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Effects of emotionality versus factuality on climate change messages' persuasiveness in bilinguals

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Abstract

Due to globalization, mass communication and political discourse worldwide are increasingly disseminated in English. Accordingly, social advertising, including climate change communication, must consider how bilinguals process messages to maximize persuasive outcomes. The complexity of climate change may demand communicative efforts to incorporate heuristic cues, such as emotionality, to ease message persuasiveness. Past research indicates a persuasive power of emotion in social advertising, but studies suggest differing emotionality perceptions in audiences' first and second language. The purpose of the current research was to examine emotionality perceptions of first and second language in Dutch-English bilinguals, and to investigate effects of emotionality and factuality in message design in an audience's first and second language on the persuasiveness of climate change communication. In an online experiment, 140 participants indicated their attitude towards climate change and behavioral intentions to act sustainably after being presented one of four persuasive messages, namely an emotional or factual message in either their first language (Dutch) or second language (English). Results indicate that emotionality perceptions did not differ between Dutch and English. However, the higher the English proficiency of the sample, the more emotional the English emotional messages were perceived. Additionally, there were no persuasive differences between the four messages. This suggests that language and emotionality manipulations may not impact persuasiveness of climate change communication towards Dutch-English bilinguals.

Keywords: Persuasiveness, emotionality, bilinguals, climate change communication

Introduction

A substantial consequence of globalization is the expanding adoption of English as a lingua franca. Since the end of World War One, English has been consolidated as a global language with continually increasing usages in, e.g., international politics, advertising, and the media (Crystal, 2003). In addition to hundreds of millions of native English speakers, increasing numbers of people from various language backgrounds acquire English as a second language to function effectively in a world that is more connected than ever before. This perpetual presence of the English language in social life has considerable consequences for mass communication towards audiences around the world. For instance, organizational communication and political discourse regarding societal issues, such as climate change, need to acknowledge the impactful role of English in communicative efforts.

Climate change is one of the most concerning issues of modern times, but communicative efforts of its negative environmental and societal impacts face challenges.

Moser (2010) acknowledges that the invisibility of global warming, and the delayed consequences of unsustainable behavior, require communication specialists to adequately communicate the urgency to act. The complexity of the issue might lead to difficulties in understanding climate change's gravity and may demand simpler formulations, and evoking emotions may have considerable positive impacts towards attitude formation. A focus on knowledge transfer, emotion, and behavior change has been the norm in climate change communication (CCC; Nerlich et al. 2010). However, insights into effects of such strategies on globalized, bilingual audiences remain sparse. It is unknown how those audiences react to CCC in different languages.

Investigating how to communicate climate change messages most effectively is crucial. Specifically, it is crucial to determine what message characteristics affect the persuasiveness of CCC, so that multilingual audiences adopt sustainable attitudes and behaviors towards climate change. Therefore, this study focuses on the effects of two message types, namely emotional and factual messages, in two languages, i.e., the audience's mother tongue and English as their foreign language, on CCC persuasiveness.

Theoretical Background

Persuasion Theory

Persuasive communication ultimately aims at changing people's behavior. Commonly, behavioral intention and its underlying components have been a focus of past research as reliable determinants of actual behavior (Fishbein & Yzer, 2003). Often, persuasive messages aim at affecting attitudes as one factor determining behavioral intention. An *attitude* describes "a psychological tendency that is expressed by evaluating a particular entity with some degree of favor or disfavor" (Eagly & Chaiken, 1993, p. 1). By influencing an attitude about a certain behavior, it is possible to shape behavioral intentions, increasing the likelihood of the behavior eventually being performed (Fishbein & Yzer, 2003). Climate change research has also acknowledged the importance of shaping environmental attitudes due to their behavioral influence (Gifford & Sussman, 2012).

The process of changing attitudes is captured in two widely cited dual processing models, namely the elaboration likelihood model (ELM; Petty & Cacioppo, 1986) and the heuristic-systematic model (HSM; Chaiken, 1980). Both models make a distinction between two routes of processing a persuasive message: the central route (ELM) or systematic processing (HSM), and the peripheral route (ELM) or heuristic processing (HSM). Depending on the audience's level of motivation and ability of processing, a message will be processed

through either route. If motivation and ability are high, the message will likely be processed centrally, leading to careful consideration of arguments. However, this costs substantial cognitive effort. Heuristic processing requires less cognitive effort; if motivation and ability are low, the message is likely processed peripherally, resulting in simple heuristic cues, such as expert opinions, affecting attitudes.

The authors of both models acknowledge that many factors can influence the processing route. The complexity of climate change suggests that audiences lack capacity to process messages systematically (Moser, 2010). Consequently, communication including heuristic cues, facilitating peripheral processing seems adequate. Research found that emotional appeals can function as such heuristic cues (Jorgensen, 1996), but audience's characteristics need to be considered. Specifically, it remains to be discussed whether the use of a native or first language (L1) or a foreign or second language (L2) can influence direction of processing (e.g., Keysar et al., 2012).

Emotion and Persuasion

Previous research has acknowledged the substantial persuasive power of emotion during message processing (e.g., Jorgensen, 1996). Petty and Briñol (2015) have examined various effects of emotions on attitudes and persuasion, basing their argumentation on the ELM. They clarify that the amount of elaboration impacts how emotions influence judgements. First, under low elaboration, emotions serve as heuristic cues, influencing judgements according to the valence of the emotion. Therefore, an upsetting message will evoke sadness. Second, during central processing, emotions can serve as arguments themselves. For instance, evoked sadness can serve as an additional argument, strengthening the assessment of a worrisome message. It remains unclear whether eliciting suitable emotions in CCC can serve as additional persuasive means. Relevant emotions seem crucial as they directly influence the direction of processing during low elaboration and serve as arguments during high elaboration.

To elicit emotional responses, the type of message appears relevant (Kopfman et al., 1998). In persuasive health communication about organ donations, narrative messages stimulated more affective responses (e.g., higher anxiety ratings), while statistical evidence elicited greater cognitive reactions (e.g., careful assessments of causal relevance). Related to the HSM, statistical evidence elicited both systematic and heuristic processing, while narratives only lead to heuristic processing. However, affective responses were only present in narratives and were not evoked by statistical evidence. The authors concluded that, statistical evidence is superior for messages' persuasive outcomes due to the possibility of processing through both

routes. However, it remains unclear whether a persuasive advantage of statistical information could be measured in CCC.

Conflicting results found advantages of emotional appeals over cognitive appeals under certain conditions in consumer decision-making research (Shiv & Fedorikhin, 1999). Accordingly, consumers made more emotional, unhealthier purchasing decisions (i.e., chocolate cake) when processing was low, and cognitive, healthier purchasing decisions (i.e., fruit salad) when processing was high. Consumer research by Klesse et al. (2015) uncovered similar findings. In multiple experiments, participants had to choose products differing in calories either orally or manually (pressing buttons, writing). Results showed that speaking led to more indulgent, emotional choices (heuristic processing), i.e., participants chose significantly unhealthier snacks, and manually deciding lead to healthier, considerate choices (systematic processing). Interestingly, this effect disappeared when participants spoke in their L2, i.e., speaking elicited considerate choices. This leads to questioning whether an emotional focus in CCC would also cause more affective reactions in the audience's L1 versus L2. Specifically, could this potentially increased affective reaction in an L1 compared to an L2 lead to increased persuasiveness of CCC?

Social advertising research provides insights into the effects of message appeal on attitudes and behavioral intention concerning pro-environmental behavior. Noble et al. (2014) investigated influences of positive emotional, negative emotional, and rational, i.e., factual, message appeals on ad effectiveness, concerning ad likability, attitude towards the issue, and behavioral intention. They found that negative emotional appeals, that evoke guilt in the audience, were most effective in influencing attitudes towards climate change and intentions to act environmentally friendly. However, it remains unclear whether this would be replicated when messages are presented in an audiences' L2 versus their L1.

The discussed studies illustrate the persuasive power of emotion on message processing and decision-making. CCC research suggests an importance of emotional appeals in aiding message effectiveness (Nerlich et al., 2010; Noble et al., 2014). Importantly, a first versus second language likely influences audiences' reactions (Klesse et al., 2015). Therefore, more CCC research, specifically investigating effects of language, is crucial.

Perceived Emotionality in Bilinguals

The previous section has emphasized the significance of emotions in persuasive message design. Due to globalization, mass communication is increasingly disseminated in English.

Therefore, it is critical to examine emotional reactions in bilinguals to ensure maximally persuasive outcomes of communicative efforts.

A *bilingual* is a speaker of two languages. Scholars classify a bilingual as using two languages in everyday situations, e.g., due to immigration or in educational settings (Pavlenko, 2005). Because both languages were acquired in different contexts, language proficiency is rarely identical. Moreover, a distinction should be made between *simultaneous bilinguals* (who have learned two languages from birth on), *early bilinguals* (who acquired an L2 at a young age before puberty), and *late bilinguals* (who have learned their L2 past the age of twelve; Pavlenko, 2012).

Past research studying bilinguals suggests that emotional perceptions differ depending on the language of messages. In a marketing context, messages were generally perceived as more emotional in participants' L1 than in their L2 (Caldwell-Harris & Aycicegi-Dinn, 2016; Puntoni et al., 2009). Puntoni et al. (2009) tested bilingual consumers' perceived emotionality of marketing communication in their L1 and L2. They found that L1 messages were perceived as more emotional. Furthermore, the context in which the language was acquired and used affected perceived emotionality. Thus, words in an L1 were perceived as more emotional when encountered predominately in L1 experiences. In CCC, relating contents to emotional experiences in an L1 (e.g., its impacts on one's family) could consequently lead to more emotional responses in an L1 than L2. Due to relations between emotion and persuasion, evoked emotions could then positively influence climate change attitudes and behavioral intention.

Caldwell-Harris and Aycicegi-Dinn (2016) refer to reduced perceived emotionality of L2 versus L1 messages as *emotional blunting* but acknowledge the importance of context of language acquisition and use. For instance, taboo words were found to elicit stronger emotional reactions in an L1 than in an L2 supposedly because of acquired emotional resonance during childhood. However, when an L2 is acquired from an early age, responses to L2 and L1 taboo words were comparable. This impact of age and context of acquisition on perceived emotionality could affect how CCC in an L1 and L2 is processed.

Perceived Emotionality in Late Learners

As many audiences of global mass communication have acquired English through school education and later exposure such as mass media, late bilinguals are important to consider. Language proficiency seems to influence judgements of emotionality in late bilinguals (Costa et al. 2014; Pavlenko, 2012). While early bilinguals judge emotionality equally in their L1 and L2, late learners perceive higher emotionality in their L1, possibly due to late learners acquiring

L2s in decontextualized classroom settings, creating little emotional resonance (Pavlenko, 2012). Therefore, it is likely that late learners, unlike early bilinguals, perceive messages as more emotional in their L1 than in their L2.

