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Original Paper

Corpus-Based Discourse Analysis of Climate Change in TED

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Abstract

In this research, guided by Wolfgang Tuebert's theory of meaning as discourse self-reference, two small self-built climate change corpora are formed and the method of corpus analysis is used to make both quantitative and qualitative analyses of 376 transcripts of climate change in TED from 2006 to 2022 by using Word mith 6.0. The study found there are similarities and differences between TED Talks 2006-2019 and 2019-2022.

Keywords

climate change, TED, discourse object, paraphrastic content

1. Introduction

Climate change refers to the climate change caused by human activities directly or indirectly changing the composition of the Earth's atmosphere, in addition to natural climate variability, which has been observed for a considerable period of time. In recent years, global warming has aroused the attention of all walks of life to the climate issue. World leaders and scholars have also joined the ranks of climate protection; more and more climate speeches, news and so on appear in front of the public. More and more scholars try to interpret climate discourse to help the public better understand climate discourse, hoping to guide people to form a correct climate attitude. In the field of linguistics, the current research on climate discourse generally adopts three research approaches which are eco-linguistics, cognitive linguistics and critical discourse analysis to explore its position, attitude and ideology behind language (Weng, 2013). However, there are few studies on the Quantitative analysis of climate discourse text with corpus.

Meanwhile, TED talks, began in 1984, gradually grew and expanded year after year, expanding from the initial integration of technology, entertainment, and design concepts to the current convergence of diverse cultures. After experiencing the development and transformation of the times and continuous improvement and optimization, it has now become a globally recognized platform for the dissemination and exchange of ideas. In addition, whether as academic seminars for elites in various industries or as

knowledge repositories for “cloud communication” on the Internet, the concept of innovation has always permeated TED speeches. Every topic disseminated on the TED speech platform has been carefully selected, with a certain degree of scientific and innovative nature, and is explained by professionals, making the content of their speeches more persuasive. With the booming development of TED speeches, the themes of speeches are becoming increasingly diverse, and speeches on climate change themes are emerging one after another.

2. Research Theory

The theory of meaning as discourse self-reference refers to starting from the discourse itself, the relevant paraphrastic content is obtained from the real use of words in the discourse, and regards it as the meaning of words. Pu (2019) proposes that the self-referential concept of discourse has two outstanding features. First, it emphasizes the self-referential property of meaning, that is, the meaning of words and so on does not lie in the referent of the external world, nor in the psychological concept that can not be directly observed, but in the discourse itself, it is about the content of what it says or describes in discourse, that is, the content of its interpretation. Second, it emphasizes the decisive role of dynamic discourse rather than static system in meaning, that is, the meaning provided by a static system is nothing more than the kinds of static relations summarized and summarized by linguists, lexicographers, etc., only dynamic discourse can provide the meaning conveyed or acquired by language users in their real language use.

Pu (2019) holds the view that the two most noteworthy types of meaning theories in linguistic research are referential theory and pragmatic theory. The former can be divided into meaning as referent, meaning as concept and meaning as system self-reference and the latter includes meaning as in the context of situation, meaning as speech act, meaning as conversational implicature and meaning as discourse self-reference. Meaning as reference attributes the meaning of linguistic signs to the things, phenomena, etc. in the external world they refer to or represent while meaning as concept attributes the meaning of linguistic signs to the things, phenomena, etc. in the inner world they refer to or represent. Meaning as system self-reference illustrates the meaning is determined by the relationships between other symbols in the system. “Meaning is what the entirety of the paraphrastic content available for a given lexical item, a phrase, a text segment or a full text within a given discourse tells us” (Teubert, 2010: 207). That is to say, the meaning of linguistic signs depends on their specific and authentic use in discourse, that is, the relevant speech or description; it is the sum of all the information provided by these words or descriptions regarding the use of the signs. Pu (2019) believes that none of the above three theories of meaning can solve the problem of meaning. He is in favor of the meaning as discourse self-reference, which finds meaning in discourse and truly has operability and deep meaning essence.

For climate discourse, although a small number of scholars have also integrated corpus tools, but they are more from the analysis of more critical discourse, Teubert’s discourse analysis puts more emphasis on the interpretation and construction of the meaning of discourse itself, and analyzes the meaning of

discourse objects through lexical items.

3. Method

This article takes 162 climate talks from 2006 to 2022 from the TED website. Guided by Wolfgang Tuebert's theory of meaning as discourse self-reference, two small self-built climate change corpora are formed and the method of corpus analysis is used to make both quantitative and qualitative analyses of 376 transcripts of climate change in TED from 2006 to 2022 by using WordSmith 6.0. This research mainly adopts the methods of keywords analysis, collocation analysis, concordance lines analysis and sentence examples to obtain the paraphrastic content of discourse objects climate change so as to explore the construction of its meaning in TED. The research mainly answers the following three questions: 1. What main concepts around *climate change* does the TED talks put forward during 2006-2019 and 2020-2022? 2. What does the TED talks say about *climate change* during 2006-2019 and 2020-2022? 3. What discourse content does TED talks construct around *climate change*?

