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Global Climate Change versus Global Warming:

What is the difference “Global Climate Change” and “Global Warming?”

Nadia Seeteram

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**Abstract**

The terms "global climate change" and "global warming" describe the same phenomena, but are not perceived as being synonymous. Both terms are used as overarching phrases to address the dramatic environmental changes that result from human interaction with natural systems. Many studies have concluded that subjects do not perceive global climate change and global warming in a similar fashion. These studies show that people are more likely to believe in the environmental issues facing the world when these problems are described under the term "global climate change." However, the media and politicians frequently use the term "global warming," which makes this term more familiar to the general public. This study was conducted to observe the views of the respondents, Fordham University Students, on "global warming" and "global climate change" and whether or not the views of the current phenomena differed based on which term the respondents saw. The survey was distributed to 53 respondents and contained 22 statements and 13 items on a semantic differential scale. In both of these sections, half the respondents were asked to rate their beliefs and perception regarding "global warming" and the other half regarding "global climate change." Results suggested that the respondents perceived global climate change to be more serious on various subscales than global warming. \*

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Climate change represents an impending crisis that is often overlooked and underestimated as a threat. The earth's temperature is rising at an alarming rate due to anthropogenic change. Excess greenhouse gases such as carbon dioxide, water vapor, and methane that are released into the air from human activity linger in the earth's atmosphere and trap heat causing the global temperatures to rise. This contributes to changing weather patterns, ocean acidification, desertification, and scarcity of water amongst other issues. Our insatiable demands resulting from our consumption culture promotes the exploitation of natural resources. As energy demands rise in the United States and emerging nations such as India and China, oil consumption shows little sign of slowing. Biodiversity is threatened daily by the continuous mass extinction of animals and plant life. Industries and polluters consistently show little regard for the quality of our air and water. Experts predict that the world population will reach 9 billion by the year 2050. With all of these environmental dilemmas at play, will earth be able to sustain life?

Despite all the future issues that need to be addressed, there is cause for hope. The earth is comprised of billions of small, resilient ecosystems that are self-sustaining and dynamic. These ecosystems can restore themselves under the right circumstances. As humans, we have the power to shape the earth that we live in through our actions. However, an inhibitor that discourages people from making environmentally and socially responsible choices is the lack of visibility that people have with how their choices effect the larger systems of the earth. Many people fail to realize their involvement with the current global problems and the scope that these issues extend to. Most people would contend that the current problems exist because businesses and industries pollute the air, water, and ecosystems. Yet, these same individuals are not cognizant that their energy consumption and daily habits contribute to the declining health of the earth. This schism that exists within the human psyche and the environment is an area that concerns psychologists today.

Psychology's intersection with climate change is primarily concerned with how people understand the risks associated with global climate change, the behaviors associated with climate change, the psychosocial impacts of climate change, and how people adapt and cope with these perceived impacts (Clayton et al., 2010). Psychologists have deemed this area of study to have great value. In understanding these dynamics, psychologists can assist in making recommendations to policy makers, who can then construct and implement policies that address the concerns of the people. In fact, psychologists have identified some of the psychological barriers that prevent people changing their actions. Ignorance, denial, and uncertainty of climate change are some of the barriers to action (Clayton et al., 2010). One of the major barriers is perceived behavioral control, in which people perceive that changing their individual behaviors will not have a large effect on a global problem like climate change (Clayton et al., 2010). However, in order to change the course of climate change, changes in individual behaviors have to occur to reflect a change on a collective level.

In understanding these dynamics, it is also important to comprehend the level of awareness that Americans have regarding climate change. The Center for American Progress conducted a study in which they differentiated the American public into "six Americas" (Leiserowitz, Light, and Maibach, 2009). The "six Americas" refer to the six distinct segments of American society and how they engage with global warming. They are Alarmed (18%), Concerned (33%), Cautious (19%), Disengaged (12%), Doubtful (11%), and Dismissive (7%) (2009). The "concerned" segment contains the majority of Americans and consists of the section of the public that are convinced that global warming is a serious issue and have the intent to engage in global warming as consumers. However, this segment is less engaged than the "alarmed" segment, which represents the most active section of society. The "dismissive" group presents a dichotomy with the "alarmed" group as they are actively engaged on this issue, but on the other end of the spectrum (Leiserowitz, Light, and Maibach, 2009). They

doubt global warming as a whole and believe that the phenomenon does not warrant a national response. In addition to the alarmed and dismissive sections are the segments of the society that fall in between them. Yet, all of these distinct mindsets combine to make one American public that has the power to influence what issues their elective representatives choose to pursue. With all of these levels of engagement at play, how then can a single message be constructed to inform the public on environmental policy?

In this sense, communication by legislators to the electorate becomes a very sensitive issue. Legislators should be aware that they are speaking to a country divided into segments of engagement. Therefore, they should choose rhetoric that effectively conveys a message geared to broad assessment of the situation when speaking on a national level. However, in our current political arena, various issues are often debated but rarely acted upon due to partisan gridlock. Despite a scientific consensus that human activity has altered global climate, climate change is still questioned for its validity (Walsh, 2011). As a result, progress in attempting to bring about change with regards to this issue is often deadlocked. The partisan divide that exists when legislators try to communicate information about the global climate crisis does not help the situation. Oftentimes, legislators with specific political viewpoints will use the term that is most appropriate towards promoting their own agenda.

### *Global Warming or Global Climate Change?*

In public discussions, academic research and the media, the terms “climate change” and “global warming” are often used interchangeably. However, research has shown that minor shifts in wording of survey research can oftentimes produce large effects in the responses (Konrath, Schuldt, and Schwartz, 2011). The term “global warming” focuses on the increase in temperature, which can be problematic when evidence for unusually cold weather exists. The term “climate change” invokes more general associations of temperature fluctuations, which

can incorporate warming and unseasonably cold temperatures (Konrath, Schuldt, and Schwartz, 2011).

The term “global warming” has been very effective in grabbing the public’s attention and raising awareness of this issue. However the usage of this term does not encompass the complexity and the range of the issues under climate change. As a result, many people view global warming as less serious than climate change. The media often utilizes these terms interchangeably, although officials prefer to use global warming. The academic and scientific community prefers “climate change” as a more accurate term (Whitmarsh, 2009).

Whitmarsh (2009) designed a study to “investigate both quantitative and qualitative commonality and variation amongst the UK public in their understanding of both ‘climate change’ and ‘global warming.’ An eight-page questionnaire was developed that comprised of both quantitative and qualitative questions. The questions asked about “environmental concerns, awareness and knowledge of climate change (CC) and global warming (GW), attitudes towards CC and GW and behavior in relation to CC and GW” (Whitmarsh, 2009). The questionnaires were mailed out to 1771 homes and 589 were returned. From this sample 277 (47%) were climate change and 312 (53%) were global warming questionnaires. The qualitative data was quantified for content analysis.