Similarly, Costa et al. (2014) tested the Trolley Dilemma in L1 and L2 conditions and found differing results depending on L2 proficiency. During the task, participants must decide between respecting the right to life of a single individual at the cost of the lives of five people, and a utilitarian choice, sacrificing the life of one by saving five, making a choice for the greater good. In the L2 condition, more utilitarian choices were made, sacrificing one individual. The authors suggest that this was due to reduced emotional response in an L2, leading to reduced intuitive emotional concerns about the outcome of sacrificing one life. However, with increased L2 proficiency, participants behaved more like native speakers, making fewer utilitarian choices, probably due to increased emotional resonance. Therefore, it would be interesting to investigate a possible correlation between L2 proficiency and perceived emotionality in a new context. Specifically, it remains unclear whether this effect can be generalized from moral dilemmas to another setting, namely CCC.

Processing Differences in L1 and L2

Language choice may influence message processing. Caldwell-Harris and Aycicegi-Dinn (2016) suggest that an L1 is likely to elicit emotional, heuristic processing while an L2 possibly stimulates more considerate, systematic processing. Klesse et al. (2015)'s study about food choices supports this, discovering that speaking an L2 evoked more cognitively considerate consumer choices than speaking in an L1. Consequently, the cognitive effort needed to speak in an L2 might be enough to process the choice cognitively, making spontaneous, indulgent decisions more unlikely. It remains unclear whether this can also lead to different persuasive outcomes in CCC in an L1 versus L2.

Research suggests that decision-making biases can be reduced in an L2 compared to an L1 due to *disembodied cognition* (Pavlenko, 2012), i.e., an emotional disconnection of an L2. Decision-making processes are possibly more logical in an L2 than in an L1 due to more systematic processing in an L2, causing less influence of emotional heuristics (Caldwell-Harris & Aycicegi-Dinn, 2016). Moreover, a *foreign language effect* has been found in an L2 whereby participants were increasingly risk-taking and accepting harm for the greater good (Circi et al., 2021). When having to choose a certain versus risky option in an L1 and L2, with the risky option optimally leading to greater outcomes, certain options were preferred in an L1 (Keysar et al., 2012). However, in an L2, participants made riskier choices based on more systematic

processing. Moreover, Costa et al. (2014)'s Trolley Dilemma showed that the systematic choice of sacrificing one life and benefiting the greater good, was preferred when conducting the experiment in an L2 compared to an L1. A possibly reduced emotional resonance in an L2 decreased emotional biases, leading to more careful consideration of the message and outcomes.

Research Focus and Relevance

Ultimately, persuasive messages aim at changing behavior. Based on Fishbein and Yzer (2003), attitudes underlie behavioral intentions, which are a predictive determinant of behavior. Therefore, the current study operationalized persuasiveness as *attitude towards climate change* and *behavioral intention*. Moreover, because of globalization and increasing amounts of mass communication disseminated in English, the study focuses on a non-native English audience (Dutch) with English as their L2.

The previous theoretical investigation demonstrated persuasive differences between factual and emotional messages. While several studies suggest persuasive benefits of emotional appeals in consumer research (Klesse et al., 2015; Shiv & Fedorikhin, 1999) and in pro-environmental advertising (Noble et al., 2014), health communication research suggests factual messages' persuasive advantage (Kopfman et al., 1998). Due to limited, contradicting findings, it remains unclear whether emotional or factual CCC would be more persuasive. Furthermore, previous literature does not indicate whether CCC might be more persuasive in the audience's L1 or L2. Therefore, the following research questions have been formulated.

RQ1: What effects do emotional messages versus factual messages have on the persuasiveness of CCC?

RQ2: What effects do L1-Dutch versus L2-English messages have on the persuasiveness of CCC?

Past research indicates increased perceived emotionality in an L1 compared to an L2 (e.g., Caldwell-Harris & Aycicegi-Dinn, 2016). Likewise, research found a relationship between L2 proficiency and perceived emotionality of an L2 (Costa et al., 2014). Therefore, a possible correlation between the two variables may exist. The following hypotheses address the effects suggested by prior studies.

H1: The L1-Dutch messages will be perceived as more emotional than the L2-English messages.

H2: English proficiency positively correlates with perceived emotionality of the English emotional message.

Past research discusses the persuasive power of emotion (Jorgensen, 1996). Relating this to the notion of increased perceived emotionality in an L1 compared to an L2 (e.g., Caldwell-Harris & Aycicegi-Dinn, 2016), and that an L2 is likely to evoke systematic processing, causing less influence of peripheral, emotional cues (e.g., Costa et al., 2014), it can be expected that emotional messages, relying on heuristics, could be more persuasive in an L1 than L2. Additionally, the factual message may activate both heuristic and systematic processing (Kopfman et al, 1998). Therefore, there should be little or no persuasive differences between the factual message in L1 and L2. Importantly, no research has investigated a possible relationship between language and message type of CCC. Therefore, the following hypothesis is speculative.

H3: If there is an L1 persuasive advantage over an L2, the effect will be greater for the emotional message than the factual message concerning CCC.

The findings of the current research will provide a better understanding of emotionality perceptions of bilingual's L1 and L2. Additionally, results will provide valuable insights into persuasive communication towards bilinguals in a new context, namely CCC. More specifically, with a focus on emotionality versus factuality, the heuristic versus systematic processing in bilinguals' L1 and L2 will be further examined. Additionally, findings will offer valuable insights into CCC towards global audiences. Investigating how message design can increase persuasiveness in multilingual audiences could contribute to society adopting more environmentally friendly attitudes and behaviors that combat climate change. Results will positively aid governments, non-governmental organizations, and environmental activists to communicate their messages as persuasively as possible.

Methodology

Materials

To operationalize the two independent variables *language* and *message type*, four written appeals discussing climate change's negative impact on Dutch farmers and providing suggestions for environmentally friendly behavior were established. An emotional and a factual message about the topics were written in English by students with a C1 English language

proficiency from the Radboud University. The messages were checked by a native English speaker with linguistic expertise and then translated into Dutch by native Dutch speaking students from the Radboud University. The four messages counted between 432 and 483 words (Appendix A).

The emotional version focused on a Dutch farmer's struggles due to consequences of climate change, focusing on his family and loved ones. The factual messages discussed Dutch farmers' problems due to weatherly changes in general.

The two message types differed in their emotional resonance. The emotional message alluded to emotional concepts, such as one's family, addressed the audience directly and included emotional words which were chosen based on research by Warriner et al. (2013). The factual message, on the other hand, excluded emotional experiences, focusing on general environmental consequences for farmers and resorting to neutral words (based on Warriner et al., 2013). A full list of the emotional and neutral words used, and their selection criteria can be found in Appendix B.

Subjects

In total, 246 subjects started the questionnaire of which 151 finished the experiment and met the selection criteria. Only participants that gave consent to their data being used, who were at least 18 years old, and who spoke English as their L2 were included. Moreover, only participants whose single L1 was Dutch were included. This was necessary because emotionality in a language partly relies on past experiences, often from childhood (e.g., Caldwell-Harris & Aycicegi-Dinn, 2016). Including simultaneous bilinguals would risk participants relating to emotional experiences in another L1 rather than in Dutch.

The final data analysis was conducted with subjects who indicated adequate comprehension of the encountered message. Specifically, participants needed to indicate "Slightly agree", "Agree", or "Strongly agree" on a comprehension check scale to be included in the data analysis. This eventually led to a sample of 140 native Dutch speakers who acquired English as an L2. The mean age of participants was 24.38 years ($SD = 7.78$; range: 19 – 62) and 68.6% were female (31.4% males). The most frequent highest or current level of education was WO, i.e., research university (65%), followed by HBO, i.e., university of applied sciences (22.9%), high school (9.3%), and MBO, i.e., secondary vocational education (2.9%).

According to the results of a LexTALE English proficiency test, participants had high English skills ($M = 79.82$, $SD = 11.98$; 1 = low proficiency, 100 = high proficiency). Generally, the age of English acquisition was 10.39 years ($SD = 2.66$).

Two chi-square analyses showed equal distribution of subjects' characteristics across conditions concerning gender ($\chi^2(3) = 0.23, p = .972$) and educational level ($\chi^2(9) = 8.82, p = .454$). Additionally, three one-way ANOVAs indicated that the characteristics age ($F(3, 136) < 1$), English proficiency ($F(3, 136) = 1.84, p = .142$), and age of English acquisition ($F(3, 136) < 1$) were equally distributed across the four conditions.

Design

Testing the proposed research questions and hypotheses, a 2x2 between-subject experiment with *language* (L1-Dutch vs. L2-English) and *message type* (emotional message vs. factual message) as independent variables was conducted, leading to four conditions.

Instruments

To test whether emotionality manipulation of the messages was successful, whether there were perceived emotionality differences between Dutch and English, and whether there was a correlation between L2 proficiency and perceived emotionality, a seven-point unipolar scale, inspired by Puntoni et al. (2009), was incorporated. Participants rated the messages on a scale preceded by the statement "This message is ...", ranging from "not emotional" to "emotional".

Moreover, a comprehension check assessed whether subjects understood the message. On a seven-point Likert scale ranging from "Strongly disagree" to "Strongly agree", participants indicated their understanding based on the statement "I fully understood the message the text was trying to convey."

The dependent interval variables to evaluate the messages' persuasiveness were *attitude towards climate change* and *behavioral intention*.

Attitude towards climate change was captured by six seven-point Likert scales based on Dijkstra and Goedhart (2012). The six statements were "People should care more about climate change", "Climate change should be given top priority", "People worry too much about climate change" (reverse coded), "Climate change is a threat to the world", "The seriousness of climate change has been exaggerated" (reverse coded), and "It is annoying to see people do nothing for the climate change problem". Each statement was anchored by "Strongly disagree" and "Strongly agree". The reliability of the scales proved to be good: $\alpha = .85$. Consequently, the mean of all six statements was used to calculate the compound variable *attitude towards climate change*, which was used in further analyses.

Behavioral intention was measured by six seven-point Likert scales, ranging from "Strongly disagree" to "Strongly agree", capturing the intentions of participants to behave

sustainably after reading the messages. The scales read “I intend to follow the behavior described in the message”, “I will follow the behavior described in the message”, “I am willing to follow the behavior described in the message”, “I plan to follow the behavior described in the message”, “I am not willing to change my lifestyle to counteract global warming and climate change” (reverse coded), and “I will do everything that I can to reduce my ecological footprint“ (based on Fishbein & Ajzen, 2010; Masud et al., 2016). The reliability of the scales was good: $\alpha = .91$. Consequently, the mean of all six statements was used to calculate the compound variable *behavioral intention*, which was used in further analyses.

A LexTALE English proficiency test (Lemhöfer & Broersma, 2012) was implemented to check for a possible correlation of L2 proficiency and perceived emotionality.

Additionally, the participants' age, gender, educational level, mother tongue, and age of English acquisition were captured.

The instruments were entirely in Dutch (find the whole questionnaire in Appendix C). This decision was based on research by De Langhe et al. (2011) who found the *anchor contraction effect*. Accordingly, people can give more intense responses when a questionnaire is in their non-native language compared to their L1. To avoid such skewed responses, the questionnaire, and scales, but not the LexTALE, were presented in participants' L1.

The suggested relationship between the independent and dependent variables is depicted in the analytical model in Figure 1.

