be distinguished from event probability. If the probability of an event's occurrence increases from 0 to 50 %, its uncertainty increases as well. However, if the probability of an event's occurrence increases from 50 % to 100 %, its uncertainty decreases. In other words, whereas the probability of an event is maximal at 100 %, its uncertainty is maximal at 50 %. Both factors may have an effect on the experienced level of stress.

Daily newspapers continuously inform people about the many uncertainties surrounding the issue of climate change. These uncertainties regard the operation of the climate system, how it is influenced by human activities, and the possible consequences of climate change, including their temporal and spatial patterns and their magnitude. Uncertainty can have an immobilizing effect on anticipatory coping responses (Lazarus & Folkman, 1984). An attempt to obviate this immobility is reflected by the precautionary principle, adopted by the United Nations Conference on Environment and Development in Rio de Janeiro: "Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation" (UNCED, 1992).

The next section is about risk perception, another line of inquiry that may shed light on individual appraisals of climate change. This section starts with describing some general characteristics of public risk perception and proceeds with outlining major research findings on public perceptions of climate change.

1.4 Risk perception

A central issue in research on risk perception has been the difference between lay and expert judgments of risks of activities associated with, for example, a nuclear power station or the transport of dangerous chemicals by rail (Meertens et al., 1994). Whereas expert judgments have been found to largely correspond with accident rates, lay judgments are influenced by factors such as personal experience and media attention. This is not to say

that public risk perceptions are less rational than expert risk assessments. They are merely based on other criteria (Wandersman & Hallman, 1993).

In psychometric studies the following dimensions underlying lay perceptions of the riskiness of activities and situations have been identified (Meertens et al., 1994): potential degree of harm or fatality; physical extent of damage; social extent of damage; time distribution of damage; probability or ambiguity of undesired consequences; controllability of consequences; experience with, familiarity, or imaginableness of consequences; voluntariness of exposure; extent and clarity of expected benefits; social distribution of risks and benefits; and harmful intentionality. These judgmental dimensions often are dimensions of risk acceptability as well. Although traditionally the study of risk perception considered primarily health and safety risks, in recent years the psychometric method has been applied to characterize ecological risks as well (e.g., McDaniels, Axelrod, Cavanagh, & Slovic, 1997; McDaniels, Axelrod, & Slovic, 1995).

Having briefly characterized public risk perception in general we will now focus on public perceptions of climate change. In the following the results will be delineated of a number of studies conducted in the nineties in Europe and the United States (Bostrom, Morgan, Fischhoff, & Read, 1994; Henning & Böhm, 1996; Heskes, 1998; Kempton, 1991; Löfstedt, 1991; Read, Bostrom, Morgan, Fischhoff, & Smuts, 1994; Weber, 1997). A wide range of qualitative and quantitative methodologies have been employed in these studies to map lay people's ideas about climate change.

The overall impression is that a considerable part of the general public believes that climate change has already occurred (Bostrom et al., 1994; Kempton, 1991; Read et al., 1994; Weber, 1997). People tend to use information about local weather to draw inferences about global climate. This may result in weather-related fluctuations in public concern about global warming. Also, people tend to relate global warming to their own experiences of daily and seasonal temperature swings. This may bring them to perceive a few degrees increase of the global mean temperature as not very harmful, without realizing that it can have large geophysical and ecosystem effects.

People have difficulty in understanding the difference between climate change and other environmental problems, particularly stratospheric ozone depletion (Bostrom et al., 1994; Heskes, 1998; Kempton, 1991; Read et al., 1994). Global warming is often perceived as a subset of stratospheric ozone depletion, or as a consequence of increased ultraviolet light entering the atmosphere due to the hole in the ozone layer.

Regarding public perceptions of the consequences of climate change, lay people were found to be able to mention a wide range of possible effects, many of which agreed with expert models of climate change (Bostrom et al., 1994). A variety of ultra-violet-related health effects such as skin cancer were also mentioned. Although it is generally believed that the greenhouse effect will produce undesirable consequences, the belief that one personally will be affected is less widely spread (Löfstedt, 1991). The respondents in a Dutch study perceived a rising sea level as the most important threat to the Netherlands, although they expressed great confidence in building dikes to avert this threat (Heskes, 1998).

The confusion of climate change with other environmental problems is also reflected in common misunderstandings about its causes. For example, people tend to think that climate change is caused by emissions in general (Bostrom et al., 1994; Heskes, 1998; Löfstedt, 1991; Read et al., 1994). This indicates that climate change is perceived as just an instance of environmental pollution. Another frequently mentioned cause of climate change is the use of spray cans (Bostrom et al., 1994; Löfstedt, 1991; Read et al., 1994), which reflects the confusion of climate change with stratospheric ozone depletion.

There also are misunderstandings concerning the relative importance of various causes of climate change (Bostrom et al., 1994). In particular, people tend to exaggerate the importance of deforestation as a cause of climate change (Bostrom et al., 1994; Read et al., 1994). Fossil fuel consumption is seldom mentioned as a cause of climate change in reaction to an open-format question. However, in reaction to a closed-format question its importance as a cause of climate change is more often recognized (Read et al., 1994).

Regarding public understanding of solutions, it is difficult for people to differentiate between good environmental practice in general and actions that help to prevent global climate change (Bostrom et al., 1994; Read et al., 1994). For example, cutting back on driving is often suggested as an effective strategy to mitigate climate change (Löfstedt, 1991; Read et al., 1994), plausibly because car driving is generally known to be harmful in many environmental respects. Other frequently mentioned strategies are undertaking political action, increasing personal awareness, and recycling (Read et al., 1994). Removing chlorofluorocarbons (CFCs) from spray cans is also often mentioned, again reflecting the confusion of climate change with ozone depletion (Löfstedt, 1991).

People have virtually no idea of the potential global climate change policies actually being debated. Reducing energy consumption is seldom mentioned as a strategy to mitigate climate change (Bostrom et al., 1994; Heskes, 1998; Kempton, 1991; Read et al., 1994).

This is also what Löfstedt (1991) found in his study on reasons for reducing energy consumption. People appeared to save energy mainly because of economic reasons. Even if they mentioned environmental reasons they referred to issues other than climate change.

The studies described in the above suggest that people generally have a poor understanding of two basic facts that are essential to the issue of climate change, that is (1) human-induced climate change is primarily the result of increasing concentrations of CO₂ in the earth's atmosphere, and (2) the single most important source of increased atmospheric CO₂ levels is the combustion of fossil fuels for the generation of energy (Read et al., 1994). Consequently, the importance of energy conservation and energy efficiency as a strategy to ameliorate climate change is insufficiently recognized (Heskes, 1998; Kempton, 1991).

Based on a review of divergent studies including opinion polls and in-depth interviews, Kempton (1993) concluded that although people seem to be concerned about global warming, they lack the proper response knowledge (i.e. knowledge on mitigation options) required for effective consumer and political action. "The communications challenge would be in connecting the existing concern with specific responses. For example, global warming needs to be associated with energy-efficiency and renewable energy, in place of the current association of global warming with spray-cans, pollution controls, and general environmental responses such as recycling" (Kempton, 1993, p. 239). Hence, the connection between climate change and energy consumption needs to be spelled out in public information campaigns. The next section goes into the issue of public information.

1.5 Public information

After a period of scepticism about the effect of mass communication on public attitudes, the present view is that communication can have a considerable impact under limited conditions (Costanzo et al., 1986; Eagly & Kulesa, 1997). For example, communicative strategies are more likely to be effective when they are combined with other strategies such as financial measures or legislation (Kempton, Darley, & Stern, 1992). The effectiveness also depends on characteristics of the communicative strategy itself, such as information specificity, vividness, repetition, the proximity of the information to the target behaviour, and source credibility (for reviews see e.g. Costanzo et al., 1986; Dennis, Soderstrom, Koncinski, & Cavanaugh, 1990; Ester & Winnett, 1982).

Public information as a policy instrument can serve various functions. The Dutch

government employs public information as an independent policy instrument to increase environmental knowledge and awareness, with a growing emphasis on transmitting knowledge about behaviour alternatives (VROM, 1993). In combination with other policy instruments such as physical and financial-economic measures public information is used to stimulate attitude and behaviour change.

In the early nineties VROM launched a public information campaign on climate change aimed at enhancing knowledge and problem awareness. The idea behind this campaign was that knowledge and problem awareness are instrumental in stimulating behaviour change and creating favourable attitudes towards climate change policy. To evaluate the effectiveness of the campaign, changes in knowledge, problem awareness, behaviour, and perceived necessity of policy measures were assessed in a pre-post design survey (Staats, Wit, & Midden, 1996). The effects of the campaign appeared to be limited. Knowledge about the greenhouse effect improved slightly, but misunderstandings were not eliminated. No campaign effects were found for problem awareness. The effects on behaviour and perceived necessity of policy measures were also nearly absent.

To increase insight into the processes underlying the effectiveness of campaigns such as these, Staats et al. (1996) analysed the relations between knowledge and problem awareness on the one hand and behaviour and the perceived necessity of policy measures on the other. Two components of problem awareness were distinguished: perceived seriousness of the problem and emotional concern about the problem. Behaviour could not be predicted by knowledge or by problem awareness. Although knowledge did not play a role in the prediction of the perceived necessity of policy measures either, problem awareness did. Both perceived seriousness and emotional concern contributed significantly to the prediction of the perceived necessity of policy measures. This indicates that emotional factors may serve an important role in public information on environmental issues. Based on the results of a survey study in Switzerland, Finger (1994) arrived at a similar conclusion: "...fear is a key variable when it comes to seeking environmental information and knowledge, especially about global environmental issues and problems" (p. 156). "The more one is afraid of environmental issues and problems, especially global environmental ones, the more one is motivated to learn" (p. 158).

The research presented in this dissertation aims to increase our understanding of the role of negative threat-related emotion in environmental communication. In this dissertation the term negative threat-related emotion (negative emotion for short) refers to feelings of

concern and fear with regard to the threat under consideration. As Eagly and Kulesa (1997) formulate it: "Given the very serious dangers posed by environmental problems like air pollution and depletion of the ozone layer, it is not surprising that many persuasive appeals stress the negative consequences of failing to ameliorate environmental problems. Such appeals may well arouse fear or anxiety. Whether fear and other negative emotions would facilitate or inhibit persuasion has been the focus of considerable research in social psychology" (pp.140 -141).

The next section briefly outlines the most important theoretical ideas and empirical findings regarding the relation between negative emotion and persuasion. As will become clear, much is yet to be discovered regarding the processes underlying this relation. In addition, the majority of fear appeal studies has been conducted within the field of health communication. It will be argued that prudence is called for in generalising the insights provided by these studies to the field of environmental communication. Naturally, the decision to apply fear appeals in environmental communication not only depends on their persuasiveness. As is true for all forms of influencing, legitimacy and morality considerations should play an important role in this decision.

1.6 Theoretical perspectives on the role of negative emotion in persuasion

From the moment that persuasion became a central issue in social psychology, the comparative impact of 'emotional' and 'rational' appeals has been studied (Hartman, 1936; Knower, 1935, 1936). There is a particularly rich literature on the persuasive effects of fear appeals. A fear appeal can be defined as a communication that attempts to influence attitudes and behaviours through the threat of some danger (Tanner, Day, & Crask, 1989).

Previous theoretical models of fear appeals can be divided into two groups, depending on whether they primarily stress the importance of either affective or cognitive factors in explaining the persuasive impact of fear appeals. The drive theories offer an affective perspective on fear appeals, whereas the parallel response model and expectancy value theories, such as the protection motivation model, offer a cognitive perspective. While the fear construct is assigned a central role in the affective perspective, its role is downplayed in the cognitive perspective.

1.6.1 Affective perspective

The first thorough analysis of the role of fear in persuasion dates back to 1953, when Hovland, Janis and Kelley presented the drive reduction model of fear appeals. The basic idea of this model is that fear acts as an unpleasant drive state that motivates people to respond in such a way as to reduce emotional tension. This line of argument implies that the responses elicited by a fear appeal serve to reduce fear. Some of these fear-reducing responses may facilitate persuasion (e.g., thinking about the message's recommendations), whereas others may have the opposite effect (e.g., discounting the threat's importance, denying its personal relevance).

For a fear-appealing communication to be persuasive two requirements have to be met. First, the level of fear induced by the communication has to be sufficiently high to function as a drive state. Second, the recommendations included in the communication have to be sufficiently reassuring to reduce this drive state. If people are insufficiently reassured by the recommendations, they will attempt to reduce fear by other means. Hence, the drive reduction model implies that the relationship between fear and acceptance of recommendations is non-linear, that is, moderate levels of fear are more effective in producing persuasion than lower and higher fear levels.

The idea of an inverted U-shaped relationship between fear and persuasion was further elaborated by McGuire (1969), who applied his reception-yielding model to the study of fear appeals. This model holds that persuasion is mediated by two processes. First, a persuasive message is attended to and comprehended, and second, it is accepted. Fear is assumed to have a negative effect on the reception process, whereas it has a positive effect on the yielding process. What level of fear produces maximal persuasion depends on the relative importance of these processes, which is determined by individual difference factors such as personal relevance, and situational factors such as message complexity.

The importance of individual difference and situational factors in determining the optimal level of fear is also stressed in the family of curves model of Janis (1967). His ideas about how the reception and yielding processes are influenced in different regions of the fear dimension are rather complex, but ultimately result in a family of inverted U-shaped curves relating fear and persuasion. The curves differ in the point at which persuasion begins to drop off as fear increases, reflecting the influence of individual difference and situational factors. Hence, each member of the family of curves is associated with specific values of these factors.

In the above models fear is the central explanatory concept. The models described in the following put less emphasis on fear, but instead stress the importance of the cognitive processes initiated by fear appeals.

1.6.2 Cognitive perspective

In 1970 Leventhal presented the parallel response model as an alternative to the drive models. The parallel response model holds that two parallel processes explain the persuasive impact of fear appeals: a fear control process and a danger control process. The fear control process attempts to reduce the unpleasant feeling of fear and is primarily guided by internal bodily cues. The danger control process attempts to cope with the danger and is primarily guided by external cues. In some instances the danger control process is also instrumental in controlling fear or vice versa. In others, the two processes may interfere.

A cognitive model that has exerted a particularly large influence on fear appeal research is the protection motivation model (Rogers, 1975, 1983). This model holds that a threat-provoking message will be effective if it not only convinces recipients that they are seriously threatened, but also that they are capable of averting the threat. An effective fear appeal therefore provides information on a threat's malignancy and probability of occurrence, the effectiveness of a coping response, and an individual's ability to perform this response. Each of these sources of information initiates a corresponding appraisal process, resulting in threat appraisal and coping appraisal. If the perceived efficacy of the recommended coping response is high, increases in the perceived threat will lead to increases in protection motivation. If the perceived efficacy is low, increases in the perceived threat will either have no effect or a boomerang effect, leading to decreases in protection motivation. A similar interplay between threat beliefs and efficacy beliefs is proposed by the health belief model (for a discussion of this model and relevant research outcomes see Taylor, 1986).

1.6.3 Critical examination of affective and cognitive perspectives

The models described in the above have been subjected to several critical reviews (Beck & Frankel, 1981; Dillard, 1994; Eagly & Chaiken, 1993; Sutton, 1982; Zanna, Detweiler, & Olson, 1984). In addition, a meta-analysis has been conducted, lining up the empirical support for the various models (Boster & Mongeau, 1984). The major conclusions are summarized in this section.

The drive models described in section 1.6.1 all state that the relation between fear

intensity and persuasion is curvilinear, with moderate fear levels being more persuasive than lower and higher levels. However, in general a positive linear relation between the level of fear and the acceptance of recommendations is found (Beck & Frankel, 1981; Boster & Mongeau, 1984; Sutton, 1982; Zanna et al., 1984). This not necessarily means that the curvilinearity claim should be rejected, though. It is plausible that the effects of low to moderate fear levels were studied exclusively.

Another problem facing the drive models is the lack of evidence for fear reduction as a mechanism underlying the fear-persuasion relation. However, as Dillard (1994) properly observes, most studies have assessed fear only once, whereas the fear reduction notion can be tested only by measuring fear at least twice: once at the end of the fear induction phase and once at the end of the reassurance phase (see Footnote 3 in Chapter 6).

The parallel response model described in section 1.6.2 has been criticized for failing to specify the conditions that lead to fear control or danger control responses (Beck & Frankel, 1981). Because of this lack of specificity the model is untestable. Section 1.6.2 also describes the protection motivation theory. No consistent support has been found for the predicted interactions between threat and efficacy components of fear appeals (Beck & Frankel, 1981; Boster & Mongeau, 1984). Also, the model has been criticized for leaving the question unanswered how threat and efficacy appraisals develop (Sutton, 1982). It simply assumes a correspondence between the information presented in the message and the appraisals made by the message receivers. The conceptualisation of the construct of protection motivation is also problematic. Initial and revised versions of the model presume that protection motivation is the result of threat and efficacy appraisals. However, as was stated recently by Rogers and Prentice-Dunn: "motivation must be supplied first to initiate the coping process" (1997, p. 116). In other words, protection motivation precedes efficacy appraisal. Moreover, the construct of protection motivation is usually operationalized as the intention to adopt the recommended coping response. This however seems to be merely one of various possible outcomes of the motivation to find protection.

Although none of the models described above is beyond discussion, they all contribute to our understanding of the relation between fear and persuasion. The affective perspective draws attention to fear as a motivator, instigating cognitive processes that eventually result in persuasion. The cognitive perspective unravels these cognitive processes. Particularly, the protection motivation model underlines the importance of two cognitive processes in determining persuasion: appraisal of the threat and appraisal of possible coping responses.

The next section presents a theoretical perspective that makes the integration possible of the notions of fear as a motivator and the specific cognitive processes that eventually lead to persuasion. This is the dual-process perspective on attitude formation and change.

1.6.4 Dual-process perspective

The theoretical models described in the previous sections were explicitly developed to explain the role of fear in persuasion. However, recent studies on fear-based persuasion have mainly been inspired by dual-process models of persuasion, which are in principle suited to explain the role of any factor in persuasion. This section successively describes the elaboration likelihood model (ELM) and the heuristic systematic model (HSM).

The ELM is based upon the assumption that people desire to attain correct attitudes and that two qualitatively different routes can be followed to achieve this: a central and a peripheral route (Petty & Cacioppo, 1981, 1986). The central route refers to evaluating a persuasive communication by thinking about its argumentative contents. This makes high demands upon people's motivation to put effort into processing the communication and on their processing capacity. Attitudes formed or changed via the central route are assumed to be relatively stable and predictive of behaviour. The peripheral route refers to evaluating a persuasive communication without thinking about its contents. When people engage in this route they base their attitude upon peripheral cues such as source attractiveness or overheard audience reactions. Various mechanisms may underlie the persuasive impact of peripheral cues, such as identification or conditioning. Peripheral route processing is possible even when the receiver's motivation or ability for elaboration is low. Although this way of processing can have a persuasive impact, the resulting attitudes are assumed to be relatively temporary and lack predictive value for behaviour. The ELM lacks an explicit statement regarding whether or not peripheral and central processing can co-occur, but it implicitly suggests that they are mutually exclusive.

Like the ELM, the HSM was originally developed to apply to settings in which people are motivated to attain correct attitudes¹. The HSM also distinguishes between a more and a less effortful way of processing a persuasive communication, referred to as systematic and heuristic processing respectively (Chaiken, 1980; Chaiken, Liberman, & Eagly, 1989). Like

¹ Later versions of the HSM incorporated two more motives: defence motivation and impression motivation. However, in this dissertation the focus is on accuracy motivation.

central route processing, systematic processing is conceptualized as evaluating a persuasive communication by scrutinizing its contents. It is also assumed to result in relatively persistent attitudes that are relatively predictive of behaviour. The conceptualisation of heuristic processing is narrower than the description of peripheral route processing. It refers to evaluating a persuasive message by focusing on cues that enable the use of simple decision rules (Eagly & Chaiken, 1993). For example, the length of the message may enable the person who receives the message to use a length-strength heuristic (e.g., the more the merrier). A heuristic is only used if it is cognitively available, accessible, and moreover is perceived as reliable. In other words, a heuristic is only used if it is present in the mind of the message receiver, if it is activated by the message, and if the message receiver has faith in it. Attitudes that are formed or changed through heuristic processing are hypothesized to be less stable and less predictive of behaviour. The HSM explicitly maintains that heuristic and systematic processing can co-occur in situations conducive to both processing modes.

The HSM assumes that people invest as little effort as possible to achieve their processing goals (e.g. attaining accurate attitudes). What amount of effort is required depends on people's actual and desired level of confidence in having achieved these processing goals. People will engage in systematic processing when the discrepancy between actual and desired level of confidence is insufficiently reduced by heuristic processing, or when heuristic processing cannot occur.

1.6.5 Research on negative emotion and information processing

As was mentioned in the previous section, attitudes formed or changed on the basis of central route or systematic processing tend to be more durable than those formed or changed on the basis of heuristic or other forms of peripheral processing. The rationale behind this is that systematic processing yields a structure of beliefs that supports the attitude (Eagly & Kulesa, 1997). This structure of beliefs bolsters the attitude against subsequent attacks. For attitudes to guide behaviour, they have to last until the time comes to make actual behavioural choices. Hence, the more persistent attitudes are, the more likely they will guide behaviour. Because the ultimate aim of persuasive communication often is to influence behaviour, a great deal of research effort has been dedicated to identifying the factors that determine the extent of systematic processing (for an overview see e.g. Tesser & Shaffer, 1990).

In a number of studies the effect of negative emotion on the extent of systematic processing has been examined (Baron, Inman, Feng Kao, & Logan, 1992; Baron, Logan, Lilly, Inman, & Brennan, 1994; Hale, Lemieux, & Mongeau, 1995; Jepson & Chaiken, 1990; Kuppens, de Wit, & Ströbe, 1996; Ruiters, Kok, & Verplanken, 1998; Wilder & Shapiro, 1989). The results are mixed. Some studies have shown that negative emotion decreases the extent to which information is systematically processed. For example, an experiment reported by Baron et al. (1992) demonstrated that fear of an upcoming dental treatment interfered with the elaboration of information about an increase in sales tax. Other studies have shown that negative emotion increases the degree to which information is systematically processed. For example, Baron et al. (1994) found that fear of a dental treatment stimulated the elaboration of information on fluoridated water as a preventive measure for tooth decay.

Several factors seem to moderate the effect of negative emotion on the extent of systematic processing. This partly explains the inconsistent outcomes mentioned earlier. For example, Gleicher and Petty (1992) found that fearful participants processed information systematically except when heuristic processing sufficed to find reassurance. Kuppens et al. (1996) found that inducing fear increased the elaboration of information except when the tendency to elaborate already was high. Another important factor that seems to moderate the relation between negative emotion and the amount of processing is information relevance, or the relation between the information and the source of emotion. With regard to negative threat-related emotion, threat-related information such as information on the severity of the threat or the efficacy of coping responses seems to be relevant. It seems that negative emotion increases the extent to which relevant information is systematically processed (see e.g. Baron et al., 1994), whereas it has the opposite effect on the elaboration of irrelevant information (see e.g. Baron et al., 1992). Chapter 5 goes into a full consideration of the moderating role of information relevance. It describes an experiment aimed at testing information relevance as a moderator of the relation between negative emotion and the amount of processing. The main part of the research presented in this dissertation, however, examines the relation between negative emotion and the elaboration of relevant information.

1.7 The present research

We are interested in the role of negative emotion in environmental communication. The experiments presented in this dissertation tested a number of hypotheses, the most important of which is that negative threat-related emotion increases the extent to which threat-related information is systematically processed. The focus is on the risks associated with climate change and energy conservation as a strategy to mitigate climate change.

Prior research on the role of negative threat-related emotion in communication has typically focussed on threats that could be substantially alleviated through individual action. Examples are studies on the promotion of healthy behaviour such as quitting smoking (Maddux & Rogers, 1983), performing breast self-examinations (Ruiter et al., 1998), and using condoms (Tanner et al., 1989). In contrast, threats to the quality of the environment cannot much be alleviated unless many individuals take action (Eagly & Kulesa, 1997). As was also mentioned in the section on social dilemmas (1.2), the responsibility for reducing environmental risks is shared by many individuals and therefore is easily repudiated. Furthermore, it may be difficult for individuals to understand the connection between their own behaviour and environmental problems. For example, the research presented in the section on risk perception (1.4) indicates that people generally are not aware of the relation between energy consumption and climate change. These and perhaps other idiosyncrasies of environmental problems preclude a straightforward generalisation of the insights obtained within the field of health communication to the field of environmental communication. However, the basic challenge in both fields is to mobilize people to undertake action against a certain threat.

1.7.1 Conceptual model

Combining early fear appeal models (see sections 1.6.1 and 1.6.2) with contemporary dual-process models (see section 1.6.4) brings us to the following theory about the relation between negative threat-related emotion and the elaboration of threat-related information. Negative threat-related emotion has motivating properties. Whether it motivates people to reduce emotional tension (cf. the drive reduction model), or to find protection (cf. the protection motivation model), or otherwise, will be left unresolved for the time being. The important point is that this motivation constitutes a goal, and that people will follow whatever strategy is best to achieve this goal. This implies that when people are provided with

information they believe is helpful in achieving the goal, they will engage in systematic processing, unless the goal can be achieved in a less effortful way (cf. the ELM and HSM; see also Gleicher & Petty, 1992). Based on this theory we developed a conceptual model underlying the research presented in this dissertation.

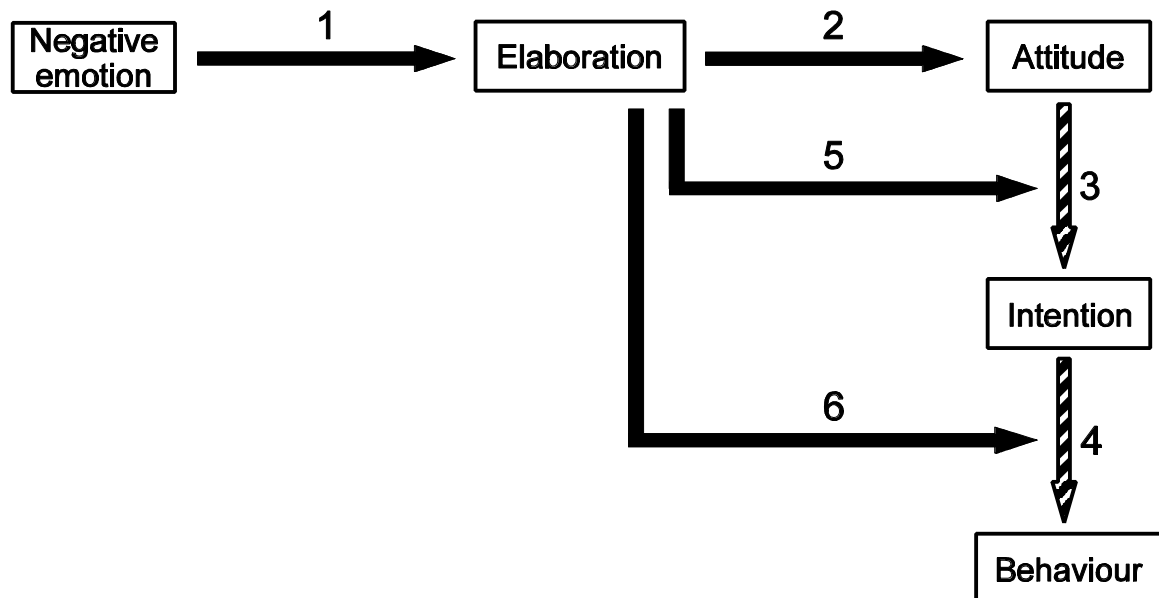


Figure 1.1. Conceptual model underlying the research presented in this dissertation.

According to the conceptual model depicted in Figure 1.1 negative threat-related emotion influences the elaboration of threat-related information, that is, as the level of negative emotion rises, so does the tendency to elaborate the information (1). The contents of this information subsequently influence attitudes (2). Furthermore, in line with the theory of reasoned action (Fishbein & Ajzen, 1975), the conceptual model holds that attitudes are related to behaviour, and that this relation is mediated by the intention to perform the behaviour. The more favourable an attitude, the stronger the intention to perform the target behaviour (3). The stronger the intention, the more likely it is that the behaviour is actually performed (4). As was mentioned before, the extent to which information is systematically processed is assumed to influence the consistency between attitudes and intentions, or the consistency between intentions and behaviour as well (Pieters & Verplanken, 1995). There is substantial evidence that greater elaboration results in stronger attitude-intention relationships (see e.g. MacKenzie & Spreng, 1992). More recently, a

comparable effect of the amount of reasoning on the relation between intention and behaviour has been demonstrated (Pieters & Verplanken, 1995). It was therefore decided to assume a moderating effect of elaboration on both the relation between attitudes and intentions (5), and the relation between intentions and behaviour (6).

1.7.2 General set-up of the experiments

The general set-up of the experiments presented in this dissertation is as follows. First, various levels of fear with regard to climate change were created. Next, participants were provided with information about energy-efficient products, or policy measures aimed at reducing energy consumption. This information included a number of arguments in favour of these products or measures. These arguments were either strong and cogent, or weak and implausible. Finally, various indicators of the extent of systematic information processing were collected (in all experiments attitudes, cognitive responses, and recall were measured; in most experiments intentions were measured too).

It is conceivable that negative threat-related emotion has a non-linear effect on the degree to which threat-related information is systematically processed. Initial increases in the level of negative emotion may primarily have a motivating effect, thereby stimulating systematic processing. Further increases in the level of negative emotion however may decrease cognitive capacity, thereby eventually interfering with systematic processing. It is also possible that high levels of negative emotion instigate defence-motivated biased processing (see e.g. Biek, Wood, & Chaiken, 1996). Although it is assumed that these interfering effects only occur at very high levels of negative emotion, it is important to take into account the possibility that negative emotion has a non-linear impact on objective in-depth processing of information. Previous studies failed to do so. Some of these studies comparatively examined the extent of systematic processing with and without inducing negative emotion (e.g. Baron et al., 1992, 1994). Others compared the impact of two levels of negative emotion on the extent of systematic processing (e.g. Gleicher & Petty, 1992; Kuppens et al., 1996). In contrast, the studies described in this dissertation comparatively examine systematic processing in three conditions: a control condition in which no fear was induced, a condition in which participants were exposed to a relatively mild fear induction, and a condition in which they were exposed to a relatively strong fear induction. Hence, the effects of mild and strong fear inductions on information processing are studied in comparison with a base-line situation in which no fear was induced.

Varying argument strength is assumed to be an effective way of locating differences in in-depth information processing (Petty & Cacioppo, 1981). The underlying idea is that the arguments included in a given message can have an impact on attitudes only if the message is carefully processed. Careful processing will result in more favourable attitudes when the argumentation is strong, rather than weak. Thus, the impact of argument strength on attitudes reflects the extent to which a message has been systematically processed.

Other widely employed indicators of systematic processing are the number of issue-relevant cognitive responses generated during message exposure and the number of arguments recalled afterwards (Chaiken & Stangor, 1987). Systematic processing is assumed to be accompanied by the generation of a relatively high number of relevant thoughts and is assumed to result in the recall of a relatively high number of message arguments. The main dependent variables in the experiments reported in this dissertation therefore are attitudes, cognitive responses, and recall.

1.8 Overview of this dissertation

Chapter 2 describes our first study of the relations between negative emotion, information processing, and attitudes within the field of environmental communication. This study examined how the level of fear with regard to climate change influenced the processing of information about energy-efficient lighting. The consequences for the relations between attitudes, intentions, and behaviour were also assessed.

A moderate fear level merely seemed to have an effect on attitudes by stimulating systematic information processing. Provided that strong arguments were presented this resulted in more favourable attitudes. Although there were indications that a high fear level also increased systematic information processing, this effect seemed to be dominated by a direct positive effect on attitudes. Though the relation between attitudes and behavioural intentions was fairly strong regardless of fear level, actual behaviour could only be reliably predicted from behavioural intentions when the level of fear was high.

Chapter 3 describes a study aimed at replicating the findings of the first study. In addition this study took into account the effect of pre-existing differences in concern about climate change. The consequences for attitude stability were also examined.

Again some indications were found that a moderate fear level increased systematic processing. Regarding the effect of level of pre-existing concern, we mainly found a direct

positive effect on attitudes. No evidence was found that the level of fear or concern through stimulating systematic processing resulted in more persistent attitudes.

Chapter 4 describes a study examining the effects of induced fear level and the level of pre-existing concern on the processing of information about the implementation of a European energy tax. No evidence was found that the induced fear level influenced the elaboration of this information. However, the level of pre-existing concern did appear to have an impact: Elaboration was higher at high rather than low levels of concern.

The purpose of the final experiment presented in Chapter 5 was to examine whether the impact of the level of fear on the extent of systematic processing depends on the relevance of the information within the given context. Although this experiment provided no evidence that fear increased the elaboration of relevant information, it did show that fear decreased the extent to which irrelevant information was processed.

Chapter 6 summarizes the results of the four experiments. Conclusions are drawn and explanations of unexpected findings and inconsistencies are suggested. Theoretical, pragmatic, and methodological implications are also outlined, and suggestions for a future research agenda are given.

Chapter 2

Effect of fear on elaboration: Consequences for attitude-behaviour relations

2.1 Introduction

This chapter describes the first study on the role of negative emotion in environmental communication. Specifically, the relation was studied between fear of climate change and the elaboration of information about energy-efficient lighting. As was explained in the introductory chapter, CO₂ emissions make an important contribution to human-induced climate change. These emissions are largely due to the combustion of fossil fuels for the generation of energy. Cutting down fossil energy consumption is an obvious strategy to reduce CO₂ emissions. This can be achieved inter alia by replacing current technology with technology that is more energy-efficient, for instance by replacing ordinary electric light bulbs with energy-efficient light bulbs.

Based on the conceptual model described in the introductory chapter it was hypothesized that information about energy-efficient lighting is more extensively processed at higher levels of fear related to climate change. This hypothesis will be referred to as Hypothesis 1a. Contrary to studies previously reported in the literature, this study takes the possibility into account that the relation between the level of fear and the extent of systematic processing is non-linear. We comparatively studied the extent of systematic processing when no fear was induced, when a relatively moderate fear level was aroused, and when a relatively high fear level was aroused.

