Original Research Article

The Effects of Linguistic Framing on Environmental Empathy and Willingness to Take Climate Action

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ABSTRACT

The framing effect has been studied widely across contexts, yet it may reveal especially important insights about how people perceive climate change when presented with certain language about the issue. From a humanities lens, solving climate change requires using language that clearly connects people's values with climate action or policies. This study investigated the effects of valence equivalency framings (positive, negative, and neutral messages) on people's climate empathy and willingness to take climate action. Survey research was conducted on 114 participants through convenience sampling by having them answer a questionnaire. This survey randomly and evenly distributed one of three message framings to each participant, after which both qualitative and quantitative data were collected and analyzed. The results found no statistically significant difference in climate empathy or willingness to take climate action across the three framing groups. My results indicate that valence framing is not universal, and framing effects are mediated by background values, worldviews, and knowledge, or lack thereof. Therefore, instead of a valence framing, there exists greater promise within clear, relatable and value-driven messages that align with people's values. This presents implications for areas such as the media, which have potential to mobilize widespread support for climate action.

Keywords: climate communication; climate psychology; framing effect; environmentalism; linguistic psychology

INTRODUCTION

Climate change has caused harm to communities and ecosystems across the world, yet there has been much stagnation, and even regression, in forming a globally united front to tackle the crisis effectively. This may be due to a prevalent lack of empathy for nature and for others, which in turn leads to a lack of willingness to conserve the environment (1). Conversely, research shows that empathy and personal concern for climate change are positively correlated with climate action (2, 3).

Another factor that may hinder climate progress is the inefficacy of many existing messages about climate change, which are often reductionist (4), unaligned with people's common values (5), or doom-and-gloom (6). These messages are all distinctly shaped by linguistic framing—a concept commonly studied in psychology, decision-making, marketing, consumer behavior, political science, and public health. Thus, this multidisciplinary approach was chosen

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intentionally, which combines cognitive science with linguistics. By studying the basis of human responses to public messages about climate change, we can better understand how to use language to move people to take action for climate change.

In linguistic psychology, decades of research show that the type of message framing used is crucial in engaging people's attention and emotion. The framing effect is a cognitive bias by which an individual's perception can be influenced depending on how a message is presented and what language is used.

In addition to language, it is helpful to study neuroscience, because it offers a different angle into understanding the impacts of framing on people's emotions. Regarding the neuroanatomy that underlies such impacts, previous studies have reported that different framing activates specific parts of the brain, mainly in the ventromedial and dorsomedial prefrontal cortices (7, 8), medial prefrontal cortex (9, 10), temporoparietal junction (11), and inferior frontal gyrus (12).

Neuroimaging research emphasizes the importance of emotional processing in human decision-making. Therefore, for strongly framed messages that engage people's emotions, the repetition of these messages will strengthen the neural circuits for that perspective or ideology in the listeners' brains. This is because the synapses in circuits become stronger the more they are activated. Once a certain framing is repeated enough times, this language can become embedded in people's minds and unconsciously trigger a certain perspective, value or belief. This process has substantial implications for everyday citizens, who are the essential foundation of a democracy, and for journalists.

Media coverage—such as news channels, articles, reports, and journalistic videos—carries undeniable importance in shaping the public's mind about issues such as climate change. Unfortunately, as briefly mentioned earlier in this section, much of the framing that is commonly used by the media is counterproductive in spurring people to action. For instance, from 2006 to 2018, global media has largely prioritized scientific and political framings of climate change, rather than emotionally moving narratives. Furthermore, around 98% of climate news stories are negative in nature (6). If repeated consistently, these framings may be harmful because they instill in people's minds a negative framing that condones lack of agency toward climate change.

Instead, the media should discuss actionable steps, clear solutions, moving stories, or potential plans of widespread implementation into sectors such as energy, agriculture, and material systems—news that give hope for the future. For example, when given news that emphasize participation and climate action instead of news that highlight the destruction of biomes, young people in Brazil and Portugal connected more deeply with the environment (13). By using messages tailored to positive emotions and values and human needs, we can help society define solutions and carry them out effectively.

