

# **WHEN DOES METAPHORICAL FRAMING REALLY WORK?**

METAPHORICAL FRAMING EFFECTS ON READING

COMPREHENSION AND PERSUASION

26 JULI 2015

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WHEN DOES METAPHORICAL FRAMING REALLY WORK?

Declaration of Originality

*I hereby declare that this thesis is an original piece of work, written by myself alone. Any information and ideas from other sources are acknowledged fully in the text and notes.*

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### **Abstract**

This thesis functions as a first step toward the incorporation of the Construction-Integration model for comprehension (Kintsch, 1988) and the Elaboration Likelihood Model for persuasion (Petty & Cacioppo, 1986) in the search for the conditions under which metaphorical framing effects occur. It is argued that previous studies toward metaphorical framing effects on comprehension and persuasion leave room for alternative explanations. An empirical investigation is reported with three text conditions (two metaphorical and one non-metaphorical) and argument quality, source credibility and the elaboration likelihood of participants as mediating variables. The data in this study provides limited support for the assumption that metaphorical framing affects comprehension and persuasion when the only source of effect can be ascribed to the metaphoricity. However, there are indications that specific metaphorical frames can influence the elaboration likelihood of certain participants. This research shows that both the comprehension and the persuasion model can be implemented in the field of metaphorical framing effects, which can in time lead to a more comprehensive view on the way metaphorical framing effects occur.

## 1. Introduction

In written language it very often happens that writers do not intend what they say to be taken literally (Ortony, Schallert, Reynolds & Antos, 1978). Already since Aristotle argued that “the greatest thing by far is to be a master of metaphor. It is the one thing that cannot be learnt from others; and it is also a sign of genius” (trans. 1952, p. 255), writers have regularly presumed that one who uses metaphors is judged in a more positive way than one who uses literal language (Sopory & Dillard, 2002). However, the reasons for the effects of metaphor usage are often assumed instead of proven.

When a writer wishes to project his own thoughts about a subject onto the reader, “the selection of metaphors should mirror the intentions of information providers” (Bielenia-Grajewska, 2015, p. 100). This does not mean that every writer uses metaphors to explain a certain concept. On the contrary: a writer might choose a metaphor for its persuasive functions, it could be a purely stylistic choice, or the writer might not even be aware of the metaphor usage (Krennmayr, 2011). But whatever the rationale of the writer is, there is the chance the metaphor choice has an effect on the reader.

According to Chong and Druckman (2007), a metaphorical frame can help interpret the core aspects of an issue. It can thus help readers understand an issue, and the judgmental shortcuts that people use in the framework can additionally help them form an opinion (Hartman, 2012). It has been examined in numerous ways how metaphors could influence an audience’s thinking, whereby the empirical studies that investigate the underlying conditions of metaphorical framing effects is “growing into a substantial body of literature” (Ottati & Renstrom, 2010, p. 784). These studies, however, come up with diverging results on the effects of metaphorical framing. One of these differences in results specifically is highlighted in Steen, Reijnders and Burgers (2014) who conducted a follow-up study on Thibodeau and Boroditsky (2013) and were not able to duplicate the results. Steen et al. (2014) conclude that with the diverging results in the research field it is no longer a question if

metaphorical framing effects influence the reader's thinking, but merely under which conditions metaphors do or do not influence or reasoning. To indeed get a clear picture of the personal characteristics and linguistic aspects that might play a role in influencing metaphorical framing effects, Ottati and Renstrom (2010) propose that the implication of mainstream social psychological models could provide insight in the way these theories can be incorporated into the field of cognitive psychology.

This study is as a first step toward the implication of cognitive processing models for comprehension and persuasion in determining the conditions that participate in the effects that different metaphorical frames might have on readers. In consonance with this discussion the following research question can be formulated:

*Under which conditions does metaphorical framing affect a reader's comprehension and persuasion?*

The next chapter sheds light on the relevant studies on metaphorical framing effects and the consequent hypotheses and implications for the current research. In the subsequent methodology chapter the way this study is conducted to test the hypotheses is defined. The results that can be analysed according to this design are tested per hypothesis in the chapter thereafter, leading to the discussion and limitations in the final part of this article.



## 2. Review of literature

In this chapter, the existing research field on the effects of metaphorical framing is outlined. The first part of this chapter discusses how metaphors can enhance reading comprehension and how the CI model (Kintsch, 1988) assists this study in the understanding of the process of comprehension. Two studies about the effects of metaphorical framing on comprehension are discussed in depth, emphasising the strengths and weaknesses that are relevant for this study. This analysis is linked to the CI model, which leads to the first hypothesis.

The second part of this chapter discusses how metaphors can change recipients' attitudes and how the ELM (Petty & Cacioppo, 1986) assists this study in the understanding of the process of persuasion. Strengths and weaknesses of three studies in the current research field are evaluated in particular, from which, in association with the ELM, hypotheses on persuasion are drawn.

### 2.1 Metaphorical Framing and Comprehension

Following a common trend, metaphor is defined by Sopory and Dillard (2002) as “an implied comparison between two dissimilar objects, such that the comparison results in aspects that normally apply to one object being transferred or carried over to the second object” (p. 382). In other words, metaphors help us to understand one thing in terms of another (Lakoff & Johnson, 1980). It lays in this definition that metaphor could enhance the comprehension of a concept by explaining it in different, more concrete and familiar terms. To define exactly how metaphors can influence comprehension, it is crucial to understand how this comprehension is obtained.

According to McNamara and Magliano (2009), who provide us with an overview of what comprehension models have offered us thus far, comprehension can be described as “the processing of information to extract meaning” (p. 298). The extraction of meaning automatically takes place within a context, and subsequently forms the basis of higher-level cognitive activities. We need comprehension

to process all information we encounter, no matter through what kind of medium the information is presented. Although we come across a wide range of mediums in everyday life, the most researched medium for this purpose is still written text wherein "the process of understanding the words, the sentences, and the relations between the sentences comprises comprehension" (McNamara & Magliano, 2009, p. 302).

**2.1.1 Comprehension models.** In their attempt to at some point reach a comprehensive model of comprehension, McNamara and Magliano (2009) take a look at the current comprehension models and their similarities and differences. They find that different existing models focus on different aspects of discourse comprehension, different kinds of discourse, different kinds of reading situations and different sources of individual differences. A study involving comprehension should therefore be accompanied by a detailed description of the model on which is relied and the elements taken into consideration. Only then different studies can be compared.

A conclusion the authors do draw from the existing models is that a prediction on reading comprehension can be made on the basis of the ease of processing of the text and the strategic level of the reader. In other words, reading comprehension will tend to be best when the ease of processing is high and the reader is strategic, and worst when the ease of processing is low and the reader is not strategic. In this study, the prior knowledge of participants is measured to define the readers' strategic level, and the c of the text takes account for the ease of processing.

**2.1.1.1 The Construction-Integration model.** The comprehension model McNamara and Magliano (2009) discuss substantially is the CI model that was introduced and modified by Kintsch (1988, 1998). The *construction* (C) part of this model refers to a reader's cognitive activation of the concepts and propositions expressed in the text and the activation of concepts and propositions in the knowledge base. In this phase, both relevant and irrelevant knowledge is included. The *integration* (I) part of this model in turn refers to the way this activated information is

settled cognitively, which means that relevant concepts and propositions are more strongly activated and irrelevant concepts and propositions are deactivated.

According to the CI model, a reader constructs the mental representation of a text on different levels. For this study, the *text base* and the *situation model* are the two levels of understanding that are relevant to discuss. Note that although the mental representation of the text base and situation model is one unitary structure, for research purposes it is convenient to study aspects of both levels of understanding separately (McNamara & Kintsch, 1996; McNamara, Kintsch, Songer & Kintsch, 1996).

The *text base* level of understanding is constructed purely on the basis of the propositions that are directly expressed in the text. The reader extracts the semantic information of the text and constructs the text base in consonance with the structure of the text. Individuals with a strong text base are able to summarise or recall the text, evaluate statements about the text and answer questions about what is read, however, they will not necessarily be capable of understanding the text at a deeper level.

The *situation model* links the propositions of the text to a reader's prior knowledge, whereby the structure of the text is adjusted to the reader's understanding of the domain as a whole. The mental representation is thus at a deeper level, and the cognitive structure that is created is not an isolated memory, but an integrated part of the reader's knowledge. For a good situation model, a reader needs the relevant prior knowledge to connect to the propositions of the text.

A good text base suffices when the only purpose of reading a text is to reproduce it (McNamara et al., 1996), but a good situation model is needed to learn from a text. After all, it is on this level of understanding where new information is linked to existing long-term knowledge. This is where a dilemma arises for text writers, because different types of people can benefit from different types of texts. Readers with little prior knowledge need a coherent text in order to create a coherent text base, because they are unable to make inferences themselves. Readers

with high prior knowledge, on the other hand, can benefit from the inferences they need to make when reading an incoherent text. By filling in the information gaps with their own relevant knowledge, these individuals will be able to create a strong situation model.

Earlier studies have provided insight into this differentiation between low- and high-knowledgeable receivers. Whereas Britton and Gülgöz (1991) saw that coherent texts indeed facilitate a better text base understanding and a better situation model, McNamara and Kintsch (1996) and McNamara et al. (1996) claim that only low-knowledgeable participants benefit from this coherence. Their studies show that high-knowledgeable receivers do not need the coherence to create a strong text base, and the coherence is counterproductive for these individuals in creating a situation model. These results do not only imply that a text that is perfect for every reader seems unrealisable, but also that when studies are conducted toward reading comprehension, both the prior knowledge of the participants and the coherence of the text ought to be taken into account. That is why in this study the prior knowledge of participants is measured, and the coherence of the text is manipulated across different conditions.

**2.1.2 Coherence through metaphorical framing.** There are numerous mechanisms that can increase the coherence of a text, such as argument overlap (e.g. Ozuru, Dempsey & McNamara, 2009) and the inclusion of explicit lexical connections (e.g. Ferstl & Von Cramon, 2001). Additionally, metaphors can also operate as such an element of coherence. If statements are organised within a metaphorical framework, this framework can function as the tool that keeps everything together. This premise has been confirmed by a meta-analysis of studies on metaphorical framing effects by Sopory and Dillard (2002). Based on Read et al. (1990), these authors state that over all, metaphorical texts organise the arguments of a message more effectively than texts with literal language do. In other words, the possible organising nature of a metaphorical frame can enhance the coherence of a text. As Gentner (1982) advocates, this organising nature might be a result of the way metaphors highlight the semantic connections and relations between different

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concepts. Within a metaphorical frame arguments can be semantically related and integrated, creating a more coherent message than a non-metaphorical frame would deliver (Albritton, McKoon & Gerrig, 1995). On the grounds of these theories it can be postulated that metaphorical frames can positively affect the coherence of a text, and according to the CI model it is this coherence on which laypersons rely when they create a text base understanding of a text.

Many studies (see McNamara & Magliano (2009) for examples) have successfully employed the CI model to examine reading comprehension. However, research into the effect of metaphorical frames on comprehension is still in its infancy. Studies so far have often investigated either how the structure of a text influences the comprehension of a message (Birkmire, 1985; Degand, Lefevre & Bestgen, 1999; Kamalski, Sanders & Lentz, 2008; McNamara & Kintsch, 1996) or how metaphors in texts are understood in general (Bowdle & Gentner, 2005; Coulson & Van Petten, 2007; Gibbs, 2002; Kintsch, 2000).

But although the amount of studies on metaphorical framing effects on comprehension is limited, insightful data in the current research field is certainly available. One way through which researchers have addressed this issue is by framing texts metaphorically within so-called Simplifying Models (SM's; Aubrun, Brown & Grady, 2006). A SM provides receivers with a brief explanation on a complex and abstract topic (as, in this case, the current food production system), which helps receivers in thinking about and understanding a topic in a way that is compatible with expert understandings. The authors pose that different SM's with different overarching metaphorical frames have different outcomes on the comprehension of receivers. This means that certain frames can be more effective in enabling participants to talk and reason about the topic as an expert.

To investigate this premise, a TalkBack procedure with more than 650 laypersons (phone interviews, street intercepts and written questionnaires) was conducted. The authors found that at the level of language and metaphor, speaking of food systems through a runaway-foundations model “has the capacity to

shift public reasoning and discourse in productive directions” (Aubrun et al., 2006, p. 5). They predict that the runaway part of the model effectively conveys the idea that the food system is dangerously out of control, cognitively supported by the schematic metaphorical image of “a massive and powerful object moving fast on an uncontrolled trajectory” (p. 3). The foundations part of the model in turn suggests that a larger structure is being harmed (instead of just a small part), which makes any damage very important for everyone. Another reason why the dual frame works, according to the authors, is because receivers do not consider the terms too obviously metaphorical. Hence, the frames are accepted as natural language.

