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„Construing Climate Change: An Investigation of Downstream effects of Construal Level on Pro-environmental Behavior and Attitudes“

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Abstract

Research linking construal level to pro-environmental behaviors and determinants of such behaviors shows mixed results and a lack of direct effects. Nonetheless, construal level is a promising concept in the field of climate change research as it can have downstream effects on the information an individual uses as a basis for their decisions. Two studies were conducted to apply findings from other areas of construal level research to climate change research. Study 1 ($N = 147$) aimed at investigating possible matching effects between construal level and climate change perceptions. It did not provide significant results. Study 2 ($N = 188$) investigated the effects of verb tense induced construal level changes on pro-environmental behavior intentions and donation intentions while controlling for past behavior and values related to pro-environmental behavior. It aimed at testing whether past behavior and values would show significant interactions with construal level. The lack of direct effect of construal level was confirmed for both types of intentions. Past behavior did not interact with construal level. Self-enhancement values and construal level, on the other hand, did show a significant interaction effect on donation intentions indicating an increased influence of self-enhancement values when in an abstract mindset. These findings imply that the relative importance of concepts that are less strongly related to climate change show greater promise in being influenced by construal level, whereas highly correlated concepts like past behavior are harder to influence.

Construing Climate Change: An Investigation of the Effects of Construal Level

Changes on Pro-Environmental Behaviors and Attitudes

Extreme heat in India, wildfires in the US and southern Europe, and floodings in central Europe. In the year 2022 human beings are increasingly confronted with the consequences of anthropogenic climate change. Little action has been taken to combat climate change until current day, yet a broad understanding of the causes and dangers has been around since the 1980s, has been communicated to world leaders and made public knowledge (Rich,

2018). Thus, the lack of action regarding climate change is not a phenomenon of late, but rather stems from the psychological inability to assess the risk climate change poses. Climate change constitutes a unique object of risk representation due to it taking place on a large scale, the temporal distance to its impacts, and the complexity of the issue and its solutions (Breakwell, 2010). Furthermore, climate change cannot be experienced directly but rather over a prolonged period, in a cumulative manner and is largely invisible (Weber, 2010). The qualities of climate change as a hazard differ greatly from the risks our minds evolved to prioritize, making climate change an evolutionary “novel” risk (Gifford, 2011). Combating this “novel” risk will require new methods of engaging the public and raising awareness of its dangers and consequences.

This studies aim is to find downstream effects of construal level that result in increased awareness of climate change topics and an increase of pro-environmental behaviors. Different manipulations will be used to investigate how mental construal can help raise awareness of environmental topics and intentions to act environmentally friendly.

Construal Level Theory

Construal Level Theory (CLT) (Trope & Liberman, 2010) connects the concept of psychological distance to the abstraction level of an individual’s mental representations. It assumes that human beings can only experience the current moment directly while everything that is removed from this moment must be mentally construed. The further removed from the current situation a represented object is, the more generalized and abstract its mental representation will be (high-level construal) (Trope & Liberman, 2012). Construing an event that is close to the current situation (low-level construal), on the other hand, induces a concrete mental representation which is based on context-specific information (Trope & Liberman, 2012). This ability to abstract allows individuals to overcome the distance that separates themselves and other people, now from then, and here from far away, and enables people to mentally traverse these distances. A meta-analysis showed that the relationship

between psychological distance and construal level is consistent throughout studies, researchers, and settings, and that it applies to all dimensions of psychological distance (Soderberg et al., 2015). These four dimensions of psychological distance include the temporal, spatial, social, and hypothetical dimension (Trope & Liberman, 2010; Soderberg et al., 2015). Nonetheless, there is evidence that in the context of emotional intensity construal level and psychological distance are not directly related to one another (Van Boven et al., 2010; Williams et al., 2014). A similar lack of relationship might be present in other contexts as well.

Out of the four dimensions of psychological distance, temporal distance has been researched the most (Soderberg et al., 2015). Temporal distance refers to how far in the future or past an event takes place. The closer an event is to the present, the closer it is perceived and vice versa (Trope & Liberman, 2003). Spatial distance refers to the location of an event or object (Trope & Liberman, 2010). Objects or events in an individuals' physical proximity are perceived as closer while distant objects and events are perceived as more distant (Trope & Liberman, 2010). In the hypothetical domain, an event or object that is seen as real or probable leads to it being perceived as close while improbable events are perceived as more distant (Wakslak et al., 2006). Lastly, in the social dimension, individuals perceive themselves and people they know well (e.g., friends, family) as psychologically close and strangers or individuals they barely know as more distant (Liviatan et al., 2008).

The relationship between psychological distance and abstraction level is bidirectional, meaning that abstraction level is not only influenced by psychological distance but that it also affects perceived psychological distance (Liberman & Trope, 2009). This implicates that the different psychological distances are related, and that their relationship is moderated by construal level. Thus, increasing the distance to an event on any psychological dimension leads to increased perceived psychological distance on the other dimensions (Maglio et al., 2013). Spatial distance seems to be less affected by changes in other dimensions (Zhang &

Wang, 2009) which might be due to its greater tangibility. Using a Stroop-test, researchers were able to show that perceived psychological distance is automatically accessed (Bar-Anan et al., 2007) and that matching the spatial distance a word was presented in to its meaning (e.g., presenting the word in a year further away) lead to quicker recognition (Bar-Anan et al., 2007). Nonetheless, the level of construal and psychological distance are not synonymous despite them being highly related and bidirectional (Liberman & Trope, 2010). The key difference between the two concepts is that psychological distance is a subjective experience whereas construal level refers to the processes that are vital to mentally represent an object or event and therefore is less likely to be influenced by experiential factors (Trope & Liberman, 2010).

Reliance on more abstract or concrete information due to changes in psychological distance can alter the meaning of an event and consequently influence judgements and decisions (Trope & Liberman, 2010). When mentally representing an object or situation, individuals tend to focus on high- or low-level features. An individual that has adapted a concrete low-level construal mindset puts more emphasis on low-level feasibility considerations. Feasibility considerations focus on the “how” aspect of an event or object and highlight the action necessary. A person that has adapted an abstract high-level construal mindset tends to display a higher reliance on high-level desirability considerations which focus on the “why” aspect of an object (Liberman & Trope, 1998). The difference between the two can be illustrated by the different ways one can think about the act of opening a door. One can pay attention to feasibility considerations by thinking about the steps that must be completed to accomplish the goal (looking for the key, inserting key into keyhole, turning the key etc.). Contrastingly, when focusing on desirability considerations, one thinks about the purpose of the aspired action (e.g., get into the flat, leave the cold etc.). Empirical research supports this effect for different dimensions of psychological distance. In a study designed to test these predictions in the hypothetical domain, effects of matching promotional campaigns

content to their level of hypotheticality were found (Todorov et al., 2007). The content of the campaigns varied between either focusing on desirability or feasibility considerations.

Participants who thought the campaign was likely to happen were more likely to choose the feasible option over the desirable option while participants who thought the campaign was unlikely to occur showed a preference for the desirable option over the feasible one (Todorov et al., 2007). Similar effects of construal level on the prioritization of low- or high-level information were shown for the spatial (Bar-Anan et al., 2007), social (Liviatan et al., 2008), and temporal (Hansen, & Trope, 2012) dimensions of psychological distance.

However, low- and high-level information are not limited to desirability and feasibility considerations. Emotions, for instance, can be separated into low-level construal and high-level construal emotions. Low-level construal emotions include emotions like pain, hunger, sadness, and fear. These emotions arise as an immediate reaction to a situation and demand no to very little mental construal (Liberman et al., 2007). High-level construal emotions require distancing from the experiencing self on at least one dimension of psychological distance (Brügger et al., 2016) – examples include anticipation and nostalgia as they are either linked to points in the future or in the past. Interestingly, guilt and shame – two emotions that are often seen as highly related – have been proven to activate distinct construal level mindsets. Shame leads to high-level construal, whereas guilt leads to low-level construal (Han et al., 2014). The distinct levels of construal shame and guilt elicit consequently lead to the activation of specific appraisal tendencies.