Whitmarsh observed that the respondents appeared to view global warming as more serious than climate change (2009). Whitmarsh noted that climate change was most associated with natural impacts, impacts that have already been observed, and natural causes. On the other hand, global warming was most often associated with heat related impacts, human causes, and ozone depletion (2009). The most commonly mentioned impact of climate change was temperature increase (23.6), but that association was still higher with respect to global warming (30.1%) (Whitmarsh, 2009). The results indicate that people are aware of the global situation. 54.9% of respondents agreed that individual activities contribute to climate change/global

warming. Additionally 22.8% of respondents cited pollution as a facilitator of climate change/global warming (Whitmarsh, 2009). These trends indicate that individuals are aware of some of the contributing factors towards climate change. However, the finding that people are aware of their effects and the effect of pollution on the climate did not seem to change their willingness to take action on the matter. Whitmarsh contends that while people associate anthropogenic change with climatic change, they do not associate their individual contributions with it, and therefore they are less willing change their behavior (2009).

Another interesting finding that Whitmarsh reported was related to the sources of information about global warming and climate change. 86.3% of respondents heard about climate change from television and 96.2% heard about global warming from television (2009). 78.3% said that they heard about “climate change” from newspapers and 91% heard about global warming from this source (Whitmarsh, 2009). Since media outlets employ the term “global warming” more than “climate change,” people are more familiar with “global warming” as opposed to “climate change.” The preference for “global warming” by the media may be a contributing factor for why the distinction for the two terms exist. While these statistics are not significant, they do represent a trend that may be crucial to understanding the distortion of this global phenomenon.

### *The Politics of Climatic Change*

As media coverage appears to be biased towards a certain term, politicians also favor one term above another in order to promote their agenda. Although scientific evidence has well documented the existence of global climate change, 33% of Americans believe that no significant evidence exists (Konrath, Schuldt, and Schwartz, 2011). This divide becomes even more apparent when factoring in political orientation. While most Democrats (78%) and Independents (71%), believe that global warming is occurring, only 53% of Republicans and



34% of Tea Party members believe global warming is happening (Leiserowitz, Maibach, Roser-Renouf, & Hmielowski, 2011). These statistics are indicative of the expressed skepticism of conservatives on the validity of global warming. Only 18% of Republicans believe that the earth's warming is caused by human activity, in comparison to 50% of Democrats (Leiserowitz, Maibach, Roser-Renouf, & Hmielowski, 2011). Scholars suggest "climate denialism exists in part because there has been a long-term, well-financed effort on the part of conservative groups and corporations to distort global-warming science (Walsh, 2011). As a result, conservative politicians that belong to the Republican Party and Tea Party have a vested interest in denying the existence of climate change.

Schuldt, Konrath, and Schwartz (2011) wanted to assess whether or not the use of "climate change" or "global warming" was politically motivated. They searched for these terms on partisan think tanks sites and recorded their observations. A panel consisting of 19 experts judged whether the sites were "conservative" or "liberal." They found that the majority of sites that were considered conservative used "global warming" more frequently, while sites that were considered liberal used "climate change" more frequently (Schuldt et al., 2011). "Global warming" represents a politically incorrect phrasing of a very real global situation, as the term only represents a linear direction of heat related change and not the full dynamics of the phenomena. Since fewer conservatives believe in the validity of the phrase "global warming," the frequent use of this term on their sites facilitates discrediting the entire phenomenon. However, the difference in the use in these terms does not imply that survey questions would yield the same results. Therefore Schuldt et al, designed an experiment to measure the impact the specific use of these terms has on beliefs on the existence of global climate change (2011). They predicted that in otherwise identical statements, the statements with the term "global warming" would produce lower levels of belief than "climate change." They also hypothesized

that this observation would be more pronounced with participants who identified as Republican rather than Democrat (Schuldt et al., 2011).

The key question was included in the American Life Panel (Schuldt et al., 2011). The question asked participants for their personal opinion regarding GW/GCC. They had seven choices to choose from on whether or not GW/GCC “has been happening.” The respondents were also asked to report their political self-identification, educational attainment, and level of environmental concern. A total of 2,261 respondents participated in the survey. All were over the age of 18 and were compensated for their service. They were randomly assigned to type of the experimental question. The mean age was 50.15 years. 32.4% of participants reported themselves as Republicans, 35.5% Democrats, 22.7% Independent, and 9.4% reported themselves as Other (Schuldt et al., 2011).

Seventy four percent of respondents believed the phenomenon to be real when the question referred to “climate change,” while only 67.7% did so when the question referred to “global warming” (Schuldt et al., 2011). The effect was more pronounced when separating the respondents through political self-identification. 60% of Republicans believed the phenomenon to be real when referred to as “climate change” but only 44% did so when referred to as “global warming.” This difference was significant at  $p < .001$  (Schuldt et al., 2011). While Republicans displayed a higher belief towards “global climate change,” Democrats were unaffected by the term manipulation. 86.4% of Democrats endorsed “climate change” while 86.9% endorsed “global warming.” Likewise, the respondents who identified as Independents and Others displayed small and statistically non-significant effects due to the word manipulation.

Schuldt, Konrath, and Schwartz’s study concluded that Democrats reported significantly greater belief in the phenomenon, whereas Republicans reported significantly less belief than all other groups (2011). The Democrat’s beliefs in the phenomenon were more pronounced and less prone to manipulations. On the other hand, Republicans believed less in the global

phenomenon and believed less so when the phenomenon was described under the term “global warming.” These observations lead the researchers to conclude that global warming refers more specifically to a directional change in temperature; an increase. On the other hand, climate change does not commit to a directional change and can encompass more unusual weather patterns. This conclusion is similar to the Whitmarsh conclusion that “global warming” is associated with heat-related effect, while “global climate change” is associated with natural occurrences (2009).

Villar and Krosnick (2009) conducted a study based off a memo that a political strategist, Frank Luntz, wrote to the Republican Party in 2002. In the memo, Luntz stated that the term “climate change” is less frightening than the term “global warming.” He proposed that people consider “global warming” as more serious than “climate change,” which is supported through the Whitmarsh study. To test the validity of this claim, Villar and Krosnick ran three separate experiments (2009). The first experiment examines the reactions of American adults to the phrases “global warming,” “climate change,” and “global climate change” by assessing the amount of seriousness they attribute to these terms. Villar and Krosnick also examined how these terms affected Democrats, Republicans, and Independents (2009). The second experiment examined the impact of the wording change through a survey in 31 European countries. In this experiment, Villar and Krosnick observed how the wording changed with people on opposing ends of the political spectrum (2009). The third experiment examined whether or not shifting the word “prices” to the word “taxes” would prompt Americans to react more negatively towards paying for the cost of climate change mitigation measures.

In the first experiment, 3,325 people participated in the survey. Respondents were randomly assigned to groups where they answered questions regarding the seriousness of the problem. Respondents were asked to answer different versions of the following question “If nothing is done to reduce global warming/climate change/global climate change in the future,

how serious of a problem do you think it will be?” on a scale from “Extremely serious” to “Not serious at all.” The respondents were also asked to politically self identify themselves as Democrats, Republicans, Independents or another party. All three wordings were perceived to be equally serious on average. None of the results were statistically significant, which is inconsistent with previous research. However, when comparing “global warming” and “climate change” by themselves, it was significant that more people were likely to rate global warming as more serious than climate change. Among Independents the terms were all weighted with the same severity. However, Republicans were more likely to rate global warming as less serious than climate change. Democrats perceived global warming as more serious than climate change (Villar and Krosnick, 2009).

