



## HOW DISTANT IS CLIMATE CHANGE? CONSTRUAL LEVEL THEORY ANALYSIS OF GERMAN AND TAIWANESE STUDENTS' STATEMENTS



**Corinna de Guttry<sup>1+</sup>**  
**Martin Döring<sup>2</sup>**  
**Beate Ratter<sup>3</sup>**

<sup>1</sup>*Helmholtz-Zentrum Geesthacht, Institute for Coastal Research, Department Human Dimensions in Coastal Areas, Germany*

<sup>2</sup>*Helmholtz-Zentrum Geesthacht, Institute for Coastal Research, Department Human Dimensions in Coastal Areas, Germany; University of Hamburg, Institute of Geography, Hamburg, Germany*

<sup>3</sup>*University of Hamburg, Institute of Geography, Hamburg, Germany*



(+ Corresponding author)

### ABSTRACT

#### Article History

Received: 21 June 2016

Revised: 20 February 2017

Accepted: 21 March 2017

Published: 4 April 2017

#### Keywords

Psychological distance  
Climate change  
Construal level theory  
Empirical analysis  
Perception.

The usefulness of Construal Level Theory to understand how people mentally represent climate change has been recognized by a number of authors in recent years. Yet, empirical studies that analyse both psychological distance and construal levels of climate change are still rare. We fill this gap by investigating the perceived geographical, temporal and social dimensions of climate change and by analyzing the construal levels employed by the participants of our research. Participants comprise two groups of university students (in Taiwan and in Germany) that carried out a 10 Statements Test on climate change. Results suggest that climate change is still perceived as distant. Nevertheless, we identified differences between the two groups in the construal levels employed. We reflect on the role of culture in the choice of different construal, on the potentials of Construal Level Theory to systematically analyse individuals' understandings of climate change and we illustrate the implications of our results for future climate communication strategies.

**Contribution/ Originality:** This study is one of very few studies which have investigated cultural differences in construal levels and psychological distances of climate change. To do so, it provides in depth empirical analysis of climate change perception based on Construal Level Theory.

### 1. INTRODUCTION

Climate change is multi-sited and local, overwhelming yet intangible, inexorable and compelling. It is boundless in time and space; everyone is responsible but not everyone engages with it. Notwithstanding its convoluted character, climate change has been a major issue in the last decades and nowadays: continuous scientific contributions and media reports boost the topic on the public agenda and on individuals' minds. Yet, increasing the quantity of information and offering a more detailed and scientific-based picture of climate change has proven to be ineffective for instigating individual engagement with climate change. In fact, the limitations of the information deficit model in the context of climate change have been recognized (Lorenzoni *et al.*, 2007). The model's assumption consists in a behavioural framing of individuals as passive and evidence-based receivers that just absorb climate change information and whose engagement is positively correlated with the increasing amount of scientific knowledge

provided (Moser and Dilling, 2011). This concept has come under scrutiny and it is nowadays clear that the production of meaning is complex, dynamic, and heterogeneous. It is now clear that individuals “play a critical role, both in terms of their direct consumption of fossil fuels and resulting greenhouse gas emissions, and through their support for political leaders or government policies to mitigate or adapt to global climate change” (Leiserowitz, 2006). As a consequence, personal experiences, values, and worldviews permeating individual mental representations of climate change cannot be overlooked. The relevance of research on individuals’ understanding of climate change is now acknowledged, even though there is a lack of studies that systematically and thoroughly investigate them (for exception see: (Sternäng and Lundholm, 2011; Fischer *et al.*, 2012).

This paper aims at filling this gap by building on Construal Level Theory (CLT) to explore mental representations and psychological distances of climate change. CLT has been developed by Trope and Liberman (2010) in the context of social psychology. It has been described as “a generic, multiply applicable framework” with theoretical implications and applications in judgement, decision making and consumer science (Fiedler, 2007). While some theoretical ambiguities are still being discussed, CLT is considered as one of the most compelling and integrative theoretical approaches of the last years (Giacomantonio *et al.*, 2010). Milfont (2010) was among the first to highlight the relevance of CLT for exploring individual perceptions of climate change and to identify their implication for the development of targeted communication strategies. The potential of this approach has recently been confirmed by empirical studies mainly based on quantitative data used to analyse climate change perception and psychological distance (Spence *et al.*, 2012). While CLT encompasses both psychological distances and construal levels, the latter have not been explored yet in the context of climate change (McDonald *et al.*, 2015).

The innovative connection and contribution of this paper to this field of research is twofold: 1) to employ CLT in the context of climate change and 2) to analyse both psychological distances and construals from a qualitative angle. Furthermore, the study is based on cross-cultural data as it empirically applies CLT to a group of Taiwanese and German students. In doing so, it contributes to the inquiry of the effects of culture on developing and employing different mental representations of climate change. The paper thus seeks to systematically investigate construal levels of climate change in order to identify how people construe, make sense of and elaborate on climate change. The second objective of this paper is to provide an in-depth analysis of the role of geographical, temporal and social dimensions permeating mental representations of climate change. In order to provide a comprehensive analysis, the three dimensions are at foremost analysed as separate, and then their commonalities and interactions are discussed.

In the next section we will illustrate how CLT can contribute to the understanding of mental representations of climate change. We will then introduce the method applied and the characteristics of the participants of the study. Afterwards, we will present results focusing on the geographical, temporal and social dimension of psychological distances, on the perceived quality and quantity of climate change communication, and on how feelings and prototypes permeate statements on climate change. In the conclusion, we will summarize the main findings and reflect on the usefulness of CLT as an approach for investigating climate change perception from a social and cultural point of view.

## **2. INTEGRATING CONSTRUAL LEVEL THEORY WITH CLIMATE CHANGE: AN INNOVATIVE APPROACH**

As already indicated above, due to its convoluted character, climate change is hardly perceivable for humans. Nevertheless, media as well as scientific reports constantly emphasize that climate change is happening and that people should mitigate and adapt to its consequences (Schmidt *et al.*, 2013). The question however remains: how can people make sense of something abstract and intangible? CLT elucidates this aspect by suggesting that an object (in this case climate change) can be mentally represented in terms of low or high level construals. Low level construals are mental representations of an object which are concrete, rich in detail, contextualized and provide answers to the “how” question. High level construals, on the contrary, are mental representations of an object focusing on central

features which are abstract, decontextualized and offer answers to the “why” question. In sum, the same activity can be described in abstract terms (e.g. make a call to a friend) or in concrete terms (e.g. dial Martin’s number) being respectively high level construals and low level construals.

