

'GLOBAL WARMING' AND 'CLIMATE CHANGE'

A corpus driven cognitive linguistic comparison

Abstract

Global climate change may be humanity's greatest challenge yet it lacks a powerful metaphor to galvanize a much-needed social response. Research shows that how issues are framed affects social response, thus an understanding of the metaphors that frame global climate change allows us a better insight into the behaviors and attitudes of speakers towards this increasingly important phenomenon. This is a corpus driven cognitive linguistic comparison of the nearly synonymous fixed phrases 'global warming' and 'climate change' to investigate the metaphors that currently structure these terms. Results show that the current frames lack the personal and moral appeal that is necessary for social engagement across the partisan divide. Results have implications for cognitive linguistic researchers and global climate change communicators

Keywords: cognitive linguistics, corpus linguistics, global climate change communication, environmental rhetoric, risk communication

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1. Introduction

This is a cognitive linguistic comparison of the fixed phrases ‘global warming,’ (GW) and ‘climate change,’ (CC), the two top terms used to describe global climate change, (GCC¹). I compare GW with CC by investigating their use through a systematic search of their collocations² across different parts of speech in the spoken subregister³ of the Corpus of Contemporary American English (COCA)⁴ in order to unpack the deeper semantic frames within which each is embedded in speech.

I apply conceptual metaphor theory (CMT), (Lakoff and Johnson 1980), combined with corpus methodology, to examine how the fixed phrases GW and CC are cognitively framed in spoken discourse. The rich database of COCA provides a robust sampling of word concordances within their phraseological contexts from which to draw conclusions about how we frame climate discourse. CMT has been combined with corpus methodology to investigate metaphors of emotion (Oster 2010, Stefanowitsch 2006) but has not been applied to investigate the metaphors involved in climate discourse. The methodology employed in these studies lays the groundwork for my investigation.

There is a considerable amount of literature dedicated to climate discourse strategy and researchers have studied and compared the terms CC and GW in the fields of environmentalism, political science, sociology and climate communication, (Center for Research on Environmental Decisions 2009, Hoffman 2012, Luers 2013, Nisbet 2009, Villar, Krosnick 2011) but there has been no systematic cognitive linguistic study to date comparing the use of these nearly synonymous⁵ fixed phrases.

¹ For the purposes of lexical clarity in the paper, I will refer to the phenomenon as ‘global climate change’ or GCC, the term currently in vogue by scientists at NASA.

http://www.nasa.gov/topics/earth/features/climate_by_any_other_name.html

² ‘Collocations,’ also referred to as ‘collocates’ are those words that co-occur together.

³ I limited my scope to the spoken subregister because I am interested in spoken language use.

⁴ COCA, created by Mark Davies of Brigham Young University currently contains 450 million words. This free software provides the most robust corpus data for the American English language available at present. For more information about the history and development of COCA please see Davies, M. (2009) in References.

⁵ Though related, the two terms are not synonymous, yet are often conflated. ‘Global warming’ and ‘climate change’ are technically two distinct phenomena, per the Environmental Protection Agency: GW is the increase
2.

A cognitive linguistic study of GW and CC is crucial for a clearer understanding of how these issues are metaphorically framed. Studies have shown that the way issues are framed influences how we understand and then solve real-world problems. (Lakoff 2010, Nisbet 2009, Thiboudeu, Boroditsky 2011⁶, Hoffman 2012). Thus the framing of GW and CC exposes how we perceive, communicate and react to these critical issues.

Current research indicates that as a society we lack effective environmental frames (Lakoff 2010, Nisbet 2009, Hoffman 2011, Maibach, Roser-Renouf, Leiserowitz 2008) to understand and consequently act upon the abstract concept of GCC. There is also a general lack of public engagement in this arena (Nisbet 2009). Not surprisingly, according to Gallup, there has apparently been little change in US public opinion on climate over the last two decades (Gallup 2012). We may infer that the lack of effective environmental frames contributes to the lack of public engagement with respect to GCC. Hence, understanding the metaphors that frame GW and CC allows us a better insight into the behaviors and attitudes of speakers towards these increasingly important environmental phenomena.

Environmentalists and social scientists are eager for more scrutiny in environmental advocacy and my study is a response to this need. As a significant sociopolitical, environmental and ecological problem, global climate change, also known as anthropogenic climate change, requires the active attention of humanity as a whole. My results have implications for cognitive linguistic researchers and global climate change communicators.

I set out my investigation with the following questions: How are the fixed phrases 'global warming' and 'climate change' construed in spoken discourse? What cognitive frames are used to understand these abstract terms and how can corpora inform us about the metaphors used to understand climate discourse?

in average earth surface temperature, while CC refers to any number of deviations from long-term climate trends. <http://www.epa.gov/climatechange/basics/>

⁶ This is an empirical study showing that cognitive frames in language affect how people perceive and then solve real-world problems. (Thibodeau PH, Boroditsky L (2011).

In what follows in Section 2, I introduce some background information about Conceptual Metaphor Theory (Lakoff, Johnson 1980) as well as a brief overview of the interface between conceptual metaphor theory and cognitive linguistics, (Oster 2010, Stefanowitsch 2006). In Section 3, I present a Methodology section outlining some corpus linguistics terminology and the methodology I used to obtain my data. In Section 4 I present my data along with results and interpretations, in Section 5 I present a conclusion that includes a discussion with implications for further study.

2. Background Information

Lakoff and Johnson (1980) posit that conceptual metaphor is integral to the way we think and not confined to literary flourish. Rather, they demonstrated that the use of metaphor is a natural mechanism by which we understand one conceptual domain in terms of another. Conceptual domains include any coherent system of human experience, abstract or concrete, for example life, love, time, space, motion, journeys or war. Lakoff and Johnson demonstrate that we commonly communicate about abstract concepts via analogous tangible experiences in life.

To clarify how conceptual metaphors function, Lakoff and Johnson devised ‘mental mappings’ or ‘cross domain mappings’ whose function is to demonstrate the transfer of an abstract idea, known as the TARGET domain to another more concrete one, known as the SOURCE domain. Additionally, one of the core concepts of CMT is that the mental mappings between source and target domains express rich sets of analogies, or ‘entailments.’ Please note that all metaphorical frames and mental mappings appear in capital letters.

In CMT we identify the frame LIFE IS A JOURNEY as a mental mapping. The abstract concept LIFE, is the TARGET domain that is understood via a SOURCE domain representing a physical experience such as a JOURNEY. A partial list,⁷ of the many entailments, of this mapping are shown below:

Target domain

Source domain

⁷ Some examples derive from Lakoff and Johnson (1999).

LIFE	JOURNEY
Entailments	
<i>LIFE'S PLAN</i>	<i>ITINERARY</i>
GOALS	DESTINATIONS
DECISIONS	CROSSROADS
<i>DIFFICULTIES</i>	ROADBLOCKS
<i>BIRTH</i>	BEGINNING OF JOURNEY
DEATH	END OF JOURNEY

Conceptual metaphor is thus understood as a cross-domain mapping, one that maps cognitive processes, between an abstract or TARGET domain and a SOURCE domain, equivalent to an embodied experience.

The entailments in this mapping include how appropriate a chosen path in life might be, as in sample (1)⁸ as well as the directionality a traveler takes on a journey as in sample (2):

- (1) We've made mistakes, but now we're on the **right path**.
- (2) He doesn't have much **direction** in his life.

Other entailments of this mapping include the quality of life as in sample (3):

- (3) She describes it as the story of her **painful journey** to self-acceptance down a very **bumpy road**.

Included in this mapping, 'standing at a crossroads' indicates decision-making and the relevant entailment of two pathways, analogous to physical choices involved in traversing a terrain, as in sample (4):

- (4) The Iraqis are standing at the **crossroads** right now and they're looking down both **paths**.

In sample (5) a roadblock is indicative of an obstacle in life:

- (5) Every single **roadblock** that my parents put in front of me has only made me better.

To resume, Lakoff and Johnson (1980) posit that because our physical experience provides the underlying interaction with the world around us, our cognition of

⁸ All instantiations in this study are authentic, deriving from the spoken subregister of COCA, 12/2013.

abstract concepts occurs through embodied experiences, i.e., cognition of abstract ideas is perceived via our physical body, both sensorimotor and neurological.