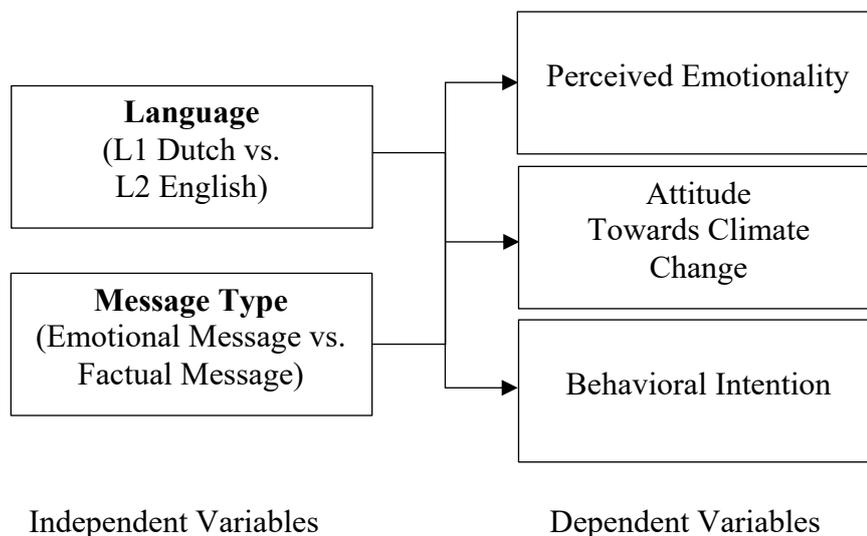


Figure 1. Analytical Model.

Procedure

The experiment was conducted online via the Internet tool Qualtrics. Individuals were recruited through convenience sampling via a link to the online experiment disseminated on the researchers' social media channels.

Participants were not informed about the purpose of the study but learned that their identity shall remain anonymous, and that they could exit the experiment at any time. Contact information of one researcher was presented in case of questions regarding the study's purpose or other issues.

First, control questions were asked to exclude subjects that did not meet the requirements for participation. Participants who did not consent with sharing their responses, were not older than 18 years old, did not have Dutch as their single L1, or did not speak English were immediately excluded from the experiment. Following, participants were randomly placed in one of the four conditions, being presented one message. Then, the comprehension check question was presented and participants who did not comprehend the message were later excluded from the study. Next, the questions testing the dependent variables and the emotionality manipulation check were presented. Afterwards, participants were asked to complete a LexTALE English test (Lemhöfer & Broersma, 2012). Following, participants reported their demographic information. Eventually, the subjects were thanked for their contribution. The median time to complete the experiment was 8.27 minutes.

Statistical Treatment

Assessing whether participants' characteristics were equally distributed across the four conditions, two chi-square analyses regarding gender and educational level, and three one-way ANOVAs concerning age, English proficiency, and age of English acquisition were conducted.

A two-way ANOVA was conducted to test whether the manipulation of perceived emotionality was successful across the message types, and to investigate whether there was a difference in perceived emotionality related to language. A possible interaction effect of message type and language on perceived emotionality was also examined.

Furthermore, to test for significant main effects of language and message type as well as possible interaction effects between language and message type on the dependent variables attitude towards climate change and behavioral intention, two two-way ANOVAs were conducted.

Lastly, a correlation analysis established a possible correlation between L2-English proficiency and perceived emotionality of the L2-English emotional message.

Results

The purpose of the study was to investigate whether Dutch native speakers with English as their L2 were differently persuaded by two message types (emotional vs. factual) about climate change in their L1 or L2. Additionally, the study aimed at examining differences in emotionality perceptions in the audience's L1 and L2, and a possible correlation between L2 proficiency and the perceived emotionality of the L2 emotional message. Means and standard deviations of all tests can be found in Table 1.

Table 1. Means, standard deviations, and *n* for perceived emotionality, attitude towards climate change, and behavioral intention in function of language (L1-Dutch and L2-English) and message type (emotional and factual). N = 140; 1 = low, 7 = high.

	L1-Dutch			L2-English			Total		
	<i>M</i>	(<i>SD</i>)	<i>n</i>	<i>M</i>	(<i>SD</i>)	<i>n</i>	<i>M</i>	(<i>SD</i>)	<i>n</i>
<i>Perceived emotionality</i>									
Emotional	5.50	(1.11)	36	5.81	(1.05)	31	5.64	(1.08)	67
Factual	3.31	(1.39)	35	3.24	(1.57)	38	3.27	(1.47)	73
Total	4.42	(1.66)	71	4.39	(1.87)	69	4.41	(1.76)	140
<i>Attitude towards Climate Change</i>									
Emotional	5.49	(0.91)	36	5.88	(0.87)	31	5.67	(0.91)	67
Factual	5.58	(0.84)	35	5.66	(1.03)	38	5.62	(0.94)	73
Total	5.54	(0.87)	71	5.76	(0.96)	69	5.65	(0.92)	140
<i>Behavioral Intention</i>									
Emotional	4.63	(1.05)	36	5.08	(1.05)	31	4.83	(1.07)	67
Factual	4.88	(1.02)	35	4.93	(1.28)	38	4.91	(1.15)	73
Total	4.75	(1.04)	71	5.00	(1.18)	69	4.87	(1.11)	140

Manipulation Check and Perceived Emotionality

First, to check whether the emotionality manipulation of the emotional and factual messages was successful, and to establish a possible difference in perceived emotionality between the L1-Dutch and L2-English messages, a two-way ANOVA with language (L1-Dutch vs. L2-English) and message type (emotional vs. factual) as factors on perceived emotionality was conducted.

The test showed a significant main effect of message type on perceived emotionality ($F(1, 136) = 115.22, p < .001$). Participants perceived the emotional messages to be significantly more emotional ($M = 5.64, SD = 1.08$) than the factual messages ($M = 3.27, SD = 1.47$). Therefore, the manipulation check was successful, and the materials were designed as intended; the emotional messages were indeed perceived as more emotional than the factual messages.

Additionally, the two-way ANOVA did not find a significant main effect of language on perceived emotionality ($F(1, 136) < 1$). Therefore, the L1-Dutch and L2-English messages were perceived as equally emotional, disconfirming H1.

Lastly, although there was no research question or hypothesis devoted to a possible interaction between language (L1-Dutch vs. L2-English) and message type (emotional vs. factual) on perceived emotionality, it would be interesting to report, as the design of the study allows such an investigation. However, the test did not reveal a significant interaction effect between language and message type on perceived emotionality ($F(1, 136) < 1$).

Persuasiveness: Attitude Towards Climate Change and Behavioral Intention

Addressing RQ1, RQ2, and H3, concerning main effects of language, main effects of message type, and an interaction effect between the two independent variables on persuasiveness, two two-way ANOVAs were conducted.

A two-way ANOVA with language (L1-Dutch vs. L2-English) and message type (emotional vs. factual) as factors did not show a significant main effect of language ($F(1, 136) = 2.24, p = .137$) or message type ($F(1, 136) < 1$) on attitude towards climate change. Moreover, the test did not reveal a significant interaction effect between language and message type on attitude towards climate change ($F(1, 136) < 1$).

A second two-way ANOVA with language (L1-Dutch vs. L2-English) and message type (emotional vs. factual) as factors did not find a significant main effect of language ($F(1, 136) = 1.76, p = .187$) or message type ($F(1, 136) < 1$) on behavioral intention. Additionally, no significant interaction effect between language and message type on behavioral intention was found ($F(1, 136) = 1.14, p = .288$). Answering RQ1 and RQ2, the emotional and factual messages were equally persuasive, and the L1-Dutch and L2-English messages did not differ in persuasiveness. Furthermore, disconfirming H3, participants were equally persuaded by either of the four messages concerning attitude towards climate change and behavioral intention.

Correlation: English Proficiency and Perceived Emotionality

Confirming H2, a significant weak positive correlation was found between L2 proficiency and perceived emotionality of the L2-English emotional message ($r(31) = .35, p = .028$). Perceived emotionality of the L2-English emotional message increased with L2-English proficiency.

Conclusion and Discussion

The purpose of the current research was to investigate whether emotional versus factual messages addressing climate change were more persuasive in an audiences' L1 (Dutch) or L2 (English). Persuasiveness was operationalized as *attitude towards climate change* and *behavioral intention* underlying environmentally friendly behavior (Fishbein and Yzer, 2003). Concerning RQ1 and RQ2, no significant difference in persuasiveness was found between the emotional and factual messages, and the same was true for the L1-Dutch and L2-English messages. Furthermore, no support was found for H3, as the four messages were perceived as equally persuasive. Surprisingly, there was no L1 persuasive advantage over L2 with a greater effect for the emotional than the factual message. Additionally, two hypotheses addressed perceived emotionality differences of the L1-Dutch and L2-English messages and a correlation between L2-English proficiency and perceived emotionality of the L2-English message. Disconfirming H1, the L1-Dutch messages were not perceived as more emotional than the L2-English messages. However, confirming H2, a weak positive correlation between perceived emotionality and English proficiency was found; that is, perceived emotionality of the English emotional message increased with enhanced English proficiency.

Discussion of Findings

Findings concerning persuasiveness of emotional and factual messages did not reveal a significant main effect of message type. Kopfman et al. (1998) suggested persuasive advantages of factual appeals in health communication, however, persuasiveness of messages was not directly tested. Rather, the conclusion of factual appeals' benefits was drawn based on statistics evoking systematic and heuristic processing, while narratives only evoked heuristic processing. The current research, however, directly measured persuasiveness, making different suggestions than those of Kopfman et al. (1998). Namely, emotional and factual messages can be equally persuasive. Moreover, consumer research showed persuasive advantages of emotion under certain circumstances (Shiv & Fedorikhin, 1999; Klesse et al., 2015). Specifically, emotional choices were preferred during low processing while factual choices were preferred during high processing. The current study, however, did not directly manipulate processing capacity of

participants. Therefore, it is not possible to link participants' route of processing to the results of persuasiveness judgements of the two message types. However, the findings of the current study give indications that, without manipulation of processing capacity, participants evaluated emotional and factual CCC equally persuasive. Concerning CCC research, Noble et al. (2014) found that emotional guilt appeals in pro-environmental communication were more persuasive than rational messages. Therefore, an advantage of emotional CCC was found which does not concur with findings of the current study. An explanation could be that the current study did not operationalize emotionality with guilt appeals. Rather, the emotional messages focused on evoking sadness towards the destiny of the family affected by climate change. Then, hope was created by offering solutions to combat climate change. This finding contributes to the literature in that sadness and hope combined may be equally persuasive as factual appeals in CCC. Future research could test the persuasiveness of different emotional appeals such as fear, anger, or excitement compared to factual appeals.

Additionally, the study did not find a persuasive advantage of L1-Dutch or L2-English in CCC. This may be explained by the high L2-English proficiency of the sample (mean LexTALE result 79.82). Specifically, the L2-English proficiency may have been too similar to the samples' L1-Dutch skills to cause a difference on the dependent variables. Future research should test the samples' Dutch skills (e.g., Dutch LexTALE; Lemhöfer & Broersma, 2012) to compare L1 and L2 skills. To the best of the researcher's knowledge, this study was the first to look at possible persuasive differences in CCC caused by an L1 or L2. Therefore, speculative findings adding to the literature can be made, in that a Dutch audiences' L1 is equally persuasive as an L2 when it comes to CCC.

