Pitfalls in the communication about CO2 capture and storage

Vries, G. de

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Gerdien de Vries

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Promotor:

Prof. dr. N. Ellemers

Co-promotor:

Dr. B.W. Terwel

Overige leden:

Prof. dr. E. van Dijk

Dr. A.M. Lokhorst — Wageningen Universiteit

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Contents

Preface

This dissertation is aimed at the identification of pitfalls in the communication about CO_2 capture and storage. It presents the results of experimental and survey research on three communication techniques: heaping information, emphasis framing, and greening. The dissertation is structured as follows:

Chapter 1 is the "umbrella" chapter. It sets the context in which the research was conducted. Furthermore, Chapter 1 connects the different lines of research by discussing their relevance, coherence, and differences. Chapters 2, 3, and 4 are adaptations of papers on the experimental research. These chapters are written in first-person plural because the papers were composed in collaboration with Bart Terwel, Naomi Ellemers, and Dancker Daamen. The original papers are published in or under review at peer-reviewed journals. Each experimental chapter discusses one of the three communication techniques and can be read independently of the other chapters. Due to this independency, however, there is some overlap between the chapters, especially in their opening paragraphs. The order of the chapters is motivated by theory, not by chronology of execution of the research.

Throughout the dissertation, references are made to Appendix A. This appendix presents data of a large-scale survey held among a representative sample of the Dutch public in October 2013.

Chapter 1

Pitfalls in the Communication about CCS

One of the greatest environmental challenges the world is facing today is combating global warming. According to the Intergovernmental Panel on Climate Change, warming of the climate system is unequivocal (IPCC, 2013). This change in climate has potentially harmful consequences for humankind and nature, including disturbance of ecosystems, extinction of some plant- and animal species, and a rising sea level.

Global warming is largely due to growing concentrations of so-called greenhouse gases in the atmosphere. Primary greenhouse gases are water vapor (H_2O), methane (CH_4), nitrous oxide (N_2O), and carbon dioxide (CO_2). In essence, greenhouse gases are very useful. They provide a livable climate by trapping solar heat that is radiated back from the earth's surface. Without greenhouse gases, the earth would be too cold for plants and animals to survive. However, when the amount of greenhouse gases increases, more heat is trapped than necessary. This causes the globe to warm up. To combat global warming, many industrialized countries have agreed to reduce their emissions of greenhouse gases. This agreement has been formalized in the so-called Kyoto Protocol and the recently adopted Doha amendment (United Nations, 1998, 2012).

Greenhouse gases partially result from naturally-induced processes. For example, methane is released from wetlands and oceans, and CO_2 is breathed out by animals and humans. However, greenhouse gases also result from human-induced (anthropogenic) activities. The best known anthropogenic activity is probably the combustion of fossil fuels such as coal, oil, and natural gas to produce energy and electricity. However, greenhouse gases are also released from the industrial production of iron, steel, and cement, and from agriculture. Anthropogenic greenhouse gases are now regarded as the most important contributors to global warming, especially CO_2 from fossil fuel-related emissions (IPCC, 2013; WMO, 2013). Therefore, most measures to combat global warming are aimed at mitigating emissions of anthropogenic CO_2.

Emissions of CO_2 can be reduced at many levels. At the individual level, people can reduce their energy consumption by turning off devices (such as the television) when not in use, installing insulation in their homes, and using public transport instead of cars. At the organizational level, manufacturers can develop energy efficient appliances, and industrial companies can make more efficient use of fossil fuels. At the

global level, countries could turn to a more balanced energy mix featuring renewable (non-fossil) sources such as water, biomass, wind, and sun.

Well-designed policies that encourage individuals, organizations, and societies to be efficient in their energy consumption can help to achieve substantial energy savings (Geller et al., 2006). However, the uptake of energy efficiency is slow (IEA, 2012) and relatively few people and organizations engage in sustainable behavior for the purpose of combating global warming (Whitmarsh, 2009). Moreover, despite the potential of renewable energy sources, progress in the development and use of clean energy is falling behind (IEA, 2012). Therefore, governments all over the world are currently considering the adoption of more immediate measures to reduce CO_2 emissions. These transition measures could bridge the gap until the more long-term sustainable options are fully developed.

CO_2 Capture and Storage

One of these transition measures is the large-scale implementation of the low-carbon energy technology CO_2 capture and storage (CCS) (IPCC, 2007). By implementing this technology, a large amount of the CO_2 emissions released by the burning of fossil fuels does not get into the atmosphere. In a nutshell, the technology of CCS exists of a chain of three processes. In the first stage, CO_2 is captured and purified. CO_2 can be captured in any process where large amounts of CO_2 are released from fossil fuels combustion, such as power generation, and oil and gas production. In the second stage, the captured CO_2 is compressed and transported to a storage site. This can be done either by pipeline, ship, rail, or truck. In the third and final step, the purified and compressed CO_2 is injected into secure deep geological formations that are screened for this purpose. Storage sites are often depleted oil or gas fields or saline aquifers, either underground or undersea. The CO_2 will be stored for an infinite amount of time. The large-scale integration of the three processes that together form CCS (capture, transport, and storage) is new. However, the processes are already applied separately on different scales and under different circumstances. For instance, the food and beverage industry uses captured CO_2 for the “fizz” in soft drinks, beer, and champagne. Furthermore, the oil and gas industry injects CO_2 into geologic reservoirs to make it easier to remove oil out of the reservoir (enhanced oil recovery).

CO_2 capture and storage is a controversial technology. The public debate is strong and clusters around several topics. Examples of such topics are whether the technology genuinely helps to solve global warming or hampers the development of renewable (energy) sources, whether or not the processes can be safely applied on a large scale, and whether or not the benefits compensate the financial costs (e.g., van Egmond & Hekkert, 2012). Similar debates, clustered around money and safety, also

accompany—or have accompanied—the introduction of other controversial, new, and complicated issues (i.e., "hard issues"; e.g., Carmines & Stimson, 1980). Examples are the implementation of wind energy (Jolivet & Heiskanen, 2010), biofuel (Wright & Reid, 2011), and nuclear energy (Arentsen, 2006). A controversial issue that has been in the news in recent days is the extraction of shale gas from underground rock formations by fracking, which involves injecting chemically treated water deep into the ground. Similar to CCS, there is large controversy about shale gas extraction including local opposition and support from national government.

Public debate has a large influence on how favorably or unfavorably people perceive an issue. This public attitude, in turn, is very relevant for the implementation of emergent technologies such as CCS. That is, implementation might be delayed or cancelled if the public does not accept the technology. For instance, public resistance hindered implementation of nuclear energy in the Netherlands (Arentsen, 2006). More recently, in November 2010, a CO_2 storage demonstration project in the Dutch town Barendrecht was cancelled by the national government; mainly because the local residents did not support implementation (Brunsting, de Best-Waldhober, Feenstra, & Milkunda, 2011; Terwel, Ter Mors, & Daamen, 2012).

Persuasive Communication

Attitudes towards controversial issues can be influenced by how these issues are communicated to the public. For example, the public opinion about nanotechnology can be influenced by the extent to which risks and benefits of the technology are described (Cobb, 2005). Similarly, attitudes towards nuclear power can be affected when this energy resource is related to climate change mitigation (Jones, Eiser, & Gamble, 2012). More than often, these communications are persuasive in nature. Persuasive communication can be defined as the process by which a communicator (the source) transmits information (the message) about a subject (the issue) to create, reinforce, modify, or extinguish the beliefs, attitudes, intentions, motivations, and/or behaviors of an audience (the recipient) (e.g., Fishbein & Ajzen, 1975; Gass & Seiter, 2007; Hovland, Janis, & Kelley, 1953).

The impact of persuasive communications can be influenced by characteristics of the source, the message, the issue, and the recipient. Dual process models such as the heuristic-systematic model (HSM; Chaiken, 1980) and the elaboration likelihood model (ELM; Petty & Cacioppo, 1986) explain how these aspects relate to each other regarding persuasion. Dual process models suggest the existence of an information processing continuum with two extreme ends: a systematic (or central) route and a heuristic (or peripheral) route. If recipients process a communication systematically, they scrutinize all available information to form an opinion. As such, they are

persuaded especially by message characteristics. In contrast, if recipients process a communication heuristically, they are persuaded by heuristic cues that are unrelated to the message, such as characteristics of the source. People will particularly follow a more heuristic route of information processing when they are not very motivated, involved, or able to process a communication. For instance, when the issue does not interest them much, or when they suffer from time constraints or cognitive limitations (Chaiken, 1980; Petty & Cacioppo, 1986). However, in general, people will use some combination of the two routes (Petty, Cacioppo, Strathman, & Priester, 2005). Both systematic and heuristic processing can affect persuasion but the amount (e.g., a lot versus little) and nature (e.g., positive or negative) of the thinking determines how the recipient's opinion is affected. It is assumed that opinions are more persistent, resistant, and predictive of behavior when they are based on systematically processed information than on heuristically processed information (Petty, Haugtvedt, & Smith, 1995).

Research on persuasive communication tends to focus on effectiveness. That is, it investigates the extent to which communications influence recipients' beliefs, attitudes, intentions, motivations, and/or behavior. However, less scientific attention has gone to how recipients perceive persuasion tactics and how these perceptions affect evaluations about the message as well as the source. Because recipients' perceptions and evaluations are relatively neglected, some communication techniques might appear to be effective while their possible unfavorable side effects (i.e., pitfalls) stay undetected. It is desirable that these pitfalls are identified because unfavorable message and source evaluations can have negative effects in turn. For instance, people can react against the position advocated in communications because they feel that their freedom to make up their own mind is threatened and they need to regain control (i.e., psychological reactance; Brehm & Brehm, 1981). Such a backfire effect has been identified in research that found people to become more negative about CCS when they place little trust in the integrity of organizations that support the implementation of CCS (Terwel, Harinck, Ellemers, & Daamen, 2009a). Moreover, unfavorable evaluations are also linked to several unwanted effects in the long run. Examples are consumer protest and boycott, and financial loss for the company (e.g., Campbell, 1995; Polonsky, 1995; Polonsky & Rosenberger III, 2001).

The Present Research

The research presented in this dissertation is aimed at identifying potential pitfalls in the persuasive communication about CCS. Furthermore, the research examines the processes underlying these pitfalls and their boundary conditions. I systematically assessed potential pitfalls of three techniques: conveying lots of information at one time (i.e., heaping), emphasizing advantages over disadvantages or vice versa (i.e., emphasis framing), and citing pro-environmental motives for involvement in CCS (i.e., greening).

I primarily focused on communications from oil and gas companies because these organizations have applied the above-mentioned techniques in their communications about CCS in the past (Brunsting et al., 2011). Oil and gas companies explore, process and refine crude oil or natural gas and sell the end products: fuels such as gasoline and domestic gas. I compared communications from oil and gas companies with communications from other stakeholders that communicate about CCS, such as environmental non-governmental organizations (ENGOs) and news agencies, to assess if oil and gas companies suffer from corporate image problems that influence the effectiveness of their communications (Yoon, Gürhan-Canli, & Schwarz, 2006).

Heaping Information

A communication technique that potentially has unforeseen effects is heaping: conveying lots of information at one time. Oil and gas companies might cumulate information about CCS in the hope that one or more chunks of information persuade individuals to support implementation of the technology. Moreover, they might heap information because recipients easily perceive a lengthy communication as truthful (i.e., the length-implies-strength heuristic; e.g., Stec & Bernstein, 1999). These CCS communications often contain multiple technical aspects (Corry & Reiner, 2011).

In fact, there is support that consumers can be convinced that a product is “good” when an advertisement displays many positive statements about a product (Petty & Cacioppo, 1984). Furthermore, technical information can be persuasive (Nisbet & Mooney, 2007). However, in the case of persuasive communication, a pitfall of heaping information lies in the possibility that the most important message does not come across when it is buried in a pile of trivia. Communications about CCS often exist of more and less relevant chunks of information (Brunsting et al., 2011). Although, in principle, only the most relevant message should dictate judgments and beliefs about the technology, I propose that irrelevant (nondiagnostic) details can dilute these judgments and beliefs (e.g., Meyvis & Janiszewski, 2002; Nisbett, Zukier, & Lemley, 1981). This dilution effect can make cumulated communications *less*—instead of

more—persuasive. Chapter 2 examines if irrelevant details dilute the persuasiveness of relevant information as a pitfall of heaping.

Emphasis Framing

A second potential communication pitfall regards the unforeseen effects of giving more weight to advantages of CCS over disadvantages as a way to nudge people towards supporting the technology. This technique is called emphasis framing. Emphasis framing can either be strong or subtle. It is strong when only one aspect of an issue is communicated and alternative considerations are omitted (i.e., one-sided framing). It is subtle when more aspects are communicated, but one aspect is emphasized (i.e., two-sided framing). Regardless of its strength, emphasis framing has shown to be effective in shaping people's attitudes. For example, research on attitudes towards genetically modified food revealed that participants were more positive about this type of food when the positive aspect of combating world hunger was given more weight than the negative aspect that the food impacts on biodiversity and the food chain (Druckman & Bolsen, 2011).

A potential pitfall of applying emphasis framing is that people might feel they are being manipulated when CCS advantages are emphasized over disadvantages (or vice versa). Such perceived manipulation could lead to a range of unfavorable (long-term) effects, such as negative source evaluations (see Campbell, 1995), and psychological reactance (e.g., Brehm & Brehm, 1981; Terwel et al., 2009a). Moreover, this pitfall might especially be severe when perceptions of manipulation lead to judgments of source illegitimacy or untrustworthiness. This could easily happen when recipients are presented with persuasive communications when they expect informative communications. Chapter 3 examines if perceptions of manipulation and judgments of illegitimacy are pitfalls of emphasis framing.

Greening

A third pitfall concerns the technique of greening: presenting (corporate) activities as being environmentally friendly. Oil and gas companies might be inclined to green their involvement in CCS because positive information about a firm's corporate social responsibility can positively affect their reputation (Alniacik, Alniacik, & Genc, 2011; Sen & Bhattacharya, 2001). Greening of corporate involvement in CCS might become a pitfall if the public suspects that the activity is actually guided by firm-serving motives such as image-enhancement or satisfying customers, instead of public-serving motives such as care for the environment (Spangler & Pompper, 2011; Terwel, Harinck, Ellemers, & Daamen, 2009b). These suspicions of strategic behavior could lead to perceptions of corporate greenwashing. That is, that a company misrepresents corporate activities as "green" in order to look more environmentally friendly than it

actually is (e.g., Laufer, 2003; Vos, 2009). Greenwashing is linked to several long-term unwanted effects including consumer protest and boycott, and financial loss for the company (e.g., Polonsky, 1995; Polonsky & Rosenberger III, 2001).

An illustration of the potential pitfall of greening is provided by the Go Green campaign of British Petroleum (BP). In 2000, BP launched this public relations and advertising campaign to show their concern for the environment and to introduce a new logo—a green and yellow sun—and new slogan: "Beyond Petroleum" (e.g., Muralidharan, Dillistone, & Shin, 2011). However, BP's green intentions and concerns were challenged (García, 2011; LeMenestrel, Van den Hove, & De Bettignies, 2002). Moreover, in 2008, BP was publicly accused of corporate greenwashing for announcing commitment to alternative energy sources while investing mainly in fossil fuels ("BP wins 'Emerald Paintbrush' award", 2008). As such, the Go Green campaign backfired. Chapter 4 investigates if perceived greenwashing is a pitfall of greening.

Research Method

To investigate potential pitfalls of heaping, emphasis framing, and greening in the communication about CCS (i.e., the research questions), I conducted experimental and survey research.

Experimental research. I conducted experimental research because this method enables the examination of causality. That is, in experimental research everything is kept constant, but one aspect is systematically varied. For example, if only one aspect of a communication (e.g., its relevance) is altered, while all other aspects are kept constant, the conclusion can be drawn that differences in the impact of the communication (e.g., its persuasiveness) must be due to the altered aspect.

In this dissertation, I altered different aspects of CCS communications depending on the research question. More specifically, I varied the relevance of chunks of information about CCS to test the weakening effect of irrelevant details on a relevant message (Chapter 2). The relative weight on advantages and disadvantages of CCS in a news article was altered to test whether or not emphasis framing is perceived as manipulative (Chapter 3). Finally, I varied communicated motives for investing in CCS on a corporate website to test whether or not a green motive for CCS is perceived as greenwashing (Chapter 4). Participants in all experiments were students of Leiden University. They were randomly allocated to experimental conditions to ensure that individual differences were evenly distributed. As such, differences in the findings between experimental conditions could not be attributed to characteristics of specific individuals.

Survey research. Experimental research with student participants is valuable to examine causality and identify specific processes. However, responses of students may not be representative for the general public. I conducted a large-scale survey among a representative sample of the Dutch public in October 2013 to explore whether conclusions drawn on the basis of experimental studies with student populations also apply to a broader sample of the general public. To anchor the results obtained with student samples, respondents were asked—amongst others—about oil and gas companies' motives to be involved in the development of CCS, and to what extent they expected oil and gas companies to try to influence public opinion about CCS. I will refer to the survey and its findings throughout this dissertation (Appendix A).

Identified Pitfalls

The experimental and survey data support the existence of pitfalls in the communication about CCS. Moreover, the data provide insight in the circumstances under which these pitfalls are most likely to occur as well as their boundary conditions.

First, an important pitfall of heaping information about CCS was identified. The results show that adding irrelevant details to a relevant argument in support of CCS can reduce the persuasiveness of the relevant argument. Irrelevant details can dilute both perceived persuasiveness (Experiment 2.1) as well as actual persuasiveness (modifications in beliefs, Experiment 2.3). Irrelevant details can also dilute the persuasiveness of relevant arguments *against* CCS, although the effect is less strong (Experiment 2.2). The current research provides an explanation for this dilution effect; irrelevant details impair the perceived overall quality of a communication (Experiment 2.3). I also discovered that heaping information is not necessarily harmful for the persuasiveness of a message. That is, the persuasiveness of a message is not diluted when arguments are added that point in the same direction as the key message but are less strong (i.e., moderately relevant information). However, this addition does not make the message more persuasive either (Experiment 2.1; Experiment 2.2).

Based on the above, an effective way to convince people of the benefits of CCS would be to spare details and only share information that is supportive of CCS. However, the present research reveals that this may raise another pitfall. That is, people perceive biased CCS communications as manipulative. More specifically, communications that emphasize advantages of the technology over disadvantages (or vice versa) are perceived as significantly more manipulative than balanced communications. Manipulation is perceived regardless of whether a communication only contains arguments for or against CCS and any competitive arguments are omitted (Experiment 3.1), or whether it contains both pro and con arguments, but with an emphasis on one of them (Experiment 3.1; Experiment 3.2).

Also as predicted, oil and gas companies that green their corporate interest in CCS can be perceived as greenwashing (see all experiments reported in Chapter 4). People suspect that the main motives for companies to be involved in the development of CCS are firm-serving (Experiment 4.2; Experiment 4.3; Appendix A). This suspicion leads to perceptions of corporate greenwashing (Experiment 4.2; Experiment 4.3). The present research further reveals this is the default expectation. That is, oil and gas companies are even perceived as greenwashing when they do not motivate their involvement in CCS at all (Experiment 4.1). This effect might be due to the fact that organizations that emit large amounts of CO_2 by combusting fossil fuels are perceived as hypocritical when they develop a measure that helps to combat global warming (cf. Yoon et al., 2006). However, I also discovered that oil and gas companies can restrain perceptions of greenwashing by providing an economic motive for their investment in CCS. For instance, oil and gas companies may acknowledge publicly that they invest because they anticipate that the investment is profitable in the long run (see all experiments reported in Chapter 4). An economic motive is in line with what the public expects from this type of organization (Appendix A). Therefore, this motive is credible and people appreciate honest motives (Terwel et al., 2009a).

Role of Communication Source

I demonstrate that characteristics of the communication source play an important role in how communications about CCS are perceived and evaluated. This is consistent with prior studies (e.g., Rabinovich, Morton, & Birney, 2012; Ter Mors, Weenig, Ellemers, & Daamen, 2010; Terwel et al., 2009b).

Source presence. The mere presence (versus absence) of source information affects the persuasiveness of a message. Specifically, I found that source presence moderates the effect of heaping on the persuasiveness of CCS communications. That is, irrelevant details only dilute the persuasiveness of relevant arguments when recipients do not know the identity of the source. The dilution effect does not occur when it is clear who is communicating. This boundary condition for the dilution effect emerges when an oil and gas company is the source, but also when an ENGO communicates about CCS (Experiment 2.3). This finding is consistent with dual process models (Chaiken, 1980; Petty & Cacioppo, 1986); persuasive communications about CCS are easily processed heuristically because the general public may not be very involved in the issue. As a result, source information—when salient—can function as a heuristic cue that affects the persuasiveness of the communications. When no source information is available, persuasiveness will be affected mainly by characteristics of the message (such as its relevance) which allows for occurrence of the dilution effect.

Source type. Dual process models can also explain the influence of type of source on perceptions of manipulation. That is, the current research indicates that people perceive the same (balanced or biased) message as more manipulative when it comes from an oil and gas company than when it comes from a news agency (Experiment 3.2). This again shows that a CCS message is evaluated primarily based on source characteristics rather than on message characteristics, and that oil and gas companies are generally expected to be more manipulative than news agencies (Experiment 3.2; Appendix A). Furthermore, the type of source determines whether or not people perceive manipulation through emphasis framing as legitimate. That is, manipulation by a news agency is judged as relatively unacceptable (compared to the provision of a balanced message), but perceptions of manipulation are less clearly related to judgments of illegitimacy when an oil and gas company frames its communications about CCS in this way (Experiment 3.2).

Effectiveness of Persuasive Communication

I also examined whether or not people's (negative) message or source evaluations would impair the effectiveness of persuasive communications regarding modifying people's beliefs and attitudes. I discovered that the effectiveness of emphasis framing is not impaired by people's negative perceptions about this technique. That is, although people do perceive emphasis framing (pro or con) as manipulative, their attitude towards CCS is still moved into the framed direction. As such that people have a more positive attitude towards CCS when communications emphasize advantages of the technology compared to when more weight is given to disadvantages (Experiment 3.1). In contrast, I found that the effectiveness of a communication can be impaired when information is heaped. More specifically, adding irrelevant information (but not moderately relevant information) raises negative message perceptions. That is, irrelevant details impair the perceived quality of a communication that puts CCS forward as a measure that helps to combat global warming. This in turn decreases the belief that CCS would have climate benefits (Experiment 2.3).[1]

Individual Characteristics

Individual differences between people can make them more or less sensitive to persuasive communication techniques (e.g., Petty et al., 2005). The survey data support this by revealing a relation between individual environmental views and expectations about honest CCS communications (Appendix A). I ensured that these individual differences would not contribute to the main experimental findings by randomly allocating participants to conditions. Randomization made it redundant to

[1] In the survey, I also assessed people's overall attitude towards CCS. I found that people are slightly more positive towards the technology than negative (M = 4.49, SD = 1.45 on a scale from 1 [*negative*] to 7 [*positive*], $t(844) = 9.76$, $p < .001$). See Appendix A.

verify whether observed effects should be attributed to individual characteristics. However, for exploratory reasons, I did examine whether a priori familiarity with CCS and dispositional skepticism towards organizational communications might moderate the effects of communication techniques. I discovered that familiarity with CCS did not moderate any of the effects, but dispositional skepticism made a difference in people's responses to the use of greening. People who are not very skeptical evaluate the use of greening as negative because it raises suspicions of strategic behavior. This indirect effect does not hold true for so-called communication skeptics. Probably because communication skeptics always doubt the truthfulness of communications, regardless of their contents (Experiment 4.3).

Implications of the Findings

The research presented in this dissertation has clear implications for organizations that have an interest in CCS. However, it also has implications for scientists who study the effects of persuasive communication as well as for the general public that is confronted with these communications.

Implications for Organizations

Awareness of pitfalls in the use of heaping, emphasis framing, and greening in the communication about CCS is important for both organizations that support the technology and organizations that oppose it. However, awareness seems to be particularly relevant for organizations with an interest in the implementation of CCS projects because, in the past, these organizations have applied the techniques I examined. For example, partners of the CO_2 storage demonstration project in Barendrecht produced lengthy communications that were not always completely relevant, and the information that they shared was relatively biased (Brunsting et al., 2011). Furthermore, the main industrial partner of the project, multinational oil and gas company Shell, claimed that climate change mitigation was the main reason for the company's involvement in the project (and not profitability), but Shell refuted alternative views on how to approach climate change mitigation (Brunsting et al., 2011).

Whether or not the Barendrecht partners applied heaping, emphasis framing, and greening in their communications strategically (i.e., with the purpose to persuade), the current research acquaints them with the fact that these techniques have potential pitfalls. If the partners had been aware of these pitfalls at the time, they might have communicated in a more balanced, relevant, and credible manner. Consequently, it would have been possible that residents' were more positive about implementation of the demonstration project. In short, the identification of pitfalls in the communication

about CCS is very relevant for organizations with an interest in the implementation of CCS.

Although I focused on stakeholders with an interest in achieving CCS projects, I demonstrated that awareness of pitfalls is also relevant for organizations that are more interested in cancellation of CCS projects. An example of such an organization is the activist group 'CO_2isNee' (i.e., CO_2isNo) that fiercely argued against the Barendrecht project through publications on its website, messages in local newspapers, and public meetings (Brunsting et al., 2011; Terwel et al., 2012). I showed that relevant arguments *against* implementation of CCS can—just as relevant pro arguments—be diluted by irrelevant information. Furthermore, emphasizing disadvantages over advantages in CCS communications is perceived as manipulative as the reverse. In sum, both proponents and opponents should be aware of pitfalls in the communication about CCS.

Source disclosure. It would seem that companies with an economic interest in CCS can avoid some of the identified pitfalls by activating their source characteristics. After all, I demonstrated that oil and gas companies could inoculate themselves to the diluting effect of irrelevant details by making their corporate identity explicit in their communications. Furthermore, it appears as if the pitfalls of emphasis framing are merely of concern for sources that are expected to be objective; oil and gas companies can emphasize CCS advantages over disadvantages without being accused of illegitimate manipulation. This conclusion needs nuance, though. Revealing corporate identity does not guarantee an easy transfer of a relevant CCS message for oil and gas companies. In contrast, disclosure will probably activate negative perceptions. That is, Chapter 4 of this dissertation shows that people suspect oil and gas companies to be primarily driven by firm-serving motives which easily raises perceptions of greenwashing. Disclosure might even backfire in a sense that it can make communication techniques less instead of more effective. That is, I found that oil and gas companies suffer from a relatively negative image, corresponding to earlier research (e.g., Terwel et al., 2009b; Yoon et al., 2006). This negative image could decrease the effectiveness of persuasive communication techniques (Druckman, 2001).