In this context, it is crucial to emphasize that both the process of abstraction (from low to high level construal) and the process of specification (from high to low level construals) have their advantages and disadvantages and hold different implications. In particular, abstraction generates information about the core meaning of an object represented and on its relation with other abstract categories. Employing high level construals reveal invariant characteristics of the object: the object’s core meaning does not change when looked at it from different distances and contexts. Contrary to this process, shifting to low level construals implies detecting and characterizing details of that object (Giacomantonio *et al.*, 2010). Representing an object at low level makes it more accessible, concrete, perhaps tangible, easier to remember and to be embodied (Shapira *et al.*, 2012). It follows that when the object of interest is not in the “here and now”, it cannot be directly experienced and appears psychologically distant to the individual. In order to conceptualize it, the individual will then employ the object’s general and decontextualized features resulting in a high construal level. An object that is located in the “here and now”, in contrast, will be represented at low construal levels indicating psychological proximity. This correlation or enmeshment of both processes in the context of climate change will be further explored in the next section.

### 3. PSYCHOLOGICAL DISTANCE: GEOGRAPHICAL, TEMPORAL AND SOCIAL DIMENSIONS OF CLIMATE CHANGE

Psychological distance is defined as “a subjective experience that something is close or far away from the self, here and now” (Trope and Liberman, 2010). As postulated in CLT, construal levels are cognitively and functionally correlated with psychological distance. The greater the psychological distance, the higher level and more abstract the construal will be. On the opposite, an object perceived to be “close” tends to be represented through a more concrete, low level construal. According to Trope and Liberman (2010) people would tend to use high construal levels to represent objects that are psychologically distant. Hence, the construal level used affects the perceived distance to the object: abstract, high level construals produce an individual sense of distance from the object represented. Consequently, psychological distance and construal levels are strongly linked: one affects and is affected by the other. These contingent effects of distance and construals bear important implications for mental representation of climate change. Following CLT’s basic assumption, describing climate change abstractly (high construal level) would lead individuals to perceive climate change as distant. On the opposite, if climate change is perceived to be psychologically distant it will be constructed on higher level.

Bearing these aspects in mind, one has to remark that psychological distance has four analytical dimensions: geographical, temporal, social and hypotheticality. However, hypothetically will not be investigated here: in fact, asking students about climate change would run the danger of a circular argument presupposing its existence. We therefore focus on a conceptual depiction of the geographical, temporal and social dimension of climate change and analyze these three psychological distances in the following sections.

#### 3.1. Geographical Distance

Geographical distance refers to the spatiality (spatial dimension) of a mentally represented object. In the case of climate change, this dimension indicates *where* climate change is perceived to take place: in distant or in near locations. Is climate change perceived to happen at a global or at a local level? Is it affecting developing countries or is it affecting the individual’s living environment?

The dichotomy between framing climate change globally and locally and its implications has been widely discussed in literature. Several studies (Leiserowitz, 2006; Lorenzoni *et al.*, 2006) found that participants relate to climate change as a geographically distant threat. One of the reasons behind these processes of distancing has been

identified in the lack of representations of climate change as a local concern. Following the same line of argument, Scannell and Gifford (2013) suggest that employing personal relevant and spatially near messages would reduce such distance. In particular, the message should focus on local impacts and on local mitigation or adaptation initiatives. However, Uzzel (2000) demonstrated with his review of three case studies that the assumption, that global issues are not relevant for people, is not valid. In his study, participants were aware of global environmental problems which were considered as more severe than the local ones. Devine-Wright (2013) recently contributed conceptually to this line of research with his call for academic research that recognizes the relevance of place attachment at both local and global levels. Perceiving climate change as a global issue is conceived to be an example of geographical distance: but there might be space for a new understanding. Messages that illustrate global effects of climate change might emotionally appeal to an attachment informed by a feeling of global identity probably boosting individual engagement.

### 3.2. Temporal Distance

The second dimension – temporal distance – refers to the time-scale of the object mentally represented. In the case of climate change, this dimension indicates *when* climate change is perceived to take place: in the past, in the present or in the future. Is it framed as a contemporary or a future problem? What temporalities and timeframes are applied to temporally situate climate change?

Time and perception of time play a crucial role in the mental representation of climate change. In fact, individuals tend to focus on short term consequences and the lengthy temporal characteristics of climate change clash with it Brace and Geoghegan (2010). Climate change is the consequence of carbon emissions of the past decades, whose effects will be mostly visible in the next years and centuries. This functional time lag between causes and effects of climate change is an obstacle to the perception of climate change as a current or contemporary threat (Milfont, 2010). In addition, media and scientific reports often refer to 2050 as a temporal turning point. Such a timeframe is too long and does not match with the sense of time held by people (about 15 years), who might conceive 2050 simply as too distant (Pahl *et al.*, 2014). In order to overcome the problem of climate change perceived as temporally distant, research often suggests focusing on communication strategies that include the contemporary visualization of climate change futures and narrative approaches (Pahl *et al.*, 2014).

### 3.3. Social Distance

The third dimension – social distance – refers to the extent to which an individual conceives him- or herself as affected by an object or an event. In the case of climate change, it indicates *who* is perceived to be affected by climate change effects. Do individuals think that climate change has an impact on themselves, on their community or on other socially and geographically distant people?

Such aspects have been raised in a number of studies that stress the role of experience in climate change perception (Spence *et al.*, 2011; Egan and Mullin, 2012). In the case of a climate change event, the perceived social distance is reduced to the minimum: the individual becomes able to directly experience the impact of climate change on his/her life and on the community. Nevertheless, social closeness to climate change still represents an exception: surveys indicate that most people do not perceive themselves as climate change victims (Ratter *et al.*, 2012; Myers *et al.*, 2013). It has furthermore been demonstrated that perceiving climate change as a socially distant phenomenon hinders preparedness to act against climate change in terms of adaptation and mitigation (Spence *et al.*, 2012).