Such downstream effects can have a significant impact on outcomes by changing the relative weight that is given to high- and low-level features of an event or object. Studies show that the level of abstraction has a range of downstream consequences which, for example, affect prejudice (Luguri et al., 2006), consumer behavior (Liberman et al., 2007; Kim et al., 2008), empathy (Wolfin et al., 2011), voting intentions (Trope & Liberman, 2010), and stereotyping (McCrea et al., 2012).

These examples point out construal levels effects on fundamental cognitive processes and accentuates the importance of CLT-based approaches. As outlined by these examples, the distinctive qualities of high- and low-level construal mindsets have implications for a variety of cognitive outcomes. The wide range of behaviors, evaluations, and predictions affected by construal level suggests that construal level theory promises to be a helpful framework to understand climate change inaction.

Construal Level theory and climate change

Psychological distance and construal level are an important part of many theories in environmental psychology. One of the most discussed psychological barriers revolves around the idea that human beings experience difficulties prioritizing events remote in space and time (e.g., Clayton et al., 2015; Gifford, 2011; van Vugt et al., 2014). This barrier is assumed to be an inherent weakness of the human mind, however, CLT is a promising theory which might help overcome this bias. Other theories, like research on climate change perceptions, recognize the importance of psychological distance to climate change. After firstly focusing on beliefs about the reality, causes, and consequences of climate change (Poortinga et al., 2019; Björnberg et al., 2017) researchers recognized that they need to add another dimension to this model – the perceived temporal and spatial distance of consequences (McDonald et al., 2015). Adding this dimension deepened the understanding of climate change perceptions and added explanatory power to this model.

The threat of climate change is seen as something that affects strangers, happens in remote places, and will mainly be felt in the future (O’Neil, & Nicholson-Cole, 2009). This perceived distance to the consequences of climate change leads to less concern for climate change topics and induces the notion that no personal action is required due to irrelevancy to the individual. Furthermore, climate change and psychological distance are highly entangled topics. Consequences of emissions often affect those who are least responsible for them, as opposed to those who contribute greatly to them. This issue is highlighted by the fact that

climate change generally is seen as a greater threat in developing countries than in industrialized countries (Kim & Wolinsky-Nahmias, 2014). This gap between the people responsible for emissions and the ones affected by them applies to both the spatial and the temporal domain.

The solution to stop this vicious cycle, raise awareness for climate change, and increase pro-environmental behavior (PEB) seems intuitive: Convince the public of the fact that climate change is happening to them in the current moment and highlight the proximal consequences (Moser & Dilling, 2007). While some empirical studies conclude that concern and mitigation behaviors can be increased by “proximising” climate change in different domains of psychological distance (Jones et al., 2017; Spence & Pidgeon, 2010; Singh et al., 2017) other show mixed results. Many studies have failed to show the effectiveness of this “proximising” approach and therefore were not able to provide sufficient evidence. For example, Spence et al. (2012) provided evidence that a decrease in perceived psychological distance did indeed lead to higher risk perceptions, but not to increased mitigative behavior.

At first, the lack of results that the “proximising” approach yields seems surprising, as it is seen as a “common sense” strategy (Devine-Wright, 2013). Upon further examination through the lens of CLT, it becomes apparent that this strategy is oversimplified and does not sufficiently explain the role of psychological distance in human behavior. Brügger et al. (2016) noticed that “proximising” climate change was seldom an object of interest in CLT research. Using a CLT approach, they were able to show that “proximising” climate change does not directly affect individuals’ motivation to act. Nonetheless, changing the level at which one construes climate change has been shown to affect the information we use as a basis for decision making and can have positive downstream effects. Brügger et al. (2016) were able to show that participants who were primed to have a proximal mindset relied more on low-level construal fear when making judgements about risk and deciding about possible responses. Participants with a distant mindset, on the other hand, based their decision more on

skepticism – a high-level construal emotion. This shows that psychological distance, and consequently construal level, can indeed affect climate change related decision making. By studying these interactions, researchers can gain insights into mechanism's that influence beliefs around climate change and the basis of PEB which could lead to more effective ways of communicating these topics.

To build more effective climate change communication, it is important to be aware of the difference between construal level and psychological distance, two highly related concepts with key differences. According to CLT, psychological distance is a subjective experience which bears difficulties for consistent operationalization (Trope & Liberman, 2010). Diverse factors can influence an individual's psychological distance to a certain topic (e.g., personal experience) which emphasizes an inherent flaw of the “proximising” approach. Another flaw associated with this approach shows when examining climate change perceptions: the same event can be perceived as proximate in one domain of psychological distance but distant in another. For example, an individual can perceive climate change as proximate on the temporal dimension (i.e., happening now) but can simultaneously perceive it as distant on a spatial dimension (i.e., happening in remote places) (Devine-Wright, 2003). This implies that the perceived relevance of local climate change effects does not necessarily lead to a decrease in the perceived relevance of global climate change effects. Some researchers argue that a combination of close, concrete and distant, abstract impressions of climate change are beneficial (Rabinovich et al., 2009). Interestingly, many individuals do exactly that. Despite the widely held belief that climate change is a threat that is more likely to affect strangers remote in time and space (Fleury-Bahi, 2008; Lorenzoni et al., 2007), results show that roughly 40-50% of people experience climate change as psychologically close on various dimensions (Spence et al., 2011). Other studies conclude that psychological distance is inadequate as a mean to combat human inaction in the context of climate change and question link between construal level and psychological distance in the domain of climate change is

questionable (Brügger et al., 2016). Other studies show a lack of correlation between the two concepts (Wang et al., 2019) and conclude that the strength of peoples preexisting beliefs and views about climate change makes it difficult to induce a change in construal level (Brügger et al., 2015; Schuldt et al., 2018).

However, using a construal level approach in the context of climate change still shows promise because information can consistently be framed in a concrete or an abstract way, thereby minimizing individual tendencies. The interaction of climate change related outcomes and construal level is not based on direct effects (Brügger et al., 2016) but on downstream effects. This indicates concrete or abstract visual messages do not influence participants' level of concern or mitigative behavioral intentions but influences them by moderating the effects of efficacy and responsibility, self-transcendence values, and political orientation on participants' mitigative behavioral intentions (Duan et al., 2021). When assuming a concrete mindset, individuals who exhibit higher self-transcendence values are more likely to think of climate change as psychologically close, show more concern for climate change, and show more willingness to take mitigative action (Duan et al., 2021).

The mixed results construal level research has shown in the field of climate change should not discourage researchers from using this framework to further the understanding of climate change. Climate change is an outlier when it comes to risk representations and risk assessment (Breakwell, 2010), and consequently should be studied extensively to reveal underlying mechanisms. Research has played an important part in revealing the moderating role construal level attains in relation to climate change perceptions and PEB. Results suggest that the importance of construal level does not only show in the laboratory, but also transfers to the field. The right mix of loss (gain) frame and concrete (abstract) information can help to increase the amount of recycled household waste (White et al., 2011). The lack of unambiguous findings in this field of research (Brügger et al., 2016; Duan et al., 2021; Spence et al., 2011) should not discourage researchers from further investigation but guide research

efforts. The missing direct effects indicate that a focus on downstream effects of construal level aiming at understanding their underlying mechanisms shows the most promise.

The current research aims to test mechanisms found in other fields of construal level research and transfer their findings onto the domain of climate change and PEB. Study 1 is based on the idea that matching effects between construal level and psychological distance lead to a preference of matching options over others. This is caused by the bidirectionality of the relationship between construal level and psychological distance. Matching construal level and psychological distance can lead to enhanced processing fluency in a Stroop task (Bar-Anan et al., 2007). Furthermore, increasing psychological distance on one dimension leads to a perceived increase in other domains (Sungur et al., 2019; Stephan et al., 2010; White et al., 2011). Based on these findings, Study 1 investigates how construal level influences the rating of spatially and temporally proximate and distant climate change perceptions.