Furthermore, no persuasive advantage of L1-Dutch over L2-English with a greater effect for the emotional than the factual message was found. This contradicts speculative expectations based on the discussed literature. Previous research discusses the persuasive power of emotion (e.g., Jorgensen, 1996). Especially regarding how emotions can play a significant role in consumer research (Klesse et al., 2015; Shiv & Fedorikhin, 1999), and CCC research indicates general advantages of emotional messages (Noble et al., 2014). Furthermore, past studies indicate increased emotionality perceptions of an L1 compared to an L2 (e.g., Caldwell-Harris & Aycicegi-Dinn, 2016; Pavlenko, 2012), with an L1 being more influenced by heuristic, emotional cues than an L2 (e.g., Costa et al., 2014). An L2, on the contrary, is more likely to cause systematic processing, as the effort needed to think in an L2 could be enough to elicit cognitive consideration of the message (Keysar et al., 2012). Therefore, heuristic, emotional cues should not influence persuasiveness of an L2 compared to an L1 message. Connecting

these insights, the current study believed that there should be an advantage of an L1 compared to an L2 for the emotional message, while the factual message should be less influenced by the factor language. However, findings of the current study indicated no difference in persuasiveness between the four messages. Neither the English emotional, English factual, Dutch emotional, nor Dutch factual message indicated increased persuasiveness. As the first study to connect emotionality and factuality of CCC to the L1 and L2 of an audience, these findings contribute to the literature. Specifically, a native or foreign language may not influence persuasiveness of emotional or factual messages in CCC towards Dutch-English bilinguals. Possible explanations for these findings are considered next.

One explanation could be that current participants might have had strong opinions about climate change and were already behaving environmentally friendly. In this instance, participants already possessed positive attitudes and behavioral intentions, as the means suggest, and the messages only confirmed preexisting beliefs. On the other hand, the four messages might have been equally persuasive and affected attitudes and behavioral intentions equally positively. This might be due to participants' high outcome-relevant involvement concerning the topic which develops when audiences have much to gain from adopting the correct attitude (Johnson & Eagly, 1989). High involvement with climate change appears likely due to the young mean age (24.38 years) and educational level (87.9% research university or university of applied science) of the sample. Recent research showed that large percentages of students around the world are worried about climate change and understand that human activities are a major cause of the issue (Leal Filho et al., 2022), increasing outcome-relevant involvement. Concerning attitudes, it is likely that the relatively young sample aspired to obtain favorable attitudes towards climate change due to its impact on future generations. Chaiken et al. (1989) suggest that high outcome-relevant involvement causes increased motivation to systematic processing of messages. Therefore, the factual messages in L1-Dutch and L2-English, were probably both centrally processed, leading to high persuasive outcomes. Concerning the emotional messages, Petty and Briñol (2015) suggest that emotions can serve as peripheral cues under low processing, and as arguments when processing is elaborate. Therefore, disregarding involvement of the audience with climate change, the emotional messages could have served persuasive means in both, the L1-Dutch, and the L2-English emotional conditions. Consequently, all four messages positively increased environmentally friendly attitudes and behavioral intentions.

A second explanation for non-significant effects of language and message type on persuasion can be found in results to H1. H1 was not confirmed as there was no significant

difference between the L2-English and L1-Dutch emotional message. Conversely, previous research found *emotional blunting*, i.e., an L2 was perceived as less emotional than an L1 (Caldwell-Harris & Aycicegi-Dinn, 2016). Therefore, the L1-Dutch messages should have scored higher on perceived emotionality than the L2-English messages. As the manipulation check for emotionality confirmed that the emotional messages were perceived as more emotional than the factual messages, these findings cannot be attributed to an unsuccessful manipulation of materials. One explanation could be the generally high English proficiency of the sample (mean LexTALE result 79.82) and the young mean age of English language acquisition (10.39 years). Moreover, Dutch people are regularly exposed to English media and education (Edwards, 2016; Gerritsen et al., 2016) which implies that exposure to emotional concepts, as displayed in, e.g., movies, consistently happens in English. Research found that increased L2 proficiency led to increased emotional responses (Costa et al., 2014), and age of acquisition linked to emotionality judgements in an L2 (Pavlenko, 2012). According to Pavlenko (2012), late learners, classified as having learned a language after the age of twelve, judge emotionality higher in their L1 compared to their L2. However, an L1 and L2 are judged similarly concerning emotionality by early bilinguals who acquired their L2 before the age of twelve. Findings of the current study concur with suggestions by Pavlenko (2012) about early bilinguals, as the current sample can be identified as early bilinguals, having acquired English before the age of twelve. Therefore, it was likely that no difference in perceived emotionality of the two emotional messages was found, as the sample was not comprised of late bilinguals, as desired.

Returning to explanations of no persuasive advantage of L1 over L2 with greater effects for the emotional than the factual message, the explanations to findings of H1 become relevant. As the theoretical background suggested, persuasion is linked to emotion (Jorgensen, 1996), and perceived emotionality should be higher in an L1 compared to an L2 (Caldwell-Harris & Aycicegi-Dinn, 2016). Due to these differing emotional perceptions, the L1-Dutch emotional message could have been more persuasive than the L2-English emotional message. However, as results indicate, the L1-Dutch and L2-English emotional messages were not judged differently concerning emotionality. Therefore, it is likely that no persuasive difference of emotional messages in the two languages would be found, as there was no difference in emotionality perceptions in the highly English proficient sample.

Similarly, the theoretical background suggested that thinking in an L2 may elicit cognitive processing (Klesse et al., 2015) which should have caused little influence of heuristic cues in the L2-English emotional message. However, due to the high English proficiency and

early English acquisition of participants, thinking in English might have not been effortful but rather automatic, causing no difference in persuasiveness of the L1-Dutch emotional and L2-English emotional message. In other words, manipulating language between English and Dutch may have not been enough to influence processing capacity of the participants. This may be another explanation for an insignificant interaction effect of language and message type on persuasiveness.

Nevertheless, the current study found a significant positive correlation between perceived emotionality and L2-English proficiency, confirming H2. Concurring with findings by Costa et al. (2014), enhanced English language proficiency increased the perceived emotionality of the L2-English emotional message. However, the correlation was weak. This can possibly be attributed to the high L2-English proficiency of the sample who judged the L2-English and L1-Dutch emotional messages similarly emotional. Nevertheless, these findings contribute to the literature in that it was found that even highly proficient L2-English users showed differences in perceived emotionality ratings of the L2-English emotional message, correlating with their L2-English proficiency. This generalizes findings to another context, namely CCC, which suggests that increased perceived emotionality with increased L2 proficiency might be a more general mechanism, rather than only related to certain emotional concepts, such as moral dilemmas (as in Costa et al., 2014).

Limitations and Future Research

Several limitations of the current study and suggestions for future research should be discussed. First, the sample was not comprised of late bilinguals, having acquired English after the age of twelve, as intended. Rather, participants acquired English at an early age and were highly proficient which was likely a cause for insignificant findings. Future research should investigate whether findings of the current study would differ with a sample of late bilinguals with a lower overall English proficiency. How low the English proficiency might have to be to find significant differences must be tested, but the current research suggests a proficiency of lower than the current sample, i.e., lower than 79.00 points on the LexTALE test (Lemhöfer & Broersma, 2012).

Second, as involvements and attitude towards climate change of the participants was not measured prior to the experiment, it was unclear whether the conditions had an influence on subjects' attitudes and behavioral intention. Future research should incorporate prescreening questions to come to clearer conclusions of the findings. Similarly, as the sample's stance of the issue was not predetermined, the messages might have communicated a persuasive claim

that could not have influenced participants' attitudes. More specifically, claims that are too extreme compared to the audience's stance on an issue fall into their latitude of rejection, while claims that are too close to the audiences' held beliefs similarly do not influence attitudes (Sherif et al., 1965). Rather, persuasive communication is believed to be the most influential when making claims that the audience has neither rejected nor already accepted, i.e., claims that fall within their latitude of noncommitment. Future research should investigate which persuasive claims regarding climate change fall within the audience's latitude of noncommitment prior to the experiment (see, e.g., Siero, 1992, for methods), as this would ensure the most substantial persuasive influence.

A third limitation can be found in the focus of the messages trying to influence attitudes about climate change as underlying behavioral intention and the target behavior (Fishbein & Yzer, 2003). While CCC research advises to influence attitudes (Gifford & Sussman, 2012), past research indicates that for environmental issues, influencing the descriptive perceived norm, underlying behavioral intention (Fishbein & Yzer, 2003), may be more effective (Nolan et al., 2008). Influencing the descriptive perceived norm by describing other people confirming to the target behavior can implicitly persuade the reader to behave similarly. Specifically, Nolan et al. (2008) showed that messages targeting the descriptive perceived norm about conserving energy were more influential in changing actual behavior than self-interest (saving money by conserving energy) and environmental appeals (protecting the environment by conserving money), while participants themselves believed the perceived norm message to be the least motivating to conform to the behavior. Results were replicated by Goldstein et al. (2008) concerning towel reuse messages. Therefore, future research should investigate whether language and message type of a persuasive message targeting descriptive perceived norms show an effect on behavior. Measuring actual behavior could be operationalized by, e.g., offering participants two snacks with differing environmental impacts after being exposed to the persuasive messages. For example, two sandwiches with the same spreads, but differing indications of their productions' CO₂ emissions in kg could be offered. One sandwich could display high CO₂ emission, and the other low CO₂ emission. Effects of the persuasive messages on behavior could be measured by how many participants choose the more environmentally friendly option after being exposed to the different messages.

Lastly, the results cannot be generalized to other countries or the general Dutch population. Participants were mostly young, highly educated, Dutch people which restricts generalization of the results to this population. To provide insights into different populations,

future research should replicate the study including more varied demographics and conduct the study in different country settings, incorporating different L1s and L2s.

Scientific and Practical Implications

To summarize, the current study provides important theoretical insights into the field of emotion and persuasion in bilinguals in a new context, namely CCC. Results are scientifically relevant in various ways. First, findings add to the literature that emotionality ratings of L1-Dutch and L2-English messages did not significantly differ in early bilinguals with advanced English proficiency in this specific context. Second, it was shown that emotionality of L2-English and L2-English proficiency correlated in participants with advanced English skills, in that enhanced L2-English proficiency increased emotionality perceptions of L2-English. Lastly, the study suggests that factual messages about climate change, including statistics, versus emotional messages, evoking sadness, and hope, in an audience's L1 and L2 were equally persuasive concerning attitude towards climate change and intentions to behave environmentally friendly. In other words, the peripheral versus systematic processing manipulation through influencing message languages may not be effective in a highly L2 proficient audience concerning a complex topic such as climate change.