4. Result and Conclusion

4.1 Keywords Analysis

Keywords in corpus linguistics refer to words that appear significantly more frequently than their corresponding words in the reference corpus, and the degree to which they appear more frequently is called keyness (Scott, 2010). In this article, after comparing corpus during 2006-2019 and corpus during 2020-2022 with the reference corpus BNC with the help of WordSmith 6.0, the keyword list can be generated. Due to the space limitations, the first thirty keywords are chosen and the statistical results between 2006 and 2019 are as follow.

Table 4.1 Keywords List from Sub-Corpus A from 2006 to 2019

Rank	Keyword	Keyness	Rank	Keyword	Keyness
1	We	7,678.88	16	Solar	943.96
2	Climate	4,002.63	17	Warming	799.89
3	Our	3,215.80	18	People	730.30
4	Carbon	1,887.55	19	Billion	675.64
5	Global	1,637.49	20	Years	669.00
6	Water	1,596.21	21	Atmosphere	620.94
7	Planet	1,436.08	22	Cities	617.63
8	Energy	1,425.21	23	Actually	596.45
9	World	1,331.96	24	Scientists	572.27
10	Change	1,113.09	25	Nuclear	519.51
11	Earth	1,092.97	26	Future	458.09

12	Ocean	1,049.36	27	dioxide	453.62
13	Ice	978.43	28	Fuels	453.06
14	Emissions	955.41	29	Greenhouse	435.76
15	Us	949.79	30	Countries	393.18

According to Table 4.1, the keyness of the word *we* ranks first because TED is a platform for speaking, and in speaking, *we* are often used to refer to humans, which is an adaptation to the social world for the reason that people tend to identify with their own group and are more willing to share more information with members of the group. That is why the collective nouns and pronouns like *us*, *our* and *people* are also in the top 30 keyness ranking indicates that in face of the climate change, people are a whole and increasingly interdependent on each other. People are either all losers or people all can be winners.

Table 4.2 Keywords List from Sub-Corpus B from 2020 to 2022

Rank	Keyword	Keyness	Rank	Keyword	Keyness
1	Climate	6,198.09	16	Cities	817.67
2	We	5,291.29	17	Solar	799.13
3	Our	3,681.79	18	Electricity	775.00
4	Carbon	3,387.41	19	Crisis	771.77
5	Emissions	2,703.04	20	Countries	750.16
6	Energy	1,908.30	21	Future	709.81
7	Global	1,341.28	22	Zero	673.75
8	Change	1,335.59	23	Methane	646.21
9	Planet	1,207.35	24	Greenhouse	616.28
10	Us	1,074.93	25	Communities	590.23
11	Fuels	1,033.34	26	Technologies	541.90
12	World	1,020.35	27	Pollution	528.35
13	Gas	871.74	28	Indigenous	526.73
14	People	857.25	29	Coal	512.41
15	Fossil	818.13	30	Atmosphere	507.55

Comparing the two tables, we can find that the majority of keywords of climate change from 2020 to 2022 are the same to the keywords of climate change from 2006 to 2019. Besides the first person plurals like *we*, *our*, *us*, words like *global*, *world* indicating the range of climate change and some measures like *carbon*, *emissions*, *energy*, *solar*, *electricity* also appear in the top 30 of sub-corpus A. During this period, the word *zero* appears, which shows the new goal of this period. With the passage of time, people are no longer limited to reducing carbon dioxide emissions in response to the issue of

climate change, but are pursuing zero emissions. It is necessary to control the discharge of waste that has been generated during the production process and reduce it to zero and fully utilize the unavoidable waste and ultimately eliminate the existence of non-renewable resources and energy.

4.2 Collocation Analysis

"Collocation is the co-occurrence of two or more words within a short distance in a text" (Sinclair, 1991, p. 170). In order to find the meaning of the objects, it is necessary to observe the context in which the words appear. In this research, the span is set as 5 which means the observation area is from five words on the left to five words on the right. The statistical measure used in this research is MI, and the higher the value is, the stronger the collocation relationship is. And the collocates of *climate change* are listed in the following.

Table 4.3 Top 15 Collocates of Climate Change from 2006 to 2019

Rank	Collocate	Stat	Freq(L)	Freq®	Freq
1	global	14.286	5	260	265
2	impacts	13.640	45	276	321
3	glaciers	9.568	18	84	102
4	challenges	7.770	63	1	64
5	affecting	5.748	36	4	40
6	adapt	5.075	8	21	29
7	panel	4.419	19	1	20
8	stratospheric	3.986	6	13	19
9	unsustainable	3.640	14	1	15
10	causing	3.147	10	0	10
11	mitigation	2.946	10	0	10
12	droughts	2.925	1	9	10
13	address	2.873	7	2	9
14	warming	2.802	6	2	8
15	fight	2.771	7	1	8

Table 4.3 presents the top 15 collocates of climate change from 2006 to 2019 on TED, the word global has the strongest relationship with climate change, which means climate change has a wide range of impacts and global characteristics. According to this table, nouns like *impacts*, *glaciers*, *droughts* and *warming* and verbs like *affecting* and *causing* present that climate change causes some damage, and other verbs like *adapt*, *address* and *fight* reflect actions against the climate change. Panel refers to the fact that the issue of climate change has been discussed by experts. At the same time, mitigation is the goal of climate change so that it has a strong relationship with the node word. To examine the

collocates of climate change from 2020 to 2022 and explore whether there is a difference between the two stages in their construction of collocates, the list of collocates of climate change from 2020 to 2022 is shown below.