Although persuasive communication should be practiced with caution, the current findings do not implicate that persuasion should be avoided completely. Instead, the findings implicate that CCS stakeholders can provide persuasive communications effectively as long as the content is relevant (to avoid the diluting effect of irrelevant details) and the message is credible (to avoid being evaluated negatively when the

public does not believe what is being said). Moreover, the communications should be in line with the expectations of the audience.

Expectations. Extending prior research (e.g., Hinnant, Len-Ríos, & Jee Oh, 2012), the current findings elucidate that expectations play an important role in how people respond to persuasive communications. This is the case, for instance, with expectations about manipulation and expectations about the message. People's attitudes are determined by expectations and the evaluations of those expectations (expectancy violations theory; see Burgoon & Le Poire, 1993). Therefore, those communicating about CCS should take the expectations of the public into account, even if these expectations are not completely in line with reality. I have demonstrated that stakeholders with a specific interest in CCS can practice persuasive communication techniques effectively when they act upon people's expectations. For example, oil and gas companies can prevent perceptions of greenwashing if they communicate a motive for their investment in CCS that the public expects: an economic motive.

Informative versus persuasive communication. Not only stakeholders with a specific interest in achieving or preventing implementation of CCS should take the expectations of the public into account. I demonstrated that expectations are also very relevant for communicators who have a supposedly more objective view on CCS, such as the media. Because these sources are expected to be objective, it pays for them to be reserved in their practice of persuasive communication. Instead, these sources do better to provide informative, balanced communications about the technology to avoid accusations of illegitimate manipulation.

Questions can be raised about what pitfalls might occur when sources that are expected to provide *subjective* information (e.g., oil and gas companies or activist groups) provide informative communications about CCS, instead of persuasive communications. For example, one may ask whether or not it is likely that partners of a CCS project encounter any unforeseen effects when they set up a local information center (as the national government and Shell did in Barendrecht, Brunsting et al., 2011).

Sharing neutral information might not be the first-choice strategy for stakeholders with a clear interest in achieving or preventing implementation of CCS. That is, their aim is to influence public opinions about the technology, and a balanced message does not likely reach that goal. In contrast, a biased message—for or against implementation—can nudge attitudes towards CCS into the preferred direction. Therefore, stakeholders with a specific interest probably prefer persuasive

communication over informative communication. However, I demonstrated that the use of persuasive communication techniques comes with a cost. That is, framing can be perceived as manipulative. And although these perceptions of manipulation are not judged as inappropriate for stakeholders with an interest in CCS, they could lead to a range of negative effects in the long run, such as negative source evaluations (see Campbell, 1995), and psychological reactance (Brehm & Brehm, 1981; Terwel et al., 2009a). Furthermore, greening can lead to perceived greenwashing which, in turn, is linked to several long-term unwanted effects including consumer protest and boycott, and financial loss for the company (e.g., Polonsky, 1995; Polonsky & Rosenberger III, 2001).

Inversely, I demonstrated that informative communications are perceived as significantly less manipulative than persuasive communications. Informative communications could lead to positive long-term effects for an organization, such as increased trust in its integrity (cf. Terwel et al., 2009a). As such, it is not such a bad idea for stakeholders with an interest in CCS to inform instead of persuade. However, informative communication should also be used with caution. That is, informative communication from sources with a specific interest in an issue could look like persuasion under the cover of education. This is also known as propaganda: a form of communication that attempts to achieve a response that furthers the desired intent of the propagandist and is often associated with unethical, harmful, and unfair tactics (Jowett & O'Donnell, 2012). To avoid perceptions of propaganda, stakeholders could share information about CCS in collaboration with stakeholders with competing views. For example, a local ENGO could cooperate with an oil and gas company. Collaborative information is perceived as more valuable because people expect that diverse perspectives are represented (Ter Mors et al., 2010).

In sum, when bias is expected, a relevant and credible persuasive message about CCS will be accepted, and informative communication will not be rejected (as long as it is not perceived as propaganda). However, when balance is expected, only informative communication will be accepted and a persuasive message will be rejected.

Scientific Contribution

As stated before, researchers who study persuasive communication techniques tend to focus on the short-term effectiveness of these techniques, for instance on the extent to which these techniques affect people's attitude towards an issue. However, up till now, less scientific attention has been given to how people perceive these techniques and how those perceptions affect evaluations about the message and the source (that can have long-term implications for reputation and perceived trustworthiness).

Therefore, the main scientific contribution of the current research is that it clarifies that although persuasive communication techniques can be effective in the short run, they can at the same time lead to unforeseen, unfavorable evaluations in the long run. Stated differently, the present research has made clear the importance to include, in future research, the examination of communication pitfalls and their effects, that were often neglected in prior research. Furthermore, the current findings indicate that scientists should also take people's expectations into account because they play a large role in how people perceive messages and communication sources.

Implications for Recipients

The present research also has implications for recipients of information about CCS. Recipients can approach messages in a more critical manner when they learn about the processes that are instigated by persuasive communication techniques. Forewarning people of the existence of persuasive tactics can help them resist persuasion (see Benoit, 1998), especially if their illusions of invulnerability to persuasion are dispelled (e.g., Sagarin, Cialdini, Rice, & Serna, 2002). The current research shows that people who are already skeptical towards organizational communications and/or have relatively profound environmental concerns show a critical approach towards CCS communications. Becoming aware of the insights of the current research might also instill a more critical approach in people who are less skeptical by nature or less concerned about the environment. As more critical consumers, people can more effectively use public communications to derive an informed opinion about difficult issues such as CCS.

Beyond the Present Research

The research presented in this dissertation is set up in a rather broad way; experimental and survey research are presented and related to theory and results obtained in the literature from the fields of psychology, political science, marketing, and communication science. Despite this broad set-up, the research has its restrictions, which of course also presents opportunities for future research. Specific limitations and opportunities of the separate lines of research are discussed in some detail at the end of Chapters 2, 3, and 4. In addition, I will now discuss two general aspects of the present research that offer opportunities for further research.

Issue Characteristics and Information-Processing

The current research was carried out in the context of CATO-2, a large-scale Dutch research and development program on the low-carbon energy technology CCS, which prescribed the focus on communication about this technology. However, the pitfalls identified in the communication about CCS are likely to arise also in the communication about other new complex technologies. Especially when these

communications apply to issues in the environmental domain, such as the adoption of nuclear energy, biofuel, wind energy, or shale gas. In the case of more familiar, interesting issues about which people easily form an opinion (i.e., “easy issues”; e.g., Carmines & Stimson, 1980), different concerns might play a role, making it less likely for the pitfalls identified in the current research to arise.

To predict possible occurrence of the identified pitfalls, it might be more useful to focus on level of information-processing than on issue characteristics. Namely, as I argued earlier in this thesis, occurrence of the pitfalls is probably largely related to how deeply a communication is processed. More specifically, the pitfalls identified in the current research were likely to arise because the communications had been processed heuristically due to low involvement and low motivation. This implicates that the pitfalls of heaping, emphasis framing, and greening are likely to occur in any communication that is processed heuristically. Most probably, these communications are about difficult issues, such as CCS. However, according to the dual process models, these can be communications about all types of issues that people are not very involved in (Chaiken, 1980; Petty & Cacioppo, 1986).

In contrast, when people are very involved in an issue, they process communications in a more systematic than heuristic manner and rely more on message cues than on heuristic cues (Chaiken, 1980; Petty & Cacioppo, 1986). These are likely to be familiar and interesting issues. However, the issues can also be difficult, such as CCS. For example, residents who live near a planned CCS storage site are very involved in CCS and will probably take a more systematic than heuristic route to process information about the storage site and the technology. As a result, some of the pitfalls identified in the present research might not arise. That is, in this case, source presence might not overrule the diluting effect of irrelevant information on the persuasiveness of relevant information. Furthermore, evaluations of communications from these people might be more clearly influenced by specific expectations, such as the belief that local properties will fall in value and accidents might happen (e.g., Terwel et al., 2012). Because residents might be focused merely on information against the issue, pro-CCS information might be perceived as untrue and manipulative, regardless of the source (selective exposure; Frey, 1986; Hart et al., 2009; Smith, Fabrigar, & Norris, 2008). Finally, these residents might be less sensitive to persuasive communication than people with a less strong opinion (Brewer, 2001, Joslyn & Haider-Markel, 2002).

In conclusion, the pitfalls identified in the present research might occur in particular when persuasive communications are processed in a more heuristic manner. Different psychological processes and pitfalls might come into play when communications are processed more systematically. Future research might further explore the role of

information-processing in the communication about CCS. For example, experiments can be conducted to unravel the individual effects of issue-difficulty (easy vs. difficult) and level of information-processing (heuristic vs. systematic) on evaluations of persuasive communication techniques.

One-way versus Two-way Communication

The current research examined a type of communication that did not allow for any explicit feedback from the recipient (i.e., one-way communication; e.g., Grunig & Hunt, 1984). However, people might be more positive about CCS if they receive an opportunity to voice their opinion about the issue (e.g., Terwel, Harinck, Ellemers, & Daamen, 2010). Future research might examine the effectiveness and pitfalls of communication strategies that are interactive, such as social media (i.e., two-way communication; e.g., Grunig & Hunt, 1984).

I suspect that parallel with one-way communication, two-way communication is effective, but also has pitfalls. On the one hand, two-way communication might be more effective in influencing peoples attitude towards the implementation of CCS because people experience increased feelings of fairness, trust, and respect when they can voice their opinion and concerns (procedural justice; Lind & Tyler, 1988; Thibaut & Walker, 1975). On the other hand, the potential pitfall here is that the possibility to give feedback can be perceived as pseudo voice when people perceive decision makers to create an illusion of voice opportunity, without the intention to actually use their input (de Vries, Jehn, & Terwel, 2012). Pseudo voice can be perceived when residents of areas near planned CCS storage sites think that the national government has already made the decision to implement the site, but engage the public merely to heighten a sense of trust and appear democratic. These residents will probably feel mistreated when they suspect pseudo voice and might act against the project because they are frustrated about this (de Vries et al., 2012). Thus, opening a dialogue about CCS might backfire if people perceive the opportunity to give voice as pseudo voice.

Future research can be aimed at examining the factors that determine whether the provision of voice opportunity leads to positive or negative effects in the context of the implementation of CCS or a similar issue, such as the extraction of shale gas from underground rock formations by fracking.

Conclusion

One of the greatest environmental challenges the world is facing today is combating global warming. Global warming is largely due to growing concentrations of human-induced CO_2 emissions. One of the solutions to mitigate these emissions is the implementation of CO_2 capture and storage (CCS). CCS is a controversial technology, and attitudes towards it are influenced by public communications. Proponents as well as opponents use persuasive communication techniques to convince the public of their views. Examples of such techniques are conveying lots of information at one time (heaping), giving more weight to either advantages or disadvantages (emphasis framing), and citing pro-environmental motives for involvement in CCS (greening). These techniques tend to be judged on their effectiveness but, up till now, less attention went to how (unfavorable) recipients might evaluate a communication in which persuasive techniques are applied as well as the source that produced it. Yet, these message and source evaluations are important because they can have long-term costs for the communicators' reputation and performance. Because message and source evaluations are rather neglected, it might appear as if it is effective to apply persuasive techniques to the communication about CCS, while possible negative side-effects stay undetected. Stated differently, communication about CCS can have pitfalls. The experimental and survey research presented in this dissertation identified pitfalls in the use of heaping, emphasis framing, and greening. That is, the results show that irrelevant details can dilute the persuasiveness of a relevant message, giving more weight to either advantages or disadvantages is perceived as manipulative—even as illegitimate when people expect informative communications—and citing pro-environmental motives for involvement in CCS can be perceived as greenwashing. Furthermore, the research reveals the psychological processes underlying these pitfalls and their boundary conditions. Expectations about the communication source appear to play an important role in how the use of persuasive techniques is perceived. To avoid long-term negative perceptions, stakeholders with an interest in CCS can best take people's source expectations into account and provide a relevant, balanced and credible message about the technology.

Chapter 2

Pitfalls of Heaping Information

This chapter is based on: de Vries, G., Terwel, B. W., & Ellemers, N. (2014). Spare the details, share the relevance: The dilution effect in communications about carbon dioxide capture and storage. *Journal of Environmental Psychology, 38,* 116-223, doi: http://dx.doi.org/10.1016/j.jenvp.2014.01.003

The mitigation of human-induced climate change is one of the greatest environmental challenges facing the world today. Considering that climate change is largely due to carbon dioxide (i.e., CO_2) emissions arising from ever-increasing energy use, the natural solution to the problem would be to increase the use of clean, sustainable energy sources (e.g., wind) and to encourage individuals, organizations, and societies to save on energy consumption. Unfortunately, this is easier said than done. Relatively few people and organizations (are willing to) engage in sustainable behavior for the purpose of mitigating climate change (Whitmarsh, 2009). A substantial increase in sustainable behavior in the near future is unlikely, among other things because of a variety of "psychological barriers" such as limited cognition about the problem and discredence of experts and authorities (Gifford, 2011). In addition to focusing on these more long-term solutions, governments all over the world are currently thinking about other, more immediate mitigation measures.

According to reports by the Intergovernmental Panel on Climate Change (IPCC, 2007) and the International Energy Agency (IEA, 2012), the large-scale implementation of CO_2 capture and storage (CCS) technology is a measure that would make a significant contribution to the mitigation of climate change in the short run. In a nutshell, it involves the capture of CO_2 in fossil fuel power plants or other major industrial processes, and the subsequent transport and long-term storage of this CO_2 in deep geological formations (e.g., depleted natural gas fields and saline aquifers). Despite the fact that several countries are considering the use of CCS, a recent Eurobarometer survey commissioned by the European Commission (2011, pp. 1-185) shows that the majority of the public is unfamiliar with the technology. Due to the lack of public knowledge and awareness of CCS there is plenty of opportunity for stakeholders (i.e., the proponents and opponents of CCS) to educate people on the matter and to convince them of the benefits and the risks associated with CCS.

In the current research, we focus on the relative persuasiveness of communications that consist of either highly relevant information only (e.g., the argument that the implementation of CCS has important climate benefits) or that combine highly relevant

with less relevant information. This is important to examine because persuasiveness plays a central role in the attitude formation process (e.g., Petty & Cacioppo, 1981). On the one hand, previous studies suggest that a message's persuasiveness may increase with length (i.e., the length-implies-strength heuristic; e.g., Stec & Bernstein, 1999). Thus, it might be useful to increase the length of communications about CCS by adding less relevant arguments (or perhaps even information that is irrelevant for attitude formation) to the most relevant argument in order to increase the persuasiveness of public communications. On the other hand, based on insights from research on the dilution effect (e.g., Nisbett et al., 1981), one might anticipate the added information to weaken the impact of the relevant argument. This would make public communications less instead of more persuasive. That is, although only the most relevant information should dictate people's judgments and beliefs, less relevant details can cause people to alter their judgments (Nisbett et al., 1981). The main question that we intend to answer is whether adding less relevant information to relevant information makes communications about CCS more or less persuasive than sharing merely the most relevant information.

The Dilution Effect

The dilution effect has been defined as "a judgment bias in which the presence of nondiagnostic cues, when processed along with diagnostic cues, causes a judge to under-weigh the diagnostic cues" (Waller & Zimbelman, 2003, p. 254). This bias has been documented by researchers from various disciplines and across different settings. Research has revealed dilution in relation to the effects of stereotypical information on impression formation (Nisbett et al., 1981; Tetlock & Boettger, 1989) and the effects of auditing cues on financial evaluations (Ettenson, Shanteau, & Krogstad, 1987). Furthermore, the dilution effect plays a role in juror decisions (Smith, Stasson, & Hawkes, 1998) and product evaluations (Meyvis & Janiszewski, 2002). For example, Meyvis and Janiszweski (2002) found that consumers' beliefs about the speed of a computer were diluted when relevant information ("this computer has a very powerful processor") was mixed with irrelevant information ("this computer can be ordered online"). Up till now, the dilution effect has not been examined in regard to evaluations of the persuasiveness of communications.

Prior research on the dilution effect has mainly focused on the effects of adding irrelevant (i.e., nondiagnostic) information to relevant information, while less is known about the possible diluting effect of moderately relevant information (i.e., less strong than highly relevant information, but pointing in the same direction). At first sight, it might seem logical to assume that if irrelevant information dilutes the impact of relevant information, moderately relevant information has a similar effect. Indeed, this would be in line with the human tendency to average evaluations of different pieces of

information into a single evaluative judgment (i.e., the averaging bias, Lichtenstein, Earle, & Slovic, 1975). Nevertheless, Tetlock and Boettger (1989) found no dilution effect when people had to predict a student's study performance after reading relevant information as well as information that was moderately relevant for this prediction. Moreover, Meyvis and Janiszewski (2002) suggest that moderately relevant information can even strengthen the persuasiveness of highly relevant information. They showed that participants who evaluated the speed of a computer were more confident that a computer was fast when they had received both highly relevant information and three pieces of moderately relevant information than when they had only received the relevant information.

Based on the above, we hypothesize that the persuasiveness of highly relevant information is diluted when irrelevant information is added (Hypothesis 2.1). Furthermore, we explore whether or not adding moderately relevant information also alters the persuasiveness of highly relevant information.

Experiment 2.1

Experiment 2.1 examines the hypothesis that the persuasiveness of a highly relevant pro-CCS argument is diluted when irrelevant information is added (Hypothesis 2.1). It furthermore explores the effect of adding moderately relevant pro-CCS information.

Method

Participants and design. Seventy-nine undergraduate students from Leiden University participated in the study. They were randomly allocated to either one of three experimental conditions (Information Relevance: highly relevant vs. highly relevant + moderately relevant vs. highly relevant + irrelevant) and received either €1 or course credits for their participation.

Procedure. Participants first received some general background information about energy production and CO_2 emissions, and a brief description of CCS. Next, participants in the 'highly relevant' condition read a pro-CCS argument that a pilot study had identified as highly relevant:[2]

[2] The pilot study (*N* = 50) was conducted in March 2011 and served to identify arguments for and against the implementation of CCS that varied in perceived relevance. The identification of irrelevant information was not part of the pilot study because this type of information was already anticipated to be quite irrelevant for the purpose of forming an opinion, due to its non-directional nature. Individuals who participated in the pilot study were not allowed to participate in the subsequent experiments.

> *By implementing CCS, approximately 90 percent of the CO_2 emissions released by the burning of fossil fuels can be captured. This helps to combat global warming because the CO_2 is not released into the air.*

Participants in the 'highly relevant + moderately relevant' condition read the highly relevant pro-CCS information complemented with three pro-CCS arguments that the pilot study had identified as moderately relevant:

> *A small proportion of the captured CO_2 can be used for the production of carbonated drinks. By implementing CCS, approximately 90 percent of the CO_2 emissions released by the burning of fossil fuels can be captured. This helps to combat global warming because the CO_2 is not released into the air. Dutch companies can qualify for European subsidies so that they do not have to finance the development of CCS completely by themselves. Also, as one of the main developers of CCS, the Netherlands can export knowledge of the technology to foreign countries.*

Participants in the 'highly relevant + irrelevant' condition read the highly relevant pro-CCS information complemented with three pieces of irrelevant information about CCS.

> *In English, CCS is referred to as "CO_2 storage" or "CO_2 sequestration". In French also two terms are used, namely "CO_2 stockage" and "CO_2 séquestration". By implementing CCS, approximately 90 percent of the CO_2 emissions released by the burning of fossil fuels can be captured. This helps to combat global warming because the CO_2 is not released into the air. September last year, a conference on CCS was held in Amsterdam. A lot of information on CCS is available on the internet, for example at Wikipedia.*

After reading these communications, participants completed a questionnaire that included items to measure the persuasiveness of the communications and the perceived relevance of the different pieces of information (this measure served as the manipulation check). Finally, participants were debriefed, paid, and thanked for their participation.

Measures

Persuasiveness of communications. The persuasiveness of the communications was measured with two separate questions that assessed how convincing and strong participants perceived the communications (1 = *not at all convincing/strong*; 7 = *very convincing/strong*). Responses to these questions were averaged to form an index of persuasiveness of communications (α = .78).

Manipulation check. To assess the adequacy of the manipulation, we asked all participants to indicate the relevance and importance of the highly relevant pro-CCS argument (i.e., CCS helps to combat global warming), the three moderately relevant pro-CCS arguments (i.e., carbonated drinks, subsidies, knowledge export), and the three pieces of irrelevant information (i.e., foreign names, conference, internet) (1 = *not at all relevant/important*; 7 = *very relevant/important*). Responses were averaged to form three separate overall indices of perceived relevance (highly relevant pro-CCS information, α = .83; moderately relevant pro-CCS information averaged across the three arguments, α = .70; irrelevant information averaged across the three pieces, α = .76).

Results

Manipulation check. As intended, participants regarded the highly relevant argument in favor of CCS as significantly more relevant (M = 5.62, SD = 1.07) than the moderately relevant pro-CCS information (M = 4.20, SD = 0.93), $t(78) = 10.41$, $p < .001$. In turn, they regarded the moderately relevant pro-CCS information as significantly more relevant than the irrelevant information (M = 2.48, SD = 1.02), $t(78) = 13.69$, $p < .001$. In addition, we checked for potential between-subjects effects but did not find any (Fs ≤ 1.13, ps ≥ .33).

Persuasiveness of communications. We performed an analysis of variance (ANOVA) with Information Relevance as the independent variable and persuasiveness of the communications as the dependent variable, which revealed a significant between-subjects effect, $F(2, 76) = 3.34$, $p = .04$, $\eta_p^2 = .08$. We then looked at two planned contrasts to determine specific differences regarding persuasiveness between conditions. A planned contrast between the 'highly relevant' and the 'highly relevant + irrelevant' conditions showed a significant difference, $F(1, 76) = 5.59$, $p = .02$, $\eta_p^2 = .07$. Participants found the highly relevant argument more persuasive in isolation (M = 4.69, SD = 0.93) than when it was mixed with irrelevant information (M = 3.92, SD = 1.32). Furthermore, a planned contrast between the 'highly relevant' and 'highly relevant + moderately relevant' conditions did not show a significant difference, $F(1, 76) = 0.14$, $p = .71$. Participants found the communications equally persuasive, regardless of whether these consisted of a mix of highly relevant and moderately relevant arguments in favor of CCS (M = 4.57, SD = 1.13) or only consisted of the highly relevant argument (M = 4.69, SD = 0.93). See Table 2.1 for all means and standard deviations.

Table 2.1.
Means (and standard deviations) for persuasiveness of communications as a function of information relevance (Experiment 2.1 and Experiment 2.2).

	Pro-CCS communications (Experiment 2.1)			Con-CCS communications (Experiment 2.2)		
	Highly relevant	Highly relevant + moderately relevant	Highly relevant + irrelevant	Highly relevant	Highly relevant + moderately relevant	Highly relevant + irrelevant
	(*N* = 24)	(*N* = 29)	(*N* = 26)	(*N* = 33)	(*N* = 33)	(*N* = 33)
Persuasiveness communications	4.69 (0.93)	4.57 (1.13)	3.92 (1.31)	4.35 (1.24)	4.42 (0.92)	3.83 (1.18)

All in all, the results of Experiment 2.1 offer support for Hypothesis 2.1: Irrelevant information diluted the persuasiveness of a highly relevant argument in favor of CCS. Furthermore, the results show that moderately relevant pro-CCS arguments did not dilute.

Experiment 2.2

Experiment 2.2 aims to replicate the results of Experiment 2.1, but this time we focus on information against the implementation of CCS. The fact that negative information is often processed differently (e.g., more thoroughly) and can have a stronger impact than positive information (e.g., Baumeister, Bratslavsky, Finkenauer, & Vohs, 2001) may have implications for the magnitude of the dilution effect. Therefore, we think it is useful to examine whether or not adding irrelevant information to relevant con-CCS information has a similar effect on persuasiveness as adding irrelevant information to relevant pro-CCS information does.

Method

Participants and design. Ninety-nine undergraduate students from Leiden University participated in the study. They were randomly allocated to either one of three experimental conditions (Information Relevance: highly relevant vs. highly relevant + moderately relevant vs. highly relevant + irrelevant) and received either €1 or course credits for their participation. Individuals who participated in the pilot study or in Experiment 2.1 were not allowed to participate in Experiment 2.2.

Procedure. As in the previous experiment, participants first received some general background information and a brief description of CCS. Next, participants in the 'highly relevant' condition read an argument against the implementation of CCS that the pilot study had identified as highly relevant:

> *The different processes that CCS consists of (capture, transport, and storage) are in general industrial use for several years but the integrated chain of these processes has never been implemented before, which is why safety cannot be completely guaranteed yet.*

Participants in the 'highly relevant + moderately relevant' condition read the highly relevant argument against CCS complemented with three con-CCS arguments that the pilot study had identified as moderately relevant:

> *The implementation of CCS in the Netherlands is just a drop in the ocean as long as other countries are unwilling to sign the international climate change agreement that obliges rich countries world-wide to emit 5.2 percent less greenhouse gasses between 2008 and 2012 compared to the level of 1990. The different processes that CCS consists of (capture, transport, and storage) are in general industrial use for several years but the integrated chain of these processes has never been implemented before, which is why safety cannot be completely guaranteed yet. The CO_2 that is stored underground cannot be used for other purposes, such as the production of carbonated drinks. The mitigation of CO_2 emissions is not so much the problem of the Netherlands; large, polluting countries such as China and the USA should solve the problem.*

Participants in the 'highly relevant + irrelevant' condition read the highly relevant con-CCS argument complemented with the same three pieces of irrelevant information as used in Experiment 2.1.

Participants then completed a similar questionnaire as in Experiment 2.1, which included items to measure the persuasiveness of communications (α = .83), the perceived relevance of the highly relevant information (α = .63), the perceived relevance of the moderately relevant con CCS information (α = .73), and the perceived relevance of the irrelevant information (α = .78). Finally, participants were debriefed, paid, and thanked for their participation.

