

Linguistic Shifts: A Journey Through Climate Change Discourse

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<https://github.com/Armen0309/intro-rm24>

Abstract

This study aims to clarify linguistic changes between 1980 and 2019 in order to address the lack of research on the linguistic discourse surrounding climate change. Seeing how people's perceptions of climate change are changing, our research question aims to identify changes in terms associated with climate change, such as "global warming" and "greenhouse gases." Though our predictions suggested that people would be more aware of climate change and the results supported our hypothesis, the actual results made us think about other various reasons why popularity may have risen, which made us think critically about how much people really know about it. This study highlights the changing public awareness of climate-related issues while also adding to our understanding of language dynamics.

1 Introduction

There is lack of research on the linguistic discourse of **climate change**. To fill this lack of research, this study examines linguistic changes between 1980 and 2019, which adds to our understanding of how society views the importance of **climate change**. Our research question therefore is: What changes have occurred between 1980 and 2019 in the linguistic expressions associated with **climate change**, particularly the terms 'global warming', '**climate change**' and 'greenhouse gases'. This is to help our understanding of the linguistic around **climate change** discourse. This research also aims to give insights into how language use reflects the relevancy of problems in the world. We hypothesize that the linguistic discourse related to **climate change** will be more

prominent in later years. We specifically think that the use of terms like **climate change**, global warming and greenhouse gases will rise in popularity, reflecting increased awareness all around the world. Our variables are simple, straightforward and easy to understand. Our dependent variable is the frequency and usage of the terms **climate change**, 'global warming' and 'greenhouse gases' in English-language literature. Our independent variable is the period from 1980 to 2019. The contingency matrix will consist of a combination of Google Books Ngram Viewer data, years, and keywords in the realm of **climate change**.

2 Related Work

We found numerous interesting papers about **climate change**, and we picked out three papers with at least a decade in between their release date, to see the improvements or similarities that researches have made. An important piece in providing us with a good understanding of **climate change** is the 2007 report by the Intergovernmental Panel on Climate Change (IPCC) (Change, 2007). It helped us gain fundamental knowledge of **climate change** and its basis. Also a key source of information for the study is L.D. Danny Harvey's 1993 guide on Global Warming Potentials (GWPs), which clarifies the metrics used to evaluate the effects of various greenhouse gases (Harvey, 1993). This study really helped us understand the importance on greenhouse gases and why it's so important to keep them in check. We were amazed how knowledgeable and these researchers were fifty years ago, and how they knew the importance of greenhouse gases. Lastly, Asif Raihan's 2023 review (Raihan, 2023) gave us more insight in what to do in the future and how to handle **climate change**. The study that resonated most with us was Raihan's work. Even though

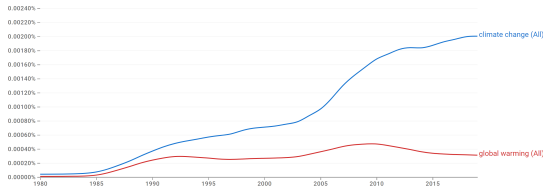


Figure 1: Usage of terms 'climate change' and 'global warming'

the reports by IPCC and GWP's are very interesting and filled with knowledge, we think that Raihan's work is most future oriented, when the other reports were more based on their respective time. Together, these works not only give you a good foundation of **climate change**, global warming and the importance of maintaining greenhouse gases, but also provide various perspectives that give you a lot of room to think about yourself and really gets the gears in your brain grinding.

3 Data

The data from this research is obtained from a combination of Google Books Ngram Viewer, specifically the English corpus from 1980-2019. It allowed us to see the usage of the terms **climate change**, global warming and greenhouse gases. This way, we can collect data for both of our variables at once by selecting a time period and the usage of those terms at that time. On the page below, you will find two different graphs, one that shows the usage of **climate change** and 'global warming' and one that shows 'greenhouse gases'. The reason we picked some older studies is to compare their contents to more recent ones and see what has changed. To our surprise, dedicated researchers from a few decades ago were very aware of the situation.

These graphs beautifully show how the terms have evolved over time in the realm of popularity. Since this research is about **climate change** and global warming, we decided to also research another term named 'greenhouse gasses'. Greenhouse gases are an essential part of the global warming and **climate change** equation, so it is only natural to include this in our research since these terms are closely related and are often mentioned with each other. For example, in L.D. Danny Harvey's GWP's, greenhouse gases are mentioned in the first sentence (Harvey, 1993). Greenhouse gases are an essential part of the global warming and **climate change** equation.