Study 2 is based on findings in the field of drinking intention research suggesting that verb tense can change the information individuals base behavioral intentions on (Carrera et al., 2012). The use of the simple past resulted in a stronger influence of participants' values while the use of the simple present resulted in a stronger influence of past behavior. Different verb tenses have been linked to a change in construal level which is seen as the driver behind the effects (Carrera et al., 2014). Similar downstream effects on the effects of self-transcendence values, efficacy and responsibility, and political orientation on mitigative intentions (Duan et al., 2021) have been observed in the context of climate change. To replicate this study in a climate change setting, it is necessary to gain an understanding of PEB and values related to it. Carrera et al. (2014) used one item measures to measure drinking intentions and attitudes related to drinking. However, PEB consists of many different behaviors and several contradicting values influence PEB. Thus, findings relating to PEB and values related to PEB need to be considered before Study 2 can be conducted.

Pro-Environmental Behavior and Values Influencing it

PEB can take many different forms and different focuses can be applied to the measurement of PEB. Researchers can for example focus on mitigation or adaptation behaviors, or behaviors related to certain aspects of PEB like saving water or energy. Moreover, researchers can focus on different target groups like students, farmers, or tourists. How behavioral measures are interpreted and what is considered an object of behavioral measurements shows great variance (Nelson, & Hayes; 1979; Yoder et al., 2018). These diverse conceptualizations and interpretations of behavioral measurements contribute to the lack of consistency when operationalizing PEB (Lange, & Dewitte, 2019). The diversity of possible pro environmental behaviors further adds to this lack of consistency.

An analysis of the factor structure of the General Ecological Behavior (GEB) scale (Kaiser, 1998), a well validated scale testing general ecological behavior, indicated a six-factor model (Kaiser et al., 2001; Kaiser & Wilson, 2004). The six factors they distinguished were energy conservation, mobility and transportation, waste avoidance, consumerism, recycling, and social behaviors. These six factors are in line with the most frequently studied individual lifestyle behaviors according to a review by Larson et al., (2015). Therefore, these six-factors will guide the conceptualization of past behavior and PEB intentions in Study 2.

Values influence human cognition in a variety of ways by influencing what we attend to, which goals are activated, what knowledge is most accessible, how important different consequences of actions seem, how particular facets of a situation are evaluated, and which other options are considered. Therefore, values function as criteria against which an individual can test their current experience (Feather, 1995). They are relatively stable over time (Stern, 2000), shared between cultures (Schwartz, 1992; Schwartz, 1994) and can affect various beliefs, preferences, and behaviors simultaneously (Rohan, 2000). This universal character of values shows great promise for PEB research because findings can probably be applied to other cultures.

4 classes of values are important for PEB: Biospheric (e.g., unity with nature), altruistic (e.g., social justice), egoistic (e.g., authority), and hedonic values (e.g., enjoying life) (Schultz & Zelezny, 1998; Stern et al., 1995; Steg et al., 2012). Both biospheric and altruistic values are positively related to pro-environmental behaviors, preferences, attitudes, and beliefs (De Groot, & Steg, 2008; Honkanen, & Verplanken, 2004; Nilsson et al., 2004). Yet, biospheric values show a stronger link to pro-environmental behaviors, preferences, attitudes, and beliefs (De Groot, & Steg, 2010; Steg et al., 2012). Together, these two groups of values are classified as self-transcendence values. Egoistic and hedonic values are mostly negatively related to pro-environmental behaviors, preferences, attitudes, and beliefs (De Groot, & Steg, 2007; Steg et al., 2012). These 2 groups of values are classified as self-enhancement values. Egoistic values have enjoyed enhanced research efforts (e.g., De Groot, & Steg, 2008, 2010; Schultz & Zelezny, 1998; Stern et al., 1995) while hedonic values only recently became a focus of PEB research (Steg et al., 2012). The importance of hedonic values in other research fields and theories (Dittmar, 1992; Lindenberg & Steg, 2007) and thus gained recognition in PEB research. Consequently, self-enhancement and self-transcendence values will both be considered in Study 2.

Study 1: Matching effects of construal level and spatial and temporal climate change perceptions

Study 1 set out to investigate the effects of matching participants construal mindset to the level climate change perceptions are construed at. As mentioned above, matching the construal level at which people mentally construe an action or event does, according to CLT, lead to the prioritization of information with a similar construal level (). This prioritization of information in turn affects human prediction, evaluation, and behavior. People tend to use higher level why descriptions more often when referring to actions which are distant in time (Liberman & Trope, 1998), space (Fujita et al., 2006), less likely (Wakslak et al., 2006) or on a social dimension (Liviatan et al., 2008) because they have a higher construal level. The

positive effects of matching information to construal level have been shown to have an impact on pro-environmental behaviors. Matching loss- (gain-) framed messages with concrete (abstract) information leads to more efficacious communication and an increase in the volume of recycled waste (White et al., 2011). Using these findings as a basis I derived following hypotheses: Participants in the how condition will rate psychologically close climate change items as more important, compared to the high construal level condition (H1). Participants in the why condition will rate psychologically distant climate change items as more important, compared to the low construal level condition (H2).

Method

Participants

Using G*Power the appropriate sample size was calculated for $\alpha = .05$ and a power of $\beta = .80$. Assuming a small-medium effect size ($f = .1$) a sample size of $N = 156$ was calculated. Exclusion criteria included a lack of German skills (lower than C-Level). Other than that, the study targeted the general population. Data was collected using an online study and participants were recruited via various social media channels. The study was mainly posted to Facebook groups with the purpose to help students find participants for their research. Furthermore, friends and family were asked to help distribute the survey via personal channels. Therefore, study one used a convenience sample. Data was collected between June 7th 2022 and August 22nd 2022.

A total number of $N = 350$ participants took part in Study 1. Due to the nature of the study (i.e., the manipulation demanding participants to write a paragraph in the beginning of the study) and the medium (online survey) a high dropout rate was observed. Of the 350 participants, 30 dropped out before giving consent on the data collection (i.e., just opened the questionnaire and closed it immediately). 130 participants did not finish the study. Another 33 participants were excluded during data collection due to not meeting the language requirements, three participants were excluded from the study for failing the attention check,

Table 1*Sociodemographic Characteristics of Participants in Study 1*

Sample characteristics	How condition		Why condition		Full sample	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Gender						
Male	33	43.4	30	42.3	63	42.9
Female	43	56.5	39	54.9	82	55.8
Non-binary	0	-	2	2.8	2	1.4
Education						
Statutory education	0	-	0	-	0	-
Vocational training	4	5.3	4	5.6	8	5.4
Vocational middle school	3	3.9	3	4.2	6	4.1
High school	18	23.7	18	25.4	36	24.5
Vocational high school	5	6.6	4	5.6	9	6.1
University degree	46	60.5	42	59.2	88	59.9
Political orientation						
Conservative	10	10.5	12	11.9	22	11.2
Liberal	14	14.7	27	26.7	41	20.9
Social democratic	24	25.3	22	21.8	46	23.5
Left	18	18.9	16	15.8	34	17.3
Green	29	30.5	24	23.7	53	27.0

and one participant was excluded due to not using enough characters in the manipulation.

During the data analysis, 6 outliers who were found during the assumption check were excluded from analysis, resulting in a final sample of $N = 147$ participants (55.8% female, 42.9% male, 1.4% non-binary). Participants were aged 18 to 65 ($M = 29.5$, $SD = 9.7$). Among

these, 76 were assigned to the psychologically close (how-) condition ($M = 28.9$, $SD = 9.8$) and 71 were assigned to the psychologically distant (why-) condition ($M = 30.3$, $SD = 9.8$).