In this study I have used corpus data from COCA since “naturally occurring language is vastly preferable to elicited or invented data.” (Deignan, 2005, p. 27). The use of corpus data has become more standard within cognitive linguistic studies (Stefanowitsch, 2006, Oster 2010, Gries & Divjak 2009). The corpus can be utilized to highlight all the contexts in which any given word occurs. (Biber, Conrad, Reppen, 1998). Most importantly, corpus linguistics argues for a more phraseological approach to the understanding of language because the semantics of lexical items are better understood within their context (Deignan, 2005, Stefanowitsch, 2006 Oster, 2010).

The fixed phrases GW and CC lend themselves well to CMT because, as abstract ideas we cannot perceive them as discrete items, rather, these expressions representing systemic natural phenomena are difficult to fathom. “Global warming is so abstract that scientists argue over how they would know if they actually observed it.” (Sarewitz, 2000). GCC is a complex and pervasive phenomenon difficult to conceptualize, even for the scientific community, accordingly it is “a complex phenomenon to decode into popular language.” (Lorenzoni, Pidgeon 2006, p. 74). Moreover, though the leading authority on climate science, the Intergovernmental Panel for Climate Change (the IPCC), states that global climate change is real⁹, it continues to be a notoriously controversial issue. Indeed GCC has reached an almost global scientific consensus, but not a social one. (Hoffman, 2011). Research has shown that the debate over GCC cannot in fact be about the science anymore, but about the values, culture and ideology surrounding these topics. (Hoffman 2011, McCright, Dunlap 2011).

Ideology in speech is reflected by the way terms are linguistically framed. Lakoff (2010) proposes more effective cognitive frames in climate science discourse,

⁹ The Intergovernmental Panel for Climate Change (IPCC) a branch of the United Nations, based in Geneva, is the top authority worldwide of climate science. Their latest report issued 9/27/13, confirms the consensus among the scientific community globally that GCC is real.
http://www.ipcc.ch/news_and_events/docs/ar5/press_release_ar5_wgi_en.pdf

frames that reflect a more embodied source, such as a health frame to breach the abstract concept of GCC to a more concrete one, one that affects individuals and future generations and eventually, society at large even beyond the partisan divide. (Butler 2006). **A successful reframing of GCC based upon basic human core values, such as health values will unite people rather than divide them.**

It seems that environmental advocates have not engaged the public because the social and political means of addressing environmental issues have been lacking, i.e. [the] technical details have prevailed, which only serve to confuse the public, not motivate. (Luers 2013, Nerlich, Koteyko, Brown 2010, Hoffman 2011). Since people are constrained by a moral obligation to their ideologies they adhere to their belief system rather than to objective facts, "frames trump facts." (Lakoff 2010). Indeed, "facts do not end the argument, on the contrary, they fuel the argument. (Myerson, Rydin, 1996, p. 21).

Linguistic means of addressing environmental issues has also been lacking, (Butler 2004, Lakoff 2010, Maibach, Roser-Renouf, Leiserowitz 2008), thus it is imperative that we understand which metaphors are currently structuring these terms and whether the framing needs modification since "[c]limate change still lacks a single, powerful, and encapsulating metaphor," (Maibach, Roser-Renouf, Leiserowitz, 2008).

A brief history of the terms in question is in order. The geochemist Wallace Broecker of Columbia University used the term 'global warming' in 1975 in his revolutionary paper "Climatic Change: Are We on the Brink of a Pronounced Global Warming?"¹⁰. The term GW was later popularized by NASA scientist and environmental activist James Hansen in 1988. The term 'climate change' was used in 1956, by the physicist Gilbert Plass in his study entitled: "The Carbon Dioxide Theory of Climatic Change." In 1977 the journal Climatic Change had its debut. The term 'climate change' became part of the name of the International

¹⁰ Wallace Broecker, "Climatic Change: Are We on the Brink of a Pronounced Global Warming?" Science, vol. 189 (8 August 1975), 460-463.

Panel on Climate Change (IPCC), which was formed in 1988. (Wayne, 2013). In 2002, Republican advisor and communications expert, Frank Luntz, counseled the Bush administration to favor using the term CC over GW because CC sounded more benign and less threatening than GW. (Luntz, 2003). The switch in terminology would have the effect of lessening the urgency to address this environmental problem, easing pressure on right wing pollution generating corporations and their political supporters.

Scientists now understand that global warming affects the climate worldwide not just in terms of warmer temperatures, but in terms of more massive natural cataclysms such as increased floodings, stronger hurricanes and greater snowfall. (Conway, 2008).

The NASA website asserts that GW and CC are non-synonymous terms. On their website¹¹ they refer to the term 'global warming' as more 'pleasing' than 'climate change.' Clearly NASA is uninformed about linguistic frames as my findings, (and those of Luntz, 2003) are counter to this.

3. Methodology

I gathered my data from COCA, the largest American English corpus bank available for free to the public, and applied CMT to analyze my findings. I will briefly explain some corpus linguistics terminology and the methodology I used to obtain my data. A corpus bank is a large collection of digitalized texts. COCA currently contains 450 million words collected between 1990-2012 and is known as a 'monitor corpus' because it is a dynamic word bank into which new texts are continuously being added.¹² Standard procedures in corpus linguistics include generating frequency word lists, setting up concordance lines and creating collocate lists. The lists generated are referred to as 'search strings.'

A frequency list shows the number of occurrences, or tokens, of a searched word in a given corpus. Concordance lines are viewed from a generated list of a searched

¹¹ http://www.nasa.gov/topics/earth/features/climate_by_any_other_name.html

¹² This differs from a static corpus bank like the British National Corpus, (BNC) which is not updated.

word, or a small cluster of words, as they occur in a corpus. Following is a list of concordance lines, with the cluster 'global climate change' as the search words.

help to address the **global climate change** issues.
obviously, nuclear weapons and nuclear war, and now **global climate change**, which is clearly a
we have to combat, as a world, issues of **global climate change**, which is not
19 of the 20 who have taken a position say that **global climate change** is unproven or
strengthening our energy security and confronting **global climate change**.
big decisions to make about health care and about **global climate change**.

Table 1. Concordance lines for GCC in the spoken register of COCA.

From the concordance lines I investigated the searched terms vertically to check for patterns of interest to the left and to the right of the searched term or terms. Collocate lists, or search strings, show which words co-occur with the searched terms. My data are derived from several search strings out of COCA. I retrieved and then analyzed sample sentences from the obtained search strings with both GW and CC as my search terms. Please note that in sample sentences retrieved from search strings, nodes and all collocates are bolded and underlined. I also bold phrases of interest in sample sentences.

Searching in COCA allowed me to quantitatively examine which lexical items co occurred with my target words, or search words, the fixed phrases GW and CC. In corpus linguistics, the search word is referred to as a 'node word,' or 'node' and the words that co occur with a node are called 'collocates' or 'collocations.'

Collocates occur to the left (L) and to the right (R) of the node and the classic default word span from the node in COCA is 4L, or 4R, i.e., four words on either side of the node. I controlled the word span from the node and conducted both narrow and broad searches. I was also able to control, or tag, for the type of collocates searched by specific parts of speech, (POS), as well as tag a specific register: spoken, fiction, magazine, newspaper or academic and sometimes I tagged for lemmas.

Lemmas are the uninflected form of a set of words, for example 'love' is the lemma for 'loving' and 'loves' and 'pretty' the lemma for 'prettier' and 'prettiest.' Lemmas are tagged by square brackets in the corpus.

I further narrowed my search to the spoken register as I am mostly interested in spoken discourse relative to GCC. I also sorted for relevance (Mutual Information or M.I.). Searching for relevance sorts out unwanted grammatical terms also known as 'noise.' 'Noise' may include such items as determiners or punctuation. In a comparison of terms, such as this one, MI sorting is useful because it shows which collocates occur more frequently with Word 1 than Word 2 and vice versa, showing a W1/W2 ratio. Additionally COCA gives a comparison score which is the division of (W1/W2) by the ratio overall of the two words. I chose to compare only those collocates of GW and CC that had a 1.5 ratio and above since any ratio below would not constitute enough variation to be of relevance. For example when comparing the lexemes 'man' and 'woman' when I searched for collocating adjectives, the adjective 'wanted' appears 53 times for 'man' and only once for 'woman,' giving a ratio of 53.