While the three dimensions have been hereby presented as separate concepts, the social, temporal and geographical dimensions should be conceived as intertwined analytical elements informing an overarching structure of distance-making. Actually, they all refer to the lack of direct experience, and they are interconnected and correlated with high and low construals (Giacomantonio *et al.*, 2010). In fact, “the different levels of construal serve to expand and contract one’s mental horizons and thus mentally traverse psychological distances” (Trope and

[Lieberman, 2010](#)). In the next paragraph, we will illustrate the method used in this research to depict construal levels, psychological distances and their correlation in climate change mental representations.

## 4. METHOD

### 4.1. Method and Data Collection

As previously explained climate change represents a scientific and abstract construct. Consequently, we argue that for investigating how individuals make sense of it, any scientific pre-conception or -assumption about climate change should be avoided. During the process of method design, two methodological challenges had to be overcome. The first challenge consisted in finding a method which was open to varying answers, but still suitable for a scientific and systematic analysis. The second challenge was to introduce a method which was able to provide insights into individual perceptions and assessments of climate change across different cultures. The solution of these two challenges was found to be inherent in the 10 Statements Test. This type of test has commonalities with the method of continued word associations and with the elicitation task, all previously used for exploring images of climate change among individuals ([Bostrom et al., 1994](#); [Lorenzoni et al., 2006](#); [Moloney et al., 2014](#)).

The test was administered by two University professors to their respective students at the University of Hamburg (Germany) and National Taiwan Normal University (Taipei, Taiwan). Each student received a sheet of paper, with the following instruction (in their language) “Please write 10 statements and/ or words referring to the topic “climate change”. Please note that there is no “right” or “wrong” answer. The test is anonymous.” Students were given 12-15 minutes: this timeframe allowed enough time to complete the task and it also ensured - as much as possible - spontaneous statements. The two student groups consisted of Geography students in their second year of Bachelors studies which made it possible that the topic of climate change had already been addressed in their studies.

The advantage of the method chosen consisted in the fact that the test allows the participant to individually express her/his own ideas, concerns and topics within the context of climate change without being biased or constrained by predefined questions and possible answers. This aspect is particularly important when conducting research on climate change perception because scientific constructs and expert-based definitions about climate change are often implicated in such surveys and represent biased starting points for analysing climate change perception. Hence, data and facts on climate change stem from scientific observation: causes and consequences as much as climate change’s geographical and temporal dimensions are (to a certain extent) shared within the scientific community. Nevertheless, such definitions and conceptualizations are mostly not reflected in non-expert (public) understandings of climate change, which are rather based on a personally relevant and a culturally experienced climate change ([Rudiak-Gould, 2013](#)). This important difference between the scientific and the individual relation to climate change is too often overlooked by standard surveys. The 10 Statements Test anticipates and avoids these problems caused by pre-imposed scientific rationales by offering participants the opportunity to raise issues and concerns that they consider as relevant.

The second advantage of the 10 Statements Test lies in its cultural suitability. In fact, cultural factors and language potentially alter the meaning of questions, which can then be misinterpreted. Furthermore, rating scales are differently rated by respondents holding diverging cultural backgrounds which implies that cultural appropriateness must be guaranteed during the design, implementation and analysis of a cross-cultural survey or the results might be biased ([He and Van, 2012](#)). Starting from the design-phase, the 10 Statements Test overcomes this cross-cultural challenge by minimising the text, using the local language and by avoiding pre-imposed categories. In the analysis phase of the 10 Statements Test, cultural appropriateness was ensured since a native Taiwanese speaker translated the statements of the Taiwanese students into English. Statements of the German students were translated by the main author of this paper from German to English. In both cases the translation was double checked for incongruences and mistakes. Despite the effort to minimize bias, cultural differences might nevertheless have had an impact in the implementation phase. In particular, the presence of the professor could have had different consequences in Taiwan



than in Germany as individuals belonging to an interdependent culture such as the Taiwanese culture, tend to be more influenced by the presence of a person in a higher social position than western individuals (Liew *et al.*, 2011).

#### 4.2. Participants

The test was delivered to 46 students at the University of Hamburg (Germany) in January 2014 and to 46 students at the National Taiwan Normal University in Taipei (Taiwan) in September 2014. Both groups were students belonging to the faculty of Geography. Students and – more generally speaking – young adults have been the object of a number of recent studies in the context of climate change (Chhokar *et al.*, 2010; Croner *et al.*, 2015). Today's young people are the generation seen as those most affected by climate change in many scientific studies. They are “the most vulnerable to the legacy of decisions made by older generations” and “their voices are not prominent in the political, media or cultural discourse on climate change” (Croner *et al.*, 2015). Also, as highlighted by Worsley and Skrzypiec (1998) young people should be conceived as important change agents in the context of future policies and climate-related strategies as they disseminate environmental behaviours within everyday family contexts and practices.

#### 4.3. Data Analysis

After translating the test results into English, their content was coded. Drawing on CLT, in the first step the three overarching categories geographical, temporal and social distance were used for an approximate analysis and classification of the data. For each overarching category, a detailed analysis was performed to tackle its structuration. This procedure provided an internal differentiation which was then followed by an analysis that focused on those remaining statements where no direct reference of the three analytical dimensions was found. Recurrent topics were identified and denominated as “communication of climate change: perceived quality and quantity” and “prototypes and emotions”. Again, we analyzed both categories drawing on CLT and in particular in the light of their implicit construal levels (high or low). Finally, we explored the convergences and divergences of the categories found among the two groups and reflected on their implications (see Fig.1.).