To be able to detect differences in the extent of systematic processing the experimental design included a manipulation of argument strength. As was explained in the introductory chapter, the manipulation of argument strength is assumed to be an effective way of locating differences in systematic processing (Petty & Cacioppo, 1981). The underlying idea is that the strength of the arguments presented in a message can only have an effect on attitudes towards the message topic if the message is carefully processed. Strong arguments will then result in more favourable attitudes than weak ones. Thus, the effect of argument strength on attitudes reflects the extent of systematic processing. The same line of reasoning can be followed regarding the effect of argument strength on behavioural intentions. Other widely employed indicators of message elaboration are the generation of issue-relevant cognitive

responses and the recall of arguments (Chaiken & Stangor, 1987). The idea is that the extent to which a message is systematically processed is reflected in the number of relevant thoughts generated during message exposure and the number of arguments recalled afterwards.

In addition to studying the effect of fear level on systematic processing, this study also examined whether this had any consequences for the relations between attitudes, behavioural intentions and actual behaviour. Based on the conceptual model it was hypothesized that fear results in stronger relationships between attitudes, intentions, and behaviour through the stimulation of systematic processing. This secondary hypothesis will be referred to as Hypothesis 1b.

2.2 Method

2.2.1 Design

The experiment had a 3 (control vs. moderate fear vs. high fear) by 2 (weak arguments vs. strong arguments) between-subjects design. Fear level was manipulated by means of a message about climate change. Different versions of this message were provided to participants in different fear conditions. Argument strength was manipulated by means of a message about a new type of energy-efficient light bulb. Different versions of this message were provided to participants in different argument strength conditions. The dependent variables in this experiment were attitudes, behavioural intentions, cognitive responses, and recall. A measurement of behaviour was also included to allow an examination of the relations between attitudes, intentions, and behaviour.

2.2.2 Participants

The experiment was conducted on a non-student sample of 120 inhabitants of Eindhoven and its environs. These participants were recruited by contacting leisure societies, and mainly musical societies. These leisure societies received financial compensation for each participant they arranged. The participants were informed that they were to take part in a study on consumer reactions to new products. They were randomly assigned to conditions.

Although the female participants outnumbered the male participants, a Chi-Square test showed that the proportion of females and males did not vary systematically across conditions, $\chi^2(5) = 2.08, p = .839$. Mean age of the participants was $M = 53.27$ ($SD =$

13.51). Regarding educational background, 39 % of the participants had an education rated low, 39 % were rated moderate, and 22 % were rated high ¹.

2.2.3 Procedure

Participants were invited into the laboratory in groups to a maximum of four persons. Following general instructions participants were put into separate cubicles. Each cubicle contained a personal computer on which the experiment was run. Before the experiment actually started, participants were given time to familiarise themselves with the computer.

The experiment consisted of several parts, starting with the fear manipulation. Participants in the moderate-fear condition read a message on climate change consisting of text only, which aroused a moderate level of fear. Participants in the high-fear condition read a message about climate change consisting of the same text, and in addition were supplied a number of photographs, which aroused a relatively high level of fear. Participants in the no-fear control condition did not receive any information about climate change.

The second part of the experiment consisted of the argument strength manipulation. Participants read a message at their own pace, which recommended a new type of energy-efficient light bulb. This message consisted of either weak or strong arguments in favour of this bulb.

The third and final part of the experiment involved measurements of the dependent variables and manipulation checks. Participants completed a questionnaire comprising a thought-listing task, measurements of attitudes and intentions, and a recall task respectively. The questionnaire concluded with manipulation checks and ancillary measures. In addition, to assess actual purchasing behaviour, participants were given the opportunity to order the bulb. Following this behaviour measurement participants were debriefed and thanked.

2.2.4 Stimulus materials

Manipulation of fear. As was already mentioned, participants in the no-fear control condition received no information about climate change. Participants in the moderate and high-fear conditions received a message about climate change, explaining in approximately

¹ Primary school and lower vocational education were classified as low education; advanced elementary education and intermediate vocational education were classified as intermediate education; and higher general secondary education, higher vocational education, and university were classified as high education.

700 words what climate change entails, how it is caused, and what negative consequences can be expected. The message concluded with a general recommendation to be careful with energy use. Participants in the high-fear condition were also shown five black and white photographs of possible negative consequences of climate change, such as floods and insect plagues. The details and colours of these photographs were removed by means of a computer to stimulate the imagination without providing additional information.

The photographs were selected from a set of 13 photographs based on the results of a pilot study. In this pilot study, 8 participants rated the extent to which they found each of the photographs frightening, shocking, and gripping on 5-point scales ranging from 1 (*not at all*) to 5 (*very much*). Scores on these scales were averaged and the five photographs that were rated highest on this measure of frighteningness were selected for use in the experiment. Mean rated frighteningness for the selected photographs was $M = 3.50$ ($SD = 0.88$).

As appears from the description of the stimulus materials, the difference between the moderate and high-fear condition was merely a matter of message vividness. Similar manipulations of fear have been employed by Rogers et al. (Sherer & Rogers, 1984; Rippetoe & Rogers, 1987). Traditionally, researchers have been interested in vividness not as a means to manipulate fear, but because of its direct persuasive effect. A widely cited definition of vividness comes from Nisbett and Ross (1980): "Information may be described as vivid, that is, as likely to attract and hold our attention and to excite the imagination to the extent that it is emotionally interesting, concrete and imagery-provoking, and proximate in a sensory, temporal, or spatial way" (p. 45). Various methods have been employed by researchers to increase information vividness, such as using concrete and specific language, pictures and videotaped presentations, first-hand information, and case-history information (Taylor & Thompson, 1982). Most studies on the persuasive effect of vividness have failed to show any such effect, regardless of how vividness was operationalized (Taylor & Thompson, 1982). However, as was said before, we are not interested in the persuasive effect of vividness, but in vividness as a means to manipulate fear. Rogers et al. showed that it is indeed possible to induce different levels of fear by varying message vividness (Sherer & Rogers, 1984; Rippetoe & Rogers, 1987).

To prevent varying message informativeness as a side-effect of varying message vividness (as was the case for example in Janis and Feshbach's classical 1953 dental health experiment), it was decided to provide participants in the moderate and high-fear condition with identical information about climate change, except for the photographs. To minimize the

information value of the photographs, their colours and 20% of the details were removed by means of a computer, resulting in vague pictures. As was pointed out by Lazarus and Folkman (1984) ambiguity in itself can be a source of threat. This suggests that the effectiveness of our fear manipulation may not be due to the pictures as such, but to their ambiguity.

Manipulation of argument strength. Both weak and strong versions of the message about the new type of energy-efficient light bulb provided a description of the new (fictitious) bulb. In addition, the weak version included four weak and unconvincing arguments in favour of purchasing and using the bulb, whereas the strong version included four strong and convincing arguments.

The arguments were selected from a set of 16 arguments based on the results of a pilot study on 8 participants. In this pilot study participants were requested to rate the arguments on a number of 5-point scales, one of which ranged from *not convincing* to *convincing*. Of the arguments selected for use in the main study, the weak arguments received significantly lower ratings of convincingness on average, $M = 2.19$ ($SD = 1.08$), compared to the strong arguments, $M = 3.97$ ($SD = 0.74$), $t(7) = 5.72$, $p = .001$. Here is an example of a weak argument: "Very little glass is used in the [product name]. So if the [product name] happens to break then you don't have much to tidy up.". An example of a strong argument is: "You earn back the extra amount you pay for the [product name], because the [product name] uses less electricity and works longer.". The number of words was 240 in the weak message and 225 in the strong message. A complete reproduction of the weak and strong arguments used in this experiment can be found in Table A1 (Appendix A).

2.2.5 Measurements

Check on fear manipulation. To check on the effectiveness of the manipulation of fear participants in the moderate and high-fear conditions were asked to rate on four 7-point scales ranging from 1 (*not at all*) to 7 (*very much*) the extent to which they found the message on climate change 'frightening', 'alarming', 'shocking', and 'gripping'. Ratings on these four items were averaged to create a measure of judged frighteningness. Cronbach's Alpha for this measure was $\alpha = .85$.

Checks on argument strength manipulation. The effectiveness of the manipulation of argument strength was checked in two ways. First, participants were asked to judge the persuasiveness of the message about the bulb as a whole on a scale ranging from 1 (*not*

convincing) to 7 (*convincing*). As a second check participants were asked to judge the persuasiveness of each of the arguments. For this purpose they were presented with the same arguments they were previously exposed to, but this time one by one. Participants rated each argument's persuasiveness on a 7-point scale ranging from 1 (*not at all convincing*) to 7 (*very convincing*). The ratings of the separate arguments were averaged. The correlation between this measure of perceived persuasiveness of the arguments and the measure of perceived persuasiveness of the whole message was $r = .52$ ($p < .001$).

Attitudes. To assess participants' attitudes towards using the new energy-efficient light bulb they were asked to rate on four 7-point scales ranging from 1 (*not at all*) to 7 (*very much*) the extent to which they found the light bulb a 'good', 'attractive', 'suitable' and 'useful' bulb to use in their own households. Scores on these items were averaged to create a composite measure of attitude towards using the new bulb, $\alpha = .89$.

Intentions. Participants were asked whether they intended to purchase the new energy-efficient light bulb in the near future on a 7-point scale ranging from 1 (*certainly not*) to 7 (*certainly*).

Behaviour. As an indicator of actual purchasing behaviour participants were given the opportunity to order the new energy-efficient light bulb at the end of the experiment. For this purpose they were provided with an order form on which they could fill in their name, address and the number of bulbs they would like to order. Behaviour was operationalized as the dichotomous choice between ordering or not ordering the bulb.

Cognitive responses. To assess participants' cognitive responses to the persuasive message they were requested to complete a thought-listing task immediately after message exposure. Participants were asked to write down all the thoughts that came to mind while reading the message about the energy-efficient light bulb. For this purpose participants were provided with a form containing numbered boxes, and they were instructed to write down only one thought per box.

The thoughts listed by the participants were categorized by two independent judges as relevant or irrelevant to the issue under consideration, i.e. the bulb. Agreement between the two judges was fairly high, Kappa = .72. The ratings of the two judges were averaged and for each participant a total number of relevant responses was computed.

Recall. To assess participants' recall of the arguments presented in the persuasive message they were requested to write down everything they remembered about the message on a blank sheet of paper.

Two independent judges rated the number of correctly reproduced message arguments. Agreement between the judges was 89 %. The ratings of the two judges were averaged to form an indication of recall.

2.3 Results

Unless defined otherwise, all analyses of variance (MANOVAs and ANOVAs) reported in this section were performed on a full factorial model, including main effects for Fear and Argument Strength, and the interaction between these two factors. The terms in the model were tested against the within-cell sum of squares.

2.3.1 Effects on manipulation checks

Effects on fear manipulation check. The fear check was entered as a dependent variable in a 2 (moderate vs. high fear) by 2 (weak vs. strong arguments) ANOVA. The control condition was excluded from this analysis because participants in this condition were not subjected to the fear check.

The analysis revealed a significant effect of the Fear manipulation, $F(1, 69) = 7.03, p = .010$. No further significant effects were found. In the high-fear condition the message on climate change was rated as significantly more frightening, $M = 5.56 (SD = 0.94)$, than in the moderate-fear condition, $M = 4.80 (SD = 1.40)$, confirming the validity of the Fear manipulation. Assuming that the central point of the scale represents moderate fear, it can be stated that participants in the moderate-fear condition experienced a relatively moderate level of fear, whereas participants in the high-fear condition experienced a relatively high level of fear.

Effects on argument strength manipulation checks. Perceived persuasiveness of the whole message and of the separate arguments were entered as dependent variables into a MANOVA. This analysis only yielded a significant main effect for Argument Strength, multivariate $F(2, 112) = 5.33, p = .006$. Although one of the univariate contrasts failed to be significant, as can be seen in Table 2.1, our conclusion is that the manipulation of Argument Strength was sufficiently successful.

Table 2.1. *Effects of Argument Strength manipulation on persuasiveness of whole message and separate arguments.*

	Weak-arguments condition	Strong-arguments condition
Persuasiveness whole message	5.05 (1.53) ^a	5.32 (1.46) ^a
Persuasiveness separate arguments	4.61 (1.57) ^a	5.38 (0.98) ^b

Note. Numbers are means with standard deviations in brackets. Within the same row, means with unequal superscripts were significantly different at $p < .01$ according to tests of the univariate contrasts.

2.3.2 Effects on dependent variables

Effects on attitudes. Table 2.2 summarizes the results of the ANOVA with attitudes as a dependent variable. The mean for the entire sample was $M = 5.00$ ($SD = 1.38$).

Table 2.2. *Analysis of variance with attitude as dependent variable*

	<i>df</i>	<i>F</i>	<i>p</i>
Fear (F)	2	3.24	.043
Argument Strength (A)	1	1.35	.247
F x A	2	2.72	.070
Within cells	114	(1.77)	

Note. Value enclosed in parentheses represents mean square error.

The main effect of Fear was studied in more detail by performing a polynomial contrast analysis. This analysis revealed a significant linear effect, $F(1, 114) = 4.84$, $p = .030$. The quadratic effect was not significant, $F(1, 114) = 1.38$, $p = .243$. The pattern of the means suggests that compared with the control condition, attitudes were more positive in the moderate-fear condition and in the high-fear condition, $M = 4.59$ ($SD = 1.39$), $M = 5.23$ ($SD = 1.36$) and $M = 5.24$ ($SD = 1.30$) respectively. In line with this, pair-wise contrast analyses revealed that the difference between the control condition and the moderate-fear condition was significant, $F(1, 114) = 4.65$, $p = .033$, as was the difference between the control condition and the high-fear condition, $F(1, 114) = 4.84$, $p = .030$. The difference between the moderate and high-fear condition was not significant, $F < 1$, *ns*. Thus, it seems that both moderate and high levels of fear with regard to climate change resulted in more positive attitudes towards using the energy-efficient bulb. An alternative explanation is that the

information about climate change that was presented in the moderate and high-fear conditions resulted in more positive attitudes.

According to Hypothesis 1a fear increases the extent to which information is

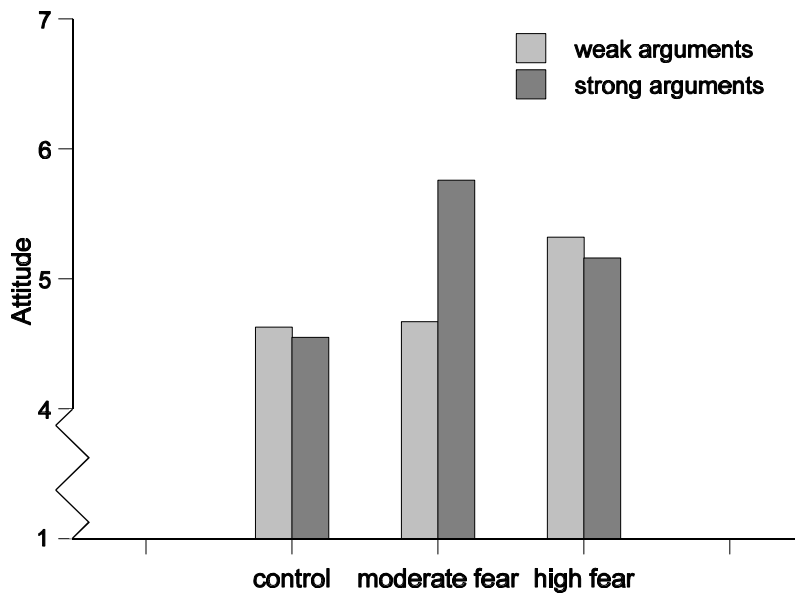


Figure 2.1. Effect of Fear and Argument Strength on attitudes.

systematically processed. In line with this hypothesis a marginally significant interaction effect of Fear and Argument Strength was found. This interaction effect was studied in more detail by testing the effect of Argument Strength within each of the fear conditions. In the control condition attitudes were not influenced by Argument Strength, $F(1, 114) < 1$, *ns*. In the moderate-fear condition participants did base their attitudes on the strength of the arguments, $F(1, 114) = 6.55$, $p = .012$, whereas this was not the case in the high-fear condition, $F(1, 114) < 1$, *ns*. As can be seen in Figure 2.1, exposure to strong arguments resulted in more positive attitudes than exposure to weak arguments only in the moderate-fear condition. This forms an indication that arousing moderate fear with regard to climate change resulted in greater elaboration of information about energy-efficient light bulbs. A high level of fear resulted in more positive attitudes, regardless of the strength of the arguments presented.

Effects on intentions. The results of the ANOVA with intentions measured immediately after exposure to the message are presented in Table 2.3. The mean for the entire sample was $M = 4.85$ ($SD = 1.65$).

Table 2.3. *Analysis of variance with intention as dependent variable*

	<i>df</i>	<i>F</i>	<i>p</i>
Fear (F)	2	3.29	.041
Argument Strength (A)	1	1.05	.309
F x A	2	< 1	<i>ns</i>
Within cells	114	(2.65)	

Note. Value enclosed in parentheses represents mean square error.

The significant main effect of Fear on intentions was further analysed by performing a polynomial contrast analysis. This analysis yielded an insignificant linear effect, $F(1, 114) = 2.13$, $p = .147$, and a significant quadratic effect, $F(1, 114) = 4.14$, $p = .044$. Mean intentions were $M = 4.39$ ($SD = 1.59$) in the control condition, $M = 5.31$ ($SD = 1.49$) in the moderate-fear condition, and $M = 4.92$ ($SD = 1.79$) in the high-fear condition. Pair-wise contrast analyses revealed a significant difference between the control condition and the moderate-fear condition, $F(1, 114) = 6.48$, $p = .012$. The difference between the moderate and high-fear condition was not significant, $F(1, 114) = 1.04$, $p = .309$, and neither was the difference between the control condition and the high-fear condition, $F(1, 114) = 2.13$, $p = .147$. Hence, particularly the induction of a moderate level of fear resulted in stronger intentions.

The data on intentions provide no support for Hypothesis 1a: The interaction effect of Fear and Argument Strength was not significant, and the pattern of the means was not as predicted either.

*Effects on cognitive responses*². The results of the ANOVA with the number of issue-

² In addition to analysing the number of relevant thoughts, the valence or evaluative direction of these thought also was analysed. Two independent judges categorized the relevant thoughts listed by the participants as positive, negative, or neutral with regard to the issue under consideration, i.e. the energy-saving light bulb. The inter rater reliability was $Kappa = .58$. The ratings of the two judges were averaged.

For each participant the number of negative responses was subtracted from the number of positive responses; the difference was divided by the total number of relevant responses. This measure of thought valence was entered as a dependent variable in an ANOVA. The mean for the entire sample was $M = .10$ ($SD = .50$). Hence, participants' thoughts about the bulb were somewhat positive.

The main effect of Argument Strength on thought valence was nearly significant, $F(1,$

relevant cognitive responses as a dependent variable are given in Table 2.4. The mean for the entire sample was $M = 3.60$ ($SD = 1.87$).

Table 2.4. Analysis of variance with number of issue-relevant cognitive responses as dependent variable

	<i>df</i>	<i>F</i>	<i>p</i>
Fear (F)	2	4.32	.015
Argument Strength (A)	1	< 1	<i>ns</i>
F x A	2	< 1	<i>ns</i>
Within cells	114	(3.38)	

Note. Value enclosed in parentheses represents mean square error.

Consistent with Hypothesis 1a the main effect of Fear was significant. A polynomial contrast analysis yielded a significant linear trend, $F(1, 114) = 8.00$, $p = .006$, and an insignificant quadratic trend, $F < 1$, *ns*. This indicates that the number of issue-relevant cognitive responses was lowest in the control condition, $M = 3.16$ ($SD = 1.48$) intermediate in the moderate-fear condition, $M = 3.40$ ($SD = 1.66$) and highest in the high-fear condition, $M = 4.33$ ($SD = 2.29$). Pair-wise comparisons revealed that the difference between the control condition and the moderate-fear condition was not significant, $F < 1$. The difference between the moderate and high-fear condition was significant, $F(1, 114) = 4.74$, $p = .032$, as was the difference between the control condition and the high-fear condition, $F(1, 114) = 8.00$, $p = .006$. Hence, it seems that only a high level of fear significantly increased the generation of relevant thoughts.

Effects on recall. The results of the ANOVA with recall as dependent variable are presented in Table 2.5. The mean number of correctly reproduced arguments for the entire sample was $M = 0.69$ ($SD = 0.84$).

No significant effects were found on this indicator of systematic information processing. Hence, the recall data provided no support for Hypothesis 1a.

114) = 3.87, $p = .052$. Contrary to what one would expect, however, the thoughts generated in response to the weak arguments were more positive than those generated in response to the strong arguments, $M = .19$ ($SD = .45$) and $M = .01$ ($SD = .53$) respectively.

Table 2.5. Analysis of variance with number of correctly reproduced message arguments as dependent variable

	<i>df</i>	<i>F</i>	<i>p</i>
Fear (F)	2	< 1	<i>ns</i>
Argument Strength (A)	1	< 1	<i>ns</i>
F x A	2	1.19	.309
Within cells	113	(.71)	

Note. Value enclosed in parentheses represents mean square error.

Correlations between attitudes and intentions. In this chapter's introductory section a secondary hypothesis was formulated, namely that fear through stimulating systematic processing results in stronger attitude-behaviour relations. According to Fishbein and Ajzen's theory of reasoned action (1975) the relation between attitudes and behaviour is mediated by behavioural intentions. Hypothesis 1b was therefore tested in two steps. In the first step a correlation was computed between attitudes and intentions for each of the fear conditions. This correlation was $r = .66$ ($p < .001$) in the control condition, $r = .74$ ($p < .001$) in the moderate-fear condition, and $r = .66$ ($p < .001$) in the high-fear condition. The difference between the control condition and the other two conditions was not significant, as appeared from Fisher Z-tests (Hays, 1973). The absolute value of both test statistics < 1 , *ns*. It can be concluded that the relation between attitudes and behavioural intentions was fairly strong regardless of the level of fear³.

Logistic regression analyses predicting behaviour from intentions. In the second test step for Hypothesis 1b logistic regression analyses were performed predicting behaviour from intentions for each of the fear conditions⁴. The regression coefficient predicting behaviour from intentions was $B = .35$, $p = .101$ in the control condition, $B = .09$, $p = .683$ in the

³ An analysis of covariance with intentions as dependent variable, Fear and Argument Strength as factors, and attitudes as covariate revealed no significant effects but a main effect of attitudes, $F(1, 114) = 49.82$, $p < .001$, confirming the conclusion that the relation between attitudes and intentions was strong regardless of the manipulations.

⁴ A Chi-Square test with the dichotomous behaviour measure as a dependent variable revealed no systematic differences between the three fear conditions, $X^2(2) = 2.37$, $p = .306$. The number of participants that purchased one or more light bulbs was 22 (= 20 %) in the control condition, 14 (= 13 %) in the moderate-fear condition, and 17 (= 15 %) in the high-fear condition.

moderate-fear condition, and $B = .45$, $p = .048$ in the high-fear condition. Hence, behaviour could only be reliably predicted from intentions in the high-fear condition. This indicates that inducing a high level of fear resulted in a stronger relation between intentions and actual behaviour.

2.4 Conclusions and discussion

This chapter described the first study of the relations between negative emotion, information processing, and attitudes within the domain of environmental communication. The elaboration of information on energy-efficient lighting was studied at various levels of fear with regard to climate change. In this chapter's introductory section a primary and a secondary hypothesis were formulated: Hypothesis 1a and 1b respectively. For each hypothesis the relevant outcomes will be summarized and conclusions will be drawn.

Conclusions on Hypothesis 1a. According to Hypothesis 1a fear increases the extent of systematic information processing. The results of this experiment provide some support for this hypothesis. A marginally significant interaction effect of Fear and Argument Strength on attitudes indicates that only when a moderate fear level was induced, strong arguments resulted in more favourable attitudes than weak arguments. This can be taken as an indication that a moderate fear level increased the tendency to engage in systematic processing. Inducing a high level of fear resulted in more favourable attitudes regardless of argument strength. Although this indicates that a high level of fear did not increase the tendency to engage in systematic processing, the results on the thought-listing task suggest otherwise: Inducing a high level of fear increased the amount of relevant thoughts generated. An explanation why this increase in elaboration was not reflected in a demonstrable impact of argument strength on attitudes may be that this effect was totally overridden by a direct positive impact of high fear on attitudes. In other words, a high level of fear concerning climate change may have directly produced acceptance of the recommendation to implement energy-efficient lighting. This positive relation between fear and acceptance of recommendations has been reported by many others in the literature on fear appeals (for reviews see e.g. Beck and Frankel, 1981; Sutton, 1982; Zanna, Detweiler, & Olson, 1984).

Conclusions on Hypothesis 1b. Besides examining whether fear influenced systematic processing, we also examined whether this had any consequences for the relations between

attitudes, behavioural intentions, and behaviour. According to Hypothesis 1b fear results in stronger relationships between attitudes, intentions, and behaviour through the stimulation of the extent of systematic processing. Although the relation between attitudes and behavioural intentions was fairly strong regardless of fear level, actual behaviour could only be reliably predicted from behavioural intentions in the high-fear condition. This provides some support for the hypothesis.

The results of this experiment contribute to our understanding of fear appeals by showing that fear may have an indirect effect on attitudes by increasing the tendency to engage in systematic information processing. In addition, the results indicate that fear may also have a direct positive effect on attitudes. Which of these effects dominates seems to depend on the level of fear aroused. A moderate fear level merely seems to have an effect by stimulating the elaboration of information. Depending on how convincing this information is, this may lead to more positive attitudes. Although there are indications that a high level of fear also resulted in greater elaboration of information, this effect seems to have been dominated by a direct positive effect on attitudes. This direct effect may be due to the informative value of the fear response (Schwarz & Clore, 1988). In other words, fear may function as a signal, informing the individual about imminent danger and the pressing need to undertake action (Leventhal, 1970). This signal function of fear may facilitate acceptance of recommendations. An alternative explanation is that fear may have resulted in more careful processing of the threatening message *itself*. This may have led to a higher perceived necessity of undertaking action, which may facilitate acceptance of recommendations.

A critical comment should be made about the fear manipulation applied in this study. In order to examine the interaction between emotional and cognitive components of threatening messages, we attempted to disconnect these components. Separate stimulus materials were used to manipulate fear and argument strength. In addition, different fear levels were created not by providing different information about the threat, but by presenting the same information in a more vivid or a less vivid way. This was done by presenting the information either with or without pictures. However, experimentally it would have been better if participants in all conditions had been exposed to a message similar in form (for example, if all participants had been exposed to both text and pictures). To meet this requirement a more sophisticated manipulation of fear was developed, which was employed in the experiments reported in Chapters 3 to 5.

Chapter 3

Effect of concern and fear on elaboration: Consequences for attitude stability

3.1 Introduction

The previous chapter described our first examination of the role of negative emotion in environmental communication. The results of this study provide indications that inducing fear with regard to climate change increased the elaboration of information about energy-efficient lighting. This is in line with the conceptual model presented in the introductory chapter. The fear induction appeared to have no effect on the relation between attitudes and intentions, in that this relation was fairly strong even when no fear was aroused. Regarding the relation between intentions and actual behaviour we did find an effect of the fear induction, in that this relation was only significant when a high level of fear was induced.

In addition to providing insight into the relationships between negative emotion, information processing, attitudes, intentions, and behaviour, the experiment reported in Chapter 2 also increased our experience with and knowledge of how to manipulate fear. In that experiment two levels of fear were created by providing information about climate change either with or without photographs illustrating the possible negative consequences of climate change. As was mentioned in the discussion section of Chapter 2, experimentally it would have been better if the stimulus materials used to manipulate fear had been similar in form. The stimulus materials employed in the present experiment and in subsequent experiments meet this requirement. Utilizing the knowledge and experience acquired in the previous experiment two videos about climate change were developed. Both videos provide approximately the same information about climate change, but the latter arouses more fear than the former due to variations in music, use of words, voice-over, and images. Based on the observed fear levels (see section 3.3.1) it was decided to refer to these videos as the low-fear and the moderate-fear video respectively. As in the previous experiment, the effect of fear on the amount of in-depth processing was studied by comparing these fear conditions with a control condition. What is new is that in this control condition participants were exposed to a filler video about an unrelated topic.

Next to studying the effect of induced fear concerning climate change on the elaboration of information about energy-efficiency, the experiment described in this chapter also takes

into account the level of pre-existing concern about climate change. In recent years the media have paid a lot of attention to the issue of climate change, including the uncertainties inherent in the complexity of the problem (see e.g. Knip, 1997). The information offered by the media may have been quite alarming to some people, whereas it may have resulted in scepticism in others. So, some people may be more concerned about climate change than others.

Environmental concern is often considered a necessary basis for the development and support of environmental conservation activities (see e.g. Hackett, 1992). Theoretical support for this notion can be found in Wilke's greed-equity-efficiency hypothesis on the motives that guide the behaviour of individuals in a social dilemma situation (see section 1.2). Although it has long been thought that individual behavioural choices in a social dilemma situation are guided by the desire to profit as much as possible from a collective good, two more motives are important as well according to Wilke (1990). The equity motive refers to the desire that profits are distributed in a fair way among individuals, and the efficiency motive holds that individuals strive for a continued existence of the collective good. This latter motive implies that if individuals believe that the continued existence of the collective good is at stake, they will be more likely to engage in conservation activities. With regard to environmental issues this means that environmental concern is conducive to environmentally sensible behaviour.

As is true for many psychological concepts, there is no consensus regarding the definition of environmental concern. Often it is used in a general sense, as a synonym for a person's attitude towards the environment (see e.g. Mainieri, Barnett, Valdero, Unipan, & Oskamp, 1997; Weigel & Weigel, 1978). However, several studies have underlined the importance of employing a more specific conceptualisation of environmental concern (Schahn & Holzer, 1990; Zimmer, Stafford, & Stafford, 1994). For example, a study by Zimmer et al. (1994) showed that some environmental issues (such as air pollution) were associated with higher levels of concern than others (such as desertification). These results underline the importance of carefully specifying the object of concern. The present study focuses on concern about climate change. Although the level of intensity is typically lower for concern than for fear (Frijda, Ortony, Sonnemans, & Clore, 1992), both concepts refer to negative affective responses to the possibility of something bad happening (Ortony, Clore & Collins, 1988). Hence, in this case fear and concern refer to negative affective responses to the possibility of climate change.

In this experiment concern was measured by asking participants to rate the extent to which they were concerned about climate change. To create a factor with two levels a median split was carried out on these ratings, resulting in a group of participants whose level of concern was relatively low and a group with a relatively high level of concern. As a matter of fact, a higher percentage of participants in the latter group reported being worried about the environment in general than in the former group. Hence, as one would expect, there is a relation between concern about climate change and concern about the environment in general.

The first hypothesis tested was the same as in the previous experiment: Induced fear increases the extent to which information is systematically processed (Hypothesis 1a). The second hypothesis was that pre-existing concern has a similar effect, in that concern increases the elaboration of information (Hypothesis 2a).

No specific hypotheses were formulated regarding the combined effects of pre-existing concern and induced fear on the elaboration of processing. However, eventual interactions between these two factors are interpreted in terms of an exploratory model, which will be referred to as the activation-induction model. This model is based upon the assumption that people's emotional responses towards a threat have to exceed a certain level for them to engage in systematic processing of threat-relevant information. Both activated pre-existing emotional responses and induced emotional responses may raise arousal above the threshold value. According to the activation-induction model a threat communication both activates pre-existing emotional responses towards the threat and induces emotional responses in itself.

Analogous to scheme theory (Koomen & van den Heuvel, 1991) it is assumed that concern functions as a background state, which can be made accessible by exposing people to a threat communication. In other words, people are not continuously aware of their concerns about climate change. But when confronted with a communication dealing with this issue, their latently present state of concern is activated. This will be referred to as the activation principle. This principle holds that a threat communication functions as a cue triggering pre-existing emotional responses towards the threat. Presumably, a communication comprising a moderate-fear induction is no more effective in performing this cue function than a communication comprising a low-fear induction.

Next to activating pre-existing emotional responses towards the threat, the model holds that a threat communication also induces emotional responses in itself. This will be referred

to as the induction principle. A threat communication comprising a moderate-fear induction is, by definition, more effective in performing this function than a threat communication comprising a low-fear induction.

Together, the activation and induction principles imply that when the level of pre-existing concern is high, exposure to both low and moderate-fear communications will result in a level of arousal high enough to increase the tendency to engage in systematic processing; when the level of pre-existing concern is low, exposure to the moderate-fear communication but not the low-fear communication will result in a level of arousal high enough to increase the tendency to engage in systematic processing.

Elaborating on Hypothesis 1a an additional hypothesis was formulated regarding the stability of attitudes and the relation between attitudes and behaviour. Systematic processing is assumed to result in attitudes that are relatively stable and predictive of actual behaviour (Chaiken, Liberman, & Eagly, 1989; Petty & Cacioppo, 1986). This means that fear results in greater attitude stability and stronger attitude-behaviour relationships through the stimulation of systematic processing (Hypothesis 1b).

Along the same lines it can be hypothesized that concern results in greater attitude stability and stronger attitude-behaviour relations through the stimulation of the extent of systematic information processing. This hypothesis will be referred to as Hypothesis 2b.

3.2 Method

3.2.1 Design

The experiment had a 2 (low concern vs. high concern) x 3 (control vs. low fear vs. moderate fear) x 2 (weak arguments vs. strong arguments) between-subjects design¹. Concern is a quasi-experimental factor that was created by measuring concern about climate change and conducting a median split on this measurement. Fear was manipulated by means of a video about climate change. Different versions of this video were provided to participants in different fear conditions. Argument strength was manipulated by means of a message about a new type of energy-efficient light bulb. Different versions of this message

¹ In addition to manipulations of fear and argument strength, the experiment comprised a manipulation of source expertise. However, there were indications that this manipulation did not have an unequivocal effect on participants. It was therefore decided to ignore this manipulation in this dissertation.

were provided to participants in different argument strength conditions. The dependent variables in this experiment were attitudes, behavioural intentions, cognitive responses, and recall. To examine attitude stability and the predictive value of attitudes for intentions, both attitudes and intentions were reassessed three weeks after the experimental session by means of a postal questionnaire.