Once I gathered my data, I scanned the list of collocations to filter for instances of metaphor.

4. Data and Interpretation

Per the spoken register of COCA, as of 12/2013, there are 1,063 tokens of GW, and 806 tokens of the use of CC.¹³ Thus the current corpus reflects that GW has been used 1.3 times more frequently than CC between 1988 and 2013 in the spoken register overall.

Per the Corpus of Historical American English, COHA¹⁴, which records word usage per decade, GW is recorded as having been used a total of 578 times and CC, 527, across all registers between 1990 and 2009. The data span from the 1980's through the year 2009. Of interest is the quadrupled increase in the usage of CC from the 1990's to the first decade of 2000, surpassing GW in terms of frequency as shown in Table 2 below:

¹³ Per COCA, the current total number of hits across all registers, 12/2013 is the following:
GW 5,140, CC 6,313.

¹⁴ COHA is the largest structured corpus of historical English, accessible through COCA.

CORPUS OF HISTORICAL AMERICAN ENGLISH, COHA				
Fixed phrase	Total usage 1980-2009	1980 ¹⁵ -1989	1990-1999	2000-2009
Global warming	578	18	219	341
Climate change	517	4	108	405

Table 2: COHA, decadal frequency of GW and CC.

Thus, though COCA shows GW to be used 1.3 times more in the overall corpus from 1988 to 2009, COHA shows that CC has increased in usage since the decade of the 1980's till 2009 by 101%, whereas GW has increased in usage by 19%.

As an introductory exploration of the terms under investigation, I conducted a broad collocation search of 9L, 9R, from the head of each fixed phrase as the node. I searched across the spoken register and all POS in COCA. I also sorted by Relevancy to filter for noise. Table 3 below is the result of this search.

Table 3. 9L, 9R, nodes: 'warming,' 'change,' sorted by Relevancy, across all POS, in the spoken register of COCA.

Rank in freq	'WARMING'			Rank in freq	'CHANGE'		
	collocate	POS	HITS		collocate	POS	HITS
1.	COOLING	(N)	17	1.	REGIME	(N)	356
2.	GLOBAL	(ADJ)	1121	2.	MIND	(N)	698
3.	TEMPERATURES	(N)	22	3.	LIVES	(N)	298
4.	MELTING	(N)	11	4.	RULES	(N)	256
5.	POLLUTION	(N)	28	5.	FUNDAMENTAL	(ADJ)	217
6.	NIÑO	(N)	13	6.	LIFE	(N)	835
7.	OCEAN	(N)	28	7.	LAW	(N)	396
8.	GASES	(N)	24	8.	LAWS	(N)	194
9.	HOAX	(N)	12	9.	ATTITUDE	(N)	193
10.	GREENHOUSE	(N)	33	10.	ELECTION	(N)	192
11.	ICE	(N)	24	11.	OPINION	(N)	156
12.	MANMADE	(N)	12	12.	SOCIETY	(N)	152
13.	PACIFIC	(ADJ)	12	13.	FOREVER	(ADV)	149
14.	DEGREES	(N)	13	14.	MILITARY	(ADJ)	142

3. Comparison of heads of phrases as nodes

Findings from this investigation indicate that 'warming' is strictly contextualized within the fixed phrase 'global warming,' i.e., 'warming' evokes collocates such as

¹⁵ Though this is a decadal column, please note that for both GW and CC, the first recorded use in COHA dates back to 1988, thus the numerical figures actually reflect one year's worth of recordings from 1989-1989.

'global,' 'manmade pollution,' 'greenhouse gases' and 'El Niño,' all related to the scientific domain of global warming.

Of most salience in this initial search string for 'warming' are the collocates 'cooling,' 'melting,' 'temperatures' and 'degrees' that encode the scalar nature of the term 'warming,'¹⁶ These collocates indicate that 'warming' is a departure from a 'normal' threshold or standard as can be seen in sentences (8) and (9):

(8) environmental groups **have been tracking rising temperatures** and **melting glaciers and other signs of global warming**.

NPR_Saturday, 2006

(9) And he found the actual **ocean warming** was well **outside the range of natural variation** in these models.

NPR_ATC, 2001

The departure from a standard norm is most often accompanied by a sense of urgency, or alarm. The sense of urgency is evident in both sentences (11) and (12) below. In sentence (11) the noun phrases 'grim predictions,' and 'catastrophic levels' evoke a negative semantic load in association with 'warming.' In sentence (12) 'warming' is connected to the 50% reduction in penguin population, i.e., 'warming' is the cause of death of a species, at an astounding rate. 'Warming' is deadly.

(11) There are **grim predictions** this **ice** sheet and others could melt with continued **warming**, sending the world's oceans to **catastrophic levels** in the distant future.

NPR_Saturday, 2006

(12) We talk about **warming** in terms of one degree, two **degrees**, over years, **but it makes a difference**. Mr-TRIVELPIECE: Yeah. You know, **when you can link a change in warming in air temperature through ice to krill to penguins and show a 50 percent reduction in the penguin populations here**, and connect all the dots, you really can't make it any clearer than that.

In sample (13) below the scalar noun 'increase' is used and the intensified adjective phrase 'more severe' modifying 'weather' is negative and cause for alarm.

(13) **global warming caused by the increase in greenhouse gases makes the weather more severe**.

ABC_Nightline, 1990

In sample (14), 'going backwards' refers to the use of fossil fuels that are 'dirty' and 'dangerous' and the two adjectives again carry a negative semantic load. The noun phrase that follows: '90 million tons of global warming pollution' renders a very

¹⁶ Intuitively 'warming' sounds comforting, not problematic; it is worth noting that the N 'warming,' deriving from the ADJ 'warm' pejorates semantically since by contrast, the top collocates for 'warm' are: fuzzy, sunny, smile.

high scalar value figure to the pollution that is discarded into the atmosphere, inferring doom. Of note also, per CMT, 'going backwards' is metaphorical and is indicative of the antithesis of progress, i.e., 'going forwards' with renewable energy.

(14) We're seeing the beginnings of quite a significant shift, and we should embrace that shift rather than trying to **go backwards** to these **dirty and dangerous polluting sources** which are responsible for putting **90 million tons of global warming pollution** into the atmosphere every 24 hours.

NPR_TalkNation, 2011

Findings from the 9L, 9R search of the head of 'global warming' strongly suggest that the semantic load of 'warming' is intrinsically negative, evoking an emotive and urgent sense of alarm.

The head of the phrase CC, 'change' is clearly not limited to the fixed phrase. The top collocates for 'change,' 'attitude,' 'minds,' 'opinions,' reveal that what changes is our psyche, as well as 'life,' 'society,' 'rules' and 'laws.' The domains of the psyche, life and social norms are vast and encompass most of human experience, thus 'change' is ubiquitous. Hence the semantics of the lexeme 'change' indicate that which is expected. Indeed life without change is impossible: seasons change, the tides change, the moon changes, all living things change from birth to death, day changes to night, etc. Though change indicates the substitution of one thing for another, it is a substitution we usually expect, it is routine and not generally cause for alarm and is inevitable. As a matter of fact, the advice for reframing GCC has included "don't call it 'climate change' because Americans like change."

(Shellenberger, Nordhaus T. 2004). Thus, not only is 'change' something that is expected, it is usually welcome.

Sample sentence (15) is a statement of fact that encapsulates the routine nature of change:

(15) Poll numbers **change**, public **opinion** changes.

NBC_MeetPress, 2010

In sample sentence (16) a 'change of mind' is certainly hoped for, instantiating that change is welcome:

(16) We **certainly hope** he'll **change** his **mind** and come on for an interview in the course of the primary process.

NBC_Meet_Press, 2012

In sentence (17) change is again desirable. The interrogative sentence utilizes the verb ‘convince,’ from the Latin, ‘convincere’ meaning ‘to win over,’ to ask how someone will convince others that change will be a part of their future.

(17) **How can you convince those people** that, you know, **you're going to change** their **lives**?

Fox_Susteren, 2012

In sentence (18), the topic is a new post revolution Tunisia, whose rules are going to change to shape a new Tunisia, the implication of change here is positive.

(18) Members of the new constituent assembly are meeting here in the parliament building **to help define** the **rules** that are going to **change** and **shape a new** Tunisia.

