Critical Metaphor Analysis of Climate Change in COP28 Speeches: An Ecolinguistic Perspective

Yu Wang[1, 2], & Hadina Habil[1]

[1] Language Academy, Faculty of Social Sciences and Humanities, Universiti Teknologi Malaysia, Johor Bahru, Malaysia

[2] College of Foreign Languages, Hengshui University, Hengshui, China

Correspondence: Hadina Habil, Language Academy, Faculty of Social Sciences and Humanities, Universiti Teknologi Malaysia, Johor Bahru, Malaysia. E-mail: hadina@utm.my

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Abstract

Climate change has emerged as a significant worldwide concern in recent years and has taken center stage in political discourses. In political speeches, metaphors are commonly used to communicate this scientific issue to the public, with the speakers' attitudes conveyed through them. From this starting point, the current study examines metaphor construction of climate change in thirty-two speeches by political leaders at the 28th Conference of the Parties (COP28) to the United Nations Framework Convention on Climate Change held from November to December 2023. Based on the conceptual metaphor theory, this study applies the framework of critical metaphor analysis and further evaluates metaphors from an ecolinguistic perspective. It is found that multifaceted metaphorical keywords and conceptual metaphors are used in constructing the key concepts in climate change, with the war, force, living being, vehicle, journey, building, commodity, and greenhouse metaphors as the most prevalent ones identified in this study, and they possess various pragmatic purposes in contexts. From the ecolinguistic perspective, metaphors identified in these speeches are generally eco-friendly, building a positive and progressing image of dealing with climate change by these political leaders and nations. This study confirms the crucial function of metaphors in political speeches on climate change to communicate information and influence the audience's perception of this issue.

Keywords: metaphor, climate change, COP28, speeches

1. Introduction

Climate change is a complicated and multidimensional phenomenon and is one of the most pressing issues confronting humanity right now (Fløttum, 2016; Kapranov, 2017). It describes alterations in the climate brought about by both natural and human activities. As society has come to terms with the realities of climate change, the concept of climate change has evolved from being primarily physical to simultaneously being a social phenomenon that takes on new meanings in relation to political, social, and cultural contexts (Fløttum, 2016; Hulme, 2009). Effective public outreach, education, and communication are always needed to boost support for the legislation, group initiatives, and behavior modification, and this requirement is perhaps most urgent in the context of anthropogenic climate change (Moser & Dilling, 2007).

It has been challenging to communicate climate science. Compared to other environmental and sustainability challenges, communicating climate change might be more difficult due to its unseen origins, remote repercussions, and the time and frequent geographic distance between cause and effect (Asplund, 2011). For scientists, explaining the basis and statistical nature of climate change to the public is difficult. For the public, climate change is similar to weather variations and is occasionally mistaken for ozone depletion (Bostrom & Lashof, 2007).

Metaphors are central to scientific thought and communication (Koteyko & Atanasova, 2017). As Pauwels (2013) points out, it is understandable that scientists turn to metaphors when trying to convey the messy complexity and ambiguity of science to the public. With the advances in metaphor studies, metaphor is found not merely a rhetorical device in language, but more importantly, it is a crucial tool and result of human cognition. According to Lakoff and Johnson (1980, p. 5), the essence of metaphor is "understanding and experiencing one kind of thing in terms of another". It is the process of conceptual mapping from a specific and concrete domain, namely the source domain, to an abstract domain, namely the target domain. Through metaphorical mappings, the source domain maps some properties to the target domain to make some abstract or complicated aspects of the target domain understandable. In terms of constructing concepts in climate change, metaphors have shown to be an effective tool for creating a clear understanding of what climate change is and how to address it (Nerlich & Hellsten, 2014), and they make a significant contribution to the (re-)conceptualization of mitigation and adaptation plans for climate change (Atanasova & Koteyko, 2017b).

With this tool of conceptualization and communication, the current study probes into metaphors in political speeches on climate change. Political speeches are a common way in which politicians enlighten the public about their opinions, ideology, and possible courses of

action with the aim of persuading the public to agree. They can greatly influence people's perception of climate change, as they are concerned with all speeches related to the evolution of public opinion on the entire spectrum of topics that a thoughtful citizen ought to consider (Barendt, 2005). Then, the researcher limits the scope to speeches at the Conferences of the Parties (COP) to the United Nations Framework Convention on Climate Change (UNFCCC). As the annual United Nations climate change conference is a unique multilateral decision-making conference on climate change worldwide, its influence is lasting and widespread. Moreover, the study of COP speeches at the high-level segment for Heads of State and Governments needs to be enriched from the perspective of metaphor analysis. As speeches at the high-level segment express national perspectives and action plans for climate change, it is worthwhile to study the latest political speeches in this segment to determine the trend in coping with climate change. Thus, speeches at the latest COP28 high-level segment for Heads of State and Governments, which is held from November to December 2023 in Dubai, are chosen as the research material.