3.2.2 Participants

The experiment was conducted on a non-student sample of 162 inhabitants of Eindhoven and its environs. These participants were recruited by contacting leisure societies, and mainly musical societies. These leisure societies received financial compensation for each participant they arranged. The participants were told that they were to take part in an experiment on consumer reactions to new products.

Approximately equal numbers of men and women participated in the experiment. Mean age of participants was $M = 44.54$ ($SD = 16.29$). Regarding educational background of participants, 30 % were rated low, 42 % intermediate, and 28 % high ².

Participants were randomly assigned to the fear and argument strength conditions, except that we took care that males and females were distributed equally across conditions.

3.2.3 Procedure

Participants were invited to the laboratory in groups with a maximum of four persons. Following general instructions participants were put into separate cubicles, each of which contained a personal computer, a videotape recorder, and a TV set. Before the experiment actually started, participants were to become familiar with the computer.

The experiment started with a measurement of concern about climate change. To make this measurement less obtrusive participants were asked to rate the extent to which they were concerned about a number of issues, including climate change. A median split was carried out on ratings of concern about climate change to create a relatively low and a relatively high level of concern. Next, participants responded to a measurement of attitudes towards energy-efficient light bulbs. This measurement was concealed by measuring attitudes towards various product categories.

Following these measurements participants were exposed to the fear manipulation.

² For a definition of education levels see Footnote 1 in Chapter 2.

Participants in the low-fear condition were shown a 3.5 min. video on climate change that aroused a low level of fear. Participants in the moderate-fear condition watched a video of approximately the same duration that aroused a moderate level of fear. The video shown to participants in the control condition dealt with a non-threatening, irrelevant topic, namely composing and producing music by means of computers. Immediately after the fear manipulation participants filled out a questionnaire designed to measure how they felt as a consequence of watching the video.

The next part of the experiment consisted of the manipulation of argument strength. Participants read a message recommending a new type of energy-efficient light bulb at their own pace. This message contained either weak arguments in favour of the bulb, or strong arguments.

Following the argument strength manipulation participants completed a questionnaire comprising measurements of cognitive responses, attitudes, intentions, and recall respectively, followed by manipulation checks and ancillary measurements. The last question participants answered concerned their willingness to fill out a small questionnaire within a few weeks.

The experimental session concluded with a short debriefing during which the purposes of the experiment were only concisely explained. Three weeks later, participants were sent a questionnaire comprising the second measurement of attitudes and intentions towards using the light bulb and some additional measurements. When most questionnaires had been sent back (answering percentage = 88 %), all participants received a letter offering an extensive explanation of the experiment.

3.2.4 Stimulus materials

Manipulation of fear. The videotapes shown to participants comprised the manipulation of fear. Participants in the low-fear condition were shown a 3.5 minute video on climate change. This video explained what is meant by climate change, what human activities contribute to it and how it may affect conditions of life. The video finished with a general recommendation to find out the energy expenditure of domestic appliances and to consider ways to reduce energy consumption in the home. The only music in the video was an opening and end tune. The voice-over was factual and little expressive, and the images chosen to visualize climate change and its possible consequences were neutral. Computer animations were often

applied in this video for example.

Participants in the moderate-fear condition were shown a video of the same duration, offering approximately the same information about climate change. However, in this video dramatic images were used to visualize what might happen as a consequence of climate change. Images of human beings in distress were shown throughout the video for example. Also, the dramatic content of the images was underlined by ominous sounds and music. The voice-over was highly expressive.

Participants in the control condition watched a video about applying computers to compose and produce music. This irrelevant video was selected as filler material to place an equal demand on the cognitive capacity of participants in the control condition without influencing their motivation to process information.

In a pilot study with a between-subjects design the efficacy of the fear manipulation was tested on a student sample³. The 62 participants were randomly assigned to conditions and were exposed to one of the videos described above. Immediately after watching the video they were asked to complete an emotion check-list. They were instructed to rate the degree to which they experienced each emotion listed on 7-point scales ranging from 1 (*not at all*) to 7 (*very much*), with all intermediate points labelled as well. The following four adjectives were selected to measure fear: 'concerned', 'frightened', 'shocked', and 'moved'. The scores on these items were averaged to create a measure of fear, Cronbach's Alpha $\alpha = .89$.

An ANOVA with this measure of fear revealed a significant effect of the fear manipulation, $F(2, 59) = 31.75, p < .001$. Mean ratings of fear were $M = 1.13$ ($SD = 0.22$) in the control condition, $M = 2.43$ ($SD = 0.73$) in the low-fear condition, and $M = 3.04$ ($SD = 1.11$) in the moderate-fear condition. All pair-wise contrasts were significant, p 's $< .015$, confirming the efficacy of the fear manipulation.

In this pilot study we also checked whether differences in knowledge about climate change were created as a side effect of the fear manipulation. The reason why this confounding should be avoided is that knowledge may in itself have an impact on the elaboration of information. This appears for example from a study by Wood and Kallgren (1988) who found that high levels of working knowledge about environmental preservation are associated with enhanced processing of information on this topic.

³ This study was conducted in collaboration with Tasmara van de Beld, Catelijne Hendriks, and Jolien Krispijn.

To examine whether we indeed managed to avoid creating different levels of knowledge in the low and moderate-fear conditions, a knowledge test was developed comprising 41 right or wrong statements about climate change. These items regarded the mechanisms underlying climate change, its causes and consequences, and measures to ameliorate climate change. The number of correct responses was taken as an indicator of knowledge about climate change, $\alpha = .78$.

An ANOVA with this knowledge measure as a dependent variable revealed a marginally significant main effect for the fear manipulation, $F(2, 59) = 2.67, p = .077$. The mean number of correct responses was $M = 30.90$ ($SD = 4.76$) in the control condition, $M = 33.81$ ($SD = 4.88$) in the low-fear condition, and $M = 34.05$ ($SD = 4.86$) in the moderate-fear condition. Tests of the pair-wise contrasts revealed that the difference between the control condition and the low-fear condition was marginally significant, $F(1, 59) = 3.71, p = .059$, and the difference between the control condition and the moderate-fear condition was significant, $F(1, 59) = 4.35, p = .041$. Most importantly, as was intended, the difference between the low and moderate-fear condition was not significant, $F < 1, ns$. Both videos on climate change increased knowledge about climate change to the same extent. Table B1 (Appendix B) provides an overview of the percentage of correct responses to each item of the knowledge test for each of the three fear conditions separately (see also Table B2 in this appendix for knowledge effects in non-students).

Manipulation of argument strength. The persuasive message about the new energy-efficient bulb contained the manipulation of argument strength. This message comprised a description of the new bulb and three arguments in favour of using it. In the weak version three weak arguments were presented, whereas in the strong version three strong arguments were presented⁴. These arguments were selected from a pool of 12 arguments, which were pretested in a pilot study on 44 participants. In this pilot study the convincingness of each argument was rated on a 7-point scale anchored at 1 (*not at all convincing*) and 7

⁴ The messages employed in the previous experiment to manipulate Argument Strength were not reused because the manipulation checks showed that the weak message was judged to be quite convincing, although less convincing than the strong message (see section 2.3.1). It was therefore decided to sharpen the formulation of the arguments and to repilot them. This pilot only yielded three arguments that clearly were weak and only three that clearly were strong. This explains why the messages used in the present experiment comprised three arguments, whereas the messages employed in the experiment reported in Chapter 2 comprised four arguments.

(*very convincing*). Regarding the arguments selected for use in the main study, the weak arguments on average received significantly lower ratings of convincingness than the strong arguments, $M = 3.10$ ($SD = 1.30$) and $M = 4.74$ ($SD = 1.05$) respectively, $t(43) = 8.90$, $p = .001$. An example of a weak argument is: "One [product name] is enough to light the entire room. Only one lamp has to be on in the living room, which is better for the environment." An example of a strong argument is: "Though the [product name] produces as much light as a 75-Watt light bulb, the [product name] uses less energy and therefore is better for the environment." Both the weak and the strong message consisted of 167 words. A complete overview of the arguments used in this experiment is provided in Table A2 (Appendix A).

3.2.5 Measurements

Pre-measurement of attitudes. Preceding the manipulations, attitudes towards using energy-efficient light bulbs were measured on a scale ranging from 1 (*highly negative*) to 7 (*highly positive*), with all intermediate points labelled as well. In order to make this measurement less obtrusive, it was embedded in an attitude questionnaire concerning various other product categories such as computers and personal phones.

Measurement of concern. The degree to which participants were concerned about the greenhouse effect was measured on a scale ranging from 1 (*not at all concerned*) to 7 (*extremely concerned*), with all intermediate points labelled as well. To mask the purpose of this measurement, participants rated their concern about a number of other issues as well, such as AIDS, racism, etc.. These issues were presented in random order, followed by the phrase: "I usually am.... about this issue", and the 7-point scale. Regarding concern about the greenhouse effect, the overall mean was $M = 3.78$ ($SD = 1.59$). Participants who scored at or below the median ($Mdn = 3$) were assigned to the low-concern group ($N = 83$) and those who scored above the median were assigned to the high-concern group ($N = 79$). Participants in the high-concern group were significantly more concerned than participants in the low-concern group, $M = 5.13$ ($SD = 0.66$) and $M = 2.52$ ($SD = 1.10$) respectively, $F(1, 150) = 302.68$, $p < .001$.

To validate the division of participants into low and high-concern groups, the experiment started with an open-ended question regarding worrying problems in the world. Participants were given the opportunity to name a maximum of three problems they were concerned about. Their answers were quantified in the following way. Participants received code 1 when they did not mention the environment at all, and they received code 2 when they

mentioned the environment at least once. The Spearman correlation between this open-ended measure of concern about the environment and the closed-ended measure of concern about climate change was $r_s = .31$, $p < .001$. The environment was mentioned at least once by 36 % of the low-concern group and by 70 % of the high-concern group.

Checks on fear manipulation. The first check on the efficacy of the fear manipulation was conducted immediately after exposure to the video. In random order a number of emotion adjectives were presented. Participants were instructed to indicate the degree to which they experienced these emotions on 7-point scales ranging from 1 (*not at all*) to 7 (*very much*), with all intermediate points labelled as well. The following four adjectives were selected to measure fear: 'concerned', 'frightened', 'shocked', and 'moved'. The scores on these items were averaged to create a measure of reported fear. Cronbach's Alpha for this scale was $\alpha = .90$.

Following measurements of the dependent variables, participants responded to a second check on the fear manipulation. This check was also employed in the previous experiment (see section 2.2.5). In random order a number of adjectives were presented to the participants, who were asked to rate the extent to which each of these adjectives described the video they were previously exposed to on 7-point scales ranging from 1 (*not at all*) to 7 (*very much*). The following four adjectives were selected to measure frighteningness: 'frightening', 'alarming', 'shocking', and 'gripping'. The scores on these items were averaged to create a measure of judged frighteningness of the video, $\alpha = .92$. The correlation between reported fear and judged frighteningness was $r = .80$ ($p < .001$).

Measurement of motivation. As was explained in Chapter 1 both the ELM (Petty & Cacioppo, 1981, 1986) and the HSM (Chaiken, 1980; Chaiken et al., 1989) hold that the extent to which a message is systematically processed depends on the degree to which the message recipient is willing and able to do so. Many factors have been identified that influence either the motivation or the capacity to elaborate information, or both. The research presented in this dissertation focuses on negative threat-related emotions as one type of factors that may influence motivation. The general approach is to create different levels of negative emotions and to study how this influences the degree to which information is systematically processed. When higher levels of negative emotions are associated with greater elaboration of information, it is assumed that this is due to higher motivation. In addition to this indirect evidence of a motivational process, the present study aimed to provide more direct evidence for the motivating impact of negative emotions. For this

purpose participants were asked to use a 7-point scale ranging from 1 (*not at all motivating*) to 7 (*very motivating*) to rate the extent to which they found the stimulus materials used to manipulate fear motivating.

Checks on argument strength manipulation. The effectiveness of the manipulation of argument strength was checked in the same way as in the previous experiment (see section 2.2.5 for information on this measure). The correlation between perceived persuasiveness of the separate arguments and of the whole message was $r = .52$ ($p < .001$).

Measurements of attitudes. Participants' attitudes towards using the new energy-efficient light bulb were measured by asking participants to rate the use of the new light bulb on five bipolar 7-point scales anchored at *bad-good*, *unattractive-attractive*, *unsuitable-suitable*, *unpleasant-pleasant* and *useless-useful*. Scores on these items were averaged to create a measure of attitude, $\alpha = .94$. This measurement of attitudes was repeated three weeks after exposure to the persuasive message, $\alpha = .94$.

Measurements of intentions. Participants were asked whether they intended to purchase the new light bulb in the near future on a 7-point scale ranging from 1 (*certainly not*) to 7 (*certainly*). This measurement of intentions was repeated three weeks after exposure to the persuasive message.

Measurement of cognitive responses. Cognitive responses were measured in the same way as in the previous experiment. Information on this measure is provided in section 2.2.5. The thoughts listed by the participants were categorized as relevant or irrelevant to the issue under consideration, that is the energy-efficient light bulb, by two independent judges. Agreement between the two judges was fairly high, Kappa = .75. The scores of the two judges were averaged and for each participant a total number of relevant responses was computed.

Measurement of recall. Recall was measured in the same way as in the previous experiments. For information on this measure the reader is referred to section 2.2.5. Two independent judges rated the extent to which participants correctly reproduced each of the four message arguments. Inter-rater reliability was high, Kappa's between .88 and .97. The ratings of the two judges were averaged and for each participant a total number of correctly reproduced arguments was computed.

3.3 Results

Unless defined otherwise, all analyses of variance (MANOVAs and ANOVAs) reported in this section were performed on a full factorial model, including main effects for Concern, Fear, and Argument Strength and all possible interactions between these factors. The terms in the model were tested against the within-cell sum of squares.

3.3.1 Effects on manipulation checks

Effects on fear manipulation checks. A MANOVA with self-reported fear and judged frighteningness as dependent variables showed a significant main effect of Concern, multivariate $F(2, 136) = 7.32, p = .001$. It appeared that ratings on both manipulation checks were higher in the high compared with the low-concern group.

The main effect of Fear also was significant, multivariate $F(4, 274) = 26.87, p < .001$. It appeared that ratings on both manipulation checks were significantly higher in the moderate compared with the low-fear condition, multivariate $F(2, 136) = 8.28, p < .001$; the difference between the low-fear and the control condition was significant as well, multivariate $F(2, 136) = 44.45, p < .001$.

The Fear by Argument Strength interaction effect was significant as well, multivariate $F(4, 274) = 2.65, p = .034$. Inspection of the univariate tests revealed that the Fear by Argument Strength interaction effect was attributable to self-reported fear, univariate $F(2, 137) = 2.99, p = .053$. The interaction effect did not occur on judgments of frighteningness, univariate $F < 1, ns$. As explained in section 3.2.3, self-reports of fear were obtained before Argument Strength was manipulated. Hence, the interaction effect of Fear and Argument Strength on self-reported fear must be coincidental. However, to be certain, the effectiveness of the fear manipulation was tested within each level of Argument Strength, revealing a significant effect in the weak-arguments condition, multivariate $F(4, 274) = 13.33, p < .001$, and also in the strong-arguments condition, multivariate $F(4, 274) = 23.01, p < .001$. It can be concluded that the fear manipulation was effective in both conditions.

Finally a significant Concern by Fear interaction effect was found, multivariate $F(4, 274) = 2.79, p = .027$. This interaction effect was further analysed by testing the simple effect of Fear within each level of Concern. This effect was significant in the low-concern group, multivariate $F(4, 274) = 12.68, p < .001$, and also in the high-concern group, multivariate $F(4, 274) = 21.73, p < .001$. Table 3.1 shows that in both groups self-reported fear and judged

frighteningness were highest in the moderate-fear condition, intermediate in the low-fear condition, and lowest in the control condition. It can be concluded that the fear manipulation was effective in both low and high-concern groups ⁵.

Table 3.1. *Effect of Fear manipulation on self-reports of fear and judgments of frighteningness for low and high-concern groups separately.*

	Low-concern group		
	Control condition	Low-fear condition	Moderate-fear condition
Self-reports of fear	1.52 (0.54) ^a	2.53 (0.93) ^b	3.18 (0.83) ^c
Judgments of frighteningness	2.15 (1.20) ^a	3.65 (1.13) ^b	4.59 (0.97) ^c
	High-concern group		
	Control condition	Low-fear condition	Moderate-fear condition
Self-reports of fear	1.64 (0.86) ^a	3.37 (0.83) ^b	3.92 (1.29) ^c
Judgments of frighteningness	1.74 (0.76) ^a	4.59 (1.03) ^b	5.06 (1.20) ^b

Note. Numbers are means with standard deviations in brackets. Within the same row, means with unequal superscripts were significantly different at $p < .05$ according to tests of the univariate contrasts.

Effects on motivation. An ANOVA with motivation as a dependent variable yielded a significant main effect of Concern, $F(1, 137) = 5.77, p = .018$. It appeared that motivation ratings were higher in the high-concern group, $M = 4.90 (SD = 1.47)$, than in the low-concern group, $M = 4.39 (SD = 1.36)$.

The main effect of Fear was also significant, $F(2, 137) = 6.24, p = .003$. Motivation ratings were highest in the moderate-fear condition, $M = 5.09 (SD = 1.32)$, intermediate in the low-fear condition, $M = 4.61 (SD = 1.28)$, and lowest in the control condition, $M = 4.00 (SD = 1.56)$. The contrast between the low and moderate-fear condition was marginally significant, $F(1, 137) = 2.19, p = .090$; the contrast between the control and low-fear

⁵ The Concern by Fear interaction effect can be considered from another perspective, by testing the simple effect of Concern within each level of Fear. This effect was insignificant in the control condition, multivariate $F(2, 136) = 2.22, p = .112$, but significant in the low-fear condition, multivariate $F(2, 136) = 7.01, p = .001$, as well as in the moderate-fear condition, multivariate $F(2, 136) = 5.16, p = .007$. Hence, both low and moderate-fear communications elicited higher levels of fear in high than in low-concern participants.

condition was significant, $F(1, 137) = 4.15, p = .044$.

Finally, a significant Concern by Fear interaction effect was found, $F(2, 137) = 3.34, p = .038$. Tests of the simple effect of Fear within each level of Concern revealed that this effect was significant in the low-concern group, $F(2, 137) = 7.74, p = .001$, and marginally significant in the high-concern group, $F(2, 137) = 2.85, p = .061$. Table 3.2 shows that in the low-concern group only the moderate-fear communication resulted in significantly higher motivation ratings. In the high-concern group low and moderate-fear communications resulted in an equal increase in motivation ratings ⁶.

Table 3.2. *Effect of Fear manipulation on motivation ratings for low and high-concern groups separately.*

	Control condition	Low-fear condition	Moderate-fear condition
Low-concern group	3.80 (1.44) ^a	3.96 (1.22) ^a	5.09 (1.10) ^b
High-concern group	4.21 (1.69) ^a	5.21 (1.01) ^b	5.10 (1.64) ^b

Note. Numbers are means with standard deviations in brackets. Within the same row, means with unequal superscripts were significantly different at $p < .05$.

Effects on argument strength manipulation checks. Perceived persuasiveness of the whole message and of the separate arguments were entered into a MANOVA as dependent variables. The expected main effect of Argument Strength appeared, multivariate $F(2, 140) = 39.87, p < .001$. Exposure to strong arguments resulted in higher ratings on both argument strength checks as compared with exposure to weak arguments. Although one of the univariate contrasts was insignificant, as can be seen in Table 3.3, our conclusion is that the manipulation of Argument Strength was sufficiently successful.

In addition to the Argument Strength effect a marginally significant main effect of Concern was found, multivariate $F(2, 140) = 2.82, p = .063$. Participants in the high-concern group rated the persuasiveness of the whole message and the separate arguments higher than participants in the low-concern group.

⁶ The Concern by Fear interaction effect can be considered from another perspective, by testing the simple effect of Concern within each level of Fear. This effect only appeared to be significant in the low-fear condition, $F(1, 137) = 12.55, p = .001$; F 's < 1 , *ns* in the control and moderate-fear conditions.

Table 3.3. *Effect of Argument Strength manipulation on persuasiveness of whole message and separate arguments.*

	Weak-arguments condition	Strong-arguments condition
Persuasiveness whole message	4.53 (1.76) ^a	4.80 (1.46) ^a
Persuasiveness separate arguments	3.74 (1.57) ^a	5.40 (1.01) ^b

Note. Numbers are means with standard deviations in brackets. Within the same row, means with unequal superscripts were significantly different at $p < .05$ according to tests of the univariate contrasts.

3.3.2 Effects on dependent variables

Effects on attitudes at T1. The results of the ANOVA with attitudes measured immediately after message exposure are presented in Table 3.4⁷. The mean for the entire sample was $M = 5.22$ ($SD = 1.36$).

Table 3.4. *Analysis of variance with attitude at T1 as dependent variable*

	<i>df</i>	<i>F</i>	<i>p</i>
Concern (C)	1	4.81	.030
Fear (F)	2	< 1	<i>ns</i>
Argument Strength (A)	1	15.71	.000
C x F	2	< 1	<i>ns</i>
C x A	1	< 1	<i>ns</i>
F x A	2	1.21	.303
C x F x A	2	< 1	<i>ns</i>
Within cells	149	(1.68)	

Note. Value enclosed in parentheses represents mean square error.

The significant main effect of Concern indicates that in general participants in the high-concern group were more positive about the energy-efficient light bulb, $M = 5.45$ ($SD = 1.24$), than those in the low-concern group, $M = 5.01$ ($SD = 1.44$). The significant main effect

⁷ Adding the pre-measurement of attitudes towards energy-efficient light bulbs as a covariate reduced the main effect of Concern to insignificance, $F(1, 148) = 2.70$, $p = .102$. The main effect of Argument Strength remained significant, $F(1, 148) = 17.15$, $p < .001$.

of Argument Strength indicates that in general exposure to strong arguments resulted in more favourable attitudes, $M = 5.62$ ($SD = 1.12$), than exposure to weak arguments, $M = 4.81$ ($SD = 1.46$).

According to Hypothesis 1a fear increases the extent to which information is systematically processed. Based on this hypothesis an interaction effect of Fear and Argument Strength on attitudes was expected. Although this interaction effect was not significant, the pattern of the means was as predicted. Indeed, analyses of the simple effect of Argument Strength within each level of Fear revealed that this effect was only significant in the moderate-fear condition, $F(1, 149) = 13.65$, $p < .001$. The effect was insignificant in the low-fear condition, $F(1, 149) = 2.57$, $p = .111$, and marginally significant in the control condition, $F(1, 149) = 2.95$, $p = .088$. As can be seen in Figure 3.1, only when preceded by a moderate-fear induction, strong arguments resulted in significantly more positive attitudes than weak arguments. This is in line with Hypothesis 1a.

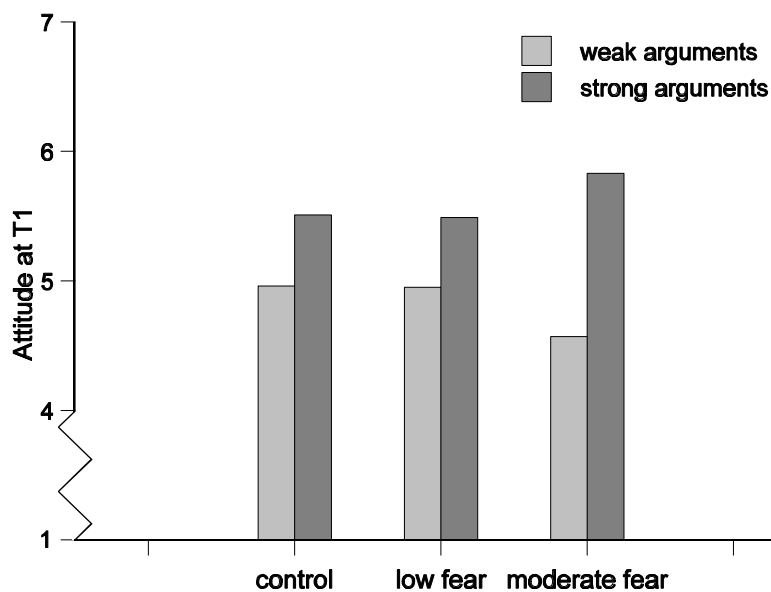


Figure 3.1. Effect of Fear and Argument Strength on attitudes at T1.

According to Hypothesis 2a there is a positive relation between the level of concern and the elaboration of information. Based on this hypothesis an interaction effect of Concern and Argument Strength was expected. This interaction effect was not significant, and the pattern of the means was not as predicted either. Hence, the results on the first measurement of attitudes provide no support for Hypothesis 2a. Also, given the insignificance of the three-way interaction effect our conclusion is that the attitude data provide no support for the

activation-induction model.

Effects on attitudes at T2. The results of an ANOVA with attitudes measured three weeks after exposure to the message are presented in Table 3.5⁸. The mean for the entire sample was $M = 5.04$ ($SD = 1.14$).

Table 3.5. Analysis of variance with attitude at T2 as dependent variable

	<i>df</i>	<i>F</i>	<i>p</i>
Concern (C)	1	3.98	.048
Fear (F)	2	< 1	<i>ns</i>
Argument Strength (A)	1	7.63	.007
C x F	2	3.50	.033
C x A	1	2.57	.112
F x A	2	2.48	.088
C x F x A	2	< 1	<i>ns</i>
Within cells	117	(1.18)	

Note. Value enclosed in parentheses represents mean square error.

The significant main effect of Concern indicates that in general attitudes at T2 were more positive in the high-concern group, $M = 5.23$ ($SD = 1.13$), than in the low-concern group, $M = 4.86$ ($SD = 1.14$). The significant main effect of Argument Strength indicates that in general exposure to strong arguments resulted in more favourable attitudes at T2, $M = 5.27$ ($SD = 1.01$), than exposure to weak arguments did, $M = 4.80$ ($SD = 1.23$).

The Argument Strength effect was qualified by a marginally significant interaction with Fear. Tests of the simple effect of Argument Strength within each level of Fear revealed that the Argument Strength effect was only significant in the moderate-fear condition, $F(1, 117) = 12.37$, $p = .001$; F s < 1, *ns* in the control and low-fear conditions. Figure 3.2 shows that strong arguments only resulted in more positive attitudes at T2 than weak arguments with a moderately high level of fear. These results provide support for Hypothesis 1a.

⁸ Adding the pre-measurement of attitudes towards energy-efficient light bulbs as a covariate reduced the main effect of Concern to insignificance, $F(1, 116) = 1.50$, $p = .223$. The main effect of Argument Strength remained significant, $F(1, 116) = 7.97$, $p = .006$, as did the Concern by Fear interaction effect, $F(2, 116) = 3.83$, $p = .025$. The Fear by Argument Strength interaction effect remained marginally significant, $F(2, 116) = 2.70$, $p = .071$.

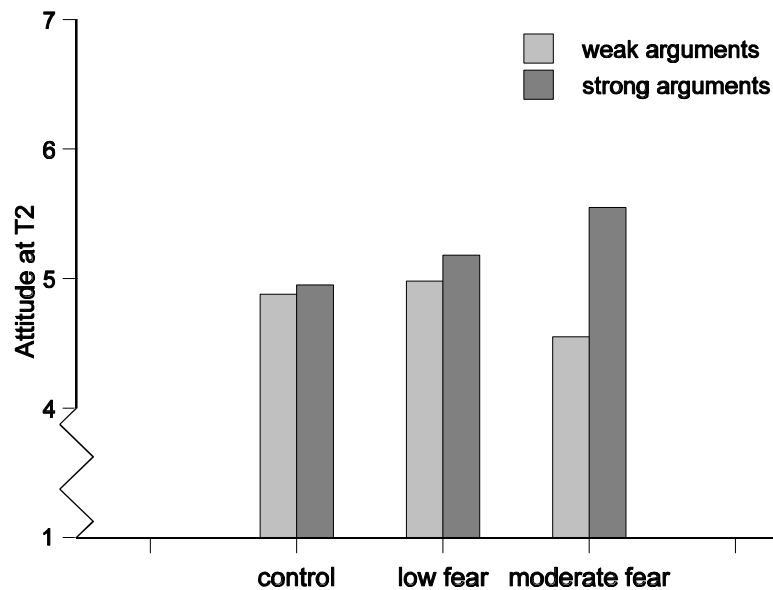


Figure 3.2. Effect of Fear and Argument Strength on attitudes at T2.

Based on Hypothesis 2a an interaction effect of Concern and Argument Strength was expected. Although this interaction effect did not reach significance, the pattern of the means was as predicted, as can be seen in Figure 3.3. Tests of the simple effect of Argument Strength within each level of Concern revealed that this effect was absent in the low-concern group, $F < 1$, *ns*, whereas it was present in the high-concern group, $F(1, 117) = 8.92$, $p = .003$. In line with Hypothesis 2a only participants with a high level of concern reported more positive attitudes at T2 when they had been exposed to strong as opposed to weak arguments⁹.

The Concern by Fear interaction effect was further analysed by testing the simple effect of Fear within each level of Concern. This effect was insignificant in the low-concern group, $F(2, 117) = 2.07$, $p = .131$, as well as in the high-concern group, $F(1, 117) = 1.59$, $p = .208$. Hence, a direct impact of the fear induction on attitudes at T2 could not be observed in either

⁹ Looking at the Concern by Argument Strength interaction effect from a different perspective, it appears that three weeks after exposure to weak arguments the low and high-concern groups were equally positive about the energy-efficient light bulb, $F < 1$, *ns*. However, three weeks following exposure to strong arguments, participants in the high-concern group were significantly more positive than participants in the low-concern group, $F(1, 117) = 6.65$, $p = .011$.

one of these groups ¹⁰.

In view of the insignificant three-way interaction effect, our conclusion is that the data provide no evidence that the effect of the fear induction on message elaboration was different for low versus high-concern participants. However, the significant Concern by Fear interaction effect on attitudes at T2 suggests that the attitudinal difference between low and high-concern participants dissipated during the course of time due to the fear induction (see Footnote 10).

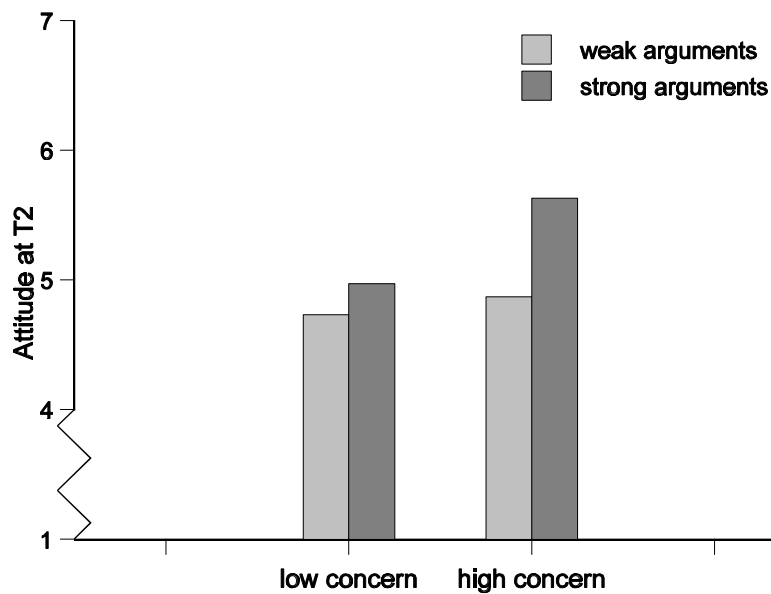


Figure 3.3. Effect of Concern and Argument Strength on attitudes at T2.

Effects on attitudes during the course of time. According to Hypothesis 1b and 2b respectively, fear and concern result in higher attitude stability through the stimulation of systematic information processing. To test these hypotheses a repeated measures analysis

¹⁰ Tests of the simple effect of Concern within each level of Fear revealed that this effect was significant in the control condition, $F(1, 117) = 7.34, p = .008$, but not in the low-fear condition, $F(1, 117) = 1.58, p = .212$, neither in the moderate-fear condition, $F < 1, ns$. Hence, three weeks following the experiment the attitudinal difference between low and high-concern participants had disappeared in the low-fear condition ($M = 4.84 (SD = 1.19)$ and $M = 5.23 (SD = 0.89)$ respectively) and the moderate-fear condition ($M = 5.11 (SD = 0.99)$ and $M = 5.06 (SD = 1.54)$ respectively), but not in the control condition ($M = 4.48 (SD = 1.26)$ and $M = 5.47 (SD = 0.96)$ respectively). It seems that over time the threat communications eliminated the difference between low and high-concern participants.

of variance was conducted with attitudes at T1 and T2 as dependent variables. In describing the results of this analysis, the within-subjects factor will be referred to as Time.

No effects were found except a significant main effect of Time, $F(1, 116) = 10.80, p = .001$. Independent of Concern, Fear, and Argument Strength, attitudes were more positive at T1, $M = 5.22 (SD = 1.36)$, than at T2, $M = 5.04 (SD = 1.14)$. Hence, this analysis provides no support for Hypotheses 1b and 2b.

Neither level of concern nor level of fear influenced attitude stability in this experiment. However, level of concern did seem to influence the stability of the argument strength effect on attitudes. As can be seen in Table 3.4, at T1 attitudes demonstrated a main effect of Argument Strength, indicating that in general attitudes were more positive when strong rather than weak arguments were presented. Although attitudes at T2 still demonstrated a main effect of Argument Strength, as can be seen in Table 3.5, tests of the simple effect of Argument Strength within each level of Concern revealed that this effect regarded only those participants whose level of concern was high. This indicates that Argument Strength only had a lasting effect on attitudes if the level of concern was high.

Effects on intentions at T1. The results of the ANOVA with intentions measured immediately after exposure to the message are presented in Table 3.6. The mean for the entire sample was $M = 4.47 (SD = 1.62)$.

Table 3.6. Analysis of variance with intention at T1 as dependent variable

	<i>df</i>	<i>F</i>	<i>p</i>
Concern (C)	1	1.92	.168
Fear (F)	2	< 1	<i>ns</i>
Argument Strength (A)	1	2.34	.128
C x F	2	< 1	<i>ns</i>
C x A	1	< 1	<i>ns</i>
F x A	2	1.43	.244
C x F x A	2	2.93	.056
Within cells	147	(1.53)	

Note. Value enclosed in parentheses represents mean square error.