PBS_NewsHour, 2012

‘Hope and change’ were the hallmark of Obama’s 2008 presidential campaign, in sample sentence (19) he informs the American people that ‘change’ is what he’d like to bring to the United States because it is what America needs, by implication then, ‘change; is good.

(19) We need **fundamental change in this country**, and **that's what I'd like to bring**.

CNN_Newsroom/Presidential debate, 2008

In sample sentence (20) the advice is that one must have confidence to change one’s life, reflecting the high desirability of ‘change.’ The implication is that ‘change’ is not only positive, but also necessary.

(20) And **you have to have the confidence that** you **can change** your **own life**.

CBS_ThisMorning, 2012

In sum, ‘change,’ is not confined to the fixed phrase CC, and differently from ‘warming,’ occurs in a discourse that carries a positive semantic load, with no negative concepts associated with it as can be seen in the sample sentences above.

Next I compared the fixed phrases GW and CC across the spoken register in a broad collocation search 9L, 9R across all POS, in the spoken subregister of COCA, as reflected in Table 4 below. For the purposes of my CMT analysis, when evaluating search strings in COCA, I have chosen to examine only those words in the string that are indicative of metaphorical framing. Therefore the rank in frequency reflects numerical gaps in Table 4. For the complete list of collocates, please see Appendix 1, Table 1. Please note that Table 4 includes a semantic domain categorization column, i.e., a specific semantic set associated with the selected collocates. Also recall that when making comparisons between two words or

phrases and searching by M.I., COCA creates a comparison list of number of hits for W1 and for W2.

GW					CC				
Rank in freq.	Collocate	Hits		Semantic domain	Rank in freq.	Collocate	Hits		Semantic domain
		W1	W2				W1	W2	
1.	FIGHT	19	1	WAR	3.	STUDY	11	2	HUMAN BEHAVIOR/ ABSTRACT IDEA
2.	AIR	17	1	NATURAL ELEMENT	5.	LEGISLATION	14	3	LEGAL/ ABSTRACT IDEA
5.	HOT	13	1	PHYSICAL STATE	7.	SUMMIT	11	3	POLITICAL/ ABSTRACT IDEA
8.	ICE	11	2	PHYSICAL EARTH/ NATURAL RESOURCE	8.	ACTION	16	5	HUMAN BEHAVIOR/ FORCE
16.	POLLUTION	25	6	SOCIAL ILL/ CHEMICAL TOXIN	8.	IMPACTS	10	5	FORCE OF MOTION
20.	OIL	11	3	PHYSICAL EARTH/ NATURAL RESOURCE	10.	ADDRESS	13	5	COGNITIVE VERB/ ABSTRACT IDEA
24.	GASES	16	5	PHYSICAL EARTH/ NATURAL RESOURCE	14.	ECONOMIC	11	5	ECONOMICS/ ABSTRACT IDEA
30.	TEMPERATURES	12	4	PHYSICAL STATES	15	THREAT	22	12	ABSTRACT IDEA/ ADVERSARIAL FORCE

Table 4. Broad comparison of the fixed phrases across all POS, 9L, 9R, in the spoken subregister of COCA

In this search, the top collocate of GW is the lexeme ‘fight,’ indicative of the cognitive frame: GW is an ADVERSARY to be fought against in the domain of WAR.

Consider the following instantiation of GW as encoded within the cognitive framework of WAR in sample sentence (21):

(21)... former Vice President Al Gore **fires up** the **fight** on **global warming**.
NPR_TalkNation, 2011

In sample (21), in addition to the collocate ‘fight,’ the phrasal verb ‘fires up’ also conjures the WAR frame, i.e., ‘firing-up’ entails the use of a weapon such as a firearm used in warfare.

In sample (22) in addition to the collocate ‘fight,’ the verb ‘protect’ also constitutes part of the WAR frame, as part of the entailment of victims and aggressors in war, since the ‘environment’ must be ‘protected’ against the opponent GW.

(22) This is an historic agreement that we have made yesterday to **fight global warming** and to **protect** our environment.

NPR_Sunday, 2006

In sample sentence (23), the compound verb, 'plan to fight' falls within the war frame as an entailment of war strategy.

(23) A draft of California's **plan to fight global warming** will be presented to the California Air Resources Board
SanFranciscoChronicle, 2008

The other top collocates of GW per Table 4, 'air,' 'ice,' and 'oil,' 'gases,' and 'temperatures' fall within the domain of natural resources and natural states and the collocate 'pollution' falls within the domain of social ill as chemical contaminant; all of these top collocates are semantically related to the science domain.

In sample sentence (24) 'pollution' as a broad collocate of GW, is a social ill that has negative connotations reflected in the noun phrase 'trapping sunrays' resulting in climate change 'creating havoc.' Further, in this sample, GW is a type of specter, a frightening phantom enemy, in this cognitive frame GW is an opponent to be feared.

(24) In 1988, scientists began to **raise the specter** of **global warming**, that **pollution**, by **trapping** the sun's rays, was heating up the earth and that the ice caps would melt and the climate change, **creating havoc**.
ABC_Brinkley, 1990

In sample (25), containing the collocate 'ice,' GW is the cause of melting ice, or ice 'falling off,' a serious environmental problem, thus GW is an intrinsically negative phenomenon. Further, the superlative intensifier 'major' modifying the collocate 'ice' denotes a sense of gravity in the noun phrase 'major ice.' Finally in the second sentence in sample (25) the definite article 'the' in the noun phrase 'the GW problem' reveals that the GW problem is easily identified by the reader, i.e., it is a well-known problem.

(25) **Major** chunks of **ice** are **falling off** of Antarctica **because of global warming**. And so **the global warming problem is here**.
Independent_Newsforum, 1999

In sum, samples (21)-(25) reveal GW to be connected to the domain of science and to carry negative semantic connotations. Also, per Table 4, the top collocate for GW is the lexeme 'fight' indicative of the cognitive mapping GW is an ADVERSARY in a WAR FRAME.

In the broad search 9L, 9R, as seen in Table 4 on p. 15, the top words that collocate with CC, 'study,' 'legislation,' 'economic,' and 'summit' all fall within the political spectrum that derive from abstract ideas and human behavior. Additionally, it is clear from the sample sentences that contain these top collocates, that CC carries a negative semantic load.

Both samples (26) and (27) feature the collocate 'study,' an abstract idea, associated with human behavior. The samples show CC to be a negative causative force in the face of nature. In sample (26) CC could make El Niños 'even more intense' and 'more dangerous.' In this sample the combination of the adverb 'even' and the comparative adjective 'more' intensifies the negative semantic load of both adjectives 'intense' and 'dangerous.'

(26) A new **study** indicates human-induced **climate change** could make future El Niños **even more intense and more dangerous**
CNN_Event, 2000

In sample (27) a study links CC to the extinction of frogs, also giving the sentence a negative semantic load.

(26) But first, a new **study** out this week links global **climate change** to the extinction of frogs in the South and Central American tropics.
NPR_Science, 2006

In samples (28) and (29) CC qualifies 'legislation' and 'summit,' such that there is a legislation and there are summits whose topic is CC, underlining that CC is a topic that falls within the semantic domain of politics.

(28) In the meantime, prospects for passing **climate change legislation** in the U.S. have dimmed.

PBS_Newshour, 2010

(29) A draft agreement was unveiled today at a U.N. **climate change summit** in Copenhagen, Denmark.

PBS_Newshour, 2009

The relevant collocates in sample (30), 'study of the causes' and 'economic impacts' again demonstrate the political nature of the fixed phrase CC. Additionally, 'remedies' in sample (30), alludes to a health frame, entailing that CC is treatable as an AILMENT or a DISEASE.

(30) Pres. Bush told those attending the White House sponsored event there was a need for more **study** of the **causes** of **climate change** and the **economic impact** of the **remedies**.

PBS_Newshour, 1990

Still per table 4, on p. 15, the top collocates of CC, 'action,' 'impact' and 'threat' fall within the cognitive domain of a FORCE, while the collocate 'address' falls within a cognitive verb category.

In sample (31), action is enlisted as a force to address another force: climate change.

(31) I've supported **action** to address **climate change**
NBC_MeetPress, 2008

Sample (32), reveals that CC is an impactful threat. Per CMT, (Lakoff, 1992) CHANGE IS MOTION, thus CC is a THREATENING FORCE IN MOTION.