Results

Manipulation check. As intended (and consistent with the results of the pilot study), participants regarded the highly relevant argument against CCS as significantly more relevant (M = 5.56, SD = 0.88) than the moderately relevant con-CCS information (M = 3.75, SD = 1.15), $t(98) = 12.54$, $p < .001$, which, in turn, was regarded as significantly more relevant than the irrelevant information (M = 2.73, SD = 1.14), $t(98) = 7.82$, $p < .001$. In addition, we checked for potential between-subjects effects but did not find any (Fs ≤ 1.98, ps ≥ .14).

Persuasiveness of communications. An ANOVA with Information Relevance as the independent variable and persuasiveness of communications as the dependent variable revealed a marginally significant effect, $F(2, 96) = 2.72$, $p = .07$, $\eta_p^2 = .05$. As in the previous experiment, we then looked at two planned contrasts to determine specific differences regarding persuasiveness between conditions. A planned contrast between the 'highly relevant' and 'highly relevant + irrelevant' conditions showed that communications were regarded as slightly less persuasive when they consisted of a mix of highly relevant con-CCS information and irrelevant information ($M = 3.83$, $SD = 1.18$) than when they only consisted of the highly relevant con-CCS argument ($M = 4.35$, $SD = 1.24$), $F(1, 96) = 3.49$, $p = .07$, $\eta_p^2 = .04$. A planned contrast between the 'highly relevant' and 'highly relevant + moderately relevant' conditions did not show any indication of the dilution effect, $F(1, 96) = 0.08$, $p = .78$. Participants regarded a mix of highly relevant and moderately relevant con-CCS information as equally persuasive ($M = 4.42$, $SD = 0.92$) as the highly relevant con-CCS information in isolation ($M = 4.35$, $SD = 1.24$).

In sum, the results of Experiment 2.2 offer weak support for Hypothesis 2.1 when it comes to negative information: Irrelevant information only slightly diluted the persuasiveness of highly relevant information against CCS. Furthermore, as in Experiment 2.1, the results show that moderately relevant con-CCS information did not dilute.

Experiment 2.3

Experiment 2.3 aims to replicate the finding that irrelevant information can dilute the persuasiveness of a relevant argument. Furthermore, Experiment 2.3 extends the previous experiments in three important ways.

First, we measure participants' belief that CCS yields benefits for the climate on earth after they have read the communications about CCS. Note that in this experiment we focus on pro-CCS information because the previous experiments show the clearest dilution effect for pro-CCS information. From an applied perspective, it is particularly relevant to measure actual beliefs as a sign of the persuasiveness of the communications (to complement the insights derived from the relatively straightforward self-report items that we used in the previous experiments). After all, CCS stakeholders determine the effectiveness of their communications by whether or not they have managed to convince people of the advantages (in the case of proponents) or disadvantages (in the case of opponents) associated with CCS. If the impact of the highly relevant argument that CCS helps to combat global warming is diluted by adding irrelevant information (Hypothesis 2.1), then the belief that the

implementation of CCS would yield important benefits for the earth's climate should thus be weaker if irrelevant information is added.

Second, we examine two possible explanations for the dilution effect, namely that it may be due to (1) a potential decrease in the perceived quality of the communications and/or (2) attention distraction as a result of adding irrelevant information to a highly relevant argument. The latter idea connects to work by Harp and Mayer (1998), which shows that details in text books may distract the reader's attention from the main text and, therefore, decrease (rather than increase) instructional effectiveness.

And third, Experiment 2.3 considers the source of communications as a potential moderator of the dilution effect. More specifically, in line with previous work on dual process models—the heuristic-systematic model (Chaiken, 1980) and the elaboration likelihood model (Petty & Cacioppo, 1986)—we suspect that irrelevant information may not dilute the persuasiveness of communications if the communication source is manifest. Especially if people are not very motivated or involved in the issue, they are more likely to engage in heuristic (peripheral) information processing than systematic (central) information processing which would involve extensive cognitive elaboration (Chaiken, 1980; Petty & Cacioppo, 1986). People tend to afford as little cognitive effort as possible in processing information (i.e., people are "cognitive misers"; Fiske & Taylor, 1991) and are therefore often inclined to base their judgments on heuristic cues (mental shortcuts that ease the cognitive load of making judgments) that may be unrelated to the specific content of communications. The identity of the source of communication is a heuristic cue that can come in handy in this regard (Pornpitakpan, 2004). Indeed, recent studies have shown that people perceive and evaluate communications about environmental issues such as climate change and CCS differently depending on the communication source (Rabinovich et al., 2012; Ter Mors et al., 2010; Terwel et al., 2009b). We think that explicit awareness of the communication source may overrule the dilution effect as the identity of the source can function as a heuristic cue when evaluating communications about CCS.

In the current research, we focus on two different sources, namely an environmental non-governmental organization (ENGO) and an oil and gas company. Both types of organizations are common sources of CCS information (Corry & Reiner, 2011) and the public probably has clear ideas about the branches in which these organizations operate. This knowledge can function as a heuristic cue that might overrule the dilution effect. The reason why we consider two types of sources is to make sure that our findings not only apply to one specific type of source. However, the presence versus absence of knowledge of the identity of the source should determine whether or not people are able to use this as a heuristic cue (independent of the specific type of

source). Therefore, we hypothesize that irrelevant information dilutes the persuasiveness of relevant information when the identity of the information source is not revealed, but this is less likely to be the case when the identity of the source is made explicit (Hypothesis 2.2).

Method

Participants and design. Hundred-forty-six undergraduate students from Leiden University participated in the study. They were allocated to one of six conditions of the 2 (Information Relevance: highly relevant vs. highly relevant + irrelevant) × 3 (Source: no source vs. ENGO vs. oil and gas company) between-subjects factorial design. Participants received either €1 or course credits for their participation. Individuals who had participated in one of the previous experiments were not allowed to participate in Experiment 2.3.

Procedure. Participants were seated in front of a computer screen and received some general background information and a brief description of CCS. Next, they received a message announcing a website with information about CCS. A website was chosen because the internet is most often used for CCS communication (Corry & Reiner, 2011) and it offers an excellent opportunity to implement the source manipulation. Participants in the ENGO condition were informed that the communication source was World Planet; an ENGO. In reality, however, World Planet was a fictitious organization. We used a fictitious organization instead of a real ENGO to prevent possible distortion of the results due to pre-existing perceptions about an organization (cf. Aggarwal, 2004). Participants in the ENGO condition were then presented with a webpage displaying World Planet's logo in the left upper corner. Participants in the 'oil and gas company' condition were informed that the communication source was Baptiste Oil & Gas, an international company in the energy sector, and they were presented with a webpage with the company's logo. Participants in the 'no source' condition were kept uninformed about the identity of the communication source: They were presented with exactly the same webpage, but there was no logo on it.

Furthermore, the information on the webpage was manipulated. Participants in the 'highly relevant' condition read that CCS helps to combat global warming (see Experiment 2.1 for the exact description). Participants in the 'highly relevant + irrelevant' condition also read that CCS helps to combat global warming but this information was mixed with the same three pieces of irrelevant information as used in Experiments 2.1 and 2.2. In the latter condition, the highly relevant information was located either before, in the middle, or after the irrelevant information. This was done to be able to control for order effects. We did not find any order effects so we do not report on this matter any further. After participants had read the webpage, they

completed a questionnaire that included items to assess their belief that CCS has climate benefits, the perceived quality of the communications, attention distraction, and the manipulation checks. Finally, participants were debriefed, paid, and thanked for their participation.

Measures

Belief in the climate benefits of CCS. Belief in the climate benefits of CCS was measured with two items: "To what extent do you believe that CCS helps to combat global warming?" and "To what extent do you think that CCS would benefit the climate on earth?" (1 = *not at all*; 7 = *very much*), α = .74.

Perceived quality of the communications. To assess the perceived quality of the communications, we asked participants to answer two questions: "To what extent did you consider the communications to be of good quality?" and "To what extent did you consider the communications to be coherent?" (1 = *not at all*; 7 = *very much*), α = .72.

Attention distraction. Attention distraction was measured by three items: "To what extent were you able to keep your attention on the information?", "To what extent were you able to concentrate on the content of the information?", and "To what extent did you find the information confusing?" (the first two items were reverse coded; 1 = *not at all*; 7 = *very much*), α = .86.

Manipulation checks. We assessed the adequacy of the manipulation of the communications about CCS in the same way as in Experiments 2.1 and 2.2. So, again, all participants rated the relevance and importance of the highly relevant information (α = .83) and the three pieces of irrelevant information (α = .61). To check their awareness of the source, participants were asked to indicate the source of the communications.

Preliminary Analyses

Manipulation check of information relevance. As in Experiments 2.1 and 2.2, paired t-tests showed that participants perceived the highly relevant information that CCS helps to combat global warming as significantly more relevant (M = 5.53, SD = 1.01) than the irrelevant information (M = 3.04, SD = 0.94), $t(91) = 21.06$, $p < .001$.[3]

[3] The results also showed a small contrast effect: The relevant argument was perceived to be somewhat stronger when it was mixed with irrelevant information (M = 5.80, SD = 0.92) compared to when it was not mixed (M = 5.26, SD = 1.03), $F(1, 86) = 6.32$, $p = .04$, $\eta_p^2 = .07$.

Manipulation check of communication source. We made the a priori decision to analyze only the data of participants who had correctly indicated which source was communicating. We continued running the experiment until we had an approximately equal number of participants with correct answers to the manipulation check in each of the communication source conditions. The data used for analyses were from 30 participants in the 'no source' condition, 28 participants in the ENGO condition, and 34 participants in the 'oil and gas company' condition. We should note that especially in the last condition quite a few participants gave an incorrect answer to the source manipulation check (N = 40). This probably has to do with the fact that the content of the relevant information (which was about the climate benefits of CCS) is incongruent with the motives oil and gas companies are assumed to act upon (e.g., de Vries, Terwel, Ellemers, & Daamen, in press). This might have been confusing to participants. However, the inclusion of these participants in the analyses did not change the pattern of results (see footnotes 4, 5 and 6).

Comparison of ENGO and oil and gas company. We reasoned that the presence versus absence of a source would moderate the dilution effect regardless of the specific type of source. Therefore, we made the a priori decision to look at the source contrast (source presence vs. absence) if the two sources did not produce different results concerning participants' belief in the climate benefits associated with implementing CCS (the main dependent variable). Accordingly, as a first step in the analysis, we sought to confirm that this was the case (as indicated before, we merely considered two types of sources to increase our confidence that the results not only apply to one specific source).

Indeed, an ANOVA with the 'highly relevant' versus the 'highly relevant + irrelevant' conditions as the two levels of Information Relevance, and ENGO versus 'oil and gas company' condition as the two levels of the source factor revealed no significant effects (ps ≥ .29).[4] Means and standard deviations are presented in Table 2.2. In subsequent analyses, we thus defined a source contrast in which the ENGO condition and the 'oil and gas company' condition were jointly contrasted against the 'no source' condition.

[4] A similar analysis including the responses of participants with an incorrect answer to the source manipulation check revealed a similar pattern of results: There was neither a main effect of Information Relevance (p = .63), nor a main effect of Source (p = .18), nor an interaction effect (p = .73).

Table 2.2.
Means (and standard deviations) for belief that CCS yields climate benefits, perceived quality of the communications, and attention distraction as a function of source and information relevance.

	No source		ENGO		Oil and gas company	
	Highly relevant	Highly relevant + irrelevant	Highly relevant	Highly relevant + irrelevant	Highly relevant	Highly relevant + irrelevant
	(*N* = 15)	(*N* = 15)	(*N* = 13)	(*N* = 15)	(*N* = 17)	(*N* = 17)
Belief in climate benefits of CCS	5.30 (0.68)	4.33 (1.22)	5.12 (0.98)	5.27 (0.92)	4.62 (1.50)	5.03 (1.69)
Perceived quality of the communications	4.83 (1.51)	3.83 (1.28)	5.00 (1.08)	5.10 (0.83)	4.94 (1.20)	4.56 (1.55)
Attention distraction	2.76 (1.48)	3.13 (1.45)	3.15 (1.43)	3.07 (1.37)	2.71 (0.98)	3.14 (1.40)

Results

Belief in the climate benefits of CCS. We performed an ANOVA with Information Relevance and the Source contrast (i.e., the 'no source' condition contrasted against the two source conditions) as the independent variables, and belief in the climate benefits of CCS as the dependent variable. The analysis did not reveal a main effect of Information Relevance, $F(1, 86) = 0.27$, $p = .61$, nor a main effect of the Source contrast, $F(1, 86) = 0.48$, $p = .49$. However, the interaction contrast effect was significant, $F(1, 86) = 5.10$, $p = .03$, $\eta_p^2 = .06$.[5] See Table 2.2 for all means and standard deviations. Simple effects analysis showed that irrelevant information only diluted the persuasiveness of relevant information when the identity of the communication source was not revealed. That is, participants in the 'no source' condition had a stronger belief that CCS would yield climate benefits if highly relevant information was not mixed ($M = 5.30$, $SD = 0.68$) than when it was mixed with irrelevant information ($M = 4.33$, $SD = 1.22$), $F(1, 88) = 4.58$, $p = .04$, $\eta_p^2 = .05$. However, the dilution effect did not occur if participants were aware about the communication source. So, these results offer support for Hypothesis 2.2.

[5] A similar analysis including the responses of participants with an incorrect answer to the source manipulation check revealed a similar pattern of results: There was neither a main effect of Information Relevance ($p = .29$), nor a main effect of the Source contrast ($p = .59$) but again, the interaction contrast effect was significant ($p = .04$, $\eta_p^2 = .03$).

Perceived quality of the communications. We also performed an ANOVA with Information Relevance and the Source contrast as the independent variables, and perceived quality of the communications as the dependent variable. The analysis did not reveal a main effect of Information Relevance, $F(1, 86) = 2.57$, $p = .11$, but there was a main effect of the Source contrast, $F(1, 86) = 3.98$, $p = .05$, $\eta_p^2 = .04$. The interaction contrast effect was not statistically significant, $F(1, 86) = 2.29$, $p = .13$.[6] Simple effects analysis revealed that irrelevant information diluted the perceived quality of relevant information only when the identity of the communication source was not made explicit. Participants in the 'no source' condition perceived communications consisting of a mix of highly relevant and irrelevant information to be of significantly lower quality ($M = 3.83$, $SD = 1.28$) than the communications consisting of only the highly relevant information ($M = 4.83$, $SD = 1.51$), $F(1, 88) = 4.65$, $p = .03$, $\eta_p^2 = .05$. Information relevance did not affect perceptions of the quality of the communications when the source was made explicit. See Table 2.2 for means and standard deviations.

Attention distraction. An ANOVA with Information Relevance and the Source contrast as the independent variables and attention distraction as the dependent variable revealed no significant effects (Fs < 1, ps ≥ .39), indicating that the dilution effect was not due to attention distraction.

Mediation

We used Preacher and Hayes' (2008) bootstrap approach to test whether perceived quality of the communications mediated the dilution effect observed in the 'no source' condition. Bootstrapping uses resampling of raw data to estimate the confidence interval (CI) of the indirect effect. We used 5000 resamples (bias corrected) and obtained a 95% confidence interval that did not include zero (lower CI = −1.00; upper CI = −0.03), indicating that the indirect effect was significant. This finding is consistent with the idea that the perceived quality of communications mediates the dilution effect.

[6] A similar analysis including the responses of participants with an incorrect answer to the source manipulation check revealed a similar pattern of results but the main effect of Information Relevance was significant ($p = .02$, $\eta_p^2 = .04$) and there was no main effect of the Source contrast ($p = .12$). Again, the interaction contrast effect was not significant ($p = .18$).

General Discussion

The implementation of CO_2 capture and storage (CCS) is considered worldwide as a viable strategy to mitigate climate change. Considering that members of the general public seem to know little or nothing about the technology, there is plenty of room for both proponents and opponents to inform people about the issue, and to convince them of the advantages or the disadvantages of CCS. The current research highlights the need to think carefully about the content of public communications. Based on insights from previous research on the dilution of judgments and beliefs due to the presence of irrelevant information (e.g., Meyvis & Janiszewski, 2002; Nisbett et al., 1981), we hypothesized that adding irrelevant (i.e., nondiagnostic) information to highly relevant information would lower the persuasiveness of communications about CCS. The results supported this prediction. Importantly, we showed that irrelevant information not only diluted evaluations of the persuasiveness of communications (Experiments 2.1 and 2.2), but also actual beliefs about the issue under consideration (Experiment 2.3). Furthermore, the results showed that the dilution effect was eliminated when the information source was made explicit.

Irrelevant information weakened the impact of positive (pro-CCS) as well as negative (con-CCS) information, but the effect was less pronounced for negative information. A possible explanation for this finding might lie in the fact that negative information is typically processed relatively thoroughly—that is, more thoroughly than positive information (cf. Baumeister et al., 2001). Accordingly, people are more likely to isolate and focus on a relevant argument against CCS (as compared to a relevant argument for CCS) that is accompanied by irrelevant information. As a result, people's judgments will be based primarily on the relevant negative argument and the accompanying irrelevant information is less likely to bias their judgments. This might explain why the dilution effect was relatively weak when irrelevant details were added to relevant negative (con-CCS) information and relatively strong when irrelevant details were added to relevant positive (pro-CCS) information.

The current research also sheds some light on the psychological process associated with the dilution effect on persuasiveness of communications. Irrelevant details impaired the perceived quality of communications when they were added to a relevant argument (i.e., that CCS helps to combat global warming) and this rather than attention distraction guided the dilution effect in Experiment 2.3. We assume the same process accounts for the dilution effect on judged persuasiveness (as in Experiments 2.1 and 2.2), although we acknowledge that different psychological processes are associated with different types of judgments. For instance, dilution in judgments about persons may be caused by the use of the representativeness heuristic (Kahneman & Tversky 1972): Non-stereotypical information can weaken stereotypical judgments

about a person because it reduces the similarity between a person and a stereotype (Nisbett et al., 1981). Evaluations of products may be diluted due to other processes though, such as due to what Meyvis and Janiszewski (2002) referred to as biased hypothesis testing, a process in which people selectively search for information that supports a prior hypothesis about a product. We think that such processes do not apply here. That is, unlike this previous research, participants in our experiments were not instructed before the presentation of the information that they had to make a judgment later, and only few may have had clear ideas about the topic prior to participating in the study. This is why biased hypothesis testing is unlikely to explain the dilution effect in our research. Instead, we propose that adding irrelevant details to relevant information impairs the quality of communications and that this causes the dilution effect on both perceived and "actual" persuasiveness (i.e., beliefs). Nevertheless, further research is needed to examine the psychological processes that underlie the dilution effect in public communications in more detail.

The current research has further identified an important boundary condition for the dilution effect. We found that adding moderately relevant information did not reduce the persuasiveness of communications. This finding is consistent with Tetlock and Boettger (1989) whose research also suggests that a dilution effect does not occur when moderately relevant information is added to highly relevant information. Our results differ from those of Meyvis and Janiszewski (2002) though. They found that moderately relevant information (which they referred to as "less supporting" information) strengthened the impact of relevant information. In their study, participants had to predict whether or not a computer was fast, and the information that was intended to be less supportive stated that the computer has 64 megabyte of working memory and a 32-speed CD-ROM. However, this information could have been interpreted as very relevant for computer speed, causing polarization instead of dilution. In the present study, we made sure to pilot test the relevance of the different pieces of information. All in all, based on the current results, we believe that adding information to a key message is not necessarily harmful for the persuasiveness of the message, as long as the additional information is not totally irrelevant. However, increasing the length of communications by aggregating information will also not benefit persuasiveness unless the additional information is really relevant.

We have considered the dilution effect in the context of communications about CCS, which raises the question of whether the results also apply to other environmental issues. We believe this is the case, considering that the dilution effect has already been shown to play a role across a wide range of different settings. However, we do think that the dilution effect in public communications might be stronger with respect to complex and novel issues (CCS, nanotechnology, and genetically modified foods, to

name a few) than for more familiar issues about which people have already formed a stable opinion. After all, communications about a well-known issue are less likely to change deep-rooted existing beliefs, regardless of the perceived quality of such communications. Moreover, people who have a strong opinion about an issue may focus on specific aspects of communications rather than that they look at all the information (i.e., selective exposure). For instance, they may select and pay attention to arguments that support their own views and ignore other information (e.g., Hart et al., 2009; Smith et al., 2008). Nevertheless, the dilution effect in public communications is most important to consider in the context of emerging environmental issues since the need to inform (and the possibility to convince) the public is clearest in such contexts.

Furthermore, the fact that we have used samples of undergraduate students to test our predictions raises the question of whether the results generalize to the general public. In this regard, it is important to realize that during their education, students are required and trained to discriminate between main issues and side issues. Accordingly, students are expected to be better able than less highly educated people to isolate the most relevant information and to base their judgments primarily on this information, even if their knowledge about the topic is limited. This is important because the skill to discriminate between relevant and irrelevant information may have implications for the magnitude of the dilution effect. Indeed, research shows that expert auditors are better able than non-experts to isolate and focus on the most relevant information when they are asked to judge account-related information (Ettenson et al., 1987), although they are not completely insensitive to irrelevant information (Waller & Zimbelman, 2003). In light of these findings, we believe that the use of undergraduate students provides a relatively conservative test of our hypotheses so that the dilution effect is probably stronger, rather than weaker, among members of the general public. We do not claim that our results apply to all possible populations, however. For instance, it remains to be seen whether the dilution effect also occurs among people for whom the issue of CCS is new, but directly personally relevant (e.g., people who are informed about plans for a CCS project in their own residential area). Perhaps the dilution effect impedes the effectiveness of “onsite” communications, but it might also be the case that increased personal relevance reduces the magnitude of the dilution effect. Future research is needed to examine this issue.

The findings of our research may be used by both the opponents and the proponents of CCS to increase the effectiveness of their communications. Sometimes organizations use the “scattergun approach” to public information-sharing, which is characterized by firing lots of information in the hope that people feel completely informed and will be persuaded by one of the pieces of information that sticks to them. We argue that it is

more effective to spare the details and share only the most relevant arguments to explain the organizational position than to use the scattergun approach. Not only irrelevant details should be spared, moderately relevant information should be used sparingly as well. That is, moderately relevant information does not seem beneficial for the persuasiveness of communications and, if perceived as irrelevant by the public, can in fact be harmful.[7]

Another concrete practical suggestion for organizations involved in CCS would be to make the organizational identity explicit, for instance by printing the name and logo of the organization on leaflets and other informational materials. After all, our findings show that awareness of the information source makes communications less sensitive to the dilution effect. We want to stress that revealing one's identity certainly not guarantees the elimination of the dilution effect though. Only those people with clear ideas about the organization (or at least about the branch in which it operates) are likely to use the identity of the organization as a heuristic cue when confronted with information. Moreover, people will not necessarily take note of the organization's name or logo. Therefore, we still advise organizations to determine the relevance of the variety of CCS information before they start communicating. This might be costly and time consuming, but could be worth the effort because only then can details be spared and the relevance be shared.

[7] Of course there are several possibilities for strategic use of our findings. For example, opponents may decide to acknowledge the climate benefits associated with the implementation of CCS but at the same time put up a smoke screen of irrelevant information to obscure this pro-CCS argument and thus weaken its impact.

Chapter 3

Pitfalls in the Use of Emphasis Framing

This chapter is based on: de Vries, G., Terwel, B. W., & Ellemers, N. (under review). Perceptions of manipulation and judgments of illegitimacy: Pitfalls in the use of emphasis framing when communicating about CO_2 capture and storage.

One of the greatest environmental challenges the world is facing today is combating global warming. According to the Intergovernmental Panel on Climate Change, warming of the climate system is unequivocal (IPCC, 2013). This change in climate has potentially harmful consequences for humankind and nature, including disturbance of ecosystems, extinction of some plant and animal species, and a rising sea level. Global warming is largely due to growing emissions of the greenhouse gas carbon dioxide (CO_2). Emissions of CO_2 partially result from natural-induced processes; however, human-induced CO_2 emissions are regarded as the most important contributors to global warming (IPCC, 2013; WMO, 2013). A well-known example is the CO_2 release from the combustion of fossil fuels such as coal, oil, and natural gas to produce energy and electricity. To combat global warming, many industrialized countries have agreed to reduce their emissions of CO_2 and other greenhouse gases (United Nations, 1998; 2012). One of the measures to reduce CO_2 emissions is the large-scale implementation of CO_2 capture and storage (CCS) (IPCC, 2007). In a nutshell, CCS involves the capture of CO_2 in fossil fuel power plants or other major industrial processes, and the subsequent transport and long-term storage of this CO_2 in deep geological formations such as depleted natural gas fields and saline aquifers.

Besides technical and regulatory issues, the viability of CCS is codetermined by whether or not members of the public accept its use. For example, a proposed CCS demonstration project in the Dutch town of Barendrecht has been cancelled in 2010 because of local opposition to this project (Terwel et al., 2012). This opposition could be partly due to communication issues, for example, information from the project partners was not always perceived as relevant and trustworthy (Brunsting et al., 2011). In contrast, a local activist group called 'CO_2isNee' (i.e., CO_2isNo) argued very fiercely against the demonstration project through publications on its website, messages in local newspapers, and public meetings (Brunsting et al., 2011; Terwel et al., 2012).

Research supports the potential influence of communication on public attitudes towards controversial, novel technologies. For example, the public opinion about nanotechnology can be influenced by the extent to which risks and benefits of the technology are described (Cobb, 2005). Similarly, attitudes towards nuclear power can

be affected when this energy resource is related to climate change mitigation (Jones et al., 2012).

More than not, public communications about novel technologies are persuasive instead of informative; they are to create, reinforce, modify or extinguish the beliefs, attitudes, intentions, motivations, and/or behaviors of an audience (e.g., Fishbein & Ajzen, 1975; Gass & Seiter, 2007; Hovland et al., 1953). Scientists as well as practitioners tend to focus on the effectiveness of persuasive communication, for instance regarding its influence on people's attitude. However, less scientific attention goes to how recipients perceive persuasive communications. Because the psychological effects are rather neglected, some persuasive communication techniques might appear to be effective on the short run while people's (presumably negative) perceptions about their use stay undetected. Yet, these perceptions are important because they can have long-term costs. In the current research, we aim to examine whether or not persuasive communication can lead to unforeseen, unfavorable perceptions about the message and the communication source (i.e., pitfalls). More specifically, we aim to identify potential pitfalls in the use of emphasis framing when communicating about CCS.