Besides the main effects of this dual frame, the authors also found that other aspects of the texts contributed to the effectiveness of a frame. A SM was more effective when specific cases of examples and statements were added, specifically:

- Farming chemicals like pesticides and weed-killer are permanently altering our soil and water
- Genetic engineering is changing the nature of the plants and animals we eat
- Mile-long fishing nets are dragging the ocean floor and altering ecosystems

Albeit the study as reported and additional studies toward cross-cultural SM’s (e.g. Aubrun & Grady, 2006) provide useful insights on how laypersons can be enabled to reason about complex and abstract topics, on certain levels this type of research remains insufficient. The most important problem herein is that the texts are manipulated in a way that makes it difficult to explain what exactly causes the found effects. The texts with different frames carry out different samples of information and different examples altogether. Except for the subject and the overall structure, the texts are barely comparable. It is therefore not necessarily a metaphorical frame or even a SM that causes the effects, but a complete and specific text. This means that (environmental) writers and speakers are still uncertain on what the effects of (metaphorical) framing are on the comprehension and reasoning of their receivers.

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The inconsistency between texts is not the only issue at fault here. Another major drawback of this approach is that the qualitative data that follow from the TalkBack procedure cannot be measured. Conclusions and recommendations are consequently solely based on the interpretations of the researchers, leaving a demand for a more reliable way of data collection. It is the latter point that motivated Jaspert, Van de Velde, Brône, Feyaerts and Geeraerts (2011) to conduct a follow-up study using quantitative data.

In their ambitious research, Jaspert et al. (2011) examine the effects of framed news texts by comparing a text without a metaphorical frame to three experimental texts with a metaphorical frame. The metaphorically framed texts are presented with a SM whereby the authors hold on to the runaway frame as defined by Aubrun et al. for the first text, the foundation frame for the second text and an additional disease frame for the third text. One of the strengths of this study is that the prior knowledge of participants is covered. As the authors justly point out, without such a score, “it cannot be reliably concluded that a successful response to the TalkBack test can be attributed to the treatment with a SM” (p. 466).

Unfortunately, on other levels this study fails to systematically approach the effects of metaphorical framing. One of the shortcomings is that although Jaspert et al. (2011) claim that their four texts have the same overall structure, this structure is in fact not strictly followed in every text. For instance, whereas the non-metaphorical text only has two statements, the manipulated texts get a third statement “which includes explicit reference to the SM” (p. 268). Within this extra statement the need to take action is made explicit, whereas this proposition remains implicit for the control condition. Furthermore, although Jaspert et al. (2011) state that each SM is invoked twice throughout the text, it appears to be the case that some SM’s are invoked more often. The runaway frame for instance concludes with the explicit metaphorical statement whereas the other conditions miss this explicit inference. Why the authors made the decision to differentiate between the texts this way is left unclear.

A second shortcoming of the method that was employed by Jaspaert et al. (2011) lays in the intuitive choice of the metaphorical and non-metaphorical units. This means that metaphors are assumed and not proven to fit within a specific frame. For instance the verb ‘repair’ is metaphorically used within the foundations frame, but could just as well fit in the runaway train frame. Additionally, the phrasal verb ‘going downhill’ is not necessarily indicative of a runaway train, but is used as such within that frame nonetheless. At last, the phrase ‘not doing well’ as used in the non-metaphorical condition can actually be metaphorical. These complications ask for a more reliable method of assigning metaphors to a frame. In §3.1.2 it is explained how the Metaphor Identification Procedure VU (MIPVU) as defined by Steen, Dorst, Hermann, Kaal, Krennmayr and Pasma (2010) is used in this study to take a more systematic approach in designing the different framing conditions.

The analyses of the studies by Aubrun et al. (2006) and Jaspaert et al. (2011) show that research toward the effects of metaphorical framing on reading comprehension still leaves room for improvement. These studies suggest that (particular) metaphorical frames, in particular in the form of SM’s, have a positive influence of a receiver’s understanding of the discussed topic, however, both studies would have been much more convincing if a systematic approach had been adopted. A well-executed framework controlling all variables is needed to provide exclusion on the specific metaphorical framing effects. Based on the above discussion of the CI model, the way metaphorical frames can increase the coherence of a text and the results in Aubrun et al. (2006) and Jaspaert et al. (2011), the following hypothesis is formulated:

**HYPOTHESIS 1:**

*Compared to a non-metaphorical frame, a metaphorical frame will increase the text base comprehension of a text. This effect will be bigger for participants with low prior knowledge on the topic of the text.*



## 2.2 Metaphorical Framing and Persuasion

Although the discussed studies toward comprehension do take higher-level cognitive activities into account (e.g. by asking participants for solutions for the problem), the possible connection between comprehension and persuasion is herein not made explicit. Further research could provide insight in how the effects of metaphorical framing are grounded in comprehension and subsequently evolve in following levels of reasoning. As proposed in the introduction, these metaphorical framing effects on persuasion are a subject numerous researchers have undertaken (e.g. Hartman, 2012; Nay & Brunson, 2013; Schlesinger & Lau, 2000). The meta-analysis by Sopory and Dillard (2002) shows that it is regularly concluded that the persuasive functions of metaphors do exist. But as Hartman (2012) points out, a major limitation of these studies is that scholars often do not distinguish the metaphoricity from the frame. In those cases it is not clear whether it is the metaphoricity that shapes a reader's persuasion, or if this is an effect of the framing in general. In the current research this problem is overcome by comparing two metaphorically framed texts to a control text that is equal to the metaphorical texts on all aspects except the metaphoricity.

The need to define the conditions under which metaphorical framing effects take place becomes clear when we look at the follow-up studies by Steen et al. (2014) and subsequently Reijnierse, Burgers, Krennmayr and Steen (in press) on Thibodeau and Boroditsky (2013). The latter authors drew up a study that compared the way people reasoned after reading a text that was either metaphorically framed within *CRIME IS A VIRUS* or within *CRIME IS A BEAST*. They found that participants who read about crime in terms of a virus favoured reforming solutions to solve the problem, whereas participants who read about crime in terms of a beast favoured solutions in enforcement. These findings are in line with i.a. Nay and Brunson (2013) and Robins and Mayer (2000), who found that metaphor is able to shape the direction of reasoning of participants.

However, a follow-up study by Steen et al. (2014) did not yield the same results. These authors show that one explanation for these difference

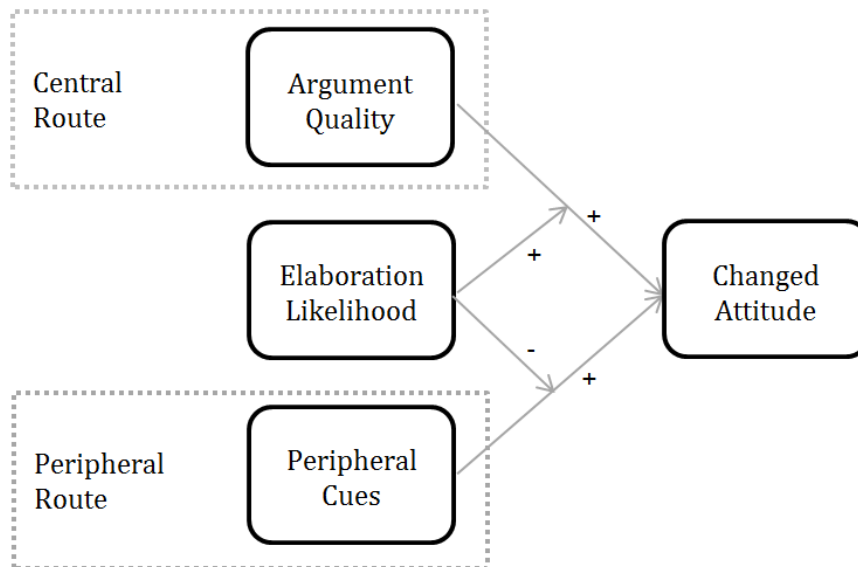
outcomes is because the way Thibodeau and Boroditsky (2013) conducted their experiment is not flawless. The metaphoricity in the material was for instance not completely controlled for, and the effects of the two metaphorical texts are not compared to the effects of a similar non-metaphorical text. What Steen et al. (2014) found when taking account for these lacks is that participants always favoured solutions in enforcement, regardless of how the text was framed (whether it was framed within CRIME IS A BEAST, within CRIME IS A VIRUS, or non-metaphorically). Taking these results a step further, Reijnierse et al. (in press) investigated if it is the extendedness of the metaphor that influences the effects on attitude. This follow-up study shows limited support for the prediction that extended metaphors are associated with a higher perceived effectiveness of measures that fit within the specific frame. The diverging results of these three studies as discussed emphasise the need to identify the context in which metaphorical framing effects take place. This can be established if new literature incorporates “the implications of mainstream social psychological models of persuasion” (Ottati & Renstrom, 2010, p. 784). One of the models Ottati and Renstrom recommended is the Elaboration Likelihood Model (ELM; Petty & Cacioppo, 1986).

### **2.2.1 The Elaboration Likelihood Model**

The ELM (Petty and Cacioppo, 1986) describes how attitudes of individuals are formed and changed through communication on the basis of different variables. It holds that “persuasion can occur when thinking is high or low, but the processes and consequences of persuasion are different in each situation” (Petty, Priester & Brinol, 2002, p. 165). The model outlines two routes of persuasion: the central route and the peripheral route. Which route users take is determined by their elaboration likelihood, which is captured by the user’s motivation and ability to evaluate the information. However, both routes can lead to the same outcome. Two different people may arrive at the same conclusion “even if such decision resulted from two entirely different influence routes” (Bhattacharjee & Sanford, 2006, p. 808).

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The central route is based on the thoroughly grounded examination of the central arguments of the issue. This route will occur when the receiver has both the motivation and the ability to process a message and requires relatively more effort of the recipient than the other route. According to the ELM, a person who takes the central route is likely to rely on argument quality in forming their attitude. The peripheral route is based on associations or inferences a person ties to the issue, and occurs when the receiver lacks the motivation or ability to actively process a message. A person following the peripheral route is likely to rely on peripheral cues, such as source credibility, to form their attitude. The way the ELM functions is displayed in figure 1.



**Figure 1:** *The Elaboration Likelihood Model as captured by Bhattacharjee and Sanford (2006)*

In this study, attitude change is extended with two collaborating variables. According to Sussman and Siegel (2003), perceived usefulness functions within the ELM as a function and a predictor of attitude change. This level of persuasion is therefore placed before attitude change in the influence process, and it is predicted that a higher perceived usefulness of the text would be an indicator of a bigger attitude change in the direction of the message. Additionally, following Thibodeau and Boroditsky (2013) and the follow-up studies by Steen et al. (2014) and Reijniere et al. (in press), the effectiveness of policy measures is included in the

model as a cognitive activity that evolves from attitude change. In contrast to the three earlier studies, the different measures are not categorised but analysed separately. It is predicted that a higher attitude in the direction of the message is associated with more effective policy measures over all. How the individual measures differ in effectiveness for the three different text conditions is an additional aspect to be investigated.

Ottati and Renstrom (2010) defined how persuasion is potentially influenced by these psychological process mechanisms, and state that the research field can be split in three groups accordingly. In line with these three groups of studies, the current research investigates three sets of hypotheses. The first category Ottati and Renstrom (2010) distinguish covers the studies that have focused on the direct influence of metaphor on attitude. But, as the authors justly note, this type of research is not very substantial. As evolves from their overview of the existing literature, it is likely that for all metaphorical framing effects other variables are participating in the effect. A first step toward the implementation of the ELM on metaphorical framing effects is therefore based on an earlier research by Ottati, Rhoads & Graesser (1999), wherein the influence of the elaboration likelihood of participants is discussed. It is predicted that the metaphorical language itself functions as a peripheral cue on which individuals with low elaboration likelihood can rely in evaluating the message. The metaphorical language in this case functions as a vehicle on which laypersons base their attitude. This theory leads to the following hypotheses in this study:

**HYPOTHESIS 2:**

*Compared to a non-metaphorical frame, a metaphorical frame is associated with a higher perceived usefulness of a message. This effect is predicted to be bigger for participants with low elaboration likelihood.*

**HYPOTHESIS 3:**

*Compared to a non-metaphorical frame, a metaphorical frame is associated with a*

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*bigger attitude change of participants in the direction of the message. This effect is predicted to be bigger for participants with low elaboration likelihood.*

### **HYPOTHESIS 4:**

*Compared to a non-metaphorical frame, a metaphorical frame is associated with a higher perceived effectiveness of policy measures. This effect is predicted to be bigger for participants with low elaboration likelihood.*

The second common field of study Ottati and Renstrom (2010) distinguish poses that “metaphorical language may influence impressions of the communication source and thereby impact attitudes toward the communication topic” (p. 783). Referring back to Aristotle (trans. 1952), metaphor has commonly been suggested to be associated with a sign of brilliance, which thus leads to a more intelligent appearance of the source of the message (Sopory & Dillard, 2002). Subsequently, researchers have advocated that metaphors can influence the persuasion of receivers by positively influencing the credibility of the source of a message (e.g. McGuire, 2000). Based on the ELM, this evaluation of the source is more likely to be taken into account by participants with low elaboration likelihood. These participants seek for peripheral cues to rely on in the influence process instead of thoroughly reading the content of the message. Based on the analysis by Ottati and Renstrom (2010) and the predictions of the ELM, the following hypotheses can be formulated:

### **HYPOTHESIS 2A:**

*Metaphorical framing will increase the source credibility of a text in a way that positively affects the perceived usefulness of the message. This effect is predicted to be bigger for participants with low elaboration likelihood.*

### **HYPOTHESIS 3A:**

*Metaphorical framing will increase the source credibility of a text in a way that will affect the attitude change of participants in the direction of the text. This effect is predicted to be bigger for participants with low elaboration likelihood.*

**HYPOTHESIS 4A:**

*Metaphorical framing will increase the source credibility of a text in a way that positively affects the perceived effectiveness of measures. This effect is predicted to be bigger for participants with low elaboration likelihood.*

The third common field of study Ottati and Renstrom (2010) distinguish states that “metaphors may affect attitudes toward the communication topic by influencing the direction or amount of elaboration that takes place when recipients process [...] the communication” (p. 783). This premise is on the one hand supported by the way metaphorical frames can increase the text base comprehension of a message (hypothesis 1). The influence of a metaphorical frame on the coherence of the text can thus increase an individual’s ability to process a message. This elicits that participants with low prior expertise can be enabled to take the central route in the influence process, which subsequently means that they are able to process the content of the message thoughtfully.