However, few studies have tested the effects of valence framing on climate empathy and climate action from an interdisciplinary lens. Thus, mixed methods are used in this research to address the inefficacy of non-tailored framing and offer solid alternatives in the following sections, upon having analyzed my own data on the effects of valence equivalency framing—non-tailored framing. The analyses used ANOVA, ANVOCA, NLP, and thematic coding. Then, all findings are outlined in an organized manner. Afterward, complex yet fascinating insights, future directions, and implications of the research are discussed in light of dozens of past findings. Most importantly, this research urges influential figures and leaders in educational curricula, policymaking, and the media to implement changes in their communication as recommended by the research. This gives way to the research question in this study:

RESEARCH QUESTION

How do valence equivalency framings of climate change influence environmental empathy and willingness to take climate action?

My hypothesis is that the more emotionally valenced messages, especially the negative framing, will elicit a stronger change in emotion or disposition toward climate change, in comparison to the neutral framing.

LITERATURE REVIEW

Environmental Empathy

This literature review provides context in the intersection of linguistics, neuropsychology and climate communication. Studies reveal the importance of empathy in fostering emotional connections to climate change and motivating pro-environmental behaviors. According to the Oxford dictionary, empathy is defined as the ability to understand viscerally the thoughts, emotions, experience, perspective or situation of

another. In the context of the environment, climate change and sustainability, empathy involves fully recognizing and carefully weighing the consequences of human actions on the environment, communities and future generations. Cultivating environmental empathy means stepping outside of our short-term thinking and immediate needs to consider the well-being and health of others and the planet, both present and future, and thus act accordingly.

Generally, individuals with high environmental empathy tend to more deeply connect with the earth and understand climate change as a significant global issue that must be addressed and tackled. They are more willing to take climate action. Specifically, climate empathy means people develop a deep, personal connection with nature, compelling them to realize the attitudinal and behavioral shifts necessary to combat climate change in unity (14). In fact, empathy was discovered to be a crucial element in helping children of ages 9 to 11 learn about climate change (15).

According to the empathy-altruism hypothesis (16), higher levels of empathy will improve environmental attitudes and behaviors. Similarly, people who rated their subjective well-being and happiness higher are more actively working to make a positive impact on the world (17). Thus, in addition to empathy, happiness and hope are important for action. In order to promote these positive feelings in humans, it is necessary to engage the parts of the brain responsible for empathy and emotion, including the limbic system, insula, and amygdala. Strong emotional responses to climate change are correlated to high activation in empathy-related brain regions, such as the limbic system—the network in the brain that regulates and controls emotional and behavioral functions, especially those associated with survival instincts. The mechanism of action representation in premotor areas including the amygdala allows humans to empathize and modulates emotional content (18).

Theoretical Framework

This paper is grounded in two main theories: the appraisal theory of emotion (ATE) and the framing theory. ATE is a cognitive appraisal process based on the idea that emotions play a central role in influencing whether and how our attention is drawn to stimuli, how we evaluate those stimuli, and how we act in response. ATE outlines exactly how this connection plays out as individuals assess the significance of a stimuli and its potential impact on their well-being (19). The process can be split into two steps: the primary appraisal, which evaluates the relevance of stimuli to the individual's background (i.e. well-being, goals, values), and the secondary appraisal, which evaluates the individual's resources and abilities to handle or respond to the stimuli (20). These two components interact with each other dynamically to shape the individuals' emotional response to the stimuli. In my study, the stimulus is a framed message about climate change. The ATE theory is crucial to my study because inherently, emotions are the essential trigger to prompting meaningful change and are thus at the core of social responses to climate change (21).

The framing theory focuses more strictly on the linguistic framing aspect. First established by Goffman in 1974, the theory posits that the framing of a message alters audience interpretation and response. Even small changes in the presentation of an issue or event may furnish substantial or large changes in opinion (22). However, there still remains the question of how arbitrary or lasting these changes are. The most common context for this theory is the news or media, where it is most prominent to note the importance of conveying certain information in a certain manner to the audience.

Though ATE is applied most prevalently in cognitive psychology and the framing theory in the media, the two frameworks can be united to build interdisciplinary studies. For example, message framing influences consumer behavior by engaging both cognitive deliberation and emotional responses, especially when the emotional tone or framing of the message aligns with preexisting attitudes (23). More specifically, when the object of persuasion (e.g., conventional, non-organic livestock farming) is perceived negatively, framing it negatively (i.e., "If conventional livestock farming continues, something horrible will happen") can improve its reception by aligning with existing tendencies of humans to avoid what is bad. This study is only one example that combines ATE with the framing theory.