Emphasis Framing

Emphasis framing is a persuasion technique in which greater weight is given to one aspect of an issue over another aspect (e.g., Chong & Druckman, 2007). Emphasis framing has shown to be effective regarding shaping people's attitudes. For example, information that genetically modified food helps to combat world hunger moves attitudes towards the food into a more positive position than information that genetically modified food impacts on biodiversity and the food chain (Druckman & Bolsen, 2011). This example—where only a single proposition is communicated and any opposing considerations are omitted—illustrates a strong form of emphasis framing: one-sided framing. A more subtle form is two-sided framing. Two-sided framing involves the communication of two competing frames with an emphasis on one of them. Two-sided framing can also be an effective technique to shape people's attitudes towards an issue. For example, people indicated more tolerance towards the Ku Klux Klan after reading a news article that characterized a planned rally of this organization both as an act of freedom of speech and as a risk to public safety, but emphasized the aspect of freedom of speech, than when the article emphasized public safety (e.g., Nelson, Clawson, & Oxley, 1997).[8]

[8] Another well-known type of framing—that will not be addressed in the current research—is equivalency framing. This type of framing refers to ways in which logically equivalent alternative phrases (e.g., "75% fat free" versus "25% fat") can lead to different attitudes and/or decisions (e.g., Levin, Schneider, & Gaeth, 1998; Tversky, & Kahneman, 1981).

Perceived Manipulation

Although emphasis framing can be effective in shaping attitudes, a potential pitfall in the use of this technique is that it can be perceived as manipulative. That is, people are regularly confronted with a variety of messages and are usually able to distinguish persuasion attempts from informative communications (e.g., Campbell & Kirmani, 2000; Friestad & Wright, 1994). When confronted with communications that emphasize one aspect over another, people may perceive being manipulated into supporting (or opposing) an issue. Such perceptions of manipulation likely elicit negative evaluations of the communications and the communication source (see Campbell, 1995; Friestad & Wright, 1994). Emphasis framing could even backfire in a sense that people may react against the advocated position if they perceive manipulation and feel that their freedom to make up their own mind is threatened. They might even adopt the opposite position in order to try to regain control over their own opinion (i.e., psychological reactance; e.g., Brehm & Brehm, 1981). This backfire effect is also identified in research that found that people became more negative about CCS when they placed little trust in the integrity of organizations that supported the implementation of the technology (Terwel et al., 2009a).

In short, perceived manipulation is a potential pitfall in the use of emphasis framing. In this paper, we will test the prediction that people perceive more manipulation when they read a news article about CCS that emphasizes advantages over disadvantages (or vice versa) compared to when they read a balanced article about the technology (Hypothesis 3.1).

Communication Source

Perceptions of manipulation in communications could depend on the communication source. That is, recent studies have shown that people perceive and evaluate communications about environmental issues such as climate change and CCS differently depending on the communication source (e.g., Rabinovich et al., 2012; Ter Mors et al., 2010; Terwel et al., 2009b). Dual process models such as the heuristic-systematic model (HSM; Chaiken, 1980) and the elaboration likelihood model (ELM; Petty & Cacioppo, 1986) can explain this dependence. According to these models, recipients process information in a more or less systematic (central) and heuristic (peripheral) way. Systematic processing means that people scrutinize all available information and are persuaded especially by message characteristics (i.e., the content). If people process information heuristically, they are persuaded especially by cues that are unrelated to the message, such as source characteristics. People are inclined to process information heuristically because they are “cognitive misers”; they tend to afford as little cognitive effort as possible (Fiske & Taylor, 1991). People will particularly follow a more heuristic route when they are not very motivated, involved

or able to process information. This is the case, for instance, when the issue does not interest them much (Chaiken, 1980; Petty & Cacioppo, 1986).

Accordingly, people could easily process communications about CCS heuristically if they are not very interested in this difficult, novel issue. As a result, source characteristics might function as a cue that affects how these communications are perceived. For example, regardless of whether an article about CCS is balanced or biased, it will probably be perceived as more manipulative when it is produced by an oil and gas company that supports the implementation of the technology, than when it is produced by a news agency that supposedly provides objective information. In the current research, we will test whether communications from oil and gas companies are generally perceived as more manipulative than communications from press agencies (Hypothesis 3.2).

Legitimacy Judgments

Although it is likely that people perceive biased communications as relatively manipulative, the application of emphasis framing might not be necessarily judged as inappropriate. We predict that the perceptions of manipulation caused by emphasis framing primarily lead to judgments of illegitimacy when people have good reason to expect balanced information. This is for example the case when the information comes from a news agency or another source that is supposed to be impartial. Indeed, objectivity is a fundamental requirement for journalists (Ryan, 2001). However, objectivity is not the norm for sources that are economically involved in an issue, such as oil and gas companies that invest in the development of CCS. People have become accustomed to the fact that—in order to try to gain the favors of the public—organizations with a specific interest in an issue use persuasive communication, instead of informative communication (Campbell, 1995; Campbell & Kirmani, 2000; Friestad & Wright, 1994). As a result, biased messages from these organizations are probably not judged as less legitimate than balanced messages.

Accordingly, we will test two predictions. The first is the prediction that for news agencies, the use of emphasis framing in communications about CCS is considered as less legitimate than the provision of balanced information. However, this does not hold true for oil and gas companies involved in the development of CCS (Hypothesis 3.3). The second prediction is that the relation between perceived manipulation and legitimacy judgments is stronger when people evaluate communications about CCS from news agencies than when they evaluate communications from oil and gas companies (Hypothesis 3.4).

The Current Research

We examine support for our hypotheses in two experiments. Experiment 3.1 tests the hypothesis that people perceive more manipulation when they read a news article that emphasizes advantages of CCS over disadvantages (or vice versa) compared to when they read a balanced article (Hypothesis 3.1). Both one-sided and two-sided frames are considered in this experiment. Furthermore, Experiment 3.1 aims to replicate the finding from prior research in examining the effectiveness of emphasis framing regarding shaping attitudes towards CCS. Experiment 3.2 examines the combined effects of emphasis framing and communication source on perceived manipulation and legitimacy judgments (all four hypotheses). The experiment focuses on differences between (positively) biased and balanced information, either from a news agency or an oil and gas company involved in CCS.

Experiment 3.1

Method

Participants and design. Participants were 120 undergraduate students from Leiden University (20 male and 99 female [1 unspecified]; M_{age} = 19.83, *SD* = 3.91). Sixty-three participants had heard about CCS prior to participating in the experiment, while 57 participants had not. Awareness of CCS did not moderate the results reported here and will not be discussed any further. Participants were randomly allocated to either one of five experimental conditions (Communication: one-sided pro CCS vs. two-sided pro CCS vs. balanced vs. two-sided con CCS vs. one-sided con CCS). Participants received either €1.50 or course credits for their voluntary participation.

Procedure. The experiment consisted of two parts. First, participants were requested to indicate their gender and age, and to answer some general questions.[9] Among these questions were items assessing how important participants considered a number of environmental topics to be. Two of these topics—combating global warming and the quality of groundwater—were of primary interest because these topics were addressed in our communication manipulation and we wanted to be able to confirm that they were judged as relevant. The remaining environmental topics were filler items concerning genetically modified food, air pollution, and deforestation. After participants had completed this first part of the experiment, they were presented with a fictitious news article about CCS (e.g., the stimulus material). When they had read the article, participants completed another questionnaire, which included items to measure attitudes towards CCS, perceived manipulation, awareness of CCS, and

[9] We do not report all measures in this paper for reasons of clarity and conciseness. Measures and results are available on request.

perceived emphasis of the article (i.e., the manipulation check). Finally, participants were debriefed, paid, and thanked for their participation.

Stimulus materials. We tailored the appearance of the article after true newspaper copy, following previous experimental research on emphasis framing (e.g., Druckman, 2001). The article was allegedly written by the Dutch national news agency ANP and displayed the logo of the agency in the upper left corner. In the opening paragraph, all articles provided the same general background information about CO_2 and CCS. The differences between the articles were in the headline and following paragraphs. The one-sided articles addressed either the positive consequences of CCS for the climate (stating that CCS helps to combat global warming by reducing CO_2 emissions) or the negative consequences for the quality of groundwater (stating the risk of acidification should CO_2 leak from the storage reservoir) without mentioning any opposing information. The two-sided articles addressed both the advantage and disadvantage but emphasis was placed on one of them (cf. Druckman, 2001). The balanced article gave equal weight to advantages and disadvantages. See Appendix B for an exact description of all five articles.

Measures

Relevance of arguments. To assess whether or not the advantage and the disadvantage mentioned in the articles were related to environmental topics that participants considered relevant prior to reading the article, we asked: "To what extent do you find it important to combat global warming?", and "To what extent is quality of the groundwater important to you*?"* (1 = *not at all*; 7 = *very much*).

Perceived emphasis. We measured perceived emphasis (i.e., the manipulation check) within the article with two items: "To what extent did you feel that the emphasis in the article was on the advantages of CCS?", and "To what extent did you feel that the emphasis in the article was on the disadvantages of CCS?" (1 = *not at all*; 7 = *very much*).

Perceived manipulation. We measured perceived manipulation with four items: "To what extent did you think that information was kept from you?", "To what extent did you think that you heard only one side of the story?", "To what extent did you perceive the information to be biased?", and "To what extent did you perceive the article as partial?" (1 = *not at all;* 7 = *very much*), $\alpha = .82$. The responses to these items were averaged into a single index of perceived manipulation.

Attitude towards CCS. We assessed participants' attitude towards CCS with four 9-point semantic differential scales (e.g., Petty & Cacioppo, 1984): "I find CCS [bad–good, harmful–beneficial, foolish–wise, unfavorable–favorable]", α = .91.

Results

Relevance of arguments. Participants considered both environmental topics relevant. Ratings of relevance of ground water quality were significantly higher than the midpoint of the 7-point scale, $t(118) = 22.27$, $p < .001$ ($M = 6.09$, $SD = 1.03$). Ratings of the relevance of combating global warming showed a similar effect, $t(118) = 9.13$, $p < .001$ ($M = 5.18$, $SD = 1.41$).[10]

Perceived emphasis. We performed a repeated measures ANOVA with Perceived Emphasis (Advantages vs. Disadvantages) as the within-subjects factor and the five communication conditions as the between-subjects factor to check the adequacy of the communication manipulation. The results showed the anticipated Communication × Perceived Emphasis interaction, $F(4, 115) = 48.23$, $p < .001$, $\eta_p^2 = .63$. As intended, participants in the pro conditions (one-sided and two-sided) perceived more emphasis on advantages than on disadvantages (ps < .001). In contrast, participants in the con conditions (one-sided and two-sided) perceived more emphasis on disadvantages than on advantages (ps = .001). Interestingly, participants in the balanced condition also perceived more emphasis on advantages than on disadvantages ($p < .001$). See Table 3.1 for means and standard deviations.

Table 3.1.
Means (and standard deviations) for perceived emphasis on advantages and disadvantages as a function of communication.

	One-sided pro CCS (N = 24)	Two-sided pro CCS (N = 24)	Balanced (N = 24)	Two-sided con CCS (N = 24)	One-sided con CCS (N = 24)
Perceived emphasis on advantages	6.29 (0.69)	5.50 (1.25)	4.25 (1.68)	3.71 (1.17)	2.96 (1.49)
Perceived emphasis on disadvantages	1.71 (1.30)	3.00 (1.02)	2.71 (0.96)	4.92 (1.35)	5.04 (1.65)

[10] One person did not answer these questions.

Perceived manipulation. We predicted that the use of emphasis framing would evoke higher levels of perceived manipulation compared to the provision of balanced information (Hypothesis 3.1). An ANOVA with Communication as the independent variable and perceived manipulation as the dependent variable revealed a significant effect, $F(4, 115) = 5.44$, $p < .001$, $\eta_p^2 = .16$. Bonferroni post hoc analyses confirmed that participants perceived the article as significantly more manipulative when emphasis framing was applied (i.e., the one-sided and two-sided pro and con conditions) than when the article was balanced ($ps \leq .01$). The level of perceived manipulation did not differ between the four emphasis-frame conditions ($ps \geq 1.00$). See Table 3.2 for means and standard deviations.

Table 3.2.
Means (and standard deviations) for perceived manipulation and attitude towards CCS as a function of communication.

	One-sided pro CCS (N = 24)	Two-sided pro CCS (N = 24)	Balanced (N = 24)	Two-sided con CCS (N = 24)	One-sided con CCS (N = 24)
Perceived manipulation	5.15 (1.00)	5.10 (1.42)	3.83 (1.26)	4.94 (0.88)	4.93 (1.06)
Attitude towards CCS	6.25 (1.60)	5.57 (1.89)	5.57 (1.80)	4.55 (1.88)	4.94 (1.84)

Note: Attitude towards CCS was measured on a 9-point scale. Perceived manipulation was measured on a 7-point scale.

Attitude towards CCS. We performed an ANOVA with Communication as the independent variable and attitude towards CCS as the dependent variable to examine the extent to which emphasis framing influenced attitude. The analysis revealed a significant effect, $F(4, 115) = 3.15$, $p = .02$, $\eta_p^2 = .10$. Bonferroni post hoc analyses showed that people in the 'one-sided pro' condition had a more positive attitude towards CCS ($M = 6.25$, $SD = 1.60$) than people in the 'two-sided con' condition ($M = 4.55$, $SD = 1.88$), $p = .02$. Further differences between conditions were not significant ($ps \geq .13$). See Table 3.2 for means and standard deviations.[11]

Discussion

Experiment 3.1 revealed the hypothesized effect of emphasis framing on perceived manipulation (Hypothesis 3.1). Participants perceived the biased news articles about CCS as more manipulative than the balanced article. Furthermore, Experiment 3.1 replicated—to some extent—the finding from previous research that emphasis

[11] In comparison, the survey shows that the general attitude towards CCS is just above the midpoint of a (7-point) scale ($M = 4.49$, $SD = 1.45$), $t(844) = 9.76$, $p < .001$. See Appendix A.

framing can affect attitudes. Participants who read that CCS can help combat global warming (without reading about risks for the quality of the ground water) were more positive towards the technology than participants who read that although CCS has positive and negative consequences, the possible risks for the ground water outweigh the advantages for the climate.

Participants in the balanced condition perceived more emphasis on advantages than on disadvantages and evaluated CCS as relatively positive. Although this effect was unanticipated (the effects of two competing frames with equal weight are expected to cancel out each other, Druckman, Peterson, & Slothuus, 2013), it did not interact with the predicted effects on perceived manipulation. As predicted, the balanced article was perceived as significantly less manipulative than the biased articles. The perceived emphasis on advantages and the more positive attitude might be explained by the fact that in the balanced article, the advantage was mentioned before the disadvantage. Information that is mentioned first can make a stronger impression than information that follows, it can be better remembered and can have more influence (i.e., primacy effect; e.g., Asch, 1952; Crowley & Hoyer, 1994). We will examine the possibility of a primacy effect in Experiment 3.2.

Experiment 3.2

Experiment 3.2 aimed to replicate the main finding of Experiment 3.1 that biased CCS communications are perceived as more manipulative than balanced communications (Hypothesis 3.1). Experiment 3.2 extends the previous experiment by also comparing different sources. More specifically, we test the hypothesis that communications from oil and gas companies are generally perceived as more manipulative than communications from press agencies (Hypothesis 3.2). Furthermore, we examine whether the use of emphasis framing in communications about CCS is judged as less legitimate than providing balanced information in the case of news agencies, but not for oil and gas companies (Hypothesis 3.3). Finally, Experiment 3.2 tests the prediction that perceptions of manipulation and judgments of legitimacy are stronger related when a news agency communicates about CCS than when an oil and gas company is the source (Hypothesis 3.4).

The basic assumption underlying our predictions is that, in general, news agencies are expected to be less manipulative than oil and gas companies. To check whether or not this assumption is correct, we assess expectations of manipulation prior to the presentation of the stimulus materials in Experiment 3.2. As an additional check, Experiment 3.2 includes two versions of the balanced article to counterbalance the order in which the advantage and disadvantage of CCS are presented. This allows us to check whether a primacy effect might explain why participants in the balanced

condition in Experiment 3.1 perceived more emphasis on advantages than on disadvantages. Whereas Experiment 3.1 revealed that pro and con articles were considered equally manipulative (regardless of their strength), we selected the (two-sided) pro CCS article for use in Experiment 3.2. We chose this particular article in order to secure the credibility of the communications. After all, it is more likely that an oil and gas company that is involved in CCS emphasizes the benefits associated with the technology rather than the risks.

Method

Participants and design. Participants were 139 undergraduate students from Leiden University (32 male, 106 female [1 unspecified], M_{age} = 20.05, *SD* = 2.82). Eighty-one participants had heard about CCS prior to participation, 58 participants had not. Again, awareness of CCS did not moderate the results reported here and will not be discussed any further. Participants were randomly allocated to one of the six experimental conditions in this 2 (Source: news agency vs. oil and gas company) × 3 (Communication: two-sided pro CCS vs. balanced advantage-first vs. balanced disadvantage-first) between-subjects design. Participants received either €1 or course credits for their voluntary participation. Individuals who had participated in Experiment 3.1 were not allowed to participate in Experiment 3.2.

Procedure. The procedure and stimulus materials were largely similar to those of Experiment 3.1 (see Appendix B). Participants in the 'two-sided pro CCS' condition read the same article as participants in this condition in Experiment 3.1. Participants in the 'balanced advantage-first' condition read the same article as participants in the balanced condition in Experiment 3.1. Participants in the 'balanced disadvantage-first' condition read a similar article, but here the disadvantage preceded the advantage. Importantly, depending on experimental condition, the article allegedly had been written by an independent news agency (as in Experiment 3.1) or an unspecified oil and gas company that invests in CCS. Upon completion of the experiment, participants were debriefed, paid, and thanked for their participation.

Measures

We used the same items as in Experiment 3.1 to measure perceived relevance of the arguments, perceived emphasis on (dis)advantages within the article, and perceived manipulation (α = .86).

Expected manipulation. We assessed the extent to which participants expected manipulation from news agencies and oil and gas companies by means of five questions per source, asked prior to presentation of the article. The items read: "To what extent do you think that [news agencies/oil and gas companies] try to influence

the public opinion?", "To what extent do you think that [news agencies/oil and gas companies] try to manipulate people by means of communication?", "To what extent do you think that [news agencies/oil and gas companies] try to convince people of their own viewpoints?", "To what extent do you think that information from [news agencies/oil and gas companies] is objective?", and "To what extent do you think that information from [news agencies/oil and gas companies] is honest?" (1 = *not at all;* 7 = *very much*; last 2 items reversed). The responses to these items were averaged into a single index of expected manipulation from oil and gas companies (α = .89) and expected manipulation from news agencies (α = .89).

Legitimacy judgments. Participants' judgments of the legitimacy of the communications were assessed by means of four 9-point semantic differential scales. Participants were requested to respond to the phrase "I consider the manner in which the article describes the issue of CCS [illegitimate–legitimate, unacceptable–acceptable, inappropriate–appropriate, not suitable–suitable]", α = .93. Responses were averaged to form a single index of legitimacy judgments.

Principal component analysis with Varimax rotation revealed that legitimacy judgments and perceived manipulation represented different constructs. The items loaded on two separate components with no substantial cross loadings (all cross loadings ≤ -.18) explaining a total variance of 76.22% in the individual items. The eigenvalue of the first component (legitimacy judgments) was 4.93; the eigenvalue of the second component (perceived manipulation) was 1.17.

Results

Relevance of arguments. As in Experiment 3.1, participants considered both environmental topics relevant. Ratings of relevance of ground water quality were significantly higher than the midpoint of the 7-point scale (t[137] = 18.30, p < .001 [M = 5.78, SD = 1.14]), as were ratings of the relevance of combating global warming, (t[137] = 14.19, p < .001 [M = 5.31, SD = 1.09]).[12]

Expected manipulation. As anticipated, participants expected news agencies to be significantly less manipulative (M = 4.25, SD = 1.12) than oil and gas companies (M = 5.06, SD = 1.11), t(138) = -5.83, p < .001. This validated our manipulation of source identity.[13]

[12] One person did not answer these questions.

[13] The survey data indicate that this expectation about manipulation by oil and gas companies is in line with general expectations (M = 5.21, SD = 1.15). See Appendix A.

Perceived emphasis. A repeated measures ANOVA with Perceived Emphasis as the within-subjects factor and Communication as the between-subject factors showed a significant interaction-effect, $F(2, 136) = 17.29$, $p < .001$, $\eta_p^2 = .20$. As in Experiment 3.1, participants in the 'two-sided pro CCS' and balanced conditions perceived more emphasis on advantages in the article than on disadvantages. However, this perceived imbalance was clearest in the pro condition. More specifically, within this condition, we found the largest difference between perceived emphasis on advantages ($M = 5.67$, $SD = 1.21$) versus disadvantages ($M = 2.74$, $SD = 1.20$), $F(1,45) = 85.39$, $p < .001$, $\eta_p^2 = .66$. Participants in the two balanced conditions also perceived more emphasis on advantages than on disadvantages. However, these differences were less pronounced than in the 'two-sided pro CCS' condition. Importantly, the difference did not only occur in the 'balanced advantage-first' condition ($M_{advantages} = 4.51$, $SD = 1.52$, $M_{disadvantages} = 3.26$, $SD = 1.21$, $F[1,46] = 27.71$, $p < .001$, $\eta_p^2 = .38$), but also in the 'balanced disadvantage-first' condition ($M_{advantages} = 3.80$, $SD = 1.54$, $M_{disadvantages} = 3.17$, $SD = 1.32$, $F[1,45] = 4.50$, $p = .04$, $\eta_p^2 = .09$). Thus, the order in which the arguments had been provided cannot explain the perceived emphasis on advantages over disadvantages. Therefore, we do not differentiate between the two balanced conditions in all further analyses, but focus on the pro CCS article versus balanced article contrast instead.

Perceived manipulation. To test Hypothesis 3.1 and 3.2, we performed an ANOVA with the Communication contrast (pro condition vs. the two balanced conditions) and Source as the independent variables, and perceived manipulation as the dependent variable. In support of Hypothesis 3.1, this analysis revealed a significant main effect of the Communication contrast, $F(1, 133) = 25.58$, $p < .001$, $\eta_p^2 = .16$. Participants in the 'two-sided pro CCS' condition perceived the article as more manipulative ($M = 4.76$, $SD = 1.36$) than participants in the balanced conditions ($M_{adv\text{-}first} = 3.91$, $SD = 1.33$, $M_{disadv\text{-}first} = 3.32$, $SD = 1.21$). Furthermore, we found the predicted main effect of Source (Hypothesis 3.2). Participants perceived the article as more manipulative when it was produced by an oil and gas company ($M = 4.31$, $SD = 1.32$) than when it was produced by a news agency ($M = 3.68$, $SD = 1.46$), $F(1, 133) = 8.63$, $p = .004$, $\eta_p^2 = .06$. There was no interaction effect, $F(1, 133) = 0.99$, $p = .32$, indicating that the effect of the type of communication (biased vs. balanced) on perceived manipulation was not moderated by the identity of the source. See Table 3.3 for all means and standard deviations.

Legitimacy judgments. We predicted that for news agencies, providing biased information is considered as less legitimate than providing balanced information, but for oil and gas companies, this does not hold true (Hypothesis 3.3). To test this prediction, we performed an ANOVA with the Communication contrast and Source as the independent variables, and legitimacy judgments as the dependent variable. The

analysis revealed a main effect of the Communication contrast, $F(1, 133) = 13.26$, $p < .001$, $\eta_p^2 = .09$, a main effect of Source, $F(1, 133) = 4.19$, $p = .04$, $\eta_p^2 = .03$, and the hypothesized interaction effect, $F(1, 133) = 4.33$, $p = .04$, $\eta_p^2 = .03$. Participants in the 'news agency' condition judged the biased article as less legitimate than the balanced articles, whereas such a difference was not observed in the 'oil and gas company' condition. These results offer support for Hypothesis 3.3. See Table 3.3 for all means and standard deviations.

Table 3.3.
Means (and standard deviations) for perceived manipulation, legitimacy judgments and attitude towards CCS as a function of source and communication.[14]

	News agency			Oil and gas company		
	Two-sided pro CCS	Balanced (adv. first)	Balanced (disadv. first)	Two-sided pro CCS	Balanced (adv. first)	Balanced (disadv. first)
	(*N* = 23)	(*N* = 23)	(*N* = 23)	(*N* = 23)	(*N* = 24)	(*N* = 23)
Perceived manipulation	4.60 (1.52)	3.75 (1.23)	2.71 (0.94)	4.92 (1.18)	4.07 (1.43)	3.93 (1.14)
Legitimacy judgments	5.50 (1.31)	6.43 (1.02)	7.21 (1.07)	5.70 (1.33)	6.18 (1.40)	5.93 (1.48)
Attitude towards CCS	5.10 (1.80)	5.71 (1.45)	5.51 (1.49)	5.50 (1.39)	5.47 (1.34)	5.33 (1.79)

Note: Attitude towards CCS and legitimacy judgments were measured on 9-point scales. Perceived manipulation was measured on a 7-point scale.

Furthermore, we predicted that the relation between perceived manipulation and legitimacy judgments is stronger when people evaluate communications from news agencies than when they evaluate communications from oil and gas companies (Hypothesis 3.4). Consistent with this hypothesis, we found that the more manipulative a news agency's article was perceived, the less legitimate it was judged ($r = -.74$, $p < .001$). This correlation was less strong when the article came from an oil and gas company ($r = -.47$, $p < .001$). Fisher's Z test confirmed that the difference between these correlation coefficients was significant, $z = -2.54$, $p = .01$.

[14] The effect of pro CCS communication on attitude could not be compared with the effect of communication against CCS because the design did not include a con condition. However, in order to be consistent, we assessed participants' attitude towards CCS with the same semantic differential scales as in Experiment 3.1, $\alpha = .86$. An ANOVA with the Communication contrast and Source as the independent variables, and attitude towards CCS as the dependent variable revealed no statistically significant effects ($ps \geq .26$).