The study takes another step forward by evaluating metaphors as they have the power to influence human cognition and action toward climate change and further influence the environment. Review shows that previous studies lack related research in this aspect, with the existing evaluation criteria (Asplund, 2011; Atanasova & Koteyko, 2017a) tending to start from a human's point of view or in relation to human behavior, and the binary classification in these criteria overly rigid in some situations. Hence, ecolinguistics is introduced into the evaluation of metaphors in the study. Ecolinguistics is "the study of the impact of language on the life-sustaining relationships among humans, other organisms, and the physical environment. It is normatively orientated towards preserving relationships which sustain life" (Alexander & Stibbe, 2014, p. 1). The specific approach is based on Stibbe's (2021) classification of discourses into beneficial, ambivalent, and destructive. Metaphors are judged based on the researcher's ecosophy that summarizes a number of philosophical ideas, including taking the environment into consideration. The ecosophy of the current study follows Stibbe's (2021), which appreciates life, health, the present and future, compassion, environmental boundaries, social justice, and profound adaptation.

This paper consists of six parts. The first part briefly introduces the study, followed by a literature review of metaphors associated with climate change and metaphors in political discourses. The third part provides the methodology of data collection and data analysis. The fourth part presents the results and analysis of metaphors in COP28 speeches on climate change, as well as the evaluation of metaphors from an ecolinguistic perspective, with a discussion of the results in the following part. The last part concludes the whole research.

2. Literature Review

This part reviews the related research on metaphors associated with climate change and metaphors in political discourses.

2.1 Metaphors Associated with Climate Change

Metaphors associated with climate change are widely studied across different fields, such as science (Nerlich & Hellsten, 2014; van der Linden, Leiserowitz, Feinberg, & Maibach, 2014), journalism and communication (Atanasova & Koteyko, 2017a; van der Hel, Hellsten, & Steen, 2018), education (Deignan, 2017; Niebert & Gropengiesser, 2013), politics (Ahmed, 2022; Al-Shboul, 2023), corporate governance (Jaworska, 2017; Kapranov, 2017), etc., and several study metaphors across different fields.

In the study of metaphors associated with climate change in discourses, the duality or flexibility of functions or implications of metaphors appear. Research on war metaphors and tipping point metaphors shows this duality or flexibility, which are among the most prominent ones used in climate change discourses. In the study of war metaphors, researchers have expressed different views on the role of this metaphor. For example, in some research, it is argued that the war metaphor portrays climate change as a threat that will bring loss and death and therefore, has a negative direction (Asplund, 2011), while other scholars (Atanasova & Koteyko, 2017a; Negrea-Busuioc, 2017) argue that war metaphor conveys the urgency of addressing climate change and therefore can be a call to action as soon as possible, advancing pro-climate change arguments. This diametrically opposed view is, on the one hand, due to the fact that the materials they study are different and influenced by specific contexts. On the other hand, it also reflects the partial nature of metaphor, highlighting one aspect while hiding the other (Lakoff & Johnson, 1980).

The tipping point metaphor is another widely studied metaphor (Russill & Nyssa, 2009; van der Hel et al., 2018) in climate change discourses. The phrase tipping point refers to the point at which significant events in a circumstance begin to occur, particularly those beyond your control. The tipping point metaphor is used to alert the public and scientific community to sudden and perhaps permanent changes in the climate system. For this metaphor, researchers also hold different opinions. Some believe that this concept consequently conveys an underlying uncertainty (Skrimshire, 2008), and the science of climate change appears to be hinting at a resurgence of environmental and climatic determinism, which is used to characterize human-environment connections but ignores human agency and the complexity of social life (Nuttall, 2012), while some holds that tipping points in the social sphere are presented as positive and essential to prevent sudden changes in the atmosphere (van der Hel et al., 2018). This division of ideas on the functions or implications of tipping point metaphors also points to the question of how to evaluate a metaphor in discourses.

Previous studies have provided references for the evaluation of metaphors. Asplund (2011) uses the terms positive direct and negative direct to determine the nature of metaphors in discourses. Positive direct metaphors refer to ones that arouse positive climate change effects, such as more significant revenue, improved farmer yields, and fresh market initiatives addressing climate change, while negative direct ones are associated with negative images, such as extreme weather, insect outbreaks, higher taxes, etc. Atanasova and Koteyko (2017a) divide metaphors as advancing pro- or anti-climate change arguments, with a pro-climate change argument as one that accepts the need to take action and/or takes the facts supporting climate change as established, and an anti-climate change argument as one that

challenges these elements. These divisions of metaphors are instructive in evaluating the nature of metaphors in discourses; however, the criteria tend to be set from a human's point of view or related to human actions, and nature merely acts as the recipient of these actions, ignoring its initiative in establishing the roles of metaphors. At the same time, this dichotomous categorization may be too absolute in some contexts. Thus, this study intends to introduce a way of evaluating metaphors from an ecolinguistics perspective.

2.2 Metaphors in Political Discourses

Many studies of political discourses have focused on the role of metaphors in persuasion. Musolff (2016) centers on the political metaphor's multifunctionality as a key component of its persuasive power. Charteris-Black (2009) points out that metaphors aid the development of a leadership style by enticing followers to adopt a specific interpretation or depiction of social reality. He further elaborates on this idea by illustrating the persuasive power of metaphors (Charteris-Black, 2011) and summarizing the seven persuasive purposes of metaphors (Charteris-Black, 2018). In Schoor's (2015) opinion, a political metaphor is used to perform a political speech act, which serves the dual purposes of building a political identity and style in addition to persuading. In summary, metaphors in political discourses are a ubiquitous and powerful tool performing the role of persuasion along with other multifaceted functions such as building identity and developing leadership.