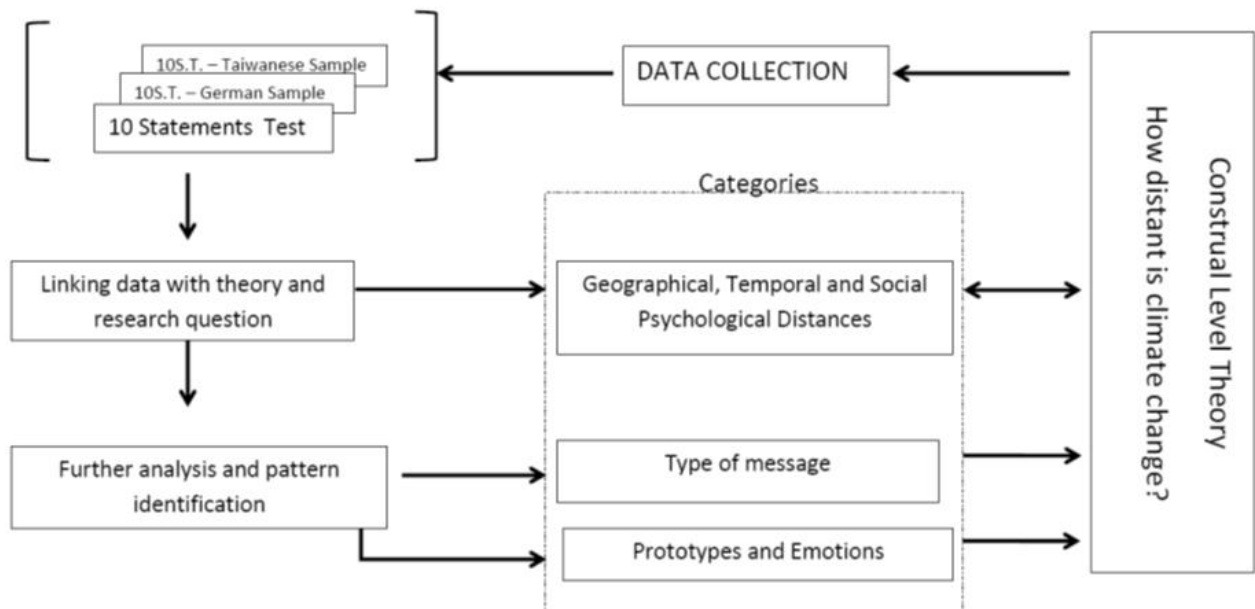


Fig-1. Steps from theory to result's analysis

Source: (readapted from Gläser and Laudel (2013)).

Building on CLT, a 10 Statements Test was designed and subsequently performed with two groups of students. In the first phase of analysis the three dimensions of psychological distance were examined as they arose in the

statements. In the second phase, the remaining statements were analyzed in order to inspect at which construal level individuals mentally represented climate change. This phase led to the categories “type of message” and “prototypes and emotions”. Finally, the analysis of the results empirically supported CLT, answering to the initial research question.

## 5. DISCUSSION OF THE RESULTS

### 5.1. Geographical, Temporal and Social Distance

In both the German and the Taiwanese sample, 41% of the respondents ( $n_{DE}= 19$ ;  $n_{TW}=19$ ), referred to the perceived geographical, temporal or social dimension of climate change in their statements. In both samples, the geographic element was the predominant one. Specifically in the German sample, 13 statements were related to the geographical dimension, 6 to the temporal and 5 to the social dimension. The Taiwanese tests included 13 geographical statements, 7 temporal and 5 social statements. These 3 dimensions will be empirically explored in the following paragraphs in which differences, commonalities and implications among the two groups will be highlighted.

#### 5.1.1. Geographical Distance

In the climate change statements of the students of the German University, the geographic dilemma “where is climate change located?” is approached in multiple ways. Often, participants ( $n=6$ ) implicitly disclose in their statements that climate change is happening in places such as: “drowning Netherlands” (DE\_10), “under- water Bangladesh” (DE\_18) and in “disappearing paradise islands” (DE\_6). The toponyms used refer to existing and threatened places while also generic ones of typically threatened geographical areas appear.

Interestingly, statements expressing a juxtaposition of the own home country to other states or geographical areas are recurrent, too. “Threat for Germany: medium-high, for other states: high” (DE\_32); “Main consequences not in Germany” (DE\_36). Such statements obviously reveal a perceived distance from the topic of climate change – a climate change that is not felt dangerous at “home” and whose worst effects happen somewhere else, in the outer German world. While the perceived geographical distance to climate change is undeniable, it is worthwhile to look to these data from another perspective. In fact, open questions such as “Will there still be Hamburg?” (DE\_13) indicate an ongoing process of reflection on the issue of climate change and on its geographical dimensions. A process that is by itself a shift from a high level construal of climate change to a lower level: the individual does not simply absorb the information of climate change as it is but s/he reflects on its concrete meaning in his/her experience and discerns its parts. The above open question implies the possibility of a closer proximity of climate change, so close that it might even affect the participant’s own city.

With regard to the analysis of the test of the Taiwanese students, it exhibits a predominant trend in localizing climate change in distant geographic areas. In particular, only 1 of the 13 participants connected the geographical dimension of climate change to Taiwan. The large majority of geographically related statements used Tuvalu, California and North and South Poles as paradigmatic examples. Such typical and generic toponyms – also encountered in the German case – stand for geographical distance and high construal level. In fact, the statements did not include any further details about the representative entity chosen or the severity of climate change impacts in these areas.

In contrast with the German’s group sample, the Taiwanese students neither did articulate any cross-national comparison nor any open question. Due to the limitations of the methodology, it would be too speculative to further elaborate on this aspect. However, these results are consistent with research carried out by the same authors and based on in-depth interviews (de Guttry *et al.*, 2016) which provide a deeper understanding of such cultural-grounded narratives.