Mediation

Furthermore, we performed a bootstrap analysis that allows for the inclusion of contrast coding (Hayes & Preacher, in press) to test whether the effect of emphasis framing on legitimacy judgments in the 'news agency' condition was mediated by perceived manipulation. This approach uses resampling of raw data to estimate the confidence interval (CI) of the indirect effect. We used 10000 resamples (bias corrected) and obtained a 95% confidence interval that did not include zero (lower CI = 0.36; upper CI = 1.41), indicating the proposed indirect effect.

General Discussion

The implementation of CO_2 capture and storage technology (CCS) is considered a useful measure to achieve significant CO_2 emission reductions in the short run. People form opinions about the technology based on informative and persuasive communications. Informative communications provide unbiased information about an issue and pay attention to relevant aspects without pushing people into one direction over another. This allows people to form their own informed opinion. Persuasive communications also provide information; however, in these types of communications, information is often framed in a way that a specific position is advanced over another in order to nudge people into that position. This is referred to as emphasis framing (e.g., Chong & Druckman, 2007).

This research contributes to literature by revealing potential pitfalls in the use of emphasis framing. We discovered that people can perceive this persuasive communication technique as manipulative which is particularly problematic when people expect informative communications. We addressed emphasis framing by the provision of a news article that either emphasized an advantage of CCS (i.e., that it is a way to combat global warming) or a disadvantage (i.e., that the technology entails a risk of groundwater acidification). We found that no matter which direction people are pushed into or how hard they are being pushed, a biased news article is perceived as more manipulative than a balanced article. That is, regardless of whether a news article reports only on the positive or negative consequences of CCS (one-sided framing), or covers both aspects but places emphasis on one of them (two-sided framing), the article is perceived as more manipulative than an article that gives equal weight to advantages and disadvantages.

We found that people find manipulation inappropriate when news agencies emphasize the advantages of CCS in their coverage. In contrast, when oil and gas companies emphasize advantages of CCS, people also find this manipulative (even more than when done by news agencies), but in this case it does not result in judgments of illegitimacy. We demonstrated that this difference is caused by the expectations

people have from the communication source. We found that people associate oil and gas companies with persuasive communications and news agencies with informative communications. This finding is in line with general views that news agencies are expected to be balanced (Ryan, 2001) and commercial organizations to be biased (e.g., Campbell, 1995). Thus, expectations play a large role in determining whether a manipulative communication technique is considered as illegitimate or not.

Finally, the current research indicates that emphasis framing can be effective when it comes to influencing people's attitudes towards CCS. People have a more positive attitude towards CCS after reading a positively framed article about the technology than after a negatively framed article. This finding in the domain of energy technologies adds to previous research on the effectiveness of emphasis framing on the shaping of attitudes (Druckman & Bolsen, 2011; Nelson et al., 1997).

Limitations and Future Research

One might expect that if advantages and disadvantages of an issue receive equal weight in a news article, they would cancel out each other's effect on attitude (Druckman et al., 2013). However, we found that people were more positive about CCS (and perceived more emphasis on advantages) when equal emphasis was placed on the benefits and risks of CCS. This is an interesting finding, moreover because participants showed relatively more concern for groundwater pollution (i.e., a risk) than for global warming (i.e., a benefit). We ruled out that this effect was due to the order in which the advantage and the disadvantage were presented. A possible explanation could be that participants perceived the information about CCS in the opening paragraph of the article as positive. Although we strived to provide a neutral introduction, it conveyed that CCS is a way to meet targets set in international agreements to reduce CO_2 emissions, which could be regarded as an advantage. Importantly, despite this perceived emphasis on advantages over disadvantages, participants perceived the balanced article as significantly less manipulative than the biased articles. Thus, although the factual description of CCS may not have been perceived as completely neutral, this perception has no implications for the impact of our experimental manipulations, nor does it undermine the interpretation of our results and the validity of our conclusions.

In our experiments with undergraduate students as participants, the level of awareness of CCS prior to participation did not affect perceptions of manipulation, legitimacy judgments, or attitude towards CCS. However, different processes might come into play when people are deeply and personally involved in CCS, for example when they live near CCS demonstration sites. Greater personal involvement with an issue typically makes people process information more systematically (Chaiken, 1980;

Petty & Cacioppo, 1986), which may limit the power of framing (e.g., Brewer 2001; Joslyn & Haider-Markel, 2002). Furthermore, local residents are more likely to have negative opinions about CCS if they believe that it is unsafe to transport and store CO_2, or if they fear falls in local property value (Terwel et al., 2012). In that case, they might focus primarily on arguments against the implementation of CCS (i.e., selective exposure; e.g., Frey, 1986; Hart et al., 2009; Smith et al., 2008) and dismiss any pro-arguments as manipulative. As a result, it is unlikely that a positively framed message will be sufficient to change already existing, strongly negative attitudes. Future research could take a closer look at how issue involvement influences the extent to which people consider communications as manipulative or (il)legitimate.

We know from prior research that public communications about environmental issues are most effective when they fit people's expectations about their purposes (Rabinovich et al., 2012). This would imply that news agencies can best communicate about CCS in an informative manner and oil and gas companies can best communicate in a persuasive manner. Indeed, the current research seems to suggest that oil and gas companies can apply emphasis framing to their communications relatively hassle-free. However, framing might not always be the best technique for oil and gas companies. That is, this type of company is generally not considered to be very credible when it comes to environmental communications (Terwel et al., 2009a), and this low credibility could decrease the effectiveness of framing (Druckman, 2001).[15] Moreover, oil and gas companies can be evaluated negatively when they frame their communications about CCS. For instance, they may be accused of corporate greenwashing when they frame the implementation of CCS as a useful measure to mitigate climate change instead of a corporate investment that might help them to make a profit in the long run (de Vries et al., in press). A better strategy for oil and gas companies might be to provide balanced information about CCS in which both advantages and disadvantages are reported. Although balance in CCS communications might be unlikely to influence people's attitudes towards the technology, it might lead to positive long-term effects such as increased trust in the integrity of organizations (cf. Terwel et al., 2009a).

In the current research, we considered communications from news agencies and oil and gas companies. This leaves open the question of how people might perceive the use of emphasis framing by other types of organizations, such as national and local government, (environmental) non-governmental organizations, pressure groups and scientists. Our findings suggest that it may be possible to predict how people will respond to framed messages from such sources, depending on the expectations of the

[15] The survey data support that people have relatively low expectations about oil and gas companies' honesty in communications about CCS. That is, expected honesty is significantly below the midpoint of a scale from 1 (*not at all*) to 7 (*completely*) (M = 3.14, SD = 1.23), $t(844) = -20.36$, $p < .001$. See Appendix A.

general public about the overall aims and goals of these parties. When the public expects the source to be persuasive in their communications, emphasis framing effects should resemble the effects we found when oil and gas companies were the source. When the source is expected to be objective, the effects are more likely to be in parallel to what we found when news agencies were the source.

Most prior investigations of emphasis framing have examined how framing benefits the communicator (e.g., Chong & Druckman, 2007). However, so far, less attention has been paid to potentially negative aspects that may only become apparent over time. As such, the identification of pitfalls in the use of emphasis framing contributes to literature. We discovered two (related) pitfalls that are likely to be highly important: perceptions of manipulation and judgments of illegitimacy.

Future research might extend our findings, for instance by taking into account behavioral effects of perceiving illegitimate manipulation. It would be interesting to investigate the number of subscribers that would discontinue a newspaper when perceiving their paper's coverage as biased.[16] Alternatively, future research could take into account effects such as the number of people completely discarding information from a source that is seen as—legitimately—framing its communications. We would anticipate perceived manipulation and legitimacy judgments to be relevant for such effects. In this way, our results offer a starting point for further research into the pitfalls in the use of emphasis framing and the conditions under which they occur.

[16] CCS coverage has shown to be focused on benefits, rather than risks (Feldpausch-Parker et al., 2013). However, not all coverage is biased (Dowd, Ashworth, Rodriguez, & Jeanneret, 2012).

Chapter 4
Pitfalls of Greening

This chapter is based on: de Vries, G., Terwel, B. W., Ellemers, N., & Daamen, D. D. L. (in press). Sustainability or profitability? How communicated motives for environmental policy affect public perceptions of corporate greenwashing. *Corporate Social Responsibility and Environmental Management*. doi: 10.1002/csr.1327

Over a decade ago, British Petroleum (BP) announced to "go green". This was a unique event in the energy industry at that time. Besides introducing a new green logo, BP launched an expensive publicity campaign to show its concern for the environment and to communicate its investment in environmental measures (Muralidharan et al., 2011). However, not everybody was convinced that BP was truly concerned about the environment (LeMenestrel et al., 2002). Since the launch of the Go Green campaign, environmentalists kept on challenging BP's activities and messages, and corporate credibility was low (García, 2011). In 2008, BP even received Greenpeace's *Worst Greenwash* award for announcing its commitment to alternative energy sources while at the same time allocating 93 percent of its total investment fund to the development and extraction of fossil fuels ("BP wins 'Emerald Paintbrush' award", 2008). Thus, the Go Green campaign only seemed to have backfired. This is in contrast to the finding that positive information about a firm's corporate social responsibility may have a positive effect on corporate reputation (Alniacik et al., 2011) and may even lead to attainment of external awards for good environmental performance (Hassan & Ibrahim, 2012). In this article, we examine when and why people might respond negatively to oil and gas companies that engage in corporate social responsibility (CSR) activities in the environmental domain. More specifically, we report a series of three experiments designed to determine how the motive that oil and gas companies communicate for investing in environmental measures affects public perceptions of corporate greenwashing.

Corporate Greenwashing

Corporate greenwashing refers to the idea that a company misrepresents corporate activities as "green" in order to look more environmentally friendly than it actually is (e.g., Laufer, 2003; Vos, 2009). Corporate greenwashing can take many different forms. For instance, a company may provide the public with disinformation in order to repair or shape its reputation (Laufer, 2003), or it may publish an environmental promise without living up to it (i.e., "talking the talk without walking the walk", Vos, 2009). However, instead of lying outright, corporate greenwashing is typically associated with a gap between rhetoric and reality; the truth about corporate social responsibility is

sometimes bended, overstated, or misrepresented in public communications (Vos, 2009). An oil and gas company that emphasizes to invest in alternative energy technologies, while it is in fact only allocating a fraction of its budget to this cause, may be seen as an example in this regard. Regardless of the company's intentions, in the end it is all about whether or not people *perceive* corporate greenwashing. People may suspect corporate greenwashing when it is absent by objective criteria, and vice versa. When a company engages in greenwashing, but people do not perceive it as such, harmful consequences might not come off. However, when people suspect greenwashing, a range of detrimental consequences may occur including consumer protest and boycott, and financial loss for the company (e.g., Polonsky, 1995; Polonsky & Rosenberger III, 2001).

The literature on corporate greenwashing tends to be theoretical rather than empirical in nature and it mainly focuses on the consequences rather than the antecedents of greenwashing. Therefore, we seek to identify causal relationships between how companies communicate their environmental engagement to the public and how people perceive these companies in terms of corporate greenwashing. We specifically focus on oil and gas companies because these are the types of organizations that run the greatest risk of being accused of greenwashing when communicating about environmental policies. That is, the public typically regards these companies as profit-focused polluters rather than as environmentalists (Muralidharan et al., 2011). People may find it hard to believe that oil and gas companies adopt environmental policies out of sincere concern with the planet in view of their primary goal of producing energy by burning "dirty" fossil fuels.

Indeed, research shows that the effectiveness of engaging in CSR activities to gain the favors of the public depends on the apparent functional fit between the type of activity and the company's core business (Alcañiz, Cáceres, & Pérez, 2010; Yoon et al., 2006; also see Melo & Garrido-Morgado, 2012). As Yoon and colleagues (2006) suggest, the likelihood that engaging in CSR activities creates a favorable company image is reduced when companies with bad reputations (e.g., companies in the tobacco and energy industries) engage in activities in the domain of the company's core business. In their research, people evaluated a (fictitious) cigarette manufacturer more negatively when it indicated financial support for cancer research than when it indicated support for environmental protection. This result suggests that consumers regard a company's positive action (supporting cancer research) as insincere when it conflicts with the consequences of the company's core business (producing cigarettes). In a similar vein, people may suspect greenwashing when an oil and gas company invests in environmental measures because, at first sight, this investment seems to conflict with

the consequences of the company's core business (i.e., producing energy by burning fossil fuels).

Communicated Motives and Suspicion of Strategic Behavior

One strategy for oil and gas companies to address public perceptions of greenwashing is to explicitly indicate the motive underlying their investments. Organizations can have a range of different motives for their involvement with (environmental) CSR activities (e.g., Babiak & Trendafilova, 2011; Ellen, Webb, & Mohr, 2006). These motives are often classified into two primary categories: public-serving motives and firm-serving motives (Forehand & Grier, 2003). Public-serving motives reflect organizational concern for the collective interest (e.g., conservation of the natural environment), where firm-serving motives reflect concern for benefits for the organization itself (e.g., maximizing company profit).

Oil and gas companies might be inclined to communicate their environmental policies in terms of concern for the environment (i.e., a public-serving motive) in order to convey a sense of environment responsibility. However, given the company's core business, people may be suspicious about the truthfulness of this claim; they may doubt the company's authenticity and start to suspect ulterior motives (see Fein, 1996; Forehand & Grier, 2003; Hilton, Fein, & Miller, 1993; Yoon et al., 2006).[17] That is, the motives of oil and gas companies are generally inferred to be firm-serving instead of public-serving (Spangler & Pompper, 2011; Terwel et al., 2009b), so people easily suspect that even though the company communicates an environmental motive, it is actually primarily interested in enhancing the corporate image, eliciting publicity, and satisfying its customers. Suspicion of such strategic behavior could lead people to view the company as less sincere (Campbell & Karmani, 2000; Terwel et al., 2009b) or even deceitful (Chan, Leung, & Wong, 2006). In short, people may regard the communication of environmental motives as rhetoric rather than reality. Accordingly, we predict that people are likely to perceive greenwashing when an oil and gas company communicates an environmental motive for its investment in environmental measures.

On the other hand, we propose that expressing an economic motive for this investment is a more fruitful way for an oil and gas company to avoid being perceived as greenwashing, because this should activate less suspicion. After all, oil and gas companies are expected to act upon economic motives and, therefore, the

[17] Forehand and Grier (2003) coined the term situational skepticism for this "momentary state of distrust of an actor's motivations".

communication of such motives (e.g., profit maximization by trading CO_2 emissions) is probably seen as a plausible and truthful reason to invest. Therefore, we hypothesize:

> Hypothesis 4.1: People perceive less greenwashing when an oil and gas company communicates an economic motive for its investment in environmental measures than when it communicates an environmental motive.

> Hypothesis 4.2: Suspicion of strategic behavior mediates the effect of communicated motive on perceived corporate greenwashing.[18]

Dispositional Skepticism

In this paper, dispositional skepticism refers to an individual's general tendency to doubt the credibility of various forms of organizational communication (Ford, Smith, & Swasy, 1990; Forehand & Grier, 2003; Obermiller & Spangenberg, 1998). Clearly, people differ in the extent to which they are skeptical. The more skeptical people are, the more they generally doubt the credibility of organizational communications (regardless of their contents). So-called skeptics will always be suspicious about true motives when they are confronted with organizational communications. Accordingly, for skeptics we do not expect that the perception of corporate greenwashing depends on the communicated motive. This implies that the predicted indirect effect of communicated motive on perceived corporate greenwashing through suspicion of strategic behavior (as stated in Hypothesis 4.2) is moderated by dispositional skepticism toward organizational communications. Thus, we hypothesize:

> Hypothesis 4.3: Dispositional skepticism toward organizational communications moderates the indirect effect of communicated motive on perceived corporate greenwashing through suspicion of strategic behavior.

The Present Research

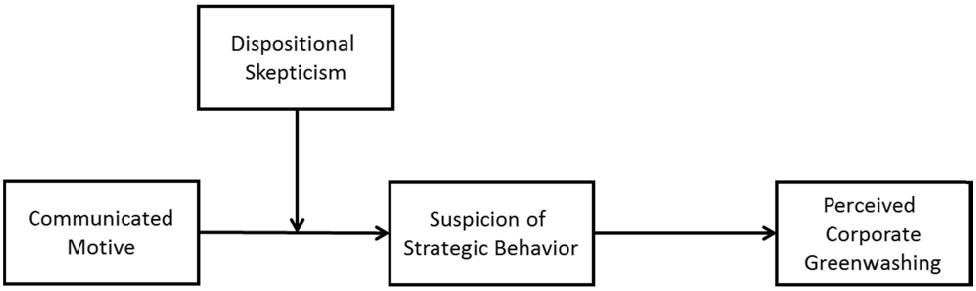
We have designed three experiments to test our hypotheses. All three experiments have the same experimental setup, in which participants learn about an oil and gas company that invests in the development of a CO_2 emission reduction technology.

The first experiment examines to what extent people perceive greenwashing when the oil and gas company communicates an economic motive, an environmental motive, or no motive for its investment (Hypothesis 4.1). The second experiment aims to replicate the findings of Experiment 4.1 and further examines whether suspicion of strategic behavior mediates the effect of communicated motive on perceived corporate

[18] Perceived greenwashing and suspicion of strategic behavior are related concepts, but it is relevant to differentiate between the two. After all, one can suspect strategic behavior, but not perceive greenwashing.

greenwashing (Hypothesis 4.2). The third experiment examines the proposed moderating role of dispositional skepticism toward organizational communications (Hypothesis 4.3). In short, we aim to show that the type of motive that oil and gas companies communicate to explain their investments in environmental measures has a conditional, indirect effect on perceived corporate greenwashing (see Figure 4.1 for a schematic representation).

Figure 4.1.
Dispositional skepticism moderating the indirect effect of an oil and gas company's communicated motive on perceived corporate greenwashing through suspicion of strategic behavior.



Experiment 4.1

Method

Participants and design. Seventy-nine undergraduate students from Leiden University participated in this experiment. They were allocated to one of three experimental conditions (Communicated Motive: environmental motive vs. economic motive vs. no motive). Participants received either €1 or course credits for their participation.

Procedure. Participants first received general background information on energy production, CO_2 emissions, and the effect of CO_2 on climate change. Furthermore, they were informed about the existence of CO_2 capture and storage technology (CCS) and were given a short description of this technology. In a nutshell, this technology involves the capture of CO_2 in fossil fuel power plants and the subsequent storage of this CO_2 in deep geological formations, both onshore and offshore. By implementing CCS, significant reductions in CO_2 emissions can be achieved, which is why CCS is currently considered as a strategy to mitigate climate change.

After having read the general information, participants were informed that the oil and gas company Baptiste Oil and Gas invests in the development of CCS. In reality, Baptiste Oil and Gas was a fictitious company made up to test our hypotheses. That is,

we used a fictitious instead of a real company in order to prevent distortion of the results due to pre-existing brand perceptions (Aggarwal, 2004; Wagner, Lutz, & Weitz, 2009). After participants had received some bogus background information about Baptiste Oil and Gas, we presented them with the company's website. This website contained the manipulation of the company's motive for investing in CCS. We created a website because companies often use websites as a communication channel for CSR communications (e.g., Tagesson, Blank, Broberg, & Collin, 2009). For participants in the 'environmental motive' condition, the website read:

> *Baptiste Oil and Gas invests in the development of CCS because this is in line with our corporate social responsibility policy. If we do not invest in this technology now, the amount of CO_2 in the atmosphere will continue to increase, causing the mean temperature on earth to rise. This has several negative effects for humankind and nature, like disturbance of the present ecosystems, extinction of some plant- and animal species, and a rising sea level, with all its consequences. By implementing CCS on a large scale, less CO_2 will be emitted into the air, which makes it possible to prevent the aforementioned ecological problems. In short, we invest in the development of CCS because of the natural environment.*

For participants in the 'economic motive' condition, the website read:

> *Baptiste Oil and Gas invests in the development of CCS because we expect to profit from it in the long run. By being involved in the development of this technology, we gain important knowledge and experience. In the future, we can export this expertise. This will have beneficial effects on our turnover. Also, we expect to enhance our profit by trading our emission rights, the so-called emissions trade. Firms have the right to emit a certain amount of CO_2. By using CCS, Baptiste Oil and Gas will emit almost no CO_2, but remains the rights to emit it. Therefore, we can sell our rights to other companies in order to enable them to emit more CO_2 than they are entitled to. In short, we invest in the development of CCS because of the profit.*

Participants in the 'no motive' (i.e., control) condition did not read a motive for the company's investment in CCS.

After the manipulation, we measured perceived corporate greenwashing by the item: "To what extent do you think that Baptiste Oil and Gas aims to improve its reputation by presenting itself as an environmentally friendly organization?" (1 = *not at all*; 7 = *very much*). Furthermore, to assess the adequacy of the manipulation, all participants were asked to indicate the motive that Baptiste Oil and Gas communicated on its website by checking one out of four answers: (1) "I did not read why Baptiste Oil and Gas invests in CCS", (2) "Baptiste Oil and Gas invests in CCS to make a profit", (3)

"Baptiste Oil and Gas invests in CCS out of concern for the natural environment", or (4) "Baptiste Oil and Gas invests in CCS because of legal obligations to reduce CO_2 emissions".

Nineteen participants in the 'no motive' condition correctly indicated that they did not read any motive. Eighteen participants in the 'economic motive' condition correctly indicated that the motive was to make a profit. Twenty participants in the 'environmental motive' condition correctly indicated that the motive was concern for the environment. Twenty-two participants failed to indicate the communicated motive correctly. Their responses were excluded from the analysis reported here to ensure the most reliable results and conclusions (although the results were virtually identical when the responses of these participants were included in the analysis). Finally, participants were debriefed, paid, and thanked for their participation.

Results

Perceived corporate greenwashing. Analysis of variance (ANOVA) with Communicated Motive as the between-subjects variable and perceived corporate greenwashing as the dependent variable revealed a significant effect, $F(2, 54) = 15.52$, $p < .001$, $\eta_p^2 = .37$. Participants who read an environmental motive ($M = 5.50$, $SD = 0.83$) or no motive ($M = 5.79$, $SD = 0.71$) perceived significantly more corporate greenwashing than participants who read an economic motive ($M = 3.56$, $SD = 2.06$).

Experiment 4.2

The results of Experiment 4.1 suggest that people tend to perceive corporate greenwashing when they learn about an oil and gas company that invests in environmental measures. In support of Hypothesis 4.1, Experiment 4.1 further shows that communicating an economic motive reduces perceived greenwashing (relative to when no motive is communicated), but that communicating an environmental motive neither reduces nor increases perceived greenwashing. Experiment 4.2 aims to examine whether suspicion of strategic behavior mediates the effect of communicated motive on perceived corporate greenwashing (Hypothesis 4.2).

Method

Participants and design. Fifty-seven undergraduate students from Leiden University were allocated to one of two experimental conditions (Communicated Motive: environmental motive vs. economic motive) and received either €1 or course credits for their participation. Those who had participated in Experiment 4.1 were not allowed to participate in Experiment 4.2.

Procedure. The procedure was largely similar to the procedure of Experiment 4.1. Differences were that the measure of perceived greenwashing was extended in order to enhance its reliability, the control (i.e., no motive) condition was omitted, and items were included to assess suspicion of strategic behavior. To assess the adequacy of the manipulation, participants were asked to indicate the motive that Baptiste Oil and Gas communicated by checking one out of four answers. The first three answers equaled the answers from Experiment 4.1 (i.e., no motive, economic motive, environmental motive). The last answer differed: "Baptiste Oil and Gas invests in CCS to make a profit as well as out of concern for the natural environment".

Twenty-three participants in the 'economic motive' condition correctly indicated that the motive communicated by the company was to make a profit and twenty-three participants in the 'environmental motive' condition correctly indicated that the communicated motive was concern for the environment. Eleven participants failed to indicate the communicated motive correctly. Again, the data of these participants were excluded from the analyses reported here, but the results were virtually identical when these cases were included in the analyses.

Measures

Perceived corporate greenwashing. We added two items to the measure used in Experiment 4.1 to create a three-item scale (α = .83): "I think Baptiste Oil and Gas aims to improve its reputation by presenting itself as an environmentally friendly organization." (1 = *totally disagree*; 7 = *totally agree*), "To what extent do you think Baptiste Oil and Gas has a hidden agenda?" (1 = *not at all*; 7 = *very much*), "I think Baptiste Oil and Gas pretends to be more environmentally friendly than it actually is." (1 = *totally disagree*; 7 = *totally agree*).

Suspicion of strategic behavior. We assessed suspicion of strategic behavior with four items (α = .79). Participants had to indicate to what extent they thought Baptiste Oil and Gas invested in CCS because the company: "…thinks that consumers expect the company to do that", "…wants to have a positive image", "…intends to get publicity", and "…hopes to get more clients" (1 = *totally disagree*; 7 = *totally agree*).

Principal component analyses with a Varimax rotation showed that suspicion of strategic behavior and perception of corporate greenwashing represented different constructs. The items loaded on two separate components explaining a total variance of 68.3%. The eigenvalue of the first component (suspicion of strategic behavior) was 3.61; the eigenvalue of the second component (perceived corporate greenwashing) was 1.18.

Results

Perceived corporate greenwashing. We conducted an ANOVA with Communicated Motive as the between-subjects variable and perceived corporate greenwashing as the dependent variable, which revealed a significant effect, $F(1, 44) = 11.11$, $p = .002$, $\eta_p^2 = .20$. Consistent with Hypothesis 4.1, participants who read an environmental motive perceived more corporate greenwashing ($M = 4.96$, $SD = 0.94$) than participants who read an economic motive ($M = 3.65$, $SD = 1.63$).

Suspicion of strategic behavior. An ANOVA with Communicated Motive as the between-subjects variable and suspicion of strategic behavior as the dependent variable also revealed a significant effect, $F(1, 44) = 13.81$, $p = .001$, $\eta_p^2 = .24$. Participants suspected more strategic behavior after reading an environmental motive ($M = 5.54$, $SD = 0.83$) than after reading an economic motive ($M = 4.26$, $SD = 1.43$).