Table 4.4 Top 15 Collocates of Climate Change from 2020 to 2022

Rank	Collocate	Stat	Freq(L)	Freq®	Freq
1	fight	29.236	983	19	684
2	impacts	28.236	1016	6	1022
3	catastrophic	20.039	537	61	598
4	effects	19.908	459	21	480
5	solve	13.539	123	106	229
6	tackling	11.875	167	27	194
7	worst	11.021	135	2	137
8	years	9.540	93	3	96
9	adapt	8.429	101	3	104
10	threat	7.941	32	36	68
11	impacted	6.962	38	20	58
12	addressing	6.960	43	12	55
13	fighting	6.895	38	13	51
14	caused	6.723	21	32	53
15	combating	6.649	38	30	68

Similar to Table 4.3, Table 4.4 shows the collocates of climate change from 2020 to 2022 through the use of the same method and criteria. Since that the topic of two corpora is the same, many of their collocations are the same such as *impacts, fight, goal, addressing* and *effects*. Since these collocates have been analyzed in the previous section, attention will be paid to the different ones. The appearance of *catastrophic*, *vulnerable* and *threat* implies that the impacts of climate change are terrible. Verbs like *solve*, *combating* and *tackling* also reflect the actions against the climate change. *Years* mainly refers to the facts that the problem of climate change has long plagued mankind and it will take a long time to mitigate it.

MI measures the probability of another word appearing in the corpus based on the frequency of one word appearing, which helps us find the words with high collocation intensity with the node word. Collocation analysis is the complement to the keywords analysis and lets us have a deeper understanding of the construction of climate change discourse. The connection between node words and other collocations, as well as the meaning association generated by this connection, reflects the unique knowledge, meaning, or stance of the text. However, the perspective of analyzing meaning

solely by observing collocations is too limited, and word collocations themselves are not yet sufficient to become a complete unit of meaning. Therefore, it is necessary to expand the observation field and search for further spans. A deeper analysis of node words will be carried out in the next section.

4.3 Collocation Analysis

"The concordance is at the center of corpus linguistics, because it gives access to many important language patterns in texts" (Sinclair, 1991, p. 170). KWIC provides a specified number of contextual words on the line for the search term entered by the user, and echo the segment (context) centered around the search term to the user to provide all true language usage information for the search term. Many important language forms in text are only accessible and discoverable in the concordance. According to Teubert's theory of meaning as discourse self-reference, the meaning of climate change can only be found in everything talking about them which especially appears around them. Thus, exploring the concordance lines' content is of great importance in the construction of climate change, and we can get a more comprehensive knowledge in this analysis. The main concordance lines of climate change from 2006 to 2019 are shown as follows.

Concordance
assume the responsibility of the global climate change negotiations. You can
pressing global challenges of our time: climate change and soil degradation.
way to cope with global challenges -- climate change, nuclear proliferation,
is a product of the recognition that climate change is a global problem ...]
. 02:33 Deforestation, extinction and climate change are all global problems
they're interested oftentimes in global climate change. They can take rocks
is deeply concerned about global climate change. He's dedicated his life
pollution reduction, but also on global climate change, where China has the
old, I first heard about something called climate change or global warming.
that's got to be done collectively. Climate change is a global
the atmosphere, contributing to global climate change, no doubt. What about
the fight. Lead the global fight against climate change. And all that with a
As sea ice in the Arctic declines due to climate change and global warming,
start this new job. The global mood on climate change was in the trash can.
to the global challenge posed by climate change lies right under our foot
solutions like Deep Decarbonization for climate change and Global Zero for
in those other areas, we can reverse climate change, including global
printing national currencies. Because climate change is a shared global

Figure 4.1 Concordance Lines of Climate Change (2006-2019)

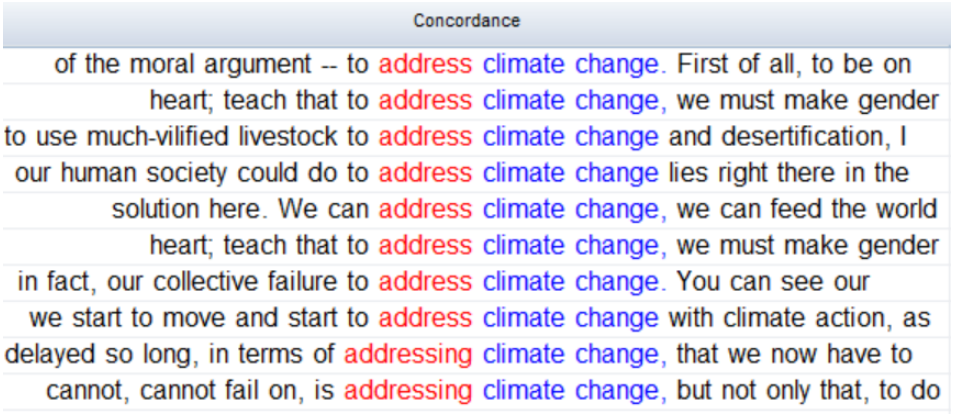

Figure 4.2 Concordance Lines of Climate Change (2006-2019)