(32) **Climate change**: It's been called an invisible **threat**, but some say it's having a very **visible impact** on all our lives

Sample (33) is an interrogative asking what the 'impacts' of CC are and what the socioeconomic solutions to CC might be. 'Impacts' again implies that CC is a FORCE IN MOTION and 'socioeconomic solutions' indicate the political nature of the term CC.

(33) ...what can communities do, what are regional **impacts**, what are the **socioeconomic solutions** to **climate change**.
Talk of the Nation: Science Friday, 2008

Samples (26)-(33) demonstrate that CC falls within the domain of politics, has a negative semantic load and is a FORCE IN MOTION.

Whereas the comparison of the heads of the phrases yielded a positive semantic load to the term 'change,' when it is associated with 'climate' as a fixed phrase, the semantic load pejorates, CC is a dangerous threatening force, a force to be watchful of.

From the analysis of samples (21)-(33) derived from the broad comparison of the fixed phrases across all POS, 9L, 9R, it is clear that both GW and CC carry a negative semantic load. Further, from this analysis, GW elicits an ADVERSARIAL WAR FRAME and is part of a scientific discourse relative to the domain of natural resources and physical states, whereas CC elicits a discourse that is relative to the domain of politics and abstract ideas and it is a FORCE IN MOTION. To summarize thus far:

GW is a WAR ADVERSARY in the domain of science and CC is a FORCE IN MOTION in the domain of politics and both carry a negative semantic load.

I then compared the fixed phrases GW and CC for verbal collocates indicative of metaphorical framing, I also tagged the verbs by lemmas to capture more lexemes. The first search was narrow, 2L, 0R from the nodes, to see how we act upon the fixed phrases in their patient mode as reflected in Table 5 below:

GW					CC				
rank	Collocate	W1	W2	Cognitive frame		Collocate	W1	W2	Cognitive frame
1.	[FIGHT]	23	3	OPPONENT/ WAR	2.	[ADDRESS]	8	3	PROBLEM/ ABSTRACT IDEA
4.	[COMBAT]	11	2	OPPONENT/ WAR	7.	[BELIEVE]	3	1	ABSTRACT IDEA/ PERSONIFICATION
6.	[SOLVE]	6	0	PROBLEM	11.	[PREDICT]	2	0	KNOWLEDGE/ IDEA
7.	[CURB]	5	0	CONTROLLABLE FORCE	13.	[PROMOTE]	2	0	IDEA
8.	[STOP]	5	0	CONTROLLABLE FORCE	16.	[TACKLE]	2	1	PROBLEM
11.	[REDUCE]	4	1	CONTROLLABLE FORCE	26.	[COUNTER]	1	0	OPPONENT
13.	[REVERSE]	3	0	CONTROLLABLE FORCE	28.	[ASSESS]	1	0	IDEA
14.	[CUT]	3	0	OPPONENT/ WAR	31.	[QUESTION]	1	0	IDEA/ PERSONIFICATION
20.	[ATTACK]	3	0	OPPONENT/ WAR	33.	[OVERCOME]	1	0	OPPONENT

Table 5. Verbal collocates, 2L, 0R from the node, spoken register, COCA.

As a general overview, out of the total 63 hits, GW is framed as an OPPONENT 59% of the time, A CONTROLLABLE FORCE 32%, and as an ABSTRACT PROBLEM 9% of the time. CC is framed as an OPPONENT 19% of the time, an ABSTRACT IDEA 43% and a PROBLEM 38%. Thus, GW is framed 3 times more as an OPPONENT than CC while CC is framed 4 times more within the PROBLEM frame than GW. GW is framed as a CONTROLLABLE FORCE and CC is not. CC is framed as an ABSTRACT IDEA and GW is not.

GW		
37/63	OPPONENT FRAME	59%
20/63	CONTROLLABLE FORCE	32%
6/63	PROBLEM FRAME	9%

Table 6. Cognitive frame percentages, narrow verbal collocates, 2L, 0R, with GW as patient.

CC		
4/21	OPPONENT FRAME	19%
9/21	ABSTRACT IDEA	43%
8/21	PROBLEM FRAME	38%

Table 7. Cognitive frame percentages, narrow verbal collocates with CC as patient.

From Table 5, on p. 19, it is clear that some of the verbal collocates of GW and CC both fall within an ADVERSARIAL/OPPONENT FRAME.

The adversarial/opponent frame verbal collocates for GW are, 'fight,' 'combat,' 'attack,' and 'beat,' while for CC OPPONENT FRAMES include 'tackle,' 'counter,' and 'overcome.'¹⁷

VERBS in the ADVERSARIAL/OPPONENT FRAME			
GW	W1/W2	CC	W1/W2
fight	23/3	tackle	2/1
combat	11/2	counter	1/0
attack	2/0	overcome	1/0

Table 8. Verbal collocates of GW and CC within the adversarial/opponent frame

I then did a reverse comparison check in the spoken register, 0L, 2R with the verbs in Table 8 as the nodes, to examine which other adversaries follow these verbs in addition to GW and CC. My objective was to draw a semantic distinction between the verbs collocating with GW and those collocating with CC via the types of patients they take on as arguments.

What follows are the results of this reverse comparison search. I have also included some sample sentences from the search string in Table 5 with GW and CC as patients of these adversarial verbs for comparison purposes.

For GW, results show that the most frequent collocating nouns for 'fight,' and 'combat, are 'war,' 'battle,' 'terrorism,' 'crime,' and 'global warming.' The sample sentences that follow illustrate the adversarial nature of the verbs in question, reflective of the source domain of WAR.

¹⁷ Though some of the collocates overlap, it is the higher frequency of usage that is of interest.

(34) He was leaving to **fight** World **War** II and he didn't come home.
CBS_Early, 2011

In sample (34), there is a direct reference to 'World War II' and an inference to death, an entailment of war.

(35) **the world is** moving forward in **fighting global warming**
PBS_Newshour, 2007

In sample (35) that 'the world' is fighting against GW, positions the patient as a formidable ADVERSARY.

(36) You say that the best way to **combat terrorism** is not with **bombs**, but books.
NBC_Today, 2007

In sample (36) both 'terrorism' and 'bombs' are entailments of a very dangerous, terroristic ADVERSARIAL FRAME.

The collocates of 'attack' include, 'president,' 'people,' 'country,' 'targets,' 'Americans,' 'Republicans,' and 'troops.' 'Attack' collocates frequently with concrete nouns poised as 'adversaries.'

(37) Where is he going to get the **army** to be able to go and **attack** another **country**?
MSNBC_Carlson, 2005

In sample sentence (37) the WAR FRAME is elicited with the lexeme 'army,' as one of the entailments of war.

To review, the nouns collocating with the verbal collocates of GW, 'fight,' 'combat,' and 'attack,' are reflective of a WAR FRAME that entails physical targets such as 'people,' 'country,' or 'troops,' or the abstract concepts of 'war,' 'terrorism,' and 'crime' and 'global warming.'

For CC, results show that the most frequently collocating nouns for 'tackle,' 'counter,' and 'overcome,' are mostly abstract. 'Tackle' and 'overcome' share collocates such as 'problems,' 'challenges,' 'issues,' and 'difficulties,' indicative of an ABSTRACT PROBLEM FRAME. The collocates of 'counter' include attacks,' indicative of an ADVERSARIAL FRAME, and 'terrorism,' and 'terror,' indicative of an ABSTRACT ADVERSARIAL FRAME.

The sample sentences that follow derive from the verbal collocates search string for CC in Table 5 on page 19 as well as some sample sentences from the reverse comparison check per Table 8 on page 20.

(38) Activists call on world leaders to **tackle climate change**.

Fox_Hume, 2007

Sample sentence (38) elicits a POLITICAL FRAME within the context of ‘activists’ and ‘world leaders.’

(39) Because I think the church is called to not just talk, but to share, to love, to help **tackle** these **issues** like poverty, and illiteracy and disease.

‘Tackle’ collocates with ‘poverty,’ ‘illiteracy,’ and ‘disease,’ nouns that denote ABSTRACT POLITICAL PROBLEMS as in sample sentence (39).

(40) In order to **overcome climate change skepticism**, we must be very careful with whom we select to **push the agenda**.