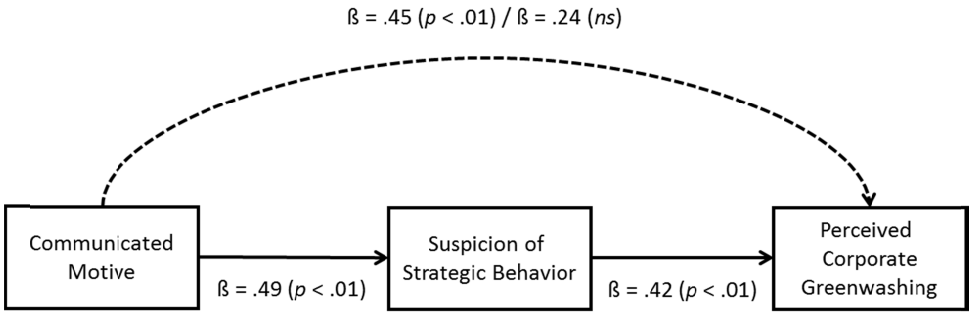
Mediation

Following the procedure specified by Baron and Kenny (1986), we performed regression analyses to test the hypothesis that suspicion of strategic behavior mediates the effect of communicated motive on perceived corporate greenwashing (Hypothesis 4.2). We first assessed the effect of communicated motive on perceived greenwashing. As shown before, this effect was significant ($\beta = .45$, $p = .002$). Mediation further requires an effect of communicated motive on suspicion of strategic behavior (i.e., the proposed mediator). This effect was significant as well ($\beta = .49$, $p = .001$). Mediation also requires an effect of suspicion of strategic behavior on perceived corporate greenwashing (controlling for the effect of communicated motive). This effect was significant ($\beta = .42$, $p = .005$). The final requirement for mediation is that the effect of the independent variable (i.e., Communicated Motive) on the dependent variable (i.e., perceived corporate greenwashing) disappears or is significantly reduced when taking into account the effect of the mediator (i.e., suspicion of strategic behavior). The effect of communicated motive on perceived corporate greenwashing disappeared when the effect of suspicion of strategic behavior was taken into account ($\beta = .24$, $p = .10$). The magnitude of the indirect effect was significant (Sobel $z = 2.28$, $p = .02$), indicating mediation.

This finding was supported by the bootstrapping approach to test for mediation (Preacher & Hayes, 2008). This approach uses resampling of raw data to estimate the confidence interval (CI) of the indirect effect. We used 10000 resamples (bias corrected and accelerated intervals) and obtained a 95% confidence interval that did not include zero (lower CI = .23; upper CI = 1.17). Thus, in support of Hypothesis 4.2, the results of both regression and bootstrap analyses indicate that suspicion of

strategic behavior mediated the effect of communicated motive on perceived corporate greenwashing (see Figure 4.2).

Figure 4.2.
Suspicion of strategic behavior mediating the effect of communicated motive on perceived corporate greenwashing in Experiment 4.2.



Experiment 4.3

The previous experiments show that people perceive more corporate greenwashing when an oil and gas company communicates an environmental motive than when it communicates an economic motive. This effect is mediated by suspicion of strategic behavior. Experiment 4.3 tests whether dispositional skepticism toward organizational communications moderates the indirect effect of communicated motive on perceived corporate greenwashing through suspicion of strategic behavior (Hypothesis 4.3).

Experiment 4.3 uses a similar procedure as in the previous studies, but with one important modification: the motives communicated by Baptiste Oil and Gas were extended by an explicit denial of the alternative motive (e.g., "…we invest in CCS because we care for the natural environment, not because we intend to profit from it"). We included this further specification because people may interpret communications as incomplete if alternative motives are not mentioned. It is possible that people—falsely or not—infer motives other than the one communicated play a role as well. They may well suspect ulterior motives (i.e., firm-serving motives) when an oil and gas company communicates an environmental motive for its investment in environmental measures, but remains silent about whether economic considerations also play a role. Similarly, when the company merely communicates an economic motive for the investment, people might think that the investment reflects at least some environmental concern as well. Therefore, Experiment 4.3 aims to determine whether or not it makes a difference to explicitly deny the alternative motive.

Method

Participants and design. Fifty-eight undergraduate students from Leiden University were allocated to one of two experimental conditions. In one condition, an environmental motive for investing in CCS was provided and an economic motive was denied. In the other condition, an economic motive was provided and an environmental motive was denied. Those who had participated in Experiment 4.1 or Experiment 4.2 were not allowed to participate in Experiment 4.3. Participants received either €1 or course credits for their participation.

Procedure. The procedure was largely similar to the procedure used in Experiment 4.1 and Experiment 4.2. Participants first received background information which was followed by the manipulation of the motive that Baptiste Oil and Gas communicated for investing in CCS. We manipulated the communicated motive in the same way as in the previous experiments, but this time the alternative motive was denied. So, in the 'environmental motive' condition, Baptiste Oil and Gas stated to invest in CCS because of the environment and not to make a profit (i.e., denial of the alternative motive). In the 'economic motive' condition, it stated to invest in CCS to make a profit and not because of the environment. Next, we assessed perceived greenwashing, suspicion of strategic behavior, and dispositional skepticism toward organizational communications. Finally, participants were debriefed, paid, and thanked for their participation.

To check the adequacy of the manipulation, participants were asked to indicate the motive Baptiste Oil and Gas communicated for investing in CCS: "Baptiste Oil and Gas invests in CCS to make a profit and not because of the natural environment", or "Baptiste Oil and Gas invests in CCS out of concern for the natural environment and not because of the profit". Twenty-eight participants in the 'economic motive' condition (with denial of an environmental motive) indicated that Baptiste Oil and Gas communicated to invest in CCS to make a profit and not because of the environment. Twenty-six participants in the 'environmental motive' condition (with denial of an economic motive) indicated that Baptiste Oil and Gas communicated to invest in CCS out of concern for the environment and not to make a profit. Four participants failed to indicate the communicated motive correctly. The responses of these four participants were not included in further analyses, but the results were virtually identical when these cases were included in the analyses.

Measures

Perceived corporate greenwashing. We measured perceived corporate greenwashing with the same three items as in Experiment 4.2 (α = .72).

Suspicion of strategic behavior. We measured suspicion of strategic behavior with the same four items as in Experiment 4.2 (α = .82).

Dispositional skepticism. We measured dispositional skepticism toward organizational communications by means of four items based on a scale developed by Obermiller and Spangenberg (1998) (α = .91): "Organizational communications are a reliable source of information.", "In general, organizational communications present a true picture.", "I think that organizational communications are generally truthful.", and "I feel I have been accurately informed after viewing most organizational communications." (1 = *completely disagree*; 7 = *completely agree*). Scores were reverse coded so that higher scores represent higher dispositional skepticism.

Results

Perceived corporate greenwashing. We conducted an ANOVA to assess the effect of Communicated Motive on perceived corporate greenwashing, which revealed a significant effect, $F(1, 52) = 27.54$, $p < .001$, $\eta_p^2 = .35$. Participants perceived less corporate greenwashing when Baptiste Oil and Gas communicated an economic motive (M = 3.43, SD = 1.51) than when it communicated an environmental motive (M = 5.17, SD = 0.79). This result yields further support for Hypothesis 4.1.

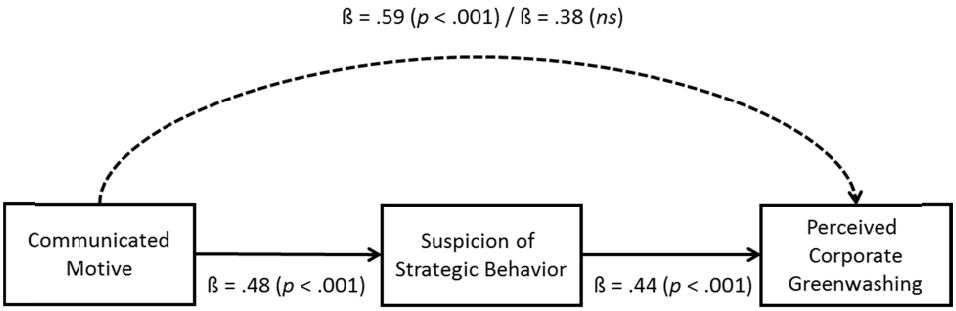
Suspicion of strategic behavior. We further conducted an ANOVA to assess the effect of Communicated Motive on suspicion of strategic behavior, which revealed a significant effect as well, $F(1, 52) = 15.32$, $p < .001$, $\eta_p^2 = .23$. Participants in the 'environmental motive' condition suspected more strategic behavior (M = 5.87, SD = 0.69) than participants in the 'economic motive' condition (M = 4.61, SD = 1.50).

Dispositional skepticism. We also checked for potential differences between conditions regarding dispositional skepticism toward organizational communications. We did not expect a difference because dispositional skepticism is a stable trait and unlikely to be affected by the motive Baptiste Oil and Gas communicated. This expectation was supported by the ANOVA, which revealed no difference between conditions, $F(1, 52) = 0.55$, $p = .46$, $\eta_p^2 = .01$ (M_{econ} = 4.34, SD = 1.17; M_{env} = 4.56, SD = 0.98).

Mediation

We performed a series of regression analyses to examine whether suspicion of strategic behavior mediated the effect of communicated motive on perceived greenwashing. As the results above already showed, communicated motive affected both perceived greenwashing (β = .59, $p < .001$) and suspicion of strategic behavior (β = .48, $p < .001$). In addition, suspicion of strategic behavior had a significant effect on perceived corporate greenwashing (controlling for the effect of communicated motive) (β = .44, $p < .001$). The effect of communicated motive on perceived greenwashing remained statistically significant, but was significantly reduced (β = .38, $p = .002$). The magnitude of this indirect effect was significant (Sobel $z = 2.70$, $p = .01$), indicating (partial) mediation. This finding was supported by a bootstrapped mediation analysis (Preacher & Hayes, 2008) using 10000 resamples (bias corrected and accelerated intervals), which revealed a 95% confidence interval that did not include zero (lower CI = .22; upper CI = 1.17). Thus, in further support of Hypothesis 4.2, the results of both the regression and bootstrap analyses indicate that the effect of communicated motive on perceived corporate greenwashing was mediated by suspicion of strategic behavior (see Figure 4.3).

Figure 4.3.
Suspicion of strategic behavior (partially) mediating the effect of communicated motive on perceived corporate greenwashing in Experiment 4.3.



Moderated mediation

We tested whether the indirect effect of communicated motive on perceived corporate greenwashing through suspicion of strategic behavior depends on the level of dispositional skepticism (the proposed moderator) by means of the bootstrapping procedure to test for moderated mediation (Preacher, Rucker, & Hayes, 2007; Preacher & Hayes, 2008). This bootstrap analysis (using 10000 resamples, and bias corrected and accelerated intervals), revealed a 95% confidence interval that did not include zero (lower CI = .25; upper CI = 1.16) and identified that the indirect effect was

statistically significant ($p < .05$) for any value of dispositional skepticism ≤ to 5.5 on the scale ranging from 1 (low) to 7 (high). These results offer support for the conditional indirect effect as stated in Hypothesis 4.3, namely that the effect of communicated motive on perceptions of corporate greenwashing through suspicion of strategic behavior occurs under low or moderate (but not high) levels of dispositional skepticism toward organizational communications in general (see Figure 4.1).

General Discussion

Oil and gas companies investing in environmental measures might be inclined to motivate this investment by environmental concern because this may have a positive effect on corporate evaluations (Alniacik et al., 2011; Hassan & Ibrahim, 2012). By doing so, they run the risk of being accused of corporate greenwashing (i.e., that a company misrepresents corporate activities as "green" in order to look more environmentally friendly than it actually is), however. The detrimental effects of being perceived as greenwashing (consumer protest and boycott, financial loss) are relatively well-documented (Laufer, 2003; Polonsky, 1995; Polonsky & Rosenberger III, 2001). The current experimental research is the first to explicitly examine when and why people perceive corporate greenwashing and, thereby, it contributes to the broader literature about the effects of engaging in CSR activities on consumer evaluations (Campbell & Kirmani, 2000; Forehand & Grier, 2003; Yoon et al., 2006).

We conducted a series of three experiments to systematically examine perceptions of corporate greenwashing in a situation where a (fictitious) oil and gas company communicates its investment in the development of a CO_2 emission reduction technology to the public. In line with our hypothesis, the results consistently show that people perceive significantly less corporate greenwashing when an oil and gas company communicates an economic motive for the investment than when it communicates an environmental motive. This effect persists if the company denies the alternative motive. Our research further demonstrates that the effect of communicated motive on perceived corporate greenwashing is mediated by suspicion of strategic organizational behavior. This is primarily true for those who are not by nature (i.e., as a dispositional trait) very skeptical toward organizational communications in general. So-called skeptics will always doubt the truthfulness of these communications, regardless of their contents.

Thus, people tend to suspect strategic behavior and, consequently, perceive greenwashing when an oil and gas company communicates an environmental motive for its environmental policies. This is in line with the fact that the public generally expects oil and gas companies to act upon firm-serving motives rather than public-serving motives (e.g., Spangler & Pompper, 2011; Terwel et al., 2009b). As a result,

people easily suspect an oil and gas company that communicates environmental (i.e., public-serving) motives to have ulterior motives (and thus to pretend to be greener than it actually is). By contrast, people suspect less strategic behavior when an oil and gas company communicates an economic motive for investing in environmental measures, which is consistent with the idea that companies that express firm-serving (economic) motives are seen as relatively trustworthy (Terwel et al., 2009b).[19]

Importantly, our research suggests that it may be a useful strategy for oil and gas companies to acknowledge economic considerations for engaging in sustainable activities or any CSR initiative in the environmental domain. At the same time, this seems to morally challenge those companies with genuine concern for the environment. After all, it may be better to be silent about this environmental concern in order to avoid being accused of corporate greenwashing. However, this in itself reflects some kind of strategic behavior. A solution for this moral challenge could be to express environmental concern, while acknowledging economic considerations as well. That is, companies with genuine environmental concern will also have an economic concern. Although it seems a good practice from a societal perspective to pursue sustainable initiatives that need not lead to financial gain (i.e., social stewardship), it is probably non-existing among oil and gas companies because it is not a viable management approach under the current business and regulatory conditions (Dutta, Lawson, & Marcinko, 2012). For companies that have both economic and environmental concern, it might be a better strategy to communicate these concerns simultaneously. People not only value pro-environmental actions, they also appreciate honesty (Terwel et al., 2009b). This connects to the concept of shared value positing that there is merit in bringing business and society back together (e.g., Porter & Kramer, 2011). However, further research is needed to confirm whether oil and gas companies are indeed less likely to be seen as greenwashing when they communicate both environmental and economic motives for a green investment.

In terms of public policy, and specifically with regard to the reporting of environmental policies and initiatives, several issues are worth noting. As Melo and Garrido-Morgado (2012) point out, adopting environmental policies and initiatives is only one CSR dimension and how this tends to affect corporate reputation depends on the specific

[19] The survey data support the idea that people expect oil and gas companies to have firm-serving motives over public-serving motives. For example, people think that oil and gas companies feel more responsibility for their economic performance (economic CSR, $M = 5.33$, $SD = 1.00$) than for their environmental impact (environmental CSR, $M = 3.45$, $SD = 1.26$), $t(844) = 34.82$, $p < .001$. More specifically, people find it more plausible that oil and gas companies are involved in the development of CCS because they can make a profit from it in the long run (economic motive, $M = 5.00$, $SD = 1.26$), than because CCS is beneficial for the natural environment (environmental motive, $M = 3.40$, $SD = 1.41$), $t(844) = 21.76$, $p < .001$. See Appendix A.

industrial sector of the company.[20] That is, it seems that environmental performance damages corporate reputation in some sectors, but in other sectors (e.g., the resources industry and other industries with salient environmental issues) it can have a positive effect (similar findings are reported by Brammer & Pavelin, 2006). The current research suggests that the reputations of companies in the energy sector are unlikely to improve when such companies decide to *communicate* environmental motives for investing in environmental measures. Messages like these are easily perceived as rhetoric and might shift public attention away from the company's actual sustainable (and valued) actions, which is less likely to be the case when companies acknowledge that economic considerations play a role. After all, the public will understand that social stewardship is not an effective management strategy (Dutta et al., 2012) and, hence, that companies pursue only sustainable and socially responsible initiatives that do not go at the direct expense of a company's interests. Considering that environmental motives are probably not the only reason for companies to invest in environmental measures, it seems advisable from a strategic perspective to be reticent in claiming purely altruistic motives in public communications in order to avoid being perceived as greenwashing. In relation to this point, the standardization of corporate environmental reporting might reduce the chance of being perceived as greenwashing. Worldwide, many companies voluntarily report their environmental performances, but public policy about environmental reporting is not yet very widespread and formalized (Cerin, 2002; Kolk & Perego, 2010; see also "Sustainability reporting fails to take off in the United States", 2012). If guidelines are developed and relevant regulations are observed, communications about environmental policies and initiatives might no longer be perceived as some kind of strategic behavior on the part of the company, but rather as compliance with public policy and, therefore, deemed more acceptable.

In a related fashion, one of the reasons to invest in environmental measures aimed at reducing CO_2 emissions may be that a company is legally obliged to cut back its CO_2 emissions (Escobar & Vredenburg, 2011). Indeed, a large number of countries have committed themselves in international agreements (like the Kyoto protocol) to reduce their CO_2 emissions in an attempt to mitigate climate change. To this end, governments have developed legislation to be able to force oil and gas companies to limit their CO_2 emissions. In order to comply with such legislations, oil and gas

[20] The survey data show that the general impression people have of oil and gas companies is relatively negative. That is, it is significantly below the midpoint of a scale from 1 (*very negative)* to 7 (*very positive*) (M = 3.36, SD = 1.24), $t(844) = -14.87$, $p < .001$. Furthermore, the data show that the general image of oil and gas companies is very strongly related to how these companies are evaluated on the environmental CSR dimension (r = .73). See Appendix A (also for correlations between general image and evaluations on other CSR dimensions).

companies can decide to invest in technologies like CCS. If this is communicated to the public, a company might be less likely to be accused of corporate greenwashing.[21]

Finally, the current research is relevant, albeit more indirectly, for the endorsement of the environmental measures and technologies by the public. That is, knowledge of corporate tactics can influence people's attitudes toward companies (Friestad & Wright, 1994) which, in turn, may influence whether or not people endorse the positions advocated by these companies. For instance, Terwel and colleagues (2009a) found that people became more negative about CCS when they placed little trust in the integrity of organizations that support the implementation of CCS. In a similar vein, when people believe that a company's investment in CCS is an act of greenwashing, this may not only affect reactions to the organization, but also attitudes to this climate change mitigation technology itself.

The current research shows that people typically tend to suspect corporate greenwashing when oil and gas companies invest in environmental measures, but also that such suspicions can be reduced by acknowledging economic motives for such investments. This is because people are much less likely to suspect strategic behavior—corporate actions aimed at image enhancement and public relations—when firm-serving (economic) rather than public-serving (environmental) motives are communicated. This indirect effect primarily occurs among people who are not by nature very skeptical toward organizational communications in general. Our findings highlight the need for companies in the energy sector to think carefully about how to communicate their environmental policies to the public; most people appreciate corporate social initiatives, but it backfires when communications about CSR activate suspicions of corporate greenwashing.

[21] The survey reveals that people find the motive that oil and gas companies are involved in CCS because of legal obligations a little less plausible (M = 4.83, SD = 1.23) than an economic motive (M = 5.00, SD = 1.26), $t(844) = 2.99$, $p = .003$. People do not have much faith that oil and gas companies feel as much responsibility for legal issues in general (legal CSR, M = 3.55, SD = 1.33) as for their economic performance (economic CSR, M = 5.33, SD = 1.00), $t(844) = 36.97$, $p < .001$. See Appendix A.

Appendix A

A survey among a representative sample of the Dutch population was conducted to provide external validity to the experimental research. The main aim of the survey was to get insight in public perceptions about oil and gas companies in relation to CCS. Furthermore, the survey assessed general environmental beliefs, perceptions about CCS, and perceptions about corporate social responsibility (CSR).

Method

Sample. The survey was administered to a sample of 845 respondents representative of the adult population of the Netherlands (51% female, mean age 49.7 years). Of this sample, 328 individuals (39%) indicated to have never heard about CCS before. Respondents were invited to complete the questionnaire based on their registration in a large database of the professional research agency that executed the survey (TNS NIPO).

Procedure. The 10-minute survey was conducted online from September 24 until October 1, 2013 after it had been pre-tested among a student sample at Leiden University. Perceptions about CSR and environmental beliefs were assessed first. Then, after a brief introduction of CCS, items followed to measure perceptions about CCS, and perceptions about oil and gas companies in relation to CCS.

Results

Measures, items, and coefficients of internal consistency are provided in Table A.1. Means, standard deviations, and correlations are shown in Table A.2.

Table A.1
Measures, items and coefficients of internal consistency.

Motive to invest in CCS:	*To what extent do you think that oil and gas companies are involved in the development of CCS… (*1 = *not at all;* 7 = *completely)*
1. Economic Motive	… because they can make a profit from it in the long run
2. Legal Motive	… because of legal obligations
3. Ethical Motive	… out of ethical considerations
4. CSR Motive	… out of corporate social responsibility
5. Environmental Motive	… because it is beneficial for the natural environment
6. Greening Motive	… to get an environmentally friendly image
7. Fit with CCS (α = .86)	To what extent do you think it is logical that oil and gas companies are involved in the development of CCS? *(*1 = *not at all;* 7 = *completely)*
	To what extent do you think that CCS suits the activities of oil and gas companies? *(*1 = *not at all;* 7 = *completely)*
8. Expected Manipulation (α = .89)	*To what extent do you expect that oil and gas companies will try to …* *(*1 = *not at all;* 7 = *completely)*
	… manipulate people's opinion about CCS?
	… convince people of their own ideas about CCS?
	… influence public opinion about CCS?
9. Expected Honesty (α = .88)	To what extent do you expect that information from oil and gas companies about CCS will be honest? *(*1 = *not at all;* 7 = *completely)*
	To what extent do you expect that information from oil and gas companies about CCS will be objective? *(*1 = *not at all;* 7 = *completely)*
10. Environmental Concern (α = .87) (based on Dunlap, Van Liere, Mertig, & Jones, 2000)	*Indicate for each of the following environmental issues to what extent you think it is a problem for our society (*1 = *no problem at all;* 7 = *a big problem)*
	Air pollution and smog
	Pollution of rivers, lakes, and oceans
	Loss of the rain forests and jungles
	Climate change, global warming, also known as the greenhouse effect
	Ozone depletion

11. Dominant Social Worldview (α = .80) (based on Dunlap et al., 2000)	*Indicate the extent to which you disagree or agree with each of the statements below (*1 = *completely disagree;* 7 = *completely agree)*
	Humans have the right to modify the natural environment to suit their needs
	Human ingenuity will ensure that we do not make the earth unlivable
	The earth has plenty of natural resources if we just learn how to develop them
	The balance of nature is strong enough to cope with the impacts of modern industrial nations
	The so-called 'ecological crisis' facing humankind has been greatly exaggerated
	Humans were meant to rule over the rest of nature
	Humans will eventually learn enough about how nature works to be able to control it
12. Attitude towards CCS	*Indicate below what you think about CCS.*
(α = .95)	"I find CCS…." *(1 = bad; 7 = good)*
(based on Petty & Cacioppo, 1984)	"I find CCS…." *(1 = harmful; 7 = beneficial)*
	"I find CCS…." *(1 = foolish; 7 = wise)*
	"I find CCS…." *(1 = unfavorable; 7 = favorable)*
13. CCS Tampering with Nature (α = .91)	*Indicate the extent to which you disagree or agree with each of the statements below (*1 = *completely disagree*; 7 = *completely agree)*
(based on Sjöberg, 2000)	The implementation of CCS goes against nature
	The implementation of CCS can turn into a catastrophe because humans try to influence the basic processes and structures of nature
	CCS is an 'unnatural' activity
	The implementation of CCS is an expression of human arrogance
	Any negative effects of CCS for the environment will probably increase over time
	CCS has risks because nature will be disturbed
	CCS is unfair and immoral
14. Importance of CSR (α = .82) (based on Maignan, 2001)	*Indicate the extent to which you disagree or agree with each of the statements below (*1 = *completely disagree;* 7 = *completely agree)*
	I would pay more to buy products from a socially responsible company
	When I buy things, I consider the ethical reputation of businesses
	I avoid buying products from companies that have behaved immorally
	I would pay more to buy products from a company that shows to care about the wellbeing of our society
	If the price and quality of two products are the same, I would buy the product from the firm that has a good reputation concerning CSR

15. Economic CSR (α = .66) (based on Maignan, 2001)	*Indicate the extent to which you disagree or agree with each of the statements below (*1 = *completely disagree;* 7 = *completely agree)* Oil and gas companies try to maximize their profits Oil and gas companies control their production costs strictly Oil and gas companies plan for their long-term success Oil and gas companies always try to improve economic performance
16. Legal CSR (α = .87) (based on Maignan, 2001)	Oil and gas companies always submit to the principles defined by the regulatory system Oil and gas companies will always fulfill their contractual obligations Oil and gas companies do not break the law, not even if this helps improve performance Oil and gas companies ensure that their employees act within the standards defined by the law
17. Ethical CSR (α = .84) (based on Maignan, 2001)	Oil and gas companies ensure that the respect of ethical principles ('doing good') has priority over economic performance Oil and gas companies permit that economic performance can be negatively affected by ethical concerns Oil and gas companies be committed to well-defined ethics principles Oil and gas companies avoid achieving corporate goals that compromise ethical standards
18. Philantropic CSR (α = .85) (based on Maignan, 2001)	Oil and gas companies allocate some of their resources to philanthropic activities Oil and gas companies participate in the management of public affairs Oil and gas companies help solve social problems Oil and gas companies play a role in our society that goes beyond the mere generation of profits
19. Environmental CSR (α = .89) (based on Chow & Chen, 2012; Turker, 2009)	Oil and gas companies do anything in their power to reduce the negative impact of their activities on the natural environment Oil and gas companies inform the public about their environmental impact and the risks involved Oil and gas companies participate in activities which aim to protect and improve the quality of the natural environment Oil and gas companies implement special programs to minimize their negative impact on the natural environment
20. General Image	The general impression I have of oil and gas companies is… *(*1 = *very negative;* 7 = *very positive)*

Table A.2
Means, standard deviations and correlations.