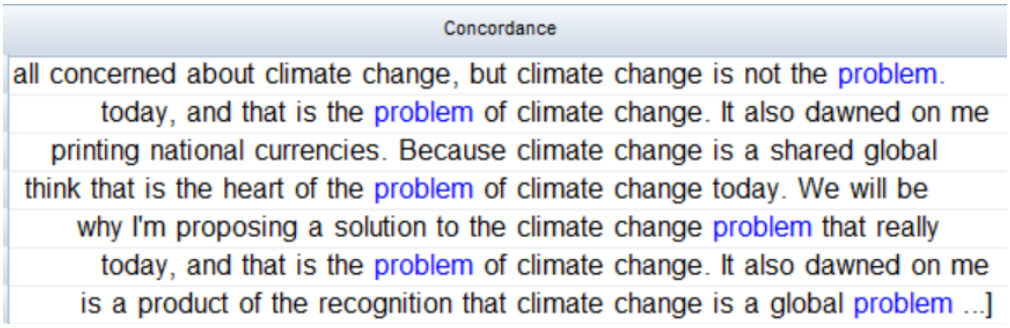

Figure 4.3 Concordance Lines of Climate Change (2006-2019)

As shown in Figure 4.1, 4.2, 4.3 and the rest concordance lines, it can be found that words can construct the meaning of *climate change* appear on the left of climate change, such as verb like *address*, *adapt*, *confront* and *fight*. On the left or right of climate change, nouns like *problem* and *challenges* and adjective like *global* and *dangerous* are also used to give meaning to climate change. In constructing climate change, the structure of subject-verb or the structure of predicative-noun is often adopted. And the predicates in this structure are always the words that imply determination while attributes are always the words that indicate great influence. Thus these words co-construct the meaning of *climate change*. KWIC helps us to find the patterns. For example, the patterns such as "address climate change", "fight climate change" and "confront climate change" are helpful to compare the examples. However, in order to have a deeper understanding of the meaning, it is necessary to observe some sentence examples, which can further illustrate representative phenomena. As some typical phenomena sometimes cannot be seen in concordance lines, we should observe some typical examples in a broader context. Only combining the two methods, can we have better understanding of the construction of climate change in TED. Then the examples are shown as follows.

(1)

Deforestation, extinction and **climate change** are all global problems that we can solve by giving value to our species and ecosystems and by working together with the local people who live next to them.

(2019)

(2)

But what I assume you might not have heard is that one of the most important things our human society could do to address **climate change** lies right there in the soil.

(3)

If we covered nine percent of the world's oceans in ocean permaculture, we would be producing enough protein in the form of fish and shellfish to give every person in a population of 10 billion 200 kilograms of high-quality protein per year. So, we've got a multipotent solution here. We can address **climate change**, we can feed the world, we can deacidify the oceans.

(4)

But this, I think, is the most promising initiative that I have seen, to be able to bring people to scale, to bring efforts and solutions to scale. And speed. Because if there's one thing that we cannot, cannot fail on, is addressing **climate change**, but not only that, to do so in a timely way.

(5)

After all, we're here to dream together, to work together, to fight **climate change** together, to protect our planet together. Because the reality is we are in it together. Some of us might dress differently, but we are in it together.

From the sentence examples, it can be seen, when the climate changes, deforestation, extinction and ocean acidification happen. Although climate change is a global problem, it can be solved through soil, ocean permaculture, giving value to our species and ecosystems and working together with the local people who live next to them. All the solutions, not be found in the concordance lines, but appear in some sentence examples. On TED, climate change is something that people should dream together and work together to deal with. Climate change is a common challenge for all mankind and is related to the future and destiny of mankind. As tackling climate change is the common cause of mankind, it requires the concerted efforts of the international community. At the same time, climate change, something we can not fail on, should be addressed timely. By further analyzing the concordance lines and sentence examples, it can be found that climate change was constructed as a difficult target. More examples are as follows.

(6)

So knowing that direct air capture is one front in our fight against **climate change**, imagine that we could invest 20 percent, 20 billion dollars. Further, let's imagine that we could get the costs down to a 100 dollars a ton. That's going to be hard, but it's part of what makes my job fun.

(7)

But in order to confront **climate change**, we need additional loyalties and commitments to a level beyond the nation. And that should not be impossible, because people can have several layers of loyalty. You can be loyal to your family and to your community and to your nation, so why can't you also be loyal to humankind as a whole?

(8)

And the scale: to avoid dangerous **climate change**, we are going to need to remove trillions -- and yes, that's trillions with a T -- trillions of tons of carbon dioxide from the atmosphere in the decades ahead. It will cost a few percent of GDP -- think defense-sized expenditure, lots of industrial activity and inevitably harmful side effects.