NPR_TalkNat, 2011

(41) Along the way, there were **injuries, personal tragedies, alcohol problems** and **addictions** to painkillers... That's what I've done all my life, is **overcome obstacles** and adversity.

(42) She's also had to **overcome** drug **problems** and custody disputes.

In samples (40)-(42) the verb ‘overcome’ collocates with CC as well as ‘injuries,’ ‘tragedies,’ ‘problems’ and ‘addictions,’ all nouns reflective of an ABSTRACT PROBLEM FRAME.

In sum, the adversarial frame of GW is a WAR FRAME entailing both physical and abstract targets, while the adversarial frame of CC is an ABSTRACT POLITICAL PROBLEM frame.

In addition to the ADVERSARY/OPPONENT frame that both GW and CC share, with the nuanced difference that GW is indicative of a WAR FRAME, and CC of a POLITICAL PROBLEM FRAME, per Table 5 on p. 19, the remaining collocating verbs reveal other cognitive frames of interest with regard to the fixed phrases in question.

The remaining verbal collocates of Table 5 with GW in the patient mode include ‘solve,’ ‘curb,’ ‘stop,’ ‘reduce,’ and ‘reverse.’ ‘Solve’ is reflective of a PROBLEM frame as in sample (43) that includes presenting three solutions, the bolded noun phrases, to solve the problem of GW.

(43) "**Solving global warming** means **investing in new infrastructure** and **building strong communities** and **creating good jobs**."

Fox_Beck, 2011

The verbal collocates, 'curb,' 'stop,' 'reduce,' and 'reverse,' imply that we as agents have some control over GW, i.e., GW is perceived as a CONTROLLABLE FORCE as in the following samples:

(44) Delegates to an international climate meeting in Montreal salvaged two weeks of negotiations by agreeing today to keep talking about **ways** to **curb global warming**.

In sample (44) delegates talk about 'ways to curb GW,' i.e., it is understood that those 'ways' are viable, GW can be restrained, it can be kept in check, thus it is controllable.

(45) But then once in office, the pressures are to - in the case of the Obama administration, for example, the pressures were to act on things like cap and trade, to **stop global warming** and health care.
NPR_ATC, 2011

In sample (45) the pressure is to 'stop GW' indicating again, that GW is controllable.

The remaining verbal collocates as seen in Table 5, p. 19, with CC in the patient mode are: 'address,' 'believe,' 'predict,' 'promote,' 'assess,' and 'question,' all cognitive verbs, substantiating again that CC occurs in a discourse that is relative to the domain of POLITICS and ABSTRACT IDEAS.

The top collocating verb for CC is 'address,' at 8 hits. In sample sentences (46)-(48) that follow, 'address' is the head of the dependent 'to clause' following the main clause. Note that in each of the samples (46)-(48) the main clause includes the 'action,' inferring that 'action' is needed 'to address CC.' 'Action,' deriving from the verb 'to act,' implies movement, or a FORCE. Thus there is an action to address CC, implying a counterforce schema. Samples (46)-(48) demonstrate this counterforce schema.

(46) We do agree **our country must take action to address climate change**.
Fox_Five, 2011

In sample sentence (46) CC is perceived as a formidable PROBLEM that requires, by way of the modal 'must,' the action of the entire country to address. Within this sample, the verb 'address' reveals a PROBLEM FRAME, and the noun 'ACTION,' also implies that a FORCE is required to address CC, a formidable PROBLEM, and a formidable FORCE.

Samples (47)-(48) highlighting the use of ‘address’ as a collocate of CC, also illustrate that a force is necessary to counter CC, inferring that CC is a FORCE itself. Note also in sample (48) that the action that is necessary as a counterforce to CC is ‘POLITICAL.’

(47) **I've supported action to address climate change**, from -- since 2000 and **said we've got to do something** about it.

NBC_MeetPress, 2008

(48) In Britain there has been, for some time now, broad public and **political support** for **strong action to address climate change**.

NPR_TalkNation, 2007

In the sample sentence that follows, (49), ‘a sweeping energy bill’ is necessary to address CC and in this example, the action of ‘sweeping’ directly implies action or a force, another metaphorical counterforce schema ‘aimed’ at addressing CC.

(49) On Friday, the House passed **a sweeping energy bill aimed at addressing climate change**.

CBS_Early, 2009

I also did a reverse check, 0L, 2R, in the spoken register, tagging for lemmas, to see which nouns collocate with ‘address,’ and found the top ten to be: [issue], [problem], [question], [nation], [concern], [point], [thing], [need], [fact], and [situation], suggesting that the verb ‘address’ elicits an ABSTRACT PROBLEM FRAME as instantiated in samples (50)-(52).

(50) [They] remain concerned about the government's ability to **address problems** like **corruption** and its crackdown on substitution therapy.

PBS_Newshour, 2011

(51) ... we must **address** the **issue** of **job creation** in America.

(52) President Obama has gone out of his way to not **address** the **question** of **race**.

In samples (50)-(52) ‘address’ collocates with ABSTRACT PROBLEM FRAMES, in sample (50) ‘corruption’ in (51) ‘the ‘issue of job creation,’ and in (52) ‘the question of race.’

The remaining verbs in the search string of table 5 for CC, [believe], [predict], [promote], [assess], and [question], all fall within a MENTAL SCHEMA. To ‘believe’ is to give credence to, ‘predicting’ results from prior knowledge or comprehension of something, to ‘promote’ is to call attention to or encourage, to ‘assess’ is to evaluate and to ‘question’ is to express doubt, all cognitive processes, suggesting that CC is understood within the domain of ABSTRACT IDEAS as in the following instantiations, (53)-(57).

(53) I **believe climate change** is real.

CNN_AM, 2006

(54) the results of these models were no better than, you know, a random number generator in terms of being able to actually **predict climate change**.

NPR_Science, 2002

(55) They are biking from New York to DC to help **promote climate change**.

CBS_Early, 2009

(56) The National Academy of Sciences periodically convenes **studies** to **assess climate change**.

NPR_Science, 2002

(57) We'll ask our Sunday panel if global warming skeptics now have another reason to **question climate change**.

Fox_Sunday, 2010

I then did a reverse comparison check for the mental process verbs, in bold, in

(53)-(57) and found that indeed these verbs collocate most frequently with

ABSTRACT IDEAS as patients, as in samples (58)-(59).

(58) No one can **predict** the **future** with absolute certainty.

CNN_WeekWar, 2006

(59) Im going to **assess** the **situation**.

MSNBC_Olbermann, 2007

Further, 'believe' and 'question' also collocate with people, supporting the

PERSONIFICATION FRAME of CC.

(60) I **believe** the **president** should have weighed in.

NBC_MeetPress, 2011

(61) he did actually **question** one **witness**

PBS_NewsHour, 2011

In sum through the verbal collocate search, both GW and CC are perceived as ADVERSARIAL FORCES, the distinction being that GW is a force of WAR, whereas CC is an ABSTRACT POLITICAL FORCE. Also GW is perceived as a CONTROLLABLE FORCE, while CC is perceived as AN ABSTRACT IDEA that we intellectualize and PERSONIFY with no indication that we can control it.

Finally I did a narrow search 2L, 0R, with GW and CC as the nodes, with no part of speech specified for collocations, in the spoken register. I also tagged for lemmas. I then sorted through the search strings for collocates reflective of cognitive frames with a minimum frequency hit of 2. **My objective was to gain a closer view of any cognitive frame for the fixed phrases GW and CC in this narrow search.**

In this search I discovered that **GW had a total of 40 collocates** that fell within the war frame as shown in Table 9 below. Collocates include the previously examined verbs 'fight' and 'combat,' as well as the preposition 'against.'

Rank in freq	Frame	Hits
	WAR OPPONENT	
6.	[FIGHT]	23
27.	[AGAINST]	6
31.	[COMBAT]	11
TOTAL HITS		40

Table 9.

Since the preposition ‘against’ had not been previously examined, I retrieved some samples from the search string highlighting this collocation. In samples (62)-(64) the preposition ‘against’ collocates with other words that infer the adversarial/opponent frame.

(62) Could painting your roof white be the **best defense against global warming?**
CBS_Early, 2009

In sample (62) ‘defense’ collocating in the left span of ‘against,’ is part of the entailment of the adversarial frame which includes an ‘offense’ and a ‘defense.’