Procedure

Participants first read a short introduction and gave consent to the collection of data. Next, participants were asked to specify which category resembles their level of German most accurately. They were then randomly assigned to one of two conditions. In the manipulation task they were instructed to either describe how (condition 1) or why (condition 2) they think climate change will affect the planet and humanity. Afterwards, participants were asked to rate several climate change perception items in the spatial and temporal domain which varied in psychological distance. Lastly, participants' demographic data was surveyed followed by a debriefing about the purpose of the study. Before the start of data collection, Study 1 was pre-registered on [aspredicted.org](https://aspredicted.org/#96796) (#96796) and an ethics approval was obtained from the Institutional Review Board (IRB) of the University of Vienna (IRB number: 2022_S_015). The study was hosted on the platform Qualtrics.com using an account provided by the University of Vienna. Study one implemented an experimental between-within subjects design.

Materials

Informed Consent and Introduction. Participants were presented with standardized information on informed consent and a short introduction to the study. They were informed that participation in the study was voluntary, that data is treated anonymously and in accordance with the DSGVO and that they could stop participation in the study at any point without giving reasons and without any repercussions. Participants who did not agree to data collection were screened out. Furthermore, they were presented with a brief introduction stating the purpose of the study, the executing university and faculty, an estimate for the duration and a contact e-mail address for further questions.

Knowledge of German. Next, participants' knowledge of German was surveyed. Participants who chose any answer but "C2 or first language" were excluded from participation. This exclusion criterion was chosen because the manipulation demanded to write a short excerpt to induce a change in construal level. To ensure a successful manipulation, participants needed to speak German fluently and be able to express themselves freely.

Manipulation task. The manipulation task split the sample into two different conditions which were assigned randomly. Participants assigned to condition one (from here on referred to as the "how-condition") were asked to describe how exactly they think climate change will affect the planet and humanity itself. They were instructed to be as precise as possible and to describe the, in their opinion most important, consequences. This was done to enhance focus on details and ensure a low construal level. Participants assigned to condition two (from here on referred to as the "why-condition") were asked why they think climate change will affect humanity and the planet.

Climate Change Perceptions. Climate change perceptions were measured using four subscales of the climate change perceptions scale (van Valkengoed et al., 2021). The subscales spatial distance, temporal distance, spatial proximity, and temporal proximity were used. They were directly derived from considerations of psychological distance and construal level which fits the goal of study one. As stated above, psychological distance is a key factor in climate change risk perceptions which lead van Valkengoed and colleagues (2021) to include these subscales. Participants were presented with 10 items of which two were part of the subscale spatial distance, three of the subscale spatial proximity, three of the subscale temporal distance and two of the subscale temporal proximity. The items consisted of statements such as "My local area will be influenced by climate change". These statements were rated on a 7-point Likert scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). Participants were also given the option to state they do not believe in climate change by

choosing 8 (*I do not believe in climate change*). Items of the temporally and spatially proximate subscales showed good reliability ($\alpha = .88$). The items of the temporally and spatially distant subscales showed less reliability ($\alpha = .69$). The reliability falls short of a satisfactory reliability rating ($\alpha \geq .7$) and therefore must be considered questionable.

Demographics. Next, participants demographic data was collected. This data included age, gender, education, and political orientation.

Debriefing. Lastly, participants were presented with a standardized debriefing which included a short thank you and outlined the purpose of the study and its hypothesis. Moreover, the debriefing described the procedure and conditions of study one.

Results

In the analysis condition served as independent variable, whereas climate change perceptions served as an outcome variable. Climate change perceptions were split into proximate climate change perceptions (including temporal and spatial proximate subscales) and distant climate change perceptions (including temporal and spatial distant subscales). As reported in table 1, distant climate change perceptions were rated slightly higher in the why condition ($M = 1.9$ $SD = 1.1$) than the how condition ($M = 1.9$, $SD = 1.0$). Proximate climate change perceptions were rated almost identically with a slightly higher rating for the how condition ($M = 6.0$, $SD = 1.2$) than for the why condition ($M = 6.0$, $SD = 1.1$).

To assess whether the conditions had a significant effect on participants' climate change perceptions, a 2x2 mixed ANOVA was conducted to compare the effect of construal level (how and why condition) on climate change perceptions (proximal and distal).

Main Analysis

Before the analysis was conducted, the assumptions for a mixed ANOVA were checked. The measurements are correlated as the participants in both conditions were presented with identical items. Dependent variables (Climate change perceptions) are interval scaled and the between-subjects-factor (condition) is categorical. Homogeneity of variances

was given for both groups, as a Levene test revealed ($p > .05$). To test normal distribution, the Shapiro-Wilk test was performed for proximate ($W = .83, p < .001$) and distant ($W = .87, p < .001$) climate change perceptions. Because the Shapiro-Wilk test turned out significant, I had to assume that the variables may not be normally distributed. To gain further insights, the Q-Q plots of both variables were analyzed. The Q-Q plot for proximate climate change items showed that values at the lower end of the scale (2 and lower) exceeded the expected normal. Except for these outliers most observed values lay close to the expected normal. The Q-Q plot for distant climate change items showed a reversed image. Here, observed values on the lower end of the scale was close to the normal distribution. Values on the higher end (4 and upwards) were observed less frequently than expected. In both cases, only few data points differed from normal distribution and laid in the extremes. Therefore, they should be considered outliers and a normal distribution can be assumed.

No significant main effect of construal level on climate change perceptions was found $F(1, 145) = 0.005, p = .944$, implying that condition one ($M = 4.0, SE = .06, 95\% CI [3.83, 4.07]$) did not show any systematic difference to condition two ($M = 3.96, SE = .06, 95\% CI [3.84, 4.09]$). Climate change perceptions, $F(1, 145) = 1116.64, p < .001$, showed significant within-subjects effects.

Exploratory Analysis

In an exploratory analysis, the different kinds of psychological distances were controlled for by conducting a 2X2X2 mixed ANOVA that featured the domain of psychological distance (temporal and spatial) as another within-subject-factor with 2 levels. Further significant effects were found for domain, $F(1,145) = 21.62, p < .001$, and the interaction between domain and psychological distance, $F(1,145) = 0.56, p = .04$.

Discussion

In conclusion, no effect of construal level on climate change perceptions was found. Neither H1 nor H2 were supported by the data. The only correlations that were found in study

one existed between related concepts. The significant effect of climate change perceptions does not come as a surprise as the two levels of climate change perceptions (distant and proximate) lay on opposite ends of the continuum. However, the lack of effect shown in this experiment might partly be due to methodological problems. Several limiting factors must be considered.

Firstly, while designing study 1, no attention was paid to the difference between egocentric and nonegocentric perspectives. The lack of differentiation between these two perspectives in the research of psychological distance and CLT in the context of climate change can be seen as part of the explanation for the mixed researchers found. As Duan et al. (2022) discuss in their paper, the differentiation between egocentric and nonegocentric perspectives rarely is considered in the field of climate change research. When adapting a nonegocentric mindset, an individual must raise their level of abstraction because the point of reference itself is removed from the experiencing self. Consequently, construal level is raised and does not affect judgement. Not acknowledging these differences can lead to problems because construal level cannot be consistently manipulated, leading to ambiguous findings and a misconception of how construal level influences climate change perceptions. In visual climate change communication, an egocentric has been shown to lead to increased mitigation intentions, whereas a nonegocentric perspective did have no effect on mitigation intentions (Duan et al., 2022). In the manipulation of experiment one participants were asked either how or why they think climate change will influence the planet and humanity. Considering the differences between the egocentric and nonegocentric perspectives it was a mistake to have participants reference the planet and humanity in general. I should have instead phrased the manipulation in a way that the experiencing subject is the point of reference. The manipulation failed to encourage participants enough to adapt an egocentric perspective. Therefore, they already adapted a higher construal mindset. Nonetheless, thinking about

reasons or causes (i.e., considering feasibility or desirability) should influence construal level. Here, another problem with the manipulation task becomes apparent.