Based on Hypothesis 1a an interaction effect of Fear and Argument Strength on intentions was expected. Although this interaction effect was not significant, the pattern of the means was as predicted. Indeed, tests of the simple effect of Argument Strength within

each level of Fear revealed that this effect was only significant in the moderate-fear condition, $F(1, 147) = 5.06, p = .026$; F 's $< 1, ns$ in the control and low-fear conditions. As can be seen in Figure 3.4, strong arguments only resulted in stronger intentions than weak arguments if they were preceded by a moderate-fear induction. This is supportive of Hypothesis 1a.

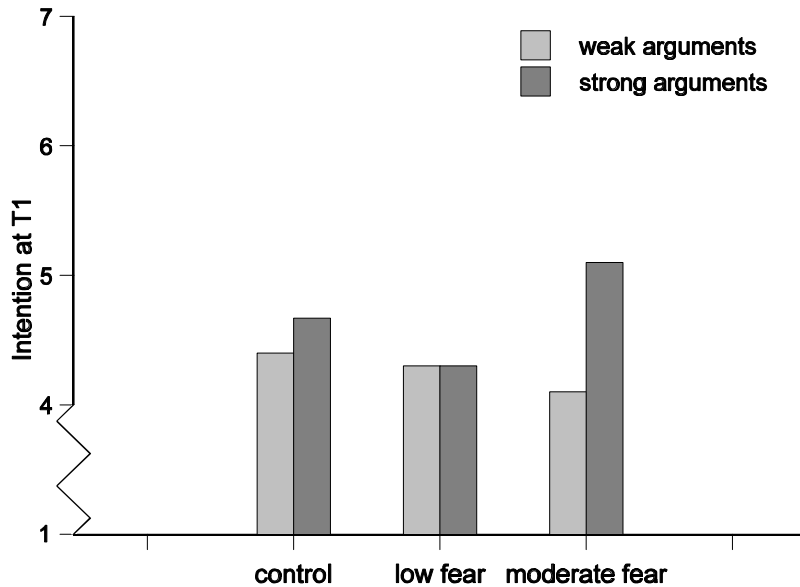


Figure 3.4. Effect of Fear and Argument Strength on intentions at T1.

No support was found for Hypothesis 2a: The interaction effect of Concern and Argument Strength did not reach significance, and the pattern of the means was not in line with the hypothesis either.

Further analysis of the marginally significant three-way interaction effect may be informative regarding the validity of the activation and induction notions outlined in this chapter's introductory section. Separate tests of the Fear by Argument Strength interaction effect were performed for the low and high-concern groups. The test yielded an insignificant outcome for the high-concern group, $F(1, 147) = 1.43, p = .242$ ($M = 4.68$ ($SD = 1.58$) for this group), and a marginally significant outcome for the low-concern group, $F(1, 147) = 2.86, p = .061$. Regarding the low-concern group we proceeded by testing the simple effect of Argument Strength within each level of Fear. This effect was only significant in the moderate-fear condition, $F(1, 147) = 4.02, p = .047$; $F < 1, ns$ in the low-fear condition; $F(1, 147) = 3.26, p = .073$ in the control condition. Only when preceded by a moderate-fear induction strong arguments resulted in stronger intentions in low-concern participants than

weak arguments, $M = 4.80$ ($SD = 1.61$) and $M = 4.00$ ($SD = 1.29$) respectively. This pattern of results indicates that the moderate-fear induction increased systematic processing in participants whose initial level of concern was low, but not in participants whose initial level of concern was high. This is in line with the activation-induction model.

Effects on intentions at T2. The results of the ANOVA with intentions measured three weeks after exposure to the message are presented in Table 3.6. The mean for the entire sample was $M = 4.50$ ($SD = 1.51$).

Table 3.6. Analysis of variance with intention at T2 as dependent variable

	<i>df</i>	<i>F</i>	<i>p</i>
Concern (C)	1	2.55	.112
Fear (F)	2	< 1	<i>ns</i>
Argument Strength (A)	1	2.69	.103
C x F	2	< 1	<i>ns</i>
C x A	1	< 1	<i>ns</i>
F x A	2	2.62	.077
C x F x A	2	1.65	.196
Within cells	131	(2.14)	

Note. Value enclosed in parentheses represents mean square error.

The marginally significant Fear by Argument Strength interaction effect was further analysed by testing the simple effect of Argument Strength within each level of Fear. In line with Hypothesis 1a, these tests revealed that this effect was significant in the moderate-fear condition, $F(1, 131) = 6.79$, $p = .010$, but not in the low-fear condition, $F(1, 131) = 2.22$, $p = .139$, nor in the control condition, $F < 1$, *ns*. As can be seen in Figure 3.5, it is only in the moderate-fear condition that intentions to purchase the energy-efficient light bulb were stronger after exposure to strong as compared with weak arguments.

The results on intentions at T2 provide no support for Hypothesis 2a, in that the interaction between Concern and Argument Strength was not significant, and the pattern of the means was not as predicted either. Also, because the three-way interaction effect was insignificant, our conclusion is that the results concerning the delayed measurement of intentions provide no support for the activation-induction model.

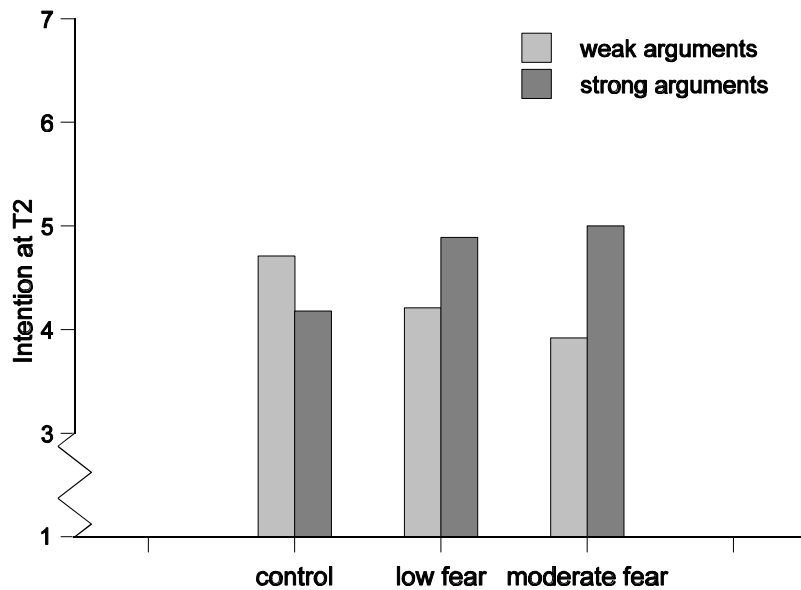


Figure 3.5. Effect of Fear and Argument Strength on intentions at T2.

Effects on intentions during the course of time. A repeated measures analysis of variance was conducted with intentions at T1 and T2 as dependent variables to test the effects of concern and fear on behavioural intentions during the course of time. In the description of the results of this analysis, the within-subjects factor is referred to as Time.

A marginally significant Time by Fear interaction effect was found, $F(2, 128) = 2.64, p = .075$, as well as a nearly significant interaction effect of Time, Concern and Fear, $F(2, 128) = 3.01, p = .053$. No further effects were found. Tests of the simple interaction effect of Time and Fear within each level of Concern revealed that this effect was significant when concern was low, $F(2, 128) = 3.34, p = .039$, but not when concern was high, $F(2, 128) = 1.93, p = .150$. We proceeded by testing the effect of Time on the intentions of low-concern participants in each of the three fear conditions. This effect was insignificant in the control condition, $F(1, 128) = 1.75, p = .188$, marginally significant in the low-fear condition, $F(1, 128) = 3.06, p = .083$, and insignificant in the moderate-fear condition, $F < 1, ns$. In view of the triviality of these effects our conclusion is that the intentions of both low and high-concern participants were fairly stable, regardless of the conditions to which they were assigned.

Correlations between attitudes and intentions. According to Hypothesis 1b and 2b respectively, fear and concern result in stronger attitude-behaviour relationship through the

stimulation of systematic information processing. Based on these hypotheses higher levels of fear and concern were expected to result in higher correlations between attitudes and behavioural intentions. To test these predictions a correlation was computed at each level of concern and fear between attitudes at T1 on the one hand and intentions at T2 on the other. Because intentions were assessed three weeks later than attitudes, the correlation between these measures provides fairly strong evidence for the predictive value of attitudes for intentions. Several studies have demonstrated that systematic information processing results in stronger relationships between attitudes and intentions. However, in the majority of these studies attitudes and intentions were measured contemporaneously (Eagly & Chaiken, 1993; see also the experiments reported in the previous chapters).

Regarding Hypothesis 1b, the correlation between attitudes at T1 and intentions at T2 was $r = .60$ ($p < .001$) in the control condition, $r = .36$ ($p = .006$) in the low-fear condition, and $r = .76$ ($p < .001$) in the moderate-fear condition. Fisher Z-tests revealed a marginally significant difference between the control condition and the low-fear condition, $Z = 1.47$, $p = .071$, and an insignificant difference between the control condition and the moderate-fear condition, $Z = 1.25$, $p = .106$. It can be concluded that the relation between attitudes and intentions was fairly strong regardless of the level of fear.

Regarding Hypothesis 2b, the correlation between attitudes at T1 and intentions at T2 was $r = .49$ ($p < .001$) in the low-concern group and $r = .63$ ($p < .001$) in the high-concern group. A Fisher Z-test pointed out that the difference between these correlations was not significant, $Z = 1.15$, $p = .125$. This indicates that the relation between attitudes and intentions was fairly strong regardless of the level of concern ¹¹.

¹¹ The outcomes of an analysis of covariance with intentions at T2 as dependent variable, Concern, Fear, and Argument Strength as factors, and attitudes at T1 as covariate lead to a more differentiated conclusion. This analysis revealed a significant main effect of Argument Strength, $F(1, 130) = 5.41$, $p = .022$, a significant main effect of attitudes, $F(1, 130) = 22.42$, $p < .001$, a significant interaction effect of Argument Strength and attitudes, $F(1, 130) = 5.71$, $p = .018$, and a marginally significant interaction effect of Concern, Argument Strength, and attitudes, $F(1, 130) = 3.52$, $p = .063$.

Separate tests for low and high-concern participants were subsequently performed. Regarding low-concern participants, the main effect of attitudes was significant, $F(1, 130) = 15.92$, $p < .001$, but the main effect of Argument strength was not, $F < 1$, *ns*, and neither was the interaction effect of Argument Strength and attitudes, $F < 1$, *ns*. This indicates that although the intentions of low-concern participants were not influenced by the strength of the presented arguments, their intentions were nevertheless strongly related to their attitudes.

Regarding high-concern participants, the main effect of attitudes was significant, $F(1, 130) = 9.12$, $p = .003$, as was the main effect of Argument Strength, $F(1, 130) = 6.53$, $p = .012$, and the interaction effect of Argument Strength and attitudes, $F(1, 130) = 6.62$, $p =$

Effects on cognitive responses¹². The results of the ANOVA with the number of relevant cognitive responses as dependent variable are presented in Table 3.7. The mean for the entire sample was $M = 3.03$ ($SD = 1.80$).

Table 3.7. Analysis of variance with cognitive responses as dependent variable

	<i>df</i>	<i>F</i>	<i>p</i>
Concern (C)	1	1.96	.164
Fear (F)	2	< 1	<i>ns</i>
Argument Strength (A)	1	< 1	<i>ns</i>
C x F	2	< 1	<i>ns</i>
C x A	1	2.75	.099
F x A	2	< 1	<i>ns</i>
C x F x A	2	< 1	<i>ns</i>
Within cells	149	(3.28)	

Note. Value enclosed in parentheses represents mean square error.

Based on Hypothesis 1a fear was expected to increase the amount of relevant thoughts generated. However, the main effect of Fear was insignificant, and the pattern of the means was not as predicted either. It can therefore be concluded that the cognitive response data provide no support for Hypothesis 1a.

Based on Hypothesis 2a concern was expected to increase the amount of relevant

.011. This indicates that the intentions of high-concern participants were strongly related to their attitudes, but that this relation depended on the strength of the presented arguments.

¹² Besides analysing the number of relevant thoughts, the valence of these thoughts was also analysed. A measure of thought valence was created in the same way as in the previous experiment (see Footnote 2 in Chapter 2), $Kappa = .59$. This measure was entered as a dependent variable in an ANOVA. The mean for the entire sample was $M = .07$ ($SD = .59$). Hence, participants' thoughts about the energy-efficient light bulb were rather neutral.

The main effect of Argument Strength on thought valence was significant, $F(1, 150) = 11.40$, $p = .001$. As one would expect, the thoughts generated in response to the weak arguments were less positive than those generated in response to the strong arguments, $M = -.08$ ($SD = .62$) and $M = .22$ ($SD = .52$) respectively. No further significant effects were found.

thoughts generated. Although the main effect of Concern was insignificant, the Concern by Argument Strength interaction effect proved to be marginally significant. This interaction effect was further analysed by testing the simple effect of Concern within each level of Argument Strength. Comparable amounts of relevant thoughts were generated by low and high-concern participants when exposed to weak arguments, $F < 1$, *ns* (the mean number of cognitive responses was $M = 3.12$ ($SD = 1.77$) in the case of weak arguments). However, when exposed to strong arguments, a higher amount of relevant thoughts was generated by high than by low-concern participants, $M = 3.37$ ($SD = 2.12$) and $M = 2.57$ ($SD = 1.49$) respectively, $F(1, 149) = 4.80$, $p = .030$. This provides some support for Hypothesis 2a.

Since the Concern by Fear interaction effect was insignificant, our conclusion is that the cognitive response data provide no support for the activation-induction model.

Effects on recall. The results of the ANOVA with the number of correctly reproduced arguments as dependent variable are presented in Table 3.8. The mean for the entire sample was $M = 1.22$ ($SD = 0.86$).

Table 3.8. Analysis of variance with recall as dependent variable

	<i>df</i>	<i>F</i>	<i>p</i>
Concern (C)	1	< 1	<i>ns</i>
Fear (F)	2	1.52	.222
Argument Strength (A)	1	< 1	<i>ns</i>
C x F	2	< 1	<i>ns</i>
C x A	1	< 1	<i>ns</i>
F x A	2	2.85	.061
C x F x A	2	1.75	.177
Within cells	148	(0.72)	

Note. Value enclosed in parentheses represents mean square error.

Based on Hypothesis 1a fear was expected to increase performance on the recall task. Although the main effect of Fear was insignificant, the Fear by Argument Strength interaction effect was marginally significant. This interaction effect was further analysed by testing the simple effect of Fear within each level of Argument Strength. This effect was insignificant in the strong-arguments condition, $F < 1$, *ns* (the mean number of correctly reproduced arguments was $M = 1.23$ ($SD = 0.87$) in this condition). In the weak-arguments condition a significant effect of Fear was found, $F(2, 148) = 2.64$, $p = .028$. The mean number of

correctly reproduced weak arguments was $M = 1.03$ ($SD = 0.74$) in the control condition, $M = 1.48$ ($SD = 0.79$) in the low-fear condition, and $M = 1.05$ ($SD = 0.91$) in the moderate-fear condition. Compared with the control condition, recall was significantly higher in the low-fear condition, $F(1, 148) = 4.38$, $p = .038$, but not in the moderate-fear condition, $F < 1$, *ns*. The difference between low and moderate fear condition was also significant, $F(1, 148) = 5.98$, $p = .016$. This pattern of results is difficult to interpret but cannot be considered evidence for Hypothesis 1a in any case.

Based on Hypothesis 2a concern was expected to increase recall. However, the main effect of Concern on recall was insignificant, and the pattern of the means was not in line with Hypothesis 2a either. Hence, the recall data provide no support for this hypothesis. Also, because the interaction between Concern and Fear was insignificant, the recall data provide no support for the activation-induction model either.

3.4 Conclusions and discussion

In this chapter's introductory section a number of hypotheses was formulated. For each hypothesis the relevant outcomes will be summarized and conclusions will be drawn.

Conclusions regarding Hypothesis 1a. According to Hypothesis 1a fear increases the extent to which information is systematically processed. The results of this study provide some support for this hypothesis. As in the previous study, there were indications that information was more carefully processed when a moderate fear level was induced. Exposure to strong arguments resulted in more positive attitudes and stronger intentions than exposure to weak arguments in the moderate-fear condition, but not in the low-fear and the control condition. Although this pattern of results occurred most clearly three weeks after message exposure, it was also visible directly after exposure¹³. The thought listing and recall data provide no additional evidence for the hypothesized impact of fear on the amount of in-depth information processing.

In the previous study we not only found evidence of an indirect effect of fear on attitudes,

¹³ Only part of the sample completed the measures of attitudes and intentions at both T1 and T2. Sample differences may therefore explain the fact that different effects were found immediately after message exposure and three weeks later. To preclude this possibility, the ANOVAs with attitudes and intentions at T1 were repeated using the data of the participants who also completed these measures at T2. The effects remained unchanged, indicating that sample differences were not responsible for the different outcomes at T1 and T2.

mediated by the amount of systematic processing, but also of a direct positive effect of fear on attitudes. The fact that no such direct effect was found in the present study may be due to the overall lower fear levels in this study compared with the previous study (see Chapter 6).

Conclusions regarding Hypothesis 2a. According to Hypothesis 2a pre-existing concern, like induced fear, increases the extent to which information is systematically processed. The results of this experiment only provide limited support for this hypothesis. Three weeks after the experiment the attitudes of high but not of low-concern participants demonstrated an effect of argument strength, in that attitudes were more favourable after strong compared with weak arguments. Also, strong arguments evoked a higher amount of relevant thoughts in high compared with low-concern participants. Other indicators of in-depth processing provide no additional support for Hypothesis 2a.

The fact that so little support was found for the hypothesis, i.e. concern increases in-depth information processing, may have to do with the topic of the information. The importance of implementing energy-efficient lighting has been frequently emphasized in mass media campaigns. It is therefore plausible that participants had already formed an attitude towards energy-efficient lighting prior to the experiment. They may have used this pre-existing attitude towards energy-efficient lighting to form an attitude towards the new bulb. This way of forming an attitude is not explicitly included in the elaboration likelihood model (Petty & Cacioppo, 1981, 1986), or in the heuristic systematic model (Chaiken, 1980; Chaiken et al., 1989). However, Forgas' affect infusion model (1994) does consider direct access of a pre-existing, stored evaluation as a separate strategy to form a social judgment.

Presumably people who are concerned about environmental issues attach more weight to environmental aspects of products than people who are unconcerned, and therefore are more favourable towards environmentally friendly products. The results of this experiment are in agreement with this notion. Participants with a high level of concern about climate change expressed more favourable attitudes towards the new energy-efficient light bulb than participants with a low level of concern. This effect was found both immediately after exposure to the bulb information as well as three weeks later. The effect disappeared when a pre-measurement of attitudes towards energy-efficient lighting in general was entered as a covariate in the analysis. This indicates that participants based their attitude towards the new bulb on their pre-existing attitude towards energy-efficient lighting in general, which was more favourable when their level of concern was high rather than low.

Conclusions regarding Hypothesis 1b. According to Hypothesis 1b fear results in greater attitude stability and stronger attitude-intention relationships through the stimulation of systematic processing. A repeated measures ANOVA with both direct and delayed measurements of attitudes did not confirm the first part of this hypothesis. Regardless of fear level, attitudes became less favourable as time passed by. With respect to the second part of Hypothesis 1b, the correlation between attitudes and intentions was fairly high regardless of fear level. All in all our conclusion is that the support for Hypothesis 1b is fairly weak.

Conclusions regarding Hypothesis 2b. According to Hypothesis 2b concern results in greater attitude stability and stronger attitude-intention relationships through its impact on the extent of systematic processing. Again, a repeated measures ANOVA with both direct and delayed measures of attitudes did not confirm the first part of this hypothesis. Although level of concern did not influence attitude stability, it did seem to influence the stability of the argument strength effect on attitudes. Immediately after message exposure attitudes demonstrated a significant effect of Argument Strength, indicating that attitudes were more positive when the arguments were strong rather than weak. Three weeks later attitudes still demonstrated a significant effect of Argument Strength. However, tests of the simple effect of Argument Strength within each level of Concern revealed that this effect only involved high-concern participants. This indicates that Argument Strength only had a lasting effect on attitudes when the level of concern was high. With respect to the second part of Hypothesis 2b, the correlation between attitudes and intentions was fairly high regardless of level of concern. All in all our conclusion is that the support for Hypothesis 2b is fairly weak.

Conclusions regarding the interaction between concern and fear. No specific hypotheses were formulated regarding the interactive effects of concern and fear on systematic processing. However, as far as interactions between concern and fear were found, these were interpreted in terms of an activation-induction model.

Section 3.1 explained that the activation-induction model is based upon the assumption that people's emotional responses towards a threat have to exceed a certain level for them to put effort into processing threat-relevant information. Both pre-existing and induced emotions may raise arousal above the threshold value. A threat communication is assumed to both activate pre-existing emotions towards the threat and induce emotions in itself. Regarding the induction of emotional responses, a threat communication comprising a moderate-fear induction is by definition more effective than a threat communication comprising a low-fear induction. Regarding the activation of pre-existing emotions, however,

it is assumed that a low-fear threat communication is as effective as a moderate-fear threat communication. Together the activation and induction notions imply that when the level of pre-existing concern is high, exposure to both low and moderate-fear threat communications will increase systematic processing; when the level of pre-existing concern is low, only exposure to the moderate-fear threat communication will increase systematic processing.

Hardly any interactive effects were found of pre-existing concern and induced fear on indicators of systematic processing in this experiment. A nearly significant three-way interaction effect on intentions measured immediately after message exposure indicates that the intentions of high-concern participants were influenced by argument strength regardless of whether or not fear was induced, whereas the intentions of low-concern participants only demonstrated an argument strength effect when a moderate level of fear was induced. Thus it can be assumed that the moderate-fear induction increased systematic processing in low but not in high-concern participants, which is supportive of the activation-induction model.

In addition a significant interaction effect of Concern and Fear on the delayed measurement of attitudes was found, indicating that the attitudes of low-concern participants were less positive than the attitudes of high-concern participants unless they were exposed to a low or moderate-fear induction. Although this can not be taken as evidence that the effect of induced fear on systematic processing was different at low and high levels of concern, it does indicate that the attitudinal difference between low and high-concern participants that was observed immediately after processing was eliminated after three weeks, provided that they were exposed to a video about climate change.

A significant interaction effect of Concern and Fear on the fear manipulation checks indicates that both threat communications aroused a higher level of fear in high than in low-concern participants, which is in line with the activation principle. In both low and high-concern participants the moderate-fear communication aroused a higher fear level than the low-fear communication, which is in line with the induction principle.

Finally a significant interaction effect of Concern and Fear on motivation ratings was found, indicating that both low and moderate-fear communications were rather motivating according to the high-concern participants, whereas according to the low-concern participants only the moderate-fear communication was motivating. This is what would have been expected on the basis of the activation-induction model. To conclude, in as far as interaction effects were found between pre-existing concern and induced fear, these effects could be interpreted in terms of an activation-induction model.

Chapter 4

Effect of concern and fear on elaboration: Replication with other target-object

4.1 Introduction

The results of the previous experiments provide support for the hypothesis that induced fear results in greater elaboration of information, although this support is not unequivocal. Hardly any support was found for the hypothesis that pre-existing concern has a similar effect on the extent of systematic processing, although some of the data patterns were in line with this hypothesis. We did find a direct positive relation between concern about climate change and attitudes towards the new energy-efficient light bulb. This relation seemed to be mediated by pre-existing attitudes towards energy-efficient lighting in general. This raises the question whether an effect of concern on the extent of systematic processing can be detected in the case of a less familiar attitude object.

As was explained in the introductory chapter, human-induced climate change is largely due to carbon dioxide (CO₂). The level of CO₂ is increasing in the atmosphere because we burn fossil fuels for the generation of energy. A large reduction of CO₂ emissions is needed to lower risks. One of the obvious ways to realize this is to decrease the consumption of fossil energy. In the previous experiments participants were provided with a persuasive message recommending energy-efficient light bulbs as a means to reduce energy consumption. Energy-efficient technologies such as these use less energy than traditional technologies to yield comparable results in terms of satisfying needs. Usually the adoption of energy-efficient innovations requires a financial investment. This eventually pays off, as the initial expense is compensated by a lower electricity bill. Hence, energy-efficient technologies are not only beneficial to the environment, but are financially advantageous to the individual as well. There also are energy-saving activities and policy measures that generate predominantly negative individual consequences, in terms of financial costs or loss of comfort. Such a measure lies at the heart of the present experiment ¹.

The purpose of this experiment was to provide an additional test of the relations between

¹ This experiment was conducted in collaboration with Willem van Rossum and Bas Wellink.

concern, fear, information processing and attitudes by focusing on another attitude object, namely the implementation of a European energy tax. Compared with energy-efficient light bulbs the general public is assumed to be relatively unfamiliar with this measure to reduce energy consumption. The energy tax has no clear direct benefits at the individual level. On the contrary, electricity bills may be expected to rise as a consequence of this measure.

As in the previous experiments, three levels of fear were created. In addition, argument strength was manipulated to allow detection of differences in the extent of systematic processing. The experiment also took into account the effect of pre-existing level of concern. For this purpose, a quasi-experimental factor of concern was created by means of the median split procedure.

The first hypothesis tested was that induced fear increases the extent to which information is systematically processed (Hypothesis 1). The second hypothesis was that pre-existing concern has a similar effect, that is concern increases the extent of systematic information processing (Hypothesis 2). As regards possible interactive effects of fear and concern, the few interactions that were found in the previous experiment could be explained in terms of an activation-induction model, and so it was retained. Hence, as far as interactive effects of fear and concern are found in the present experiment, these are interpreted in terms of the activation-induction model (see section 3.1 for a description of this model).

4.2 Method

4.2.1 Design

The experiment had a 2 (low concern vs. high concern) x 3 (control vs. low fear vs. moderate fear) x 2 (weak arguments vs. strong arguments) between-subjects design. As with the previous experiment, concern was a quasi-experimental factor that was created by measuring concern about climate change and carrying out a median split on this measure. Fear was manipulated in the same way as in the previous experiment, by means of a video about climate change. Participants in different fear conditions were exposed to a different version of the video. Argument strength was manipulated by means of a message recommending the implementation of a European energy tax. Participants in different argument strength conditions were exposed to different versions of this message. The dependent variables in this experiment were attitudes towards the proposed energy tax, cognitive responses, and recall.

4.2.2 Participants

Participants consisted of 119 undergraduate and graduate students from various educational institutions in Eindhoven. They were recruited through advertisements on bulletin-boards. They received financial compensation for taking part in the experiment. Approximately equal numbers of men and women participated in the experiment. Mean age of the participants was $M = 22$ ($SD = 3$). Participants were randomly assigned to the fear and argument strength conditions, except that we took care that males and females were distributed equally across conditions.

4.2.3 Procedure

The procedure of this experiment was very similar to that of the previous experiment (see section 3.2.3). This section will therefore be restricted to an outline of the experimental procedure; more detailed information will only be provided regarding new aspects of the experiment.

The experiment started with a measurement of concern about climate change. A median split was carried out on this measurement to create a relatively low and a relatively high level of concern. Next, participants responded to a measurement of attitudes towards the implementation of a European energy tax. This measure was concealed by measuring attitudes towards various policy measures.

The second phase of the experiment consisted of the fear manipulation, which was conducted with the same stimulus materials as in the previous experiment. Participants in the low-fear condition were shown a video on climate change that aroused a low level of fear. Participants in the moderate-fear condition watched a video on the same topic that aroused a moderate level of fear. The video shown to participants in the control condition dealt with a non-threatening, irrelevant topic, namely composing and producing music by means of computers. Directly following the fear manipulation participants responded to a self-report measure of fear.

The third phase consisted of the manipulation of argument strength. Participants read a message recommending the implementation of a European energy tax at their own pace. This message involved either weak or strong arguments in favour of this measure.

The experiment concluded with measurements of the dependent variables. Participants responded to a thought-listing task, a measurement of attitudes, and a recall task respectively, followed by manipulation checks and additional measures. Afterwards the

participants were debriefed and thanked.

4.2.4 Stimulus materials

Manipulation of fear. For a description of the stimulus materials used to manipulate fear the reader is referred to section 3.2.4.

Manipulation of argument strength. The persuasive message about the implementation of a European energy tax formed the manipulation of argument strength. This message comprised a brief explanation of the policy measure and four arguments supporting this measure. In the weak version of the message four weak arguments were presented, whereas in the strong version four strong arguments were presented. These arguments were selected from a pool of 17 arguments, which were pretested on 23 participants in a pilot study. In this pilot study the persuasiveness of each of the arguments was rated on a scale anchored at 1 (*weak*) and 7 (*strong*) and on a scale anchored at 1 (*very unconvincing*) and 7 (*very convincing*). Ratings on these two scales were combined to form a measure of persuasiveness. Regarding the arguments selected for use in the main study, the weak arguments on average received significantly lower ratings of persuasiveness than the strong arguments, $M = 3.06$ ($SD = 1.24$) and $M = 5.00$ ($SD = 0.94$) respectively, $t(21) = 8.01$, $p < .001$. An example of a weak argument is: "By introducing this measure, Europe can take a leading role in solving the environmental issue and will increase its status." An example of a strong argument is: "Part of the profits from the measure will be used to finance research on sustainable energy sources, such as solar and wind power." The number of words was 130 in the weak message and 128 in the strong message. See Table A3 (Appendix A) for a complete reproduction of the weak and strong arguments used in this experiment.

4.2.5 Measurements

Pre-measurement of attitudes. Preceding the manipulations, attitudes towards the implementation of a European energy tax were measured on a scale ranging from 1 (*highly negative*) to 7 (*highly positive*), with all intermediate points labelled as well. To conceal the purpose of this measurement, we also measured attitudes towards various other issues such as introducing a European monetary unit and increasing tobacco duty.

Measurement of concern. Concern about the greenhouse effect was measured in the same way as in the previous experiment (see section 3.2.5). The overall mean score was $M = 3.87$ ($SD = 1.83$). Participants whose ratings fell below the median ($Mdn = 4$) were

assigned to the low-concern group ($N = 56$) and those who scored at or above the median were assigned to the high-concern group ($N = 63$). Participants in the high-concern group were significantly more concerned than participants in the low-concern group, $M = 5.35$ ($SD = 1.00$) and $M = 2.20$ ($SD = 0.82$) respectively, $F(1, 107) = 356.80$, $p < .001$.

As in the previous experiment, the division of participants in low and high-concern groups was validated by having them respond to an open-ended question regarding problems in the world they worried about (see section 3.2.5). The Spearman correlation between this open-ended measure of concern about the environment and the closed-ended measure of concern about climate change was $r_s = .45$, $p < .001$. The environment was mentioned at least once by 43 % of the low-concern group and by 79 % of the high-concern group.

Checks on fear manipulation. The effectiveness of the fear manipulation was checked in the same way as in the previous experiment (see section 3.2.5). Cronbach's Alpha for the four-item scale constituting the self-report measure of fear was $\alpha = .86$. The reliability of the four-item scale measuring judged frighteningness was $\alpha = .92$. The correlation between reported fear and judged frighteningness was $r = .88$ ($p < .001$).

Measurement of motivation. Like in the previous experiment, participants were asked to rate the stimulus materials that were used to manipulate fear on a 7-point scale ranging from 1 (*not at all motivating*) to 7 (*very motivating*).

Checks on argument strength manipulation. The effectiveness of the manipulation of argument strength was checked in the same way as in the previous experiments (see section 2.2.5). The correlation between perceived persuasiveness of the separate arguments and of the whole message was $r = .53$ ($p < .001$).

Measurement of attitudes. Attitudes towards the implementation of a European energy tax were measured in much the same way as attitudes towards using the energy-efficient light bulb in the previous experiment. For details on this measure the reader is referred to section 3.2.5. Reliability of this four-item attitude scale was $\alpha = .85$.

Measurement of cognitive responses. Cognitive responses were measured in the same way as in the previous experiments (see section 2.2.5 for information on this measure). The thoughts listed by the participants were categorized by two independent judges as relevant or irrelevant to the issue under consideration, i.e. the energy tax. Agreement between the two judges was fairly high, Kappa = .72. The scores of the two judges were averaged and a total number of relevant responses was computed for each participant.

Measurement of recall. Recall was measured in the same way as in the previous

experiments. For information on this measure the reader is referred to section 2.2.5. Two independent judges rated the extent to which participants correctly reproduced each of the four message arguments. Inter-rater reliability was high, Kappas between .75 and 1.00. The ratings of the two judges were averaged and for each participant a total number of correctly reproduced arguments was computed.

4.3 Results

Unless defined otherwise, all analyses of variance (MANOVAs and ANOVAs) reported in this section were performed on a full factorial model, including main effects for Concern, Fear, and Argument Strength and all possible interactions between these factors. The terms in the model were tested against the within-cell sum of squares.

4.3.1 Effects on manipulation checks

Effects on fear manipulation checks. A MANOVA with self-reported fear and judged frighteningness as dependent variables showed a significant main effect for Concern, multivariate $F(2, 105) = 9.53, p < .001$. Ratings on both manipulation checks were higher in the high compared with the low-concern group.

The main effect of Fear also was significant, multivariate $F(4, 212) = 18.75, p < .001$. Ratings on both measures were significantly higher in the moderate compared with the low-fear condition, multivariate $F(2, 105) = 3.29, p = .041$; the difference between the low-fear and the control condition was significant as well, multivariate $F(2, 105) = 28.11, p < .001$.

Finally, a significant Fear by Concern interaction effect was found, multivariate $F(4, 212) = 3.20, p = .014$. Tests of the simple effect of Fear within each level of Concern revealed that this effect was significant in the low-concern group, multivariate $F(4, 212) = 8.99, p < .001$, and also in the high-concern group, multivariate $F(4, 212) = 16.56, p < .001$. Table 4.1 shows that in both groups self-reported fear and judged frighteningness were highest in the moderate-fear condition, intermediate in the low-fear condition, and lowest in the control condition, although some of the univariate contrasts were insignificant. It can be concluded that the Fear manipulation was sufficiently successful in both low and high-concern groups ².