From the above examples, it can be found that climate change, as a global issue, is both dangerous and challenging, and people are inevitably facing numerous obstacles on the road to mitigating climate change. When facing this difficulty, people need to be loyal to the environment in which humans live just like being loyal to the country, and pay attention to climate change issues, which is shown in Example 20. According to the concordance lines, TED's construction of great challenges, loyalty, commitment and determination reflects the difficulties of addressing climate change as well as the expectation of people taking practical actions. At the same time, the speakers of TED propose the measure to promote the mitigation of climate change lies in the carbon reduction. And air capture plays an important role in reducing carbon, which needs a great deal of money. In the collocation, we can find that the investment of funds appear frequently. And through further analysis of concordance lines and sentence examples, it can be found that the investment refers to the investment of air capture, a new technology. From the analysis, we can know that the investment of funds plays an important part in mitigating the climate change. For carbon dioxide emissions from power plants, steel plants, chemical plants, etc., carbon capture can not only use physical and chemical technologies to clearly separate fossil fuels before and after combustion, but also achieve precise capture to block their entry into the atmosphere. Similarly, carbon dioxide in the air can also be captured by carbon capture technology. The development of carbon capture requires a lot of money. All countries have more or less given financial support to carbon capture technology. Since 2005, the United States has allocated US $6.9 billion for the development and commercial application of carbon capture, and since 2007, the European Union has carried out 12 demonstration projects. To combat climate change, in addition to the investment of money, words like *panel* and *intergovernmental* also appear in the TED talk, giving meaning to climate change. Here are some examples.

(9)

The monarch butterfly could be one of the 20 to 50 percent of all species that the Intergovernmental Panel on **Climate Change** estimates will be ticketed for extinction by the end of the century if we stay on business-as-usual fossil fuel use.

(10)

Recently, the headlines looked like this when the Intergovernmental Panel on **Climate Change**, or IPCC, put out their report on the state of understanding of the atmospheric system. (2009)

(11)

But in order to get to this limit of two degrees, which is possible for us to survive, the IPCC, the Intergovernmental Panel on **Climate Change**, defines that we have a budget of emissions of 1,000

billion tons of CO2 from now until the end of the century. (2015)

(12)

To prevent this circumstance, the UN's International Panel on **Climate Change** predicts that we need to stop and even reverse emissions by 2050. (2019)

All the words mentioned above can form the meaning of *climate change*, offering meaning to it as well as demonstrating climate change is a big issue that experts need to work together to develop scientific forecasts and measures and assess the current climate situation. IPCC is an intergovernmental body established in 1988 by World Meteorological Organization and United Nations Environment Programme. The main task is to assess the current state of scientific knowledge on climate change, the potential social and economic impacts of climate change and possible responses to how to adapt to and mitigate climate change. IPCC assessments provide a scientific basis for climate-related policy making at all levels of government, and are policy relevant but not policy indicative. According to the estimation of IPCC, the continued use of fossil fuels will lead to the extinction of some species and greatly increase the amount of carbon dioxide and other gases in the air. Therefore, for the sake of human survival, the committee proposes that the carbon dioxide emissions from now to the end of this century should not exceed 1,000 billion tons and we need to stop and even reverse emissions by 2050

From the analysis of keywords and collocation above, it can be observed that there is a similarity between climate change from 2006 to 2019 and climate change from 2020 to 2022. To further explore the similarities and differences between the two stages, the main concordance lines of climate change from 2020 to 2022 are shown as follows.

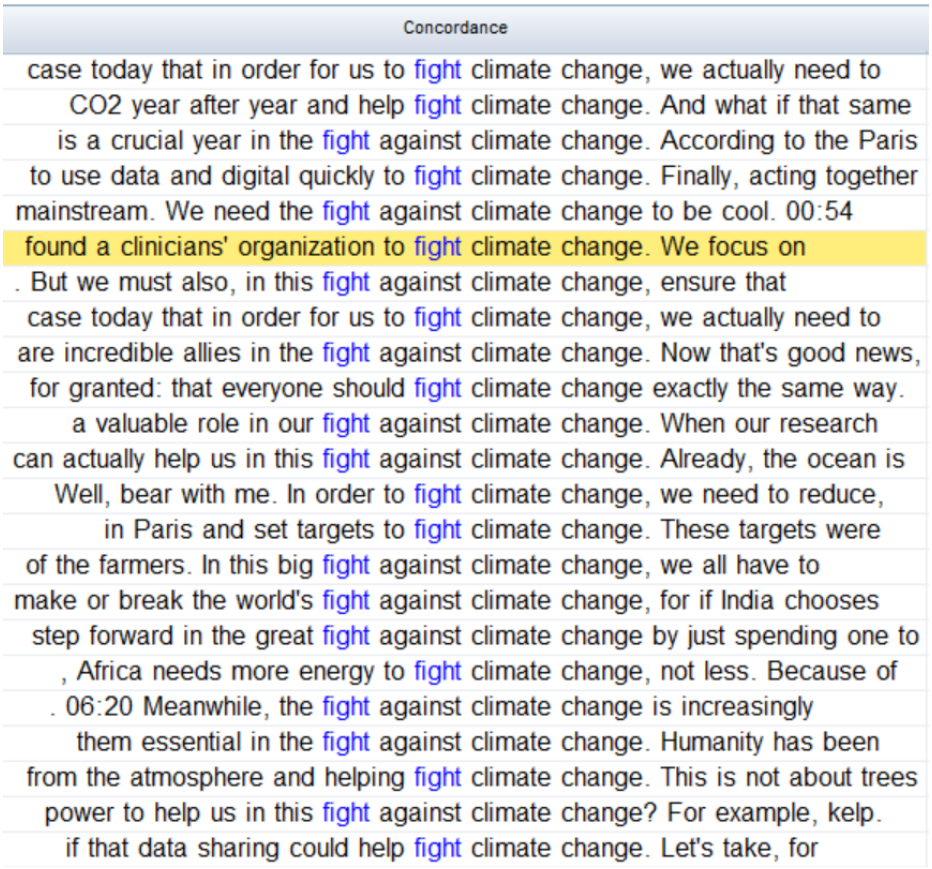

Figure 4.4 Concordance Lines of Climate Change (2020-2022)