Political speeches are a typical form of political discourse. Politicians manipulate people's perceptions, persuade them, and further their political objectives using language (Almahasees & Mahmoud, 2022). Political speeches employ narratives with the goal of engrossing the listener, conveying political ideals, and improving topic understanding (Pedersen, 2015). Thus, it has been the focus of metaphor studies (Ahmed, 2022; Ahrens, 2019; Almahasees & Mahmoud, 2022; Al-Shboul, 2023), etc., which demonstrates that metaphors in political speeches are a viable means of persuasion and should be further investigated. Speeches at the high-level segment for Heads of State and Governments at COP are national statements in which political leaders have used a variety of language and persuasion techniques to highlight the worldwide threat posed by climate change and to outline ambitious plans to control and limit the rise in global temperature (Ahmed, 2022). Thus, they are widely studied (Ahmed, 2022; Bagozzi, 2015; Johansson, 2021; Prosser Bravo, Arboleda-Ariza, & Bonilla Hevia, 2020) as they announce national attitudes and actions toward climate change. However, studies of COP speeches at the high-level segment for Heads of State and Governments need to be enriched from the perspective of metaphor analysis. At the same time, as COP28 was just held from November to December 2023, it is also worthwhile to study the latest speeches to explore the trend in coping with climate change.

3. Methodology

This study adopts a qualitative research design. The following part presents the corpus data, the retrieval method, and the scope of the study, followed by a detailed introduction to the approaches of data analysis.

3.1 Corpus Data

Thirty-two speeches at the COP28 high-level segment for Heads of State and Governments are chosen as the research material. The speeches are from the opening of the first part of this segment and retrieved from the COP28 official website (*https://unfccc.int/cop28/high-level#High-Level-Segment*). They are delivered by presidents, kings, sultans, prime ministers, secretaries of the state, ministers of national environment and climate change departments, etc., of thirty-two countries such as Egypt, Japan, Kenya, Brazil, France, etc. The total word count is 19962 after text cleaning.

In determining the relevant concepts in climate change and their metaphorical construction, the keywords list of the corpus is generated in comparison with the British National Corpus (BNC) Sampler Written Corpus through Wmatrix5, a corpus tool. The keywords in relation to climate change with a frequency of above ten times are further categorized into sub-themes for detailed analysis. This study chooses three sub-themes with the highest keyword frequencies, and their corresponding keywords (shown in brackets) are (a) Climate change (climate change, climate, global warming, temperature); (b) Climate efforts (effort, adaptation, action, mitigation, resilience, reduction, technology); and (c) Carbon (carbon, emissions, greenhouse, net-zero, neutrality, decarbonization). Then, the concordance lines of these keywords are generated to identify the existence of metaphors.

3.2 Data Analysis

Critical Metaphor Analysis. The critical metaphor analysis examines the metaphors in political speeches on climate change. It adheres to the conceptual metaphor theory proposed by Lakoff and Johnson (1980) and the approach of critical metaphor analysis proposed by Charteris-Black (2018). This approach combines concepts from corpus linguistics, critical discourse analysis, and conceptual metaphor theory as a method of metaphor analysis in order to "reveal the covert (and possibly unconscious) intentions of language users" (Charteris-Black, 2004, p. 34). It has four major stages.

i. Contextual analysis entails choosing texts and formulating research questions.

The chosen texts in this study are clarified in section 3.1, and the research questions are: 1) What metaphors are applied in COP28 speeches on climate change, and what are the purposes of applying them? 2) From an ecolinguistic perspective, are these metaphors beneficial, ambivalent, or destructive to the ecosystem?

ii. Metaphor identification entails evaluating words and sentences to determine what qualifies as a metaphor.

In this stage, the metaphorical keywords, the source, and the target domains are identified, and then the resonance of metaphors is

calculated.

iii. Metaphor interpretation is the process of classifying and organizing metaphors based on different classification criteria.

In this stage, the conceptual metaphors are extracted and interpreted based on the metaphorical keywords identified in the previous part and their source and target domains.

iv. Metaphor explanation involves analyzing the underlying intentions of users by referencing the broader social and political environment.

In this study, the persuasive purposes of metaphors are analyzed from a pragmatic perspective.

Ecological Discourse Analysis. The ecological discourse analysis is to evaluate metaphors from an ecolinguistic perspective. The evaluation of metaphors in the current study is based on Stibbe's (2021) classification of discourses: beneficial, ambivalent, and destructive. The judgement depends on the ecosophy of the researcher, and the ecosophy for the current study adheres to Stibbe's, which appreciates life, health, the present and future, compassion, environmental boundaries, social justice, and profound adaptation. The following part introduces the clarification of metaphors in different categories.

i. Beneficial metaphors: include viewing people as a component of nature, which is more ecocentric and consistent with ecosophy.

ii. Ambivalent metaphors: have aspects that are both consistent with and inconsistent with ecosophy.

iii. Destructive metaphors: violate ecosophy, forcibly place people in a predicament where they cannot live in harmony with the natural world, and further damage environmental construction.