An earlier study by Ratneshwar and Chaiken (1991) confirms this predicted effect between comprehension and attitude change. Although this study does not explicitly implement the ELM, the methodology of this study can be partially translated as such. The authors found that when participants received an incomprehensible message, they relied on source credibility to form their attitude. When participants received a comprehensible message, they did not rely on source credibility as such. It could be speculated that the comprehensible message enabled participants to take the central route of persuasion, which would be why they did not rely on source credibility to form their attitude. The interpretation of these results suggests that it is not that higher levels of comprehension necessarily correspond with higher levels of attitude change in the direction of the message, but merely that the levels of comprehension determine the way in which attitude change is established. This premise is supported by Kok and Siero (1985), who found that attitude change can occur without full comprehension of a message.

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Next to the ability to decrease the complexity of a text, metaphors also have the ability to increase the vividness of a text (Ortony, 1975; Ortony et al., 1987). This characteristic of metaphors leads to implications for this research as Smith and Shaffer (2000) find that “vivid presentations attract attention and increase motivation to process a message” (p. 770), but only for participants with low motivation originally. Motivated people were minimally affected by the vividness of the same message, a result that is in line with earlier research by Frey and Eagly (1993).

Based on the previous discussion, it can be predicted that both the ability and the motivation of participants (i.e. both aspects of participants’ elaboration likelihood) are affected by a metaphorical frame. This means that participants with low elaboration likelihood in the metaphorical conditions are predicted to follow the central route of persuasion, whereas participants with low elaboration likelihood in the control conditions are predicted to follow the peripheral route of persuasion. The metaphorical frames will not affect the way the persuasion of participants with high elaboration likelihood is established. These predictions are captured in the following hypotheses:

### **HYPOTHESIS 2B:**

*Metaphorical framing will increase the elaboration likelihood of participants that originally have low elaboration likelihood. This way, participants in the metaphorical framing conditions will all rely on argument quality to judge the perceived usefulness of a message, whereas in the non-metaphorical condition only participants with high elaboration likelihood will.*

### **HYPOTHESIS 3B:**

*Metaphorical framing will increase the elaboration likelihood of participants that originally have low elaboration likelihood. This way, participants in the metaphorical framing conditions will all rely on argument quality to form their post-manipulation attitude, whereas in the non-metaphorical condition only participants with high elaboration likelihood will.*

**HYPOTHESIS 4B:**

*Metaphorical framing will increase the elaboration likelihood of participants that originally have low elaboration likelihood. This way, participants in the metaphorical framing conditions will all rely on argument quality to rate the effectiveness of measures, whereas in the non-metaphorical condition only participants with high elaboration likelihood will.*

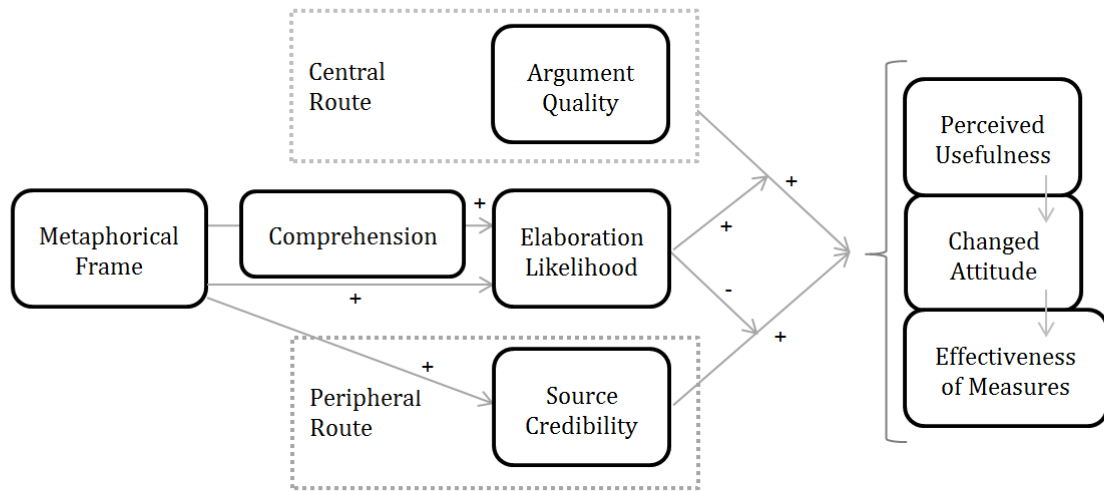
**2.3 Answering the Research Question**

The diverging findings in studies toward metaphorical framing effects on persuasion, and the lack of reliable findings in studies on the metaphorical framing effects on comprehension, raise the question how these effects are actually shaped throughout the cognitive process of readers. With the present study the methodological shortcomings of previous research are overcome and the research question is specifically aimed at the conditions under which metaphorical framing effects occur. This study therefore monitors effects on both comprehension and persuasion with a consequent and reliable framework, hence making it possible to put these effects in relation to each other. By examining the hypotheses as presented throughout this chapter, this study will be able to answer the research question as posed in the introduction. The research model that supports these hypotheses, as based on the ELM in figure 1, is presented in figure 2.

This article reports an empirical investigation based on one of the text models as carried out by Aubrun et al. (2006): the runaway-foundations model. This text is chosen because these authors consider this model most effective in improving the comprehension of participants on the subject, and the text includes the specific examples that the study found to strengthen the effects of the SM (see §2.1.2.). Based on the runaway-foundations model two texts with an overarching metaphorical frame are created (either the runaway train frame or the foundations frame) as well as an additional text with literal language.



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**Figure 2:** *The research model of this study based on the Elaboration Likelihood Model*

Because the texts by Aubrun et al. (2006) are adapted to this study, the results of the previous study, the follow-up study by Jaspert et al. (2011) and the current study can be compared. The goal of this study is to show if it is the metaphorical frame that underlies the results found in previous studies, or if it is the way the text is shaped in general that causes the effects. Subsequently, this study will shed light on the contrast in results by Thibodeau and Boroditsky (2013) on the one hand, and Steen et al. (2014) and Reijnierse et al. (in press) on the other. These results taken together provide insight in the way specific metaphorical frames influence specific types of people under specific conditions (Steen et al., 2014). The methodology that was employed to test the hypotheses set up in this chapter, is discussed in the next chapter.

### 3. Methodology

This research investigates metaphorical framing effects on comprehension and on persuasion with a framework wherein little room is left for additional textual characteristics to function as the source of the effects. Furthermore, the predictions of the CI model (Kintsch, 1988) and the ELM (Petty & Cacioppo, 1986) are tested to account for mediating variables. This chapter describes the way the metaphorical frames were conducted and how the metaphorical framing effects were measured. Because participants were required to have the US nationality (see §3.2), both the texts and the questionnaire were conducted in American English.

#### 3.1 Text design

The experiment was conducted with metaphorical frame as a between-subjects factor, whereby a non-metaphorical frame was included as a control condition. This resulted in three conditions: two different texts with a metaphorical frame and one text with a non-metaphorical frame.

**3.1.1 Experimental texts.** The three texts in this study are designed in close relation to the text that Aubrun et al. (2006) considered most effective in improving the comprehension of laypersons, i.e. the text with the runaway-foundations model. This means that the overall structure of our texts is comparable to said text, as well as the provided information and examples. The texts begin with a general statement including the fear of ‘experts’. As in Aubrun et al. (2006) the vague term ‘experts’ was chosen over e.g. ‘environmental experts’ (as in Jaspert et al. (2011)) because of the possible connotations people might have with environmentalists or other authorities. The introduction is followed by three sentences with an example of what is going wrong in the agricultural food production system (farming chemicals, genetic engineering and fishing with large dragging nets). Finally, the last sentence reinforces the need for measures.

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The biggest difference between the three texts in the current study and the text in the previous study is that the most recent texts each carry one frame instead of an overarching dual frame (runaway + foundations). These texts either promoted a *runaway train* frame (FR1), a *collapsing house* frame (FR2) or a non-metaphorical *increasing problem* frame (FR3). FR1 is based on the runaway part of the model as employed by the previous authors and FR2 on the foundations part.

A second difference between this study's texts and the runaway-foundations text lays in the way the frame is conducted. Aubrun et al. (2006) do this by introducing a new, unconventional term in the first sentence: the Runaway Food System. Because this term refers to the SM and not to the metaphorical frame in general, this term is excluded in the present study. Instead, the metaphorical frame is introduced as an 'A = B'-construction, namely "our current food system is a runaway train" (FR1), "our current food system is a collapsing house" (FR2) or "our current food system is a increasing problem" (FR3). To redesign the first sentence but still have it to carry the same message, it was split up in two separate sentences whereby the first sentence became an introductory sentence that was the same for all three conditions, and the second sentence held the initiation to the frame. The last sentence, originally emphasising the dual frame again, had to be redesigned to fit the single frame as well. The overall meaning of the sentence, the need to take action, was maintained which enabled the opportunity to conclude with a sentence that strongly contributed to the metaphorical frame, namely "The United States needs to *control* the situation before everything *crashes*" (FR1) and "The United States needs to *rebuild* the situation before everything *comes down*" (FR2). Additionally, contrary to Aubrun et al. (2006) who only mention the frame in the first and last sentence of the text, in our study each frame is extended throughout the sentences. This means that every sentence except for the introductory sentence carries at least one metaphor that adds to the frame.

Like the overall structure of the texts the grammatical structure of each sentence is also controlled for across the three conditions. In other words, the manipulated word had to fall within the same word class as its counterparts

in the other texts. Hence each text carried an equal amount of nouns, transitive verbs and intransitive verbs, and these words were positioned comparably. This resulted in the identical sentences 2, 4, 5 and 7 (except for the metaphorical manipulation), and the almost identical sentences 3 and 6. These sentences are not identical because this would result in unnatural language, as is elaborated on in the next section.

**3.1.2 Dictionary use.** Every extended metaphorical expression that is used solely fits within the (metaphorical) frame of that text. The dictionary use as described by MIPVU (Steen et al, 2010) can provide evidence for ascribing words to a certain metaphorical frame. This metaphor identification method uses a dictionary to determine the metaphoricity of lexical units in context. If the contextual meaning as presented in the dictionary is less concrete, body-related and/or precise than the most basic meaning in the dictionary, a unit is considered metaphorical.

In this study, the Macmillan Dictionary (Rundell, 2002) is used to make sure that a) the lexical units in the metaphorical frames are metaphorical (according to MIPVU), and b) these metaphorical units fit within the metaphorical frame of the particular text. The latter is the case when the dictionary carries a basic definition that is related to one frame but no definition that is related to the other frame.

This means that for FR1, one of the basic definitions of a metaphorical unit had to be related to *train* or *vehicle* but no definition could be related to *building*. Additionally, one of the definitions did have to carry the appropriate contextual (metaphorical) meaning. To illustrate, one definition of the verb ‘control’ (‘the power to make something such as a *vehicle* [...] do what you want’; Macmillan sense description 2 or MM2) proves it is related to a runaway train, no other definitions of Macmillan can be associated with FR2, and the definition in MM3 (‘the ability to stop something from increasing or becoming dangerous’) proves that the contextual meaning is metaphorical. In contrast, the verb ‘wreck’ (‘to severely damage or destroy a *vehicle* or *building*’; MM1) could not be used in FR1 because it is also

## WHEN DOES METAPHORICAL FRAMING REALLY WORK?

related to FR2. For FR2, the basic definitions of used terms had to be related to a or the act of *building*, which is why the verb ‘demolish’ (‘to deliberately destroy a *building*’; MM1) could be used. The noun ‘framework’ could not be used, because the definition (‘a structure that supports something and makes it a particular shape’, MM2) has no direct link to *building*. At last, the definitions of the terms in the non-metaphorical frame were not allowed to relate to any kind of general metaphorical frame, which is why the noun ‘concept’ (‘an idea of something that exists’; MM1) with only one definition in the dictionary could be used within this condition. Eventually, FR1 was accompanied by terms such as *derailed* and *track*, FR2 by terms such as *rebuild* and *foundation*, and FR3 by terms such as *separated* and *destruction*.