Participants' answers in both conditions did not consistently differ. The manipulation was either worded too vaguely or was not suited for climate change perception research. The distinction between causes (the why) and effects (the how) of climate change on humanity is not always apparent. A cause for other effects (e.g., heat leading to famine and drought) can be affecting humans directly (e.g., heat as a health hazard). Heat is not the only example which can be seen as both a cause and effect of climate change. The global character of climate change with many events relating to and influencing each other further blur the lines between causes and effects. Moreover, participants answers varied greatly in depth and length, indicating a big gap in knowledge of and interest in the topic of climate change. Answer length ranged from 121 characters to 1986 characters ($M = 325.46$, $SD = 257.99$). This huge variance in length emphasizes the different levels of importance that climate change has for different participants which as well shows in the quality of answers and knowledge they contain.

Another potential weakness of Study 1 were the dependent variables. The 4 subscales are part of a larger scale and were chosen due to their apparent fit for study one. However, due to their tendency to evoke answers on the extremes of the continuum, they might not have been the best fit for this purpose. The wording of the items heavily favors approval (e.g., "The region where I live will feel the effects of climate change") or rejection (e.g., "Climate change only affects places far away from me") in most people. During the validation of the scale the authors tested the discriminant validity by comparing how gender and political orientation influence the two subscales. The scales did not discriminate between genders but were found to show a mean difference between democrats and republicans of $\Delta = 1.44$ for the subscale spatial distance and $\Delta = 1.5$ for the subscale temporal distance (van Valkengoed et al., 2021). As studies have shown, political orientation has a consistent effect on climate change

perceptions (Poortinga et al., 2019). Comparing the inconsistent effects construal level produces in an environmental context to the consistent effects of political orientation, a lower Δ for construal level compared to political orientation can be assumed. These ceiling effects in combination with the ambiguous manipulation contribute to the lack of significant results.

A further point for optimization was the sampling method. Due to the chosen method (an online study with convenience sampling) there was no way of controlling participants environment and limited ways to control their focus on the manipulation task. Attention checks were used but they cannot guarantee a focus on the execution of the manipulation. The recruitment via social media groups in which students take part in each other's studies was not optimal either. These groups work on a quid pro quo basis, meaning members take part in each other's. This can lead to participants rushing through studies or not paying attention to the instructions properly. Moreover, members also tend to take part in several studies consecutively which can exhaust participants leading to reduced mental capacities and failure of the manipulation.

Lastly, it is possible that the lack of effect is caused a missing link between construal level and psychological distance as findings by Wang et al. (2019) suggest. In two questionnaire studies and one experiment they found no evidence supporting the assumption of a bidirectional relationship between construal level and psychological distance. Several other studies display difficulties when researching the influence of construal level and psychological distance on a range of pro-environmental outcomes (e.g., McDonald et al., 2015; Brügger & Pidgeon, 2017; Schuldt et al., 2018). The lack of matching effect between spatial and temporal distance and the level of construal is in line with these findings and support the idea that the bidirectional relationship between these concepts does not exist in the context of climate change.

Study 2: Investigation of the Effects of Verb Tense Induced Construal Level Changes on PEB Intentions

Study 2 set out to investigate the effects of verb tense on the information individuals base their PEB intentions by applying methods that have been tested in other behavioral domains to pro-environmental behavior. Verb tenses have been linked to a change in construal level (Carrera et al., 2014). Research in has furthermore shown a strong influence of language on cognitive processes (Roberts et al., 2015). Tense, for one, has been shown to influence cognition on different levels. The way a language marks future events can influence PEB in tourists (Essl et al., 2022) and the relationship of knowledge of environmental impacts on pro-environmental attitudes in tourists (Kim & Filimonau, 2017).

I hypothesize that verb tense will have no direct effect on PEB intentions (H1). There will be a significant interaction between verb tense and self-transcendence values (H2a). There will be a significant interaction between verb tense and self-enhancement values (H2b). There will be a significant interaction between verb tense and past behavior (H3).

The same hypotheses apply to donation intentions. Verb tense will have no direct effect on donation intentions (H4). There will be a significant interaction between verb tense and self-transcendence values (H5a). There will be a significant interaction between verb tense and self-enhancement values (H5b). There will be a significant interaction between verb tense and past behavior (H6).

Method

Participants

Using G*Power, a sample size for $\alpha = .05$ and a power of $\beta = .80$ was determined. Assuming a small-medium effect size ($d = .35$) a sample size of $N = 102$ per group was calculated. Therefore, a total sample size of $N = 204$ participants was required. Exclusion criteria included not consistently using one tense in the manipulation task. Moreover, participants who finished the study in under 240 seconds were screened out before reaching the end and participants who failed one of the three attention checks were excluded from the analysis. Data was collected using an online format and participants were recruited via a

panel. This collaboration with a panel permitted to draw a representative sample for the Austrian population. The distribution of age, gender, and federal country for the year 2022 was obtained from Statistik Austria (Statistik Austria, 2022) to calculate quotas. Therefore, this study uses a representative sample. Due to a high number of invalid cases which were excluded post data collection, certain categories are underrepresented in the sample. Data was collected from October 27th 2022 to November 17th 2022.

A total number of $N = 263$ participants completed Study 2. Of these 263 participants, 55 were excluded because they did not complete the manipulation task properly. A further 20 participants were excluded for failing one of the attention checks. After excluding all invalid cases, a total of $N = 188$ participants (55,9% female, 43,1% male, 1,1% non-binary) were left. Participants were aged 18 to 83 ($M = 44.57$, $SD = 15.49$) and randomly assigned to one of two conditions. 91 participants were assigned to condition 1 (the present condition) ($M = 46.4$, $SD = 14.9$) and 97 participants were assigned to condition 2 (the present condition) ($M = 42.9$, $SD = 15.9$). Further demographics are reported in table 2.

Procedure

Participants first were presented with a consent form and demographic questions which were used to control the distribution of the sample. Participants then were presented with a short introduction and further demographic questions. In a next step, participants filled out two questionnaires measuring past behavior and values related to PEB. They then wrote a short text in either the present tense (condition 1, the present condition) or the past tense (condition 2, the past condition). Afterwards, the dependent variables, participants PEB and donation intentions, were measured using a self-report measure and a hypothetical donation measure. Furthermore, participants filled out a communal orientation scale. Before the start of data collection, the study was pre-registered on aspredicted.org (#96649) and an ethics approval was obtained from the University of Vienna (IRB number: 2022_S_015). Study 2 was hosted

Table 2*Sociodemographic Characteristics of Participants in Study 2*

Sample characteristics	Present condition		Past condition		Full sample	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Gender						
Male	36	39.6	45	46.4	81	43.1
Female	55	60.4	50	51.5	105	55.9
Non-binary	0	-	2	2.1	2	1.1
Education						
Statutory education	3	3.3	6	6.2	9	4.8
Vocational training	21	23.1	21	21.6	42	22.3
Vocational middle school	14	15.4	16	16.5	30	16.0
High school	14	15.4	16	16.5	30	16.0
Vocational high school	15	16.5	17	17.5	32	17.0
University degree	24	26.4	21	21.6	45	23.9
Political orientation						
Conservative	16	17.6	18	18.6	34	18.1
Liberal	31	34.1	22	22.7	53	28.2
Social democratic	33	36.3	41	42.3	74	39.4
Left	6	6.6	8	8.2	14	7.4
Green	5	5.5	8	8.2	13	6.9
Size city of residence						
<5.000	30	33.0	24	24.7	54	28.7
5.000 - 10.000	15	16.5	17	17.5	32	17.0
10.000 - 50.000	16	17.6	19	19.6	35	18.6
50.000 – 100.000	6	6.6	4	4.1	10	5.3
100.000 – 500.000	9	9.9	12	12.4	21	11.2
500.000 +	15	16.5	21	21.6	36	19.1

on the platform Quatrics.com using an account provided by the University of Vienna. It implemented an experimental between-subjects design.

Materials

Informed Consent and Introduction. Participants were asked to read standardized information on informed consent and further instructions. They were informed that participation was voluntarily, that data is treated anonymously and in accordance with the DSGVO, and that they could stop participation in the study at any point without having to state a reason. Participants who did not agree to data collection were screened out. Furthermore, they received a brief introduction stating the purpose of the study, the executing university and faculty, an estimate for the duration, and a contact e-mail address for further questions.