### 5.1.2. Temporal Distance

Besides the geographical aspects, temporal characteristics of climate change have been indicated as psychological barriers to the perception of climate change (Pahl *et al.*, 2014). Our results confirm the presence of a temporal distance in both the German and the Taiwanese student group. In the German group, statements such as: “In the next 100 years humans will be extinguished”(DE\_35), “Decrease of my life quality in the future” (DE\_46) are representative examples. Contrarily, Taiwanese students mainly refer to: “there was no Typhoon in August” (TW\_2; TW\_10), “Ancient Egypt Civilisation moved” (TW\_23). The dissimilarity between the two could be revealed. While the German group located climate change in the future, the Taiwanese focused their climate change statements in the past. The statements of the students of Hamburg University were future-oriented: often generic in time and in many cases related to the effect of climate change on one’s own future-life. Furthermore, the Taiwanese’ statements were much more specific in their time frames referring to the year (2012) and in some cases to the month (August): such detailed temporal representation suggests a low construal level. In both groups, climate change is seen as taking in place in the future or in the past, but not in the present, indicating temporal distance.

The results presented here are an excellent example for illustrating the importance of acknowledging cultural differences in individual’s mental representations. It becomes apparent why scientific studies, communication strategies or policy proposals that ignore these factors and that focus on the wrong temporal dimension will have little social resonance and are probably bound to fail.

### 5.1.3. Social Distance

In contrast to the analysis of implied temporalities and spatialities, the study of the social dimensions revealed that this was the least mentioned among the three dimensions of psychological distance: 13% ( $n_{DE}=6$ ) of the German students and 17% ( $n_{TW}=8$ ) of the Taiwanese students referred to it at least once. Yet, it offers the possibility to delve into the differences among the two groups and to understand the strict correlation within the three dimensions of psychological distance.

Some of the Taiwanese students approached the problem of social distance of climate change by stating that “All people face greater challenges” (TW\_43); or “Challenges to human” (TW\_46). These non-individualistic statements contrast to those mentioned by the German students which were predominantly reflecting on climate change in individualistic terms or in relation with their societal environment: “To what extent am I affected?” (DE\_10) ; “Threat not for us”(DE\_21); “Decrease of my life quality in the future”(DE\_46).

The differences among the two groups of students encountered in the analysis of geographical and temporal distance are mirrored and confirmed in the creation of social proximity and distance. As in the geographical distance, also in the social distance’s statement a process of reflection can be found predominantly in the German sample which is absent in the Taiwanese tests. The above mentioned open questions (DE\_10) and clear statements (DE\_21; DE\_46) suggest an ongoing process of reflection. As observable in the quotes above, students tended to ponder the effect of climate change on *their own*, as individuals. This is emblematically expressed in the use of personal and possessive pronouns (I, us, my). In fact, it suggests a certain extent of embodiment and a feature of low construal level. The response patterns of participants from Taiwan were opposed to those of the Germans. In fact, statements about the effect of climate change on the self were substituted with generic and abstract statements about the effect of climate change on “people” and “humans”, coherent to high construal levels.

The second recurrent aspect is the close link between the social and temporal dimensions and, as seen previously, the different temporal orientations of the two groups. The tendency of German students to connect the social dimension as happening in the future (“future generation” (DE\_46); “generation Y” (DE\_39)) is absent in the Taiwanese sample, where all statements refer to the present. It is thus clear that exploring the social dimension of psychological distances is crucial for understanding climate change and potential climate change engagement. Who is affected by climate change? Who should adapt and mitigate to it? Awareness about these aspects involving different



ways of “personalization” is imperative to develop socially adequate and culturally grounded mitigation and adaptation strategies.

Informed by CLT, the three psychological dimensions mentioned in the tests were analysed. The analysis disclosed information on where and when climate change is perceived to take place, and who is perceived to be affected by it. In the following section, we will investigate the results of the second analysis we carried out: these are based on statements which did not explicitly mentioned the three dimensions of psychological distance but provide insight into a cognitive context where they appear. In this phase, 2 categories were found: “communication of climate change: perceived quality and quantity” and “emotions and prototypes”. Both reveal interesting patterns in mental representations of climate change and they offer an insight into construal levels of climate change.

## 5.2. Communication of Climate Change: Perceived Quality and Quantity

Among the German group, the topic of climate change seems to be rather fuzzy. In fact, almost half of the German participants expressed some kind of uncertainty about climate change. While its existence is not questioned, doubts exist about the credibility of the messages received. In the 46 tests often aspects such as “it is not known which prediction to trust or which will be the consequences” (DE\_3) emerge.

German students gave statements ( $n=17$ ) about the source of information – mainly media – with a critical eye. “Media exaggerate” (DE\_7), “Doubts regarding media reports” (DE\_34) are recurring entries in the data set. Considering that participants were university students, it is important to note the lack of statements referring to science: climate change appears solely as a scientific research opportunity for the future while academic work is not explicitly listed as source of information.

Notwithstanding the leading presence of media, science’s messages are perceived in a scattered and discordant way, as reflected in these statements:

“1000000 experts” (DE\_36); “many different predictions” (DE\_2); “different opinions” (DE\_28).

Here disorientation and lack of trust in science prevail while it is striking to note that some students report an excessive number of information and of sources of information while others state that “we are not concretely informed” (DE\_5) and “too little informed” (DE\_14).

In the first statement the participant draws attention to the quality of information. It could be understood as a call for a socially closer and less scientific information about climate change which can be supported only by concrete interaction and personally relevant information. Only then, climate change might be represented at a lower, more concrete construal level.

The apparent discrepancy between the surplus and the lack of information lead to important considerations. The receiver seems overwhelmed and almost anaesthetized by the amount of different messages coming from different sources, to the point that none of them is conceived as relevant or trustworthy. Paradoxically, the receiver considers him/herself uninformed. Feeling uninformed about a topic suspends the process of making sense of it. From a CLT perspective, it means staying on high level construal where there are no details and where the topic is neither geographically nor socially contextualized. It can be argued that the perceived characteristics of the message – scattered, discordant and abstract – constrains the receiver to stay at non-concrete level, even widening the psychological distance between the topic under discussion and its audience.

Interestingly, the Taiwanese students did not elicit any comment or reflection on the quality and the quantity of information received via climate change communication.