All constructed collocations were checked for conventionality in news articles because “the distinction between novel and conventional metaphor might interact with the emergence of a metaphorical framing effect” (Reijnierse et al., in press, p. 7, based on e.a. Sopory and Dillard (2002)). For a collocation to be accepted it had to have a reasonable amount of hits on Google (10.000+). At last, five native English speakers with an affinity with language (either because they are a professor in a relevant field at university or work as a journalist) commented on the three texts to account for any unnatural wordings. This eventually resulted in the texts as presented in table 1.

**Table 1**

*Texts per frame as used in this study compared to the runaway-foundations text as used by Aubrun et al. (2006). The manipulated units are expressed in bold, whereby the word class of that unit is presented in superscript*

	<u>Frame 1</u>	<u>Frame 2</u>	<u>Frame 3</u>	<u>Runaway-foundations</u>
1	Experts are increasingly concerned about our agricultural methods.	Experts are increasingly concerned about our agricultural methods.	Experts are increasingly concerned about our agricultural methods.	<i>Experts are increasingly concerned about what they call our Runaway Food System.</i>
2	They think our current food system is a <b>runaway</b> <sup>adjective</sup> <b>train</b> <sup>noun</sup> .	They think our current food system is a <b>collapsing</b> <sup>adjective</sup> <b>house</b> <sup>noun</sup> .	They think our current food system is an <b>increasing</b> <sup>adjective</sup> <b>problem</b> <sup>noun</sup> .	
3	The way we produce food today has radically changed, and is now <b>derailed</b> <sup>trans verb</sup> from the <b>track</b> <sup>noun</sup> of life as we know it.	The way we produce food today has radically changed, and is now <b>reconstructed</b> <sup>trans verb</sup> on the <b>foundation</b> <sup>noun</sup> of life as we know it.	The way we produce food today has radically changed, and is now <b>separated</b> <sup>trans verb</sup> from the <b>concept</b> <sup>noun</sup> of life as we know it.	<i>The way we produce food today has radically changed, and now has the power to alter the foundations of life as we know it almost by accident.</i>
4	Farming chemicals, such as pesticides and weed-killer, are continually in a <b>collision</b> <sup>noun</sup> with our soil and water.	Farming chemicals, such as pesticides and weed-killer, are continually bringing about the <b>decay</b> <sup>noun</sup> of our soil and water.	Farming chemicals, such as pesticides and weed-killer, are continually causing the <b>destruction</b> <sup>noun</sup> of our soil and water.	<i>Farming chemicals like pesticides and weed-killer are permanently altering our soil and water.</i>
5	Genetic engineering is <b>hitting</b> <sup>trans verb</sup> the nature of the plants and animals we eat.	Genetic engineering is <b>demolishing</b> <sup>trans verb</sup> the nature of the plants and animals we eat.	Genetic engineering is <b>transforming</b> <sup>trans verb</sup> the nature of the plants and animals we eat.	<i>Genetic engineering is changing the nature of the plants and animals we eat.</i>
6	And mile-long fishing nets are dragging the ocean floor, influencing the <b>course</b> <sup>noun</sup> of ecosystems.	And mile-long fishing nets are dragging the ocean floor, influencing the <b>restoration</b> <sup>noun</sup> of ecosystems.	And mile-long fishing nets are dragging the ocean floor, influencing the <b>evolution</b> <sup>noun</sup> of ecosystems.	<i>And mile-long fishing nets are dragging the ocean floor and altering ecosystems.</i>
7	The United States needs to <b>control</b> <sup>trans verb</sup> the situation before everything <b>crashes</b> <sup>intrans verb</sup> .	The United States needs to <b>rebuild</b> <sup>trans verb</sup> the situation before everything <b>comes down</b> <sup>intrans verb</sup> .	The United States needs to <b>improve</b> <sup>trans verb</sup> the situation before everything <b>deteriorates</b> <sup>intrans verb</sup> .	<i>America needs to retake control of this Runaway Food System before it does more damage to the Foundations we depend on.</i>

### 3.2 Participants

The aim was to have 150 participants completing the survey with 50 participants per condition. Sampling criteria were specified before collecting data: participants had to have the US nationality and English as their first language, had to be 18 years or older, could not spend less than 5 seconds or more than 180 seconds on reading the text and had to be able to name at least one correct keyword after reading the text. Relying on experiences in previous research (Reijnierse et al., in press) a dropout rate of 10% was predicted. Therefore 165 participants completed the survey. After applying the exclusion criteria this resulted in valid data of 154 participants:  $N = 52$  in condition 1,  $N = 52$  in condition 2 and  $N = 50$  in condition 3. Three participants were excluded because they spent too little time on the page with the text, two participants were excluded because they spent too much time on the page with the text and six participants were excluded because they did not have the US nationality and/or English as their first language. The demographic characteristics of the valid participants are found in table 2.

A Chi-square test for independence revealed no significant association between frame and age ( $\chi^2(6, n = 154) = 8.46, p = .21$ ; Cramer's  $V = .17$ ), nor frame and gender ( $\chi^2(2, n = 154) = 2.03, p = .36$ ; Cramer's  $V = .12$ ), nor frame and education ( $\chi^2(4, n = 154) = 2.43, p = .66$ ; Cramer's  $V = .09$ ) nor frame and political affiliation ( $\chi^2(4, n = 154) = 3.85, p = .42$ ; Cramer's  $V = .12$ ). This means that participants were equally distributed across the three conditions regarding all demographic characteristics, and these characteristics thus did not influence our findings.

**Table 2**

*Demographic characteristics of the participants*

	<u>Frame 1</u>	<u>Frame 2</u>	<u>Frame 3</u>
<i>Age in years - M (SD)</i>	37.87 (14.09)	36.46 (11.32)	36.56 (11.62)
<i>Gender - percent (n)</i>			
Women	53.8% (28)	40.4% (21)	44.0% (22)
Men	46.2% (24)	59.6% (31)	56.0% (28)
<i>Education - percent (n)</i>			
Middle school/junior high	0% (0)	0% (0)	0% (0)
(Senior) high school	25.0% (13)	21.2% (11)	24.0% (12)
Undergraduate study	63.5% (33)	63.5% (33)	54.0% (27)
Graduate study	11.5% (6)	15.4% (8)	22.0% (11)
<i>Political affiliation - percent (n)</i>			
Republican	21.2% (11)	11.5% (6)	18.0% (9)
Democrat	32.7% (17)	38.5% (20)	46.0% (23)
Independent	46.2% (24)	50.0% (26)	36.0% (18)
<i>Position of independent participants- percent (n)</i>			
Conservative	11.5% (6)	13.5% (7)	4.0% (2)
Liberal	19.2% (10)	28.8% (15)	14.0% (7)
In between	15.4% (8)	7.7% (4)	18.0% (9)
<i>Total number of participants in frame (n)</i>	52	52	50

### **3.3 Instrumentation**

**3.3.1 Independent variables and independent covariates.** The only independent variable in this study that is analysed as such is the frame as discussed in §3.1 that functions as the manipulated between-subjects factor. However, because prior knowledge and prior attitude were measured before participants were introduced to the framed text, these are considered as additional independent covariates.

**3.3.1.1 Prior knowledge.** A great factor that can both influence comprehension and persuasion is prior knowledge. According to the CI model for comprehension (Kintsch, 1988), prior knowledge can affect the way different levels of



understanding are cognitively created, and the ELM (Petty & Cacioppo, 1986) predicts that prior knowledge increases a person's ability to process the information in a text. This variable was measured according to the approach of the Organisation for Economic Co-operation and Development (OECD; 2007). Before reading the text, participants rated how familiar they were with four different concepts (integrated farming, fertiliser, GMO and bottom trawl). Following McNamara and Kintsch (1996), the terms in the prior knowledge questionnaire were related to the subject of the text, but were not mentioned in the text itself. The four questions took the format of example 1.

### Example 1

---

How familiar are you with the term 'GMO'?

- I have never heard of this
  - I have heard of this but I would not be able to explain what it is really about
  - I know something about this and could explain the general issue
  - I am familiar with this and I would be able to explain this well
- 

**3.3.1.2 Pre attitude.** To account for the attitude change of participants, it is crucial to measure the prior attitude. It has become commonplace to assess attitude as “a summary evaluation of a psychological object captured in such attribute dimensions as good-bad, harmful-beneficial, pleasant-unpleasant and likeable-dislikeable” (Ajzen, 2001, p. 28), which is why Petty and Cacioppo (1989) use a scale ranging from unfavourable to favourable when measuring attitude. In this study, attribute dimensions as described by Ajzen (2001) are used in like manner. On a 7-point semantic differential scale participants rated their opinion on four statements closely related to the text: using farming chemicals (from bad to good), using genetic engineering to alter food (from harmful to beneficial), using mile-long fishing nets (from foolish to wise) and the overall way our agricultural system is functioning (from unpleasant to pleasant). Example 2 shows how these questions were presented to participants.

### Example 2

---

Using genetic engineering to alter food is:

harmful      ○      ○      ○      ○      ○      ○      ○      beneficial

---

Reversed-polarity items were incorporated to control for participants' response bias. In the default condition of attitude questions, which half of the participants were randomly assigned to, the scale of the first and third question ranged from positive to negative. In the counterpart condition this applies to the scale of the second and fourth question. All participants received the questions in the same order.

It is possible that the prior knowledge and prior attitude questions have biased reading by pointing attention to the topics of the text. However, as posed by McNamara et al. (1996), these effects are equal for all three conditions.

### 3.3.2 Dependent variables.

**3.3.2.1 Comprehension.** There are multiple reliable methods to measure comprehension (McNamara & Kintsch, 1996), but not every method measures the same aspects of comprehension. In this study the focus lays on the text base understanding of a text, because this is the understanding level that reflects if participants benefit from the coherence of metaphors. Comprehension was therefore, as proposed by McNamara and Kintsch (1996), measured with multiple-choice questions to which the answers are given within one sentence of the text. To illustrate, the correct answer (in bold) to the question in example 3 is given in sentence 6.

### Example 3

---

According to the text, how do our agricultural methods affect the ecosystems in the oceans?

- The polluted soil erodes into the water
  - **The dragging fishing nets are causing damage**
  - Our garbage from food ends up in the water
  - Firms allow waste products and chemicals to flow into streams and rivers
-

**Sentence 6** (as used in the control condition):

---

And mile-long fishing nets are dragging the ocean floor, influencing the evolution of ecosystems.

---

Every question had four possible answers and only one correct answer. Participants answered four multiple-choice questions in this format, whereby every participant received the questions and answers in the exact same order.

**3.3.2.2 Attitude.** Post attitude was measured with the same four questions that measured pre attitude, but in a different order. All participants received the post attitude questions in the same (adjusted) order. Again, reversed-polarity items were incorporated resulting in a default and counterpart question condition.

**3.3.2.3 Perceived usefulness.** To measure the perceived usefulness of the text, the method as employed by Sussman and Siegel (2003) was adopted. Participants judged the information of the message on a 7-point semantic differential scale from valuable to worthless, informative to uninformative and helpful to harmful. The three questions on usefulness took the form of example 4. Half of the participants rated the scales from positive to negative and the other half of the participants vice versa.

**Example 4** (from positive to negative)

---

The information in this message is:

valuable      ○      ○      ○      ○      ○      ○      ○      unvaluable

---

**3.3.2.4 Perceived effectiveness of measures.** Participants judged six proposed policy measures that could solve the problem as discussed in the text. Who was in charge to implement these measures was left unclear, to avoid possible connotations participants might have with for example the government.

The measures evolved from the TalkBack material in Aubrun et al. (2006). In the conversations these authors held, participants were asked how the problems in the food system could be solved. For this study the answers to this question

were categorised, and for each category an overarching measure was formulated. The perceived effectiveness of these measures is measured in line with Thibodeau and Boroditsky (2013) on a 7-point Likert scale as shown in example 5.

**Example 5**

---

Please rate the effectiveness of following measures:

Introduce full disclosure of the whole food production process

not effective    ○    ○    ○    ○    ○    ○    ○    very effective

---

**3.3.3 Mediating and moderating variables.** The questions for source credibility, argument quality and self-rated expertise and involvement are adopted from Sussman and Siegel (2003). It is expected that prior knowledge highly correlates with expertise since the scope of both variables is comparable. The reason to include both variables nonetheless is that prior knowledge is measured objectively and prior to exposure to the text (favourable in evaluating the variable as a covariate for reading comprehension), whereas self-rated expertise is measured in the same manner as self-rated involvement, which makes analytical results of the two variables comparable.