Additionally, the study's findings provide valuable practical implications for governments, non-governmental organizations, and environmental activists. Contributing to the ongoing debate whether internationally running English campaigns should be standardized or localized (see e.g., De Pelsmacker et al., 2017), the current study showed that communication targeted at highly educated young Dutch adults can be standardized due to equal persuasion of messages in Dutch and English. Therefore, organizations can save valuable resources on not having to localize to a Dutch context. Moreover, CCC can be presented to the mentioned audience using emotional or statistical appeals equally.

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Appendix A

Materials for experiment including emotional and factual messages in English and Dutch.

Appendix A1. English emotional message.

My name is Daan. I am 37 years old, and I am the father of two joyful boys. My wife Tessa and I own a potato farm in beautiful South Limburg in the Netherlands. We inherited the farm in early 2018 after my father died. Ever since, we have had to face terrible weather challenges.

In the summer of 2018, it was incredibly hot and sunny, and it rained less than ever before – a horrible time to grow potatoes. Because of that, our family's farm severely suffered. The severe drought killed most of the harvest, and with awfully little rain, groundwater was scarce. Watering the plants was hopeless. We lost half of our harvest and thus our most important income source. We could not pay our bills.

As we slowly recovered, the next tragedy hit in 2021. Monstrous rainfalls in Limburg, Belgium, and Germany led to disastrous floods. We feared for our lives and evacuated the farm to stay with Tessa's mother in Utrecht. The flood destroyed the fields, causing massive losses in the harvest. Our dearly loved home and cherished belongings are ruined forever. A few days later, a sad message from Germany hit me. My childhood friend Luuk, who had moved to Western Germany, was overwhelmed by the flood. His house was swept away by the forceful stream of a usually peaceful creek, drowning his wife and daughter.

These catastrophes are the result of global warming. Our lifestyle activities release enormous amounts of CO₂ which disturbs the usual balance between sunshine and rain. This leads to higher global temperatures, melting polar ice caps, and rising sea levels. More dreadful droughts, storms, and floods will cause families like mine or Luuk's to lose our homes, income, and loved ones.

This is how you can help:

- 1) Instead of flying to your next beach vacation, consider travelling by train. Trains are much more environmentally friendly. Or start small by taking the bike or bus to university or work rather than driving by car.
- 2) Next time you go shopping at the supermarket, consider buying local and seasonal foods. Eating fresh food coming right from your neighborhood is very environmentally friendly. The strawberries and tomatoes don't have to travel from far away, exotic countries and, therefore, fewer harmful gases are released.
- 3) Lastly, try to eat less meat and drink less milk. You can help the environment by not eating animals like cows, pigs, and chickens, or by not drinking cow milk and eating animal products like eggs and cheese. Raising animals for food releases immense

amounts of CO₂ that harm our beautiful earth. Eating more vegetarian and vegan meals helps with this.

Appendix A2. English factual message. Footnotes with references were omitted in the online experiment.

The Netherlands is the second biggest exporter of agricultural produce in the world, amounting to 17.5% of Dutch exports and 10% of the Dutch economy and employment¹. Produce worth €65 billion is exported annually. The sector employs approximately 660.000 people, including 50.000 vegetable and fruit farmers² who are affected by the consequences of global warming.

In mid-2018, temperatures increased to up to 38.2°C³, and only 105 milliliters of precipitation fell over three months, less than 50% of the average⁴. This negatively affected the agricultural sector⁵. A drought causes decreased crop performance due to nutrient-deficient soil, and rainfall is crucial for groundwater collection⁶. 2018 left farmers with no resources to water the crops. Potato farmers were especially affected, as their wages were reduced by 56% due to the drought⁷.

Three years later in 2021, another extreme weather event affected Southern Netherlands and Western Germany. In mid-July, some regions observed a precipitation of up to 241 l/m² in 22 hours⁸. Creeks and rivers overflowed; for instance, the Maas River in Limburg reached a flux of 3168 cubic meters per second, 20 times more than the average⁹. Water levels peaked and were 50% higher than in the previous year. The flood demolished properties, with damage costing approximately €400 million in the Netherlands¹⁰ and around €10 billion in Germany¹¹. In Germany and Belgium, around 200 people passed away¹².

These are consequences of extreme weather events due to global warming. Human activity emits extensive amounts of greenhouse gases, increasing the global temperature. Scientists estimate a 3°C increase by 2100¹³. This leads to melting polar ice caps, sea levels

¹ Government of the Netherlands (n.d.)

² Gowling (2014)

³ 2018 European heat wave (2021)

⁴ DutchNews.nl (2018)

⁵ Siepman (n.d.)

⁶ Al-Kaisi (2017)

⁷ Siepman (n.d.)

⁸ Junghänel et al. (2021)

⁹ Sharma (2021)

¹⁰ NL Times (2021)

¹¹ Zajonz (2021)

¹² Kreienkamp (2021)

¹³ Gibbens (2021)

rising, and increased water vapor in the atmosphere¹⁴. Consequently, water availability becomes less predictable, causing droughts, storms, and floods.

These are measures to prevent this:

- 1) Take public transportation. Trains emit less CO₂ than planes. A flight from London to Edinburgh releases 193kg CO₂ per passenger while a train between the two cities emits 87% less, namely 24kg CO₂ per passenger¹⁵. Moreover, commuting 32km by train rather than by car reduces 9kg CO₂ daily¹⁶.
- 2) Consume regional and seasonal products. Acquiring produce that is manufactured regionally and seasonally emits fewer greenhouse gases than acquiring produce from foreign countries. Products supplied from abroad are transported long distances to stores and can emit up to 20 times more CO₂ than regional produce¹⁷.
- 3) Consume fewer animal products. Consuming animal products emits large amounts of greenhouse gases. Global emission due to livestock amounts to 7.1 Gigatons CO₂ yearly, 14.5% of all anthropogenic greenhouse gas emissions¹⁸. Moreover, consuming oat milk compared to cow milk produces 80% less greenhouse gases and 60% less energy¹⁹.

Appendix A3. Dutch emotional message.

Mijn naam is Daan. Ik ben 37 jaar oud en vader van twee vrolijke jongens. Mijn vrouw Tessa en ik zijn eigenaar van een aardappelboerderij in het mooie Zuid-Limburg in Nederland. Wij hebben de boerderij begin 2018 geërfd na het overlijden van mijn vader. Sindsdien hebben we te maken gehad met verschrikkelijke uitdagingen door het weer.

In de zomer van 2018 was het ongelooflijk heet en zonnig, en het heeft nog nooit zo weinig geregend - een verschrikkelijke tijd om aardappelen te verbouwen. Daardoor heeft de boerderij van onze familie zwaar geleden. De ernstige droogte doodde het grootste deel van de oogst, en met akelig weinig regen was grondwater schaars. Water geven aan de planten was hopeloos. We verloren de helft van onze oogst en dus onze belangrijkste inkomstenbron, waardoor we onze rekeningen niet konden betalen.

Terwijl we langzaam herstelden, sloeg in 2021 de volgende tragedie toe: monsterlijke regenval in Limburg, België en Duitsland leidde tot rampzalige overstromingen. We vreesden

¹⁴ European Environment Agency (2018)

¹⁵ Train versus planes... (n.d.)

¹⁶ KCATA (n.d.)

¹⁷ Smead (2018)

¹⁸ Kourous (2013)

¹⁹ Wiseman (2021)

voor ons leven en evacueerden de boerderij om bij Tessa's moeder in Utrecht te gaan logeren. De overstroming heeft de velden verwoest, waardoor enorme delen van de oogst verloren zijn gegaan. Ons geliefde huis en onze dierbare bezittingen zijn voor altijd geruïneerd. Een paar dagen later kreeg ik een triest bericht uit Duitsland: het huis van mijn jeugdvriend Luuk, die naar West-Duitsland is verhuisd, was overspoeld door de overstroming. Zijn huis werd weggevaagd door de krachtige stroom van een gewoonlijk rustige beek, waardoor zijn vrouw en dochter verdronken.

Deze catastrofes zijn het gevolg van de opwarming van de aarde. Door onze levensstijl komen enorme hoeveelheden CO₂ vrij, waardoor het gebruikelijke evenwicht tussen zonneschijn en regen wordt verstoord. Dit leidt tot hogere temperaturen op aarde, smeltende ijskappen en een stijgende zeespiegel. Meer vreselijke droogtes, stormen en overstromingen zullen ervoor zorgen dat gezinnen zoals het mijne of dat van Luuk hun huis, inkomen en geliefden verliezen.

Dit is hoe je kunt helpen:

- 1) In plaats van vliegen naar je volgende strandvakantie, kun je overwegen met de trein te reizen. Treinen zijn veel milieuvriendelijker. Of begin klein en neem de fiets of de bus naar de universiteit of het werk in plaats van rijden met de auto.
- 2) Als je de volgende keer boodschappen gaat doen in de supermarkt, overweeg dan om lokaal en seizoensgebonden voedsel te kopen. Het eten van vers voedsel dat rechtstreeks uit je buurt komt is zeer milieuvriendelijk. De aardbeien en tomaten hoeven niet uit verre, exotische landen te komen en daardoor komen er minder schadelijke gassen vrij.
- 3) Tot slot, probeer minder vlees te eten en minder melk te drinken. Je kunt het milieu helpen door geen dieren te eten zoals koeien, varkens en kippen, of door geen koemelk te drinken en geen eieren en kaas te eten. Het houden van dieren voor voedsel produceert immense hoeveelheden CO₂ die onze mooie aarde schaden. Meer vegetarische en veganistische maaltijden eten helpt daarbij.

Appendix A4. Dutch factual message.

Nederland is de op één na grootste exporteur van landbouwproducten ter wereld, goed voor 17,5% van de totale Nederlandse export en 10% van de Nederlandse economie en werkgelegenheid. Jaarlijks wordt voor 65 miljard euro aan producten geëxporteerd. De sector biedt werk aan ongeveer 660.000 mensen, waaronder 50.000 groente- en fruitboeren die worden getroffen door de gevolgen van klimaatopwarming.

Medio 2018 liepen de temperaturen op tot 38,2°C en viel er slechts 105 milliliter neerslag in drie maanden tijd, minder dan 50% van het gemiddelde. Dit had een negatieve invloed op de landbouwsector. Een droogte veroorzaakt verminderde gewasprestaties als gevolg van een voedingsarme bodem, en regenval is cruciaal voor grondwaterwinning. In 2018 hadden de boeren geen middelen om de gewassen te besproeien. Vooral aardappelboeren werden getroffen, wat te zien is in hun lonen die met 56% daalden door de droogte.

Drie jaar later, in 2021, werden Zuid-Nederland en West-Duitsland opnieuw getroffen door extreme weersomstandigheden. Half juli viel er in sommige regio's tot 241 l/m² neerslag in 22 uur. Kreken en rivieren overstromden, en zo bereikte de Maas in Limburg een debiet van 3.168 kubieke meter per seconde, 20 keer meer dan het gemiddelde. Het waterpeil bereikte een hoogtepunt en lag 50% hoger dan in het voorgaande jaar. De overstroming vernielde eigendommen met schade van ongeveer 400 miljoen euro in Nederland en ongeveer 10 miljard euro in Duitsland. In Duitsland en België zijn ongeveer 200 mensen om het leven gekomen.