4. Results and Analysis

This section presents the results and analysis of metaphors in COP28 speeches on climate change and the evaluation of these metaphors from the ecolinguistic perspective.

4.1 Metaphor Identification

In this stage, the Metaphor Identification Procedure proposed by Pragglejaz Group (2007) is adopted. It is intended to be a trustworthy and flexible technique for identifying terms that are used metaphorically in context. It offers a set of four methodical procedures for identifying metaphorical keywords by comparing the contextual meaning and basic meaning of lexical units and determining whether the contextual meaning can be understood through the basic meaning which is more concrete or more related to the bodily action. In determining the meanings of words, the Cambridge Dictionary (online version) (*https://dictionary.cambridge.org/*) is used as a reference. Then, the source and target domains are determined based on the semantic domains of the keywords, and the resonance of metaphors is calculated by multiplying the types of metaphorical keywords with the total frequencies.

Metaphors are found in twenty-nine speeches in this corpus. The metaphorical keywords are identified and displayed by the sub-themes shown as follows. The numbers in the brackets show the frequencies of metaphorical keywords, and the "*" sign indicates that its metaphorical resonance has been shown in the resonance of the same source domain above.

Table 1. Metaphor identification in the sub-theme of "climate change"

Target domain	Sub-domains	Metaphorical keywords	Source domains	Metaphorical resonance
Climate change	Climate change	fight (3), frontline (2), combat (12), victim (2), battle (1)	war	132
		drive (1), hit (1)	force	4
		counter (1), confront (1)	conflict	4
		discriminate (1)	human being	1
	Global warming	hurtle (1), velocity (1)	journey	4
	Climate crisis	threat (1)	threat	1
		war (1)	war	*
		brunt (1)	attack	4
	Climate adversity	frontline (1)	war	*
	Climate impact	withstand (1)	attack	*

From Table 1, it can be seen that "climate change", "global warming", "climate crisis", "climate adversity", and "climate impact" are constructed as a "war" with metaphorical keywords such as "fight, combat, frontline"; a "force" with metaphorical keywords such as "drive, hit"; a "conflict" with metaphorical keywords "counter, confront"; a "human being" with the metaphorical keyword "discriminate"; a "journey" with metaphorical keywords "hurtle, velocity"; a "threat" with metaphorical keyword "threat", an "attack" with metaphorical keywords "brunt, withstand".

As for the metaphorical resonance, the "war" metaphor is far higher than other source domains, showing that it is the most prevalent metaphor in constructing climate change in these speeches. "Force", "conflict", "journey", and "attack" metaphors are used several times, and "human being" and "threat" metaphors appear only once in this corpus.

Table 2. Metaphor identification in the sub-theme of "climate efforts"

Target domains	Sub-domains	Metaphorical keywords	Source domains	Metaphorical resonance
Climate actions	Climate action	turning point (1)	journey	1
		heart (4)	living being	10
		pillar (1)	building	1
		momentum (1)	vehicle	4
	Green technology adaptation	drive (1)	vehicle	*
	Climate policy	backbone (1)	living being	*
	Technology	ally (1)	human being	1
Climate goals	Climate resilience	build (3)	building	8
	Climate neutrality	pathway (1), move to (1), achieve (1), goal (1)	journey	45
	Climate regime	construction (1)	building	*
	Sustainable development	pathway (1)	journey	*
	Temperature drop	pathway (1)	journey	*
	Climate goal	far behind (1), achieve (1), goal (1)	journey	*
	Climate mitigation	accelerate (1)	vehicle	1
	Adaptation	investment (1)	business	1

Based on the metaphorical expressions identified, the sub-theme of "climate actions and goals" is divided into two target domains: climate actions and climate goals. From Table 2, it can be seen that "climate action", "green technology adaptation", "climate policy", and "technology" are constructed as a "journey" with the metaphorical keyword "turning point"; a "living being" with metaphorical keywords "heart, backbone"; a "building" with metaphorical keyword "pillar"; a "vehicle" with metaphorical keywords "momentum, drive"; and a "human being" with metaphorical keyword "ally".

"Climate resilience", "climate neutrality", "climate regime", "sustainable development", "temperature drop", "climate goal", "climate mitigation", and "adaptation" are constructed as a "building" with metaphorical keywords "build, construction"; a "journey" with metaphorical keywords such as "pathway, achieve, goal"; a "vehicle" with metaphorical keyword "accelerate"; and a "business" with metaphorical keyword "investment".

As for the metaphorical resonance, the "living being" metaphor is found most prevalent in constructing "climate actions". The "vehicle" metaphor is used several times, and "journey", "building", and "human being" metaphors only appear once. In constructing "climate goals", the "journey" metaphor appears most frequently. The "building" metaphor is used several times, and the "vehicle" and "business" metaphors only appear once.