In the second experiment, 30,170 people were interviewed in their home in 25 EU member countries. Respondents were randomly assigned to two groups to answer questions about the severity of “global warming” (GW) or “climate change.” (CC). The respondents were asked an open ended question which assessed how they ranked GW and CC amongst other potential global catastrophes and how serious GW/CC is on a scale of 1-10. They were also asked to identify where they belonged on the political spectrum from “left to center to right.” On average, global warming and climate change seemed to be perceived as equally serious. The results indicated that all ideologies ranked GW and CC as equally serious; however these results were not statistically significant (Villar and Krosnick, 2009).

The Villar and Krosnick study disproved the allegations in the Luntz memo. Climate change was not perceived to be less serious than global warming (2009). The study suggested that the wording choice between GW and CC has little or no effect on national level. However, Villar and Krosnick conclude that if leaders want to prompt voters to press for change they should target phrases using GW towards Democrats and CC towards Republicans.

*The Current Study*

The current study seeks to identify the perceptions and attitudes that people have towards “global climate change” (GCC) and “global warming” (GW). More specifically, the study is designed to discern whether or not people view these two terms as distinct phenomena and what properties are attributed to each term. In order to test for these differences, the study will examine how participants respond to statements and how they rate their emotions and attitudes towards GCC or GW. The respondents will also have the opportunity to describe in their own words what they associate with GCC or GW.

This study takes an in-depth approach to documenting the differences between global climate change and global warming. As previous research has shown, GCC and GW are associated with different beliefs and attitudes. Since both terms are being used to describe the global climatic issues that are ongoing, media officials and politicians may be conveying the wrong information to the public. Therefore, psychologists need to identify on what levels do these terms differ in order to begin to clarify the misconceptions of these issues. Only after these differences are documented and accepted can effective language be shaped to convey the real global issues of the world.

We predict that GCC will produce higher means than GW on the statement level and that GCC will be associated with more serious and severe emotions. We also predict that will be associated with more uncertain emotions and attitudes. Additionally, we hypothesize that respondents will affiliate GW with heat related effects and associate GCC with temperature changes that encompass more than just a directional shift towards warming.

**Methods***Experimental Design*

The measure used in the study was divided into three parts. For both the first and second part of the measure, there were two versions of the items: one set that uses only the term

“global warming” and the other set that uses the exact same wording except when replacing “global warming” with the term “global climate change.” The participants were randomly assigned to one of the two conditions.

### *Measures*

The questionnaire used in this study contained 41 items. The first part contained a series of 22 statements, in which participants had to indicate on a five point scale whether they “strongly disagree,” “mildly disagree,” are “unsure,” “mildly agree,” or “strongly agree” with the statement. The statements were taken from a questionnaire used in Yuko Heath’s and Robert Gifford’s study entitled, “Free Market Ideology and Environmental Degradation: The Case of Belief in Global Climate Change.” The questionnaire was designed to measure three different beliefs: the belief that global climate change is occurring, the beliefs about its possible causes, and the beliefs of its possible consequences (Heath and Gifford 2006). The questionnaire that Heath and Gifford distributed contained 28 items. However, for the purposes of this experiment, only 19 of the 28 statements were used. These statements define seven scales: (1) Belief in GCC/GW (2) Personal Experience with GCC/GW (3) Perception that GCC/ GW is caused by humans, (4) Perceptions of Negative Causes, (5) Self- Efficacy, and (6) Intention to Act. In addition to these six sections, a seventh section was created and entitled (7) Actions. This section was not a part of the original questionnaire, but was added to measure the type of actions people would commit to in order to mitigate some of the effects of GCC/GW. See Appendix A.

The second part of the measure was a 13 item semantic differential questionnaire designed to analyze what descriptive words participants associated with “global warming” and “global climate change” (See Appendix B). The descriptive words included bipolar descriptions of emotions and attitudes towards global warming or global climate change. Participants in

both groups were asked to rate the positions on a seven-point scale that best describes their views of either term. Again, participants remained in their previous randomly assigned set, and only saw the set of items specific to their group. This means that a participant who saw the “global warming” statements also saw the bipolar scale items regarding “global warming.”

After the semantic differential, participants were asked an open-ended question. The question asked participants to describe in 400 words or less, what they associate with the term “global warming” or “global climate change,” respectively.

The third part of the measure included 5 demographic items. The demographic items asked participants to voluntarily indicate their age, gender, educational attainment, and political self-identification. The participants were also shown a final seven-point bipolar scale item that asked them to rank the importance of “protecting the environment” or “economic growth.” Favorability to either concept is judged by determining how close the participant marketed his/her position to either ideal. A mark in the middle of both ideals indicates neutrality on the issue.

### *Procedure*

The measure was hosted on a survey software site known as Qualtrics. Qualtrics software is a research tool that allows researchers to conduct electronic surveys. All participants were required to agree to the letter of consent before proceeding to the survey (See Appendix C). The letter of consent informed the participants of any potential risks and benefits and provided contact information for any questions. The letter also guaranteed the participant’s right to confidentiality, right to withdraw from the study, and right to compensation in this study. Once the participants agreed to the terms of the study, the Qualtrics software randomly assigned them into two groups. One group received the “global climate change” series of statements and the other received the “global warming” set. The survey took approximately 10

minutes to complete. Upon completion of the survey, the participants were all compensated for their participation.

### *Participants*

The researcher employed two methods to secure participation. One method involved the university's research volunteer subject pool and the other method required the use of the university's SONA system. Prior to the launch of the survey, the researcher contacted the IRB, who approved a recruitment message that would be used in a blast e-mail to the University's research subject pool. The message contained a short description of the survey and the researcher's contact information. Additionally, the message informed the potential participants of two options for taking the survey- on-line or in the lab. Compensation was contingent on which option the participant preferred. If the participant opted for the online version of the survey, they would receive via e-mail an electronic \$7 Amazon.com gift card. If they opted to take the survey in the lab, the participants would receive \$7 cash upon completion of the survey.

When the message obtained approval, the researcher contacted the Office of Research. Personnel from this office forwarded the message to the university wide student research volunteer pool. At the time of dissemination, the subject pool consisted of 618 students- 72% female and 28% male. The undergraduate enrollment gender ratio for the class of 2015 is 54:46 (Profile of the Class of 2015). Since the class profile is more or less reflective of the profiles of the other classes, males are underrepresented in the university's subject pool, while females are overrepresented.

Once the recruitment message was publicized to the subject pool, the potential participants contacted the researcher for further information. If the participant preferred to take the online version of the survey, the researcher e-mailed each participant a link, which would



lead him or her to the site where the survey was hosted. If the participant preferred to take the survey in the lab, the researcher scheduled a survey run and e-mailed the participants the link to the survey, but advised the participants not to open the link until they were in the lab.

The second method of recruitment employed the university's SONA system, which is a system designed to host research surveys from graduate and undergraduate students in the psychology department. However, no students were recruited from this method.