Dit zijn de gevolgen van extreme weersomstandigheden als gevolg van klimaatopwarming. Menselijke activiteiten stoten grote hoeveelheden broeikasgassen uit waardoor de temperatuur op aarde stijgt. Wetenschappers schatten een stijging met 3°C tegen 2100. Dit leidt tot smeltende poolkappen, een stijgende zeespiegel en meer waterdamp in de atmosfeer. Als gevolg daarvan wordt de beschikbaarheid van water minder voorspelbaar, met droogtes, stormen en overstromingen tot gevolg.

Dit zijn maatregelen om dit te voorkomen:

- 1) Neem het openbaar vervoer. Treinen stoten minder CO₂ uit dan vliegtuigen. Bij een vlucht van Londen naar Edinburgh komt 193 kg CO₂ per passagier vrij, terwijl een trein tussen de twee steden 87% minder uitstoot, namelijk 24 kg CO₂ per passagier. Bovendien stoot het woon-werkverkeer van 32 km met de trein dagelijks 9 kg minder CO₂ uit dan met de auto.
- 2) Consumeer regionale en seizoensproducten. De aankoop van producten die regionaal en seizoensgebonden zijn geproduceerd, stoot minder broeikasgassen uit dan de aankoop van producten uit het buitenland. Producten die vanuit het buitenland worden geleverd, worden over lange afstanden naar de winkels vervoerd en kunnen tot 20 keer meer CO₂ uitstoten dan regionale producten.
- 3) Consumeer minder dierlijke producten. Het consumeren van dierlijke producten stoot grote hoeveelheden broeikasgassen uit. De wereldwijde uitstoot door de veeteelt bedraagt 7,1 gigaton CO₂ per jaar, 14,5% van alle antropogene

broeikasgasemissies. Bovendien produceert de consumptie van havermelk in vergelijking met koemelk 80% minder broeikasgassen en 60% minder energie.

Appendix B

Table of emotional and neutral words used for messages, including valence (the pleasantness of a word) and arousal (emotional intensity provoked by a word) codes based on Warriner et al. (2013). Decisions about which words were “emotional” and which words were “neutral” were not made by Warriner et al. (2013) but by the researcher of the current study. However, Warriner et al. (2013) suggest a U-shaped relationship between the two emotional scales of valence and arousal in that very positive and negative words evoke higher arousal.

High emotionality was determined by words with high and low valence, and high arousal. High and low valence were chosen based on the overall *M* valence of the corpus ($M = 5.06$) plus or minus one *SD* of valence ($SD = 1.68$). High arousal was based on words with a higher arousal rating than the *M* of arousal ($M = 4.21$, $SD = 2.30$). Therefore, emotional words were chosen based on the criteria of valence = <3.38 & >6.74 , and arousal >4.21 .

Neutrality of words was determined by one *SD* of valence around the *M*, and low arousal words were chosen when their ratings were lower than the *M* arousal. Therefore, neutral words were chosen based on the criteria of valence = >3.38 & <6.74 , and arousal = <4.21 .

1 = low valence/arousal, 8 = high valence/arousal.

Emotional words (Valence, Arousal)	Neutral words (Valence, Arousal)
Father (6.88, 3.68*)	Big (5.64, 4.33*)
Joyful (8.21, 5.55)	Export (4.79, 3.45)
Wife (6.7, 4.21)	Agricultural (5.5, 3.55)
Beautiful (7.61, 5.71)	Produce (6.57, 3.23)
Inherit (7.11, 4.35)	Amount (5.42, 3.53)
Farm (6.22*, 3.05*)	Annual (5.19, 3.7)
Die (1.67, 6.9)	Sector (4.67, 4)
Terrible (2.1, 4.39)	Employ (5.89, 3.83)
Challenge (5.95*, 5.25)	Affect (5.65, 3.61)
Summer (7.5, 5.48)	Consequence (3.86, 4.31*)
Incredible (7.59, 6.35)	Mid (5.21, 2.8)
Sunny (7.95, 5.38)	Temperature (5.58, 4.86*)
Rain (6.58*, 3.29*)	Month (5.78, 3.64)
Horrible (2.33, 5.95)	Average (4.89, 3.29)
Family (7.25, 4.35)	Drought (2.79, 3.55)
Severe (3.21, 5.43)	Cause (5.14, 3.48)
Suffer (2.05, 4.5)	Decrease (4.16, 3.05)
Severe (3.21, 5.43)	Crop (5.88, 3.19)
Kill (1.81, 6.81)	Deficient (3.63, 3.56)
Harvest (6.57*, 3.75*)	Crucial (5.16, 4.14)
Awful (2.28, 4.86)	Resource (5.63, 3.17)
Plant (7.05, 3.94*)	Wage (6, 3.43)
Hopeless (2.2, 4.52)	Reduce (5.1, 3.67)

Lose (3.59*, 5.43)	Region (5.21, 3.24)
Important (6.82, 4.71)	Observe (5.3, 4.25*)
Pay (6.23*, 4.42)	Overflow (4.76, 4.25*)
Recover (6.4*, 4.42)	Reach (5.78, 3.35)
Tragedy (2.11, 6.8)	Flux (4.17, 4.18)
Hit (3.95*, 5.48)	Peak (6.1, 3.9)
Monstrous (3.43*, 5.9)	Previous (4.74, 3.59)
Disaster (1.71, 6.35)	Demolish (2.67*, 4.5*)
Flood (2.76, 5.31)	Property (6, 4.75*)
Fear (2.93, 6.14)	Pass (5.73, 4.38*)
Life (6.68*, 5.59)	Emit (4.81, 3.96)
Evacuate (3.4*, 5.17)	Extensive (5.25, 4.75*)
Mother (7.53, 4.73)	Scientist (5.83, 4.14)
Destroy (2.67, 5.16)	Vapor (4.68, 3.24)
Loss (2.9, 5.2)	Atmosphere (6.05, 4)
Loved (7.65, 5.59)	Availability (5.68, 4.38*)
Home (7.48, 3.78*)	Predictable (5.25, 2.86)
Cherish (6.75, 4.14*)	Measures (5.14, 4.36*)
Ruin (2.32, 5.4)	Prevent (5.42, 4.18)
Sad (2.1, 3.49*)	Public (5.33, 3.35)
Message (6.18*, 3.81*)	Transport (5.9, 3.76)
Childhood (6.65*, 3.73*)	Planes (5.72, 4.91*)
Friend (6.79, 4.29)	Flight (6.11, 4.2)
Overwhelmed (2.8, 4.9)	Commute (4.14, 3.15)
Forceful (3.7*, 5.36)	Classroom (5.57, 4)
Stream (6.9, 4.35)	Office (4.54, 3.05)
Peaceful (8, 4.38)	Consume (5.48, 4)
Drown (2.33, 5.35)	Regional (4.95, 4.95*)
Daughter (6.73*, 5)	Product (5.5, 3.45)
Catastrophe (2.7, 5.64)	Acquire (5.5, 4.86*)
Lifestyle (5.95*, 5.52)	Foreign (4.86, 5.43*)
Enormous (5.68*, 5.05)	Supply (5.11, 3.28)
Sunshine (8.14, 5.32)	Distance (3.89, 3.81)
Dreadful (2.6, 4.5)	Store (5.94, 3.43)
Income (6.26*, 3.82*)	Emission (4.1, 3.67)
Help (6.95, 4.29)	Livestock (5.95, 2.95)
Fly (6.06*, 4.9)	Anthropology (5.3, 2.91)
Beach (7.21, 5.1)	
Vacation (8.53, 5.22)	
Travel (7.89, 5.55)	
Train (6.36*, 4.05*)	
Environmental (5.5*, 6.05)	
Friendly (7.84, 4.27)	
university (6.95, 4.24)	
Drive (6.5*, 4.19*)	
Car (6.63*, 4.04*)	
Shop (5.89*, 4.76)	
Supermarket (6.37*, 4.65)	
Local (6.77, 3.8*)	

Seasonal (6.58*, 4.3)
Food (7.52, 4.69)
Eat (7.1, 4.38)
Fresh (6.67*, 2.35*)
Neighborhood (6.09*, 4.05*)
Strawberry (7.25, 4.05*)
Tomatoes (6.25*, 3.82*)
Exotic (7.55, 6.9)
Harmful (2.29, 4.89)
Meat (6.62*, 4.3)
Drink (6.67*, 5.19)
Milk (6.74, 2.33*)
Environment (6.7, 3.45*)
Animal (7.06, 4.3)
Immense (5.48*, 5.85)
Harm (1.91, 5.9)
Beautiful (7.61, 5.71)
Earth (6.83, 5.04)
Meal (7.05, 4.85)

* the value of either valence or arousal is not within the criteria for emotional or non-emotional words.

Appendix C

Full questionnaire in Dutch as administered to participants.

Start of Block: Introduction

Beste deelnemer,

Op deze pagina nodigen wij u uit tot het deelnemen aan een vragenlijst met betrekking tot klimaatverandering. Het meedoen en invullen van de vragenlijst zal ongeveer 10 minuten duren. Bij deze willen wij u garanderen dat uw ingevulde antwoorden anoniem zullen zijn en ook zo behandeld zullen worden. Uw antwoorden zullen binnen het departement Taal en Communicatie van de Radboud Universiteit vertrouwelijk gebruikt worden ten behoeve van het beantwoorden van de onderzoeksvragen van onze bachelorscriptie.

Deelname

Deelname is vrijwillig en het is dan ook te allen tijde mogelijk om de vragenlijst af te breken en te stoppen met het invullen. Hiermee beloven wij u ook dat uw data gewist zal worden en niet gebruikt zal worden in het onderzoek. Als u besluit om de vragenlijst wel naar voltooidheid in te vullen, zal de data na afronding van de scriptie alsnog ook gewist worden uit het systeem.

Instructies

In de vragenlijst zal eerst aan u gevraagd worden om nauwkeurig een tekst te bestuderen met betrekking tot klimaatverandering. Hierna volgen enige vragen ter evaluatie van de tekst, gevolgd door een korte evaluatie met betrekking tot uw Engels niveau. Afsluitend vragen wij nog enige demografische informatie. Op iedere pagina zal nogmaals de gevraagde opdracht/informatie staan ter verduidelijking.

Contact

Voor nu willen we u hartelijk bedanken voor het lezen van de benodigde informatie en het deelnemen aan onze vragenlijst. Bij vragen en/of opmerkingen over het doel, de data of andere zaken kunt u een email sturen naar Teun.Kemmerling@ru.nl.

Hartelijk dank,

Nina van Loosen
Mynorka Daza Quintero
Iris de Boer
Imke Swinkels
Jelle van Dongen
Moritz Hofstede
Teun Kemmerling

Page Break

Ik geef toestemming tot het gebruiken van mijn antwoorden.

- Ja (1)
- Nee (2)

Skip To: End of Survey If Ik geef toestemming tot het gebruiken van mijn antwoorden. = Nee

Page Break

Om ervoor te zorgen dat wij de correcte doelgroep bereiken volgen hier drie korte vragen ter evaluatie daarvan:

Hoe oud bent u?