Linguistic Framing

Linguistic framings influence decision-making by manipulating the way information is presented and thus perceived. There exist various framing techniques, such as stories, metaphors, contrast, spin (positive or negative value judgment), or slogans (catchy phrases). For example, local framing—which focused on the impact of a climate policy or event on the local scale

rather than a global scale—was found to increase perceptions of the severity of the problem and support for local (sub-national) policy action for all subjects, as well as behavioral intentions for subjects who are Independents or Republicans (24).

My paper will focus on valence equivalency frames—positive, negative, or neutral. Equivalency framing effects occur when "different, but logically equivalent, phrases cause individuals to alter their preferences" (25). Though the information itself remains unchanged, equivalency communication frames often have effects that reveal cognitive bias or error of thinking in human psychology. Such effects carry important implications across various fields, such as business and finance, public policy, politics, law, environmental sustainability, and medicine, translating over to everyday life and society.

Some equivalency communication frames involve alternate descriptions. For example, "tax relief" is a term often used to refer to "tax cuts." If politicians voice their support for "tax *relief*," they are adding biased emphasis to the idea that taxes are burdensome on people and must be relieved. This framing also makes it easy to ignore the potential benefits that may come from taxes, such as social safety nets. "Tax *relief*" is an emotionally charged, negative term. Though it has the same logical meaning, the emotionally neutral term "tax cuts" do not contribute any bias toward or against taxes.

The framing also implicates decision making in the medical field. For example, in a classic study by Tversky and Kahneman in 1981, participants were asked to choose between two different treatments for 600 people afflicted with a deadly disease. In the positive framing, the first treatment (sure) was to "save 200 people," and the second treatment (gamble) was "⅓ chance to save all 600 people." 72% chose the first treatment (the sure and risk-averse option). However, in the negative framing, the first treatment described that "400 people will die" whereas the second treatment allowed for a "⅓ chance that no one dies." 78% chose the second treatment (the gamble and risk-seeking option). Despite identical outcomes, the framing effect led to a dramatic shift in preferences for either treatment. This study proved the dramatic change in people's perceptions of the same-content message and subsequent measured decisions, depending on a gain vs. loss framing. Due to the psychological effect of language, people were led to make inconsistent choices—belying their lack of awareness regarding the inconsistency created by alternate frames. After having accounted for publication bias, a meta-analysis similarly discovered that the effects of valence framing on moral decisions is small yet significant (26).

Returning to environmental implications of the valence equivalency framing effect, negatively framed messages proved to be more effective than positively framed ones in prompting consumers to engage in pro-environmental behaviors (e.g. buying green products). Anticipated shame was considered the primary emotion responsible for such an effect (27). Taking the ATE framework into consideration, questions are raised whether this effect still holds true for not only consumers but also business owners and manufacturers, who represent the other half of the equation when it comes to environmental sustainability in the economy as well as other vital sectors, such as agriculture.

As the literature above implies, there is a promising convergence between empathy, the ATE framework and framing theory, and how factual messages about climate change are framed. For instance, strategies such as storytelling and relational climate conversations can increase environmental empathy and turn concern into action (28). Currently, however, many climate activists and scientists create a narrative that, by nature, mainly only appeals to like-minded others (5). Thus, the question remains as to how we can create messages that will help us more productively discuss with those who are not like-minded.

Ultimately, through a greater knowledge on how to appeal to human connectedness and empathy to global climate change, we can propel climate action. We can do this using effective, targeted communication strategies that are informed by cognitive science and linguistics.

METHODOLOGY

To collect data for my question, survey research was conducted. In July 2025, the survey was designed from scratch and administered on Qualtrics.

Sampling

I distributed the survey online to peers from school and strangers on two Reddit channels, r/samplesize and r/surveyexchange. Since the distribution was not random, the participant pool turned out to be largely skewed to mostly contain people already informed and relatively conscientious about climate change. In the course of a week, a total of 114 survey responses was collected.

Survey Design

The questionnaire design was informed by the major points outlined in the literature review above. The purpose of the questionnaire was to gauge people's attitudinal or emotional shifts toward a specific aspect of environmental stewardship or climate change before and after receiving an emotional stimulus, which is a framed message. The randomizer feature in Qualtric's "Survey flow" tab was used to randomly and evenly distributed the respondents among three message framings: negative (N=37), positive (N=38), and neutral (N=39).

The questionnaire had 11 questions. It is split into two parts: the pre-message survey and the post-message survey. Below is my justification for including each question, except name and age, which were marked optional to respect individual privacy.