Between the two methods of data collection, 65 people started the survey. Only 53 people finished the study and only their results were analyzed. Therefore, the results that will follow only reflect the answer of the 53 respondents who completed the study. All of the participants surveyed in this study attend a Jesuit University in New York City. The average age of the participants was 22.15 years. In terms of gender, the participants were unevenly split with 60.4% females and 39.6% males. This gender ratio is roughly comparative to the University's undergraduate gender ratio of 56% female and 46% male. However, graduate students (26.4%) were the most represented year of educational attainment followed by freshman and seniors (both at 24.5%). Sophomores and juniors both represented 11.3 % of participants, while professional studies students only represented 1.9% of the subjects. Most participants identified themselves as Democrats (39.6%), while smaller percentages of participants identified themselves as Independents (20.8%) and Republicans (9.4%). 24.5% of respondents expressed that they were "not interested in politics." Table 1 present the full distribution of the respondents.

Table 1.

Demographic	n	%	M
<i>Age</i>	53		22.15
<i>Gender</i>			
Male	21	39.6	

Female	32	60.4
<i>Educational Attainment</i>		
Freshman	13	24.5
Sophomore	6	11.3
Junior	6	11.3
Senior	13	24.5
Graduate Student	14	26.4
Professional Studies	1	1.9
<i>Political Self-Identification</i>		
Democrat	21	39.6
Republican	5	9.4
Independent	11	20.8
Other	3	5.7
Not Interested in Politics	13	24.5

## Results

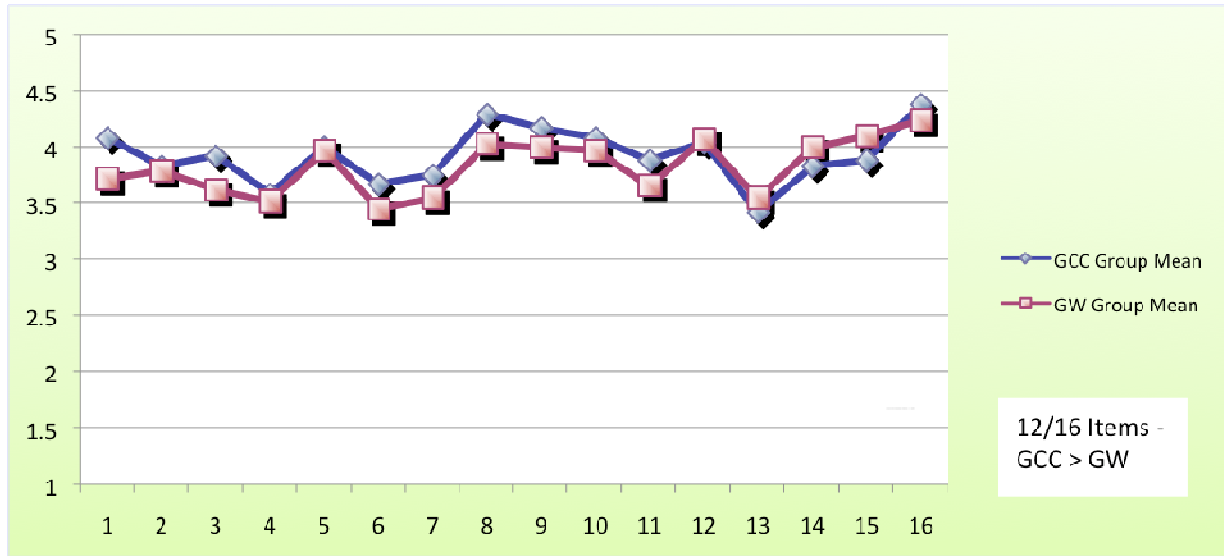
### *Statements*

A total fifty-three respondents (n= 53) participated and were randomly assigned into two groups; the group that responded to items on global climate change consisted of 24 participants (n=24), while the group that responded to items on global warming consisted of 29 participants (n=29).

In order to determine, whether or not the global warming group or the global climate group elicited more serious results, the means responses to the statements were calculated. Since the statements were rated on a 5-point scale (“Strongly Disagree” to “Strongly Agree”), higher means indicate a lean towards agreement in statements that are normally oriented. In items that are reverse scored, lower means indicate a lean towards agreement in statements because the items are formulated to express the opposite opinions. (“Strongly Agree” to “Strongly Disagree”.)

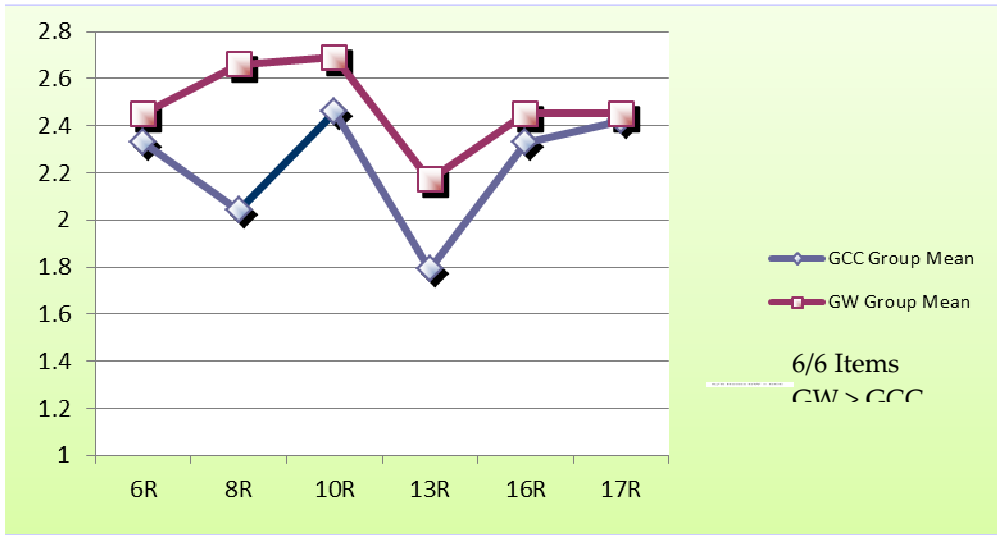
Out of the 22 statements, 16 items were normally scored and 6 were reverse scored. Twelve out of 16 items had higher means in the GCC group, suggesting a pattern (See Figure 1). However, none of the statements produced statistically significant results at  $p < 0.05$ .

Figure 1.



All 6 items that were reverse scored produced higher means in the GW group than in the GCC group (See Figure 2). While these trends may seem contradictory to the results observed in the normally scored items, this finding is consistent with the pattern. Since these six items are reverse scored, the reverse outcome or an outcome in which GW means are greater than GCC means, continues a consistent pattern. In this case, the higher GW means produced from reversed scoring indicate that the GCC means produce a higher effect.

Figure 2.