**3.3.3.1 Source credibility and argument quality.** The credibility of the source was defined by four questions. On a 7-point Likert scale participants rated the knowledgeability, expertise, trustworthiness and reliability of the writer of the text (as in example 6). For argument quality, participants rated the content of the message on a 7-point Likert scale from incomplete to complete, inconsistent to consistent and inaccurate to accurate (as in example 7). The three questions on argument quality appeared on the same page as the three questions on perceived usefulness. Reverse-polarity items were incorporated the other way around: participants who got assigned to the positive-negative scales for usefulness, received the negative-positive scales for argument quality, and vice versa.

**Example 6**

---

How trustworthy is the person who wrote this message, on this topic?

not trustworthy                                trustworthy

**Example 7** (from negative to positive)

---

The information in this message is:

incomplete                                complete

**3.3.3.2 Expertise and involvement.** For involvement, thus the motivation of a participant to read the text thoughtfully, participants stated how involved they are in the topic of the text and how much the issue has been on their minds lately (as in example 8). For prior expertise, thus the ability of a participant to read the text thoughtfully, participants stated how informed they are on the topic of the text and to what extent they are an expert (as in example 9). All questions were measured on a 7-point Likert scale.

**Example 8**

---

How much has the issue discussed in this text been on your mind lately?

not at all                                a great deal

**Example 9**

---

How informed are you on the subject matter of this issue?

novice                                expert

---

**3.4 Procedure**

All participants completed the survey via Amazon Mechanical Turk on <http://mturk.com> and each received \$0.50 for their participation. The HIT approval rate was set to 95%. Data were collected via Qualtrics on <http://qualtrics.com> on 6 June 2015.

Participants in each experimental condition followed the same procedure, the main difference being the text they had to read. Qualtrics randomly assigned participants to one of the three conditions, and additionally randomly assigned them to the default or reversed polarised set of pre-attitude questions, the default or reversed polarised set of post-attitude questions, and the default or reversed polarised set of argument quality and usefulness questions.

On the opening page, participants were welcomed to the survey and they checked if their user-ID was correct before continuing. The program automatically excluded participants who had participated in the researches by Steen et al. (2014) and Reijnierse et al. (in press). These persons were provided with the reason for their exclusion and were thanked for their effort.

After participants agreed that their data could be (anonymously) analysed for the purpose of this study, they answered the four prior knowledge questions and, on the next page, the four pre-attitude questions. After this, participants read the framed text they were assigned to. Reading the text took participants on average 31.70 seconds ( $SD = 25.52$ ). On the subsequent page, participants listed three keywords of the text they had just read. This question was added to eliminate participants who did not read the text. The participants followed the course of the questionnaire from involvement on exactly as presented in appendix 1. Note that participants could only move on to the next page if they had answered every question on the open page. Once participants had moved on to the next page, they could not go back. This means the surveys came up with no missing data.

In the end, participants entered their demographic characteristics (age, gender, political affiliation and education) and were finally thanked for their participation. They now received the confirmation code, which they could enter in MTurk to receive their reward. The full questionnaire is found in appendix 1.

#### 4. Results

This chapter begins with an analysis of the internal reliability of each variable. Subsequently the results are presented on the basis of the hypotheses as lined up in chapter 2.

The internal reliability of the scales that comprised one variable were measured with Cronbach's  $\alpha$ , as presented in table 3. Ideally, the Cronbach's  $\alpha$  should have a minimum value of .7 (see Kline, 2013). However, for smaller scale measures (less than 10 variables), Cronbach's  $\alpha$  is commonly lower than the acceptable .7 (DeVellis, 2003). In this study, the reliability of pre attitude and involvement are therefore accepted, but the measures for prior knowledge and comprehension are still unacceptably low. These disappointing results (discussed substantially in the limitations section) required supplementary actions. Because prior knowledge was measured in the form of self-appointed expertise as well, a variable that does show internal reliability, the latter functioned as the determinant for prior knowledge in this study. The reliability problem with comprehension was solved by analysing the comprehension questions separately.

**Table 3**

*Descriptive statistics, Pearson's correlations and scale reliability for all variables*

Variable	Cronbach's $\alpha$	Number of items	Scale
(1) Prior knowledge	.46	4	4 - 28
(2) Pre attitude	.63	4	4 - 28
(3) Post attitude	.82	4	4 - 28
(4) Comprehension	.40	4	0 - 4
(5) Usefulness	.93	3	3 - 21
(6) Effectiveness of measures	.72	6	6 - 36
(7) Source credibility	.93	4	4 - 28
(8) Argument quality	.78	3	3 - 21
(9) Expertise	.81	2	2 - 14
(10) Involvement	.69	2	2 - 14

*N* = 154

## 4.1 Hypothesis Testing

Before testing the hypotheses, multiple simple regression analyses were conducted to verify if perceived usefulness predicts attitude change, and if the established attitude subsequently predicts the effectiveness of measures. First, attitude change was regressed on perceived usefulness. This model was statistically significant ( $\beta = -.36$ ,  $p < .0005$ ), wherein usefulness was able to explain 12% of the variance in attitude change (adjusted  $R^2 = .12$ ). The established post attitude was then regressed onto perceived effectiveness of measures. This model was statistically significant ( $\beta = -.36$ ,  $p < .0005$ ), wherein attitude was able to explain 13% of the variance in perceived effectiveness of measures (adjusted  $R^2 = .13$ ).

**4.1.1 Metaphorical framing effects on comprehension.** Hypothesis 1 predicted that people with little prior knowledge benefit from the coherence of the metaphorical frames in understanding the text on a text base level. This means that non-experts in the control condition should have a weaker text base comprehension than non-experts in one of the metaphorical conditions, and that there is no difference of comprehension between experts in the three different conditions. Participants were first divided into two expertise groups, based on the median value of expertise. This resulted in an equally distributed amount of participants per frame per expertise group. To test the hypothesis, a two-way between-groups multivariate ANOVA was conducted with the four scores on comprehension as the dependent variables and frame and expertise (low/high) as the independent variables. The mean, standard deviation and number of participants per group per condition can be found in table 4.

**Table 4**  
*Descriptive statistics for comprehension per expertise group per condition*

<b>Expertise group</b>	<b>Condition</b>	<i>M</i>	<i>SD</i>	<i>N</i>
Low expertise ( $\leq 8$ )	Frame 1	3.33	.82	24
	Frame 2	3.41	.87	29
	Frame 3	3.46	.76	26
High expertise (9+)	Frame 1	3.36	.73	28
	Frame 2	3.39	.89	23
	Frame 3	3.25	.85	24



There was no statistically significant interaction effect for frame and expertise on the combined comprehension questions, Wilks' Lambda = .98,  $F(8, 290) = .32$ ,  $p = .96$ ,  $\eta^2 = .01$ . Furthermore, there was no substantial main effect for frame on comprehension, Wilks' Lambda = .97,  $F(8, 290) = .60$ ,  $p = .78$ ,  $\eta^2 = .02$ , nor for expertise, Wilks' Lambda = 1.00,  $F(4, 145) = .12$ ,  $p = .98$ ,  $\eta^2 = .00$ . The effects per comprehension question are not significant and are not reported upon. These results indicate that the metaphorical frames did not affect the comprehension of participants and that the prior expertise of participants was of no influence. Hypothesis 1 is thus not supported.

**4.1.2 Metaphorical framing effects on persuasion while taking account for the elaboration likelihood of participants.** Hypothesis 2 predicted that people with low elaboration likelihood relied on metaphors as a peripheral cue to judge the usefulness of the text. This means that participants with low elaboration likelihood in the control condition should have a lower perceived usefulness of the message than participants with low elaboration likelihood in one of the metaphorical conditions, and that there is no difference of perceived usefulness between participants with high elaboration likelihood in the three different conditions.

This hypothesis was first tested with expertise as the determinant for elaboration likelihood, i.e. the ability of participants to process the message. To test the hypothesis, a two-way between-groups ANOVA was conducted with the perceived usefulness as the dependent variable and frame and expertise (low/high) as the independent variables. The mean, standard deviation and number of participants per group per condition can be found in table 5. There was no statistically significant interaction effect for frame and expertise on the perceived usefulness of the message,  $F(2, 148) = 14.04$ ,  $p = .10$ ,  $\eta^2 = .03$ . Furthermore, there was no substantial main effect for frame on usefulness,  $F(2, 148) = .89$ ,  $p = .42$ ,  $\eta^2 = .01$ , nor for expertise,  $F(1, 148) = .34$ ,  $p = .56$ ,  $\eta^2 = .00$ . These results indicate that the metaphorical frames did not affect the perceived usefulness of the message and that the prior expertise of participants was of no influence.

**Table 5**

*Descriptive statistics for perceived usefulness per expertise group per condition*

<b>Expertise group</b>	<b>Condition</b>	<b><i>M</i></b>	<b><i>SD</i></b>	<b><i>N</i></b>
Low expertise (<=8)	Frame 1	16.71	3.20	24
	Frame 2	16.48	2.89	29
	Frame 3	15.96	4.23	26
High expertise (9+)	Frame 1	14.57	4.81	28
	Frame 2	16.52	3.38	23
	Frame 3	17.00	3.53	24

This procedure was repeated with involvement as independent variable instead of expertise, i.e. the motivation of participants to process the message. A variable for grouped involvement (low/high) was computed based on the median value of involvement. This resulted in an equal amount of participants per frame per involvement group. The mean, standard deviation and number of participants per group per condition can be found in table 6. There was no statistically significant interaction effect for frame and involvement on the perceived usefulness of the message,  $F(2, 148) = .20, p = .82, \eta^2 = .00$ . Furthermore, there was no substantial main effect for frame on usefulness,  $F(2, 148) = .92, p = .40, \eta^2 = .01$ , nor for involvement,  $F(1, 148) = 2.53, p = .11, \eta^2 = .02$ . These results indicate that the metaphorical frames did not affect the perceived usefulness of the message and that the involvement of participants was of no influence. All in all, the results provide no support for hypothesis 2.

Hypothesis 3 predicted that people with low elaboration likelihood relied on metaphors as a peripheral cue to form their attitude. This means that participants with low elaboration likelihood in the control condition would have a lower attitude change than participants with low elaboration likelihood in one of the metaphorical conditions, and that there is no difference in attitude change between participants with

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**Table 6**

*Descriptive statistics for perceived usefulness per involvement group per condition*

<b>Involvement group</b>	<b>Condition</b>	<b><i>M</i></b>	<b><i>SD</i></b>	<b><i>N</i></b>
Low involvement (<=8)	Frame 1	15.29	4.61	21
	Frame 2	15.74	2.91	23
	Frame 3	15.81	4.55	21
High involvement (9+)	Frame 1	15.74	4.05	31
	Frame 2	17.10	3.13	29
	Frame 3	16.93	3.37	29

high elaboration likelihood in the three different conditions. Attitude change was calculated by regressing post-attitude on pre-attitude and saving the unstandardized residuals as a new variable, as suggested by Angst and Agarwal (2009). This variable could then be used as the dependent variable in the following calculations.

Hypothesis 3 was first tested with expertise as the determinant for elaboration likelihood. A two-way between-groups ANOVA was conducted with attitude change as the dependent variable and frame and expertise (low/high) as the independent variables. The mean, standard deviation and number of participants per group per condition can be found in table 7. There was no statistically significant interaction effect for frame and expertise on the attitude change of participants,  $F(2, 148) = .59$ ,  $p = .55$ ,  $\eta^2 = .01$ . Furthermore, there was no substantial main effect for frame on attitude change,  $F(2, 148) = 1.24$ ,  $p = .29$ ,  $\eta^2 = .02$ . However, there was a main effect for expertise,  $F(1, 148) = 5.33$ ,  $p < .05$ ,  $\eta^2 = .04$ . These results indicate that the metaphorical frames did not affect the perceived usefulness of the message, but that non-experts had a higher attitude change in the direction of the message ( $M = -.59$ ,  $SD = 3.17$ ) than experts ( $M = .62$ ,  $SD = 3.03$ ).

This procedure was repeated with involvement as independent variable instead of expertise. The mean, standard deviation and number of participants per group per condition can be found in table 8. There was no statistically significant interaction

**Table 7**

*Descriptive statistics attitude change per expertise group per condition*

<b>Expertise group</b>	<b>Condition</b>	<i>M</i>	<i>SD</i>	<i>N</i>
Low expertise (<=8)	Frame 1	-.29	3.44	24
	Frame 2	-.36	3.31	29
	Frame 3	-.12	2.79	26
High expertise (9+)	Frame 1	1.35	3.23	28
	Frame 2	.04	3.04	23
	Frame 3	.32	2.71	24

\* To address the impact of frame on attitude, attitude change was calculated by partialing out the impact of pre-attitude. This was accomplished by “regressing post-attitude on pre-attitude and saving the unstandardized residuals”, as described by Angst and Agarwal (2009, p. 370).

effect for frame and involvement on attitude change,  $F(2, 148) = .75, p = .48, \eta^2 = .01$ . Furthermore, there was no substantial main effect for frame on attitude change,  $F(2, 148) = 1.65, p = .20, \eta^2 = .02$ , nor for involvement,  $F(1, 148) = .86, p = .36, \eta^2 = .01$ . These results indicate that the metaphorical frames did not affect the attitude change of participants and that the involvement of participants was of no influence. All in all, the results provide no support for hypothesis 3.