## 5.3. Emotions and Prototypes

Statements of the two groups differed in a third, salient aspect: the clear predominance of prototypes in the Taiwanese statements in contrast to the appearance of personal feelings-related statements in the German group. In the Taiwanese group, more than three of every four participants (78.2%;  $n_{tw}=36$ ) gave at least one statement which

represented a prototype. Global warming, greenhouse effect and ozone layer depletion were the most mentioned ones. To a less extent than the Taiwanese sample (26%,  $n_{de}=12$ ), German students elicited prototypes. Also in this case the term global warming was recurrent, together with “polar bears” (completely absent among Taiwanese students). In both samples, prototypes were cited solo, without any explicit context or further explanation – as if they were self-explanatory and synonyms of climate change. Prototypes are the result of a categorization process, which is in turn characteristic of high level construal which implies lower level categorizations and connotations. In fact, the individual employs a superordinate object to represent another object (in this case climate change) leading to contingent simplification and abstraction. In sum, global warming, polar bears, greenhouse effect and ozone layer depletion are mentally represented as belonging to the same category of climate change. While this similitude is scientifically inaccurate, participants employ these objects and concepts in order to understand and to represent climate change in a meaningful way. It is interesting here to observe – as suggested by CLT – how psychological distances and different kinds of construals are closely related. In fact, the choice of those objects and concepts reveal and at the same time induce psychological distance. In fact, the different kinds of prototypes used, refer to different cognitive models and imply different cognitive distance (Mervis and Rosch, 1981).

As suggested by Rudiak-Gould (2013) climate change, global warming and the greenhouse effect are popular terms which create invisibility and consequently enhance psychological distance. The greenhouse effect is a metaphor which is “both global and microscopic” (Rudiak-Gould, 2013). The term global warming also encompasses a global spatiality dimension, by definition not observable at the local level. As shown in recent studies, the terms climate change and global warming are increasingly used by media and by the public interchangeably, but their impacts on public understanding is different (Whitmarsh, 2009). The former being more neutral, with a scientific connotation and more abstract while global warming would evoke embodied experiences, concerns and emotions. Yet, studies on the effects of using one or the other give dissonant results (Dunlap and Brulle, 2015). This correlates with research undertaken since 1994 (Bostrom) until the most recent research (Philo and Happer, 2013) which has shown that a large amount of the public conflates ozone layer depletion and climate change. According to Ungar (2000) the conflation of the two topics is an example of syncretism, consisting in assimilating new information with pre-existing knowledge. In line with these findings, the present study shows that even younger generations of students associate climate change with the ozone layer.

As explained above, the process of categorization leading to prototypes is a process of abstraction where the object’s (climate change) characteristics are observed and conceptualized. During this process, the individual relegates his/her individuality in the background and reflects on it based on the mental representation. This condition changes once the individual starts to think on how the object to be represented might exert an impact on his/her world and on his/herself. Such a reflection shortens the psychological distance between the subject and the object, ultimately leading to an expression of emotions.

This process and the consequent individual dimension was completely absent in the Taiwanese sample, but it emerged in the 17,3% ( $n_{DE}=8$ ) of German participants. The following quote extrapolated by a 10 Statements Test of a German student offers a picture of how climate change can become an emotional issue. “Feelings like fear, concern, pity for the victims, fury and irritation” (DE\_4). This statement encompasses different levels of emotional reactions to different aspects of climate change. Fears and concern suggest a reference to climate change consequences, pity is explicitly referred to climate change victims and finally, fury and irritation might be associated to the causes of climate change and the way it has been managed. As also highlighted by this student, fear is the most recurrent feeling that emerges in the German group’s statement. Admittedly, the numbers are still small and the emotional component is still secondary to other aspects such as psychological distance or discordant communication. Nevertheless, the mere fact that students gave space to feelings when referring to climate change is significant and symptomatic of a climate change that is neither abstract and nor distant: on the opposite, it provokes emotions and emotional engagement. This would require (Ramkissoon and Smith, 2014) an effective climate change

communication strategy that should include emotions, supporting a low construal level of climate change representation. The empirics of this research suggest that emotions already form part of climate change framings. While this is an important result, the role of the emotional dimension in climate change perception and in climate change engagement requires further exploration.

## 6. CONCLUSION

In recent years Construal Level Theory contributed to understand a number of cognitive mechanisms that underlie the social framing of climate change and it succeeded in integrating different concepts. In this study progress has been made by providing empirical results both on psychological distances and on construal levels. Through an in-depth analysis, we were able to illustrate how individuals make sense of climate change and its perceived geographical, temporal and social dimensions. To date, these crucial aspects have seldom been investigated in the climate change related literature which mainly focuses on quantitative approaches and on one or the other psychological dimension.

The results of our integrated study showed that climate change is “distant” – not or not only in an Euclidian way, but in the three dimensions of psychological distance. Analytical categories (first psychological distances and then construal levels) supported a systematic analysis of students’ statements which revealed that both distances and construals are culturally embedded.

In relation to construal levels, our data highlighted relevant differences among the two groups. High construal levels of climate change were recurring mainly in the Taiwanese sample: in fact, this group often used abstract definitions and prototypes to express their mental representations of climate change. Differently, the statements given by German students revealed an open reflection on climate change characterized by low level construal: mental processes of specification alternate with processes of abstraction to make sense of climate change.

This difference must be understood in its cultural context. [Shapira et al. \(2012\)](#) draw attention to how individuals belonging to different cultures might have different predispositions towards certain construals. In particular, interdependent cultures (Asiatic and South-American) typically interpret objects in their context and in relation with other objects, which would be coherent with high construal mental representations. On the other side, independent cultures (North-European and North-American) define an object in isolation from its context and prefer to focus on its characteristics, which correspond to low construal levels. Our data cohere with these assumptions and suggest that culture plays a crucial role in mental representations of climate change.

The analysis of the statements elicited by German and by Taiwanese students also illustrated that climate change construals are permeated by psychological distances. Geographical distance in particular was important for describing climate change, but also the temporal dimension and the social ones were present. This study is in line with previous research that found that climate change is perceived as taking place somewhere else, in the future and that it is affecting/it will affect other people. But the results also refer a different trend: an attempt to make climate change less distant is coming to light. Indications of this trend are open questions and comparisons of climate change impacts in the individual’s own country with other areas as found in the German students’ statements.