Table 3. Metaphor identification in the sub-theme of "carbon"

Target domains	Sub-domains	Metaphorical keywords	Source domains	Metaphorical resonance
Carbon	Carbon	market (4), price (3), tax (1), trade (2)	commodity	40
		credit (1)	money	1
		footprint (3)	footprint	3
		sequestration (1)	property	1
		sink (1)	water	1
	Gas	cut (1)	entity	4
		greenhouse (13)	greenhouse	13
	Emission	cut (1)	entity	*
Emission reduction	Net-zero emission	reach (1), achieve (2), goal (2), pave…way (1), pathway (2)	journey	84
	Emission reduction	pathway (1), achieve (2), goal (2)	journey	*
		on track (2)	train	2
	Decarbonization	roadmap (1)	journey	*

Based on the metaphorical expressions identified, the sub-theme of "carbon" is divided into two target domains: carbon and emission reduction. From Table 3, metaphors used to construct "carbon" are the most abundant in types and frequency. "Carbon" are constructed as a "commodity" with metaphorical keywords such as "market, price, trade", etc.; "money" with metaphorical keyword "credit"; a "footprint" with metaphorical keyword "footprint"; a "property" with metaphorical keyword "sequestration"; and metaphorical keyword "sink" is used to construct "carbon" as a kind of "water".

As for "net-zero emission", "emission reduction", and "decarbonization", they are constructed as a "journey" with metaphorical keywords such as "reach, pathway, roadmap", etc., and a "train" with metaphorical keyword "on track".

In terms of metaphorical resonance, the "commodity" and "greenhouse" metaphors are used most abundantly in constructing "carbon". The "footprint" and "entity" metaphors appear several times, and the "money", "property", and "water" metaphors appear only once. In

constructing "emission reduction", the most prevalent metaphor is the "journey" metaphor, with a much higher resonance than the "train" metaphor.

4.2 Metaphor Interpretation

Based on the identified metaphorical keywords and their corresponding target and source domains, this part interprets the conceptual metaphors in these speeches. The conceptual metaphors are displayed in the order of the target domains.

4.2.1 Climate Change

In constructing climate change, the "war", "force", "conflict", "human being", "journey", "threat", and "attack" metaphors are employed. The corresponding conceptual metaphors are "CLIMATE CHANGE IS A WAR", "CLIMATE CHANGE IS A FORCE", "CLIMATE CHANGE IS A CONFLICT", "CLIMATE CHANGE IS A HUMAN BEING", "CLIMATE CHANGE IS A JOURNEY", "CLIMATE CHANGE IS A THREAT", and "CLIMATE CHANGE IS AN ATTACK". The following part analyzes the most prevalent metaphors used in this category, namely the "war" and the "force" metaphors.

War metaphor. The war metaphor is the most prevalent among all the metaphors identified in this corpus. And it exists in twelve speeches among a total of thirty-two speeches. Here are some examples (the metaphorical keywords are shown in bold type):

- *We are facing the urgent need to intensify the global **fight** against climate change and achieve tangible results* (Ukhnaa, 2023).
- *We do not give up on our targets neither on economy nor on **combating** climate change* (Erdoğan, 2023).

In this metaphor, climate change is constructed as a war we fight and combat against. In this war, climate change is our "enemy", humans are "warriors", people dealing with climate change are "fighting a battle", people who are impacted by climate change are "victims", and nations that positively participate are "in the frontline". It is a war without smoke, but it does affect everyone on the planet and every aspect of people's lives. On one hand, it points out the urgency and destructiveness of this issue and emphasizes the importance of dealing with it. On the other hand, it puts climate, which represents nature, in opposition to humankind. In this conceptualization, nature and humans are enemies against each other.

Force metaphor. The force metaphor has also been used several times in constructing climate change. The following part shows some examples:

- *This new set of rights is **driven** by climate change and by our reckless attitude towards nature* (Musar, 2023).
- *And we need to do more for those countries that are **hit** the hardest by climate change* (Frederiksen, 2023).

In this metaphor, climate change is constructed as a kind of force. In this force, climate change can "drive the establishment of rights and hit humans with its power". Humans can be the "beneficiary" or the "victim". Hence, it is a force with two sides. Treated appropriately and taken seriously, it can promote the process of human evolution; when treated inappropriately and not dealt with urgently, it can damage countries and people. This metaphor stresses the strong impact of climate change on humankind and makes listeners aware of the power of this issue.

4.2.2 Climate Actions

In constructing climate actions, the "journey", "living being", "building", "vehicle" and "human being" metaphors appear. The corresponding conceptual metaphors are "CLIMATE ACTION IS A JOURNEY", "CLIMATE ACTION IS A LIVING BEING", "CLIMATE ACTION IS A BUILDING", "CLIMATE ACTION IS A VEHICLE", and "CLIMATE ACTION IS A HUMAN BEING". The "living being" and "vehicle" metaphors are employed most frequently in this part, and the following part is a detailed analysis of these two metaphors.

Living being metaphor. This metaphor is used most prevalent in the construction of climate actions, and most of them come from the metaphorical keyword "heart". Here are some examples:

- *Let us put "nature, people, lives and livelihoods at the **heart** of climate action"* (Tupou VI, 2023).
- *This will become the **backbone** of Latvia's climate policy and sustainable economic growth* (Rinkevics, 2023).

In this metaphor, climate actions are constructed as a living being. The critical factor in climate action is the "heart" and "backbone' of it, which makes the concept of climate action more intuitive and easier to understand for the public. The most frequently used metaphorical keyword "heart" comes from an expression "Putting nature, people, lives and livelihoods at the heart of climate action" (Al Jaber, 2023). This line first appears as one of the paradigm shifts of COP28 in a letter to parties from the Incoming Presidency in July 2023. Thus, this widely quoted line shows the endorsement from leaders in the world of the idea that nature, people, and livelihoods are crucial factors in conducting climate actions.