Demographic Information. Demographic information was surveyed in two parts. To control the distribution, respondents first were asked for their age category, the region they live in, and their gender. In a next step, respondents were asked for their age, political orientation, education, and the number of inhabitants of place of residence.

Past Behavior. Past behavior was measured using the RPEB-Q (Brick et al., 2017), a 21-item scale which lets participants rate how often they show certain behaviors (e.g., using a reusable bag when grocery shopping) on a 5-point Likert Scale from 1 = *never* to 5 = *always*. Items were sorted into the categories suggested by the six-factor model of PEB (Kaiser et al., 2007). The categories mobility and transportation, social behaviors, and energy conservation were all represented by three items each. Two items represented waste avoidance and six items represented consumerism. One item was excluded because it was referencing the use of aerosol products. Aerosol products contribute a minor part to greenhouse gas emissions and afterwards stopped being a prominent factor in the debate around climate change after CFCs got banned. Thus, this scale consisted of 20 items ($\alpha = .76$).

This categorization of items was chosen to ensure that all six facets of PEB are represented in both the past behavior and PEB intentions. Certain items could have been part of several categories which is why the category that represented them most was chosen. This categorization is not important for any further analysis.

Values. To assess participants values the Environmental Portrait Value Questionnaire (E-PVQ, Bouman et al., 2018) was used. The E-PVQ tests for egoistic, hedonic, biospheric, and altruistic values. Egoistic and hedonic values form one category, the self-enhancement values (8 items, $\alpha = .78$) while biospheric and altruistic values form the self-transcendence values (9 items, $\alpha = .87$). It is based on the E-SVS (Steg & De Groot, 2012), a well-researched and validated scale with minor methodical flaws (e.g., comprehensibility, self-representation biases). The E-PVQ aims to eliminate these flaws by asking participants for a likeliness rating of a person which represents a certain value (e.g., It is important to [him/her] to prevent environmental pollution.) to themselves. This is done on a 7-point Likert scale ranging from 1 (*not like me at all*) to 7 (*very much like me*).

Manipulation Task. In the manipulation task, participants were asked to shortly describe an episode of their lives in which they did not behave environmentally friendly out of convenience. A between-subjects design was applied, in which participants were divided into two groups either tasked to describe the episode in the past or the present tense. Participants were told that their answers would be coded using a computer program and that it therefore was of great importance to exclusively use the tense they were assigned to. While Carrera et al., (2012) tasked participants in the past condition to exclusively use the simple past, I decided to allow them to use the present perfect as well. This change was made to reflect the reality of colloquial German use better. In contrast to English, or Spanish like in the case of Carrera et al. (2012), in German the present perfect often assumes the role of both the present perfect and the simple past. Despite the German Perfekt being the structural analog to the English present perfect its application does not follow the same rules. In modern standard

German, the Perfekt is used as single past tense (Klein, 2018) and linguists speak of the extinction of the Präteritum (the German simple past) in certain German dialects (Lindgren, 1957). Nonetheless, participants were given the option to use the simple past to not limit their ability to express themselves.

PEB Intention. Two different measures were applied to measure participants PEB intention. Measure one was based on a method applied by Fuji (2006). Here, participants were asked to rate six statements each resembling one of the six factors of PEB (e.g., I intend to conserve energy). They then had to rate these six items ($\alpha = .81$) on a 7-point scale with verbal endpoints (1 = *strongly agree*, 4 = *neutral*, 7 = *strongly disagree*).

The second measure of PEB intention was a donation intention measure adapted from De Groot and Steg (2008). Respondents were given the instruction to imagine they had 10 Euros they wanted to donate. Next, they were presented with five pairs of organizations and had to rate which organization they would donate their 10 Euros to. Each of those pairs contained one humanitarian (e.g., UNICEF) and one environmental (e.g., WWF) organization. To minimize the impacts of factors like familiarity and size of the organization, the organizations were matched considering their scope of operation (international vs. national organizations) and popularity. For example, UNICEF was matched to WWF as both organizations operate internationally and are well known. Scores for donation intention were computed by summing up the amount of money someone gave to environmental organizations. This score reached from 0 (0 Euros donated to environmental and 50 Euros to humanitarian organizations) to 50 (50 Euros donated to environmental and 0 Euros to humanitarian organizations).

Communal Orientation Scale. Lastly, participants were asked to fill out a communal orientation scale (Betsch et al., 2018) which was used for explorative purposes. This scale was included because PEB can be seen as a form of pro-sociality (Klein et al., 2022) and pro-

sociality is often used to explain PEB. This measurement used a 5-point scale (1 = *extremely atypical* to 7 = *extremely typical*) and showed good reliability ($\alpha = .78$).

Results

Mean Analysis and Correlational Analysis

Two main analyses were conducted. Both analyses aimed to investigate the effect of verb tense on PEB intentions, and the relative weight of past behavior and values when deciding on PEB intentions. A mean analysis was used to compare the dependent variables, past behavior, self-transcendence, and self-enhancement values between both conditions. The results of these comparisons are depicted in Table 3. No differences were found for PEB intentions, past behavior, self-transcendence, and self-enhancement values. Only donation intentions showed a large difference between the two conditions ($M_{present} = 18.68$, $SD_{present} = 13.35$; $M_{past} = 22.58$, $SD_{past} = 13.41$). Despite the larger range of possible values for donation intentions compared to the other scales (0 to 50), this cannot be seen as the main driver behind these differences. The difference of 3.9 scale points accounts for 7.8% of the scales range, indicating that the data needs to be checked for outliers before conducting any further analysis with this dependent variable. Next, a correlation analysis between independent and dependent measures was conducted. Its results are shown in Table 4. Past behavior is significantly correlated to both outcome variables, whereas self-transcendence values only showed a significant correlation to PEB intentions, and self-enhancement values did not show any significant correlation to the outcome variables.

Before any further analysis was conducted, values for the independent variables were centered to account for their different scale levels. Therefore, all independent values, are centered in both main analyses. Moreover, a dummy-coded indicator variable for verb tense was created (1 = present condition, 0 = past condition).

Table 3*Results of Mean Analysis*

Variable	Present		Past		Total	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
PEB intention	5.2	1.1	5.2	5.4	5.2	1.0
Donation intention	18.7	13.4	22.6	13.4	20.7	13.5
ST values	5.0	0.8	4.9	0.8	5.0	0.8
SE values	4.1	0.8	4.1	0.7	4.1	0.7
Past behavior	3.3	0.5	3.3	0.5	3.3	3.3

Note. ST = Self-transcendence, SE = Self-enhancement

Table 4*Correlation Analysis of Variables in Study 2*

Variables	1	2	3	4	5	6
1. Tense	-					
2. Past behavior	.017	-				
3. ST values	-.033	.531**	-			
4. SE values	.033	.019	.176*	-		
5. Intentions	.038	.663**	.686**	.112	-	
6. Donations	.145*	.160*	.049	.011	.072	-

Note. ST = Self-transcendence, SE = Self-enhancement; * $p < .05$ ** $p < .001$

Main Analysis

PEB Intentions. In a first step, the assumptions necessary for a regression analysis were checked. To test the assumption of multicollinearity, the interaction terms were excluded from the regression to eliminate structural multicollinearity and focus on data

multicollinearity. This resulted in PEB intentions being regressed onto tense, past behavior, self-transcendence, and self-enhancement values before the Variance Inflation Factor (VIF) was checked for all variables. The VIFs indicate no multicollinearity (*min. VIF* = 1.01 for gender; *max. VIF* = 1.45 for self-transcendence values). Next, an analysis of standard residuals was conducted to identify possible outliers. It showed that the data does not contain any outliers (*Std. Residual Min.* = -2.75, *Std. Residual Max.* = 2.8). Furthermore, the data met the assumption of independent errors (*Durbin-Watson value* = 1.86). The histogram of standardized residuals indicated that the data contained approximately normally distributed errors. The P-P plot of standardized residuals only showed minimal deviations from the assumed line, further proving the assumption of normally distributed errors. Lastly, the scatterplot of standardized residuals showed that the data met the assumption of linearity and homoscedasticity.