² An alternative approach to the Concern by Fear interaction effect is to test the simple effect of Concern within each level of Fear. As in the previous experiment (see section 3.3.1) this effect was significant in the low-fear condition, multivariate $F(2, 212) = 3.32, p = .040$, and in the moderate-fear condition, multivariate $F(2, 212) = 13.36, p < .001$,

Table 4.1. Effect of Fear manipulation on self-reports of fear and judgments of frighteningness for low and high-concern groups separately.

	Low-concern group		
	Control condition	Low-fear condition	Moderate-fear condition
Self-reports of fear	1.40 (0.47) ^a	2.19 (0.78) ^b	2.59 (0.84) ^b
Judgments of frighteningness	1.47 (0.52) ^a	2.91 (1.08) ^b	3.75 (1.07) ^b
	High-concern group		
	Control condition	Low-fear condition	Moderate-fear condition
Self-reports of fear	1.58 (1.12) ^a	3.09 (0.57) ^b	3.83 (1.12) ^c
Judgments of frighteningness	1.66 (1.30) ^a	3.90 (1.03) ^b	4.47 (1.24) ^b

Note. Numbers are means with standard deviations in brackets. Within the same row, means with unequal superscripts were significantly different at $p < .05$ according to tests of the univariate contrasts.

Effects on motivation. An ANOVA with motivation as a dependent variable yielded a significant main effect of Fear, $F(2, 106) = 10.56, p < .001$. Motivation ratings were highest in the moderate-fear condition, $M = 4.81 (SD = 1.05)$, intermediate in the low-fear condition, $M = 4.23 (SD = 1.27)$, and lowest in the control condition, $M = 3.29 (SD = 1.63)$. The contrast between the low and moderate-fear condition was marginally significant, $F(1, 106) = 2.97, p = .088$; the contrast between the control and low-fear condition was significant, $F(1, 106) = 7.37, p = .008$.

Finally, a marginally significant Concern by Fear interaction effect was found, $F(2, 106) = 3.00, p = .054$ ³. Tests of the simple effect of Fear within each level of Concern revealed an insignificant effect in the low-concern group, $F(2, 106) = 1.79, p = .172$, and a significant effect in the high-concern group, $F(2, 106) = 12.43, p < .001$. Table 4.2 shows that

but not in the control condition, multivariate $F < 1$. ns. Hence, both low and moderate-fear communications elicited higher fear levels in high than in low-concern participants.

³ The ANOVA also revealed a significant three-way interaction effect, $F(2, 106) = 3.29, p = .041$. It was decided to pay no further attention to this interaction effect.

participants in the low-concern group rated the three communications to be equally motivating, whereas participants in the high-concern group made a distinction between the filler communication on the one hand and the threat communications on the other; they rated both threat communications to be more motivating than the filler communication ⁴.

Table 4.2. *Effect of Fear manipulation on motivation ratings for low and high-concern groups separately.*

	Control condition	Low-fear condition	Moderate-fear condition
Low-concern group	3.71 (1.40) ^a	3.77 (1.35) ^a	4.59 (1.18) ^a
High-concern group	2.95 (1.75) ^a	4.59 (1.10) ^b	5.05 (0.85) ^b

Note. Numbers are means with standard deviations in brackets. Within the same row, means with unequal superscripts were significantly different at $p < .05$.

Effects on argument strength manipulation checks. Perceived persuasiveness of the whole message and of the separate arguments were entered into a MANOVA as dependent variables. The main effect of Concern was significant, multivariate $F(2,105) = 4.91, p = .009$. Ratings on both measures were higher in the high compared with the low-concern group.

The main effect of Argument Strength also was significant, multivariate $F(2,105) = 42.19, p < .001$. Ratings on both manipulation checks were higher in the strong as compared with the weak-arguments condition.

Finally, the Concern by Argument Strength interaction effect was significant as well, multivariate $F(2,105) = 3.72, p = .028$. Tests of the simple effect of Argument Strength within each level of Concern revealed that Argument Strength had a significant effect in the low-concern group, multivariate $F(2, 105) = 11.57, p = .000$, and also in the high-concern group, multivariate $F(2, 105) = 36.37, p < .001$ ⁵. Although one of the univariate contrasts

⁴ The Concern by Fear interaction effect can be considered from another perspective, by testing the simple effect of Concern within each level of Fear. This effect appeared to be insignificant in the control condition, $F(1, 106) = 2.62, p = .109$, in the low-fear condition, $F(1, 106) = 2.23, p = .138$, and in the moderate-fear condition, $F(1, 106) = 1.60, p = .209$. This is not surprising, given the fact that the main effect of Concern was insignificant.

⁵ Looking at the Concern by Argument Strength interaction effect from an alternative perspective, it appears that the weak arguments received similar judgments from the low and high-concern groups, $F < 1, ns$; the strong arguments, however, were judged to be more persuasive by the high-concern participants compared with the low-concern participants, $F(1, 105) = 9.02, p < .001$.

was insignificant, as can be seen in Table 4.3, overall these analyses indicate that the manipulation of Argument Strength was sufficiently successful.

Table 4.3. *Effect of Argument Strength manipulation on persuasiveness of whole message and separate arguments for low and high-concern groups separately.*

	Low-concern group	
	Weak-arguments condition	Strong-arguments condition
Persuasiveness whole message	3.62 (1.69) ^a	3.74 (1.58) ^a
Persuasiveness separate arguments	3.30 (0.99) ^a	4.41 (1.00) ^b
	High-concern group	
	Weak-arguments condition	Strong-arguments condition
Persuasiveness whole message	3.62 (1.74) ^a	5.04 (1.40) ^b
Persuasiveness separate arguments	3.28 (1.23) ^a	5.51 (0.50) ^b

Note. Numbers are means with standard deviations in brackets. Within the same row, means with unequal superscripts were significantly different at $p < .05$ according to tests of the univariate contrasts.

4.3.2 Effects on dependent variables

Effects on attitudes. The results of the ANOVA with attitudes towards the energy tax as a dependent variable are presented in Table 4.4 ⁶. The mean for the entire sample was $M = 3.82$ ($SD = 1.14$).

The significant main effect of Concern indicates that, overall, high-concern participants were more positive about the energy tax, $M = 4.10$ ($SD = 1.02$) than low-concern participants, $M = 3.50$ ($SD = 1.20$).

According to Hypothesis 1 fear increases the extent to which information is systematically processed. Based on this hypothesis an interaction effect of Fear and Argument Strength

⁶ Adding the pre-measurement of attitudes towards the energy tax as a covariate reduced the main effect of Concern to insignificance, $F < 1$, *ns*. The interaction effect of Concern and Argument Strength remained significant, $F(1, 106) = 8.76$, $p = .004$.

was expected. Because the interaction effect was insignificant, and the pattern of the means was not as predicted either, the conclusion is that Hypothesis 1 is not supported by these attitude data.

Table 4.4. *Analysis of variance with attitude as a dependent variable*

	<i>df</i>	<i>F</i>	<i>p</i>
Concern (C)	1	5.85	.017
Fear (F)	2	1.45	.239
Argument Strength (A)	1	< 1	<i>ns</i>
C x F	2	< 1	<i>ns</i>
C x A	1	12.82	.001
F x A	2	1.04	.358
C x F x A	2	< 1	<i>ns</i>
Within cells	107	(1.14)	

Note. Value enclosed in parentheses represents mean square error.

Hypothesis 2 holds that concern leads to greater elaboration of information. Based on this hypothesis an interaction effect of Concern and Argument Strength was expected. This interaction effect indeed proved to be significant. Tests of the simple effect of Argument Strength within each level of Concern revealed that this effect was significant in the low-concern group, $F(1, 107) = 7.35, p = .008$, and also in the high-concern group, $F(1, 107) = 5.48, p = .021$. As can be seen in Figure 4.1, low-concern participants expressed more favourable attitudes when exposed to weak rather than strong arguments. In the high-concern group attitudes were more positive after exposure to strong arguments than after exposure to weak arguments, which is in line with Hypothesis 2⁷.

The finding that weak arguments resulted in more favourable attitudes in low-concern participants than strong arguments deserves an explanation. A closer look at the contents of the arguments reveals that the strong arguments primarily referred to environmental motives to adopt the measure, whereas the weak arguments primarily referred to political and health

⁷ Looking at the Concern by Argument Strength interaction effect from a different perspective, it appears that the low and high-concern participants were equally positive about the energy tax when exposed to weak arguments, $F < 1, ns$. However, when exposed to strong arguments, high-concern participants were significantly more positive than low-concern participants, $F(1, 107) = 19.34, p < .001$.

motives (see Table A3 in Appendix A). Logically, environmental motives are not very appealing to low-concern participants (see Footnote 7). Obviously, they can be persuaded more easily by addressing alternative motives.

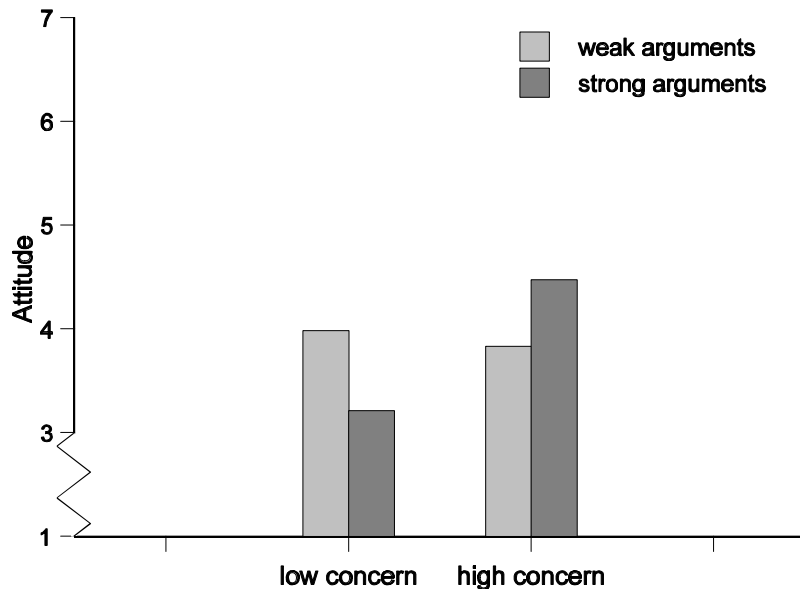


Figure 4.1. Effect of Concern and Argument Strength on attitudes.

The absence of a significant three-way interaction effect brings us to the conclusion that the attitude data do not support the activation-induction model.

*Effects on cognitive responses*⁸. Table 4.5 presents the results of an ANOVA with the number of relevant cognitive responses as a dependent variable. The mean for the entire sample was $M = 3.34$ ($SD = 1.42$).

Based on Hypothesis 1 a main effect of Fear on the number of relevant cognitive responses was expected, which did not occur, and the pattern of the means was not as

⁸ In addition to analysing the number of relevant thoughts, the valence of these thoughts was also analysed. A measure of thought valence was created in the same way as in the previous experiments (see Footnote 2 in Chapter 2), $Kappa = .73$. This measure was entered as a dependent variable in an ANOVA. The mean for the entire sample was $M = -.32$ ($SD = .48$). Hence, participants' thoughts about the energy tax were predominantly negative.

The main effect of Argument Strength on thought valence was significant, $F(1, 107) = 16.70$, $p < .001$. As one would expect, the thoughts generated in response to the weak arguments were more negative than those generated in response to the strong arguments, $M = -.47$ ($SD = .42$) and $M = -.17$ ($SD = .49$) respectively. No further significant effects were found.

predicted either. However, we did find some support for Hypothesis 2: the main effect of Concern was marginally significant. High-concern participants generated more cognitive responses, $M = 3.56$ ($SD = 1.47$), than low-concern participants, $M = 3.09$ ($SD = 1.34$). This is in line with the hypothesis that concern increases the extent of systematic processing.

Table 4.5. *Analysis of variance with cognitive responses as a dependent variable*

	<i>df</i>	<i>F</i>	<i>p</i>
Concern (C)	1	3.02	.085
Fear (F)	2	< 1	<i>ns</i>
Argument Strength (A)	1	< 1	<i>ns</i>
C x F	2	1.34	.266
C x A	1	< 1	<i>ns</i>
F x A	2	< 1	<i>ns</i>
C x F x A	2	1.69	.190
Within cells	107	(2.02)	

Note. Value enclosed in parentheses represents mean square error.

As the interaction between Concern and Fear was not significant, it is concluded that the cognitive response data provide no support for the activation-induction model.

Effects on recall. Table 4.6 presents the results of the ANOVA with number of correctly reproduced arguments as a dependent variable. The mean for the entire sample was $M = 2.30$ ($SD = 1.07$).

The marginally significant main effect of Argument Strength indicates that recall was better in the case of weak arguments, $M = 2.55$ ($SD = .94$), than in the case of strong arguments, $M = 2.07$ ($SD = 1.14$). Presumably this is due to a difference between the weak and strong arguments on a dimension irrelevant to the purposes of this experiment⁹.

No support was found for Hypothesis 1, i.e. the main effect of Fear was not significant, and the pattern of the means was not as predicted either. However, we did find a marginally significant main effect of Concern, indicating that recall was better in the high-concern group, $M = 2.51$ ($SD = 1.03$), than in the low-concern group, $M = 2.07$ ($SD = 1.07$). This provides

⁹ Besides persuasiveness participants were asked to rate the comprehensiveness, complexity, and familiarity of the message. No differences were found between the weak and strong message, $F_s < 1$, *ns*.

some support for Hypothesis 2.

The interaction between Concern and Fear was not significant, which brings us to the conclusion that the recall data provide no evidence for the activation-induction model.

Table 4.6. Analysis of variance with recall as a dependent variable

	<i>df</i>	<i>F</i>	<i>p</i>
Concern (C)	1	3.05	.084
Fear (F)	2	2.16	.121
Argument Strength (A)	1	3.54	.063
C x F	2	< 1	<i>ns</i>
C x A	1	< 1	<i>ns</i>
F x A	2	1.72	.184
C x F x A	2	< 1	<i>ns</i>
Within cells	107	(1.07)	

Note. Value enclosed in parentheses represents mean square error.

4.4 Conclusions and discussion

In this chapter's introductory section two hypotheses were formulated. We will now summarize and discuss the evidence for each hypothesis.

Conclusions regarding Hypothesis 1. According to Hypothesis 1 fear increases the extent of systematic processing. Contrary to the results of the previous studies the present results provide no support for this hypothesis. Neither the attitude data nor the cognitive response and recall data yielded evidence of a positive relation between fear and in-depth processing.

Conclusions regarding Hypothesis 2. According to Hypothesis 2 there is a positive relation between concern and the extent of systematic processing. Contrary to the results of the previous study the present results indeed demonstrate a clear effect of individual differences in concern on the elaboration of information. The amount of cognitive responses generated during message exposure and the number of arguments recalled afterwards were higher when concern was high rather than low. Furthermore, contrary to low-concern participants, those with a high level of concern expressed more favourable attitudes after receiving a strong rather than a weak argumentation. This too is in agreement with Hypothesis 2.

Conclusions regarding the interaction between concern and fear. Although no specific

hypotheses were formulated regarding the combined effects of concern and fear on in-depth information processing, again the data were interpreted in terms of an activation-induction model. This model is based upon the assumption that emotional responses towards a threat have to exceed a certain level for people to engage in systematic processing of threat-related information. Both pre-existing and induced emotional responses may raise arousal above the threshold value.

The activation-induction model assumes that a threat communication both activates pre-existing emotional responses towards the threat and induces threat-related emotional responses in itself. As regards the induction of emotions, a threat communication comprising a moderate-fear induction is by definition more effective than a threat communication comprising a low-fear induction. As far as the activation of pre-existing emotions is concerned however, it is assumed that low and moderate-fear threat communications are equally effective. Together the activation and induction notions imply that when the level of pre-existing concern is high, both low and moderate-fear threat communications will increase elaboration; when the level of pre-existing concern is low, only the moderate-fear threat communication will increase elaboration.

No interactive effects of pre-existing concern and induced fear on indicators of systematic processing were found in this experiment. A significant interaction effect of Concern and Fear on the fear checks was found, indicating that both threat communications aroused a higher level of fear in high than in low-concern participants, which is in line with the activation principle. The moderate-fear communication aroused a higher level of fear than the low-fear communication in both low and high-concern participants, which can be taken as an indication of the validity of the induction principle. In addition, a marginally significant interaction effect of Concern and Fear on motivation ratings was found, indicating that both threat communications were highly motivating for high-concern participants; for low-concern participants neither one of the threat communications was particularly motivating.

In the remainder of this chapter we will attempt to explain why the results of the present experiment deviate from the results of the previous experiments in a number of respects. The previous studies provided evidence that fear increases the extent to which information is systematically processed, whereas very little evidence was found that the level of pre-existing concern has a similar impact. The present study by contrast showed evidence of a positive relation between the level of pre-existing concern and the extent of systematic processing, but failed to demonstrate any effect of the level of induced fear.

An important difference between this study and the previous ones regards the topic of the persuasive message. As was already explained in this chapter's introductory section, an energy tax has no clear benefits at the individual level. On the contrary, it quite likely results in higher electricity bills. Energy-efficient light bulbs on the other hand are not only beneficial from a collective perspective but from an individual perspective as well, because these bulbs save both energy and money.

Research findings reported by Yates suggest that the effectiveness of fear appeals is moderated by the costs associated with the recommendations (unpublished doctoral dissertation, cited in Meyerowitz & Chaiken, 1987). Yates found that negatively framed messages were more effective in promoting energy-saving devices for the home than positively framed messages, but only when the costs of purchasing these devices were low. Research by Meyerowitz and Chaiken (1987) also underlines the importance of behavioural costs. They found that immediate negative consequences of performing breast self-examination were strongly correlated with self-reported frequency of this behaviour.

It seems obvious that it is less difficult to even motivate people who are not concerned about climate change to consider using energy-efficient light bulbs, than to motivate them to consider accepting an energy tax. This may explain why in the previous experiments an effect of the fear induction on systematic processing could be demonstrated, whereas in the present experiment no such effect was found.

Acceptance of an energy tax requires recognition of its benefits at the collective level. This in turn depends on problem awareness. Only people who recognize that there is a collective problem have reason to consider the collective benefits of the measure. This may explain why the present experiment showed an effect of the level of pre-existing concern on the extent of systematic processing.

Another explanation for the inconsistent findings is that the impact of naturally occurring concern and induced fear on message processing is moderated by the perceived relevance of the message topic. It can be argued that for negative threat-related emotion to increase the extent of systematic information processing, this information has to be perceived as relevant within the context of the depicted threat (see Chapter 5). In the previous experiment as well as in the present one perceived relevance was measured by asking participants to rate the extent to which they thought the message topic was related to climate change on a 7-point scale anchored at 1 (*has very little relevance*) and 7 (*has very much relevance*).

In the present experiment a main effect of Concern on this relevance measure was found,

$F(1, 112) = 7.45, p = .007$. Participants in the high-concern group rated the message more relevant than participants in the low-concern group, $M = 5.21$ ($SD = 1.51$) and $M = 4.41$ ($SD = 1.87$) respectively. Hence, participants in the high-concern group had every reason to process the energy tax message for they were concerned about climate change and they were convinced of the relevance of the proposed measure, whereas participants in the low-concern group had none for they were not concerned about climate change and they were less convinced of the relevance of the proposed measure. No further effects were found.

In the experiment reported in Chapter 3 a main effect of Concern on perceived relevance was found too, $F(1, 147) = 6.29, p = .013$, indicating that according to high-concern participants the energy-efficient light bulb was more relevant within the context of climate change, $M = 4.99$ ($SD = 1.76$), than according to low-concern participants, $M = 4.40$ ($SD = 1.62$). However, the main effect of Fear also was significant, $F(2, 147) = 3.54, p = .032$, indicating that perceived relevance of the message about energy-efficient light bulbs was lower in the control condition than in the low and moderate-fear conditions, $M = 4.15$ ($SD = 1.87$), $M = 4.95$ ($SD = 1.66$), and $M = 4.78$ ($SD = 1.57$) respectively. Thus, when the message on the energy-efficient light bulb was preceded by a video about climate change, its relevance became evident. This was even true for low-concern participants.

Sample difference may explain the fact that the video about climate change resulted in a heightened perceived relevance of the target object in the previous experiment, but not in the present experiment. The previous experiment was conducted on a non-student sample, whereas the present experiment was conducted on a sample of students, mostly with a technical schooling. These students' beliefs about the issue of climate change are probably relatively well-developed and therefore less susceptible to attempts to influence them (compare Table B1 and B2 in Appendix B). An alternative explanation has to do with the fact that the video finished with a general recommendation to find out the energy expenditure of domestic appliances and to consider ways to reduce energy consumption in the home. The energy-efficient light bulb more closely relates to this recommendation than the energy tax.

Chapter 5

Relevance as a moderator of the relation between fear and elaboration

5.1 Introduction

The previous chapter concluded with a section stressing the possible importance of relevance as a moderator of the relation between negative emotion and the elaboration of information. The present chapter describes an experiment examining this moderating role of information relevance.

In an attempt to define information relevance Sperber and Wilson (1986) emphasize the effects that are brought about by the information within a given context. We are interested in information processing within the context of an imminent danger. Two classes of information appear to be relevant within this context. The first class encompasses information that may be functional in appraising the depicted threat. This type of information will be referred to as 'threat information'. Examples are information concerning the seriousness of the threat and its likelihood of occurrence (Rogers, 1975, 1983). Information inherent to an individual's emotional response towards the threat (see Schwarz and Clore, 1988, for a discussion of the informative function of affective states) and information that is helpful in attributing the emotional response (Schachter & Singer, 1962; Schwarz, Servay, & Kumpf, 1985) can also be considered to fall within this class of relevant information.

The second class of information that is presumed to be relevant within a threat context is information that may be functional in appraising potential coping responses. Coping responses are defined as attempts, whether cognitive or behavioural, to gain control of one's emotions, the danger itself, or both (Leventhal, 1970). This class of relevant information will be referred to as 'coping information'. Examples are information about the efficacy of potential coping responses and one's own ability to exhibit these responses (Rogers, 1983).

The previous experiments examined in-depth processing of information about devices or measures that are helpful in reducing energy consumption and hence in mitigating climate change. Within the context of climate change, information about energy-saving devices and measures can be viewed as coping information.

There are at least two theoretical perspectives on relevance as a moderator of the relation between negative emotion and systematic processing (Baron, Logan, Lilly, Inman, &

Brennan, 1994). According to the reduced capacity perspective negative emotional arousal decreases the cognitive capacity to process stimuli in general. This perspective implies that fear arousal decreases the elaboration of information, whether this information is irrelevant or relevant within the given context. According to the second perspective negative emotional arousal increases the motivation to elaborate relevant stimuli, leaving less capacity free for the processing of other stimuli. This perspective, which is called the attention allocation perspective, implies that fear arousal increases the extent to which relevant information is elaborated, but decreases the extent to which irrelevant information is elaborated.

Several studies have shown that fear arousal impedes the elaboration of irrelevant information (Baron, Inman, Feng Kao, & Logan, 1992; Wilder & Shapiro, 1989). This is reconcilable with both theoretical perspectives. There also are studies that have shown that fear arousal encourages the elaboration of relevant information (Baron et al., 1994; see also the experiments reported in the previous chapters). This contradicts the reduced capacity perspective but supports the attention allocation perspective. Jepson and Chaiken (1990) by contrast found that fear arousal resulted in less careful processing of relevant information. However, their study look at the impact of chronic fear, whereas the other studies mentioned examined the impact of temporarily induced fear. As was proposed by Jepson and Chaiken, chronic fear may lead individuals to develop a characteristic style of information processing, which may be typified as avoidance. Hence, Jepson and Chaiken also explained their results in terms of an underlying motivational process, i.e. a processing style involving avoidance may be functional because it reduces the chance of being exposed to frightening facts.

Each of the studies mentioned above examined the impact of fear on the elaboration of either irrelevant or relevant information. These studies therefore do not provide a basis to draw firm conclusions about the moderating role of relevance. We are aware of only one study in which information relevance was manipulated to study its moderating impact on the relationship between fear and systematic processing. Gleicher and Petty (1992) manipulated relevance not by varying the information to be processed but by varying the fear source. Fear was aroused with regard to either crime or illness on the campus. The information to be processed was about a crime prevention programme. Hence, this information was relevant with regard to the former source of fear and irrelevant with regard to the latter. No evidence was found that the relation between fear arousal and in-depth information processing was moderated by the fear source.

The question is whether Gleicher and Petty's manipulation of relevance was powerful enough. As they themselves formulated it: "although crime and illness are distinct in the specific threat posed by each, it is possible that the underlying themes of personal safety and self-esteem maintenance would allow for protection motivation aroused by one issue to be satisfied by reassurance on the other issue" (1992, p. 91). Varying the fear source therefore does not seem to be an effective way of manipulating relevance.

Although Gleicher and Petty's study failed to provide a convincing test of the moderating impact of relevance, the results did support a motivational explanation of the relationship between fear and in-depth information processing: participants either were or were not given the opportunity to find reassurance through peripheral information processing. If reassurance could be reached through peripheral processing, frightened participants refrained from in-depth information processing. If not, frightened participants engaged in in-depth information processing. A study by Liberman and Chaiken (1992) also points to a motivational mechanism. This study showed that when a certain health risk was personally relevant, participants were less critical of reports that vitiated the risk than of confirmatory reports. When the health risk was not personally relevant, opposing and affirmative reports were treated equally critically.

Our conclusion is that there are both theoretical and empirical grounds to assume that a motivational mechanism underlies the relation between fear arousal and the extent of systematic information processing. In line with the attention allocation perspective, we assume that fear focuses the attention on relevant information, leaving less room for the processing of irrelevant information. In the terminology of the heuristic systematic model (Eagly & Chaiken, 1993) fear arousal increases the discrepancy between the actual and desired level of confidence for relevant information while decreasing it for irrelevant information. Until now no convincing test of these notions has been conducted. The purpose of the present experiment was to provide such a test.

It was decided to manipulate relevance by varying the topic of the information rather than varying the fear source for several reasons. First, as was suggested by Gleicher and Petty (1992), it is difficult to vary relevance by varying the fear source because seemingly different fear sources may refer to the same underlying themes such as personal safety. Second, even if relevance can be varied by exposing half of the participants to one threat and the other half to another threat, these threats are probably different in other respects as well. For example, some threats may induce counterfactual thinking more than others.

The first hypothesis tested in this experiment was that fear increases the extent to which relevant information is systematically processed (Hypothesis 1a). The second hypothesis tested was that fear decreases the extent to which irrelevant information is systematically processed (Hypothesis 2a). Elaborating on these primary hypotheses additional hypotheses were formulated regarding the relation between attitudes and behaviour. Based on the conceptual model presented in the introductory chapter it was hypothesized that fear results in stronger relations between attitudes and behaviour in the case of relevant information (Hypothesis 1b) and weaker attitude-behaviour relations in the case of irrelevant information (Hypothesis 2b) through its impact on the extent of systematic information processing.

5.2 Method

5.2.1 Design

The experiment had a 3 (control vs. low fear vs. moderate fear) x 2 (irrelevant information vs. relevant information) x 2 (weak arguments vs. strong arguments) between-subjects design. As in the previous two experiments, fear was manipulated by means of a video about climate change. Participants in different fear conditions were exposed to different versions of this video. Relevance and argument strength were manipulated by means of a message about a new TV set. Participants in different relevance and argument strength conditions were exposed to different versions of this message. The dependent variables in this experiment were attitudes, intentions, cognitive responses, and recall.

5.2.2 Participants

The experiment was conducted on a non-student sample of 228 inhabitants of Eindhoven and its environs. These participants were recruited by contacting leisure societies, and mainly musical societies. These leisure societies received financial compensation for each participant they arranged. The participants were informed that they were to take part in a study on consumer reactions to new products.

Approximately equal numbers of men and women participated in the experiment. The mean age of participants was $M = 45$ ($SD = 14$). As regards their educational background, 14 % of the participants were rated low, 32 % intermediate, and 54 % high ¹.

¹ For a definition of education levels see Footnote 1 in Chapter 2.

Participants were randomly assigned to the twelve cells of the experimental design, except that we took care that men and women were distributed equally across conditions.

5.2.3 Procedure

The procedure of this experiment was similar to that of the experiments reported in previous two chapters (see sections 3.2.3 and 4.2.3). This section will therefore be restricted to an outline of the experimental procedure; more detailed information will only be provided on particulars. An important procedural difference was that the successive phases of this experiment were presented as separate studies. In this way it was attempted to disconnect the manipulations of fear and relevance as much as possible.

The first phase consisted of the manipulation of fear, which was conducted with the same stimulus materials as in the previous two experiments. Participants in the low-fear condition were shown a video on climate change that aroused a low level of fear. Participants in the moderate-fear condition also watched a video about climate change that was designed to induce a moderate level of fear however. The video shown to participants in the control condition dealt with a non-threatening, irrelevant topic, namely composing and producing music by means of computers. Immediately after this manipulation its effectiveness was checked by having participants respond to a self-report measure of fear.

The next phase consisted of the manipulations of relevance and argument strength. Participants read a message recommending a new TV set at their own pace, which was presented as innovative either in an environmental respect or in some other respect. The message consisted of either weak or strong arguments in favour of the TV set.

In the last phase of the experiment the dependent variables were measured. Participants responded to a thought-listing task, measurements of attitudes and intentions, and a recall task respectively, followed by manipulation checks and additional measurements. After the experiment participants were debriefed and thanked.

5.2.4 Stimulus materials

Manipulation of fear. Fear was manipulated in exactly the same way as in the previous two experiments. For a description of the stimulus materials the reader is referred to section 3.2.4.

Manipulation of relevance. Relevance was manipulated by exposing half of the participants to a persuasive message about a new environmentally friendly TV set and the

other half to a message about a new TV set that excelled in some other respect. In the relevant information condition participants were told that the new TV set was more environmentally friendly because of its lower energy use and its higher suitability for recycling. Participants in the irrelevant information condition were told that the new TV set was better for the eyes because of its flicker-free image. The manipulation of relevance was reinforced by using the label 'Greenline television' in the relevant condition, whereas in the irrelevant condition the label 'Softline television' was applied.

In a pilot study with a one factorial between-subjects design, 41 participants rated the television's relevance. The relation between the TV set and the environment, the greenhouse effect, and energy saving was rated on 7-point scales anchored at 1 (*very weak relation*) and 7 (*very strong relation*). Ratings on these scales were combined to form a measure of relevance. Cronbach's Alpha for this scale was $\alpha = .82$. The environmentally friendly television was perceived as significantly more relevant than the steady-image television, $M = 4.97$ ($SD = 1.04$) and $M = 3.35$ ($SD = 1.50$) respectively, $F(1, 39) = 16.21$, $p < .001$ ².

In this pilot study the attitude towards the TV set was also measured on a scale ranging from 1 (*highly negative*) to 7 (*highly positive*), with all intermediate scale points labelled as well. There was no significant difference between attitude towards the Greenline television and attitude towards the Softline television, $F < 1$, *ns*. In addition a measurement of motivation to process information was included. Participants were asked to rate the extent to which they were interested in information about the TV set on a scale ranging from 1 (*not at all interested*) to 7 (*highly interested*), with all intermediate scale points labelled as well. The motivation to process information did not appear to differ for the Greenline and the Softline television, $F < 1$, *ns*.

² It should be noted that in the same pilot study it was also tested whether relevance could be successfully manipulated by presenting a light bulb as innovative either in an environmental or in a decorative sense. For reasons of continuity it would have been better to use the bulb as an attitude object instead of the TV set, because in two of the three previous studies a bulb was used. However, it turned out from the pilot study that the bulb did not allow for a sufficiently strong manipulation of relevance, $F(1, 39) = 1.24$, $p = .271$. The problem was that perceived relevance not only was high in the case of the relevant bulb, $M = 4.60$ ($SD = 1.57$) but also in the case of the irrelevant bulb, $M = 4.10$ ($SD = 1.30$). Possibly this is due to public campaigns pointing at the environmental aspects of lighting, whereas virtually no media attention has been paid to the environmental aspects of domestic appliances such as TV sets.

Manipulation of argument strength. The persuasive message about the new TV set encompassed the manipulation of argument strength. Following a description of the TV set either four weak or four strong arguments in favour of the TV set were presented. These arguments were selected from a pool of 25 arguments, which were pretested on 17 participants in a pilot study. They were asked to rate each argument's persuasiveness on a scale anchored at 1 (*weak*) and 7 (*strong*) and on a scale anchored at 1 (*very unconvincing*) and 7 (*very convincing*). Ratings on these two scales were combined to form a measure of persuasiveness. The persuasiveness of each of the weak arguments selected for use in the main study was rated significantly lower than each of the strong arguments, all p 's < .01. An example of a weak argument is: "Because the housing of the [product name] is dark grey, you can't see dust on it that easily." An example of a strong argument is: "The flat dark screen of the [product name] reduces irritating light reflection, so that the picture is clear during the day." The number of words was 124 in the weak message and 125 in the strong message. To avoid confounding of the manipulations of argument strength and relevance, only one set of weak arguments and one set of strong arguments was developed, which were used in both relevance conditions. All arguments were irrelevant in the sense that none of them referred to environmental aspects of the TV set. For a complete reproduction of the arguments used in this experiment see Table A4 (Appendix A).

5.2.5 Measurements

Checks on fear manipulation. The effectiveness of the fear manipulation was checked in the same way as in the previous experiments. For a description of these checks the reader is referred to section 3.2.5. Cronbach's Alpha was $\alpha = .91$ for the four-item scale constituting the self-report measure of fear and $\alpha = .93$ for the four-item scale measuring frighteningness. The correlation between reported fear and judged frighteningness was $r = .85$ ($p < .001$).

Checks on relevance manipulation. The effectiveness of the relevance manipulation was checked by asking participants to rate the extent to which they thought there was a relation between the TV set and the environment, the greenhouse effect, and energy saving, respectively, on three scales ranging from 1 (*very weak relation*) to 7 (*very strong relation*). These ratings were averaged to create a measure of relevance, $\alpha = .83$.