Vehicle metaphor. This metaphor appears several times in the corpus. The following part shows some examples:

- *The resulting new Environmental Code of Kazakhstan will **drive** comprehensive adaptation of green technology in practically every sector of our national economy* (Tokayev, 2023).
- *To build a **momentum** on climate action in Central Asia, we have also decided to convene a Regional Climate Summit in Kazakhstan in 2026 under UN auspices* (Tokayev, 2023).

The vehicle metaphor constructs climate actions as a vehicle. Environmental policy can be the "driving force" that promotes climate actions such as adaptation to green technology. The climate summit can be the "momentum" that unites each related sector in advancing the development of climate action. This metaphor shows the importance of active climate actions such as environmental policy and climate summit, which can drive people to take action as quickly as possible.

4.2.3 Climate Goals

The "journey", "building", "vehicle", and "business" metaphors are applied in constructing climate goals in this corpus, and the corresponding conceptual metaphors are "CLIMATE GOALS IS A JOURNEY", "CLIMATE GOALS IS A BUILDING", "CLIMATE GOALS IS A VEHICLE", and "CLIMATE GOALS IS A BUSINESS". The following part shows the most prevalent metaphors in this target domain, the "journey" and "building" metaphors.

Journey metaphor. This metaphor appears most frequently in constructing climate goals. Here are some examples from the corpus:

- *We are on a **pathway** to climate neutrality by 2050* (Rinkevics, 2023).
- *The Global Stock Take has shown us that our world is still **far behind** in **achieving** the goals set by the Paris Agreement* (Abdullah II, 2023).

In this metaphor, climate goals are constructed as a journey. Climate neutrality, sustainable development, and temperature drop are "destinations"; humans are "travelers"; and climate actions are "vehicles". This metaphor visualizes the climate goal, which makes it a familiar concept. It points out the process humans need to achieve these goals and the efforts we should make. Though they cannot be achieved immediately, it is encouraging for all nations to have common goals in pursuing a better climate and environment and move forward towards them together.

Building metaphor. This metaphor is also used in constructing climate goals. The following part shows some examples:

- *COP 28 presents a pivotal call to action to **build** climate resilience before the last grain of sand slips away* (Ramkalawan, 2023).
- *We reaffirm our commitment to the Paris Agreement and the **construction** of a new climate regime based on justice and equity* (Embaló, 2023).

In this metaphor, climate goals are constructed as a building. To achieve climate goals is "to construct a building"; humans are "construction workers"; humans' belief in making a better climate and environment is the "foundation"; and efforts to achieve the goals are "bricks of the building". It requires great endeavor to realize these goals, as in constructing a solid building, and the quality of this "building" depends on the way people construct it. Thus, it also emphasizes the process of achieving climate resilience, climate neutrality and climate regime.

4.2.4 Carbon

In constructing carbon, the "commodity", "money", "footprint', "property", "water", "entity", and "greenhouse" metaphors are employed. It has the widest variety of metaphor types found in this corpus, with metaphors as many as the ones constructing climate change. The corresponding conceptual metaphors are "CARBON IS A COMMODITY", "CARBON IS MONEY", "CARBON IS A FOOTPRINT", "CARBON IS A PROPERTY", "CARBON IS WATER", "CARBON IS AN ENTITY", and "CARBON IS A GREENHOUSE". The following part is a detailed analysis of the "commodity" metaphor and "greenhouse" metaphor, which appear the most frequently in these speeches.

Commodity metaphor. This metaphor is the most widely used one in constructing carbon with the most diversified metaphorical keywords. Here are some examples:

- *Forest carbon **markets** are also creating revenue for more than 500 LCDS projects across indigenous and other communities* (Ali, 2023).
- *And we need bold initiatives to make sure that at least 60% of global emissions are covered by a carbon **price** by 2030* (Michel & von der Leyen, 2023).

In this metaphor, carbon is constructed as a commodity. Trading platforms where carbon credits are bought and sold are known as carbon markets. Businesses and individuals may utilize carbon markets to offset their greenhouse gas emissions by buying carbon credits from organizations that offset or minimize their emissions. In this metaphor, the money paid for carbon emission is its "price" and "tax", the purchasing of carbon credit is its "market", and the action of selling and purchasing carbon credit is "trade". This metaphor visualizes the process of buying and selling carbon credit as the process of purchasing commodities, which makes the public aware of the mechanism of carbon emission and its trading system.

Greenhouse metaphor. This metaphor is also frequently seen in constructing carbon. The following part shows some examples:

- *Our target is to reduce a net 82% of **greenhouse** gas emissions by 2030 compared to 1990 levels* (Pendarovski, 2023).
- *This strategic document assumes 20% reduction in **greenhouse** gas emissions in 2030 compared to 2010 levels* (Berdimuhamedov, 2023).