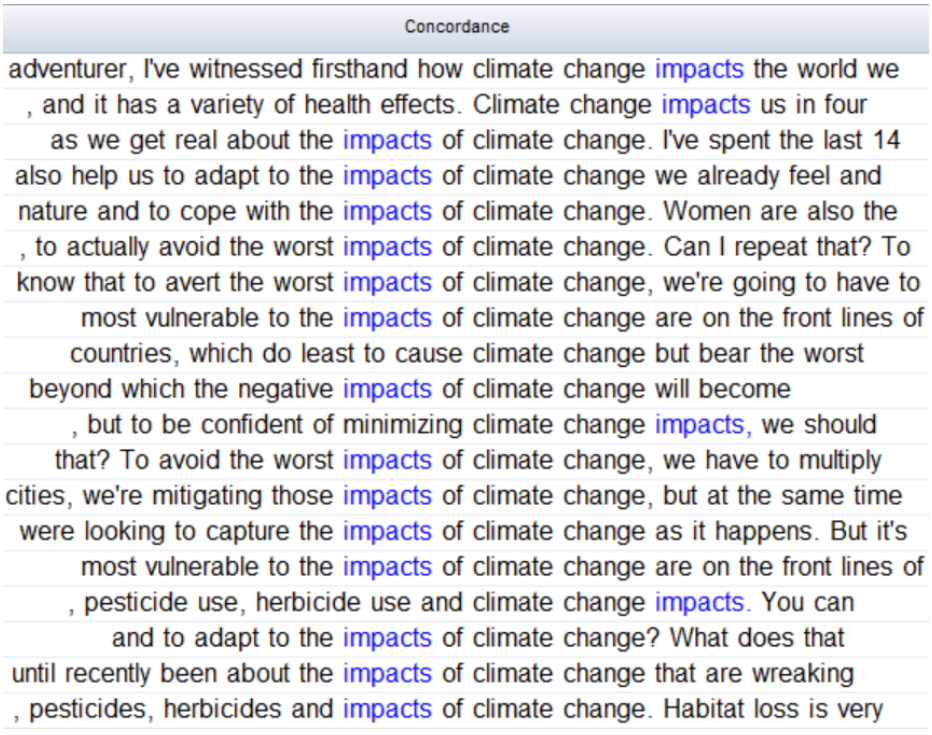

Figure 4.5 Concordance Lines of Climate Change (2020-2022)

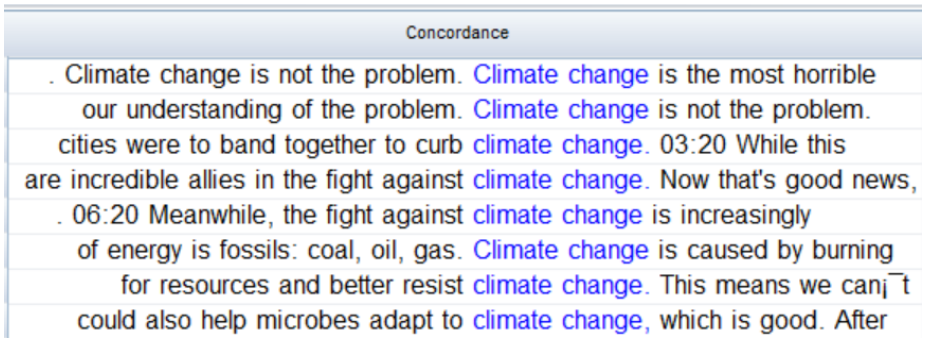

Figure 4.6 Concordance Lines of Climate Change (2020-2022)

From the Figure 5.4, 5.6 and the rest concordance lines, we can see that similar to the main concordance lines of climate change from 2006 to 2019, the concordance lines of climate change from 2020 to 2022 also contains a large number of verbs on the left of climate change, such as *fight*, *curb*, *fight against*, *resist*, *address*, *confront*, *combat*, *adapt* and *solve*, which are similar to the construction of climate change from 2006 to 2019 and show a strong sense of action. The analysis of these words can be corroborated by the following examples.

(13)

Or what if we could harness more of the ocean's biological power to help us in this fight against **climate change**? (2020)

(14)

Basically, what we need to do is think about not how to save the ocean, but instead how the ocean can actually help us in this fight against **climate change**. Already, the ocean is absorbing 25 to 30 percent of the CO2 that we release into the atmosphere. It is the world's largest carbon sink. (2021)

(15)

And one of the most important ways that these companies, or any company, can help solve **climate change** outside their own operations and supply chains is by protecting tropical forests. So that bears repeating. Companies in LEAF are investing in forest protection over and above what they're doing to reduce their own emissions. (2022)

(16)

If we get this right, dealing with climate change will help us preserve nature, and investing in nature will help us mitigate and adapt to **climate change**. (2021)

All the words mentioned above can form the meaning of climate change. Just like the concordance lines from 2006 to 2019, all the words offer the meaning that climate change is something that should be addressed. But from the sentence examples, we can see that in the construction of climate change during this period, the transcripts of speeches mention various methods that help to address the climate change, mainly including the ocean's biological power, tropical forests, the participation of the companies and the investment in nature, etc,. The measures indicate that TED talks build "protect nature", "respect for nature" and other discourse, which reflects TED's speaker's desire for the

audience to take action to pay attention to the marine and jungle ecosystems and thereby slow down climate warming. In addition to the contribution that nature can make to climate change mitigation, corporate involvement also plays an important role. Just like Companies in LEAF, providing countries committed to protecting tropical forests with the funds they need to accelerate climate action, invest in forest protection over and above what they're doing to reduce their own emissions.