Throughout the survey, Likert-scale questions were used for quantitative data, supplemented with open-ended questions for qualitative data. This qualitative strategy was chosen to record nuanced responses and reveal the reasoning behind quantitative answers. Qualitative data helps read between the lines and gives spaces for participants to elaborate on their beliefs and context.

The pre-message survey asks four questions in addition to name and age. Questions 3-4 are intended to gauge participants' pre-existing feelings—empathy and concern—toward climate change. They track participants' longer-term beliefs or attitudes regarding "global climate health," which is the exact phrase used. Question 6 was asked directly after the message stimulus to measure the immediate affective change in environmental empathy.

Q5 was designed to consider participants' current climate behavior—how often they intentionally take climate-friendly actions such as biking, recycling, and making sustainable purchases. Q7 asked how much participants *perceive* their willingness to engage in climate-conscious actions changed upon reading the message. In other words, they are intended to assess whether participants *intend* to take action following the message. The quantitative answer choices used a Likert scale (-3 to +3) of negative and positive emotions for balance to detect each participant's direction of change. Q8 was qualitative but marked optional, asking participants to briefly explain their answers to Q6 and Q7.

As a final reflection, Q9 and Q10 asked participants to rate—on a completely neutral scale of 1-10—the extent to which they believed the messages influenced their perception of climate change and willingness to take climate-friendly actions, respectively. Finally, Q11 (optional) asked participants to briefly explain their answers to Q9 and Q10.

Data Analysis

To analyze the quantitative data, non-parametric ANOVA (Analysis of Variance) regression models were conducted. ANOVA was chosen rather than a paired T-test, because the study contains three groups. I also decided against using only descriptive statistics, such as mean and standard deviation, because they would not reveal substantial insight into answering my research question, which involves deeper comparison analyses and takes into consideration potential pre-message differences in climate empathy and behavior across the three groups. Both measures were immediate and short-term.

Stemming from the classical work of Fisher in 1925, an ANOVA uses the F-test to compare means across multiple groups and determine whether any group differs notably, helping identify if a stimulus has an effect on a result. Applying this principle to my research, between the three groups who received positive, negative, and neutral linguistic framing, ANOVA allowed me to explore whether linguistic framing has any impact on environmental empathy and willingness to help the climate. Since the raw numeric values had varying scales across different questions in my study, the Kruskal-Wallis H Test (a type of one-way ANOVA) was used, which is based on data ranks rather than means.

To statistically control for potential baseline differences in pre-message climate empathy and behavior between the three framing groups, an ANCOVA was used, which confirmed the results from the ANOVA. This was effective in forecasting because it helped inform how changes in the independent variables affect the dependent variable. Specifically, bootstrapped estimation of indirect effects was used for a more robust assessment of whether pre-existing beliefs and behavior mediated the effects of message framing on environmental empathy and willingness to take climate action, respectively.

For the qualitative data, thematic coding was used—one of the most foundational qualitative analyses. Thematic coding involves identifying the overall theme of each text and then categorizing all the texts by shared themes (29). Themes are major recurring ideas

observed in participants' responses that help to answer a research question with more nuance. Reliability in the thematic coding was ensured by comparing the qualitative answers with the results from the same participant's quantitative responses. Thematic coding was conducted both by me, the researcher, as well as through NLP.

Ethics Statement

This study did not fall under the purview of an institutional review board, because there was no committee in place at my institution at the time the study was conducted. Nevertheless, the study was conducted in accordance with the ethical principles outlined in the Belmont Report and the Declaration of Helsinki. At the beginning of the survey, participants were provided with a consent statement outlining anonymity, voluntary participation, and the option to withdraw at any time without any consequences. Informed consent was obtained through participants' decision to proceed with the form. Furthermore, personal information was minimized, and data was de-identified to ensure participant confidentiality.

RESULTS

To thoroughly present my findings, I unpacked and divided the research question into two separate grounds. First, I look at how linguistic framing affected climate empathy. Then, I explain how linguistic framing affected willingness to take climate action.

Climate Empathy

For this aspect, tests were run separately for post-message climate empathy and self-perceived overall change in empathy. Post-message concern (Q6) and overall post-message perception change (Q9) were the dependent variables. The framing group was the grouping variable entered into the analysis.