In physics and atmospheric sciences, the greenhouse effect metaphor has a long and illustrious history (Nerlich & Hellsten, 2014). The

term greenhouse effect appears as early as 1827, and with years of development, the public is rather familiar with this term. In this metaphor, carbon is constructed as a greenhouse that covers the earth. The carbon and other gases are the "glasses in a greenhouse", the earth is "the plant inside", and the sunlight is "warming the greenhouse as well as the earth". This metaphor points out the effect of the accumulated carbon and other gases, which would lead to the temperature rise as a function of a greenhouse.

4.2.5 Emission Reduction

The "journey" and "train" metaphors are applied to construct emission reduction. The corresponding conceptual metaphors are "EMISSION REDUCTION IS A JOURNEY" and "EMISSION REDUCTION IS A TRAIN". The following part presents the most widely used metaphor in this category, the "journey" metaphor.

Journey metaphor. This metaphor is used most frequently with various metaphorical expressions. Here are some examples:

- *We plan to **reach** the net-zero emission target as of 2053* (Erdoğan, 2023).
- *We look forward to strengthened commitments that will inform immediate and future climate action, including clear **pathways** to achieve emissions reductions* (Hichilema, 2023).

This metaphor presents net-zero emission, emission reduction and decarbonization as a journey. The emission reduction goals are "destinations"; the process of realizing these goals is "traveling along the way"; the efforts in achieving the goals are "the toil of the journey". It emphasizes the common goal for humans and points out the importance of joint efforts, as humans are companions along this journey. The process of realizing emission reduction cannot be accomplished in one action, and we should have the determination and patience to build a better atmospheric environment.

4.3 Metaphor Explanation

Metaphor explanation requires understanding the social agency behind metaphor formation and their social role in persuasion. This study analyses the persuasive purposes of metaphors from a pragmatic perspective. The analysis follows Charteris-Black's (2018) classification of the purposes of metaphors and focuses on four specific ones: the purpose of gaining attention and establishing trust, heuristic purpose, empathetic purpose, and ideological purpose.

Metaphors can contribute to the purpose of connecting with audiences by attracting their attention. Building trust and proving that the speaker is sincere is crucial when trying to attract attention. In one of the speeches, the president of Namibia says, "Women and children are the primary victims of the adverse effects of climate change" (Geingob, 2023). The war metaphor maps women and children who are affected by climate change as the victims of a war, which could attract audiences' attention immediately, and the speaker also establishes himself as sharing the intense feelings aroused by the damage of climate change, thus putting the speaker on the same side with women and the children and establishing trust.

The heuristic purpose refers to presenting topics in a comprehensible manner to support a position. Metaphors help to reduce abstract, complicated, and sometimes contentious political, social, and especially economic matters so that the public can more easily understand them. This purpose is crucial in communicating scientific topics such as climate change. Take the carbon footprint metaphor as an example. In the speeches by the president of Slovakia, the president of Hungary, and the president of Latvia, they all use this metaphor, such as in the sentence, "Yet they are the least responsible for the carbon footprint" (Rinkevics, 2023). The entire amount of greenhouse gases—including carbon dioxide and methane—produced due to human activity is known as a carbon footprint. In this metaphor, emitting greenhouse gases is constructed as leaving a footprint on the earth, making the traces or results of human actions more understandable for the public.

Empathetic purpose means to evoke emotions in the audience that would make them support the speaker. The way the speaker and audience respond proves how metaphors elicit an emotional reaction. For example, in the widely quoted line "put nature, people, lives and livelihoods at the heart of climate action" (Al Jaber, 2023), climate action is constructed as a living being, with nature, people and livelihoods as the important elements in these actions. This metaphor can evoke the audiences' emotions in valuing the environment and lives and supporting the speaker of this idea, thus realizing the empathetic purpose of metaphors.

The ideological purpose of metaphors is to present a worldview. Ideology is defined as the shared foundation for social representation among group members (van Dijk, 1998). It indicates that ideologies enable individuals to organize a wide range of social views about what is true—good or terrible, right, or wrong—so that they can act appropriately as group members. Metaphors that construct climate goals and emission reduction as a journey offer a worldview of the process and the hard work humans need to realize these goals. They define a destination for all nations and humans and call on joint efforts to achieve it. This type of metaphor conveys the idea that though there may be hardship during this journey, the future is bright and worth fighting for. Thus, metaphors with an ideological purpose help to understand the universe since they are orderly and create lasting mental images.

4.4 Metaphor Evaluation

The evaluation of metaphors is conducted from an ecolinguistic perspective by an ecological discourse analysis. It follows Stibbe's (2021) classification of metaphors based on an ecosophy which appreciates life, health, the present and future, compassion, environmental boundaries, social justice, and profound adaptation. The following section displays the evaluation of metaphors with a detailed analysis.