**Table 8**

*Descriptive statistics for perceived usefulness per involvement group per condition*

<b>Involvement group</b>	<b>Condition</b>	<i>M</i>	<i>SD</i>	<i>N</i>
Low involvement (<=8)	Frame 1	.74	4.24	21
	Frame 2	-.89	3.68	23
	Frame 3	-.67	2.87	21
High involvement (9+)	Frame 1	.50	2.77	31
	Frame 2	.38	2.63	29
	Frame 3	-.26	2.82	29

Hypothesis 4 predicted that people with low elaboration likelihood relied on metaphors as a peripheral cue to judge the effectiveness of policy measures. This means that participants with low elaboration likelihood in the control condition would have a lower perceived effectiveness of measures than participants with low

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elaboration likelihood in one of the metaphorical conditions, and that there is no difference in perceived effectiveness of measures between participants with high elaboration likelihood in the three different conditions.

This hypothesis was tested first with expertise as the determinant for elaboration likelihood. The mean, standard deviation and number of participants per group per condition can be found in table 9. A two-way between-groups multivariate ANOVA was conducted with the perceived effectiveness of the different measures as the dependent variables and frame and expertise (low/high) as the independent variables. There was no statistically significant interaction effect for frame and expertise on the perceived effectiveness of the measures combined, Wilks' Lambda = .88,  $F(12, 286) = 1.52$ ,  $p = .12$ ,  $\eta^2 = .06$ . Furthermore, there was no substantial main effect for frame on perceived effectiveness of the measures, Wilks' Lambda = .92,  $F(12, 286) = 1.09$ ,  $p = .37$ ,  $\eta^2 = .04$ , nor for expertise, Wilks' Lambda = .95,  $F(6, 143) = 1.29$ ,  $p = .27$ ,  $\eta^2 = .05$ . Zooming in on the different measures, the interaction effect for frame and expertise is statistically significant for measure 1,  $F(2, 148) = 5.91$ ,  $p < .005$ ,  $\eta^2 = .07$ , a medium sized effect according to Cohen (1988). Experts in condition 1 rate this measure lower ( $M = 4.75$ ,  $SD = 1.88$ ) than non-experts in this condition ( $M = 5.87$ ,  $SD = .90$ ), but experts in condition 2 ( $M = 5.43$ ,  $SD = .104$ ) and condition 3 ( $M = 5.88$ ,  $SD = 1.19$ ) rate this measure higher than non-experts in these conditions (respectively  $M = 5.10$ ,  $SD = 1.37$  and  $M = 5.23$ ,  $SD = 1.58$ ). The other effects per policy measure are not significant and are not reported upon. These results indicate that the metaphorical frames did indeed partially interact with expertise in influencing the perceived effectiveness of measures, but not in the direction that was hypothesised.

This procedure was repeated with involvement as independent variable instead of expertise. The mean, standard deviation and number of participants per group per condition can be found in table 10. There was no statistically significant interaction effect for frame and involvement on the perceived effectiveness of the measures combined, Wilks' Lambda = .91,  $F(12, 286) = 1.13$ ,  $p = .33$ ,  $\eta^2 = .05$ .

**Table 9**

*Descriptive statistics for perceived effectiveness of measures per expertise group per condition*

<b>Expertise group</b>	<b>Condition</b>	<b><i>M</i></b>	<b><i>SD</i></b>	<b><i>N</i></b>
Low expertise (<=8)	Frame 1	34.71	5.25	24
	Frame 2	33.24	5.33	29
	Frame 3	32.88	6.73	26
High expertise (9+)	Frame 1	31.93	6.55	28
	Frame 2	33.22	5.67	23
	Frame 3	35.29	4.15	24

Furthermore, there was no substantial main effect for frame on perceived effectiveness of the measures, Wilks' Lambda = .92,  $F(12, 286) = 1.07$ ,  $p = .39$ ,  $\eta^2 = .04$ . However, there was a main effect for involvement, Wilks' Lambda = .88,  $F(6, 143) = 3.11$ ,  $p < .01$ ,  $\eta^2 = .12$ . Zooming in on the different measures, the main effect for involvement is statistically significant for measure 3,  $F(1, 148) = 4.22$ ,  $p < .05$ ,  $\eta^2 = .03$  and measure 4,  $F(1, 148) = 14.31$ ,  $p < .0005$ ,  $\eta^2 = .09$ . Participants with low involvement rate both measure 3 ( $M = 5.28$ ,  $SD = 1.59$ ) and measure 4 ( $M = 5.09$ ,  $SD = 1.75$ ) less effective than participants with high involvement (respectively  $M = 5.76$ ,  $SD = 1.37$  and  $M = 6.04$ ,  $SD = 1.33$ ). The other effects per policy measure are not significant and are not reported upon. These results indicate that the metaphorical frames did not affect the perceived effectiveness of measures, but involvement was of significant influence. All in all, the results provide no support for hypothesis 4.

#### **4.1.3 Metaphorical framing effects on persuasion while taking account for elaboration likelihood and the mediating effect of source credibility.**

Hypotheses 2a, 3a and 4a pose that metaphorical framing will increase the credibility of the source of a message through which participants form their persuasion. To test these hypotheses it is necessary to assess whether the effect on source credibility mediated the effect of metaphorical frames on (different levels of) persuasion, and

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**Table 10**

*Descriptive statistics for perceived effectiveness of measures per involvement group per condition*

<b>Involvement group</b>	<b>Condition</b>	<b><i>M</i></b>	<b><i>SD</i></b>	<b><i>N</i></b>
Low involvement (<=8)	Frame 1	32.76	5.17	21
	Frame 2	31.48	4.93	23
	Frame 3	32.08	7.10	21
High involvement (9+)	Frame 1	33.52	6.71	31
	Frame 2	34.62	5.48	29
	Frame 3	35.48	4.00	29

specifically if these mediating effects differ for receivers with low elaboration likelihood versus high elaboration likelihood. To test this mediating function of source credibility, the procedure as outlined by Baron and Kenny (1986) was followed. Two dummy variables were created to represent the framing conditions (control condition versus frame 1, and control condition versus frame 2). According to Baron and Kenny (1986) multiple regression analyses combined show the mediating effect of a possible mediating variable. This approach consists of three steps, each including a separate regression analysis:

1. There is a significant relationship between the independent variable and the mediating variable
2. There is a significant relationship between the independent variable and the dependent variable
3. The mediator is a significant predictor of the dependent variable when both the mediator and the independent variable are included in the model

To assess the difference in elaboration likelihood between participants, calculations were either done for the two expertise groups separately or the two involvement groups.

**4.1.3.1 Perceived usefulness.** Hypothesis 2a predicted that the effect of metaphorical frames on perceived usefulness is mediated by source

credibility, and that this effect is bigger for people with low elaboration likelihood. First, this hypothesis was tested for the two expertise groups separately. In step 1, source credibility (the mediator) was regressed onto frame 1 while controlling for frame 2 as a covariate, and onto frame 2 while controlling for frame 1 as a covariate. Neither frame 1 ( $B = .04, p = .74$ ) nor frame 2 ( $B = -.12, p = .37$ ) reached statistical significance in the low-expertise group. In the high-expertise group, however, frame 1 was a statistically significant predictor ( $\beta = -.28, p < .05$ ). Frame 2 was not statistically significant ( $\beta = -.09, p = .51$ ).

In step 2, usefulness (the dependent variable) was regressed onto frame 1 while controlling for frame 2 as a covariate, and onto frame 2 while controlling for frame 1 as a covariate. Neither frame 1 ( $\beta = .10, p = .45$ ) nor frame 2 ( $\beta = .07, p = .58$ ) reached statistical significance in the low-expertise group. In the high expertise group, however, frame 1 was a statistical significant predictor ( $\beta = -.29, p < .05$ ). Frame 2 was not statistically significant ( $\beta = -.05, p = .69$ ).

In step 3, usefulness was regressed onto source credibility and the dummy variables for frame. Source credibility was a significant predictor in both the low-expertise group ( $\beta = .79, p < .0005$ ) and the high-expertise group ( $\beta = .78, p < .0005$ ). In the low-expertise group, frame 2 compared to the other frames was statistically significant ( $\beta = .17, p < .05$ ). This is a suppressor effect that was not hypothesised. Because the clarification of this effect is fairly complicated and, in particular, not necessary for this study, this suppressor effect is not interpreted. Frame 1 was not statistically significant compared to the other two conditions ( $\beta = .07, p = .43$ ). In the high-expertise group, neither frame 1 ( $\beta = -.07, p = .43$ ) nor frame 2 ( $\beta = .02, p = .86$ ) was statistically significant when compared to the other two frames. These results indicate that in the high expertise group, source credibility mediated the effect of metaphorical frame 1 on usefulness.

Next, hypothesis 2a was tested for the two involvement groups separately. In step 1, source credibility was regressed onto frame 1 while controlling for frame 2 as a covariate, and onto frame 2 while controlling for frame 1 as a covariate.



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Neither frame 1 ( $\beta = -.21, p = .15$ ) nor frame 2 ( $\beta = -.18, p = .23$ ) reached statistical significance in the low-involvement group. Also in the high-involvement group, neither frame 1 ( $\beta = -.08, p = .50$ ) nor frame 2 ( $\beta = -.05, p = .70$ ) reached statistical significance.

In step 2, usefulness was regressed onto frame 1 while controlling for frame 2 as a covariate, and onto frame 2 while controlling for frame 1 as a covariate. Neither frame 1 ( $\beta = -.06, p = .68$ ) nor frame 2 ( $\beta = -.01, p = .95$ ) reached statistical significance in the low-involvement group. Also in the high-involvement group, neither frame 1 ( $\beta = -.16, p = .20$ ) nor frame 2 ( $\beta = -.02, p = .85$ ) reached statistical significance.

In step 3, usefulness was regressed onto source credibility and the dummy variables for frame. Source credibility was a significant predictor in both the low-involvement group ( $\beta = .82, p < .0005$ ) and the high-involvement group ( $\beta = .76, p < .0005$ ). In both involvement groups, neither frame 1 nor frame 2 was a significant predictor of usefulness compared to the other two frames. These results are not reported upon. These results indicate that source credibility did not mediate the effect of the metaphorical frames on perceived usefulness when analysing the two involvement groups separately. Over all, hypothesis 2a is thus not supported.

**4.1.3.2 Attitude change.** Hypothesis 3a predicted that the effect of metaphorical frames on attitude change is mediated by source credibility, and that this effect is bigger for people with low elaboration likelihood. First, this hypothesis was tested for the two expertise groups separately. As suggested by the regression analysis in step 1 in §4.1.3.1 (differentiated by expertise), in step 1 neither frame 1 nor frame 2 had a statistical significant effect on source credibility in the low-expertise group. In the high expertise group, however, frame 1 was a statistical significant predictor, but frame 2 was not.

In step 2, attitude change (the dependent variable) was regressed onto frame 1 while controlling for frame 2 as a covariate, and onto frame 2 while

controlling for frame 1 as a covariate. Neither frame 1 ( $\beta = .12, p = .36$ ) nor frame 2 ( $\beta = .12, p = .38$ ) reached statistical significance in the low-expertise group. Also in the high-expertise group, neither frame 1 ( $\beta = .17, p = .22$ ) nor frame 2 ( $\beta = -.04, p = .76$ ) reached statistical significance.

In step 3, attitude change was regressed onto source credibility and the dummy variables for frame. Source credibility was a significant predictor in both the low-expertise group ( $\beta = -.41, p < .0005$ ) and the high-expertise group ( $\beta = -.36, p < .005$ ). In both expertise groups, neither frame 1 nor frame 2 was a significant predictor of usefulness compared to the other two frames. These results are not reported upon. These results indicate that source credibility did not mediate the effect of the metaphorical frames on attitude change when analysing the two expertise groups separately.

Next, hypothesis 3a was tested for the two involvement groups separately. As suggested by the regression analysis in step 1 in §4.1.3.1 (differentiated by involvement), in step 1 neither frame 1 nor frame 2 had a significant effect on source credibility in the low-involvement group nor in the high-involvement group.

In step 2, attitude change was regressed onto frame 1 while controlling for frame 2 as a covariate, and onto frame 2 while controlling for frame 1 as a covariate. Neither frame 1 ( $\beta = .18, p = .21$ ) nor frame 2 ( $\beta = -.03, p = .84$ ) reached statistical significance in the low-involvement group. Also in the high-involvement group, neither frame 1 ( $\beta = .13, p = .29$ ) nor frame 2 ( $\beta = .11, p = .38$ ) reached statistical significance.