Table 1. One-Way ANOVA (Non-parametric)

	χ^2	df	p
Q6 - Post-message concern	1.618	2	0.445
Q9 - Overall perception change	0.283	2	0.868

There was no statistically significant effect of framing groups on either post-message concern or overall perception change regarding climate change.

Since p was much greater than 0.05, there were no statistically significant differences in post-message climate concern between framing groups. The results failed to reject the null hypothesis. Even though χ^2 might have indicated some difference in medians between the groups, it does not indicate a meaningful difference because the p-value is far above the threshold of 0.05 (Table 1).

Thematic coding offers informed explanations as to why the quantitative analyses revealed the framings had negligible effect on climate empathy. Based on the qualitative responses written by some participants, the messages had little to no effect on changing their perception of climate change because the majority of participants who explained their answers already knew about the issues presented in each message. For example, a respondent who had maxed out in concern for the environment explained that the message did not change his/her perspective of climate change at all and only slightly increased willingness to take action because "I knew this stuff already but it's good to have a reminder." Similarly, a different respondent wrote, "Since I am already aware of the issues in the messages it's a bit hard to rate how they 'influenced' me." Another person wrote, "I was already aware so the messages didn't influence much, but I think it acted as a good reinforcer."

On the other hand, for the few participants in this study who were less familiar with specific environmental issues but were aware of climate change as a harmful issue, they reported a more significant change in perception. One respondent wrote, "Although I knew that human actions were harmful to the environment before reading the provided statement, I had only heard of the general idea and not the specific problems that humans were causing. The statement provided me with greater insight that helped me better understand human impact on the environment." As inferred from the response, this change in perception happened because this individual had lower baseline knowledge than most others but was already aware while reading an informative text.

Therefore, pre-existing beliefs serve as a strong buffer against framing effects. Thematic coding reveals that it is not because framing is ineffective, but rather because my sample contains a strong pro-climate bias with the majority of participants already concerned about the climate to varying degrees. This phenomenon reflects the ceiling effect, where participants' pre-message scores for climate empathy or concern

begin near the top of the scale, leaving little room for substantial increase post-message.

To confirm if the earlier ANOVA results will persist upon controlling for baseline differences, an ANCOVA mediation analysis was run, where the two covariates were pre-message feelings about climate change (Q3) and pre-message belief in human impact (Q4).

Table 2. Non-parametric ANCOVA regression model

Predictor	Coefficient	p-value
Framing (neutral vs negative)	+0.047	0.915
Framing (positive vs. negative)	-0.539	0.217
Q3: Pre-message concern	+0.050	0.760
Q4: Pre-message understanding	-0.691	0.001

The framing groups and pre-message concern lacked a statistically significant effect on post-message concern. However, pre-message understanding of human impacts on climate change has a statistically significant effect on post-message concern, meaning that the greater the participants' knowledge, the higher their post-message concern on average.

The ANCOVA confirms that framing group has no statistically significant effect on post-message concern (Q6). Neither does pre-message concern (1 = Extremely pessimistic, 4 = Neutral, 7 = Extremely optimistic). However, as $p<0.05$, pre-message understanding of human impacts on climate change (1 = Extremely harmful, 4 = Neutral, 7 = Extremely beneficial) has a statistically significant negative effect (Table 2). The more a person already understands climate change (lower Q4 score), the higher their post-message concern. This suggests that people's prior knowledge is much more impactful than framing.

Qualitative analysis confirms the theme that pre-existing awareness reduces framing effects. Across the qualitative responses, the word "already" was highly prevalent. Some responses were "I'm already trying to do my part so the statements just reinforced my beliefs" or "I'm already fairly aware and invested in climate change; these passages covered information I'm already familiar with."

The opposite seems to hold true as well. The message framings had no effect on participants who possessed an adamant doom-and-gloom mindset or disinterested attitude toward climate change. Some responses were "can't really say much more to spur me to action," "I just feel guilt. It's so important to value sustainability… but there is so much else to care about in life that the added load feels stressful instead of a call to action," and "I've heard the same messaging all my life and it's hard to want to make these…lifestyle changes when… [climate change] doesn't feel dangerous enough for me to sacrifice any comfort in fixing it."

Willingness to Take Climate Action

The ANOVA was run for post-message willingness to act and overall self-perceived change in willingness to act. The Kruskal-Wallis tests revealed no statistically significant differences in post-message willingness to act between framing groups. The framing has little to no effect.