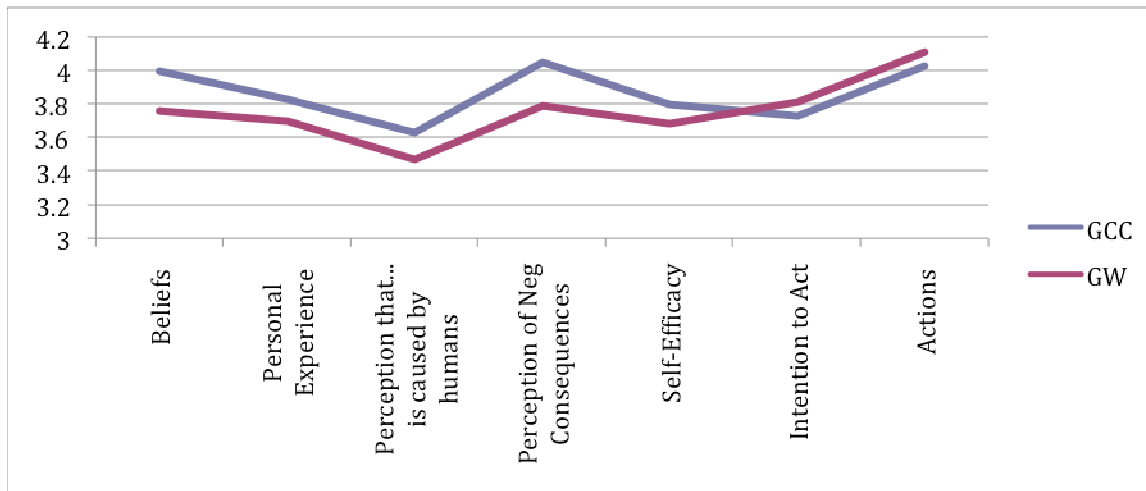


Therefore, a significance test was calculated to determine whether the trend established by the higher GCC group means was significant. The probability of obtaining such a result by chance alone is  $(1 - .998) = .002$ . Therefore, we reject the hypothesis that the trend of higher GCC means was due to chance ( $p < 0.002$ ).

#### *By Subscale*

Mean scores were also calculated for each subscale. The statements were divided into 7 subscales and an individual score for each participant was calculated by averaging the items within each of the subscales. On the subscale level, the means for the GCC group were higher on 5 out of 7 subscales (See Figure 3). Only the “Intention to Act” and “Actions” subscale produced lower means on the GCC level than the GW level. This finding reinforces the trend noticed on the statement level, in which the GCC statements produced higher means than the GW statements.

Figure 3.



The correlations between the subscales produced significant results between all of the subscales, except for self-efficacy, at the  $p < 0.01$  and  $p < 0.05$  level within both the GCC and GW groups. The self- efficacy subscale produced no significant correlations within either the GCC or GW groups. The difference in correlations between GCC and GW produced a majority of positive correlations, indicating a unitary pattern of responses amongst respondents .

*Semantic Differential Scale*

The semantic differential scale was designed to record the differences in means on attitudes and emotions concerning GCC or GW. More extreme means on either the left or right side of the scale indicate a tendency towards that particular side creating patterns that each term is more closely associated with. On the 8-item attitude subscale, the pattern is less consistent than the emotions subscale (See Table 2). On the emotions subscale the GW group evoked stronger emotions in all cases (See Table 3).

Table 2.

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Table 3.

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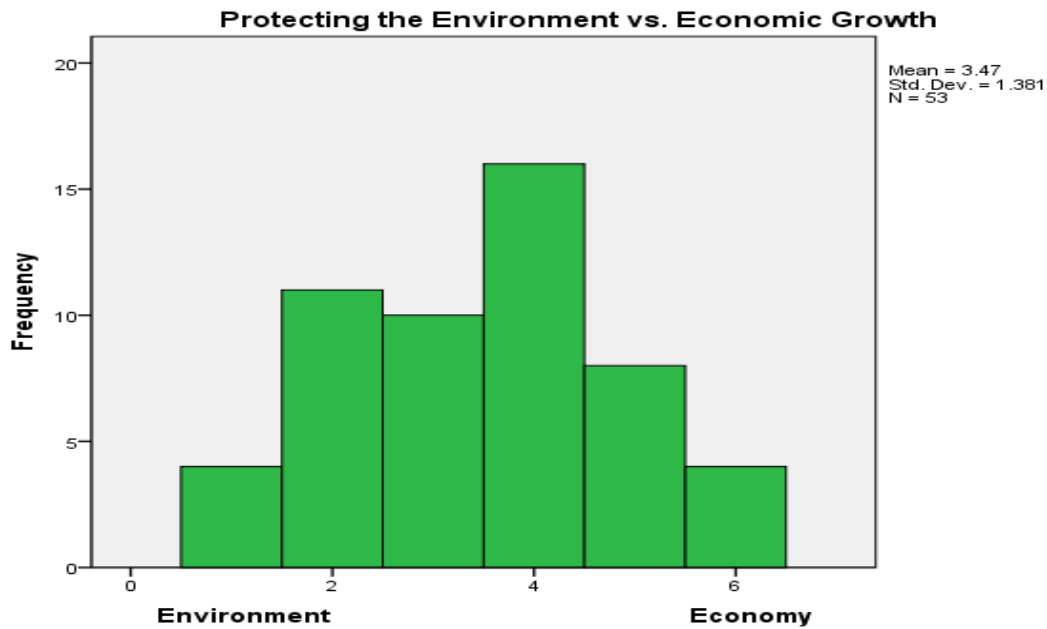
*Protecting the Environment versus Economic Growth*

The “protecting the environment” versus “economic growth” item measured where participants fell on a seven -point scale on this issue. On the far left side of the scale, or 1, lies “protecting the environment” as the highest priority. On the far right side of the scale, or 7, lies “economic growth” as the highest priority. Most participants (30%) fell in the neutral position, or 4. However, there are about twice as many responses at the environmental end (47%) than the economic growth end (23%), indicating that most participants view protecting the environment as a high priority (See Table 4). No participants indicated that “economic growth” was their highest priority. Figure 4 illustrates the distribution of the responses.

Table 4.

Scale	Frequency	Percent	Cumulative Percent
1	1	7.5	7.5
2	11	20.8	28.3
3	10	18.9	47.2
4	16	30.2	77.4
5	8	15.1	92.5
6	4	7.5	100
7	0	0	