In sample (63) within the noun phrase ‘protecting the world against GW,’ ‘the world’ is perceived as the victim of GW, an entailment of an adversarial frame.

TARGET	SOURCE
GW	aggressor
the world	victim

(63) You can't simply abandon it without investing some thought into **protecting the world against global warming.**

Fox_Sunday, 2001

In sample (64) the collocate ‘against’ collocates with ‘fight,’ inferring another adversarial frame. In addition we see the verb phrase ‘protect the environment’ as part of the entailment of the adversarial frame.

(64) But while the President says there are billions to be made by creating new technologies to **protect the environment,** industries like coal and oil worry that they might get taxed unfairly in the **fight against global warming.**

ABC_Jennings, 1993

GW had 17 hits in the ‘moving entity that can be manipulated by physical force frame’ as shown in Table 10.

Rank in freq	Frame	Hits
	MOVING ENTITY THAT CAN BE MANIPULATED BY	

	PHYSICAL FORCE	
3.	stop	5
4.	curb	5
11.	reverse	3
14.	reduce	4
TOTAL HITS		17

Table 10

Since these verbal collocates have been previously examined, please refer to p. 22 for sample sentences illustrating the ‘moving entity’ or ‘force that can be manipulated by physical force’ frame.

GW had only 3 hits in terms of the ‘ideas are objects’ category as shown in table 11.

Rank in freq	Frame	hits
	OBJECT AS ABSTRACT SYSTEM/ IDEAS ARE OBJECTS	
43.	solve	3
TOTAL HITS		3

Table 11

Since ‘solve’ has been previously examined, please refer to page 22 for a sample sentence highlighting this collocate of GW.

In sum, of the total 60 hits under consideration, within this search, GW is perceived within the context of a WAR FRAME 67% of the time, as a CONTROLLABLE MOVING FORCE 28% of the time and as an ABSTRACT IDEA, 5% of the time. Thus GW ranks highest as a WAR OPPONENT in the patient role, but is clearly also seen as a DYNAMIC MOVING ENTITY which we can control, infrequently it is seen as an OBJECT that can be dealt with rationally.

40/60	WAR METAPHOR	67%
17/60	MOVING ENTITY AS DYNAMIC FORCE	28%
3/60	IDEAS ARE OBJECTS	5%
60/60		100%

By using the same parameters I found three lexical content verbs in this search, ‘address,’ ‘believe,’ and ‘combat’ and one preposition ‘against’ of cognitive value that collocated with CC in patient mode.

Results show that CC had a total of 9 hits in the personification frame.

Rank in freq	Frame	Hits
	PERSONIFICATION	
5.	[BELIEVE]	9

Table 12

CC had a total of 3 hits as an 'abstract idea.'

Rank in freq	Frame	Hits
	ABSTRACT IDEA	
6.	[ADDRESS]	3

Table 13

CC had a total of 7 hits in the war/opponent frame.

Rank in freq	Frame	Hits
	OPPONENT	
32.	[COMBAT]	4
33.	[AGAINST]	3
TOTAL HITS		7

14

Of the total 19 hits under consideration,

9/19	PERSONIFICATION	47%
3/19	ABSTRACT IDEA	16%
7/19	OPPONENT	37%
19/19		100%

These data in this search string support that CC is perceived as a PERSONIFIED FORCE 47% of the time, an OPPONENT 37% of the time and an ABSTRACT IDEA 16% of the time.

There is a similar divide at the noun level, corroborating results achieved thus far in the study. See Appendix 1, Table 2, for a broad noun collocate search of GW and CC.

5. Discussion and Conclusion

The environmental movement, sociologists, psychologists and climate change communicators are hard pressed to formulate how best to frame abstract concepts such as 'global warming and climate change.' Research shows that the way issues are framed influences how we perceive and then solve real-world problems. (Lakoff, 2010; Nisbet, 2009; Thibodeau, Boroditsky, 2011¹⁸; Hoffman, 2012).

¹⁸ Indeed even empirical studies have shown that cognitive frames in language affect how people perceive and then solve real-world problems. (Thibodeau PH, Boroditsky L (2011).

Understanding the metaphors that frame GW and CC allows us a better insight into the behaviors and attitudes of speakers towards these increasingly important complex phenomena especially since the level of public engagement in this arena is lacking. (Nisbet, 2009). In this paper, I have shown that the words that collocate with the fixed phrases in question unveil their deeper evaluative semantic frames. From this study we can make sense of how we perceive these fixed phrases and how we communicate about them.

The data I have retrieved and examined from COCA, demonstrate that GW is understood as an adversary to be fought and controlled, while CC is a personified abstract force constituting a threat¹⁹ that cannot be manipulated. It is clear from my investigation that the common cognitive frame between GW and CC is that of an ADVERSARIAL FORCE that needs to be overcome. But adversarial frames are counterproductive because “[f]raming climate change as an issue which evokes fear and personal stress becomes a self-fulfilling prophecy.” (Hulme, 2006). Indeed, research shows that cognitive frames evoking fear cause the public to feel a sense of alarm, even fatalism, particularly when neither a solution or an alternative is offered to the problem. (Payne, 2010, Risbey, 2008). The adversarial frame thus is counterproductive for GCC.

Additionally, as extensive research has shown, (Lakoff 2010, Nisbet, 2009, Hoffman, 2011, Hoffman, 2012) current frames utilized around GCC are not galvanizing humanity as a whole to come together for a shared solution to the problem. Therefore a new framework is needed to provide fresher approaches for dealing with environmental problems. Most importantly, the current adversarial framing of GW and CC runs counter to the more holistic ecological frame in which it is recognized that we as a part of nature are included in the vulnerability, or plight of global climate change.

Indeed “[w]e [humans] are within global warming, not outside of it[.]” (Darroch-Lozowski, 2006). Hence, since we live on a planet affected by GCC, ‘fighting’ GCC,

¹⁹ Per the **Oxford English Dictionary** the semantic trajectory of threat is of interest: ‘threat’ (c. 950) = ‘throng’ -> ‘pressure’ (c. 971) -> ‘a menace of impending evil,’ (c. 1,000), corroborating ‘CC’ as a personified, dangerous force.

or considering this phenomenon an ‘abstract threat,’ as my findings show, is self-defeating. Since GCC is currently affecting the planet and by consequence our existence as creatures living on the planet, framing GW and CC within more personally tangible frames such as a health frame, that is morally value laden, will most likely prompt us to find ‘remedies’ to this problem across partisan divide. Studies have shown that value laden and more personal frames successfully engage the public because these metaphorical frames appeal to the life experience and the morality of the hearer. (Center for Research on Environmental Decisions, 2009, Lakoff, 2010, Luntz, 2003). To strengthen these more personalized healing frames, language that evokes emotion will also prove to be particularly motivating to engage the widespread public support that is necessary to resolve the increasingly important issue of global climate change.

Environmental discourse should be cognitively tenable, evoke emotion, and relate to people’s values (Lakoff, 2010, Luntz 2003, Mühlhäusler 2006). To quote a respondent from a questionnaire out of Princeton about GCC conducted in 1990, “When you destroy your environment... it’s like burning down your home, destroying where you live.” (Kempton 1990, p. 14). The respondent has naturally personalized the problem of GCC. ‘Burning down’ the home may not be tenable as a frame, but framing the EARTH or the ENVIRONMENT as our HOME is a very useful and simple concretization of the problem and literally brings the concept of GCC home. In fact, the respondent has intuited the very meaning of ‘ecology.’ Per the OED, ‘ecology’ is ‘[t]he branch of biology that deals with the relationships between living organisms and their environment. Most importantly, the lexeme derives from the ancient Greek *οἶκος*’ meaning ‘house’ or ‘dwelling.’

Yet another more personal and less adversarial frame was discussed by a group of 400 scientists from all over the world, who suggested that GCC could be viewed as an illness that needs tending to, much like an infection. “The analogy of global warming to a disease” (Kintisch, 2010) may prove to be the frame that is more suitable for the public understanding of climate discourse, across the political spectrum. Indeed, the effective use of cognitive frames linking human health to the

²⁰ equivalent to the English ‘*wich*’ and the Latin ‘*vicus*.’

urgent environmental problems of GW and CC may also galvanize social action towards civic and social behaviors that reduce harmful human impacts in the face of anthropogenic climate change. A 'disease' frame for GCC may inspire a much-needed adaptive collective response to this urgent problem in the interest of the preservation of humanity for generations to come. This is a complex undertaking, but one that begs to be further studied, not only in English, but also in cross-linguistic studies.