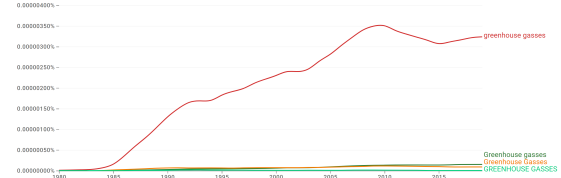


Figure 2: Usage of terms 'greenhouse gasses' in percentages from Google Books Ngram Viewer.

Data summary Our predicted results and the actual results will consist of a table, which will display the usage of the terms in percentages and in what year the terms were noted. This and the graphs from Google Books Ngram Viewer will be all the data used in this research. For clarity, the null values are now placeholders for the actual results later on.

year	c-change	g-warming	-g-gases
1980	NULL	NULL	NULL
2010	NULL	NULL	NULL
2019	NULL	NULL	NULL

Table 1: Summary of what our data will look like

Pre-processing We ultimately decided to keep our ways of collecting data easy to understand; hence, we chose Google Books Ngram Viewer, because the graphs are easy to understand and fit well with the overall flavor of this research: simple, clean, and straightforward. We knew we wanted to work with Google Books Ngram Viewer when we were thinking of our variables, which go hand in hand together. To refresh your memory, the dependent variable was the frequency and usage of the terms **climate change**, "global warming" and greenhouse gases in English-language literature. The independent variable was the period of time from 1980 to 2019. So these factors combined made us decide to do our research like this.

4 Predicted Results

Our predictions for this research were that over the years, **climate change** and global warming will be more recognized, so they will be addressed more. Naturally, if global warming and **climate change** are addressed more, terms like greenhouse gases, which play a big role in the equation, will also increase in popularity. Given that we got our data from Google Books Ngram Viewer, the data we are working with is still valid, but it was difficult to

predict. The reason for that is that Google Books Ngram Viewer is a big corpus based on all the literature available, in our case English literature, so the percentage, for example, is very little. To put things in perspective, even though the term global warming peaked in popularity in the English literature in 2010 (see figure 1), the usage percentage was still 0.0003838829 percent. As you can understand, there was slim to no chance of us getting an accurate prediction like that, so our predicted results are off. In the table below, we used three timestamps: 1980, 2010, and 2019, predicted the corresponding usage of the terms, and put all of that data into a table.

year	c-change	g-warming	-g-gases
1980	0.012	0.014	0.008
2010	0.019	0.022	0.013
2019	0.021	0.025	0.018

Table 2: Our prediction of terms used based of literature

Discussion If you look at table 3, you will notice that the numbers of the actual results are way different and lower than we expected.

year	c-change	g-warming	-g-gases
1980	0.0000269	0.0000080	0.0000000
2010	0.0011668	0.0003838	0.0000001
2019	0.0013928	0.0002487	0.0000032

Table 3: Actual percentages of terms used in literature

There are a few things to note. Our initial hypothesis was correct: that the linguistic discourse related to **climate change** will be more prominent in later years and that we specifically think that the use of terms like **climate change**, global warming and greenhouse gases will rise in popularity. Initially were were happy with the results but after critically thinking we got into an argument about that in 1980, writing literature itself was more difficult than now. Now with all the online tools and programs available, it's has become a lot easier to write, spread and read information. Even though that is the case, we still believe that the world has evolved to become much more aware of such things. In the period of 1980 it was widely believed that smoking was good and healthy for you, but nowadays when you buy a pack of cigarettes you know the actual consequences of it.

5 Conclusion

To sum things up, this research aimed at expanding our understanding of the linguistic around **climate change** discourse. We think that all things considered we did a good job, given that our hypothesis was correct. We learned the fundamentals of an important problem in the world, and were happy to highlight the fact that society has become more aware of this problem. The way the we formed our paper, made it so that we would not have many constraints, in terms of data that we could use. We think that Google Books Ngram Viewer did a good job at highlighting what our hypothesis was. We also want to inspire people who read this paper, make them think critically then spread their knowledge to others, and maybe even become a part of our team!

References

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