In step 3, attitude change was regressed onto source credibility and the dummy variables for frame. Source credibility was a significant predictor in both the low-involvement group ( $\beta = -.45, p < .0005$ ) and the high-involvement group ( $\beta = -.35, p < .001$ ). In both involvement groups, neither frame 1 nor frame 2 was a significant predictor of usefulness compared to the other two frames. These results are not reported upon. These results indicate that source credibility did not mediate

the effect of the metaphorical frames on attitude change when analysing the two involvement groups separately. Over all, hypothesis 3a is thus not supported.

**4.1.3.3 Perceived effectiveness of measures.** Hypothesis 4a predicted that the effect of metaphorical frames on perceived effectiveness of measures is mediated by source credibility, and that this effect is bigger for people with low elaboration likelihood. First, this hypothesis was tested for the two expertise groups separately. As suggested by the regression analysis in step 1 in §4.1.3.1(differentiated by expertise), in step 1 neither frame 1 nor frame 2 had a statistical significant effect on source credibility in the low-expertise group. In the high expertise group, however, frame 1 was a statistical significant predictor, but frame 2 was not.

In step 2, perceived effectiveness of measures (the dependent variable) was regressed onto frame 1 while controlling for frame 2 as a covariate, and onto frame 2 while controlling for frame 1 as a covariate. Neither frame 1 ( $\beta = .15, p = .27$ ) nor frame 2 ( $\beta = .03, p = .82$ ) reached statistical significance in the low-expertise group. In the high expertise group, however, frame 1 was a statistical significant predictor ( $\beta = -.29, p < .05$ ). Frame 2 was not statistically significant ( $\beta = -.17, p = .21$ ).

In step 3, perceived effectiveness of measures was regressed onto source credibility and the dummy variables for frame. Source credibility was a significant predictor in both the low-expertise group ( $\beta = .46, p < .0005$ ) and the high-expertise group ( $\beta = .39, p < .001$ ). In both expertise groups, neither frame 1 nor frame 2 was a significant predictor of usefulness compared to the other two frames. These results are not reported upon. These results indicate that in the high expertise group, source credibility mediated the effect of metaphorical frame 1 on usefulness.

Next, hypothesis 4a was tested for the two involvement groups separately. As suggested by the regression analysis in step 1 in §4.1.3.1 (differentiated by involvement), in step 1 neither frame 1 nor frame 2 had a significant effect on source credibility in the low-involvement group nor in the high-involvement group.

In step 2, perceived effectiveness of measures was regressed onto frame 1 while controlling for frame 2 as a covariate, and onto frame 2 while controlling for frame 1 as a covariate. Neither frame 1 ( $\beta = .06, p = .69$ ) nor frame 2 ( $\beta = -.05, p = .75$ ) reached statistical significance in the low-involvement group. Also in the high-involvement group, neither frame 1 ( $\beta = -.17, p = .17$ ) nor frame 2 ( $\beta = -.07, p = .56$ ) reached statistical significance.

In step 3, perceived effectiveness of measures was regressed onto source credibility and the dummy variables for frame. Source credibility was a significant predictor in both the low-involvement group ( $\beta = .40, p < .001$ ) and the high-involvement group ( $\beta = .45, p < .0005$ ). In both involvement groups, neither frame 1 nor frame 2 was a significant predictor of usefulness compared to the other two frames. These results are not reported upon. These results indicate that source credibility did not mediate the effect of the metaphorical frames on perceived effectiveness of measures when analysing the two involvement groups separately. Over all, hypothesis 4a is thus not supported.

#### **4.1.4 Metaphorical framing effects on persuasion while taking account for elaboration likelihood and the mediating effect of argument quality.**

Hypotheses 2b, 3b and 4b pose that metaphorical framing will increase the coherence of the text in a way that improves the ability of participants to process the message. This means that participants with low expertise in the metaphorical conditions follow the central route and rely on argument quality to form their persuasion. On the other hand, these hypotheses predict that the metaphorical language will enhance the motivation of people to process the message, which means that participants with low involvement in the metaphorical conditions follow the central route and rely on argument quality to form their persuasion. To test these hypotheses it is necessary to assess whether the effect on argument quality mediated the effect of metaphorical frames on (different levels of) persuasion, and specifically if these mediating effects differ for receivers with low elaboration likelihood versus high elaboration likelihood. To test this mediating function of argument quality, the

same procedure as for the previous three hypotheses was followed.

**4.1.4.1 Perceived usefulness.** Hypothesis 2b predicted that the effect of metaphorical frames on perceived usefulness is mediated by argument quality for all participants, regardless of their elaboration likelihood. For participants with low elaboration likelihood in the control condition, however, argument quality would not mediate the effect of the frame on perceived usefulness. First, this hypothesis was tested for the two expertise groups separately. In step 1, argument quality (the mediator) was regressed onto frame 1 while controlling for frame 2 as a covariate, and onto frame 2 while controlling for frame 1 as a covariate. Neither frame 1 ( $\beta = -.02, p = .90$ ) nor frame 2 ( $\beta = -.00, p = .98$ ) reached statistical significance in the low-expertise group. Also in the high-expertise group, neither frame 1 ( $\beta = -.22, p = .11$ ) nor frame 2 ( $\beta = -.11, p = .43$ ) had a statistically significant influence.

As suggested by the regression analysis in step 2 in §4.1.3.1 (differentiated by expertise), in step 2 neither frame 1 nor frame 2 was significant in the low-expertise group. In the high-expertise group, however, frame 1 was statistically significant but frame 2 was not.

In step 3, usefulness was regressed onto argument quality and the dummy variables for frame. Argument quality was a significant predictor in both the low-expertise group ( $\beta = .80, p < .0005$ ) and the high-expertise group ( $\beta = .79, p < .0005$ ). In both expertise groups, neither frame 1 nor frame 2 was a significant predictor of usefulness compared to the other two frames. Frame 1 thus did not keep its significant predictive value in the high expertise group from step [X] ( $\beta = -.41, p = .16$ ). The other non-significant results are not reported upon. These results indicate that argument quality did not mediate the effect of the metaphorical frames on perceived usefulness when analysing the two expertise groups separately.

Next, hypothesis 2b was tested for the two involvement groups separately. In step 1, argument quality (the mediator) was regressed onto frame 1 while controlling for frame 2 as a covariate, and onto frame 2 while controlling for frame 1 as

a covariate. Neither frame 1 ( $\beta = -.21, p = .15$ ) nor frame 2 ( $\beta = -.18, p = .23$ ) reached statistical significance in the low-involvement group. Also in the high-involvement group, neither frame 1 ( $\beta = -.08, p = .50$ ) nor frame 2 ( $\beta = -.05, p = .70$ ) had a statistically significant influence.

As suggested by the regression analysis in step 2 in §4.1.3.1 (differentiated by involvement), in step 2 neither frame 1 nor frame 2 was significant in neither the low-expertise group nor the high-expertise group.

In step 3, usefulness was regressed onto argument quality and the dummy variables for frame. Argument quality was a significant predictor in both the low-involvement group ( $\beta = .81, p < .0005$ ) and the high-involvement group ( $\beta = .79, p < .0005$ ). In both involvement groups, neither frame 1 nor frame 2 was a significant predictor of usefulness compared to the other two frames. These results are not reported upon. These results indicate that argument quality did not mediate the effect of the metaphorical frames on perceived usefulness when analysing the two involvement groups separately. Over all, hypothesis 3b is thus not supported.

**4.1.4.2 Attitude change.** Hypothesis 3b predicted that the effect of metaphorical frames on attitude change is mediated by argument quality for all participants, regardless of their elaboration likelihood. For participants with low elaboration likelihood in the control condition, however, argument quality would not mediate the effect of the frame on attitude change. First, this hypothesis was tested for the two expertise groups separately. As suggested by the regression analysis in step 1 in §4.1.4.1 (differentiated by expertise), in step 1 neither frame 1 nor frame 2 had a statistically significant effect on argument quality neither in the low-expertise group nor in the high-expertise group.

As suggested by the regression analysis in step 2 in §4.1.3.2 (differentiated by expertise), in step 2 neither frame 1 nor frame 2 had a statistically significant effect on

attitude change in neither the low-expertise group nor the high-expertise group.

In step 3, attitude change was regressed onto argument quality and the dummy variables for frame. Argument quality was a significant predictor in both the low-expertise group ( $\beta = -.27, p < .05$ ) and the high-expertise group ( $\beta = -.41, p < .0005$ ). In both expertise groups, neither frame 1 nor frame 2 was a significant predictor of attitude change compared to the other two frames. These results are not reported upon. These results indicate that argument quality did not mediate the effect of the metaphorical frames on attitude change when analysing the two expertise groups separately.

Next, hypothesis 3b was tested for the two involvement groups separately. As suggested by the regression analysis in step 1 in §4.1.4.1 (differentiated by involvement), in step 1 neither frame 1 nor frame 2 had a significant effect on argument quality neither in the low-involvement group nor in the high-involvement group.

As suggested by the regression analysis in step 2 in §4.1.3.2 (differentiated by involvement), in step 2 neither frame 1 nor frame 2 had a significant effect on attitude change neither in the low-involvement group nor in the high-involvement group.

In step 3, attitude change was regressed onto argument quality and the dummy variables for frame. Argument quality was a significant predictor in both the low-involvement group ( $\beta = -.36, p < .005$ ) and the high-involvement group ( $\beta = -.32, p < .005$ ). In both involvement groups, neither frame 1 nor frame 2 was a significant predictor of attitude change compared to the other two frames. These results are not reported upon. These results indicate that argument quality did not mediate the effect of the metaphorical frames on attitude change when analysing the two involvement groups separately. Over all, hypothesis 3b is thus not supported.

**4.1.4.3** *Perceived effectiveness of measures.* Hypothesis 4b predicted that the effect of metaphorical frames on perceived effectiveness of measures is

mediated by argument quality for all participants, regardless of their elaboration likelihood. For participants with low elaboration likelihood in the control condition, however, argument quality would not mediate the effect of the frame on perceived effectiveness of measures. First, this hypothesis was tested for the two expertise groups separately. As suggested by the regression analysis in step 1 in §4.1.4.1 (differentiated by expertise), in step 1 neither frame 1 nor frame 2 had a statistically significant effect on argument quality neither in the low-expertise group nor in the high-expertise group.

As suggested by the regression analysis in step 2 in §4.1.3.3 (differentiated by expertise), in step 2 neither frame 1 nor frame 2 had a statistically significant effect on perceived effectiveness of measures in the low-expertise group. In the high-expertise group, however, frame 1 was statistically significant but frame 2 was not.

In step 3, perceived effectiveness of measures was regressed onto argument quality and the dummy variables for frame. Argument quality was a significant predictor in both the low-expertise group ( $\beta = .50, p < .0005$ ) and the high-expertise group ( $\beta = .41, p < .0005$ ). In both expertise groups, neither frame 1 nor frame 2 was a significant predictor of perceived effectiveness of measures compared to the other two frames. These results indicate that argument quality did not mediate the effect of the metaphorical frames on perceived effectiveness of measures when analysing the two expertise groups separately.

Next, hypothesis 4b was tested for the two involvement groups separately. As suggested by the regression analysis in step 1 in §4.1.4.1 (differentiated by involvement), in step 1 neither frame 1 nor frame 2 had a significant effect on argument quality neither in the low-involvement group nor in the high-involvement group.

As suggested by the regression analysis in step 2 in §4.1.3.3 (differentiated by involvement), in step 2 neither frame 1 nor frame 2 had a significant effect on attitude



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change neither in the low-involvement group nor in the high-involvement group.

In step 3, perceived effectiveness of measures was regressed onto argument quality and the dummy variables for frame. Argument quality was a significant predictor in both the low-involvement group ( $\beta = .52, p < .0005$ ) and the high-involvement group ( $B = .42, p < .0005$ ). In both involvement groups, neither frame 1 nor frame 2 was a significant predictor of perceived effectiveness of measures compared to the other two frames. These results are not reported upon. These results indicate that argument quality did not mediate the effect of the metaphorical frames on perceived effectiveness of measures when analysing the two involvement groups separately. Over all, hypothesis 4b is thus not supported.

## **5. Discussion**

### **5.1 Main Findings**

This study investigated under which conditions metaphorically framed texts affect the comprehension and different levels of persuasion of readers when the only cause of effect can be found in the metaphoricity of the text. The results in this study show very limited support for the hypotheses. Only for experts, source credibility mediated the effect of frame 1 on the usefulness of the message and the effectiveness of measures as perceived by participants. These findings are in contrast to the hypotheses that non-experts in the metaphorical conditions rely on source credibility in the persuasion process. Besides this effect, the three frames seemed to work the same, consistently influencing a participant's comprehension, perceived usefulness, attitude change and perceived effectiveness of measures. The predicted mediating variables (source credibility, argument quality and the expertise and involvement of participants) did prove to be of influence on the dependent variables in some cases, however, these effects could not be related to the metaphorical frame participants received. Zooming in on the perceived effectiveness of measures, only on measure 1 (improve the regulation with reference to the food production system) a medium sized interaction effect of expertise and frame was identified.