- Onder 18 (1)
- 18 of ouder (2)

Skip To: End of Survey If Hoe oud bent u? = Onder 18

Wat is uw moedertaal?

- Nederlands (1)
- Nederlands plus een andere taal (2)
- Anders (3)

Skip To: End of Survey If Wat is uw moedertaal? = Nederlands plus een andere taal

Skip To: End of Survey If Wat is uw moedertaal? = Anders

Spreekt u Engels?

- Ja (1)
- Nee (2)

Skip To: End of Survey If Spreekt u Engels? = Nee

End of Block: Introduction

Start of Block: Introduction to messages

U wordt nu gevraagd een korte tekst over klimaatverandering te lezen en deze te beoordelen. Dit duurt ongeveer 2-3 minuten, dus neem de tijd en lees de tekst grondig door. Nadat u de tekst hebt gelezen, wordt u gevraagd een aantal vragen in te vullen. Dit zal ongeveer 3 minuten duren.

End of Block: Introduction to messages

Start of Block: Message 1: emotional - English

My name is Daan. I am 37 years old, and I am the father of two joyful boys. My wife Tessa and I own a potato farm in beautiful South Limburg in the Netherlands. We inherited the farm in early 2018 after my father died. Ever since, we have had to face terrible weather challenges.

In the summer of 2018, it was incredibly hot and sunny, and it rained less than ever before – a horrible time to grow potatoes. Because of that, our family's farm severely suffered. The severe drought killed most of the harvest, and with awfully little rain, groundwater was scarce. Watering the plants was hopeless. We lost half of our harvest and thus our most important income source. We could not pay our bills.

As we slowly recovered, the next tragedy hit in 2021. Monstrous rainfalls in Limburg, Belgium, and Germany led to disastrous floods. We feared for our lives and evacuated the farm to stay with Tessa's mother in Utrecht. The flood destroyed the fields, causing massive losses in the harvest. Our dearly loved home and cherished belongings are ruined forever. A few days later, a sad message from Germany hit me. My childhood friend Luuk, who had moved to Western Germany, was overwhelmed by the flood. His house was swept away by the forceful stream of a usually peaceful creek, drowning his wife and daughter.

These catastrophes are the result of global warming. Our lifestyle activities release enormous amounts of CO₂ which disturbs the usual balance between sunshine and rain. This leads to higher global temperatures, melting polar ice caps, and rising sea levels. More dreadful droughts, storms, and floods will cause families like mine or Luuk's to lose our homes, income, and loved ones.

This is how you can help:

- 1) Instead of flying to your next beach vacation, consider travelling by train. Trains are much more environmentally friendly. Or start small by taking the bike or bus to university or work rather than driving by car.
- 2) Next time you go shopping at the supermarket, consider buying local and seasonal foods. Eating fresh food coming right from your neighborhood is very environmentally friendly. The strawberries and tomatoes don't have to travel from far away, exotic countries and, therefore, fewer harmful gases are released.
- 3) Lastly, try to eat less meat and drink less milk. You can help the environment by not eating

animals like cows, pigs, and chickens, or by not drinking cow milk and eating animal products like eggs and cheese. Raising animals for food releases immense amounts of CO₂ that harm our beautiful earth. Eating more vegetarian and vegan meals helps with this.

End of Block: Message 1: emotional - English

Start of Block: Message 2: factual - English

The Netherlands is the second biggest exporter of agricultural produce in the world, amounting to 17.5% of Dutch exports and 10% of the Dutch economy and employment. Produce worth €65 billion is exported annually. The sector employs approximately 660.000 people, including 50.000 vegetable and fruit farmers who are affected by the consequences of global warming.

In mid-2018, temperatures increased to up to 38.2°C, and only 105 milliliters of precipitation fell over three months, less than 50% of the average. This negatively affected the agricultural sector. A drought causes decreased crop performance due to nutrient-deficient soil, and rainfall is crucial for groundwater collection. 2018 left farmers with no resources to water the crops. Potato farmers were especially affected, as their wages were reduced by 56% due to the drought.

Three years later in 2021, another extreme weather event affected Southern Netherlands and Western Germany. In mid-July, some regions observed a precipitation of up to 241 l/m² in 22 hours. Creeks and rivers overflowed; for instance, the Maas River in Limburg reached a flux of 3168 cubic meters per second, 20 times more than the average. Water levels peaked and were 50% higher than in the previous year. The flood demolished properties, with damage costing approximately €400 million in the Netherlands and around €10 billion in Germany. In Germany and Belgium, around 200 people passed away.

These are consequences of extreme weather events due to global warming. Human activity emits extensive amounts of greenhouse gases, increasing the global temperature. Scientists estimate a 3°C increase by 2100. This leads to melting polar ice caps, sea levels rising, and increased water vapor in the atmosphere. Consequently, water availability becomes less predictable, causing droughts, storms, and floods.

These are measures to prevent this:

- 1) Take public transportation. Trains emit less CO₂ than planes. A flight from London to Edinburgh releases 193kg CO₂ per passenger while a train between the two cities emits 87% less, namely 24kg CO₂ per passenger. Moreover, commuting 32km by train rather than by car reduces 9kg CO₂ daily.
- 2) Consume regional and seasonal products. Acquiring produce that is manufactured regionally and seasonally emits fewer greenhouse gases than acquiring produce from foreign countries. Products supplied from abroad are transported long distances to stores and can emit up to 20 times more CO₂ than regional produce.
- 3) Consume fewer animal products. Consuming animal products emits large amounts of greenhouse gases. Global emission due to livestock amounts to 7.1 Gigatons CO₂ yearly, 14.5% of all anthropogenic greenhouse gas emissions. Moreover, consuming oat milk

compared to cow milk produces 80% less greenhouse gases and 60% less energy.

End of Block: Message 2: factual - English

Start of Block: Message 3: emotional - Dutch

Mijn naam is Daan. Ik ben 37 jaar oud en vader van twee vrolijke jongens. Mijn vrouw Tessa en ik zijn eigenaar van een aardappelboerderij in het mooie Zuid-Limburg in Nederland. Wij hebben de boerderij begin 2018 geërfd na het overlijden van mijn vader. Sindsdien hebben we te maken gehad met verschrikkelijke uitdagingen door het weer.

In de zomer van 2018 was het ongelooflijk heet en zonnig, en het heeft nog nooit zo weinig geregend - een verschrikkelijke tijd om aardappelen te verbouwen. Daardoor heeft de boerderij van onze familie zwaar geleden. De ernstige droogte doodde het grootste deel van de oogst, en met akelig weinig regen was grondwater schaars. Water geven aan de planten was hopeloos. We verloren de helft van onze oogst en dus onze belangrijkste inkomstenbron, waardoor we onze rekeningen niet konden betalen.

Terwijl we langzaam herstelden, sloeg in 2021 de volgende tragedie toe: monsterlijke regenval in Limburg, België en Duitsland leidde tot rampzalige overstromingen. We vreesden voor ons leven en evacueerden de boerderij om bij Tessa's moeder in Utrecht te gaan logeren. De overstroming heeft de velden verwoest, waardoor enorme delen van de oogst verloren zijn gegaan. Ons geliefde huis en onze dierbare bezittingen zijn voor altijd geruïneerd. Een paar dagen later kreeg ik een triest bericht uit Duitsland: het huis van mijn jeugdvriend Luuk, die naar West-Duitsland is verhuisd, was overspoeld door de overstroming. Zijn huis werd weggevaagd door de krachtige stroom van een gewoonlijk rustige beek, waardoor zijn vrouw en dochter verdronken.

Deze catastrofes zijn het gevolg van de opwarming van de aarde. Door onze levensstijl komen enorme hoeveelheden CO₂ vrij, waardoor het gebruikelijke evenwicht tussen zonneschijn en regen wordt verstoord. Dit leidt tot hogere temperaturen op aarde, smeltende ijskappen en een stijgende zeespiegel. Meer vreselijke droogtes, stormen en overstromingen zullen ervoor zorgen dat gezinnen zoals het mijne of dat van Luuk hun huis, inkomen en geliefden verliezen.

Dit is hoe je kunt helpen:

- 1) In plaats van vliegen naar je volgende strandvakantie, kun je overwegen met de trein te reizen. Treinen zijn veel milieuvriendelijker. Of begin klein en neem de fiets of de bus naar de universiteit of het werk in plaats van rijden met de auto.
- 2) Als je de volgende keer boodschappen gaat doen in de supermarkt, overweeg dan om lokaal en seizoensgebonden voedsel te kopen. Het eten van vers voedsel dat rechtstreeks uit je buurt komt is zeer milieuvriendelijk. De aardbeien en tomaten hoeven niet uit verre, exotische landen te komen en daardoor komen er minder schadelijke gassen vrij.
- 3) Tot slot, probeer minder vlees te eten en minder melk te drinken. Je kunt het milieu helpen door geen dieren te eten zoals koeien, varkens en kippen, of door geen koemelk te drinken en geen eieren en kaas te eten. Het houden van dieren voor voedsel produceert immense

hoeveelheden CO₂ die onze mooie aarde schaden. Meer vegetarische en veganistische maaltijden eten helpt daarbij.

End of Block: Message 3: emotional - Dutch

Start of Block: Message 4: factual - Dutch

Nederland is de op één na grootste exporteur van landbouwproducten ter wereld, goed voor 17,5% van de totale Nederlandse export en 10% van de Nederlandse economie en werkgelegenheid. Jaarlijks wordt voor 65 miljard euro aan producten geëxporteerd. De sector biedt werk aan ongeveer 660.000 mensen, waaronder 50.000 groente- en fruitboeren die worden getroffen door de gevolgen van klimaatopwarming.

Medio 2018 liepen de temperaturen op tot 38,2°C en viel er slechts 105 milliliter neerslag in drie maanden tijd, minder dan 50% van het gemiddelde. Dit had een negatieve invloed op de landbouwsector. Een droogte veroorzaakt verminderde gewasprestaties als gevolg van een voedingsarme bodem, en regenval is cruciaal voor grondwaterwinning. In 2018 hadden de boeren geen middelen om de gewassen te besproeien. Vooral aardappelboeren werden getroffen, wat te zien is in hun lonen die met 56% daalden door de droogte.

Drie jaar later, in 2021, werden Zuid-Nederland en West-Duitsland opnieuw getroffen door extreme weersomstandigheden. Half juli viel er in sommige regio's tot 241 l/m² neerslag in 22 uur. Kreken en rivieren overstroomden, en zo bereikte de Maas in Limburg een debiet van 3.168 kubieke meter per seconde, 20 keer meer dan het gemiddelde. Het waterpeil bereikte een hoogtepunt en lag 50% hoger dan in het voorgaande jaar. De overstroming vernielde eigendommen met schade van ongeveer 400 miljoen euro in Nederland en ongeveer 10 miljard euro in Duitsland. In Duitsland en België zijn ongeveer 200 mensen om het leven gekomen.