Table 3. One-Way ANOVA (Non-parametric) Kruskal-Wallis

	χ^2	df	p
Q6 - Post-message behavior	1.275	2	0.529
Q9 - Overall behavior change	0.237	2	0.888

Neither the post-message behavior nor the overall behavior change—both dependent variables—were affected by the framing group.

Since p was much greater than 0.05, there were no statistically significant differences in post-message willingness to take climate action between framing groups (Table 3). The results failed to reject the null hypothesis.

Qualitative analysis confirms the theme that people's pre-existing climate-conscious lifestyles reduce framing influence. For many respondents who reported already being environmentally conscious in their actions, the messages—regardless of framing—reinforce existing habits and values but do not necessarily change behavior.

For example, one respondent wrote, "I was already aware of the impacts of people's actions on the environment. The information mainly reinforced [my view]. As a result, my perspective of the issue was not altered much, and I will continue to keep at my efforts of making a small, positive difference whenever possible." Another participant wrote, "I was already aware of many of these issues…[my husband and I] already make sustainable choices when we can." Other responses included, "Since I was already aware of these issues, my support or concern for climate-conscious actions remains steady" and "Reading the message reminds me to take action, even if it seems small."

Other respondents—those who were already both highly aware and concerned—expressed that they would like to be informed about clearer, concrete actionable steps or more specific, emotionally appealing messages. One individual wrote that "[it is] more likely [that I] take these options if I know how to properly implement them." Regarding the statements from my survey, some responses were, "Very vague and does not give a sense about how my personal action could benefit the environment and it is hard for me to change my lifestyle" as well as "To me, the messages both speak of the negative impact of human activity on the climate, but do not strongly call the reader to action… [they speak] very passively about action."

On the other hand, for the few participants in this study who were less familiar with the environmental issues mentioned in the messages but were aware of climate change as an issue at large, they reported an overall increase in openness to take climate-friendly actions. One participant wrote, "knowing that these are specific ways that I can help makes me feel more in control." Another person wrote, "I was not previously aware of the environmental costs of clothing—I can and will make an effort to stay sustainable on that front… small steps at a time." A different individual wrote, "By understanding two causes of deteriorating global climate health provided in the passage, I am better able to understand what I could do on an individual level to prevent it. Thus, it encourages me to take action by giving me better insight as to what specific actions I could undertake."

In order to confirm the ANOVA results, a mediation ANCOVA analysis was conducted. The covariate was pre-message climate-friendly behavior (Q5). The dependent variable was the participant's self-measured post-message willingness to take climate-friendly actions (Q7).

Table 4. Non-parametric ANCOVA regression model

Predictor	F-value	p-value
Framing Group	0.667	0.515
Pre-Message Behavior (Q5)	0.731	0.394

The framing group—one of the independent variables—had an F-value of 0.667 and p-value of 0.515, indicating a statistically insignificant effect on the dependent variables. The same effect appears true for pre-message behavior, another independent variable, which was analyzed to have an F-value of 0.731 and p-value of 0.394.

Again, since p is far greater than 0.05, there is no statistically significant effect of message framing on participants' willingness to take climate-friendly actions, even upon controlling for potential differences in baseline behavior (Table 4). Similarly, there is no substantive evidence that pre-message behavior predicts a change in post-message action willingness. In other words, more climate-friendly behavior before seeing the message does not mediate or predict post-message behavior change.

Concluding Note on Findings

To conclude, the results reveal no statistical significance between different linguistic framings in influencing both climate empathy and willingness to take climate action. The results reject my hypothesis.

As the researcher in this study, I suspect several reasons to explain why the framing messages did not yield significant, differing effects. One potential issue may have been that the messages were short, containing only two to three lines, and were not framed strongly enough. In fact, some participants reported that the "positive" message felt too neutral and detached. Also, the messages were not specific and only stated general effects of harmful practices (fast fashion, overfishing and trawling) on the environment, which could have been said about many other harmful actions.

Natural Language Processing (NLP) was used to create a heatmap of the relative frequency of emotional words in participants' qualitative responses across the different framing groups. Evidently, the negative or positive groups—which are supposed to be more emotional—do not particularly contain a higher frequency of emotional words than the neutral group (Figure 1). Therefore, it may very well be the case that the messages in the study were not strong enough in emotional appeal.