In sum, this study highlighted important aspects concerning how individuals make sense of climate change, going beyond scientific definitions of it. Climate change occupied a spatial, temporal and social dimension in people’s mind. Yet, such positions are dynamic and further studies are needed to understand how and why people might change their climate change representations. Admittedly, the method we used is probably not adequate for answering such complex question. In fact, while the 10 Statements Test gives space to the participant to freely and spontaneously state his/her own framing of and relation to climate change, its logic and structure also imply certain time and space restrictions. As a consequence, our method does not offer enough space to investigate in depth aspects such as individual experiences, worldviews and values.

The second important aspect consists in the fact that this study does not cover the actual engagement of the participant. The question of how psychological distances and construals of climate change are associated with perceived personal relevance and, ultimately, how this might or might not lead to climate change engagement, is still open. As also stressed by Brügger *et al.* (2015) CLT explores the role of psychological distances on how people relate to climate change, but this does not imply that psychological proximity is equal to perceived personal relevance. In fact, making climate change closer might even have an opposite effect and decrease the likelihood of taking action against climate change, e.g. references to a close and overwhelming climate change might trigger defense mechanism and lead to skepticism and rejection (McDonald *et al.*, 2015).

In sum, providing too much information is as counterproductive as providing too little; representing climate change as a psychological distant issue might decrease concern, but representing it as “too” close might be ineffective, too. But where is the median point between all of these aspects that can trigger engagement? As seen in the introduction of this paper, the answer cannot lie in providing sheer numbers, graphs and scientific definition to the public: a new focus on individuals must be introduced which acknowledges the relevance of sociocultural backgrounds in the context of science-stakeholder interaction (Döring and Ratter, 2015). The CLT approach and, in particular, the analysis of construals and of psychological distances at the individual level offer a great opportunity to delve into individual understandings of climate change.

**Funding:** The research undertaken in this paper was funded by the Reklim-Initiative of the Helmholtz Society, Germany.

**Competing Interests:** The authors declare that they have no competing interests.

**Contributors/Acknowledgement:** Thanks go out to the students who participated to this research and to Professor Wen-Cheng Wang, from National Taiwan Normal University

## REFERENCES

- Bostrom, A., M. Morgan, B. Fischhoff and D. Read, 1994. What do people know about global climate change?1. Mental models. *Risk Analysis*, 14(6): 959-970. [View at Google Scholar](#) | [View at Publisher](#)
- Brace, C. and H. Geoghegan, 2010. Human geographies of climate change: Landscape, temporality, and lay knowledges. *Progress in Human Geography*, 35(3): 248-302.
- Brügger, A., S. Dessai, P. Devine-Wright, T.A. Morton and N.F. Pidgeon, 2015. Psychological responses to the proximity of climate change. *Nature Climate Change*, 5(12): 1031-1037. [View at Google Scholar](#) | [View at Publisher](#)
- Chhokar, K., S. Dua, N. Taylor, E. Boyes and M. Stanisstreet, 2010. Indian secondary students' views about global warming: Beliefs about the usefulness of actions and willingness to act. *International Journal of Science and Mathematics Education*, 9(5): 1167-1188. [View at Publisher](#)
- Croner, A., O. Roberts, S. Chiari, S. Völler, E.S. Mayrhuber, S. Mandl and K. Monson, 2015. How do young people engage with climate change? The role of knowledge, values, message framing, and trusted communicators. *WIREs Climate Change*, 6(5): 523-534. [View at Google Scholar](#) | [View at Publisher](#)
- de Guttery, C., M. Döring and B. Ratter, 2016. Challenging the current climate change – migration nexus: Exploring migrants' perceptions of climate change in the hosting country. *Die Erde –Journal of the Geographical Society of Berlin*, 147(2): 109-118. [View at Google Scholar](#)
- Devine-Wright, P., 2013. Think global, act local? The relevance of place attachments and place identities in a climate changed world. *Global Environmental Change*, 23(1): 61-69. [View at Google Scholar](#) | [View at Publisher](#)
- Döring, M. and B. Ratter, 2015. Heimat as a boundary object? Exploring the potentialities of a boundary object to instigate productive science-stakeholder interaction in North Frisia (Germany). *Environmental Science & Policy*, 55(3): 408-415.
- Dunlap, R.E. and R.J. Brulle, 2015. *Climate change and society sociological perspectives*. New York: Oxford University Press.
- Egan, P.J. and M. Mullin, 2012. Turning personal experience into political attitudes: The effect of local weather on Americans' perceptions about global warming. *Journal of Politics*, 74(3): 796-809. [View at Google Scholar](#) | [View at Publisher](#)