Dit zijn de gevolgen van extreme weersomstandigheden als gevolg van klimaatopwarming. Menselijke activiteiten stoten grote hoeveelheden broeikasgassen uit waardoor de temperatuur op aarde stijgt. Wetenschappers schatten een stijging met 3°C tegen 2100. Dit leidt tot smeltende poolkappen, een stijgende zeespiegel en meer waterdamp in de atmosfeer. Als gevolg daarvan wordt de beschikbaarheid van water minder voorspelbaar, met droogtes, stormen en overstromingen tot gevolg.

Dit zijn maatregelen om dit te voorkomen:

1) Neem het openbaar vervoer. Treinen stoten minder CO₂ uit dan vliegtuigen. Bij een vlucht van Londen naar Edinburgh komt 193 kg CO₂ per passagier vrij, terwijl een trein tussen de twee steden 87% minder uitstoot, namelijk 24 kg CO₂ per passagier. Bovendien stoot het woon-werkverkeer van 32 km met de trein dagelijks 9 kg minder CO₂ uit dan met de auto.

2) Consumeer regionale en seizoensproducten. De aankoop van producten die regionaal en seizoensgebonden zijn geproduceerd, stoot minder broeikasgassen uit dan de aankoop van producten uit het buitenland. Producten die vanuit het buitenland worden geleverd, worden over lange afstanden naar de winkels vervoerd en kunnen tot 20 keer meer CO₂ uitstoten dan regionale producten.

3) Consumeer minder dierlijke producten. Het consumeren van dierlijke producten stoot grote hoeveelheden broeikasgassen uit. De wereldwijde uitstoot door de veeteelt bedraagt 7,1

gigaton CO2 per jaar, 14,5% van alle antropogene broeikasgasemissies. Bovendien produceert de consumptie van havermelk in vergelijking met koemelk 80% minder broeikasgassen en 60% minder energie.

End of Block: Message 4: factual - Dutch

Start of Block: comprehensibility check

Beantwoord de vraag door het bolletje aan te kruisen dat uw mening het beste weergeeft. Aangezien we geïnteresseerd zijn in uw eerste indruk, zijn er geen foute antwoorden.

	Helemaal mee oneens (1)	Mee oneens (2)	Enigszins mee oneens (3)	Neutraal (4)	Enigszins mee eens (5)	Mee eens (6)	Helemaal mee eens (7)
Ik begreep de boodschap die de tekst probeert over te brengen volledig. (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

End of Block: comprehensibility check

Start of Block: Dependent Variables

Gelieve er rekening mee te houden dat u tijdens het invullen van de vragenlijst niet kunt terugkeren naar de tekst.

Deel 1: Houding

Beantwoord de vragen door het bolletje aan te kruisen dat uw mening het beste weergeeft.
 Aangezien we geïnteresseerd zijn in uw eerste indruk, zijn er geen foute antwoorden.

	Helemaal mee oneens (1)	Mee oneens (2)	Enigszins mee oneens (3)	Neutraal (4)	Enigszins mee eens (5)	Mee eens (6)	Helemaal mee eens (7)
Mensen zouden zich meer moeten bekommeren om klimaatverandering. (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Klimaatverandering moet de hoogste prioriteit krijgen. (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Mensen maken zich te veel zorgen over klimaatverandering. (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Klimaatverandering is een bedreiging voor de wereld. (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
De ernst van klimaatverandering is overdreven. (5)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Het is vervelend om te zien dat mensen niets doen voor het probleem van klimaatverandering. (6)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Page Break

Deel 2: Gedragsintentie

Beantwoord de vragen door het bolletje aan te kruisen die uw mening het beste weergeeft.
 Aangezien we geïnteresseerd zijn in uw eerste indruk, zijn er geen foute antwoorden.

	Helemaal mee oneens (1)	Mee oneens (2)	Enigszins mee oneens (3)	Neutraal (4)	Enigszins mee eens (5)	Mee eens (6)	Helemaal mee eens (7)
Ik heb de intentie om het in de boodschap beschreven gedrag te volgen. (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ik zal het in de boodschap beschreven gedrag volgen. (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ik ben bereid het in de boodschap beschreven gedrag te volgen. (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ik ben van plan het in de boodschap beschreven gedrag te volgen. (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ik ben niet bereid mijn levensstijl te veranderen om de opwarming van de aarde en de klimaatverandering tegen te gaan. (5)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ik zal alles doen wat ik kan om de nadelige effecten jegens het klimaat te verkleinen. (6)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Page Break

Emotionality Deel 3: Waargenomen emotionaliteit

Deze boodschap is:

	1 (1)	2 (2)	3 (3)	4 (4)	5 (5)	6 (6)	7 (7)	
niet- emotioneel	<input type="radio"/>	emotioneel						

End of Block: Dependent Variables

Start of Block: LexTALE

This test consists of about 60 trials, in each of which you will see a string of letters. Your task is to decide whether this is an existing English word or not. If you think it is an existing English word, you click on "yes", and if you think it is not an existing English word, you click on "no".

If you are sure that the word exists, even though you don't know its exact meaning, you may still respond "yes". But if you are not sure if it is an existing word, you should respond "no".

In this experiment, we use British English rather than American English spelling. For example: "realise" instead of "realize"; "colour" instead of "color", and so on. Please don't let this confuse you. This experiment is not about detecting such subtle spelling differences anyway.

You have as much time as you like for each decision. This part of the experiment will take about 5 minutes.

	No (1)	Yes (2)
Platery (1)	<input type="radio"/>	<input type="radio"/>
Denial (2)	<input type="radio"/>	<input type="radio"/>
Generic (3)	<input type="radio"/>	<input type="radio"/>
Mensible (4)	<input type="radio"/>	<input type="radio"/>
Scornful (5)	<input type="radio"/>	<input type="radio"/>
Stoutly (6)	<input type="radio"/>	<input type="radio"/>
Ablaze (7)	<input type="radio"/>	<input type="radio"/>
Kermshaw (8)	<input type="radio"/>	<input type="radio"/>
Moonlit (9)	<input type="radio"/>	<input type="radio"/>
Lofty (10)	<input type="radio"/>	<input type="radio"/>
Hurricane (11)	<input type="radio"/>	<input type="radio"/>
Flaw (12)	<input type="radio"/>	<input type="radio"/>
Alberation (13)	<input type="radio"/>	<input type="radio"/>
Unkempt (14)	<input type="radio"/>	<input type="radio"/>
Breeding (15)	<input type="radio"/>	<input type="radio"/>
Festivity (16)	<input type="radio"/>	<input type="radio"/>
Screech (17)	<input type="radio"/>	<input type="radio"/>
Savoury (18)	<input type="radio"/>	<input type="radio"/>

Plaudate (19)	<input type="radio"/>	<input type="radio"/>
Shin (20)	<input type="radio"/>	<input type="radio"/>
Fluid (21)	<input type="radio"/>	<input type="radio"/>
Spaunch (22)	<input type="radio"/>	<input type="radio"/>
Allied (23)	<input type="radio"/>	<input type="radio"/>
Slain (24)	<input type="radio"/>	<input type="radio"/>
Recipient (25)	<input type="radio"/>	<input type="radio"/>
Exprate (26)	<input type="radio"/>	<input type="radio"/>
Eloquence (27)	<input type="radio"/>	<input type="radio"/>
Cleanliness (28)	<input type="radio"/>	<input type="radio"/>
Dispatch (29)	<input type="radio"/>	<input type="radio"/>
Rebondicate (30)	<input type="radio"/>	<input type="radio"/>
Ingenious (31)	<input type="radio"/>	<input type="radio"/>
Bewitch (32)	<input type="radio"/>	<input type="radio"/>
Skave (33)	<input type="radio"/>	<input type="radio"/>
Plaintively (34)	<input type="radio"/>	<input type="radio"/>
Kilp (35)	<input type="radio"/>	<input type="radio"/>
Interfate (36)	<input type="radio"/>	<input type="radio"/>

Hasty (37)	<input type="radio"/>	<input type="radio"/>
Lengthy (38)	<input type="radio"/>	<input type="radio"/>
Fray (39)	<input type="radio"/>	<input type="radio"/>
Crumper (40)	<input type="radio"/>	<input type="radio"/>
Upkeep (41)	<input type="radio"/>	<input type="radio"/>
Majestic (42)	<input type="radio"/>	<input type="radio"/>
Magrity (43)	<input type="radio"/>	<input type="radio"/>
Nourishment (44)	<input type="radio"/>	<input type="radio"/>
Abergry (45)	<input type="radio"/>	<input type="radio"/>
Proom (46)	<input type="radio"/>	<input type="radio"/>
Turmoil (47)	<input type="radio"/>	<input type="radio"/>
Carbohydrate (48)	<input type="radio"/>	<input type="radio"/>
Scholar (49)	<input type="radio"/>	<input type="radio"/>
Turtle (50)	<input type="radio"/>	<input type="radio"/>
Fellick (51)	<input type="radio"/>	<input type="radio"/>
Destription (52)	<input type="radio"/>	<input type="radio"/>
Cylinder (53)	<input type="radio"/>	<input type="radio"/>
Censorship (54)	<input type="radio"/>	<input type="radio"/>

Celestial (55)	<input type="radio"/>	<input type="radio"/>
Rascal (56)	<input type="radio"/>	<input type="radio"/>
Purrage (57)	<input type="radio"/>	<input type="radio"/>
Pulsh (58)	<input type="radio"/>	<input type="radio"/>
Muddy (59)	<input type="radio"/>	<input type="radio"/>
Quirty (60)	<input type="radio"/>	<input type="radio"/>
Pudour (61)	<input type="radio"/>	<input type="radio"/>
Listless (62)	<input type="radio"/>	<input type="radio"/>
Wrought (63)	<input type="radio"/>	<input type="radio"/>

End of Block: LexTALE

Start of Block: Demographics

Wat is uw leeftijd?

Wat is uw geslacht?

- Mannelijk (1)
 - Vrouwelijk (2)
 - Niet-binair / derde geslacht (3)
 - Zeg ik liever niet (4)
-

Wat is uw huidige of hoogst behaalde opleidingsniveau?

- Middelbare school (1)
 - MBO (2)
 - HBO (3)
 - WO (4)
-

Vanaf welke leeftijd bent u (ongeveer) begonnen met het leren van Engels?

End of Block: Demographics

Appendix D

Statement of own work

Sign this *Statement of own work* form and add it as the last appendix in the final version of the Bachelor's thesis that is submitted as to the first supervisor.

Student name: Nina van Loosen

Student number: _____

PLAGIARISM is the presentation by a student of an assignment or piece of work which has in fact been copied in whole or in part from another student's work, or from any other source (e.g. published books or periodicals or material from Internet sites), without due acknowledgement in the text.

DECLARATION:

- a. I hereby declare that I am familiar with the faculty manual (<https://www.ru.nl/facultyofarts/stip/rules-guidelines/rules/fraud-plagiarism/>) and with Article 16 "Fraud and plagiarism" in the Education and Examination Regulations for the Bachelor's programme of Communication and Information Studies.
- b. I also declare that I have only submitted text written in my own words
- c. I certify that this thesis is my own work and that I have acknowledged all material and sources used in its preparation, whether they be books, articles, reports, lecture notes, and any other kind of document, electronic or personal communication.

Signature:

Place and date: June 9, 2022