		M	*SD*	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1.	**Economic Motive**	5.00	1.26																			
2.	**Legal Motive**	4.83	1.23	**.16**																		
3.	**Ethical Motive**	3.39	1.39	**-.24**	.03																	
4.	**CSR Motive**	3.65	1.36	**-.23**	.05	**.65**																
5.	**Environmental Motive**	3.40	1.41	**-.28**	.01	**.60**	**.68**															
6.	**Greening Motive**	4.62	1.46	.08	**.30**	.07	**.14**	**.22**														
7.	**Fit with CCS**	4.91	1.28	.04	**.29**	**.09**	**.27**	**.23**	**.26**													
8.	**Expected Manipulation**	5.21	1.15	**.39**	**.28**	**-.29**	**-.29**	**-.31**	**.19**	**.20**												
9.	**Expected Honesty**	3.14	1.23	**-.32**	-.05	**.45**	**.48**	**.54**	.06	**.13**	**-.47**											
10.	**Environm. Concern**	5.69	0.98	**.12**	**.12**	-.02	-.01	-.00	**.10**	**.13**	**.24**	-.09										
11.	**Dom. Social Worldview**	3.49	1.03	**-.13**	-.00	**.26**	**.23**	**.29**	-.03	.04	**-.24**	**.34**	**-.35**									
12.	**Attitude CCS**	4.49	1.45	**-.09**	**.14**	**.20**	**.30**	**.37**	**.11**	**.35**	-.06	**.26**	.09	**.16**								
13.	**CCS Tamp. with nature**	4.47	1.17	**.23**	.06	-.04	**-.16**	**-.28**	-.03	**-.21**	**.24**	**-.28**	**.19**	**-.18**	**-.55**							
14.	**Support for CSR**	4.40	1.14	.06	**.13**	.00	.04	.01	**.18**	**.18**	**.20**	-.05	**.33**	**-.14**	**.14**	-.00						
15.	**Economic CSR**	5.33	1.00	**.19**	**.22**	-.07	-.04	-.07	.08	**.14**	**.24**	-.04	.08	.02	.06	.04	**.18**					
16.	**Legal CSR**	3.55	1.13	**-.19**	.01	**.35**	**.38**	**.38**	.03	**.13**	**-.25**	**.46**	**-.10**	**.33**	**.19**	**-.16**	.04	**.15**				
17.	**Ethical CSR**	3.07	1.12	**-.23**	**-.14**	**.43**	**.42**	**.43**	-.02	-.02	**-.37**	**.50**	**-.09**	**.34**	**.10**	-.07	-.01	-.05	**.58**			
18.	**Philantropic CSR**	3.48	1.18	**-.19**	-.01	**.32**	**.39**	**.39**	**.16**	**.16**	**-.19**	**.43**	-.07	**.26**	**.16**	**-.15**	**.09**	**.09**	**.47**	**.52**		
19.	**Environmental CSR**	3.45	1.26	**-.19**	-.01	**.43**	**.48**	**.48**	**.11**	**.16**	**-.28**	**.52**	**-.09**	**.37**	**.22**	**-.14**	.02	.06	**.62**	**.64**	**.65**	
20.	**General Image**	3.36	1.24	**-.25**	-.04	**.39**	**.46**	**.46**	.08	**.16**	**-.34**	**.52**	**-.16**	**.35**	**.20**	**-.21**	.01	**.10**	**.64**	**.60**	**.62**	**.73**

Note: bold faces indicate significance at $p < .01$

Appendix B

One-sided pro CCS condition

CO_2 Capture and Storage has Positive Consequences for Climate

In the Netherlands, a lot of energy is used. This energy is mainly produced by fossil fuels such as oil, natural gas, and coal. During the production of energy from fossil fuels carbon dioxide (CO_2) is released. International agreements have been made to reduce CO_2 emissions. Reduction of CO_2 can be achieved in several ways. One of these ways is the implementation of CO_2 capture and storage technology. The capture and deep underground storage of CO_2 is also considered in the Netherlands.

The increase of CO_2 in the air can contribute to the rise of the average temperature on earth. Recent research shows that considerably less CO_2 will be released into the air when CO_2 capture and storage is implemented. This helps to combat global warming. Thus, CO_2 capture and storage has benefits for the climate.

One-sided con CCS condition

CO_2 Capture and Storage has Negative Consequences for Ground Water

In the Netherlands, a lot of energy is used. This energy is mainly produced by fossil fuels such as oil, natural gas, and coal. During the production of energy from fossil fuels carbon dioxide (CO_2) is released. International agreements have been made to reduce CO_2 emissions. Reduction of CO_2 can be achieved in several ways. One of these ways is the implementation of CO_2 capture and storage technology. The capture and deep underground storage of CO_2 is also considered in the Netherlands.

Recent research shows that there is a possibility that stored CO_2 leaks from the underground reservoirs. If this happens, this could have negative consequences such as acidification of the ground water.

Two-sided pro CCS condition

CO_2 Capture and Storage has Positive Consequences for Climate

In the Netherlands, a lot of energy is used. This energy is mainly produced by fossil fuels such as oil, natural gas, and coal. During the production of energy from fossil fuels carbon dioxide (CO_2) is released. International agreements have been made to reduce CO_2 emissions. Reduction of CO_2 can be achieved in several ways. One of these ways is the implementation of CO_2 capture and storage technology. The capture and deep underground storage of CO_2 is also considered in the Netherlands.

Recent research shows that the implementation of CO_2 capture and storage has advantages as well as disadvantages. The increase of CO_2 in the air can contribute to the rise of the average temperature on earth. Considerably less CO_2 will be released into the air when CO_2 capture and storage is implemented. This helps to combat global warming. Thus, CO_2 capture and storage has benefits for the climate. However, if stored CO_2 leaks from the underground reservoirs, negative consequences could occur such as acidification of the ground water.

Many people support the implementation of CO_2 capture and storage because of the positive consequences for the climate. One of them remarked: "The quality of our ground water is important, but so is combating global warming. I am convinced that this technology helps to keep the climate on earth livable. Although CO_2 capture and storage can have negative consequences, the advantages for the climate outweigh the disadvantages for the ground water."

Two-sided con CCS condition

CO_2 Capture and Storage has Negative Consequences for Ground Water

In the Netherlands, a lot of energy is used. This energy is mainly produced by fossil fuels such as oil, natural gas, and coal. During the production of energy from fossil fuels carbon dioxide (CO_2) is released. International agreements have been made to reduce CO_2 emissions. Reduction of CO_2 can be achieved in several ways. One of these ways is the implementation of CO_2 capture and storage technology. The capture and deep underground storage of CO_2 is also considered in the Netherlands.

Recent research shows that the implementation of CO_2 capture and storage has advantages as well as disadvantages. The increase of CO_2 in the air can contribute to the rise of the average temperature on earth. Considerably less CO_2 will be released into the air when CO_2 capture and storage is implemented. This helps to combat global warming. Thus, CO_2 capture and storage has benefits for the climate. However, if stored CO_2 leaks from the underground reservoirs, negative consequences could occur such as acidification of the ground water.

Many people oppose the implementation of CO_2 capture and storage because of the negative consequences for the climate. One of them remarked: "Combating global warming is important, but so is the quality of our ground water. We cannot allow that CO_2 is being dumped underground. Although CO_2 capture and storage also has positive consequences, the possible disadvantages for the ground water outweigh the advantages for the climate."

Balanced condition

CO_2 Capture and Storage

In the Netherlands, a lot of energy is used. This energy is mainly produced by fossil fuels such as oil, natural gas, and coal. During the production of energy from fossil fuels carbon dioxide (CO_2) is released. International agreements have been made to reduce CO_2 emissions. Reduction of CO_2 can be achieved in several ways. One of these ways is the implementation of CO_2 capture and storage technology. The capture and deep underground storage of CO_2 is also considered in the Netherlands.

Recent research shows that the implementation of CO_2 capture and storage has advantages as well as disadvantages. The increase of CO_2 in the air can contribute to the rise of the average temperature on earth. Considerably less CO_2 will be released into the air when CO_2 capture and storage is implemented. This helps to combat global warming. Thus, CO_2 capture and storage has benefits for the climate. However, if stored CO_2 leaks from the underground reservoirs, negative consequences could occur such as acidification of the ground water.

In short, the implementation of CO_2 capture and storage has both advantages and disadvantages.

References

Aggarwal, P. (2004). The effects of brand relationship norms on consumer attitudes and behavior. *Journal of Consumer Research, 31,* 87-101. doi: 10.1086/383426

Alcañiz, E., Cáceres, R., & Pérez, R. (2010). Alliances between brands and social causes: The influence of company credibility on social responsibility image. *Journal of Business Ethics, 96,* 169-186. doi: 10.1007/s10551-010-0461-x

Alniacik, U., Alniacik, E., & Genc, N. (2011). How corporate social responsibility information influences stakeholders' intentions. *Corporate Social Responsibility and Environmental Management, 18,* 234-245. doi: 10.1002/csr.245

Asch, S. E. (1952). *Social psychology*. Englewood Cliffs, NJ: Prentice Hall.

Babiak, K., & Trendafilova, S. (2011). CSR and environmental responsibility: Motives and pressures to adopt green management practices. *Corporate Social Responsibility and Environmental Management, 18,* 11-24. doi: 10.1002/csr.229

Baron, R. M., & Kenny, D. A. (1986).The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical consideration. *Journal of Personality and Social Psychology, 51,* 1173-1182. doi: 10.1037/0022-3514.51.6.1173

Baumeister, R. F., Bratslavsky, E., Finkenauer, C., & Vohs, K. D. (2001). Bad is stronger than good. *Review of General Psychology, 5*, 323-370. doi: 10.1037/1089-2680.5.4.323

Benoit, W. L. (1998). Forewarning and persuasion. In M. Allen & R. Preiss (Eds.), *Persuasion: Advances through meta-analysis* (pp. 139-154). Creskill, NJ: Hampton Press.

BP wins coveted 'Emerald Paintbrush' award for worst greenwash of 2008. (2008). http://www.greenpeace.org.uk/blog/climate/bps-wins-coveted-emerald-paintbrush-award-worst-greenwash-2008-20081218/ [9 November, 2011]

Brammer, S. J., & Pavelin, S. (2006). Corporate reputation and social performance: The importance of fit. *Journal of Management Studies, 43,* 435-455. doi: 10.1111/j.1467-6486.2006.00597.x

Brehm, S. S., & Brehm, J. (1981). *Psychological reactance*. New York: Academic Press.

Brewer, P. R. (2001). Value words and lizard brains. *Political Psychology,* 22, 45-64. doi: 10.1111/0162-895X.00225

Brunsting, S., de Best-Waldhober, M., Feenstra, C. F. J., & Mikunda, T. (2011). Stakeholder participation practices and onshore CCS: Lessons from the Dutch CCS case Barendrecht. *Energy Procedia, 4,* 6376-6383. doi: 10.1016/j.egypro.2011.02.655

Burgoon, J. K., & Le Poire, B. A. (1993). Effects of communication expectancies, actual communication, and expectancy disconfirmation on evaluations of communicators and their communication behavior. *Human Communication Research, 20*, 67-96. doi: 10.1111/j.1468-2958.1993.tb00316.x

Campbell, M. C. (1995). When attention-getting advertising tactics elicit consumer inferences of manipulative intent: The importance of balancing benefit and investments. *Journal of Consumer Psychology, 4*, 225-254. doi: 10.1207/s15327663jcp0403_02

Campbell, M. C., & Kirmani, A. (2000). Consumers' use of persuasion knowledge: The effects of accessibility and cognitive capacity on perceptions of an influence agent. *Journal of Consumer Research, 27*, 69-83. doi: 10.1086/314309

Carmines, E. G., & Stimson, J. A. (1980). The two faces of issue voting. *The American Political Science Review, 74*, 78-91. doi: 10.2307/1955648

Cerin, P. (2002). Communication in corporate environmental reports. *Corporate Social Responsibility and Environmental Management, 9,* 46-65. doi: 10.1002/csr.6

Chaiken, S. (1980). Heuristic versus systematic information processing and the use of source versus message cues in persuasion. *Journal of Personality and Social Psychology, 39*, 752-766. doi: 10.1037/0022-3514.39.5.752

Chan, R., & Leung, T. K. P., & Wong, Y. H. (2006). The effectiveness of environmental claims for services advertising. *Journal of Services Marketing, 20,* 233-250. doi: 10.1108/08876040610674580

Chong, D., & Druckman, J. N. (2007). Framing theory. *Annual Review of Political Science, 10*, 103-126. doi: 10.1146/annurev.polisci.10.072805.103054

Chow, W. S., & Chen, Y. (2012) Corporate sustainable development: Testing a new scale based on the mainland Chinese context. *Journal of Business Ethics, 105,* 519-533. doi: 10.1007/s10551-011-0983-x

Cobb, M. D. (2005). Framing effects on public opinion about nanotechnology. *Science Communication*, *27*, 221-239. doi: 10.1177/1075547005281473

Corry, O., & Reiner, D. (2011). *Evaluating global Carbon Capture and Storage (CCS) communication materials: A survey of global CCS communications*. Cambridge, United Kingdom: University of Cambridge.

Crowley, A. E., & Hoyer, W. D. (1994). An integrative framework for understanding two-sided persuasion. *Journal of Consumer Research, 20*, 561-574. doi: 10.1086/209370

de Best-Waldhober, M., Daamen, D., & Faaij, A. (2009). Informed and uninformed public opinions on CO_2 capture and storage technologies in the Netherlands. *International Journal of Greenhouse Gas Control, 3*, 322-332. doi: 10.1016/j.ijggc.2008.09.001

de Vries, G., Jehn, K. A., & Terwel, B. W., (2012). When employees stop talking and start fighting: The detrimental effects of pseudo voice in organizations. *Journal of Business Ethics, 105,* 221-230. doi: 10.1007/s10551-011-0960-4

de Vries, G., Terwel, B. W., Ellemers, N., & Daamen, D. D. L. (in press). Sustainability or profitability? How communicated motives for environmental policy affect public perceptions of corporate greenwashing. *Corporate Social Responsibility and Environmental Management*. doi: 10.1002/csr.1327

de Vries, G., Terwel, B. W., & Ellemers, N. (2014). Spare the details, share the relevance: The dilution effect in communications about carbon dioxide capture and storage. *Journal of Environmental Psychology, 38*, 116-223. doi: 10.1016/j.jenvp.2014.01.003.

de Vries, G., Terwel, B. W., & Ellemers, N (under review). Perceptions of manipulation and judgments of illegitimacy: Pitfalls in the use of emphasis framing when communicating about CO_2 capture and storage.

Dowd, A., Ashworth, P., Rodriguez, M., & Jeanneret, T. (2012). CCS in the media: An analysis of international coverage. *Energy and Environment, 23*, 283-298. doi: 10.1260/0958-305X.23.2-3.283

Druckman, J. N. (2001). On the limits of framing effects: Who can frame? *The Journal of Politics, 63,* 1041-1066. doi: 10.1111/0022-3816.00100

Druckman, J. N., & Bolsen, T. (2011). Framing, motivated reasoning, and opinions about emergent technologies. *Journal of Communication, 61*, 659-688. doi: 10.1111/j.1460-2466.2011.01562.x

Druckman, J. N., Peterson, E., & Slothuus, R. (2013). How elite partisan polarization affects public opinion formation. *American Political Science Review, 107*, 57-79. doi: 10.1017/S0003055412000500

Dunlap, R. E., Van Liere, K. D., Mertig, A. G., & Jones, R. E. (2000). Measuring endorsement of the new ecological paradigm: A revised NEP scale. *Journal of Social Issues, 56,* 425-442. doi: 10.1111/0022-4537.00176

Dutta, S., Lawson, R., & Marcinko, D. (2012). Paradigms for sustainable development: implications of management theory. *Corporate Social Responsibility and Environmental Management, 19,* 1-10. doi: 10.1002/csr.259

Ellen, P. S., Webb, D. J., & Mohr, L. A. (2006). Building corporate associations: Consumer attributions for corporate socially responsible programs. *Journal of the Academy of Marketing Science, 34,* 349-356. doi: 10.1177/0092070305284976

Escobar, L., & Vredenburg, H. (2011). Multinational oil companies and the adoption of sustainable development: A resource-based and institutional theory interpretation of adoption heterogeneity. *Journal of Business Ethics, 98,* 39-65. doi: 10.1007/s10551-010-0534-x

Ettenson, R., Shanteau, J., & Krogstad, J. (1987). Expert judgment: Is more information better? *Psychological Reports, 60*, 227-238. doi: 10.2466/pr0.1987.60.1.227

European Commission (2011). *Public awareness and acceptance of CO_2 capture and storage.* Special Eurobarometer (364/Wave 75.1 ed., pp. 1-185). Brussels, Belgium.

Fein, S. (1996). Effects of suspicion on attributional thinking and the correspondence bias. *Journal of Personality and Social Psychology, 70,* 1164-1184. doi: 10.1037/0022-3514.70.6.1164

Feldpausch-Parker , A. M., Ragland, C. J., Melnick, L. L., Chaudhry, R., Hall, D. M., Peterson, T. R., Stephens, J. C., & Wilson, E. J. (2013). Spreading the news on carbon capture and storage: A state-level comparison of US media. *Environmental Communication: A Journal of Nature and Culture, 7,* 336-354. doi: 10.1080/17524032.2013.807859

Fishbein, M., & Ajzen, I. (1975). *Belief, attitude, intention, and behavior: An introduction to theory and research*. Reading, MA: Addison-Wesley.

Fiske, S. T., & Taylor, S. E. (1991). *Social cognition* (2nd ed.). New York, NY: Mac-Graw-Hill.

Ford, G. T., Smith, D. B., & Swasy, J. L. (1990). Consumer skepticism of advertising claims: Testing hypotheses from economics of information. *Journal of Consumer Research, 16*, 433-441. doi: 10.1086/209228

Forehand, M. R., & Grier, S. (2003). When is honesty the best policy? The effect of stated company intent on consumer skepticism. *Journal of Consumer Psychology, 13,* 349-56. doi: 10.1207/S15327663JCP1303_15

Frey, D. (1986). Recent research on selective exposure to information. In L. Berkowitz (Ed.), *Advances in experimental social psychology* (Vol. 19, pp. 41-80). New York, NY: Academic Press.

Friestad, M., & Wright, P. (1994). The persuasion knowledge model: How people cope with persuasion attempts. *Journal of Consumer Research, 21*, 1-31. doi: 10.1086/209380

García, M. M. (2011). Perception is truth: How U.S. newspapers framed the 'go green' conflict between BP and Greenpeace. *Public Relations Review, 37,* 57-59. doi: 10.1016/j.pubrev.2010.10.001

Gass, R. H., & Seiter, J. S. (2007). *Persuasion, social influence, and compliance gaining* (3rd ed.). Boston, MA: Allyn and Bacon/Pearson.

Geller, H., Harrington, P., Rosenfeld, A. H., Tanishima, S., & Unander, F. (2006). Policies for increasing energy efficiency: Thirty years of experience in OECD countries. *Energy Policy, 34*, 556-573. doi: 10.1016/j.enpol.2005.11.010

Gifford, R. (2011). The dragons of inaction: Psychological barriers that limit climate change mitigation and adaptation. *American Psychologist, 66*, 290-302. doi: 10.1037/a0023566

Grunig, J. E., & Hunt, T. (1984). *Managing public relations.* New York, NY: Holt, Rinehart & Winston.

Harp, S. F., & Mayer, R. E. (1998). How seductive details do their damage: A theory of cognitive interest in science learning. *Journal of Educational Psychology, 90*, 414-434. doi: 10.1037/0022-0663.90.3.414

Hart, W., Albarracín, D., Eagly, A. H., Brechan, I., Lindberg, M. J., & Merrill, L. (2009). Feeling validated versus being correct: A meta-analysis of selective exposure to information. *Psychological Bulletin, 135*, 555-588. doi: 10.1037/a0015701

Hassan, A., & Ibrahim, E. (2012). Corporate environmental information disclosure: Factors influencing companies' success in attaining environmental awards. *Corporate Social Responsibility and Environmental Management*, *19,* 32-46. doi: 10.1002/csr.278

Hayes, A. F. & Preacher, K. J. (in press). Statistical mediation analysis with a multicategorical independent variable. *British Journal of Mathematical and Statistical Psychology.* doi: 10.1111/bmsp.12028

Hilton, J. L., Fein, S., & Miller, D. T. (1993). Suspicion and dispositional inference. *Personality and Social Psychology Bulletin*, *19*, 501-512. doi: 10.1177/0146167293195003

Hovland, C. I., Janis, I. L., & Kelley, H. H. (1953). *Communication and persuasion; psychological studies of opinion change*. New Haven, CT: Yale University Press.

Hinnant, A., Len-Ríos, M. E., & Jee Oh, H. (2012). Are health journalists' practices tied to their perceptions of audience? An attribution and expectancy-value Approach. *Health Communication, 27*, 234-243, doi: 10.1080/10410236.2011.578331

IEA (2012). *Energy technology perspectives 2012: Pathways to a clean energy system* (*executive summary)*. Paris, France: International Energy Agency (IEA). http://www.iea.org [10 December, 2012]

IPCC (2007). Summary for Policymakers. In: *Climate Change 2007: Mitigation. Contribution of working group III to the fourth assessment report of the Intergovernmental Panel on Climate Change* (B. Metz, O. R. Davidson, P. R. Bosch, R. Dave, & L. A. Meyer [Eds]), Cambridge and New York, NY: Cambridge University Press.

IPCC (2013). Summary for Policymakers. In: *Climate Change 2013: The physical science basis. Contribution of working group I to the fifth assessment report of the Intergovernmental Panel on Climate Change* (Stocker, T. F., D. Qin, G-K. Plattner, M. Tignor, S. K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex, & P. M. Midgley [Eds.]). Cambridge and New York, NY: Cambridge University Press.

Jolivet, E. & Heiskanen, E. (2010). Blowing against the wind: An exploratory application of actor network theory to the analysis of local controversies and participation processes in wind energy. *Energy Policy, 38*, 6746–6754. doi: 10.1016/j.enpol.2010.06.044

Jones, C. R., Eiser, J. R., & Gamble, T. R. (2012). Assessing the impact of framing on the comparative favourability of nuclear power as an electricity generating option in the UK. *Energy Policy*, *41*, 451-465. doi: 10.1016/j.enpol.2011.11.006

Joslyn, M., & Haider-Markel, D. (2002). Framing effects on personal opinion and perceptions of public opinion: The cases of physician-assisted suicide and social security. *Social Science Quarterly, 83*, 690-706. doi: 10.1111/1540-6237.00109

Jowett, G. S., & O'Donnell, V. (2012). *Propaganda and Persuasion* (5th ed.). Thousand Oaks, CA: Sage.

Kahneman, D., & Tversky, A. (1972). Subjective probability: A judgment of representativeness. *Cognitive Psychology, 3*, 430-454. doi: 10.1016/0010-0285(72)90016-3

Kolk, A., & Perego, P. (2010). Determinants of the adoption of sustainability assurance statements: An international investigation. *Business Strategy and the Environment, 19,* 182-198. doi: 10.1002/bse.643

Laufer, W. S. (2003). Social accountability and corporate greenwashing. *Journal of Business Ethics, 43,* 253-261. doi: 10.1023/A:1022962719299

Le Menestrel, M., van den Hove, S., & de Bettignies, H-C. (2002). Processes and consequences in business ethical dilemmas: The oil industry and climate change. *Journal of Business Ethics, 41,* 251-66. doi: 10.1023/A:1021237629938

Levin, I. P., Schneider, S. L., & Gaeth, G. J. (1998). All frames are not created equal: A typology and critical analysis of framing effects. *Organizational Behavior and Human Decision Processes, 76*, 149-188. doi: 10.1006/obhd.1998.2804

Lichtenstein, S., Earle, T. C., & Slovic, P. (1975). Cue utilization in a numerical prediction task. *Journal of Experimental Psychology: Human Perception and Performance, 1,* 77-85. doi: 10.1037/0096-1523.1.1.77

Lind, E., & Tyler, T. (1988). *The social psychology of procedural justice*. New York, NY: Plenum Press.

Maignan, I. (2001). Consumers' perceptions of corporate social responsibilities: A cross-cultural comparison. *Journal of Business Ethics, 30,* 57-72. doi: 10.1023/A:1006433928640

Melo, T., & Garrido-Morgado, A. (2012). Corporate reputation: A combination of social responsibility and industry. *Corporate Social Responsibility and Environmental Management, 19,* 11-31. doi: 10.1002/csr.260

Meyvis, T., & Janiszewski, C. (2002). Consumers' beliefs about product benefits: The effect of obviously irrelevant product information. *Journal of Consumer Research, 28*, 618-635. doi: 10.1086/338205

Muralidharan, S., Dillistone, K., & Shin, J-H. (2011). The Gulf Coast oil spill: Extending the theory of image restoration discourse to the realm of social media and beyond petroleum. *Public Relations Review*, 37, 226-232. doi: 10.1016/j.pubrev.2011.04.006

Nelson, T. E., Clawson, R. A., & Oxley, Z. M. (1997). Media framing of a civil liberties conflict and its effect on tolerance. *The American Political Science Review, 91,* 567-583. doi: 10.1023/a:1024834831093

Nisbet, M. C., & Mooney, C. (2007). Framing science. *Science, 316,* 56-56. doi: 10.1126/science.1142030

Nisbett, R. E., Zukier, H., & Lemley, R. E. (1981). The dilution effect: Nondiagnostic information weakens the implications of diagnostic information. *Cognitive Psychology, 13*, 248-277. doi: 10.1016/0010-0285(81)90010-4

Obermiller, C., & Spangenberg, E. R. (1998). Development of a scale to measure consumer skepticism toward advertising. *Journal of Consumer Psychology, 7,* 159-186. doi: 10.1207/s15327663jcp0702_03

Petty, R. E., & Cacioppo, J. T. (1981). *Attitudes and persuasion: Classic and contemporary approaches.* Dubuque, IA: Wm. C. Brown.