- Fiedler, K., 2007. Construal level theory as an integrative framework for behavioral decision-making research and consumer psychology. *Journal of Consumer Psychology*, 17(2): 101-106. [View at Google Scholar](#) | [View at Publisher](#)
- Fischer, A., V. Peters, M. Neebe, J. Vávra, A. Kriel, M. Lapka and B. Megyesi, 2012. Climate change? No, wise resource use is the issue: Social representations of energy, climate change and the future. *Environmental Policy and Governance*, 22(3): 161-176. [View at Google Scholar](#) | [View at Publisher](#)
- Giacomantonio, M., L. Mannetti and M. Lauriola, 2010. Oggi le tessere e domani il mosaico: Construal level theory e distanza psicologica. *Psicologia Sociale*, 2(maggio - agosto): 195-228.
- Gläser, J. and G. Laudel, 2013. Life with and without coding: Two methods for early-stage data analysis in qualitative research aiming at causal explanations. *Forum Qualitative Sozialforschung/ Forum: Qualitative Social Research*, 14(2): 5. [View at Google Scholar](#)
- He, J. and D.V.F. Van, 2012. Bias and equivalence in cross-cultural research. *Online Readings in Psychology and Culture*, 2(2): 8. [View at Google Scholar](#) | [View at Publisher](#)
- Leiserowitz, A., 2006. Climate change risk perception and policy preferences: The role of affect, imagery and values. *Climatic Change*, 77(1)-2: 45-72. [View at Google Scholar](#) | [View at Publisher](#)
- Liew, S.L., Y. Ma, S. Han and L. Aziz-Zadeh, 2011. Who's afraid of the boss: Cultural differences in social hierarchies modulate self-face recognition in Chinese and Americans. *PLoS ONE*, 6(2): e16901. [View at Google Scholar](#) | [View at Publisher](#)
- Lorenzoni, I., S. Nicholson-Cole and L. Whitmarsh, 2007. Barriers perceived to engaging with climate change among the UK public and their policy implications. *Global Environmental Change*, 17(3-4): 445-459. [View at Google Scholar](#) | [View at Publisher](#)
- Lorenzoni, I.A., M. Leiserowitz, D. De Franca, W. Poortinga and N. Pidgeon, 2006. Cross-national comparisons of image associations with “global warming” and “climate change” among laypeople in the United States of America and Great Britain 1. *Journal of Risk Research*, 9(3): 265-281. [View at Google Scholar](#) | [View at Publisher](#)
- McDonald, R.I., H.Y. Chai and B.R. Newell, 2015. Personal experience and the “psychological distance” of climate change: An integrative review. *Journal of Environmental Psychology*, 44: 109-118. [View at Google Scholar](#) | [View at Publisher](#)
- Mervis, C.B. and E. Rosch, 1981. Categorization of natural objects. *Annual Review of Psychology*, 32(1): 89-115. [View at Google Scholar](#)
- Milfont, T.L., 2010. Global warming, climate change and human psychology. In Corral-Verdugo V, García-Cadena CH, Frías-Arment M (Eds.), *Psychological approaches to sustainability: Current trends in theory, research and practice*. New York: Nova Science Publishers.
- Moloney, G., Z. Leviston, T. Lynam, J. Price, S. Stone-Jovicich and D. Blair, 2014. Using social representations theory to make sense of climate change: What scientists and nonscientists in Australia think. *Ecology and Society*, 19(3): 19. [View at Google Scholar](#) | [View at Publisher](#)
- Moser, S.C. and L. Dilling, 2011. Communicating climate change: Closing the science-action gap. In Dryzek JS, Norgaard RB, Schlosberg D, *The Oxford handbook of climate change and society*. New York: Oxford University Press.
- Myers, T.A., E.W. Maibach, C. Roser-Renouf, K. Akerlof and A. Leiserowitz, 2013. The relationship between personal experience and belief in the reality of global warming. *Nature Climate Change*, 3(4): 343-347. [View at Google Scholar](#)
- Pahl, S., S. Sheppard, C. Boomsma and C. Groves, 2014. Perceptions of time in relation to climate change. *Wiley Interdisciplinary Reviews: Climate Change*, 5(3): 375-388. [View at Google Scholar](#) | [View at Publisher](#)
- Philo, G. and C. Happer, 2013. *Communicating climate change and energy security: New methods in understanding audiences*. New York: Routledge.
- Ramkissoon, H.R. and L.D.G. Smith, 2014. The relationship between environmental worldviews, emotions and personal efficacy in climate change. *International Journal of Arts & Sciences*, 7(1): 93- 109. [View at Google Scholar](#)
- Ratter, B.M.W., K.H.I. Philipp and S.H. Von, 2012. Between hype and decline: Recent trends in public perception of climate change. *Environmental Science and Policy*, 18: 3-8. [View at Google Scholar](#) | [View at Publisher](#)
- Rudiak-Gould, P., 2013. We have seen it with our own eyes: Why we disagree about climate change visibility. *Weather, Climate & Society*, 5(2): 120-132. [View at Google Scholar](#) | [View at Publisher](#)



- Scannell, L. and R. Gifford, 2013. Personally relevant climate change: The role of place attachment and local versus global message framing in engagement. *Environment and Behavior*, 45(1): 60-85. [View at Google Scholar](#)
- Schmidt, A., A. Ivanova and M.S. Schäfer, 2013. Media attention for climate around the world: A comparative analysis of newspaper coverage in 27 countries. *Global Environmental Change*, 23(5): 1233-1248. [View at Google Scholar](#) | [View at Publisher](#)
- Shapira, O., N. Liberman, Y. Trope and S.Y. Rim, 2012. Levels of mental construal. In Fiske ST, Macrae CN. *The Sage handbook of social cognition*. Los Angeles: Sage.
- Spence, A., W. Poortinga, C. Butler and N.F. Pidgeon, 2011. Perceptions of climate change and willingness to save energy related to flood experience. *Nature Climate Change*, 1(1): 46-49. [View at Google Scholar](#) | [View at Publisher](#)
- Spence, A., W. Poortinga and N. Pidgeon, 2012. The psychological distance of climate change. *Risk Analysis*, 32(6): 957-972. [View at Google Scholar](#) | [View at Publisher](#)
- Sternäng, L. and C. Lundholm, 2011. Climate change and morality: Students' perspectives on the individual and society. *International Journal of Science Education*, 33(8): 1131-1148. [View at Google Scholar](#) | [View at Publisher](#)
- Trope, Y. and N. Liberman, 2010. Construal-level theory of psychological distance. *Psychological Review*, 117(2): 440-463. [View at Google Scholar](#) | [View at Publisher](#)
- Ungar, S., 2000. Knowledge, ignorance and the popular culture: Climate change versus the ozone hole. *Public Understanding of Science*, 9(3): 297-312. [View at Google Scholar](#) | [View at Publisher](#)
- Uzzel, D.L., 2000. The psycho-spatial dimension of global environmental problems. *Journal of Environmental Psychology*, 20(4): 307-318. [View at Google Scholar](#) | [View at Publisher](#)
- Whitmarsh, L., 2009. What's in a name? Commonalities and differences in public understanding of "climate change" and "global warming". *Public Understanding of Science*, 18(4): 401-420.
- Worsley, A. and G. Skrzypiec, 1998. Environmental attitudes of senior secondary school students in South Australia. *Global Environmental Change*, 8(3): 209-225. [View at Google Scholar](#)

*Views and opinions expressed in this article are the views and opinions of the author(s), International Journal of Asian Social Science shall not be responsible or answerable for any loss, damage or liability etc. caused in relation to/arising out of the use of the content.*