Finally, the messages were not tailored to emphasize the effects of climate change on certain aspects that might matter the most to people, such as health, well-being, nutrition, and the economy. Nevertheless, it is unclear whether these factors would have made a difference in the results, and further studies are necessary to confirm or reject my assumptions.

DISCUSSION

This study revealed that the different valence equivalency framings had no statistically significant effect on changing individuals' levels of empathy or

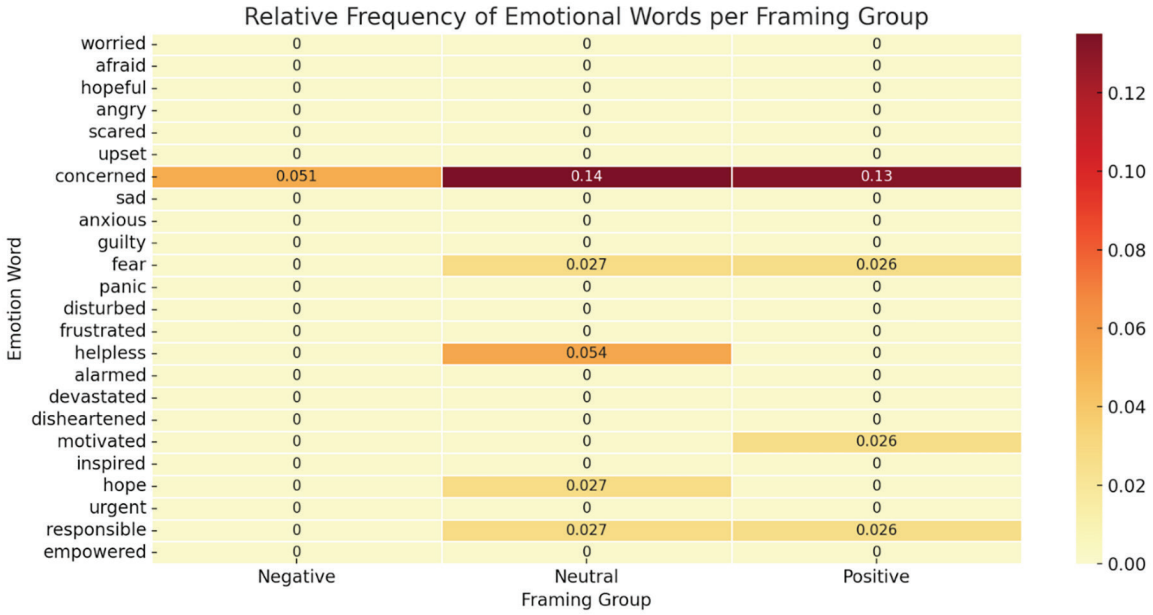

Figure 1. Heatmap of Relative Frequency of Emotional Words per Framing Group. The higher the number, the more frequent the words were included in qualitative answers from participants. 0 indicates that none of the words were used.

self-reported willingness to engage in climate action. In light of the framing theory as detailed in the literature review section, these results were unexpected because they contradicted my hypothesis, which had been informed by my holistic literature review.

Past literature had pointed to the idea that framings *do* have a substantive impact. For instance, positive "gain" frames are superior to negative "loss" frames in increasing favorable attitudes towards climate change mitigation as well as increasing the perceived severity of climate change impacts (30). In another case, negative framings were more effective than positive framings in spurring consumers to engage in pro-environmental behaviors (27). In yet another study, participants tended to react differently to positive "gain" frames and negative "loss" frames regarding the environmental impacts of livestock farming (23). Beyond the climate context, there had been statistically significant differences between framings across various studies. Since my findings did not replicate these effects, it seems that emotional framing does not universally influence environmental empathy or behavior intent.

There may be few concrete reasons for this contradiction between the research and past literature. For example, the valence equivalency framing effect may be less influential when the language used is subtle in emotional appeal as perceived by a good majority of the participants. Furthermore, the effect may fail to be substantive when most of the participants are already climate-conscious and informed, because this limits the variability in scores for climate empathy and sustainable disposition. Finally, efficacy may also be reduced if the medium of delivery lacks vividness (i.e. the text is plain and short without striking images or audiovisual elements). All of these aspects were objectively true in my study.