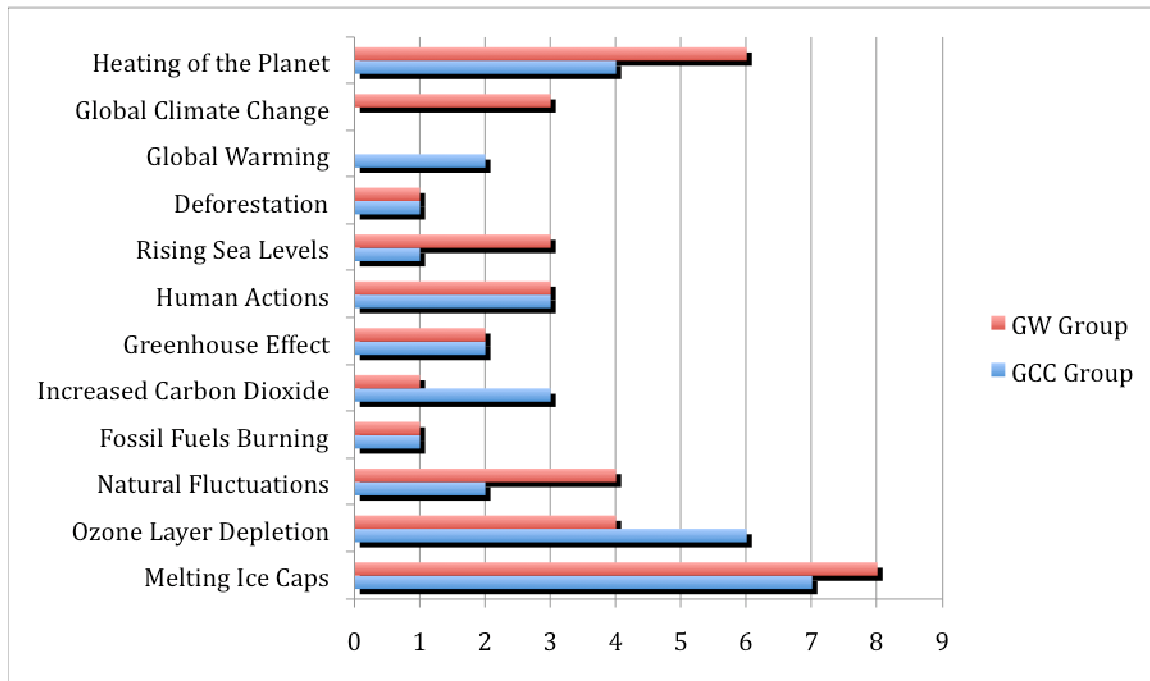
Figure 4.



### *Open Ended Item*

We asked participants about associations of global climate change or global warming, respectively. After reviewing the fifty-three responses, certain phenomena were commonly associated with both terms. Melting ice caps, ozone layer depletion, and heating of the planet were at the highest of the distribution of associated phenomena (See Figure 5). GW and GCC were tied with respect to many themes. More participants associated GW with “heating of the planet,” “rising sea levels,” and “melting ice caps.”

Figure 5.



## Discussion

### *Discussion of Hypothesis*

As predicted, the GCC group produced higher means on the statement level than the GW group. While the individual items did not produce statistically significant results, the trend of higher GCC means was statistically significant. This result indicates that the respondents in the GCC group agreed more with the statements than the respondents in the GW group. The higher agreement in the GCC group illustrates a higher belief in GCC than GW. On the semantic differential scale, GCC was also associated with the more serious emotions, and GW was associated with more uncertain emotions (this will be discussed in further detail below). However, the prediction that respondents would associate GW with heat related effects and GCC with temperature change only proved to be somewhat true in this study.

### *Further Discussion of Statements*

While none of the statements produced statistically significant results, certain items stand out because of their relatively large difference in means between groups. The first item, “GW/GCC is occurring now,” produces the largest mean difference between both groups. In



the GCC group, the average score was 4.08 and in the GW group the mean was 3.72. This mean differential indicates that more respondents believe that GCC is occurring as opposed to GW. This is consistent with the hypothesis and previous findings and reinforces the notion that media and elected officials should reconsider the terms they use when speaking about climatic issues.

The perceived difference between GCC and GW is more apparent when looking at the means on the subscale level. The two subscales in which GCC is not higher than GW are “Intention to Act” and “Actions.” Therefore, while respondents seem to place more severity on GCC, their intentions to act and actions were more strongly felt in the GW group. This finding indicates that more respondents believe that a change in their actions may have a greater effect on GW, but not GCC. Interestingly enough, the semantic differential scale displays that “irreversible” attitude is higher in the GCC group than in the GW group.

The difference in correlations between the subscales reinforced the trends reflected in the higher GCC and lower GW means. The difference in correlation matrix (See Appendix D) illustrates that GW and GCC produced more positive than negative results. In order to observe positive differences, one group had to have produced higher and stronger correlations. The GW group produced stronger correlations, which reflect a more common pattern of answers amongst the respondents. In this case, respondents in the GW were more unified in the way that they answered the statements, thereby substantiating the trend observed within the GW group.

#### *Further Discussion of the Semantic Differential Scale*

The trends observed in the semantic differential scale are more apparent when looking at the subscale level. On the emotions subscale, the means of the GW group lean more the right of the scale, while the GCC group leans towards the left (See Figure 6 for depiction and refer to Table 2 for exact numbers). When the phenomenon is described under “global warming,” the

respondents gravitate towards associating the issue with emotions like “indifferent,” “hopeful,” “calm,” “unconcerned,” and “certain.” These emotions are all inclined towards a more optimistic view of climatic change, as opposed to the emotions that were affiliated with GCC, such as “anxious,” “hopeless,” “fear,” “concern,” and “doubtful.” Since pessimistic emotions are more closely aligned with GCC, the idea that GCC is perceived as a more serious threat is reinforced.

Figure 6.

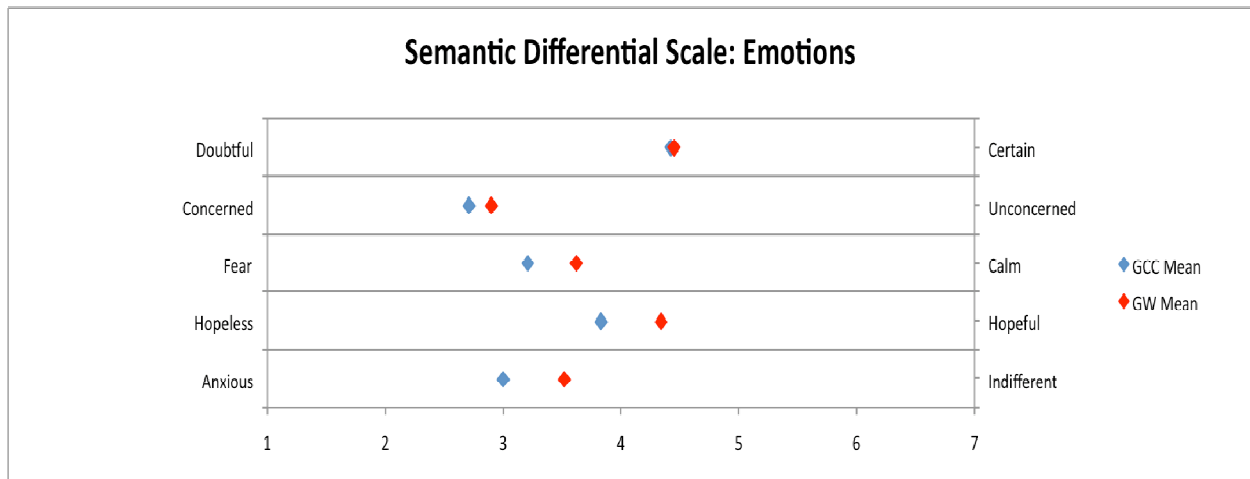
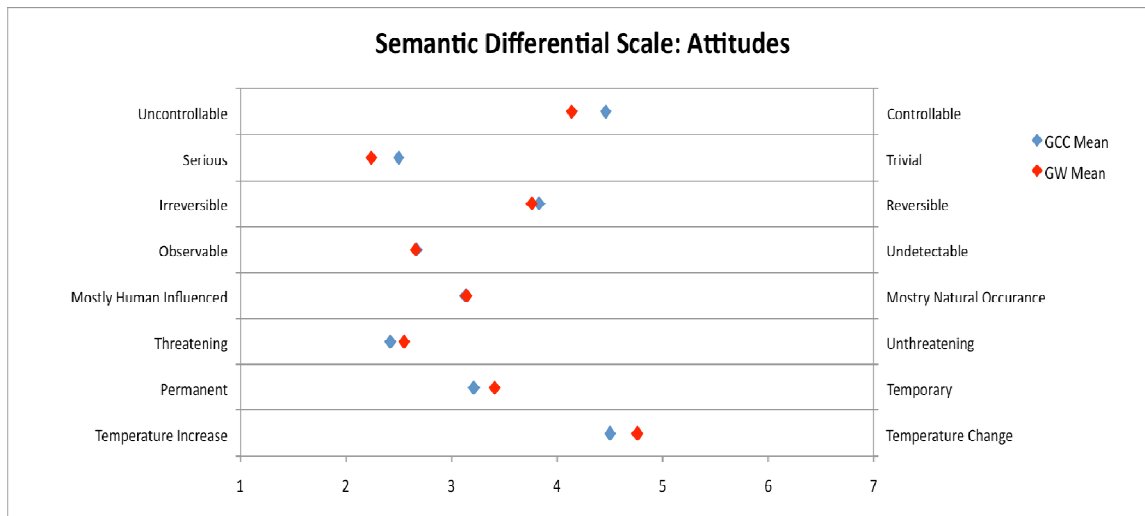