### **5.2 Implications**

The current findings on the metaphorical framing effects on comprehension contradict the findings by Aubrun et al. (2006) and Jaspert et al. (2011). There are several explanations for the difference in results. The first explanation is that the comprehension in this study is approached as the text base understanding of the text as defined by the CI model (Kintsch, 1988). The previous studies are not clear about the type of comprehension that is studied. However, because participants are asked to make their own inferences (e.g. ascribe responsibility for the problem when this was not stated in the text), it can be advocated that the approach of previous researchers rather focuses on the participants' construction of a situation model than on

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the construction of a text base. It is possible that metaphorical framing effects on the situation model of receivers are bigger than the effects on their text base. As suggested by McNamara and Kintsch (1996) these levels should be studied separately, and can differ within one mental representation (a person can have a strong text base but a weak situation model and vice versa). Further research should make a clear distinction between the different levels of understanding in order to provide insight into the conditions of metaphorical framing effects on comprehension.

A second explanation can be found in the analysis of the studies by Aubrun et al. (2006) and Jaspaert et al. (2011) as presented in §2.1.2. This evaluation shows that the findings of these earlier studies can be attributed to more aspects of the text than just the metaphorical frame. The texts in Aubrun et al. (2006) for instance also differ on content, and the texts in Jaspaert et al. (2011) differ in amount of sentences (amongst others). It could be the case that in these studies, the texts as a whole carry the effects on comprehension, and that these effects cannot be solely attributed to the metaphorical framing.

Another explanation, which is supported by much evidence, is that the text as used in the current study is perhaps already rather coherent without the metaphorical frame. The predicted coherence that is brought to a text with an extended metaphor could lose its effectiveness if participants do not need extra coherence to understand a text. In support of this premise, Robins and Mayer (2000) pose that “when reasoners can find an organizing structure without using the metaphor, the utility of the metaphor is diminished” (p. 84). Another factor that promotes this explanation is that the overall score on comprehension is relatively high ( $M = 3.37$ ,  $SD = .81$  with a minimum score of 0 and a maximum score of 4). This suggests that many participants almost fully comprehended the text, which left little room for differences to be measured.

Next to the systematic examination of the effect of metaphorical framing on comprehension, this study was designed to assess the reasons behind the diverging results scholars have reported on metaphorical framing effects on

persuasion. Contrary to the hypotheses, source credibility mediated the effects of frame 1 on experts' perceived usefulness and perceived effectiveness. A possible explanation for this effect is that frame 1 did influence the elaboration likelihood of participants, but not in the way that was predicted. It could be the case that the metaphor in frame 1 was able to decrease the elaboration likelihood of participants, especially that of experts. Because the evidence suggests that the texts were rather coherent, or at least did not differ in comprehensibility, it is more likely that the motivation of experts was affected by the metaphor in frame 1. According to Ottati, Roads and Graesser (1999) metaphor can only increase central processing of participants if the content of the metaphor is of personal interest to the participant. It is possible that the runaway train frame did not interest experts, which made them take the peripheral route instead.

Additionally, the lack of results on the predicted change in elaboration likelihood of participants can be interpreted on numerous levels. When reasoners for instance do not need the metaphor to comprehend the message, they might also not rely on the metaphor in visualising the problem (Robins & Mayer, 2000). Thus, drawing further on the speculated high coherence of all three texts, it can be suggested that the metaphorical frame did not increase the expertise of non-experts any better than the non-metaphorical frame did. This could explain why the mediating effect of argument quality on persuasion does not differ for the three different conditions.

The previous explanation does not take account for the lack of enhanced motivation of participants in the metaphorical conditions. As discussed, metaphors can increase the vividness of the text (Ortony, 1975; Ortony et al., 1987). However, did this did not seem to be the case in this study. An explanation is found in Ottati and Renstrom (2010), who pose that metaphorical language can motivate a participant to process a message, but only when the metaphor at stake is in line with the participant's preferences and interests. It is suggested that the opposite is true for the metaphor in frame 1, which encouraged experts to take the peripheral route. The fact that this effect occurs for frame 1 but not for frame 2 emphasises the need to distinguish different metaphorical frames on their individual characteristics,

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such as novelty (Bowdle & Gentner, 2005), deliberateness (Steen, 2008) and the perceived appropriateness (Ottati, Rhoads & Graesser, 1999). Different metaphors might have a different impact on their receivers, which is why additional research should either make a prior distinction between metaphors that differ on different dimensions, or measure how different metaphors are perceived. For instance, Ottati, Rhoads and Graesser (1999) found that sports metaphors motivated central processing for sports enthusiasts, whereas it decreased the motivation for individuals who dislike sports. Manipulating or measuring the appropriateness of different metaphors can assess the way specific metaphors systematically decrease the elaboration likelihood of certain participants as other metaphors might increase this elaboration likelihood.

This study emphasises the need to systematically investigate “which metaphorical frames influence which types of people under which conditions” (Steen et al., 2014, p. 23), because the results indicate that certain metaphorical frames might affect the influence process of receivers under different conditions than other metaphorical frames. A first step toward the incorporation of mainstream cognitive models for comprehension (the CI model) and persuasion (the ELM) is initiated, but further research is needed to systematically control the participating variables. This will provide a clearer overview of the characteristics of participants, types of metaphors and textual aspects that enable a metaphorical frame to influence the reasoning of the receiver. I look forward to additional studies that incorporate the ELM in research toward metaphorical framing effects.

## **6. Limitations**

The way that this study was conducted can be criticized on multiple grounds, but due to space restrictions only the main limitation is discussed in this section. The main shortcoming of this study is that the questions that comprise prior knowledge as well as the questions that comprise comprehension show little internal reliability. It can be argued that this is the case for the prior knowledge questions because each question was designed to measure a different aspect of the knowledge that was relevant to understanding the text. One question focused on the use of farming chemicals, another on the pollution of the sea, another on the way we alter food, and the last on the food production system as a whole. The same reasoning goes up for comprehension, which was measured per subtopic as well. Further research should focus on the topic of the text in general (instead of every subtopic of the text in a narrow sense) or should include clustered questions per subtopic so each of these can be analysed separately.

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8. Appendix

**Table 5**

Measurement items for all variables in this study, chronologically ordered as received by participants. The question codes were not presented to participants in the actual questionnaire.

<b>Prior knowledge</b>	
PRIOKNO1.	How familiar are you with the term “integrated farming”?
	<ul style="list-style-type: none"> <li>○ <i>I have never heard of this</i></li> <li>○ <i>I have heard of this but I would not be able to explain what it is really about</i></li> <li>○ <i>I know something about this and could explain the general issue</i></li> <li>○ <i>I am familiar with this and I would be able to explain this well</i></li> </ul>
PRIOKNO2.	How familiar are you with the term “fertilizer”?
	<ul style="list-style-type: none"> <li>○ <i>I have never heard of this</i></li> <li>○ <i>I have heard of this but I would not be able to explain what it is really about</i></li> <li>○ <i>I know something about this and could explain the general issue</i></li> <li>○ <i>I am familiar with this and I would be able to explain this well</i></li> </ul>
PRIOKNO3.	How familiar are you with the term “GMO”?
	<ul style="list-style-type: none"> <li>○ <i>I have never heard of this</i></li> <li>○ <i>I have heard of this but I would not be able to explain what it is really about</i></li> <li>○ <i>I know something about this and could explain the general issue</i></li> <li>○ <i>I am familiar with this and I would be able to explain this well</i></li> </ul>
PRIOKNO4.	How familiar are you with the term “bottom trawl”?
	<ul style="list-style-type: none"> <li>○ <i>I have never heard of this</i></li> <li>○ <i>I have heard of this but I would not be able to explain what it is really about</i></li> <li>○ <i>I know something about this and could explain the general issue</i></li> <li>○ <i>I am familiar with this and I would be able to explain this well</i></li> </ul>
<b>Pre attitude condition 1 (condition 2 has reversed polarised scales)</b>	
PREATT1.	Using farming chemicals is:
<i>bad</i>	○ ○ ○ ○ ○ ○ ○ <i>good</i>
PREATT2.	Using genetic engineering to alter food is:
<i>beneficial</i>	○ ○ ○ ○ ○ ○ ○ <i>harmful</i>
PREATT3.	Using mile-long fishing nets is:
<i>foolish</i>	○ ○ ○ ○ ○ ○ ○ <i>wise</i>
PREATT4.	Overall, the way our agricultural system is functioning is:

---

*pleasant*                   ○   ○   ○   ○   ○   ○   ○   *unpleasant*

---

**Comprehension** (correct answer in bold)

---

COMP1.           According to the text, who are concerned about our agricultural methods?

- *Environmentalists*
- *Politicians*
- *Scientific researchers*
- ***Experts***

COMP2.           According to the text, how do our agricultural methods affect the ecosystems in the oceans?

- *The polluted soil erodes into the water*
- ***The dragging fishing nets are causing damage***
- *Our garbage from food ends up in the water*
- *Firms allow waste products and chemicals to flow into streams and rivers*

COMP3.           Which two types of farming chemicals that are used in agriculture are mentioned in the text?

- *Insecticides and paraquat*
- *Phosphorus and fuels*
- *Herbicides and repellent*
- ***Pesticides and weed-killer***

COMP4.           According to the text, how is the nature of the plants and animals we eat altered? With:

- ***Genetic engineering***
- *DNA architecture*
- *Molecular modification*
- *Biotechnical control*

---

**Post attitude** condition 1 (condition 2 has reversed polarised scales)

---

POSTATT1.       Using mile-long fishing nets is:

*foolish*                   ○   ○   ○   ○   ○   ○   ○   *wise*

POSTATT2.       Overall, the way our agricultural system is functioning is:

*pleasant*                   ○   ○   ○   ○   ○   ○   ○   *unpleasant*

POSTATT3.       Using farming chemicals is:

*bad*                       ○   ○   ○   ○   ○   ○   ○   *good*

POSTATT4.       Using genetic engineering to alter food is:

*beneficial*                   ○   ○   ○   ○   ○   ○   ○   *harmful*

---



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<b>Involvement</b>	
INVOL1.	How involved are you in the topic of this text?
<i>not at all</i>	<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <i>a great deal</i>
INVOL2.	How much has the issue discussed in the text been on your mind lately?
<i>not at all</i>	<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <i>a great deal</i>
<b>Expertise</b>	
EXP1.	How informed are you on the subject matter of this issue?
<i>novice</i>	<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <i>expert</i>
EXP2.	To what extent are you an expert on the topic of this text?
<i>not at all</i>	<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <i>a great deal</i>
<b>Source credibility</b> condition 1 (condition 2 has reversed polarised scales)	
SC1.	How knowledgeable is the person who wrote this message, on the topic of this message?
<i>not knowledgeable</i>	<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <i>knowledgeable</i>
SC2.	To what extent is the person who wrote this message an expert on the message topic?
<i>not expert</i>	<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <i>expert</i>
SC3.	How trustworthy is the person who wrote this message, on the topic of the message?
<i>not trustworthy</i>	<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <i>trustworthy</i>
SC4.	How reliable is the person who wrote this message, on the topic of this message?
<i>not reliable</i>	<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <i>reliable</i>
<b>Argument quality</b> condition 1 (condition 2 has reversed polarised scales)	
AQ1./2./3.	The information in this message is:
<i>incomplete</i>	<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <i>complete</i>
<i>inconsistent</i>	<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <i>consistent</i>
<i>inaccurate</i>	<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <i>accurate</i>
<b>Usefulness</b> condition 1 (condition 2 has reversed polarised scales)	
USE1./2./3.	The information in this message is:
<i>valuable</i>	<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <i>worthless</i>
<i>informative</i>	<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <i>uninformative</i>
<i>helpful</i>	<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <i>harmful</i>
<b>Effectiveness of measures</b>	

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MEAS1.	Improve the regulation with reference to the food production system
<i>ineffective</i>	○ ○ ○ ○ ○ ○ ○ <i>effective</i>
MEAS2.	Increase penalties for convicted offenders of the regulation
<i>ineffective</i>	○ ○ ○ ○ ○ ○ ○ <i>effective</i>
MEAS3.	Invest in “the little guy” (the smaller food producers)
<i>ineffective</i>	○ ○ ○ ○ ○ ○ ○ <i>effective</i>
MEAS4.	Grow your own fruit and vegetables
<i>ineffective</i>	○ ○ ○ ○ ○ ○ ○ <i>effective</i>
MEAS5.	Introduce full disclosure of the whole food production process
<i>ineffective</i>	○ ○ ○ ○ ○ ○ ○ <i>effective</i>
MEAS6.	Invest in new technologies regarding food production
<i>ineffective</i>	○ ○ ○ ○ ○ ○ ○ <i>effective</i>

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