In conclusion, I propose moving beyond viewing global warming and climate change as an adversary, rather we should strive to disseminate human affliction, or disease frames in which to couch GW and CC. The inference therefore will be that we must cure the affliction or disease of GCC.

The current opponent frame in which GW and CC are ensconced must shift to a more domestic frame or a clinical frame if we are to be invested in it to solve the greatest problem we now face globally. "The earth is a *res publica* and it must be *cared for* with caution." Luke (2005).

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Appendix 1

Table 1

GW and CC as the nodes, 9L, 9R, no POS specified							
Rank in freq	GW			CC			
	Collocate	W1	W2	Rank in freq	Collocate	W1	W2
1	FIGHT	19	1	1	CLIMATE	846	52
2	AIR	17	1	2	INTERGOVERNMENTAL	13	1
3	GORE	33	2	3	STUDY	11	2
4	AL	26	2	4	LIKELY	10	2
5	HOT	13	1	5	LEGISLATION	14	3
6	SPEECH	10	1	6	PANEL	19	5
7	GLOBAL	1113	119	7	SUMMIT	11	3
8	ICE	11	2	8	ACTION	16	5
9	THINGS	26	5	9	PAST	11	4
10	HAD	25	5	10	ADDRESS	13	5
11	INDUSTRY	10	2	11	BILL	15	6
12	PERCENT	10	2	12	IMPACTS	10	4
13	STILL	10	2	13	COPENHAGEN	10	4
14	STORY	10	2	14	ECONOMIC	11	5
15	MAN	14	3	15	NATIONAL	13	6
16	POLLUTION	25	6	16	THREAT	22	12
17	HOAX	12	3	17	-	33	19
18	MR	12	3	18	HOW	47	28
19	ALREADY	11	3	19	WAY	20	12
20	OIL	11	3	20	CAUSED	16	10
21	WASHINGTON	11	3	21	VERY	32	21
22	CHANGES	10	3	22	TAKE	16	11
23	SHE	10	3	23	GET	23	16
24	GASES	16	5	24	SERIOUS	18	13
25	LET	16	5	25	RESEARCH	11	8
26	THAN	16	5	26	UP	26	19
27	DID	31	10	27	INTERNATIONAL	16	12
28	MEAN	21	7	28	CAN	45	34
29	PROBLEMS	18	6	29	AT	56	43
30	TEMPERATURES	12	4	30	REPORT	13	10

Table 2. Broad collocation search, 9L, 9R, noun collocates for GW and CC:

NOUNS COLLOCATING WITH GW AND CC, 9L, 9R FROM THE NODE							
GW				CC			
Rank in freq	Collocate	W1	W2	Rank in freq	Collocate	W1	W2
1	AIR	17	1	1	CLIMATE	846	52
2	SPEECH	10	1	2	LEGISLATION	14	3
3	ICE	11	2	3	PANEL	19	5
4	THINGS	26	5	4	SUMMIT	11	3
5	STORY	10	2	5	ACTION	16	5
6	INDUSTRY	10	2	6	BILL	15	5
7	PERCENT	10	2	7	IMPACTS	10	4
8	MAN	14	3	8	THREAT	22	12
9	POLLUTION	25	6	9	WAY	19	11
10	HOAX	12	3	10	CARE	11	8

Table 2. Nouns collocating with GW and CC as the nodes, 9L, 9R, from the node, spoken register, sorted by Relevancy. Frequency 10,10

APPENDIX 2

Adversary frame verbs, 'fight,' 'combat,' 'attack,'
collocating with GW, reverse check

Table 1

FIGHT		
Rank in freq	Collocate	Hits
1	<u>WAR</u>	<u>269</u>
2	TERRORISM	136
3	<u>CRIME</u>	<u>72</u>
4	WAY	66
5	<u>WARS</u>	<u>62</u>
6	<u>AIDS</u>	<u>53</u>
7	<u>BATTLE</u>	<u>50</u>
8	FIRE	43
9	<u>CANCER</u>	<u>37</u>
10	DAY	36
11	<u>FIRES</u>	<u>30</u>
12	<u>TERRORISTS</u>	<u>30</u>
13	<u>BATTLES</u>	<u>28</u>

Table 2

COMBAT		
Rank in freq	Collocate	Hits
1	TERRORISM	39
2	<u>TROOPS</u>	<u>34</u>
3	<u>TEAM</u>	<u>17</u>
4	<u>AIRCRAFT</u>	<u>16</u>
5	<u>UNITS</u>	<u>15</u>
6	CRIME	14
7	<u>SUPPORT</u>	<u>12</u>
8	<u>DRUG</u>	<u>11</u>
9	<u>WARMING</u>	<u>10</u>
10	<u>FORCES</u>	<u>9</u>
11	OPERATIONS	9
12	AIDS	8
13	<u>TRAFFICKING</u>	<u>8</u>

Table 3

ATTACK		
Rank in freq	Collocate	Hits
1	PRESIDENT	55
2	<u>PEOPLE</u>	<u>37</u>
3	<u>PROBLEM</u>	<u>37</u>
4	<u>COUNTRY</u>	<u>24</u>
5	<u>ADS</u>	<u>20</u>
6	CREDIBILITY	19
7	<u>FORCES</u>	<u>19</u>
8	<u>TARGETS</u>	<u>19</u>
9	<u>AMERICANS</u>	<u>14</u>
10	<u>REPUBLICANS</u>	<u>12</u>
11	<u>OIL</u>	<u>11</u>
12	TROOPS	11
13	<u>CANCER</u>	<u>9</u>

2. Adversary frame verbs, 'tackle,' 'counter,' 'overcome,' collocating with CC, reverse check

Table 4

TACKLE		
Rank in freq	Collocate	Hits
1	<u>PROBLEM</u>	<u>29</u>
2	<u>PROBLEMS</u>	<u>16</u>
3	<u>ISSUE</u>	<u>15</u>
4	<u>ISSUES</u>	<u>13</u>
5	<u>DEFICIT</u>	<u>13</u>
6	<u>DEBT</u>	<u>6</u>
7	<u>QUESTIONS</u>	<u>6</u>
8	<u>QUESTION</u>	<u>6</u>
9	<u>ENTITLEMENTS</u>	<u>5</u>
10	<u>THINGS</u>	<u>5</u>
11	<u>ECONOMY</u>	<u>4</u>
12	<u>SUBJECT</u>	<u>4</u>
13	<u>LOT</u>	<u>3</u>

Table 5

COUNTER		
Rank in freq	Collocate	Hits
1	<u>TERRORISM</u>	<u>11</u>
2	<u>THREAT</u>	<u>8</u>
3	<u>CHARGES</u>	<u>7</u>
4	<u>THREATS</u>	<u>6</u>
5	<u>CRITICISM</u>	<u>5</u>
6	<u>ATTACKS</u>	<u>4</u>
7	<u>ATTACK</u>	<u>4</u>
8	<u>INTELLIGENCE</u>	<u>4</u>
9	<u>KIND</u>	<u>3</u>
10	<u>EXPERT</u>	<u>3</u>
11	<u>EFFECTS</u>	<u>3</u>
12	<u>ARGUMENT</u>	<u>3</u>
13	<u>TERROR</u>	<u>3</u>

Table 6

OVERCOME		
Rank in freq	Collocate	Hits
1	<u>OBSTACLES</u>	<u>33</u>
2	<u>FEAR</u>	<u>24</u>
3	<u>PROBLEMS</u>	<u>24</u>
4	<u>DIFFERENCES</u>	<u>13</u>
5	<u>PROBLEM</u>	<u>13</u>
6	<u>CHALLENGES</u>	<u>12</u>
7	<u>ODDS</u>	<u>12</u>
8	<u>ADVERSITY</u>	<u>11</u>
9	<u>LOT</u>	<u>11</u>
10	<u>DIFFICULTIES</u>	<u>9</u>
11	<u>RESISTANCE</u>	<u>8</u>
12	<u>THINGS</u>	<u>8</u>
13	<u>FEARS</u>	<u>7</u>