Figure 7 depicts the relationship between the GCC group and GW group on the attitude subscale (Refer back to Table 3 for exact numbers). The patterns on this subscale are not as consistent as the emotions subscale. GCC was affiliated with “uncontrollable,” “serious,” “irreversible,” and “observable.” These affiliations correspond to the trend set in the emotions subscale in which GCC is taken to have a more serious connotation. On the other hand, GW was associated with “temperature change,” “temporary,” “unthreatening,” and “mostly naturally occurring.” These associations indicate that the understanding of GW is largely inaccurate and misguided.

Figure 7.



### *Discussion of Qualitative Items*

The qualitative question gives insight to the thoughts of respondents, which might not otherwise be reflected in the questionnaire. The open-ended response item implored respondents to record what they associated with global warming or climate change, respectively. Although each respondent had a unique perspective to convey, most responses shared common associations with various phenomena. GW was most commonly associated with “heating of the planet,” “melting ice caps,” and “rising sea levels. These associations show a clear trend towards associating global warming with heat related effects, which is consistent with previous studies.

Some respondents demonstrated a distinction between the definitions of each term. One respondent in the GW group wrote, “I prefer using ‘climate change.’ CC is a neglected issue because it is mostly unseen. It is political, personal and universal.” The respondent’s preference towards using climate change indicates that he or she understands the politics of using the appropriate term. Another respondent associated GCC with “factors (mostly human, some natural) that affect the sensitive naturally occurring processes and lead to interruptions or alterations of the [natural] process often leading to changes that the environment is not prepared for.” While the response is somewhat vague, it demonstrates a clearer comprehension of the

dynamics of climate change. However, not many other respondents demonstrate the same ability.

The analysis indicated that participants associated “natural fluctuations” more with GW than GCC. “Natural fluctuations” are more indicative of temperature changes, which is most commonly associated with GCC. The association of GW with natural fluctuations disproves the prediction made earlier that GCC would be linked to temperature changes without a specific directional shift. Also, the instances in which this association is made apparent with GW suggests a deeper misconception of the actualities of climate change. One respondent wrote, “Global warming is a naturally occurring cyclical change in temperature and weather patterns. Humans have the ability to influence global warming or make it happen faster, but overall weather is a constantly changing pattern anyway, with or without human influence.” Furthermore, on the semantic differential scale, the “mostly naturally occurring” attitude was more closely with GW. However, this observance was recorded at a very small margin, so the effect is minimal. Yet, this finding is unusual because most prior research suggests that GCC is most closely associated with naturally occurring changes. The only conclusion that can be drawn is that the awareness on climatic issues is still limited at best, and at most severely misunderstood.

### **Limitations of the Study**

#### *Higher Liberal Demographic*

One of the major limitations of the study is the volume of responses elicited from a high liberal demographic. Almost 40% of the respondents identified with the Democratic Party, while less than 10% indentified with the Republican Party. This representation is likely caused by the distribution of this survey in a University in New York. Yet, even with the high liberal demographic, most of the results stayed within the realm of expectations. The disparity

between “protection of the environment” and “economic growth” is quite possibly one of the few instances in which the highly liberal demographic overpowered the lower conservative response rate. Generally speaking, however, a sample more representative of the population is desired. Therefore, future studies should try alternative sampling methods to ensure a more representative population.

### *Higher Female Demographic*

Another limitation of the study was a higher participation of female than males in the study. Female participation was at 60.4% while male participation was at 39.6%. This discrepancy is a twenty percent difference, which indicate that the results represent a higher percentage of female respondents. However, the 60/40 ratio is not inconsistent with the female–male ratio at the university where the survey was distributed. At the university, the enrolled gender ratio is 54/46, which is closer to the ratio of respondents (Profile of the Class of 2015). Also, the university’s voluntary research subject pool is composed primarily of females (72%) as opposed to males (28%), which accounts for the discrepancy between female and male respondents. Future researchers should try to equalize the gender ratio to as close to 50/50 as possible.

### **Further Research**

#### *Manipulation of Weather- Warm vs Cold Day*

In terms of further research, there are a variety of variables that can be changed to further manipulate the extent to which perceptions and attitudes differ between global warming and global climate change. Studies suggest that people tend to believe more in a global climatic phenomenon on days that display some sort of abnormal weather pattern, mainly on days that are unusually hotter than average. Perhaps researchers should look into whether or not beliefs

in global climate change or global warming increases on days that are hotter or colder than average. While this particular experiment is nuanced in terms of when to schedule such an experiment, it may provide researchers with valuable insight into how people react according to daily temperature.

### *Conclusion*

The belief in climate change as an actual direct threat to our ecosystems and livelihood is essential in the political arena in order to establish a basis for why legislation and policy to mitigate climate change mitigation is necessary. If the electorate is unconvinced that climate change poses potentially serious risks then legislators will be less likely to try to enact policies that uphold these values. Legislators also have tremendous potential to shape the agenda and influence their constituents. If legislators choose to use terminology with a partisan agenda, this ploy can significantly reduce the ability of the government to legislate effectively. As a result, communication on climatic issues should be carefully structured to ensure that the public understands the issue. Since “global climate change” appears to be the more effective term, perhaps politicians and media officials should re-evaluate how they approach climate issues. Using the most accurate description of the phenomena is a stepping-stone in the right direction into convincing the electorate that global climate change is an issue that needs political intervention now. Only through public pressure will legislators be pressed into addressing the environmental issues of today to ensure the future.