While the absence of significant results may appear inconclusive at surface glance, the results offer a fascinating counterpoint to prior literature that emphasize the valence equivalency framing effect. My findings indicate a different idea: the stronger the pre-existing values and knowledge about a topic (i.e. climate change), the lesser the effects of valence equivalency framing. Instead, in order to have a significant effect, the messages must be strongly framed in a personalized way that aligns with people's values. Thus, other types of framings, such as emphasis, identity, and issue frames, may be more promising. Tying back to the second theoretical framework (ATE), this central message seems plausible because people do not evaluate messages in a purely logical manner; their perceptions are made much more complex by a combination of their

existing resources, values, worldviews, identities, and other distinct backgrounds. Therefore, even though the valence framing effect exists in general, its efficacy depends on various factors.

My research supports the appraisal theory, and viceversa, providing an interesting point of discussion that is supported by other literature. For example, my research aligns with a past paper that determined that neither positive nor negative frames reliably increased sustainable consumer behaviour (31). Instead, the combined use of two or more message frames produced a greater effect. Unlike the research, however, Florence examined the use of three different framing types, not only the equivalency framings.

Another paper on framing and context in relation to climate change supports my theory. This paper emphasizes that framing only works when the audience's context and the message's emotional salience align, which is rarely universal (2). The reason for this, as outlined by the ATE theory, is that people's interpretation of climate messages is shaped by local, cultural, and social contexts, not solely by message content or framing. For example, free-market ideology motivates its proponents to deny the necessity of climate mitigation when the message is not aligned with their worldview (32).

When the message *is* aligned, it is a different story. For example, a one-month advertising campaign deployed videos that featured spokespeople who resonated with conservative values and married them to the importance of caring about climate change. This advertising, targeted for Republicans, proved highly effective in increasing their concern and personal importance regarding climate change (33). An older study also identified the identity frame as having the greatest impact in encouraging sustainable behavior among the total sample, as well as among those who rejected the anthropogenic causes of climate change (34). This literature supports my point that messages are highly persuasive when they are aligned with people's grounded identity and values.

Often, framing effects are only studied in the short term; few papers are longitudinal. One study found that the effects of news framing on citizens' understanding of politics remained persistent across the duration of two weeks (35). Therefore, there remains a need to study how long any change in opinion truly lasts when caused by the framing effect. When a message about a specific issue under a particular framing is communicated to the public, how can we track the duration or sustainability of any attitudinal and behavioral shifts in the public that were directly caused by the framing?

Ultimately, my research carries important implications for global climate communication and cooperation, especially how the media can shift their framings of climate change. As implied by my quantitative findings and as supported by my qualitative findings, framings should be intentional about appealing to what matters the most to the audience. Since people have different needs and understandings of the issue, it is necessary to tailor context-specific, personally relevant messages.

As supported by my research and past literature (2, 31, 32, 33, 34), it seems true that pre-existing values in the public are important in shaping their response to certain messages, because these values interact with tailored messages. Thus, there is potential in applying the results of my paper to the media, because it has an undeniably huge influence on shaping public knowledge and beliefs about climate change.

Clear, moving messages about climate change have the potential to encourage climate discussions on a regular basis among the public and ultimately increase people's agency for climate action—knowing how to take action. For example, people are effectively moved or inspired by stories about others already engaging in positive climate action (6). The study argues that our actions change our beliefs. By emphasizing climate *action*, messages compel people to take action first, which subsequently changes their beliefs, awareness and concerns about the environment through a natural process of self-justification and self-persuasion—not the other way around. Such positive strategies are not only applicable in digital media but also in education, policy and activism. In the end, by clarifying a central message, we can mobilize widespread support and incentivize climate action.

CONCLUSION

The research studied the effects of linguistic framings on climate empathy and willingness to take climate action. It involved a mixed-methods survey of both quantitative and qualitative strategies—ANCOVA and thematic coding, respectively. The analyses revealed no statisically significant difference in change of climate empathy and willingness to take climate action across the three framings.

The null results caution against the assumption that emotionally toned messages will always work in their

purpose. Instead, other techniques—emphasis framing (highlighting specific aspects or consequences of an issue), vivid storytelling, relational conversations, personal relevance, message credibility, or visual elements—may play a stronger role in aligning with individuals' distinct values and beliefs regarding climate change. Future research is recommended to study which techniques, or a unique combination of them, will work best on engaging specific groups of people.

APPENDIX

Gil, Eleanor (2025). Climate Change Framing Effect Survey. figshare. Online resource. https://doi.org/10.6084/m9.figshare.29943389

CONFLICT OF INTERESTS

The author declares that there are no conflicts of interest regarding the publication of this article.

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