Petty, R. E., & Cacioppo, J. T. (1984). The effects of involvement on responses to argument quantity and quality: Central and peripheral routes to persuasion. *Journal of Personality and Social Psychology, 46*, 69-81. doi: 10.1037/0022-3514.46.1.69

Petty, R. E., & Cacioppo, J. T. (1986). *Communication and persuasion: Central and peripheral routes to attitude change*. New York, NY: Springer-Verlag.

Petty, R. E., Cacioppo, J. T., Strathman, A., & Priester, J. R. (2005). To think or not to think? Exploring two routes to persuasion. In T. C. Brock & M. C. Green (Eds.), *Persuasion: Psychological insights and perspectives* (pp. 81-116). Thousand Oaks, CA: Sage.

Petty, R. E., Haugtvedt, C. P., & Smith, S. M. (1995). Elaboration as a determinant of attitude strength: Creating attitudes that are persistent, resistant, and predictive of behavior. In R. E. Petty & J. A. Krosnick (Eds.), *Attitude strength: Antecedents and consequences* (pp. 93-130). Mahwah, NJ: Lawrence Erlbaum.

Polonsky, M. J. (1995). Cleaning up environmental marketing claims: A practical checklist. In M. J. Polonsky & A. T. Mintu-Wimsatt (Eds.), *Environmental Marketing* (pp 199-223). Binghamton, NY; Haworth.

Polonsky, M. J., & Rosenberger III, P. J. (2001). Reevaluating green marketing: A strategic approach. *Business Horizons, 44,* 21-30. doi: 10.1016/S0007-6813(01)80057-4

Pornpitakpan, C. (2004). The persuasiveness of source credibility: A critical review of five decades' evidence. *Journal of Applied Social Psychology, 34*, 243-281. doi: 10.1111/j.1559-1816.2004.tb02547.x

Porter, M. E., & Kramer, M. R. (2011). The big idea: Creating shared value: How to reinvent capitalism – and unleash a wave of innovation and growth. *Harvard Business Review,* January-February: 1-17.

Preacher, K. J., & Hayes, A. F. (2008). Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models. *Behavior Research Methods, 40*, 879-891. doi: 10.3758/brm.40.3.879

Preacher, K. J., Rucker, D. D., & Hayes, A. F. (2007). Addressing moderated mediation hypotheses: Theory, methods, and prescriptions. *Multivariate Behavioral Research, 42,* 185-227. doi: 10.1080/00273170701341316

Rabinovich, A., Morton, T. A., & Birney, M. E. (2012). Communicating climate science: The role of perceived communicator's motives. *Journal of Environmental Psychology, 32*, 11-18. doi: 10.1016/j.jenvp.2011.09.002

Ryan, M. (2001). Journalistic ethics, objectivity, existential journalism, standpoint epistemology, and public journalism. *Journal of Mass Media Ethics, 16*, 3-22. doi: 10.1207/S15327728JMME1601_2

Sagarin, B. J., Cialdini, R. B., Rice, W. E., & Serna, S. B. (2002). Dispelling the illusion of invulnerability: The motivations and mechanisms of resistance to persuasion. *Journal of Personality and Social Psychology, 83*, 526-541. doi: 10.1037/0022-3514.83.3.526

Sen, S., & Bhattacharya, C. B. (2001). Does doing good always lead to doing better? Consumer reactions to corporate social responsibility. *Journal of Marketing Research, 38,* 225-243. doi: 10.1509/jmkr.38.2.225.18838

Sjöberg, L. (2000) Perceived risk and tampering with nature. *Journal of Risk Research, 3,* 353- 367. doi: 10.1080/13669870050132568

Smith, H., Stasson, M., & Hawkes, W. (1998). Dilution in legal decision making: Effect of non-diagnostic information in relation to amount of diagnostic evidence. *Current Psychology, 17*, 333-345. doi: 10.1007/s12144-998-1015-6

Smith, S. M., Fabrigar, L. R., & Norris, M. E. (2008). Reflecting on six decades of selective exposure research: Progress, challenges, and opportunities. *Social and Personality Psychology Compass, 2*, 464-493. doi: 10.1111/j.1751-9004.2007.00060.x

Spangler, I. S., & Pompper, D. (2011). Corporate social responsibility and the oil industry: Theory and perspective fuel a longitudinal view. *Public Relations Review, 37,* 217-25. doi: 10.1016/j.pubrev.2011.03.013

Stec, A. M., & Bernstein, D. A. (1999). *Psychology: Fields of application.* Boston, MA: Houghton, Mifflin and Company.

Sustainability reporting fails to take off in the United States. (2012). http://www.guardian.co.uk/sustainable-business/blog/sustainability-reporting-fails-united-states [7 January, 2013]

Tagesson, T., Blank, V., Broberg, P., & Collin, S-O. (2009). What explains the extent and content of social and environmental disclosures on corporate websites: A study of social and environmental reporting in Swedish listed corporations. *Corporate Social Responsibility and Environmental Management, 16,* 352-364. doi: 10.1002/csr.194

Ter Mors, E., Weenig, M. W. H., Ellemers, N., & Daamen, D. D. L. (2010). Effective communication about complex environmental issues: Perceived quality of information about carbon dioxide capture and storage (CCS) depends on stakeholder collaboration. *Journal of Environmental Psychology, 30*, 347-357. doi: 10.1016/j.jenvp.2010.06.001

Terwel, B. W., Harinck, F., Ellemers, N., & Daamen, D. D. L. (2009a). Competence-based and integrity-based trust as predictors of acceptance of carbon dioxide capture and storage (CCS). *Risk Analysis, 29,* 1129-1140. doi: 10.1111/j.1539-6924.2009.01256.x

Terwel, B. W., Harinck, F., Ellemers, N., & Daamen, D. D. L. (2009b). How organizational motives and communications affect public trust in organizations: The case of carbon dioxide capture and storage. *Journal of Environmental Psychology, 29,* 290-299. doi: 10.1016/j.jenvp.2008.11.004

Terwel, B. W., Harinck, F., Ellemers, N., & Daamen, D. D. L. (2010). Voice in political decision-making: The effect of group voice on perceived trustworthiness of decision makers and subsequent acceptance of decisions. *Journal of Experimental Psychology: Applied, 16,* 173-186. doi: 10.1037/a0019977

Terwel, B. W., Ter Mors, E., & Daamen, D. D. L. (2012). It's not only about safety: Beliefs and attitudes of 811 local residents regarding a CCS project in Barendrecht. *International Journal of Greenhouse Gas Control, 9*, 41-51. doi: 10.1016/j.ijggc.2012.02.017

Tetlock, P. E., & Boettger, R. (1989). Accountability: A social magnifier of the dilution effect. *Journal of Personality and Social Psychology, 57*, 388-398. doi: 10.1037/0022-3514.57.3.388

Thibaut, J., & Walker, L. (1975). *Procedural justice: A psychological analysis*. Hillsdale, NJ: Erlbaum.

Turker, D. (2009) Measuring corporate social responsibility: A scale development study. *Journal of Business Ethics, 85,* 411-427. doi: 10.1007/s10551-008-9780-6

Tversky, A., & Kahneman, D. (1981). The framing of decisions and the psychology of choice. *Science, 211*, 453-458. doi: 10.1126/science.7455683

United Nations (1998). *Kyoto protocol to the United Nations Framework Convention on Climate Change.* Retrieved from http://unfccc.int/resource/docs/convkp/kpeng.pdf

United Nations (2012). *Doha amendment to the Kyoto Protocol*. Retrieved from http://unfccc.int/files/kyoto_protocol/application/pdf/kp_doha_amendment_english.pdf

Van Egmond, S., & Hekkert, M. P. (2012). Argument map for carbon capture and storage. *International Journal of Greenhouse Gas Control, 11,* S148–S159. doi: 10.1016/j.ijggc.2012.08.010

Vos, J. (2009). Actions speak louder than words: Greenwashing in corporate America. *Notre Dame Journal of Law, Ethics & Public Policy, 23,* 673-697.

Wagner, T., Lutz, R. J., & Weitz, B. A. (2009). Corporate hypocrisy: Overcoming the threat of inconsistent corporate social responsibility perceptions. *Journal of Marketing, 73,* 77-91. doi: 10.1509/jmkg.73.6.77

Waller, W. S., & Zimbelman, M. F. (2003). A cognitive footprint in archival data: Generalizing the dilution effect from laboratory to field settings. *Organizational Behavior and Human Decision Processes, 91*, 254-268. doi: 10.1016/s0749-5978(03)00024-4

Whitmarsh, L. (2009). Behavioural responses to climate change: Asymmetry of intentions and impacts. *Journal of Environmental Psychology, 29*, 13-23. doi: 10.1016/j.jenvp.2008.05.003

WMO (2013). *Greenhouse gas Bulletin. The State of Greenhouse Gases in the Atmosphere Based on Global Observations through 2012.* http://www.wmo.int [24 February, 2014]

Wright, W., & Reid, T. (2011). Green dreams or pipe dreams? Media framing of the U.S. biofuels movement. *Biomass and Bioenergy, 35*, 1390-1399. doi: 10.1016/j.biombioe.2010.07.020

Yoon, Y., Gürhan-Canli, Z., & Schwarz, N. (2006). The effect of corporate social responsibility (CSR) activities on companies with bad reputations. *Journal of Consumer Psychology, 16,* 377-390. doi: 10.1207/s15327663jcp1604_9

Samenvatting (summary in Dutch)

Valkuilen in de communicatie over CO_2 -afvang en -opslag

Dit proefschrift heeft als titel "Valkuilen in de communicatie over CO_2 -afvang en -opslag". De technologie van het afvangen en opslaan van CO_2 wordt in het kort ook wel "CCS" genoemd, naar het Engelse *carbon dioxide capture and storage*. CCS is een technologie waarmee CO_2 wordt afgevangen dat vrijkomt bij de verbranding van fossiele brandstoffen (olie, gas en kolen) tijdens industriële processen, waarna de afgevangen CO_2 in gesteenten diep onder de grond of zee opgeslagen wordt. CCS is één van de maatregelen die genomen kunnen worden om de groeiende hoeveelheid CO_2 in de atmosfeer te verminderen. Het reduceren van CO_2 is nodig omdat dit broeikasgas volgens het laatste rapport van de *Intergovernmental Panel on Climate Change* een zeer belangrijke oorzaak van klimaatverandering is (IPCC, 2013). CCS is een controversiële technologie. Dat wil zeggen, er zijn voorstanders en tegenstanders die beiden de publieke opinie proberen te beïnvloeden. Het belang van de mening van het publiek voor een succesvolle introductie van CCS is gebleken uit het feit dat in 2010 een demonstratieproject in Barendrecht werd afgeblazen vanwege een tekort aan publiek draagvlak (Brunsting et al., 2011).

De publieke opinie over controversiële onderwerpen zoals CCS wordt onder andere beïnvloed door hoe er over deze onderwerpen wordt gecommuniceerd. Zo is bijvoorbeeld gebleken dat mensen anders over kernenergie gaan denken als deze vorm van energie wordt gerelateerd aan het tegengaan van klimaatverandering (Jones et al., 2012). Ook is de link gelegd tussen de wijze van communiceren over het CCS demonstratieproject in Barendrecht en het tekort aan draagvlak voor dit project (Brunsting et al., 2011). Vaak is communicatie over dergelijke onderwerpen persuasief van aard. Met persuasieve communicatie probeert een zender de gedachten, meningen of gedragingen van een ontvanger te beïnvloeden (e.g., Fishbein & Ajzen, 1975; Gass & Seiter, 2007; Hovland et al., 1953). Hoe de aspecten van bron (i.e., zender), boodschap, onderwerp en ontvanger de impact van persuasieve communicatie bepalen, wordt uitgelegd door zogenaamde duale informatieverwerkingsmodellen (*dual process models*) zoals het *heuristic-systematic model* (HSM; Chaiken, 1980) en het *elaboration likelihood model* (ELM; Petty & Cacioppo, 1986). Duale informatieverwerkingsmodellen suggereren het bestaan van een continuüm met twee uiterste routes voor informatieverwerking: een systematische (of centrale) route en een heuristische (of perifere) route. Als mensen informatie systematisch verwerken, nemen ze alles wat er gezegd of geschreven wordt nauwkeurig onder de loep en komen dan tot een mening. Deze mensen worden dus

voornamelijk overtuigd door kenmerken van de boodschap. In tegendeel, als mensen informatie heuristisch verwerken, worden ze voornamelijk door zaken overtuigd die meer oppervlakkig dan inhoudelijk zijn, zoals kenmerken van de bron. Mensen verwerken informatie vooral via de heuristische route als ze niet heel erg gemotiveerd of betrokken zijn bij het onderwerp of als ze niet in staat zijn om de informatie dieper te verwerken (bijvoorbeeld door tijdgebrek of gebrek aan cognitieve capaciteit) (Chaiken, 1980; Petty & Cacioppo, 1986). Echter, in het algemeen gebruiken mensen een combinatie van de twee verwerkingsroutes (Petty et al., 2005).

Wetenschappelijk onderzoek naar informatieverwerking en persuasieve communicatie richt zich vooral op effectiviteit. Dat wil zeggen, er wordt onderzocht in hoeverre gedachten, meningen en gedragingen van mensen beïnvloed worden door communicatie. Zo is er bijvoorbeeld gevonden dat een mening langer beklijft en resistenter is als informatie systematisch is verwerkt dan als het heuristisch is verwerkt (Petty et al., 1995). Echter, tot nu toe ging er weinig (wetenschappelijke) aandacht uit naar wat mensen vinden van persuasieve communicatietechnieken en hoe deze waarnemingen van invloed zijn op evaluaties over de boodschap en de bron. Omdat deze effecten relatief verwaarloosd zijn, kan een bepaalde techniek op de korte termijn effectief lijken, terwijl dit op de lange termijn niet het geval hoeft te zijn. Bijvoorbeeld, op de korte termijn kan het delen van louter positieve informatie over een product—terwijl negatieve informatie wordt stilgehouden—zorgen voor een positieve houding tegenover het product, en wellicht gunstige verkoopcijfers. Echter, het zou zo kunnen zijn dat mensen het niet eerlijk vinden als negatieve informatie achter wordt houden. Dergelijke negatieve evaluaties kunnen de effectiviteit van communicatie verminderen en op de lange termijn tot imagoschade en winstverlies leiden (e.g., Brehm & Brehm, 1981; Campbell, 1995; Polonsky, 1995; Polonsky & Rosenberger III, 2001; Terwel et al., 2009a). Dit noem ik de valkuil van (persuasieve) communicatie.

Het experimentele en survey onderzoek dat ik in dit proefschrift presenteer was gericht op de identificatie van potentiele valkuilen in de communicatie over CCS. In mijn onderzoek heb ik de focus gelegd op communicatie van olie- en gasmaatschappijen, omdat deze organisaties in het verleden de persuasieve communicatietechnieken hebben toegepast die ik wilde onderzoeken (Brunsting et al., 2011). Ik heb de communicatie van olie- en gasmaatschappijen vergeleken met die van andere partijen die communiceren over CCS, zoals milieuorganisaties en persbureaus, om te testen in hoeverre de effectiviteit en potentiële valkuilen van communicatie afhangen van een bepaald soort bron. Ik heb drie persuasieve communicatietechnieken onderzocht aan de hand van drie onderzoekslijnen. In Hoofdstuk 1 van dit proefschrift verbind ik deze lijnen met elkaar en beschrijf hun

verschillen en overeenkomsten. Ook beschrijf ik de context waarin het onderzoek is uitgevoerd en in hoeverre het huidige onderzoek gegeneraliseerd kan worden naar andere onderwerpen en vormen van communicatie.

In Hoofdstuk 2 laat ik de valkuil zien van het opstapelen van veel verschillende stukjes informatie in één tekst. Olie- en gasmaatschappijen kunnen informatie over CCS stapelen in de hoop dat één of meer van die stukjes informatie mensen zal overtuigen om de implementatie van de technologie te steunen. Ze zouden bovendien informatie kunnen opstapelen omdat mensen een lange tekst vaak overtuigend vinden (de *length-implies-strength* heuristiek; e.g., Stec & Bernstein, 1999). Echter, ik vond dat het opstapelen van informatie averechts kan werken. Namelijk, als er irrelevante details over CCS (bijvoorbeeld dat er informatie over CCS op internet staat) aan een relevante boodschap worden toegevoegd, neemt de overtuigingskracht van de relevante boodschap af. Dit wordt het verdunningseffect, of *dilution effect*, genoemd (e.g., Meyvis & Janiszewski, 2002; Nisbett et al., 1981). De overtuigingskracht van zowel een positieve boodschap over CCS (de technologie helpt klimaatverandering tegen te gaan) als een negatieve boodschap (omdat het een nieuwe technologie betreft kan veiligheid niet volledig worden gegarandeerd) kan worden verdund, hoewel het effect sterker is bij een positieve boodschap. Het proces dat ten grondslag ligt aan het verdunningseffect is dat aangelengde informatie kwalitatief zwakker wordt gevonden dan niet-aangelengde informatie. Ik heb verder nog bekeken of irrelevante details de aandacht afleiden van de hoofdboodschap, maar dat bleek niet het geval. Informatie die dezelfde valentie heeft als de hoofdboodschap (positief of negatief), maar minder relevant is, heeft geen verdunnend effect. Echter, deze minder relevante informatie versterkt de hoofdboodschap ook niet, dus is er weinig reden om minder relevante informatie toe te voegen. Er is ook een manier om het verdunningseffect te bestrijden. Het effect treedt namelijk niet op als de ontvanger een goed beeld heeft wie er achter de communicatie zit, doordat bijvoorbeeld een logo van het bedrijf zichtbaar is of de naam van de bron duidelijk vermeld is. Dit komt doordat mensen (via de heuristische verwerkingsroute) de broninformatie gebruiken om de informatie te beoordelen in plaats van dat ze zich baseren op de inhoud van de communicatie.

In Hoofdstuk 3 beschrijf ik de valkuilen van het benadrukken van voordelen of nadelen van CCS in communicatie (*emphasis-framing*). Olie- en gasmaatschappijen kunnen geneigd zijn om de voordelen van CCS te benadrukken, omdat nadruk in communicatie de mening van mensen kan beïnvloeden (Druckman & Bolsen, 2011). Ik heb inderdaad gevonden dat mensen positiever over CCS gaan denken als de voordelen van de technologie voor het klimaat worden benadrukt, vergeleken met als de eventuele risico's worden benadrukt. Echter, ik vond tegelijkertijd dat mensen het kleuren van communicatie manipulatief vinden en zelfs onacceptabel wanneer zij gebalanceerde,

informatieve communicatie verwachten. Dit is bijvoorbeeld het geval als een instantie die geacht wordt objectief te zijn, zoals een persbureau, communicatie kleurt. Dit is een belangrijke keerzijde van *emphasis-framing*, omdat deze percepties van manipulatie op de lange termijn kunnen leiden tot negatieve bronevaluaties en afkeer van de boodschap (e.g., Brehm & Brehm, 1981; Campbell, 1995; Terwel et al., 2009a). Als een commercieel bedrijf, zoals een olie- en gasmaatschappij, communicatie kleurt wordt dit ook zeer manipulatief gevonden. Echter, mensen vinden een gekleurde boodschap van deze bron niet minder acceptabel dan een gebalanceerde boodschap, omdat zij gekleurde communicatie van dergelijke bedrijven verwachten.

Bovenstaande resultaten doen vermoeden dat olie- en gasmaatschappijen bepaalde valkuilen in de communicatie over CCS kunnen vermijden. Ik heb per slot van rekening aangetoond dat deze organisaties het verdunningseffect van irrelevante details kunnen ontwijken door hun identiteit duidelijk kenbaar te maken en dat het kleuren van een boodschap vooral onacceptabel is voor bronnen die verwacht worden objectief te zijn. Echter, dit vermoeden is niet geheel terecht. Olie- en gasmaatschappijen hebben namelijk te kampen met een negatief imago (Yoon et al., 2006). Dit blijkt ook uit een survey die ik gehouden heb onder een representatieve groep volwassen Nederlanders (Appendix A). Het voornaamste doel van deze survey (waar ik door middel van voetnoten naar refereer in dit proefschrift) was inzicht te verkrijgen in publieke percepties van olie- en gasmaatschappijen in relatie tot CCS, maar ik heb onder andere ook het algemene imago gemeten van deze organisaties. Zodra olie- en gasmaatschappijen hun identiteit blootgeven kan dit negatieve algemene imago worden geactiveerd, hetgeen er onder andere voor kan zorgen dat bepaalde communicatietechnieken minder effectief worden (Druckman, 2001).

Ook kan het negatieve imago van olie- en gasmaatschappijen bijdragen aan ongewenste bronevaluaties. Dit laat Hoofdstuk 4 zien waarin ik kijk naar de valkuilen van het “vergroenen” van bedrijfsactiviteiten. Commerciële organisaties kunnen geneigd zijn hun bedrijfsactiviteiten als milieuvriendelijk te presenteren, omdat positieve informatie over de maatschappelijke verantwoordelijkheid van een bedrijf bij kan dragen tot een positief algemeen imago (Alniacik, Alniacik, & Genc, 2011; Sen & Bhattacharya, 2001). Het huidige onderzoek toont echter aan dat het geven van een groen motief voor de investering in CCS niet leidt tot dit gewenste effect. Ik heb gevonden dat olie- en gasmaatschappijen die investeren in CCS a priori—zonder dat zij iets communiceren—beschuldigd worden van groenwassen: het valselijk presenteren van bedrijfsactiviteiten als “groen” om milieuvriendelijker te lijken dan je eigenlijk bent (*greenwashing;* e.g., Laufer, 2003; Vos, 2009). Verdenkingen van groenwassen worden in verband gebracht met ongewenste effecten op de lange termijn, zoals protest, boycot en financiële verliezen voor het bedrijf (e.g., Polonsky, 1995; Polonsky &

Rosenberger III, 2001). De reden dat bedrijven die investeren in CCS a priori worden verdacht van groenwassen kan zijn dat mensen het hypocriet vinden als organisaties die door hun activiteiten het milieu belasten een technologie ontwikkelen die klimaatverandering helpt tegen te gaan (Yoon et al., 2006). Het huidige onderzoek laat zien dat olie- en gasmaatschappijen deze a priori verdenking van groenwassen niet weg kunnen nemen door te communiceren dat ze investeren in CCS vanwege het feit dat CCS voordelen heeft voor het klimaat, zelfs niet als ze ontkennen dat het eigenlijke motief om te investeren economisch zou zijn (om eventuele twijfels over hun motieven weg te nemen). De verdenking van groenwassen neemt alleen af als een bedrijf juist toegeeft vanuit een winstoogmerk in CCS te investeren, met of zonder ontkenning van een groen motief. Het psychologische proces dat hieraan ten grondslag ligt is dat olie- en gasbedrijven die een groen motief geven ervan verdacht worden een strategisch doel na te streven, zoals het zoeken naar publiciteit en het verwerven van nieuwe klanten. Dit leidt tot de beschuldiging van groenwassen. Olie- en gasbedrijven die een economisch motief geven worden in mindere mate van strategisch gedrag verdacht—het motief wordt eerlijk gevonden—en daardoor worden ze ook in mindere mate van groenwassen beschuldigd. Het huidige onderzoek toont overigens aan dat bovenstaand proces vooral geldt voor mensen die van nature niet zeer sceptisch tegenover bedrijfscommunicatie staan. Mensen die wel van nature sceptisch zijn zullen waarschijnlijk altijd aan de oprechtheid van bedrijven twijfelen, ongeacht de gecommuniceerde boodschap.

Samenvattend toont dit proefschrift aan dat het communiceren over CCS valkuilen kent. Het opstapelen van informatie kan ertoe leiden dat de meest relevante boodschap niet overkomt (Hoofdstuk 2), het benadrukken van voordelen of nadelen wordt manipulatief gevonden, en zelfs als onacceptabel gezien als objectieve informatie wordt verwacht (Hoofdstuk 3), en in plaats dat mensen een industriële organisatie die communiceert in CCS te investeren vanwege het milieu milieuvriendelijk vinden, ziet men dit als een uiting van strategisch gedrag (Hoofdstuk 4). De identificatie van deze valkuilen heeft duidelijke implicaties voor organisaties met een belang in CCS. Echter, het heeft ook implicaties voor wetenschappers die de effecten van persuasieve communicatie onderzoeken en voor het algemene publiek dat geconfronteerd wordt met deze vorm van communicatie. Dit onderzoek geeft organisaties die betrokken zijn bij CCS het inzicht dat zij, als zij zowel effectief willen communiceren als positief beoordeeld willen worden op de lange termijn, in hun communicatie rekening moeten houden met de verwachtingen van het publiek en het beste een relevante, gebalanceerde en geloofwaardige boodschap kunnen delen. Onderzoekers kunnen van de huidige resultaten leren dat ze in toekomstig onderzoek niet alleen naar de effectiviteit van persuasieve communicatietechnieken kunnen kijken, maar ook naar hoe deze technieken ontvangen worden door het publiek. Tot

slot kan het algemene publiek wellicht tot een beter geïnformeerde mening komen over moeilijke onderwerpen—zoals CCS—als ze communicatie op een meer kritische manier benaderen. Dit proefschrift kan mensen vooral aanzetten om kritisch te kijken naar persuasieve technieken, hetgeen hen kan helpen om beïnvloeding te weerstaan (e.g., Benoit, 1998; Sagarin et al., 2002).

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Curriculum Vitae

Gerdien de Vries was born on the 17th of March 1975 in Uithoorn, the Netherlands. She completed her secondary education (VWO) in 1993 at the Alkwin Kollege in Uithoorn. The following decade, Gerdien has moved across the country to study and work at several institutes and organizations.

In September 2003, she started as a part-time student at Leiden University to study Psychology while working in Marketing Communications in the area of Den Haag. Gerdien obtained a Research Master degree in Social and Organizational Psychology (with honours) in 2009. Her dissertation reported the findings of a field study to the effects of perceived pseudo voice on employee voice behavior and work team conflict. In March 2010, Gerdien started a PhD project at Leiden University within CATO-2, the Dutch research program on CO_2 capture and storage technology. This project resulted in the present dissertation under the supervision of Naomi Ellemers and Bart Terwel.

Gerdien lives in Scheveningen—the beachside area of Den Haag—with her husband Frank Engel. Besides conducting research, she runs a sole-proprietorship business that produces voice-over and copywriting projects (Engel Voice & Studio). Gerdien likes to read books, run along the beach, and travel the world.

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