Checks on argument strength manipulation. The effectiveness of the manipulation of argument strength was checked in the same way as in the previous experiments. These checks are described in section 3.2.5. The correlation between perceived persuasiveness of

the separate arguments and of the whole message was $r = .57$ ($p < .001$).

Attitudes. Attitudes towards using the TV set were measured in a comparable way, as were attitudes towards using the energy-efficient light bulb and attitudes towards the energy tax in the previous experiments. For a description of this measure the reader is referred to section 3.2.5. The reliability of this four-item attitude scale $\alpha = .91$.

Intentions. Intention towards purchasing the TV set was measured by asking participants to rate the probability that they would purchase the TV set in the near future on a scale ranging from 1 (*very small probability*) to 7 (*very high probability*).

Cognitive responses. Cognitive responses were measured in the same way as in the previous experiments. Information on this measure is provided in section 2.2.5. Two independent judges categorized each response generated by the participant as either relevant or irrelevant to the message topic. Agreement between the judges was fairly high, Kappa = .80. The ratings of the two judges were averaged and a total number of relevant responses was computed for each participant.

Recall. Recall was measured in the same way as in the previous experiments. Information on this measure is provided in section 2.2.5. Two independent judges rated the extent to which participants correctly reproduced each of the four message arguments. Inter-rater reliability was fairly high, Kappa's between .75 and .93. The ratings of the two judges were averaged and a total number of correctly reproduced arguments was computed for each participant.

5.3 Results

Unless defined otherwise, all analyses of variance (MANOVAs and ANOVAs) reported in this section were performed on a full factorial model, including main effects for Fear, Relevance, and Argument Strength and all possible interactions between these factors. The terms in the model were tested against the within-cell sum of squares.

5.3.1 Effects on manipulation checks

Effects on fear manipulation checks. A MANOVA with reported fear and judged frighteningness as dependent variables only revealed a significant multivariate main effect of Fear, $F(4, 426) = 50.70$, $p < .001$. Table 5.1 shows that ratings on both checks were significantly higher in the moderate compared with the low-fear condition, multivariate $F(2,$

212) = 97.06, $p < .001$; the difference between the low-fear and the control condition was significant as well, multivariate $F(2, 212) = 12.74$, $p < .001$. It can be concluded that the manipulation of Fear was successful.

Table 5.1. *Effects of Fear manipulation on self-reports of fear and judgments of frighteningness*

	control condition	low-fear condition	moderate-fear condition
Self-reports of fear	1.32 (0.44) ^a	2.87 (0.97) ^b	3.50 (0.97) ^c
Judgments of frighteningness	1.58 (0.74) ^a	3.92 (1.28) ^b	4.71 (1.09) ^c

Note. Numbers are means with standard deviations in brackets. Within the same row, means with unequal superscripts are significantly different at $p < .05$ according to tests of the univariate contrasts.

Effects on relevance manipulation checks. An ANOVA with perceived relevance as a dependent variable showed a significant main effect of Relevance, $F(1, 215) = 44.58$, $p < .001$. Relevance ratings were higher in the relevant as compared with the irrelevant information condition, $M = 4.62$ ($SD = 1.38$) and $M = 3.41$ ($SD = 1.38$) respectively.

Table 5.2. *Effects of Fear and Relevance manipulations on perceived relevance.*

	Relevant-information condition	Irrelevant-information condition
Control condition	4.48 (1.24) ^a	3.14 (1.27) ^b
Low-fear condition	4.30 (1.64) ^a	3.66 (1.50) ^b
Moderate-fear condition	5.08 (1.12) ^a	3.44 (1.35) ^b

Note. Numbers are means with standard deviations in brackets. Within the same row, means with unequal superscripts were significantly different at $p < .05$.

The interaction effect between Fear and Relevance also was marginally significant, $F(2, 215) = 2.68$, $p = .071$. Tests of the simple effect of Relevance within each level of Fear revealed that this effect was significant in the control condition, $F(1, 215) = 18.45$, $p < .001$; in the low-fear condition, $F(1, 215) = 4.20$, $p = .042$; and in the moderate-fear condition, $F(1, 215) = 27.06$, $p < .001$. Means and standard deviations are presented in Table 5.2. It can

be concluded that the manipulation of Relevance was successful³.

Effects on argument strength manipulation checks. Perceived persuasiveness of the whole message and of the separate arguments were entered into a MANOVA as dependent variables.

Table 5.3. *Effects of Argument Strength manipulation on perceived persuasiveness of whole message and separate arguments.*

	Weak-arguments condition	Strong-arguments condition
Persuasiveness whole message	3.41 (1.29) ^a	3.81 (1.37) ^b
Persuasiveness separate arguments	3.18 (1.27) ^a	4.32 (1.25) ^b

Note. Numbers are means with standard deviations in brackets. Within the same row, means with unequal superscripts were significantly different at $p < .05$ according to tests of the univariate contrasts.

The expected main effect of Argument Strength appeared, multivariate $F(2, 214) = 25.01, p < .001$. No further effects were found. As can be seen in Table 5.3, perceived persuasiveness was higher when the message contained strong arguments, than when it contained weak arguments. It can be concluded that the manipulation of Argument Strength was successful.

5.3.2 Effects on dependent variables

Effects on attitudes. The results of the ANOVA with attitudes as a dependent variable are presented in Table 5.4. The mean for the entire sample was $M = 5.34$ ($SD = 1.08$).

The significant main effect of Argument Strength indicates that in general attitudes towards the TV set were more positive following exposure to strong arguments, $M = 5.50$ ($SD = 1.11$) than following exposure to weak arguments, $M = 5.18$ ($SD = 1.04$).

³ The Fear by Relevance interaction effect can also be analysed from a different perspective. Tests of the simple effect of Fear within each level of Relevance revealed that the fear manipulation influenced perceived relevance of the environmentally friendly television, $F(2, 215) = 3.34, p = .037$, but not of the steady-image television, $F(2, 215) = 1.38, p = .253$. Exposure to the frightening video about climate change resulted in higher perceived relevance of the environmentally friendly TV set, than exposure to either the neutral video about climate change, $F(1, 215) = 6.14, p = .014$, or the filler video, $F(1, 215) = 3.58, p = .060$. Whether participants were exposed to the filler video or the neutral video about climate change did not make a difference, $F < 1, ns$.

The marginally significant three-way interaction effect gave rise to additional tests of the simple Fear by Argument Strength interaction effect within each level of Relevance.

According to Hypothesis 1a fear increases the extent to which relevant information is systematically processed. Based on this hypothesis an interaction effect of Fear and Argument Strength was expected. However, this interaction effect was insignificant in the case of relevant information, $F < 1$, *ns*, and the pattern of the means was not as predicted either ($M = 5.39$ ($SD = 1.02$) in the relevant-information condition). Hence, our conclusion is that Hypothesis 1a is not supported by the attitude data.

Table 5.4. *Analysis of variance with attitude as a dependent variable*

	<i>df</i>	<i>F</i>	<i>p</i>
Fear (F)	2	1.31	.271
Relevance (R)	1	< 1	<i>ns</i>
Argument Strength (A)	1	5.29	.022
F x R	2	< 1	<i>ns</i>
F x A	2	2.21	.112
R x A	1	< 1	<i>ns</i>
F x R x A	2	2.36	.097
Within cells	216	(1.13)	

Note. Value enclosed in parentheses represents mean square error.

According to Hypothesis 2a fear decreases the extent to which irrelevant information is systematically processed, which should be expressed in an interaction effect of Fear and Argument Strength. This interaction effect indeed proved to be significant in the case of irrelevant information, $F(2, 216) = 3.99$, $p = .020$. Further tests revealed that in the case of irrelevant information Argument Strength had a significant impact on attitudes in the control condition, $F(1, 216) = 5.22$, $p = .023$, and in the low-fear condition, $F(1, 216) = 4.81$, $p = .029$, but not in the moderate-fear condition, $F(1, 216) = 1.49$, $p = .224$. As can be seen in Figure 5.1, exposure to strong arguments resulted in more favourable attitudes than exposure to weak arguments in the control condition and in the low-fear condition, but not in the moderate-fear condition. This indicates that inducing a moderate fear level decreased the extent to which irrelevant information was systematically processed.

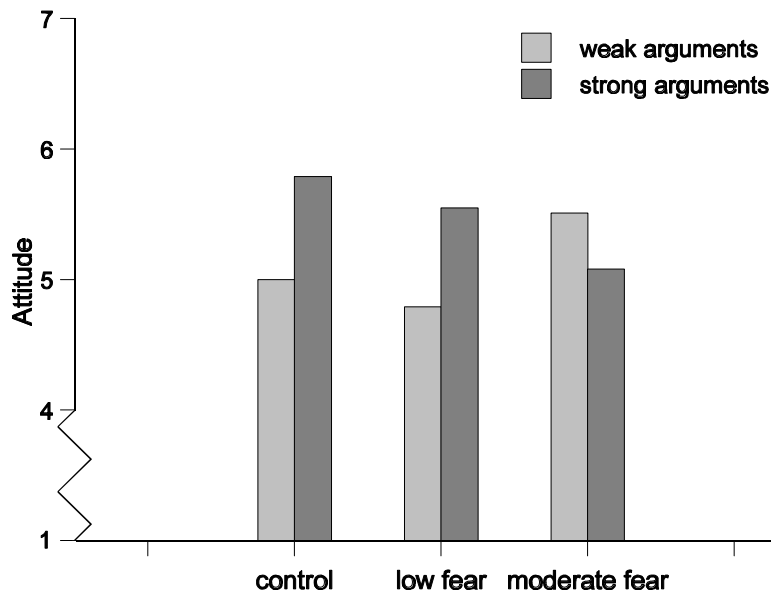


Figure 5.1. Effect of Fear and Argument Strength on attitudes in the case of irrelevant information.

Effects on intentions. The results of the ANOVA with intentions as a dependent variable are presented in Table 5.5. The mean for the entire sample was $M = 3.90$ ($SD = 1.91$).

Table 5.5. Analysis of variance with intention as a dependent variable

	<i>df</i>	<i>F</i>	<i>p</i>
Fear (F)	2	1.27	.283
Relevance (R)	1	< 1	<i>ns</i>
Argument Strength (A)	1	6.06	.015
F x R	2	< 1	<i>ns</i>
F x A	2	< 1	<i>ns</i>
R x A	1	< 1	<i>ns</i>
F x R x A	2	< 1	<i>ns</i>
Within cells	216	(3.65)	

Note. Value enclosed in parentheses represents mean square error.

Only the main effect of Argument Strength was significant, indicating that exposure to strong arguments resulted in stronger intentions to purchase the TV set, $M = 4.21$ ($SD = 1.91$) than exposure to weak arguments did, $M = 3.59$ ($SD = 1.87$).

No support was found for Hypotheses 1a and 2a: The predicted three-way interaction effect on intentions did not reach significance, and the pattern of the means was not in line

with the hypotheses either.

Correlations between attitudes and intentions. According to Hypothesis 1b fear results in stronger relations between attitudes and behaviour through the stimulation of the elaboration of relevant information. Based on this hypothesis the correlation between attitudes and behavioural intentions towards the relevant attitude object was expected to be higher at higher levels of fear. The correlation was $r = .62$ ($p < .001$) in the control condition, $r = .57$ ($p < .001$) in the low-fear condition, and $r = .52$ ($p = .001$) in the moderate-fear condition. The difference between the control condition and the other two conditions was not significant, as appeared from Fisher Z-tests (absolute value of both test statistics < 1 , *ns*). Our conclusion is that the correlation between attitudes and behavioural intentions towards the relevant attitude object was fairly strong regardless of the fear level.

According to Hypothesis 2b fear results in weaker relations between attitudes and behaviour by inhibiting the elaboration of irrelevant information. Based on this hypothesis the correlation between attitudes and behavioural intentions towards the irrelevant attitude object was expected to be lower at higher levels of fear. The correlation was $r = .64$ ($p < .001$) in the control condition, $r = .53$ ($p = .001$) in the low-fear condition, and $r = .71$ ($p < .001$) in the moderate-fear condition. The difference between the control condition and the other two conditions was not significant, as appeared from Fisher Z-tests (absolute value of both test statistics < 1 , *ns*). Our conclusion is that the correlation between attitudes and behavioural intentions towards the irrelevant attitude object was fairly strong regardless of the level of fear⁴.

*Effects on cognitive responses*⁵. The results of the ANOVA with the number of relevant

⁴ An analysis of covariance with intentions as dependent variable, Fear, Relevance, and Argument Strength as factors, and attitudes as covariate revealed no significant effects but a main effect of attitudes, $F(1, 216) = 70.07$, $p < .001$, confirming the conclusion that the relation between attitudes and intentions was strong regardless of the manipulations.

⁵ Besides analysing the number of relevant thoughts, the valence of these thoughts was also analysed. The measure of thought valence was created in the same way as in the previous experiments (see Footnote 2 in Chapter 2), Kappa = .75. This measure was entered as a dependent variable in an ANOVA. The mean for the entire sample was $M = .11$ ($SD = .61$). Hence, participants' thoughts about the TV set were somewhat positive.

Although the main effect of Argument Strength on thought valence was not significant, $F(1, 216) = 2.09$, $p = .149$, the pattern of the means was as one would expect. The thoughts generated in response to the weak arguments were less positive than those generated in response to the strong arguments, $M = .06$ ($SD = .62$) and $M = .17$ ($SD = .59$) respectively. The other effects were not significant either.

cognitive responses as a dependent variable are presented in Table 5.6. The mean for the entire sample was $M = 3.75$ ($SD = 1.41$).

Based on Hypothesis 1a and 2a fear arousal was expected to increase the generation of cognitive responses during exposure to relevant information, and decrease the generation of cognitive responses during exposure to irrelevant information. However, the interaction effect between Fear and Relevance did not reach significance, and the pattern of the means was not as predicted either. Hence, the cognitive response data provide no support for the hypotheses.

Table 5.6. Analysis of variance with number of relevant cognitive responses as a dependent variable

	<i>df</i>	<i>F</i>	<i>p</i>
Fear (F)	2	< 1	<i>ns</i>
Relevance (R)	1	1.94	.165
Argument Strength (A)	1	< 1	<i>ns</i>
F x R	2	2.23	.110
F x A	2	< 1	<i>ns</i>
R x A	1	< 1	<i>ns</i>
F x R x A	2	< 1	<i>ns</i>
Within cells	216	(2.46)	

Note. Value enclosed in parentheses represents mean square error.

Effects on recall. The results of the ANOVA with the number of correctly reproduced message arguments as a dependent variable are presented in Table 5.7. The mean for the entire sample was $M = 0.98$ ($SD = 0.92$).

The significant main effect of Argument Strength indicates that in general recall was better in the case of weak arguments, $M = 1.12$ ($SD = 0.97$), than in the case of strong arguments, $M = 0.85$ ($SD = 0.86$). Presumably this is due to a difference between the weak and strong arguments on a dimension irrelevant to the purposes of this experiment ⁶.

Based on Hypothesis 1a and 2a respectively fear arousal was expected to increase recall in the case of relevant information, and decrease recall in the case of irrelevant information. Although the expected Fear by Relevance interaction effect was insignificant, we did find a

⁶ Besides persuasiveness participants were asked to rate the comprehensiveness, complexity, and familiarity of the message. No differences were found between the weak and strong message, $F_s < 1$, *ns*.

significant three-way interaction effect. To examine whether the hypotheses served for one type of arguments but not for the other, the interaction effect of Fear and Relevance was tested for weak and strong arguments separately. The result was insignificant in the weak-arguments condition, $F < 1$, *ns*, as well as in the strong-arguments condition, $F(1, 216) = 2.28$, $p = .105$. Inspection of the means revealed a rather complex pattern that did not correspond with the hypotheses. Our conclusion is that the recall data provide no support for the hypotheses.

Table 5.7. *Analysis of variance with number of correctly reproduced message arguments as a dependent variable*

	<i>df</i>	<i>F</i>	<i>p</i>
Fear (F)	2	1.79	.170
Relevance (R)	1	< 1	<i>ns</i>
Argument Strength (A)	1	4.98	.027
F x R	2	< 1	<i>ns</i>
F x A	2	< 1	<i>ns</i>
R x A	1	2.04	.155
F x R x A	2	3.43	.034
Within cells	216	(0.82)	

Note. Value enclosed in parentheses represents mean square error.

5.4 Conclusions and discussion

The purpose of this experiment was to examine whether the impact of fear arousal on the extent of systematic information processing depends on the relevance of the information within the context of the threat. The main hypotheses tested were that fear arousal increases the extent to which relevant information is processed (Hypothesis 1a) and decreases the extent to which irrelevant information is processed (Hypothesis 2a). Elaborating on these primary hypotheses two additional hypotheses were formulated. Fear arousal results in stronger relations between attitudes and behaviour in the case of relevant information (Hypothesis 1b) and weaker attitude-behaviour relations in the case of irrelevant information (Hypothesis 2b) through its impact on the extent of systematic information processing. We will now summarize the evidence for each of the hypotheses separately.

Conclusions regarding Hypothesis 1a and 1b. Hypothesis 1a was not supported by the

results of this experiment. Neither the attitudes and intentions data, nor the cognitive response and recall data indicated that fear arousal resulted in greater elaboration of relevant information. In line with this, Hypothesis 1b equally could not be accepted. The relation between attitudes and intentions appeared to be fairly strong regardless of the fear level.

Conclusions regarding Hypothesis 2a and 2b. Some support was found for Hypothesis 2a. When the message topic was irrelevant, participants in the control and low-fear conditions based their attitudes on the strength of the message arguments, whereas participants in the moderate-fear condition did not. This can be taken as an indication that inducing a moderate level of fear decreased the extent to which irrelevant information was systematically processed. This corresponds with findings reported by others (Baron et al., 1992; Wilder & Shapiro, 1989) and can be explained both in terms of the reduced capacity view and the attention allocation view. No support was found for Hypothesis 2b. Regardless of the fear level the relation between attitudes and intentions appeared to be fairly strong.

The fact that this experiment did not demonstrate a stimulating impact of fear arousal on the elaboration of relevant information is inconsistent with the findings reported by Baron et al. (1994) as well as our own findings reported in the previous chapters. To find an explanation for this inconsistency, it is important to have a closer look at what did exactly happen in the relevant information condition.

In short, it is unclear in what way attitudes were formed in the relevant information condition: Neither the level of fear nor the strength of the arguments appeared to have an effect on attitudes. We did find an effect of argument strength on purchase intentions. Exposure to strong arguments resulted in stronger intentions than exposure to weak arguments. No effects whatsoever were found on cognitive responses. The effects on recall were difficult to interpret, but did not offer support for Hypothesis 1a in any case. Considering these results the conclusion is that actually very little seemed to occur in the relevant information condition. The question remains why in this study, contrary to previous studies, no evidence was found that fear results in a higher extent of systematic processing of relevant information.

Possibly the attitude object used in this study differed in some significant respect from the attitude objects used in the previous studies. It is conceivable that the relevance of the environmentally friendly TV set was less obvious than that of the energy-efficient light bulb. This may have resulted in an ambiguous situation, leaving the message receivers in doubt as to whether or not to pay careful attention to the message about the TV set. Unfortunately the measure of perceived relevance that was employed in the previous experiments deviates too much from the measure used in this experiment to allow an analysis on an aggregated level. However, in a pilot study with a within-subjects design perceived relevance of a comparable TV set and a comparable light bulb was measured in the same way as in the present study. A total of 13 participants rated the bulb as being more relevant, $M = 4.80$ ($SD = 1.25$), than the TV set, $M = 4.33$ ($SD = 1.39$). According to a paired samples T-test this difference was not significant, $t(12) = 1.51$, $p = .157$. It should be noted however that the power of this test was limited due to the small number of participants.

It is also possible that the contents of the messages used in this study differed in some significant respect from the contents of the messages used in the previous studies. In the previous studies some of the arguments presented in favour of the attitude object were relevant, as they referred to its environmental qualities. In the present study by contrast, only irrelevant arguments were presented, referring to aesthetical and hedonic qualities of the attitude object. Hence, while processing the persuasive message about the relevant attitude object, participants may have discovered that it was less relevant than they had expected and may therefore have abandoned further processing efforts.

According to Anderson's information integration theory (1991), judgments are formed and modified as people value incoming information and then integrate this information with their prior judgments. Valuation refers to determining the evaluative meaning and importance of new items of information. Integration refers to combining the valued items of information. The theory assumes that this integration process can be described in terms of simple algebraic models. One of the most popular variants is the averaging model. This model holds that people respond as if they have taken an average of the valued items of information.

If the averaging model correctly describes how judgments about relevance come about, presenting irrelevant arguments in favour of a relevant attitude object decreases overall relevance. Indeed, during the debriefing, quite a few participants in the relevant information condition expressed their surprise about the fact that the message did not contain

information about environmental qualities of the TV set. This anecdotal evidence can be amplified with the results of a pilot study with a 2 (irrelevant vs. relevant information) x 2 (weak vs. strong arguments) between-subjects design. In this pilot study with 45 participants data were gathered on the perceived relevance of the message about the TV set, and of the TV set itself. A repeated measures ANOVA with perceived relevance of the message and of the attitude object revealed that the message was perceived as less relevant, $M = 3.63$ ($SD = 1.77$), than the attitude object itself, $M = 3.97$ ($SD = 1.49$), $F(1, 41) = 4.14$, $p = .048$. This was true regardless of the manipulations.

A third difference between the previous studies and the present one that may explain the deviating results has to do with the experiment's set-up. Contrary to the previous experiments the subsequent phases of the present experiment (the fear manipulation, the manipulation of relevance and argument strength, and the measurements of the dependent variables) were presented as separate studies. As was explained in section 5.2.3, this was done to prevent participants from seeking a connection between the successive stimulus materials in conditions where this connection was lacking. However, due to this set-up the relation between the stimulus materials may have been unclear even in conditions where such a connection was meant to exist. An alternative explanation is that the switching from one study to the next may simply have distracted participants.

Chapter 6

General conclusions and discussion

In the introductory chapter the core issue of this dissertation was formulated as reaching people's minds through their hearts, or making people think by appealing to their emotions. A series of experiments was presented that tested a number of hypotheses, the most important of which was that negative threat-related emotion increases the elaboration of threat-related information.

The general set-up of the experiments was as follows. First, different levels of fear with regard to climate change were created. Next, participants were provided with information about energy-efficient products, or policy measures aimed at reducing energy consumption, including a number of arguments in favour of these products or measures. Finally, cognitive responses, recall, and attitudes were measured as indicators of the elaboration of information, and usually intentions too.

Before summarizing the results of our research an overview will be provided of the levels of fear induced in each of the four experiments. We will then outline the evidence that was found for our hypotheses and try to explain unexpected and inconsistent findings. Next, critical remarks are made on this particular research that apply to fear appeal research in general as well as research conducted within the dual-process paradigm (see introductory chapter). Fear appeals have never been off the research agenda, judging by the continuous flow of publications on this topic. However, the study of the relation between fear and persuasion has received renewed attention since it is being approached from a dual-process perspective. In this chapter questions to be addressed in future studies are outlined. The chapter concludes with remarks on the practical applicability of the insights obtained in this doctoral research.

6.1 An overview of the fear levels induced in the four experiments

In each of the four experiments presented in this dissertation participants were asked to judge the frighteningness of the stimulus materials that were used to manipulate fear. Figure 6.1 depicts these ratings of frighteningness. In the control conditions of the respective experiments no fear was induced. The ratings in these conditions refer to filler materials. In

Experiment 1 no filler materials were presented in the control condition. This explains why this condition is omitted in Figure 6.1.

The figure shows that frighteningness ratings were higher in the first experiment than in subsequent experiments. The most obvious explanation is that this is due to differences in stimulus materials. While print materials were used to manipulate fear level in the first experiment, in subsequent experiments video materials were employed for this purpose. As is stated by Maheswaran and Meyers-Levy: “Print media typically are thought to be more involving than TV” (1990, p. 366).

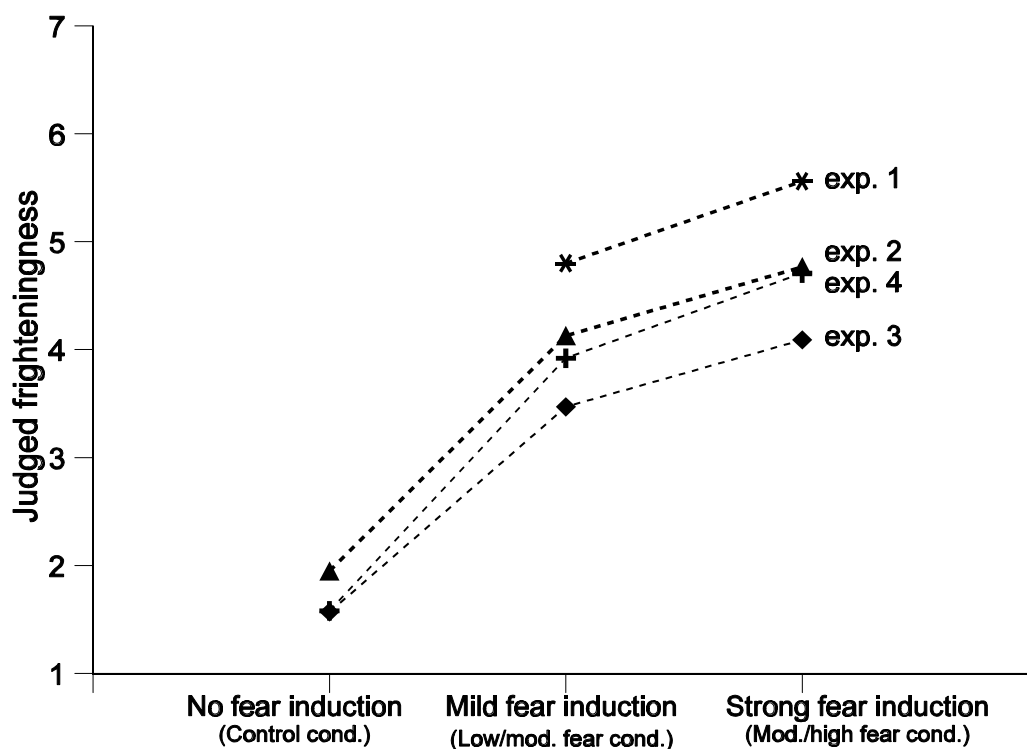


Figure 6.1. Induced fear levels in each of the four experiments.

An alternative explanation for the higher frighteningness ratings in Experiment 1 is that the percentage of female participants was higher in this experiment (68 %) than in subsequent experiments (48 %, 50 %, and 55 % respectively). Women tend to express fear more frankly than men (see e.g. Manstead, 1992; Fischer, 1993), though it is unclear whether this reflects a difference in emotional experience or merely a difference in emotional expressiveness. Support for this notion is provided by a T-test with the aggregated data of the four experiments, examining the effect of Sex on ratings of frighteningness. This effect was significant, $t(563) = 3.45$, $p = .001$, indicating that in general the stimulus materials were

more frightening according to female participants, 3.89 ($SD = 1.72$), than according to male participants, $M = 3.40$ ($SD = 1.64$).

Figure 6.1 also shows that comparable ratings of frighteningness were given in Experiments 2 and 4, but that in Experiment 3 somewhat lower judgments were given, despite equality of stimulus materials. An explanation may again be sought in sample differences. All experiments except the third were conducted on samples taken from the general public. Experiment 3 was conducted on a sample of students who probably were well-informed already about climate change (see Table B1 in Appendix B) and were therefore less impressed by the videos. Support for this notion is offered by a T-test with the aggregated data of the four experiments, examining the effect of Educational level on ratings of frighteningness. This effect was significant, $t(562) = 4.82$, $p < .001$, indicating that the stimulus materials were more frightening according to participants with a low or intermediate educational level, $M = 4.02$ ($SD = 1.71$) than according to participants with a high educational level, $M = 3.34$ ($SD = 1.63$).

Assuming that the central point of the measurement scale represents a moderate level of fear, it was decided to refer to the conditions of Experiment 1 as the control, moderate-fear and high-fear conditions respectively. The conditions of Experiments 2 to 4 are referred to as the control, low-fear and moderate-fear conditions, respectively. We will now proceed with discussing the results of our research.

6.2 Effect of induced fear on systematic processing

The hypothesis that arousing fear about climate change increases the elaboration of relevant information, e.g. about energy saving as a means to mitigate climate change, was tested in all four experiments reported in this dissertation. The results of Experiments 1 and 2 but not of Experiments 3 and 4 provide some support for this hypothesis. A (marginally) significant interaction effect of Fear and Argument Strength on attitudes (Experiments 1 and 2) and intentions (Experiment 2) and a significant main effect of Fear on cognitive responses (Experiment 1) indicate that inducing a moderate to high level of fear increased the tendency to engage in systematic processing of relevant information.

Besides influencing attitudes indirectly by increasing systematic processing, fear also seemed to directly affect attitudes. A significant main effect of Fear on attitudes in

Experiment 1 indicates that higher levels of fear about climate change were associated with more favourable attitudes towards the new energy-efficient light bulb. In discussing the results of Experiment 1 (see section 2.4) we proposed that this direct effect may be due to the informative value of the fear response (see Schwarz & Clore, 1988). In other words, fear may function as a signal, informing the individual about imminent danger and the pressing need to find protection. This signal function of fear may facilitate acceptance of the recommended coping response.

The informative value of fear can be conceived of as a simple heuristic (Eagly & Chaiken, 1993). Interestingly, the heuristic systematic model holds that variables that increase the motivation to engage in systematic processing should also enhance the likelihood of heuristic processing, because they increase the cognitive accessibility of relevant heuristics and/or the attentiveness for relevant heuristic cues (Chaiken, Liberman, & Eagly, 1989). Theoretically it therefore is possible that fear simultaneously functions as a motivator of systematic processing and as a heuristic cue.

In addition to testing the hypothesis that fear increases the elaboration of *relevant* information, Experiment 4 tested the hypothesis that fear decreases the elaboration of *irrelevant* information. This experiment provides some support for this hypothesis. A significant interaction effect of Fear and Argument Strength on attitudes towards the irrelevant attitude object indicates that inducing a moderate level of fear decreased the tendency to engage in systematic processing of irrelevant information.

Differences in attitude objects and arguments may explain why the results of the first two experiments are not replicated by the results of the last two experiments. In Experiments 1 and 2 the target information was about energy-efficient lighting. Energy-efficient light bulbs are not only beneficial from a collective perspective, but from an individual perspective as well. Although the initial expense of purchasing energy-efficient light bulbs is relatively high, the net costs of using these bulbs are relatively low due to a lower electricity bill. Hence, applying energy-efficient lighting not only saves energy but money too. By contrast, the target information in Experiment 3 was about the implementation of a European energy tax. From an individual perspective an energy tax is unfavourable, because the implementation of this measure quite likely results in higher electricity bills. Hence it seems obvious that it is harder to motivate people to consider accepting an energy tax than to motivate them to consider using energy-efficient light bulbs. This may explain why an effect of the fear induction on systematic processing could be demonstrated in Experiments 1 and 2, whereas

in Experiment 3 no such effect was found.

In Experiment 4 the target information was about a new TV set that was more environmentally friendly because of its lower energy use and its higher suitability for recycling. Compared with light bulbs, the environmental aspects of TV sets probably are less well-known to the general public. In the Netherlands energy-efficient lighting has been the focus of several public information campaigns; far less attention has been paid to environmental aspects of domestic appliances such as TV sets. Therefore, the environmental relevance of the target object in Experiment 4 may have been less obvious than that of the target objects used in the other experiments. This may have been even more so because for experimental reasons it was decided to present only environmentally irrelevant arguments in Experiment 4, referring to aesthetical and hedonic qualities of the target object instead of its environmental qualities. Hence, while processing the information about the environmentally friendly TV set, the receivers may have become less and less convinced of its relevance and may therefore have abandoned further processing efforts. This may explain why no effect of fear on the elaboration of 'relevant' information could be demonstrated in Experiment 4.

6.3 Effect of pre-existing concern on systematic processing

The hypothesis that the level of pre-existing concern is positively related to the elaboration of relevant information was tested in Experiments 2 and 3. Regarding the latter experiment, a significant interaction effect of Concern and Argument Strength on attitudes and a marginally significant main effect of Concern on cognitive responses and recall indicate that information indeed was more carefully processed when the level of concern was high rather than low. Experiment 2 provides far less support for the hypothesis that concern increases the elaboration of information, although some of the data patterns are in line with this hypothesis.

It is remarkable that in Experiment 2 indications were found of an effect of the level of induced fear on the elaboration of information, but not of a comparable effect of the level of pre-existing concern, whereas the opposite is true for Experiment 3. An explanation why no effect of individual differences in concern on the elaboration of information could be demonstrated in Experiment 2 may be that this effect was overruled by the effect of the fear induction. In the previous section it was argued that in contrast with an energy tax, energy-

efficient lighting may not only be accepted because of collective motives but also because of self-interested motives. Even persuading people who are unconcerned to consider accepting energy-efficient lighting may therefore be easier than persuading them to consider accepting an energy tax. This may explain why an effect of the fear induction was found on the elaboration of information about energy-efficient lighting (Experiment 2), but not on the elaboration of information about an energy tax (Experiment 3). Because the consequences of an energy tax are primarily negative at the individual level, accepting this measure requires recognition of its benefits at the collective level. It can be argued that this in turn depends on problem awareness. Only people who recognize that there is a collective problem have reason to consider the collective benefits of the measure. This may explain why Experiment 3 demonstrated an effect of the level of pre-existing concern on the extent of systematic processing.

6.4 Combined effects of pre-existing concern and induced fear on elaboration

No specific hypotheses were formulated regarding the combined effects of the level of naturally occurring concern and the level of induced fear on in-depth information processing. However, we proposed an activation-induction model (see section 3.1), which is based upon the assumption that emotional responses towards a threat have to exceed a certain level for people to engage in systematic processing of threat-relevant information. Both activated pre-existing emotions and induced emotions may raise arousal above the threshold value.

The activation-induction model holds that threat communications may both activate pre-existing emotional responses towards the threat and induce emotional responses in themselves. Regarding the induction of emotional responses, a threat communication comprising a moderate-fear induction is by definition more effective than a threat communication comprising a low-fear induction. As for the activation of pre-existing emotions, however, it is presumed that a low-fear threat communication is as effective as a moderate-fear threat communication.