From the figure 5.5 and the rest concordance lines, it can be seen that compared with the stage from 2006 to 2019, TED talks from 2020 to 2022 emphasize the impacts of the climate change more. Nouns like *impacts*, *effects* and *threat* appear on the left or right. Through further analysis of the concordance lines, it can be found that climate change was constructed as something that is hazardous. More examples are as follows.

(17)

They've identified 1.5 degrees of warming—global averages half a degree warmer than today's—as a threshold beyond which the negative impacts of **climate change** will become increasingly severe. (2020)

(18)

The International Panel on Climate Change has predicted that by mid-century the world may reach a threshold of global warming beyond which current agricultural practices can no longer support large human civilizations. The USDA scientist Jerry Hatfield put it to me this way: the single biggest threat of **climate change** is the collapse of food systems. (2021)

The above examples quote the inference and words of the scientists, constructing the climate change as something that has threshold. The threshold means 1.5 degrees of warming. The 2015 Paris Climate Agreement calls for limiting global warming to 1.5℃ in order to minimize the most damaging effects of climate change. Global warming is still ongoing, and this is not controversial, and more than 1 degree above the average temperature rise has been normal. Earth's temperature will pass the 1.5℃ mark between 2033 and 2035. If current emissions continue, we won't be able to limit warming to 2 degrees, let alone 1.5 degrees, while global growth in greenhouse gas emissions has slowed from 2.1 per cent a year at the start of the decade to 1.3 per cent a year between 2010 and 2019. The effects of climate warming, such as the collapse of food systems which is the single biggest threat, are irreversible. The normalisation of extreme weather has had a major impact on global agricultural production, increasing pressure on food supplies. The already unequal distribution of food around the world will therefore become even more acute. The global climate has entered a state of emergency. In addition to being a threat, climate change is constructed as being catastrophic.

(19)

However, the currently implemented actions of all countries will do little more than stop an increase in future emissions. That will put us on a trajectory for an estimated warming of 2.9 degrees Celsius by 2100, and lead to catastrophic **climate change**. (2021)

(20)

Because we can't put a precise number on permafrost emissions, policymakers are essentially excluding them, setting global emissions targets that are wholly insufficient to protect us from catastrophic **climate change**. (2021)

(21)

Now, the science shows that to avoid the worst effects of **climate change**, we must limit the rise in average global temperature to 1.5 degrees centigrade. That if temperatures rise higher, the risk of species extinction and catastrophic impacts on human lives increases dramatically. (2021)

From the above sentence examples, it can be seen that setting global emissions targets that are wholly insufficient to protect us from catastrophic climate change. Exceeding the threshold, 1.5 degrees centigrade, could trigger multiple tipping points and self-reinforcing feedback loops, thus preventing climate stabilization and causing much more serious warming and sea level rise, and lead to serious damage to the ecosystem, society and economy. Decisions made in the next decade could affect the Earth's climate for tens of thousands to hundreds of thousands of years, and could even lead to uninhabitable conditions in current human societies. Even if the Paris agreement target of limiting warming to 1.5-2.0℃ is met, a series of tipping points could be triggered. The impact of climate change is so horrible that some solutions can also be seen in this stage.

(22)

Because if we're going to solve **climate change**, we need to achieve both deep cuts in fossil fuel emissions and dramatic reductions in forest emissions. (2022)

(23)

The workforce, the technologies, they are assets that we can leverage now to solve **climate change**. (2021)

(24)

Tackling **climate change** will require an accelerated transition to low-carbon energy sources. (2020)

In the construction of climate change between 2020 and 2022, TED talks also mention various methods to solve climate change mainly including cuts in fossil fuel emissions, reductions in forest emissions, transition to low-carbon energy sources, technologies, which are similar to the stages between 2006 and 2019. The common measures mentioned above, or measures that appear only once or twice in the corpus, constitute the paraphrase contents of climate change and give it a certain meaning. The discourse of TED talks on these measures has influenced the formation of audience's attitudes, deepened people's understanding of climate change.