In the first regression analysis, PEB intentions were regressed onto tense, past behavior, self-transcendence and self-enhancement values, and the interactions between tense and past behavior, tense and self-transcendence values, and tense and self-enhancement values. This model (*adjusted R*² = .59, *F* (7, 187) = 39.71, *p* < .001) showed significant effects of self-transcendence values and past behavior on PEB intentions. No significant effects of tense were found, thereby confirming H1. Enhancement values, the interactions between tense and self-transcendence values, tense and self-enhancement values, and tense and past behavior did not show any significant effects. This shows that tense did not change the relative weight of past behavior and values when deciding on PEB intentions, proving H2a, H2b, and H3 wrong. The results of this regression can be seen in Table 5.

Donation intentions. Before conducting the second regression, the data needed to be checked for outliers as the mean analysis suggested a difference in donation intentions between the two conditions. However, standard residuals did not indicate any outliers (*Std*

Table 5*Results of Linear Regression Analysis of PEB Intentions*

Variable	Beta	SE	95 % CL		β	p
			LL	UL		
Intercept	5.26	0.07	5.12	5.39		< .001**
Tense	-0.10	0.10	-0.29	0.10	-0.05	.321
Self-transcendence values	0.46	0.08	0.30	0.61	0.44	< .001**
Self-enhancement values	-0.06	0.07	-0.20	0.07	-0.06	.353
Past behavior	0.44	0.08	0.28	0.60	0.42	< .001**
Self-transcendence*tense	0.07	0.12	-0.16	0.30	.04	.562
Self-enhancement*tense	0.18	0.10	-0.02	0.37	0.12	.073
Past behavior*tense	-0.02	0.12	-0.25	0.21	-0.01	.866

Note. * $p < .05$ ** $p < .001$

Residual Min. = -1.87, *Std. Residual Max.* = 2.56). Next, the assumption of multicollinearity was checked by excluding the interaction terms from the regression. The data showed no signs of multicollinearity (*min. VIF* = 1.01 for gender; *max. VIF* = 1.45 for self-transcendence values). The data also met the assumption of independent errors (*Durbin-Watson* = 2.08). The histogram of standardized residuals indicated that the data contained approximately normally distributed errors. The P-P plot of standardized residuals confirmed this assumption further, showing that the data points were close to the expected line. Some slight deviations from the expected line can be seen between .2 and .5 which, however, were not sufficient to question this assumption. The scatterplot did show several parallel declining lines because the dependent variable was not continuous. Due to the sufficient number of possible values the dependent variable could take, this does not negate the feasibility of a

regression analysis. Other than that, the Scatterplot did show no violations of the assumption of homoscedasticity and linearity.

In the second regression analysis, donation intentions were regressed onto tense, past behavior, self-transcendence and self-enhancement values, and the interactions between tense and past behavior, tense and self-transcendence values, and tense and self-enhancement values. The dummy-coded indicator variable was used for this regression as well. This model ($adjusted R^2 = .06$, $F(7, 187) = 2.68$, $p = .012$) showed significant effects of self-enhancement values, past behavior, and the interaction between self-enhancement values and tense. The results of this regression analysis can be seen in Table 6. The effect of tense almost turned out significant. Nonetheless, the effect of tense did not reach the threshold of significance and therefore confirms H4. No significant interaction between verb tense and self-transcendence values was found, denying H5a and a significant interaction between verb tense and self-enhancement values confirmed H5b. The interaction between verb tense and past behavior did not turn out significant, rejecting H6.

Exploratory Analysis. Donation intentions were regressed onto biospheric, altruistic, egoistic, and hedonic values, past behavior, tense and the interaction terms between the values and verb tense and past behavior and verb tense. This model ($adjusted R^2 = .14$, $F(10, 187) = 3.95$, $p < .001$) displayed an increased fit and a slightly lower Standard Error ($SE = 12.53$) compared to the main analysis. None of the predictors was significant except for the interaction between biospheric values and verb tense ($\beta = 0.31$, $p = .010$).

Discussion

PEB intentions

The regression analysis of PEB intentions did only confirm H1, all other hypotheses could not be confirmed. However, a statistically significant model with a fit ($adjusted R^2 = .59$) was

Table 6*Results of Linear Regression Analysis of Donation Intentions*

Predictor	Beta	SE	95 % CL		β	p
			LL	UL		
Intercept	22.37	1.33	19.75	25.00		< .001**
Tense	-3.78	1.91	-7.55	0.00	-0.14	.05
Self-transcendence values	-2.65	1.54	-5.69	0.39	-0.20	.087
Self-enhancement values	2.71	1.36	0.03	5.40	0.20	.048
Past behavior	3.17	1.60	0.01	6.34	0.24	.049
Self-transcendence*tense	4.47	2.32	-0.11	9.04	0.22	.056
Self-enhancement*tense	-5.17	1.94	-9.00	-1.34	-0.27	.008
Past behavior*tense	-1.53	2.26	-5.99	2.93	-0.08	.500

Note. * $p < .05$ ** $p < .001$

retrieved. Past behavior as well as self-transcendence values act as significant predictors in this model while self-enhancement values did not predict PEB intentions. The interaction term of self-enhancement values and verb tense was the only interaction term that came close to significance and indicated a crossover interaction. When decomposing this interaction, it shows that the effect of self-enhancement values changes direction depending on verb tense. It is negative in the past condition ($\beta = -.07$) and positive in the present condition ($\beta = .11$). Self-enhancement values tend to be negatively related to PEB, but a low construal mindset seems to reverse this relationship. These findings are interesting as most studies focusing on climate change and PEB mainly focus on self-transcendence values (e.g., Duan et al., 2021). Self-enhancement values and especially hedonic values have not found much consideration in CLT research of climate change thus far. But maybe these values are the ones that construal level shows the greatest influence on. Self-transcendental values as well as past behavior both

showed direct effects due to their importance for PEB, but these values and behaviors can include strong convictions surrounding the topic of climate change which make it difficult to induce a different mindset.

Donation intentions

In the second part of experiment two, I received a significant model again. However, the poor model fit is something that needs to be kept in mind while discussing these results. This regression model showed a large standard error ($S = 13.08$) and large differences in means between the two conditions. These problems with the dependent variable contribute to the poor model fit and do explain the almost significant effect of verb tense. Even though it is important to keep these limitations in mind during the discussion, the results can still offer insights into PEB.

While the interaction between verb tense and self-enhancement values turned out significant and the interaction between verb tense and self-transcendence values was close to significance, the interaction term of verb tense and past behavior was did not near significance. Considering the significant main effect past behavior has on PEB intentions, it appears like the relationship is too pronounced to be affected by verb tense and changes in construal level. This emphasizes the general importance of past behavior for donation intentions and highlights a possible difference between PEB intentions and drinking intentions.

As shown in Table 7, self-transcendence and self-enhancement values show crossover interactions. All 3 predictors show higher regression coefficients in the past condition than the present condition but none of the predictors turned out significant. In the past condition self-transcendence and self-enhancement values come close to the significance level.

Interestingly, in the past condition, the regression coefficients show an opposite direction than assumed as values should have a stronger impact on PEB intentions in the past condition. The assumed positive relationship between PEB and self-transcendence values is

negative in this case. Meanwhile self-enhancement values, which are meant to be negatively correlated to PEB, show a positive effect in the past condition. Both effects are greater in the past condition which is in line with the findings of Carrera et al. (2019). Because participants had to choose between an environmental and a humanitarian organization, values in one class might have contrary effects and cancel each other out. To address these concerns, an explanatory analysis which accounted for altruistic, biospheric, hedonistic, and egoistic values was conducted. When the regression term was decomposed, biospheric and altruistic values did show a significant effect in the present condition but not in the past condition. The significant effects in the present condition indicated opposite directions for biospheric values ($\beta = .51, p < .001$) and altruistic values ($\beta = -.35, p = .004$) which is a possible explanation for the low model fit of the original regression analysis. The data suggests, that adopting a low-level construal mindset enhanced the reliance on biospheric and altruistic values. Both classes of values are vital for the decision to either donate to a humanitarian or environmental organization because they directly relate to the outcome. These effects appear to have a stronger influence on donation intentions when participants are in a concrete low-construal mindset compared to an abstract one.