Figure 6.2 visualizes the implications of the activation-induction model for the combined effects of the level of pre-existing concern and the level of induced fear with regard to the threat on the elaboration of threat-relevant information. The model's activation principle implies that if the level of pre-existing concern is high, both low and moderate-fear threat communications will increase systematic processing. The model's induction principle implies

that if the level of pre-existing concern is low, only the moderate-fear threat communication will increase systematic processing. The figure also leaves room for main effects for the level of pre-existing concern and the level of induced fear on the extent of systematic processing.

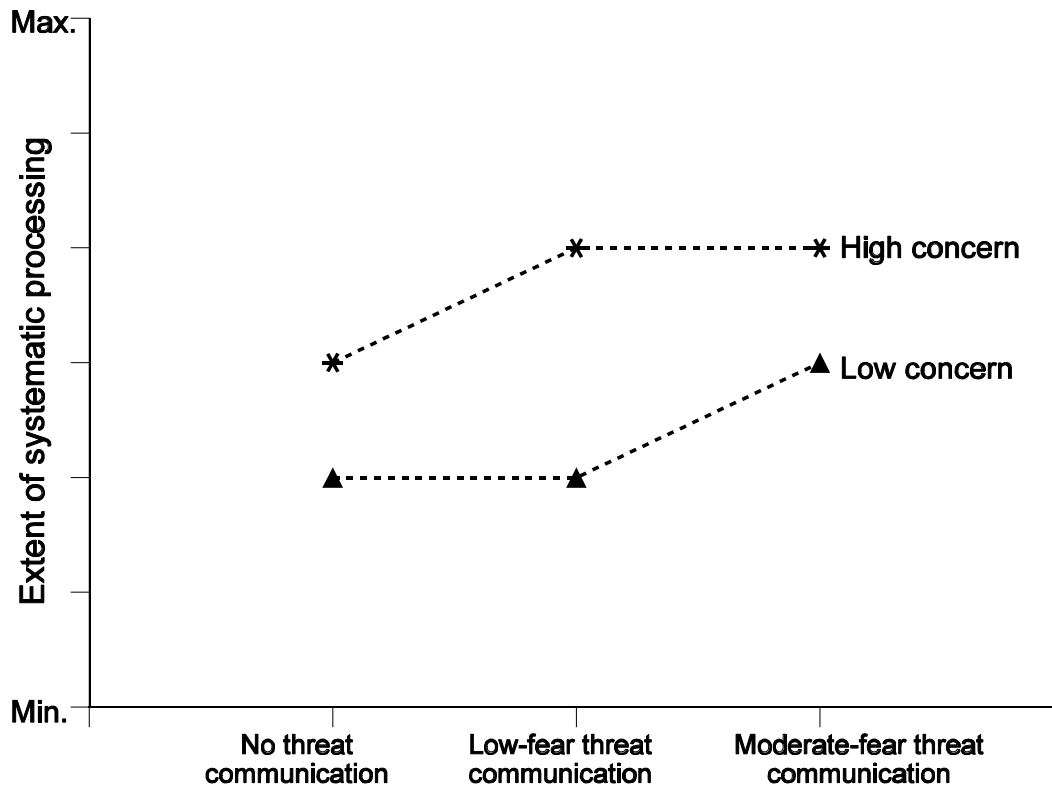


Figure 6.2. Expected combined effects of the level of pre-existing concern and the level of induced fear on the extent of systematic processing according to the activation-induction model.

Experiments 2 and 3 examined the impact of both the level of pre-existing concern and the level of induced fear on the elaboration of information. Below the evidence that was found for the activation-induction model will be lined up. Starting with the fear manipulation checks, significant main effects of Concern and Fear and a significant Concern by Fear interaction effect were found (Experiments 2 and 3). Further analyses of these effects revealed that in line with the activation principle both low and moderate-fear communications aroused a higher level of fear in high than in low-concern participants. In line with the induction principle the moderate-fear communication aroused a higher level of fear than the low-fear communication in both low and high-concern participants. This indicates that the threat communications both activated pre-existing emotions and induced ‘new’ emotions.

Participants were also asked to rate the extent to which they found the stimulus materials

motivating that were used to manipulate fear. A (marginally) significant interaction effect of Concern and Fear was found in these motivation ratings (Experiments 2 and 3). Further analyses of this interaction effect revealed that in agreement with the activation principle both low and moderate-fear communications were highly motivating according to high-concern participants. In agreement with the induction principle only the moderate-fear communication was particularly motivating according to low-concern participants. This data pattern provides further support for the activation-induction model.

Concerning indicators of the extent of systematic processing the only evidence for the validity of the activation-induction model was a nearly significant interaction effect of Concern, Fear and Argument Strength on behavioural intentions measured immediately after message exposure (Experiment 2). Further analyses of this interaction effect revealed that when the level of pre-existing concern was high, intentions were influenced by the strength of the arguments regardless of whether or not fear was induced. When the level of concern was low, intentions were only influenced by the strength of the arguments when moderate fear was induced. This pattern of results is in agreement with the expectations depicted in Figure 6.2.

6.5 Effects of negative emotion on attitude stability and attitude-behaviour relations

The hypothesis that negative emotion (whether it is pre-existing concern or induced fear) results in higher attitude stability by increasing the elaboration of relevant information was tested in Experiment 2. No evidence was found for this hypothesis. Regardless of the level of negative emotion attitudes were less favourable three weeks later, than immediately after message exposure.

Experiments 1, 2, and 4 tested the hypothesis that negative emotion (whether it is pre-existing concern or induced fear) results in a stronger relation between attitudes and intentions by increasing the elaboration of relevant information. No support was found for this hypothesis. The relation between attitudes and intentions appeared to be strong even when the level of negative emotion was low. Experiment 1 also examined the relation between intentions and actual behaviour. This relation indeed appeared to only be significant when the level of fear was high.

Experiment 4 tested the hypothesis that in the case of irrelevant information fear results in a weaker relation between attitudes and intentions by decreasing the elaboration of this

information. No evidence was found for this hypothesis. The relation between attitudes and behavioural intentions appeared to be fairly strong regardless of fear level.

The generally strong relation between attitudes and intentions may be due to a lack of discriminant validity of the attitude and intention measures. It is possible that the attitude and intention items employed in the experiments in fact tapped the same underlying construct. In line with this, factor analyses resulted in a one-factor solution explaining the correlations among the attitude and intention items.

6.6 Possibility of a non-linear effect of negative emotion on elaboration

In contrast with previous studies (e.g. Baron, Logan, Lilly, Inman, & Brennan, 1994; Gleicher & Petty, 1992; Kuppens, de Wit, & Ströbe, 1996) the research described in this dissertation took into account the possibility that negative emotion has a non-linear effect on systematic processing. The results show no sign of a non-linear impact of negative emotion on the extent of systematic processing, though. The results summarized in sections 6.2 and 6.3 indicate that low levels of negative emotion (whether it is pre-existing concern or induced fear) have no effect on the elaboration of information (Experiment 2, 3, and 4), whereas there are some indications that moderate to high levels of negative emotion increase the elaboration of relevant information (Experiment 1, 2, and 3) and decrease the elaboration of irrelevant information (Experiment 4). Hence these research outcomes merely reflect a linear relation between negative emotion and the amount of processing.

The fact that the results of our experiments showed no sign of a non-linear relation between negative emotion and the extent of systematic processing does not rule out the theoretical possibility of non-linearity. It is plausible that cognitive capacity decreases as the level of fear approaches the maximum pole of the fear continuum. From a certain point in the continuum this capacity-reducing effect of fear overrules its motivating effect, resulting in a decrease in systematic processing (see also section 1.7.2). The exact location of the break-point in the fear continuum may depend on individual difference and situational factors (see Janis' family of curves model, 1967). However, we think that the level of arousal typically elicited by emotional appeals is not that high, certainly not when environmental threats are considered.

6.7 Assessing the extent of systematic processing

The experiments presented in this dissertation aimed to assess differences in the extent of systematic processing caused by differences in the level of negative emotion. The dependent variables in these experiments can be divided into two groups. Attitudes and behavioural intentions can be considered outcomes of information processing, whereas cognitive responses and recall are assumed to more directly reflect the extent of systematic processing. The validity of each of these variables as an indicator of systematic processing can be queried and their operationalization is not without problems either.

Despite the problems associated with generally accepted indicators of systematic processing such as cognitive responses and recall, these variables have demonstrated the effects that were predicted on the basis of the dual-process theories in many previously published studies. However, the majority of these studies was carried out on student samples (Verplanken, 1991). By contrast, three of the four studies described in this dissertation were carried out on non-student samples and these studies hardly showed any effects on cognitive responses and recall. Possibly cognitive response and recall tasks are more suitable for studying information processing in students, for they are more used to performing complex verbal tasks.

Some support for the notion that the suitability of cognitive response and recall tasks depends on the educational level of the participants is offered by a T-test with the aggregated data of the four experiments, examining the effect of Educational Level on cognitive responses. This effect appeared to be significant, $t(626) = 4.82, p < .001$, indicating that participants with a high educational level generated more thoughts than participants with a low to intermediate educational level, $M = 4.13 (SD = 1.66)$ and $M = 3.43 (SD = 1.50)$ respectively. Regarding recall we also found an effect of Educational Level, $t(623) = 9.02, p < .001$, indicating that participants with a high educational level performed better on the recall task than participants with a low to intermediate educational level, $M = 1.63 (SD = 1.15)$ and $M = 0.89 (SD = 0.87)$ respectively.

Publications are remarkably inconsistent in the selection of indicators for the the extent of systematic processing that are reported. In some publications cognitive responses are used as indicators in diverse ways: the total number of relevant responses (e.g. Block & Keller, 1995), the number or proportion of positive responses and the number or proportion of negative responses (e.g. Bless, Mackie, & Schwarz, 1992), and the difference between the

number or proportion of positive and negative responses (e.g. Wegener, Petty, & Smith, 1995)¹. In some publications recall of arguments is reported (e.g. Baron et al., 1994). Also, reading times are sometimes reported (e.g. Mackie & Worth, 1989). The seeming arbitrariness with which indicators are or are not reported may reflect a lack of agreement on how to make a valid assessment of the extent of systematic processing.

6.8 Manipulating fear

It is common practice in fear appeal research to create different fear levels by providing different information on the severity of and vulnerability to the threat (e.g. Baron et al., 1994; Gleicher & Petty, 1992; Hale, Lemieux, & Mongeau, 1995). However, this precludes disentangling the effects of affective and cognitive aspects of experiencing threat. In Chapter 3 we referred for example to Wood and Kallgren (1988) who demonstrated that merely being knowledgeable about environmental preservation increases the tendency to systematically process information on this issue. In the present research we therefore attempted and managed to manipulate fear without concurrently manipulating knowledge. Different fear levels were created by varying the vividness of threat communications while keeping its informational contents constant (see sections 2.2.4 and 3.2.4).

It was difficult to obtain a fear manipulation that was powerful enough merely by varying non-content aspects of the threat communications. While developing the videos that were employed to manipulate fear in Experiments 2 to 5, it was therefore decided to simultaneously vary different non-content aspects, such as voice-over and music, to achieve a sufficiently powerful fear manipulation.

It should be noted that the fact that this research considered an environmental threat instead of a personal health threat (see section 1.7) is likely to be one of the causes why it was difficult to obtain a sufficiently powerful fear induction. Threats to the environment seem to be less concerning to people than threats to personal health². This seems to be

¹ We also conducted analyses of variance with a measure of thought valence as a dependent variable and hardly found any effects, see footnotes in Chapters 2 to 5.

² In Experiments 3 and 4 participants were asked to rate their concern about the greenhouse effect (see section 3.2.5 for further details on this measurement). To mask the purpose of this measurement, participants were asked to rate their concern about a number of other issues as well, among which AIDS. A paired samples T-test with the aggregated data of Experiments 3 and 4 revealed that participants were significantly more concerned

particularly true for large-scale environmental threats such as climate change. The farther away in time and space people think a threat is, and the more difficult it is for them to visualize the threat, the less involved they are (Veldkamp, 1997). This nicely captures one of the key challenges in climate change policy: How to legitimize drastic policy measures against a problem as 'far away' and as 'abstract' as climate change.

In Experiments 2 to 4 the effectiveness of the fear manipulation was not only examined by having participants rate the frighteningness of the stimulus materials, but also by having them report their feelings. Assuming that emotions are relatively short-lived (Forgas, 1994), this self-report measure of fear had to be conducted immediately after the fear manipulation, and hence, preceding the other manipulations³. This may have interfered with the process under investigation. To check this it is advisable that in future research the check is included in half of the conditions, while it is omitted in the other half.

6.9 Manipulating argument strength

A few comments should also be made on the manipulation of argument strength. The persuasive messages that were used to study differences in the extent of systematic processing included 3 to 4 arguments. Perhaps more complex messages including a higher number of arguments would have made differences in elaboration more visible. The small number of arguments, for example, may explain why hardly any effects on the recall

about AIDS than about the greenhouse effect, $M = 4.21$ ($SD = 1.67$) and $M = 3.82$ ($SD = 1.69$) respectively, $t(280) = 3.31$, $p = .001$. This is just an example to illustrate that people generally are more concerned about threats to personal health than about threats to the environment.

³ In Experiment 4 fear was reassessed after the measurements of the dependent variables. A repeated measures ANOVA with self-reported fear at T1 and T2 as dependent variables revealed a main effect of Time, $F(1, 215) = 276.94$, $p < .001$. At T2 self-reported fear was lower $M = 1.62$ ($SD = 0.81$), than at T1, $M = 2.56$ ($SD = 1.24$), which confirms our notion that emotion is a short-lived response (the second measurement of fear was conducted about ten minutes after exposure to the fear manipulation).

No further significant effects were found except an interaction effect of Fear and Time, $F(2, 215) = 59.36$, $p < .001$. The level of fear decreased significantly in the moderate-fear condition, $F(1, 215) = 262.57$, $p < .001$, and in the low-fear condition, $F(1, 215) = 130.01$, $p < .001$. In the control condition the level of fear already was very low and therefore could not decline, $F(1, 215) = 1.38$, $p = .242$.

measure were found.

Another important remark regarding the argument strength manipulation is its dependency on situational and individual difference factors. Experiments 2 and 3 showed that low and high-concern participants disagreed about the strength of the whole message and the separate message arguments (see sections 3.3.1 and 4.3.1). This indicates that argument strength depends on individual difference factors and possibly also on situational factors. This has important pragmatic implications, for it seems to be quite difficult or even impossible to develop information campaigns that are persuasive to the general public as a whole. Hence it is important to divide the target group into segments and to tune the campaign to these segments. The research presented in this dissertation suggests that concern is one of the factors on the basis of which the target group should be segmented in preparing campaigns about environmental issues. If it is not possible to develop and implement different communication strategies for different segments of the target group (e.g. because of a limited budget), a communication strategy should be chosen that is tuned to the largest segment, or the segment that is believed to have the largest potential to contribute to a solution for the issue under consideration.

6.10 Integrating information elements during processing

We would like to briefly return to an issue brought up in section 5.4. In this section we argued that the manipulation of relevance employed in Experiment 4 maybe was not powerful enough because the attitude object was presented as environmentally friendly, yet the arguments that were presented in favour of this attitude object were about other qualities. In other words, the environmentally relevant attitude object was praised for its environmentally irrelevant qualities. Hence, while processing the message about this attitude object, the receivers may have concluded that it was less relevant to the environmental threat they faced than they had expected and may therefore have abandoned further processing efforts.

These speculations on how receivers may have adjusted their judgment while processing the message underlines the importance of gaining insight into how receivers integrate the various elements of a message when attempting to form an opinion. Combining information integration theory (Anderson, 1981) with contemporary dual-process theories of persuasion and particularly with the heuristic systematic model's notions of actual and desired levels of

confidence (Chaiken, Liberman, & Eagly, 1989) offers useful starting-points to form hypotheses about the integration of information.

6.11 Alternative methods to study the extent of systematic processing

Manipulating argument strength is a method broadly applied to determine differences in the extent of systematic processing. Aside from the fact that the impact of argument strength on attitudes and intentions only indirectly reflects the degree to which information has been elaborated, it is not a very efficient way of studying differences in the extent of systematic information processing either. Conditions are doubled when an argument strength manipulation is included. It therefore is highly desirable that more efficient ways of studying systematic processing are developed.

We are aware of some studies in which alternative methods were employed to assess differences in systematic processing (see e.g. Baron, Inman, Feng Kao, & Logan, 1992; Wilder & Shapiro, 1989; Liberman & Chaiken, 1992). These however are exceptions to the rule of manipulating argument strength for examining differences in elaboration. Research within the dual-process paradigm would benefit from a systematic examination of the similarities and dissimilarities of various methods of studying the amount of in-depth processing and their respective advantages and disadvantages.

6.12 The role of negative emotion in real-life communication settings

In reality the circumstances often are not conducive to systematic processing. In this dissertation one way of improving the circumstances for systematic processing was examined, namely by appealing to negative threat-related emotions. As was mentioned earlier in this chapter, the heuristic systematic model of persuasion holds that variables which increase the motivation to engage in systematic processing should also enhance the likelihood of heuristic processing (Chaiken et al., 1989). This is because they increase the cognitive accessibility of relevant heuristics and/or increase attentiveness to relevant heuristic cues. To allow a simultaneous examination of the effect of negative emotion on systematic and heuristic processing, future research designs should be extended with a manipulation of a heuristic cue.

Because a laboratory offers optimal circumstances to keep disturbing influences within

bounds, it was decided to conduct the experiments in a laboratory setting. This dissertation may have made clear that even in circumstances that are optimal in this respect it is hard to map the processes underlying the persuasive effects of environmental communications that appeal to negative emotions. Still, it is advisable to eventually examine these effects in more realistic field settings, or at least to examine the moderating role of characteristics of field settings.

In many real-life situations the capacity or opportunity to carefully process information is limited. Due to factors such as distraction, time pressure, and information overload people only superficially process the greater part of the many hundreds of communications they are confronted with every day. In these circumstances emotions such as fear may function as a cue, permitting attitude formation or change in a relatively effortless way. Whether this method of processing has a positive or a negative impact on attitudes depends on the mechanism involved. When a process of conditioning is put into operation, the experience of fear may be directly associated with the recommended coping response, resulting in a negative attitude towards this response. In the case of heuristic processing (see also section 6.2) fear arousal may activate a 'positive' heuristic, for example 'fear should be fought', resulting in a positive attitude towards the recommended coping responses, or it may activate a 'negative' heuristic, for example 'fear is a bad counsellor', resulting in a negative attitude. It is clear that research is needed to determine the impact of negative emotions such as fear when factors such as distraction interfere with systematic processing.

Another important characteristic of field settings is the confrontation with counter-arguments. Over the years the media have paid a lot of attention to disagreements between experts regarding both causes and consequences of climate change (see e.g. Knip, 1997). This raises the question what happens when people are confronted with messages to the contrary after being exposed to an information campaign appealing to negative threat-related emotions. Based on the dual-process theories of persuasion we predict that, provided that negative emotion increases systematic processing, it also increases resistance to counter-argumentation. It is indisputable that uncertainty is a scientific reality and this uncertainty should not be disguised in communications directed towards the general public. It is a psychological reality though that this uncertainty can be embraced to deny the necessity to undertake action and to legitimate inaction.

6.13 Implications for the practice of developing information campaigns

Prior fear appeal research has almost exclusively been conducted within the domain of communications concerning threats to personal health. The literature study and the empirical research presented in this dissertation suggest that appeals to negative emotions may also be functional within the domain of communications concerning large-scale environmental threats such as climate change. Such appeals may make people think and this may result in more positive attitudes towards anti-climate change actions and policies, provided that several requirements are met. First, people have been found to generally have a poor understanding of the relation between human-induced climate change and the combustion of fossil fuels for energy consumption (e.g., Read, Bostrom, Morgan, Fischhoff, & Smuts, 1994). To prevent feelings of a lack of control and boomerang effects, appeals to negative emotions should be combined with a crystal-clear explanation of the relation between the depicted threat and individual behaviour. The second requirement is that effective and feasible recommendations on how to mitigate the threat should be provided (see also Rogers, 1975; 1983). Finally, the arguments provided in favour of these recommendations should be strong and compelling and at least some of them should underline the efficacy of the recommendations.

The research presented in this dissertation first and foremost demonstrates that developing a persuasion strategy based on negative threat-related emotions requires a delicate touch. Furthermore, our treatise of possible cue effects of negative threat-related emotions in the previous section suggests that appealing to such emotions may be counter-productive under certain circumstances. We therefore agree with Boster and Mongeau's conclusion, based on their meta-analysis of fear-appeals, that "at minimum, a practitioner must pretest persuasive messages before using them in an applied context, such as a public service campaign" (1984, p. 370). Pretesting entails more than examining the acceptability of messages. It entails examining whether the intended effects on for example attitudes actually occur in an experimental set-up. To conclude, if it is developed along theoretical and empirically proved principles and thoroughly pretested, a persuasion strategy based on negative-threat related emotions can be a useful instrument to reach people's minds through their hearts.

Samenvatting

Deze samenvatting zet per hoofdstuk de hoofdlijnen uiteen van het proefschrift 'Klimaatverandering en verandering van attitudes: Effect van negatieve emotie op informatieverwerking'.

Hoofdlijnen van Hoofdstuk 1

In Hoofdstuk 1 wordt ingegaan op het belang van het in dit proefschrift gepresenteerde onderzoek en wordt het theoretische kader van het onderzoek uiteengezet. Het hoofdstuk begint met een citaat van Brundtland, de voorzitter van World Commission on Environment and Development: "Als het ons niet lukt de urgentie van onze boodschap duidelijk te maken aan de ouders en besluitvormers van nu, zetten we het fundamentele recht van onze kinderen op een gezonde en leefbare omgeving op het spel. De vergaande sociale veranderingen die nodig zijn om het tij te keren kunnen we niet realiseren tenzij we in staat zijn onze woorden te spreken in een taal die het hart en het verstand van jong en oud bereikt". Dit proefschrift betreft het bereiken van het verstand van mensen via hun hart, ofwel het doen van een beroep op emoties om mensen aan het denken te zetten. In de experimenten die beschreven worden in dit proefschrift werd het verband onderzocht tussen emotionele reacties van mensen op klimaatverandering en de manier waarop zij informatie over energiebesparing als strategie tegen klimaatverandering verwerken.

Het klimaat verandert voortdurend. Echter, sinds het einde van de vorige eeuw verandert het klimaat met ongekeerde snelheid. Volgens het Intergovernmental Panel on Climate Change is er sprake van een menselijke invloed op het klimaat. Broeikasgassen komen ten gevolge van menselijke activiteiten in steeds hogere concentraties voor in de dampkring. Deze gassen hebben een opwarmende werking. Aërosolen, die een koelende werking hebben, komen eveneens door toedoen van de mens in steeds grotere hoeveelheden voor in de dampkring. Het netto effect van de groeiende atmosferische concentraties van broeikasgassen en aërosolen is een stijging van de gemiddelde temperatuur op aarde.

Een van de belangrijkste broeikasgassen is kooldioxyde (CO₂). De concentratie CO₂ in de dampkring neemt vooral toe ten gevolge van de verbranding van fossiele energiedragers ten behoeve van de opwekking van energie. Steeds grotere hoeveelheden fossiele energiedragers worden verbrand om in de almaar groeiende energiebehoefte te voorzien. De uitstoot van CO₂ kan aanzienlijk gereduceerd worden onder meer door de energie-efficiëntie van technologieën te verhogen en door over te schakelen op andere brandstoffen.

Deze technische maatregelen zullen echter aangevuld moeten worden met maatregelen gericht op attitude- en gedragsverandering. Dit is temeer zo daar maatschappelijke acceptatie een vereiste is voor succesvolle implementatie van nieuwe technologieën. Ook is de wijze waarop deze technologieën gebruikt worden bepalend voor de mate waarin de beoogde effectiviteitswinst behaald wordt.

Voorlichting is een van de instrumenten die ingezet worden om attitude- en gedragsverandering te bevorderen. Er zijn aanwijzingen dat emotionele factoren een belangrijke rol kunnen spelen in voorlichting over milieuproblemen. Dit proefschrift betreft de rol van negatieve probleem gerelateerde emoties in voorlichting. De term negatieve probleem gerelateerde emotie (of simpelweg negatieve emotie) verwijst in dit proefschrift naar gevoelens van angst en bezorgdheid met betrekking tot een probleem, in dit geval klimaatverandering. Bij het woord angst denkt men wellicht in eerste instantie aan een emotie met een hoge intensiteit. Echter de intensiteit van angst kan variëren van zeer laag tot zeer hoog. De intensiteit van door voorlichting opgewekte gevoelens van angst is doorgaans relatief laag.

De rol van negatieve emotie in voorlichting werd onderzocht vanuit het theoretisch perspectief dat geboden wordt door het *elaboration likelihood model* (ELM) van Petty en Cacioppo en het *heuristic systematic model* (HSM) van Chaiken en collega's. Volgens deze modellen kunnen voorlichtingsboodschappen of andere vormen van overredende communicatie op twee fundamenteel verschillende manieren verwerkt worden. Als de boodschapontvangers over voldoende verwerkingscapaciteit beschikken en zij voldoende gemotiveerd zijn, zullen zij de boodschap systematisch verwerken. Dit houdt in dat zij uitgebreid nadenken over de inhoud van de boodschap, ofwel de gepresenteerde argumenten. Hun houding (attitude) ten aanzien van het onderwerp van de boodschap (attitude-object) baseren zij dan op de sterkte van die argumenten. Beschikken de boodschapontvangers echter over onvoldoende verwerkingscapaciteit of schiet hun motivatie tekort, dan zullen zij de boodschap oppervlakkig verwerken. Dit houdt in dat zij vooral aandacht besteden aan simpele aanwijzingen voor de waarde van de boodschap, zoals bijvoorbeeld de expertise van de bron, de aantrekkelijkheid van de vormgeving en dergelijke. Hun attitude ten aanzien van het attitude-object baseren zij dan op dergelijke aanwijzingen.

Attitudes die tot stand gekomen zijn via systematische verwerking zijn volgens het ELM en het HSM stabiel en vormen betere voorspellers van gedrag dan attitudes die tot stand

gekomen zijn via oppervlakkige verwerking. Er is dan ook veel onderzoek verricht naar factoren die de mate van systematische verwerking beïnvloeden. In dit proefschrift wordt een viertal experimenten beschreven waarin de invloed van negatieve emotie op de mate van systematische informatieverwerking onderzocht werd. De belangrijkste hypothese was dat naarmate het niveau van negatieve emotie hoger is, de mate waarin relevante informatie systematisch verwerkt wordt ook hoger is.

Hoofdpijnen van Hoofdstuk 2

Hoofdstuk 2 beschrijft het eerste experiment naar de invloed van negatieve emotie op de mate van systematische verwerking. De belangrijkste onderdelen van dit experiment waren: (1) het creëren van verschillende niveaus van angst door middel van informatie over klimaatverandering (2) het creëren van verschillende niveaus van argumentsterkte door middel van informatie over een nieuwe energiezuinige lamp (3) het meten van de mate van systematische verwerking van deze informatie.

Het variëren van argumentsterkte maakt het mogelijk verschillen in de mate van systematische verwerking vast te stellen. Immers, zoals reeds eerder uitgelegd werd, kan de sterkte van de argumentatie alleen een effect hebben op attitudes indien deze systematisch verwerkt wordt. Het effect van argumentsterkte op attitudes vormt dus een indicatie van de mate van systematische verwerking. Andere indicatoren van de mate van systematische verwerking zijn: het aantal gedachten (cognitieve responsen) dat men heeft tijdens het lezen van de argumenten, alsmede het aantal argumenten dat men zich naderhand kan herinneren. Aangenomen wordt dat men meer cognitieve responsen genereert en men zich meer argumenten herinnert naarmate men de boodschap uitgebreider verwerkt heeft.

Experiment 1 heeft een 3 (controle versus matige angst versus hoge angst conditie) bij 2 (zwakke versus sterke argumenten conditie) *between-subjects design*. Er waren dus zes condities: een controle conditie waarin geen angst voor klimaatverandering geïnduceerd werd en waarin men een zwakke argumentatie ten gunste van een energiezuinige lamp voorgelegd kreeg, een controle conditie waarin geen angst voor klimaatverandering geïnduceerd werd en waarin men een sterke argumentatie ten gunste van de energiezuinige lamp voorgelegd kreeg, enzovoorts. Aan het experiment deden 120 inwoners van Eindhoven en omliggende gemeenten mee. Zij werden in groepjes van maximaal vier personen uitgenodigd op de universiteit. Daar werden zij na een algemene instructie achter computers geplaatst. Het experiment verliep verder geheel computergestuurd. Dat wil zeggen dat

instructies, informatie en vragen via de computer aangeboden werden.

Eerst werden verschillende niveaus van angst gecreëerd. Dit werd als volgt gedaan. In de controle conditie werd geen informatie over klimaatverandering gegeven. In deze conditie werd dus geen angst geïnduceerd. In de matige angst conditie werd wel informatie gegeven over de oorzaken en mogelijke gevolgen van klimaatverandering. Deze informatie was enigszins angstaanjagend. In de hoge angst conditie werd dezelfde informatie gegeven en werd daarnaast een aantal foto's getoond van mogelijke gevolgen van klimaatverandering, bijvoorbeeld droogte, overstromingen en dergelijke. Deze combinatie van informatie en foto's was behoorlijk angstaanjagend.

Vervolgens werden verschillende niveaus van argumentsterkte gecreëerd door de deelnemers een overredende boodschap over een nieuwe energiezuinige lamp te laten lezen. Deze boodschap bevatte een aantal argumenten ten gunste van de lamp. In de zwakke argumenten conditie waren deze argumenten zwak, in de sterke argumenten conditie waren ze sterk.

Na het lezen van de overredende boodschap over de energiezuinige lamp werd de attitude van de deelnemers ten aanzien van deze lamp gemeten, alsmede hun voornemen om de lamp aan te schaffen (gedragsintentie). Ook werd hen gevraagd de gedachten op te schrijven die bij hen op kwamen tijdens het lezen van de boodschap, alsmede de argumenten die zij zich herinnerden. Dit experiment bevatte ook een gedragsmeting. De deelnemers konden namelijk aangeven of zij de energiezuinige lamp wilden bestellen. Het wel of niet bestellen van de lamp werd beschouwd als een indicator van feitelijk gedrag.

De resultaten van dit experiment boden enige ondersteuning voor de hypothese dat angst met betrekking tot klimaatverandering resulteert in een hogere mate van systematische verwerking van informatie over energiebesparing. Alleen bij een matig hoog angstniveau resulteerden sterke argumenten in een positievere attitude ten aanzien van de energie-efficiënte lamp, dan zwakke argumenten. Een hoog angstniveau bleek ongeacht de sterkte van de gepresenteerde argumenten te resulteren in positievere attitudes ten aanzien van de lamp. Wel werden bij een hoog angstniveau de meeste cognitieve responsen gegenereerd. Er zijn dus aanwijzingen dat zowel een matig hoog als een hoog angstniveau resulteerde in een hogere mate van systematische verwerking. De resultaten op de overige indicatoren van systematische verwerking boden overigens geen additionele ondersteuning voor de hypothese.

In dit experiment werd eveneens nagegaan of angst door zijn effect op de mate van

systematische verwerking resulteert in sterkere relaties tussen attitudes, gedragsintenties en gedrag. Echter, de relatie tussen attitudes en gedragsintenties bleek vrij sterk te zijn ongeacht het niveau van angst. De sterkte van de relatie tussen gedragsintenties en gedrag bleek wel af te hangen van het angstniveau: Alleen bij een hoog angstniveau bleek gedrag voorspeld te kunnen worden uit de gedragsintentie. Met andere woorden, alleen bij hoge angst bleek het daadwerkelijk bestellen van de lamp samen te hangen met het voornemen om de lamp aan te schaffen.

Hoofdpijnen van Hoofdstuk 3

Hoofdstuk 3 beschrijft het tweede experiment naar de invloed van negatieve emotie op de mate van systematische verwerking. De belangrijkste onderdelen van dit experiment waren: (1) het meten van bezorgdheid met betrekking tot klimaatverandering (2) het creëren van verschillende angstniveaus door middel van informatie over klimaatverandering (3) het creëren van verschillende niveaus van argumentsterkte door middel van informatie over een nieuwe energiezuinige lamp (4) het meten van de mate van systematische informatieverwerking.

Experiment 2 heeft een 2 (lage versus hoge bezorgdheidsgroep) bij 3 (controle versus lage angst versus matige angst conditie) bij 2 (zwakke versus sterke argumenten conditie) between-subjects design. Er waren dus twaalf condities. Aan het experiment deden 162 inwoners van Eindhoven en omliggende gemeenten mee.

Het experiment begon met een meting van de mate waarin de deelnemers zich zorgen maakten over het broeikaseffect. Middels een splitsing op de mediaan werden de deelnemers verdeeld in twee groepen: een groep met een laag niveau van bezorgdheid en een groep met een hoog bezorgdheidsniveau.

Na de meting van reeds aanwezige bezorgdheid werden weer verschillende angstniveaus gecreëerd, deze keer door middel van speciaal voor dat doel ontwikkelde video's. Deze video's werden ook in de navolgende experimenten gebruikt. In de controle conditie keken de deelnemers naar een video over een neutraal, irrelevant onderwerp, terwijl de deelnemers in de lage en matige angst condities naar verschillende versies van een video over klimaatverandering keken. Beide versies gaven dezelfde informatie over klimaatverandering, maar de video die in de matige angst conditie vertoond werd was door variaties in muziek, woordgebruik en intonatie van de commentaarstem en beeldmateriaal angstaanjagender dan de video die in de lage angst conditie vertoond werd. Hierna verliep

Experiment 2 nagenoeg hetzelfde als Experiment 1, behalve dat de gedragsmeting ontbrak. In plaats daarvan ontvingen de deelnemers drie weken na afloop van het experiment per post een vragenlijstje waarmee hun attitudes en gedragsintenties voor de tweede keer gemeten werden.