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## Appendix A

## Statements: Global Warming

## Beliefs

1. Global warming is occurring now.
2. I am quite sure that global warming is occurring now.

## Personal Experience

3. I have already noticed some signs of global warming.
4. It seems to me that temperature is warmer now than in years before.
5. It seems to me that weather patterns have changed compared to when I was a child.

## Perception as Caused by Humans

6. Global warming is mainly due to natural causes, not human activity.
7. The main causes of global warming are human activities.
8. Global warming is merely a natural fluctuation, not caused by human activity.
9. I am quite sure that human activities are responsible for global warming.

## Perception of Negative Consequences

10. There will be some positive consequences of global warming for the environment.
11. The consequences of global warming will be harmful for the environment.
12. Global warming will bring about some serious negative consequences.
13. The consequences of global warming will be more positive than negative overall.

## Self-Efficacy

14. There are simple things that we can do that will have a meaningful effect to alleviate the negative effects of global warming.
15. I believe that little things we can do will make a difference to alleviate the negative effects of global warming.
16. Even if we try to do something about global warming, I doubt if it will make any difference.
17. There is very little we can do to mitigate the negative effect of global warming.

## Intention to Act

18. I will make some efforts to mitigate the negative effects of global warming.
19. I intend to take concrete steps to do something to mitigate the negative effects of global warming.

## Action

20. I will reduce my electricity usage in order to conserve energy as a simple step towards alleviating the effects of global warming.
21. I will incorporate public transportation into my traveling regiment in order to reduce my carbon footprint.
22. I will recycle more in order to reduce waste because it is a simple step that I can make towards alleviating the effects of global warming.



## Statements: Global Climate Change

## Beliefs

1. Global climate change is occurring now.
2. I am quite sure that global climate change is occurring now.

## Personal Experience

3. I have already noticed some signs of global climate change.
4. It seems to me that temperature is warmer now than in years before.
5. It seems to me that weather patterns have changed compared to when I was a child.

## Perception as Caused by Humans

6. Global climate change is mainly due to natural causes, not human activity.
7. The main causes of global climate change are human activities.
8. Global climate change is merely a natural fluctuation, not caused by human activity.
9. I am quite sure that human activities are responsible for global climate change.

## Perception of Negative Consequences

10. There will be some positive consequences of global climate change for the environment.
11. The consequences of global climate change will be harmful for the environment.
12. Global climate change will bring about some serious negative consequences.
13. The consequences of global climate change will be more positive than negative overall.

## Self-Efficacy

14. There are simple things that we can do that will have a meaningful effect to alleviate the negative effects of global climate change.
15. I believe that little things we can do will make a difference to alleviate the negative effects of global climate change.
16. Even if we try to do something about global climate change, I doubt if it will make any difference.
17. There is very little we can do to mitigate the negative effect of global climate change.

## Intention to Act

18. I will make some efforts to mitigate the negative effects of global climate change.
19. I intend to take concrete steps to do something to mitigate the negative effects of global climate change.

## Action

20. I will reduce my electricity usage in order to conserve energy as a simple step towards alleviating the effects of global climate change.
21. I will incorporate public transportation into my traveling regiment in order to reduce my carbon footprint.
22. I will recycle more in order to reduce waste because it is a simple step that I can make towards alleviating the effects of global climate change.



Appendix B

Semantic Differential Scale

Global Climate Change/ Global Warming

Observable \_\_\_\_\_ Undetectable

Permanent \_\_\_\_\_ Temporary

Threatening \_\_\_\_\_ Unthreatening

Reversible \_\_\_\_\_ Irreversible

Serious \_\_\_\_\_ Trivial

Under Control \_\_\_\_\_ Uncontrollable

Mostly Human influenced \_\_\_\_\_ Mostly Naturally occurring

Temperature Increase \_\_\_\_\_ Temperature

Change

Concerned \_\_\_\_\_ Unconcerned

Anxious \_\_\_\_\_ Indifferent

Fear \_\_\_\_\_ Calm

Doubtful \_\_\_\_\_ Certain

Hopeless \_\_\_\_\_ Hopeful

## Appendix C

**Letter of Consent**

**Title of Study:** Assessing Beliefs and Perceptions on Environmental Change

**Please read this consent document carefully before you decide to participate in this study.**

**Purpose of the research study:** A study investigating how people perceive changes in our environment and climate

**What you will be asked to do in the study:** This is a computerized study. You will read a series of statements concerning the environment and the climate and you will report your views, opinions and beliefs about these statements.

**Time required:** 25 – 30 minutes

**Risks and Benefits:** There are no risks beyond everyday life associated with the experiment. By virtue of participating in this experiment you may gain some insights into how you interpret results based on the items in the survey. You are strongly encouraged to ask questions and clarify any doubts you have. At the conclusion of the study we will debrief you and explain the objectives of the study.

**Compensation:** If you complete the survey in our lab you will be paid \$7 in cash upon completion of the survey. If you complete the survey on line you will receive a \$7 Amazon.com gift card by email within two weeks of the survey's completion.

**Confidentiality:** Your identity will be kept confidential to the extent provided by law. Your data will be assigned a code number, in lieu of any personally identifying information. When the study is completed and the data has been analyzed, the list containing your personal information will be destroyed. Your name or any identifying information will not be used in any report.

**Voluntary participation:** Your participation in this study is completely voluntary. There is no penalty for not participating. You may also refuse to answer any of the questions we ask you.

**Right to withdraw from the study:** You have the right to withdraw from the study at anytime without consequence. You will be deemed as not completing the study.

**Whom to contact if you have questions about the study:** Email Dr David Budescu at DMLab.Fordham@gmail.com

**Whom to contact about your rights as a research participant in the study:**

E. Doyle McCarthy, Chair of the Fordham University Institutional Review Board  
113 W. 60th Street, New York, NY 10023-7484

Phone: 212-636-7946

FAX: 212-636-6482

E-mail: [IRB@fordham.edu](mailto:IRB@fordham.edu)

**Agreement:** I have read the procedure described above. I voluntarily agree to participate in this study.

## Appendix D

## Difference in Correlation Matrix

	Belief in GW	Personal Experience with GW	Perception that GW is caused by humans	Perception of Neg Consequences of GW	Self-Efficacy GW	Intention to Act GW	Actions GW
Belief in GCC		<b>.057</b>	<b>.26</b>	<b>.149</b>	<b>.216</b>	-.025	-.209
Personal Experience with GCC	<b>.057</b>		<b>.109</b>	<b>.102</b>	<b>.373</b>	-.018	<b>.018</b>
Perception that GCC is caused by humans	<b>.26</b>	<b>.109</b>		-.046	.257	-.076	-.019
Perception of Neg Consequences of GCC	<b>.149</b>	<b>.102</b>	-.046		<b>.145</b>	<b>.005</b>	<b>.063</b>
Self-Efficacy GCC	<b>.216</b>	<b>.373</b>	<b>.257</b>	<b>.145</b>		<b>.383</b>	<b>.238</b>
Intention to Act GCC	-.025	-.018	-.076	<b>.005</b>	<b>.383</b>		<b>.08</b>
Actions GCC	-.209	<b>.018</b>	-.019	<b>.063</b>	<b>.238</b>	<b>.08</b>	