Because of the number of the concordance lines, only some prominent examples with high frequency can be analyzed and from the concordance lines analysis of *climate change* from 2006 to 2019 and *climate change* from 2020 to 2022, it can be found there are some similarities and differences. In terms of similarities, both stages point to climate change as an object that needs to be solved and addressed. Climate change is a daunting challenge that needs to be addressed by all humankind. Secondly, we can see that the impacts of climate change are occurring in both phases, with the rise in global temperatures,

the instability of agricultural production and the serious destruction of forests threatening human life. Thirdly, in response to climate change, both phases set goals and measures to address it, and stress the need for people to come together and fight together. In terms of differences, to solve the climate change, the first stage emphasizes the carbon capture, which is a new technology needs a lot of funds. And during this period, IPCC plays an important role, proposing that we need to stop emissions by 2050. As for the second stage, IPCC calls for limiting global warming to 1.5℃. However, more examples tell us setting global emissions targets that are wholly insufficient to protect us from catastrophic climate change. And compared with the first stage, achieving carbon neutrality by 2050 is proposed by some countries in the second stage. The second stage also emphasizes the importance of the allocation of responsibilities, which can not be seen in the second stage.

In summary, as time goes on, there is a growing awareness of climate change, as humanity accelerates towards catastrophic global warming, and climate change is approaching an irreversible tipping point, once triggered, there is no going back, and although people know the tipping point, they can not know exactly when it will be triggered, which is extremely dangerous. The text therefore shifted from climate change mitigation to zero emissions, and the speaker delivered solutions to the audience. The first is to embrace renewable energy, fossil fuels like coal, natural gas and oil as the single largest source of emissions from global warming. What we should do is to make the most of it, including solar energy, renewable energy, including wind and water. The second is to restore carbon sinks, and increasing nature's ability to absorb carbon is one of the more valuable solutions to climate change by making full use of the oceans and forests, which play an important role in absorbing carbon emissions, at the same time, farming needs to be done in a way that locks carbon into the soil rather than releasing it, using low-and zero-tillage methods to promote agroforestry. Third, the development of carbon capture and utilization technology is one of the key technologies to reduce carbon dioxide emissions, reducing carbon emissions by capturing carbon dioxide from factories, power plants, nuclear reactors and other facilities and storing or converting it into other useful products, and the development of technology can not be separated from people's investment. All these measures need people to work together, and in the division of labor, the developed countries need to shoulder more responsibilities than the developing countries because the developed countries use more energy resources than the developing countries, and the resulting environmental pollution and destruction, the developing world suffers more from the climate problems of the developed world. In any case, to deal with climate change, people must act as soon as possible.

5. Conclusion

From the keywords analysis, the majority of keywords of *climate change* from 2020 to 2022 are the same to the keywords of *climate change* from 2006 to 2019. At the same time, it can be concluded from high-frequency words analysis and keywords analysis that the construction of TED's discourse around *climate change* can be roughly divided into four aspects which are explained from the influences,

actions, approaches and goals of climate change which cover various topics like emissions reduction, zero emissions, carbon capture, technology innovation and so on. From the collocation analysis, the words with the highest collocation intensity with climate change about two stages were calculated by MI respectively and analyzed in detail in the concordance lines. From the statistics, it can be found that both two stages emphasize the actions against the climate change and the damage of climate change. However, word *Panel* appears more frequently in the first stage, reflecting the fact that climate change attracts experts' attention. And for the second stage, the appearance of some words imply the climate change is not just dangerous, but catastrophic. The third question of paraphrastic content of"climate change" can be figured out through the analysis of concordance lines and sentence examples. During 2006 to 2019, the goal of mitigating climate change is constructed as arduous and challenging, which should be addressed in time and can not be failed on. No matter how difficult the target is, there are also some measures we can do to address it, such as soil, ocean permaculture, giving value to our species and ecosystems and working together with the local people who live next to them, especially the development of carbon capture technology. The speakers of TED emphasize importance of the concerted efforts of the international community, in order to realize the target propose by IPCC that is to stop emissions by 2050. During the period from 2020 to 2022, with the passage of time, setting global emissions targets are wholly insufficient to protect us from catastrophic climate change as the threshold of 1.5℃ will a series of tipping points could be triggered. Thus, the speakers of TED point out that some countries propose to achieve carbon neutrality by 2050. The solutions listed at this stage are the help of the nature, cuts in fossil fuel emissions, reductions in forest emissions, transition to low-carbon energy sources and technology. Though addressing climate change needs the efforts of all mankind, the tasks that each country has to undertake are different, and developed countries need to take on more responsibilities as they enjoy the benefits of more industrialization.

In summary, TED has created a rich meaning for climate change. Although the meanings of the climate change in two stages are sometimes different, they all convey the information that combatting climate change is not only a slogan, but goals that require the government, institutions and individuals to work together and achieve through arduous efforts. The magnitude and frequency of climate disasters are unprecedented, and they continue to plague people all over the world, who need to unite and participate actively in the fight against climate change.

References

Scott, M. (2010). *Problems in investigating keyness, or clearing the undergrowth and marking out trails*. Philadelphia: John Benjamins Publishing Company.

Sinclair, J. (1991). *Corpus, Concordance, Collocation*. Oxford: Oxford University Press.

Teubert, W. (2010). *Meaning, Discourse and Society*. Cambridge: CUP.

Pu, J. Z. (2019). *Exploring the Essence of Meaning: From Object-reference to Discourse-self-reference*. Foreign Language Teaching and Research.

Weng, Q. Q. (2013). Metaphor and Identity Construction in Climate Diplomacy Discourse: Examples from Speeches Made by the UK, Canada and China at Previous Climate Conferences. *Journal of Contemporary Asia-Pacific Studies*.