De resultaten van Experiment 2 boden gedeeltelijk ondersteuning voor de hypothese dat angst leidt tot een hogere mate van systematische verwerking. Alleen bij een matig hoog angstniveau resulteerden sterke argumenten in positievere attitudes en sterkere intenties met betrekking tot de energiezuinige lamp dan zwakke argumenten. Dit patroon was overigens het duidelijkst zichtbaar drie weken na afloop van het experiment. De resultaten op de overige indicatoren van systematische verwerking boden geen additionele ondersteuning voor de hypothese.

In dit experiment werd eveneens nagegaan of geïnduceerde angst door zijn effect op de mate van systematische verwerking resulteert in stabielere attitudes en een sterkere relatie tussen attitudes en gedragsintenties. Hiervoor werden echter geen aanwijzingen gevonden. Ongeacht het angstniveau werden de attitudes ten aanzien van de energiezuinige lamp minder positief met het verstrijken van de tijd en was de relatie tussen attitudes en gedragsintenties vrij sterk.

Behalve de hypothese dat geïnduceerde angst resulteert in een hogere mate van systematische verwerking, werd de hypothese getoetst dat gemeten bezorgdheid een vergelijkbaar effect heeft. De resultaten van dit experiment boden enige ondersteuning voor deze hypothese: Alleen bij een hoog bezorgdheidsniveau werd een effect geconstateerd van argumentsterkte op de attitudes gemeten drie weken na afloop van het experiment. De hoog bezorgden genereerden ook meer cognitieve responsen dan de laag bezorgden, maar alleen in geval van sterke argumenten. De resultaten op de overige indicatoren van systematische verwerking boden geen additionele ondersteuning voor de hypothese.

In dit experiment werd eveneens nagegaan of bezorgdheid door haar effect op de mate van systematische verwerking resulteert in stabielere attitudes en een sterkere relatie tussen attitudes en gedragsintenties. Hiervoor werden echter geen aanwijzingen gevonden.

Hoofdlijnen van Hoofdstuk 4

Hoofdstuk 4 beschrijft het derde experiment naar de invloed van negatieve emotie op de mate van systematische verwerking. Experiment 3 heeft een 2 (lage versus hoge bezorgdheidsgroep) bij 3 (controle versus lage angst versus matige angst conditie) bij 2

(zwakke versus sterke argumenten conditie) between-subjects design. Aan dit experiment deden 119 studenten uit Eindhoven mee. Het belangrijkste verschil tussen Experiment 2 en 3 was dat het attitude-object in Experiment 3 niet bestond uit een energiezuinige lamp, maar uit een energieheffing.

De resultaten van Experiment 3 boden in tegenstelling tot de resultaten van de voorgaande experimenten geen ondersteuning voor de hypothese dat geïnduceerde angst resulteert in een hogere mate van systematische verwerking van informatie. Wel werd ondersteuning gevonden voor de hypothese dat reeds bestaande bezorgdheid resulteert in een hogere mate van systematische verwerking. Deelnemers met een hoog niveau van bezorgdheid genereerden meer cognitieve responsen en herinnerden zich meer argumenten dan deelnemers met een laag niveau van bezorgdheid. Ook bleek argumentsterkte enkel van invloed te zijn op de attitudes van deelnemers met een hoog niveau van bezorgdheid. Dus alleen in geval van een hoog bezorgdheidsniveau resulteerden sterke argumenten in een positievere attitude ten aanzien van de energieheffing dan zwakke argumenten. Al deze bevindingen wijzen op de juistheid van de hypothese dat bezorgdheid leidt tot een hogere mate van systematische verwerking.

Hoofdpijnen van Hoofdstuk 5

Hoofdstuk 5 beschrijft het vierde experiment naar de invloed van negatieve emotie op de mate van systematische verwerking. Experiment 4 heeft een 3 (controle versus lage angst versus matige angst conditie) bij 2 (relevante versus irrelevante boodschap conditie) bij 2 (zwakke versus sterke argumenten conditie) between-subjects design. Aan dit experiment deden 228 inwoners van Eindhoven en omliggende gemeenten mee.

Het belangrijkste verschil met de voorgaande experimenten is dat in Experiment 4 de relevantie van de overredende boodschap gevarieerd werd. Met relevantie wordt het verband bedoeld tussen het onderwerp van de overredende boodschap en de bron van angst, in dit geval klimaatverandering. Het onderwerp van de relevante boodschap was een nieuwe televisie die uitblonk in milieuvriendelijkheid, terwijl de irrelevante boodschap ging over een nieuwe televisie die in een ander opzicht uitblonk. De hypothese was dat angst de systematische verwerking van een relevante boodschap bevordert, maar de systematische verwerking van een irrelevante boodschap juist afremt. Afgezien van deze manipulatie van relevantie was de opzet van Experiment 4 nagenoeg hetzelfde als van de voorgaande experimenten.

De hypothese dat angst de mate van systematische verwerking van relevante informatie verhoogt werd in dit experiment niet bevestigd. Evenmin bleek angst van invloed te zijn op de sterkte van de relatie tussen attitudes en intenties in geval van relevante informatie. Wel werd enige ondersteuning gevonden voor de hypothese dat angst de mate van systematische verwerking van irrelevante informatie verlaagt. Deelnemers in de controle en de lage angst conditie baseerden hun attitude op de sterkte van de gepresenteerde argumenten, maar deelnemers in de matige angst conditie niet. Dit vormt een aanwijzing dat de irrelevante boodschap bij matige angst minder uitgebreid verwerkt werd. Dit bleek echter geen gevolgen te hebben voor de sterkte van de relatie tussen attitudes en intenties. Deze relatie bleek vrij sterk te zijn ongeacht het niveau van angst.

Hoofdpijnen van Hoofdstuk 6

In Hoofdstuk 6 worden de resultaten van alle experimenten op een rij gezet en wordt getracht verklaringen te geven voor onverwachte en inconsistente bevindingen. Vervolgens worden kritische kanttekeningen geplaatst bij het onderzoek, worden suggesties gedaan voor vervolgonderzoek, en wordt ingegaan op de praktische toepasbaarheid van de onderzoeksresultaten.

De hypothese dat het induceren van angst de mate van systematische verwerking van relevante informatie verhoogt, werd in alle experimenten getoetst. De resultaten van Experiment 1 en 2 boden enige ondersteuning voor de hypothese, die van Experiment 3 en 4 echter niet (zie overzichtstabel in Appendix C). Behalve de hypothese dat angst de systematische verwerking van relevante informatie bevordert, testte Experiment 4 de hypothese dat angst de systematische verwerking van irrelevante informatie afremt. Zoals reeds werd aangegeven boden de resultaten enige ondersteuning voor deze hypothese.

Dat de resultaten van de eerste twee experimenten niet gerepliceerd werden in de laatste twee experimenten heeft mogelijk te maken met verschillen tussen de attitude-objecten en de argumenten. In Experiment 1 en 2 was het attitude-object een nieuw type energiezuinige lamp. Het gebruik van deze lampen is niet alleen gunstig vanuit het perspectief van het milieu, maar ook vanuit het perspectief van het individu. Het gebruik van energiezuinige lampen bespaart niet alleen energie maar ook geld omdat het resulteert in een lagere energierekening. In Experiment 3 was het attitude-object een energieheffing. Vanuit het perspectief van het individu is een energieheffing ongunstig omdat zij resulteert in een hogere energierekening. Waarschijnlijk is het dus moeilijker om mensen te motiveren om

een energieheffing te accepteren, dan om energiezuinige lampen te gebruiken. Dit is temeer zo daar een energieheffing opgelegd wordt, terwijl het gebruik van energiezuinige lampen vrijwillig is. Dit verklaart mogelijk waarom de angstinductie wel een effect had op de verwerking van informatie over de energiezuinige lamp (Experiment 1 en 2), maar niet op de verwerking van informatie over de energieheffing (Experiment 3). In Experiment 4 was het attitude-object een 'milieuvriendelijke' televisie. Waarschijnlijk staan mensen doorgaans minder stil bij de milieu-aspecten van televisies dan bij die van lampen. Het belang van energiezuinige verlichting is meermalen het onderwerp geweest van voorlichtingscampagnes; de milieu-aspecten van apparatuur zoals televisies zijn minder uitgebreid belicht. De relevantie van het attitude-object was daardoor wellicht minder duidelijk in Experiment 4 dan in de overige experimenten. Dit verklaart mogelijk waarom geen effect gevonden werd van de angstinductie op de verwerking van informatie over de 'milieuvriendelijke' televisie.

In Experiment 2 en 3 werd de hypothese getest dat de mate waarin men zich zorgen maakt over de klimaatproblematiek samenhangt met de mate waarin men informatie die relevant is in die context systematisch verwerkt. De resultaten van beide experimenten boden enige ondersteuning voor deze hypothese, zij het dat de resultaten van Experiment 3 in dat opzicht duidelijker waren dan die van Experiment 2 (zie overzichtstabel in Appendix C).

Wat opvalt is dat in Experiment 2 aanwijzingen gevonden werden voor een effect van geïnduceerd angstniveau op de mate van systematische verwerking, terwijl de aanwijzingen voor een vergelijkbaar effect van het gemeten niveau van bezorgdheid veel zwakker waren. In Experiment 3 werden juist aanwijzingen gevonden voor een effect van gemeten bezorgdheidsniveau op de mate van systematische verwerking, maar niet voor een vergelijkbaar effect van geïnduceerd angstniveau. Dit doet vermoeden dat in Experiment 2 het effect van reeds aanwezige bezorgdheid werd overvleugeld door het effect van de angstinductie, terwijl het omgekeerde gebeurde in Experiment 3. Zoals al eerder werd uitgelegd, kan niet alleen het milieu maar ook de eigen portemonnee een reden zijn om het gebruik van energie-efficiënte lampen te overwegen. Een energieheffing daarentegen mag dan goed zijn voor het milieu, maar is dat zeker niet voor de eigen portemonnee. Daarom is het wellicht makkelijker om zelfs mensen die zich geen zorgen maken over het milieu te motiveren het gebruik van energiezuinige verlichting te overwegen, dan om hen te motiveren een energieheffing in overweging te nemen. Dit is een mogelijke verklaring voor het feit dat

een effect gevonden werd van de angstinductie op de verwerking van informatie over energiezuinige verlichting (Experiment 2) maar niet op de verwerking van informatie over een energieheffing (Experiment 3). De acceptatie van een energieheffing is geheel afhankelijk van de onderkenning van het milieubelang van deze maatregel. Alleen mensen die het milieuprobleem onderkennen hebben dus een reden om de invoering van een energieheffing te overwegen. Dit verklaart mogelijk waarom in Experiment 3 een effect gevonden werd van gemeten niveau van bezorgdheid op de mate van systematische verwerking.

In Experiment 2 werd de hypothese getest dat negatieve emotie (hetzij gemeten bezorgdheid, hetzij geïnduceerde angst) de stabiliteit van attitudes verhoogt. Voor deze hypothese werd echter geen bewijs gevonden. Ongeacht het niveau van negatieve emotie werden attitudes in de loop van de tijd minder positief.

In Experiment 1, 2 en 4 werd de hypothese getest dat negatieve emotie (hetzij gemeten bezorgdheid, hetzij geïnduceerde angst) de sterkte van de relatie tussen attitudes en gedragsintenties beïnvloedt. In tegenspraak met de hypothese bleek de relatie tussen attitudes en intenties vrij sterk te zijn zelfs als het niveau van negatieve emotie laag was. In Experiment 1 werd de hypothese getoetst dat negatieve emotie de sterkte van de relatie tussen gedragsintenties en feitelijk gedrag beïnvloedt. De relatie tussen intenties en gedrag bleek inderdaad alleen sterk te zijn als het niveau van negatieve emotie hoog was.

In tegenstelling tot eerder gepubliceerde studies werd in het huidige onderzoek rekening gehouden met de mogelijkheid van een non-lineaire relatie tussen het niveau van negatieve emotie en de mate van systematische verwerking. De resultaten wijzen echter niet op een dergelijk non-lineair verband. Lage niveaus van negatieve emotie (hetzij gemeten bezorgdheid, hetzij geïnduceerde angst) bleken niet te resulteren in een hogere mate van systematische verwerking; daarentegen leken matig hoge tot hoge niveaus wel een bevorderend effect te hebben op de elaboratie van relevante informatie. Dit doet echter niets af aan de theoretische mogelijkheid van een non-lineaire relatie tussen het niveau van negatieve emotie en de mate van systematische verwerking. Wellicht waren de niveaus van negatieve emotie in dit onderzoek niet hoog genoeg om een dergelijke relatie te kunnen vaststellen.

In het onderzoek gepresenteerd in dit proefschrift werd getracht verschillende niveaus van angst te creëren, niet door verschillende informatie over het probleem te geven, maar door de levendigheid van deze informatie te variëren. Dit is een belangrijke verbetering ten

opzichte van eerder gepubliceerd onderzoek, waarin verschillende angstniveaus gecreëerd werden door verschillende informatie over de ernst en waarschijnlijkheid van het probleem te geven. Het nadeel hiervan is dat het onmogelijk is de effecten van emotie los te koppelen van de effecten van kennis. Overigens bleek het niet eenvoudig te zijn verschillende niveaus van angst te induceren louter door de levendigheid van de probleem informatie te variëren. Dit kan te maken hebben met het type probleem. Milieuproblemen, zeker grootschalige, lijken minder indruk te maken op mensen dan gezondheidsproblemen, het type problemen waarop het meeste onderzoek naar de rol van emotie in voorlichting betrekking heeft.

Het variëren van argumentsterkte is een veelvuldig toegepaste methode om verschillen in de mate van systematische verwerking te kunnen vaststellen. Echter, het effect van argumentsterkte op attitudes en intenties vormt slechts een indirecte aanwijzing voor systematische verwerking. Overigens bleek de sterkte van de argumenten anders beoordeeld te worden door deelnemers met een laag niveau van bezorgdheid, dan door deelnemers met een hoog bezorgdheidsniveau. Dit maakt eens te meer duidelijk dat emotie een factor is om rekening mee te houden in de opzet van voorlichtingscampagnes.

Naast het effect van argumentsterkte op attitudes en intenties werd in dit onderzoek gekeken naar de hoeveelheid cognitieve responsen en het aantal herinnerde argumenten als aanwijzingen voor de mate van systematische verwerking. Deze indicatoren leverden echter over het geheel genomen weinig op. Mogelijk zijn deze maten geschikter voor toepassing in onderzoek met steekproeven bestaande uit studenten, dan in onderzoek met meer heterogene groepen.

De experimenten gepresenteerd in dit proefschrift werden uitgevoerd onder de gecontroleerde omstandigheden van een laboratorium voor gedragsonderzoek. Zelfs onder deze omstandigheden bleek het moeilijk te zijn de processen in kaart te brengen die ten grondslag liggen aan de effecten van emotiegerichte milieuvorlichting. Toch verdient het aanbeveling om deze processen op den duur ook onder meer realistische omstandigheden te bestuderen. Voorbeelden van factoren, kenmerkend voor reële voorlichtingssituaties, zijn: tekortschietende verwerkingscapaciteit ten gevolge van afleiding, tijdsdruk of een teveel aan informatie en de confrontatie met tegenstrijdige berichten. Toekomstig onderzoek moet uitwijzen of en hoe deze factoren de effecten van emotiegerichte milieuvorlichting modereren.

Het literatuuronderzoek en het empirisch onderzoek gepresenteerd in dit proefschrift duiden erop, dat voorlichting gericht op negatieve probleem gerelateerde emoties een plaats

kan hebben in de aanpak van grootschalige milieuproblemen als klimaatverandering. Een dergelijke emotiegerichte voorlichtingsbenadering kan mensen aan het denken zetten en op die manier resulteren in positievere attitudes ten aanzien van oplossingen, mits aan een aantal voorwaarden wordt voldaan. Allereerst dient de relatie tussen het probleem en de aanbevolen oplossingen kristalhelder uitgelegd te worden. Ten tweede dienen de aanbevelingen effectief en uitvoerbaar te zijn. Tenslotte dienen argumenten aangedragen te worden die door de beoogde doelgroep overtuigend gevonden worden.

Het onderzoek gepresenteerd in dit proefschrift maakt in elk geval het belang duidelijk van een zorgvuldige voorbereiding van voorlichtingscampagnes. Het uittesten van voorlichtingsboodschappen zou een vast onderdeel moeten zijn van deze voorbereiding. Hiermee wordt bedoeld dat niet alleen de aanvaardbaarheid van voorlichtingsboodschappen vastgesteld moet worden, maar juist ook dat nagegaan moet worden of de beoogde effecten, bijvoorbeeld op attitudes en gedrag, inderdaad optreden.

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Appendix A

Arguments presented in Experiments 1 to 4

Table A1. *Arguments used to manipulate Argument Strength in Experiment 1.*

Weak arguments	
1	The fact that the [product name] consists of two separate components means that you can clean the [product name] quite easily.
2	Since the light tube has a pretzel shape, you can simply put the [product name] on a table without having to worry about it rolling off the table.
3	Very little glass is used in the [product name]. So if the [product name] does happen to break then you don't have much broken glass to tidy up.
4	Since the [product name] does not become very warm, you can easily change the light bulb without burning your fingers.

Strong arguments	
1	The pretzel shape of the light tube ensures that light is spread equally.
2	The [product name] is not much longer than an ordinary light bulb with a large fitting. The advantage of this is that you can use this bulb in nearly all your lamps without it sticking out.
3	You earn back the extra amount you pay for the [product name], because the [product name] uses less electricity and works longer.
4	The fact that the [product name] uses less energy also means it is better for the environment.

Table A2. *Arguments used to manipulate Argument Strength in Experiment 2.*

Weak arguments	
1	The fact that the [product name] consists of two components means that the light bulb can easily be cleaned.
2	Because the [product name] is not round, but has the shape of a pretzel, the light bulb can be simply placed on a table without the risk of it rolling off.
3	One [product name] is enough to light the entire living room. Only one lamp has to be on in the living room, which is better for the environment.

Strong arguments	
1	Changing the light bulb is very easy. The foot of the [product name] stays in the fixture and a new light is clicked into it.
2	The [product name] is just as long as a standard light bulb with a large fitting. The advantage of this is that you can use this bulb in nearly all your lamps without it sticking out.
3	Though the [product name] produces as much light as a 75-Watt light bulb, the [product name] uses less energy and therefore is better for the environment.

Table A3. Arguments used to manipulate Argument Strength in Experiment 3.

Weak arguments

- 1 By taking this measure less energy will be used. Less heat will be produced, so that the earth will not heat up as much. Thus, the greenhouse effect will not increase as quickly.
 - 2 By introducing this measure, Europe can take a leading role in solving the environmental issue and will increase its status.
 - 3 The European environmental movement will be satisfied with this measure.
 - 4 As a result of the measure people will heat their houses less, which is better for the health of some of them.
-

Strong arguments

- 1 Less energy use will lead to a reduction in CO₂ production and therefore will lead to a decrease in the greenhouse effect.
- 2 Reduced use of energy will also mean that our stocks of fossil fuels will not be exhausted as quickly.
- 3 Part of the profits from the measure will be used to finance research on sustainable energy sources, such as solar and wind power.
- 4 Part of the profits from the measure will be used to decrease the environmentally unfriendly effects of the production of electricity.

Table A4. Arguments used to manipulate Argument Strength in Experiment 4.

Weak arguments

- 1 The dark screen and the dark-grey housing of the [product name] have nicely matching colours.
 - 2 Because the housing of the [product name] is dark grey, you can't see dust on it that easily.
 - 3 The connections for a video camera and video recorder can easily be distinguished because one of them is at the front of the TV set and one is at the back.
 - 4 Since you only need to have one remote control to operate the TV set and video recorder, there is only one remote control you need to tidy up.
-

Strong arguments

- 1 The flat dark screen of the [product name] reduces irritating light reflection, so that the picture is clear even during the day.
- 2 The quality of the sound of the [product name] is very high.
- 3 You can choose between a number of pre-programmed standard settings for the screen and sound, which is very practical because you don't have to find out what the best settings are.
- 4 Programming the various television stations is very simple, because you can have the stations be programmed automatically according to the order given via the cable's overview station.

Appendix B

Knowledge effects of videos employed to manipulate fear

Table B1. *Percentage of correct responses by students for each of the fear conditions separately.*

Item	condition		
	control N = 20	low fear N = 21	mod. fear N = 21
1 The greenhouse effect (GHE) means that the atmosphere is trapping more and more heat.	70	100	91
2* The GHE means that the weather is becoming more and more stifling.	75	67	62
3* The GHE means that the ozone layer is becoming thinner and thinner.	50	71	86
4 The natural composition of the earth's atmosphere consists of different gases among which carbon dioxide (CO ₂).	95	91	100
5 If there was no atmosphere it would be too cold for there to be any life.	70	62	62
6* The harsh winter we had demonstrates that things aren't so bad after all as far as the heating of the atmosphere is concerned.	100	95	95
7* If the Netherlands have a heat wave this summer, it means the climate is changing.	85	100	95
8 The GHE is a result of the altered composition of the atmosphere.	90	91	91
9 The increasing emission of carbon dioxide (CO ₂) into the atmosphere makes an important contribution to the GHE.	95	95	86
10 The GHE is partly due to the burning of fossil fuels.	95	95	100
11 The GHE is partly due to everyday energy consumption.	85	95	95
12 The GHE is partly due to energy consumption by industry.	80	95	100
13 The GHE is partly caused by large-scale deforestation without the presence of reforestation.	70	57	81
14* The GHE is a result of the ozone layer becoming thinner.	40	71	86
15* If the average temperature on earth rises, it is especially the result of the increasing emission of chlorine-fluorine-carbons (CFC's) into the atmosphere.	50	81	81
16* The GHE is partly caused by the increase in the emission of heavy metals.	75	91	81
17* The GHE is the result of the production of energy in nuclear plants.	95	95	95
18 Because of the GHE some areas will become colder.	60	57	52
19 One result of the GHE is that deserts will become even hotter.	85	86	95
20 Because of the GHE the water in the seas and oceans will expand.	40	81	48

Table B1 (continued). *Percentage of correct responses by students for each of the fear conditions separately.*

Item	condition		
	control N = 20	low fear N = 21	mod. fear N = 21
21 Because of the GHE the sea level will rise.	100	91	86
22 Because of the GHE there will be more precipitation in many areas.	45	71	81
23 One result of the GHE is that floods will become more frequent.	95	95	100
24 Because of the GHE problems may arise with the food supply in some areas.	90	91	91
25 Because of the GHE certain plants and animals may become extinct.	85	91	91
26 Because of the GHE insects and therefore diseases, like malaria, will be able to spread to larger parts of the earth.	55	52	71
27* There is a direct link between the GHE and skin cancer.	50	76	57
28* Because of the GHE an oxygen deficit can arise.	60	71	57
29* Because of the GHE solar activity will increase.	85	86	86
30* Because of the GHE the earth has less protection from radiation from space.	50	71	76
31* Because of the GHE harmful gases can no longer escape the atmosphere.	70	71	95
32* Carbon dioxide (CO ₂) leads to poisoning upon inhalation.	70	86	86
33* Another name for the GHE is acid rain.	95	95	100
34* The acidification of the forests is a result of the GHE.	90	86	76
35* Because of the GHE statues and walls are deteriorating.	95	95	86
36 By investing in sustainable energy sources, such as wind turbines and solar cells, we help to fight the GHE.	90	95	91
37 By saving energy we can help to fight the GHE.	80	81	95
38 By reducing the amount we drive we help to fight the GHE.	90	91	91
39 By choosing not to travel short distances by plane, we help to fight the GHE.	80	67	86
40* By using lead-free rather than leaded petrol, we help to fight the GHE.	55	76	71
41* By using detergents without chlorine rather than with chlorine, we help to fight the GHE.	55	67	52
Mean number of correct responses (standard deviations in brackets):	30.90 (4.76)	33.81 (4.88)	34.05 (4.86)

Note. * refers to wrong statement. Unless otherwise mentioned, numbers in last three columns are percentages. GHE refers to greenhouse effect.

Table B2. *Percentage of correct responses by non-students for each of the fear conditions separately.*

Item	condition		
	control N = 72	low fear N = 71	mod. fear N = 69
1 The greenhouse effect (GHE) means that the atmosphere is trapping more and more heat.	59	80	72
2* The GHE means that the weather is becoming more and more stifling.	47	55	47
3* The GHE means that the ozone layer is becoming thinner and thinner.	25	41	30
4 The natural composition of the earth's atmosphere consists of different gases among which carbon dioxide (CO ₂).	63	79	71
5 If there was no atmosphere it would be too cold for there to be any life.	41	57	47
6 The harsh winter we had demonstrates that things aren't so bad after all as far as the heating of the atmosphere is concerned.	83	79	87
7* If the Netherlands have a heat wave this summer, it means the climate is changing.	80	83	79
8 The GHE is a result of the altered composition of the atmosphere.	70	74	71
9 The increasing emission of carbon dioxide (CO ₂) into the atmosphere makes an important contribution to the GHE.	86	88	86
10 The GHE is partly due to the burning of fossil fuels.	59	90	78
11 The GHE is partly due to everyday energy consumption.	84	87	91
12 The GHE is partly due to energy consumption by industry.	84	91	91
13 The GHE is partly caused by large-scale deforestation without the presence of reforestation.	58	61	59
14* The GHE is a result of the ozone layer becoming thinner.	25	45	30
15* If the average temperature on earth rises, it is especially the result of the increasing emission of chlorine-fluorine-carbons (CFC's) into the atmosphere.	45	45	36
16* The GHE is partly caused by the increase in the emission of heavy metals.	32	38	41
17* The GHE is the result of the production of energy in nuclear plants.	75	68	63
18 Because of the GHE some areas will become colder.	29	20	25
19 One result of the GHE is that deserts will become even hotter.	67	79	76
20 Because of the GHE the water in the seas and oceans will expand.	43	74	70

Table B2 (continued). *Percentage of correct responses by non-students for each of the fear conditions separately.*

Item	condition		
	control N = 72	low fear N = 71	mod. fear N = 69
21 Because of the GHE the sea level will rise.	67	87	88
22 Because of the GHE there will be more precipitation in many areas.	28	68	70
23 One result of the GHE is that floods will become more frequent.	61	88	87
24 Because of the GHE problems may arise with the food supply in some areas.	72	78	75
25 Because of the GHE certain plants and animals may become extinct.	83	80	84
26 Because of the GHE insects and therefore diseases, like malaria, will be able to spread to larger parts of the earth.	41	49	53
27* There is a direct link between the GHE and skin cancer.	30	37	26
28* Because of the GHE an oxygen deficit can arise.	40	45	41
29* Because of the GHE solar activity will increase.	49	57	40
30* Because of the GHE the earth has less protection from radiation from space.	45	49	40
31* Because of the GHE harmful gases can no longer escape the atmosphere.	55	50	46
32* Carbon dioxide (CO ₂) leads to poisoning upon inhalation.	33	49	47
33* Another name for the GHE is acid rain.	78	70	66
34* The acidification of the forests is a result of the GHE.	40	32	26
35* Because of the GHE statues and walls are deteriorating.	62	63	49
36 By investing in sustainable energy sources, such as wind turbines and solar cells, we help to fight the GHE.	86	91	87
37 By saving energy we can help to fight the GHE.	86	91	91
38 By reducing the amount we drive we help to fight the GHE.	92	90	91
39 By choosing not to travel short distances by plane, we help to fight the GHE.	71	71	72
40* By using lead-free rather than leaded petrol, we help to fight the GHE.	22	22	17
41* By using detergents without chlorine rather than with chlorine, we help to fight the GHE.	46	49	28
Mean number of correct responses (standard deviations in brackets):	24.69 (5.46)	28.31 (5.57)	27.23 (4.85)

Note. * refers to wrong statement. Unless otherwise mentioned, numbers in last three columns are percentages. GHE refers to greenhouse effect.

Appendix C

Major outcomes of analyses presented in this dissertation

Table C1. Overview of major outcomes of analyses of variance presented in this dissertation.

		Experiment 1 (N = 120)		Experiment 2 T1 (N = 162)		Experiment 2 T2 (N = 144)		Experiment 3 (N = 119)		Experiment 4 (N = 228)	
		F	p	F	p	F	p	F	p	F	p
Manipulation checks											
Fear	F	7.03	.010	82.16	<.001	—	—	56.91	<.001	175.23	<.001
Argument Strength	A	10.20	.002	65.08	<.001	—	—	79.96	<.001	46.28	<.001
Relevance	R	—	—	—	—	—	—	—	—	44.58	<.001
Dependent variables											
Attitudes	F	3.24	.043	< 1	<i>ns</i>	< 1	<i>ns</i>	1.45	.239	1.31	.271
	F x A	2.72	.070	1.21	.303	2.48	.088	1.04	.358	2.21	.112
	R x F x A	—	—	—	—	—	—	—	—	2.36	.097
	C	—	—	4.81	.030	3.98	.048	5.85	.017	—	—
	C x A	—	—	< 1	<i>ns</i>	2.57	.112	12.82	.001	—	—
Intentions	F	3.29	.041	< 1	<i>ns</i>	< 1	<i>ns</i>	—	—	1.27	.283
	F x A	< 1	<i>ns</i>	1.43	.244	2.62	.077	—	—	< 1	<i>ns</i>
	R x F x A	—	—	—	—	—	—	—	—	< 1	<i>ns</i>
	C	—	—	1.92	.168	2.55	.112	—	—	—	—
	C x A	—	—	< 1	<i>ns</i>	< 1	<i>ns</i>	—	—	—	—
Cognitive responses	F	4.32	.015	< 1	<i>ns</i>	—	—	< 1	<i>ns</i>	< 1	<i>ns</i>
	R x F	—	—	—	—	—	—	—	—	2.23	.110
	C	—	—	1.96	.164	—	—	3.02	.085	—	—
Recall	F	< 1	<i>ns</i>	1.52	.222	—	—	2.16	.121	1.79	.170
	R x F	—	—	—	—	—	—	—	—	< 1	<i>ns</i>
	C	—	—	< 1	<i>ns</i>	—	—	3.05	.084	—	—

Note. A, C, F, and R refer to Argument Strength, Concern, Fear and Relevance, respectively. Only univariate tests are reported. The fear manipulation check refers to the measure of judged frighteningness. The argument strength manipulation check refers to the measure of perceived persuasiveness of the separate arguments.

Autobiographical note

I was born in Eindhoven on 22 December 1968. In 1987 I started studying psychology at the Catholic University of Nijmegen. My specialisation is social psychology, although organisational and clinical psychology courses also formed a substantial part of my curriculum. I conducted my final research at Visio, a rehabilitation centre for persons with a visual handicap in Haren (Groningen). My Master's thesis was about affective and cognitive aspects of attitudes towards persons with a visual handicap. Immediately after my graduation in March 1993 I started work on my dissertation at the Faculty of Technology Management, Eindhoven University of Technology. September 1998 I was appointed lecturer and researcher at this faculty. Besides continuing the research presented in this dissertation I am working on a line of inquiry concerning the affective and cognitive aspects of consumer attitudes towards technical products.

Stellingen

behorende bij het proefschrift 'Climate change and changing attitudes: Effect of negative emotion on information processing' door Anneloes Meijnders

1. Om problemen te kunnen oplossen moeten ze eerst onderkend worden (dit proefschrift).
2. Het doen van een beroep op negatieve probleem gerelateerde emoties in milieuvorlichting kan functioneel zijn mits de relatie tussen het probleem en de aanbevolen oplossing duidelijk gemaakt wordt, de oplossing effectief en uitvoerbaar is, en de argumentatie overtuigend en relevant is (dit proefschrift).
3. Voorlichtingsboodschappen ter bevordering van milieuvriendelijke attitudes en gedrag dienen zowel qua vorm als qua inhoud afgestemd te worden op de mate van milieubezorgdheid van de doelgroep (dit proefschrift).
4. Onderzoek in het dual-process paradigma (Chaiken, 1980; Petty & Cacioppo, 1981) is gebaat bij een vergelijkende analyse van bestaande methoden om de mate van systematische verwerking te bestuderen, alsmede bij de ontwikkeling van nieuwe methoden (dit proefschrift).

Chaiken, S. (1980). Heuristic versus systematic information processing and the use of source versus message cues in persuasion. *Journal of Personality and Social Psychology*, 3, 752-766.

Petty, R.E., & Cacioppo, J.T. (1981). *Attitudes and persuasion: Classic and contemporary approaches*. Dubuque, IA: Brown.
5. Een belangrijke vraag voor toekomstig onderzoek betreft de wijze waarop ontvangers van een overredende boodschap de verschillende elementen van deze boodschap integreren tijdens het vormen van een attitude over het onderwerp van de boodschap (dit proefschrift).
- 6a. Iemand het voordeel van de twijfel geven betekent een onzekere factor voor hem of haar zo gunstig mogelijk laten meetellen (Van Dale: groot woordenboek der Nederlandse taal, twaalfde druk). Het milieu krijgt doorgaans het nadeel van de twijfel.
- 6b. Hoe langer het milieu het nadeel van de twijfel krijgt, des te sneller is er geen twijfel meer mogelijk.
7. Promoveren leidt op korte termijn tot een blikvernaauwing, maar op lange termijn tot een blikverruiming.
8. Zowel AiO's als hun begeleiders zijn gebaat bij het afronden van het eerste jaar van het AiO schap met een literatuurverslag en een uitgewerkt onderzoeksplan. Dit geeft AiO's een doel om naar toe te werken en begeleiders een uitgangspunt voor de beoordeling aan het einde van het eerste jaar.
9. Onderwijs- en onderzoeksvisitaties versterken de groepscohesie en de sociale identiteit van de werknemers van de gevisiteerde instellingen. Het is echter maar de vraag of ze de kwaliteit van de output van de betreffende instellingen verhogen.
10. De innovativiteit van ontwerpprocessen wordt bevorderd door het doel van het te ontwerpen product als uitgangspunt te nemen, in plaats van de eigenschappen van bestaande producten.
11. Voor patiënten is het vaak moeilijk de medische expertise van artsen te beoordelen. Veel makkelijker is het om hun communicatieve vaardigheden te beoordelen. Patiënten gebruiken hun oordeel over de communicatieve vaardigheden van artsen dan ook als heuristisch bij de beoordeling van de medische expertise van de betreffende artsen.
12. Wie zich snel thuis wil voelen in een onbekende stad moet haar op de fiets verkennen.