Table 7

<i>Deconstructed regression coefficients</i>				
Predictor	Present		Past	
	Beta	<i>p</i>	Beta	<i>p</i>
Self-transcendence values	.13	.296	-.21	.090
Self-enhancement values	-.19	.078	.20	.050
Past behavior	.24	.305	.24	.051

General discussion and limitations

Two studies were conducted to understand research downstream effects of construal level changes on climate change perceptions and PEB intentions. Study 1 did not indicate any significant matching effects between construal level and climate change perceptions. Study 2 did show significant effects of values and past behavior on PEB intentions and donation intentions. Crossover interaction of self-enhancement values and verb tense on donation intentions were found in a regression analysis of donation intentions. Furthermore, self-transcendence values showed a similar cross-over interaction but did not turn significant.

Taken together, the result of Study 1 and 2 question the assumption that one can transfer results from CLT research and apply them to climate change research. Other theories show similar issues when findings are transferred to climate change research. A metareview of the relationship of protection motivation theory and PEB concluded that the mixed results found in PEB research contrast the constant effects protection motivation theory showed in metareviews of other areas of research (Kothe et al., 2019). This highlights the special position climate change has as a mental representation due to its complexity.

Future studies should aim at identifying the mechanisms of climate change outcomes possible failures of CLT. As the results of Study 2 show, interaction between values and construal level exist while no interaction between past behavior and construal level could be found. This indicates that the downstream effects of construal level are not strong enough to change the direction of aspects as strongly related as past PEB and PEB intentions but have been shown to influence values. Thus, the strength of the relationship of could play a key role to understand when Construal Level has downstream effects on PEB. Identifying areas of research and conditions under which CLT can be used effectively is important as critique of CLT as a mean to investigate climate change shows (Brügger, 2020). According to this critique CLT is often used for research questions which lie outside of its scope. Narrowing

this scope by identifying the conditions under which CLT can be used effectively will help guide future research efforts.

Research in the field of climate change is confronted with complex mental representation and the influence of different psychological concepts on outcome variables. As seen in Study 2, when adapting an idea from another area of research, many aspects must be considered. While it might be enough for research of drinking intentions to ask participants how many times per week they are drinking or how they see drinking, many more factors must be considered in the research of climate change and PEB intentions. Looking at the range of behaviors that can be seen as PEB (Lange & Dewitte, 2009) and the values that influence PEB in different directions (Steg, & De Groot, 2012) highlights the complexity of climate change as a topic and the range of beliefs associated with it. Several other factors, like self-efficacy (White et al., 2011), the perspective a person is taking (Duan et al., 2022), beliefs (Poortinga et al., 2019) and several demographic factors need to be considered.

Limitations

Further limitations can be seen in the applicability of these results. An experimental approach does not ensure valid results which can be used to design interventions. PEB research would benefit from shifting its focus towards studying mechanisms and potential interventions under controlled laboratory conditions (Lange, & Dewitte, 2019). Despite the advantages of online studies, like the access to a larger, more heterogeneous population, they come with disadvantages such as a higher possibility of distraction compared to online studies (Clifford & Jerit, 2014). Both manipulations could have benefited from an approach that offers a more controlled environment.

The lack of behavioral measurement is a limiting factor of Study 2. Even though often assumed, the intention-behavior relationship is not well researched (Kothe et al., 2019). This problem can be resolved by measuring behavior directly using key behavioral outcomes such as recycling volume or energy use (e.g., White et al., 2011). Even when these behavioral

outputs are not a feasible option, actual behavior can be measured with specifically designed donation tasks. In these donation tasks, participants can donate a part of the compensation they receive for taking part in the study (e.g., Clements et al., 2015). This will lead to results with stronger implications for actual behavior and overcome the troubles of measuring PEB intentions. Thus, there would be no need to use ad-hoc measures of PEB intentions which is another limitation of the study.

Two studies investigated the downstream of changes in construal level on climate change perceptions and PEB. Study 1 showed a lack of matching effects between construal level and the psychological distance of climate change perceptions. This provided further evidence that the hypothesized relationship between construal level and psychological distance might not hold true in the context of climate change (Wang et al., 2019). Study 2 showed downstream effects of construal level on values but failed to show them for past behavior, indicating that concepts that are too closely related to climate change weaken the effect of construal level on PEB intentions. These findings suggest that applying CLT findings from other research fields to the field of climate change research can be problematic because the strong beliefs surrounding climate change hinder the effects of construal level in this domain. Nonetheless, gaining a deeper understanding of the connection between PEB and construal level can prove helpful in guiding future research efforts.

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Reconstruing Intolerance: Abstract Thinking Reduces Conservatives' Prejudice

Against Nonnormative Groups—Jamie B. Luguri, Jaime L. Napier, John F.

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Appendix A

Abstracts

A1 Abstract (English)

Research linking construal level to pro-environmental behaviors and determinants of such behaviors shows mixed results and a lack of direct effects. Nonetheless, construal level is a promising concept in the field of climate change research as it can have downstream effects on the information an individual uses as a basis for their decisions. Two studies were conducted to apply findings from other areas of construal level research to climate change research. Study 1 ($N = 147$) aimed at investigating possible matching effects between construal level and climate change perceptions. It did not provide significant results. Study 2 ($N = 188$) investigated the effects of verb tense induced construal level changes on pro-environmental behavior intentions and donation intentions while controlling for past behavior and values related to pro-environmental behavior. It aimed at testing whether past behavior and values would show significant interactions with construal level. The lack of direct effect of construal level was confirmed for both types of intentions. Past behavior did not interact with construal level. Self-enhancement values and construal level, on the other hand, did show a significant interaction effect on donation intentions indicating an increased influence of self-enhancement values when in an abstract mindset. These findings imply that the relative importance of concepts that are less strongly related to climate change show greater promise in being influenced by construal level, whereas highly correlated concepts like past behavior are not influenced.

A2 Abstract (German)

Forschung, die Construal Level in Verbindung mit umweltfreundlichen Verhaltensweisen und den Determinanten solcher Verhaltensweisen bringt, weist gemischte Ergebnisse und ein Fehlen von direkten Effekten auf. Nichtsdestotrotz ist die Construal Level Theory ein vielversprechendes Konzept auf dem Gebiet der Klimawandelforschung, da es

Folgewirkungen auf die Informationen haben kann, die Individuen als Entscheidungsgrundlage verwenden. Zwei Studien wurden durchgeführt, um Erkenntnisse aus anderen Bereichen der Construal Level Theory Forschung auf die Klimawandelforschung anzuwenden. Studie 1 ($N = 147$) zielte darauf ab, mögliche matching Effekte zwischen dem Construal Level und Klimawandelwahrnehmungen zu untersuchen. Sie lieferte keine signifikanten Ergebnisse. Studie 2 ($N = 188$) untersuchte die Auswirkungen von Tempus induzierten Construal Level Veränderungen auf umweltfreundliches Verhaltensintentionen und Spendenintentionen. Außerdem wurden die Auswirkungen von construal level auf die Gewichtung von vergangenem Verhalten und Werten kontrolliert. Das Fehlen von direkten Effekten wurde für beide Arten von Intentionen bestätigt. Tempus zeigte keinen Einfluss auf die Gewichtung vergangenen Verhaltens, aber auf Werte der Selbstverbesserung. Diese Ergebnisse deuten darauf hin, dass Construal Level Gewichtungen, die nicht zu direkt mit umweltfreundlichem Verhalten verbunden sind, beeinflussen und stark verwandte Themen, wie vergangenes Verhalten, nicht.