Table 4. Classifications of metaphors

Classifications	Conceptual metaphors
Beneficial metaphors	CLIMATE CHANGE IS A HUMAN BEING; CLIMATE CHANGE IS A JOURNEY; CLIMATE ACTION IS A JOURNEY; CLIMATE ACTION IS A LIVING BEING; CLIMATE ACTION IS A BUILDING; CLIMATE ACTION IS A VEHICLE; CLIMATE ACTION IS A HUMAN BEING; CLIMATE GOALS IS A JOURNEY; CLIMATE GOALS IS A BUILDING; CLIMATE GOALS IS A VEHICLE; EMISSION REDUCTION IS A JOURNEY; EMISSION REDUCTION IS A TRAIN
Ambivalent metaphors	CLIMATE CHANGE IS A FORCE; CLIMATE GOALS IS A BUSINESS; CARBON IS A COMMODITY; CARBON IS MONEY; CARBON IS A FOOTPRINT; CARBON IS A PROPERTY; CARBON IS WATER; CARBON IS AN ENTITY
Destructive metaphors	CLIMATE CHANGE IS A WAR; CLIMATE CHANGE IS A CONFLICT; CLIMATE CHANGE IS A THREAT; CLIMATE CHANGE IS AN ATTACK

Beneficial metaphors in the COP28 speeches include constructing climate change, climate actions, climate goals and emission reduction as a human being, a journey, a living being, a building, a vehicle, and a train. These metaphors are beneficial as they stress the process and hard work humans need to change the current situation and construct climate actions and goals as vehicles and trains to promote the development of human society. Thus, this kind of metaphor should be one that we support and promote.

Ambivalent metaphors in these speeches include constructing climate change as a force, climate goals as a business, and carbon as a commodity, money, footprint, property, water, and entity. These metaphors are ambivalent as they have aspects that are both consistent and inconsistent with ecosophy. On the one hand, these metaphors help the audience understand the nature of climate change, climate goals, and carbon; on the other hand, these metaphors do not give an apparent inclination to evaluate these entities. It is hard to determine whether a force, a commodity, a business, etc., is eco-friendly or vice versa. Thus, it may be confusing for the audience to judge how to treat these issues.

Destructive metaphors in this study include constructing climate change as a war, a conflict, a threat, and an attack. These are destructive metaphors because they all stress the destructiveness and damage climate change brings and call on humans to stand on the opposite side of this issue while overlooking humans' role in leading to this situation. The climate is innocent in this result but only takes the blame for human activity and behavior. These metaphors put the innocent nature against humans and thus should be opposed and avoided being used.

5. Discussion

The study determines three key concepts in the climate change issue and probes into their metaphorical construction. The key concepts defined in this study are climate change, climate efforts and carbon.

In constructing climate change, the "war", "force", "conflict", "human being", "journey", "threat", and "attack" metaphors are employed with various metaphorical keywords and expressions. The metaphor with the highest metaphorical resonance is the war metaphor. This metaphor is rather common across different domains in public discourses (Flusberg, Matlock, & Thibodeau, 2017). By emphasizing the gravity of a problem and the necessity of finding a solution, war metaphors can serve to bring people together around it. As for the issue of climate change in political speeches, on the one hand, the war metaphor could inspire the audience to solve the problem by changing their conservation behavior and feel an even greater feeling of urgency and risk around it. On the other hand, according to previous studies, terror is typically useless in encouraging participation in social concerns like global warming. Therefore, using war metaphors in the context of climate change may backfire and fail to boost sentiments of urgency (Atanasova & Koteyko, 2015). Another point is that this metaphor also hides the result of human activity and actions contributing to climate change. From the ecolinguistic perspective, conceptual metaphors are relatively evenly distributed, with three beneficial metaphors, one ambivalent metaphor, and four destructive metaphors, which build a complex image of climate change.

Climate efforts can be further divided into climate actions and climate goals, with the former stressing human efforts and the latter stressing the objectives of the efforts. "Journey", "living being", "building", "vehicle", and "human being" metaphors are found in constructing climate actions. The living being metaphor is found to be most prevalent in this category. It constructs climate actions as a living being, and nature, humans, and livelihood are crucial parts of it. They all appear from a quote in a letter from the Incoming Presidency, and the repeated quotations of this sentence display the national leaders' recognition of this line and the idea conveyed behind it. In constructing climate goals, the "journey", "building", "vehicle", and "business" metaphors are found in this corpus, with the journey metaphor possessing the highest metaphorical resonance. Journey metaphors are used to demonstrate that realizing the goals such as climate resilience, climate neutrality, and sustainable development is comparable to traveling a great distance to get to the intended destinations. Reaching climate goals will not happen overnight, and this metaphor highlights the process of experience and efforts to pay by humans. From the ecolinguistic perspective, most metaphors in this category are beneficial, which shows that the speakers build a positive image of climate efforts.

In constructing carbon, the subdivision is carbon and emission reduction. Carbon includes greenhouse gases and their emissions, and emission reduction emphasizes cutting emissions. In constructing carbon, the "commodity", "money", "footprint', "property", "water", "entity", and "greenhouse" metaphors are employed. The commodity metaphor is the most prevalent with various metaphorical keywords such as "market", "price", and "trade". This metaphor constructs carbon as a commodity. The carbon market is a crucial instrument for

offering one of the flexibility mechanisms meant to reduce CO2 emissions on a budget to address the issue of climate change (Kanamura, 2021). With this metaphor, the public can understand how carbon credits are purchased and sold in carbon markets, as on trading platforms. The "journey" and "train" metaphor are applied to construct emission reduction. The journey metaphor appears most frequently in this category and constructs net-zero emission, emission reduction and decarbonization as a journey, which functions similarly to constructing climate goals as a journey. From the ecolinguistic perspective, conceptual metaphors constructing carbon are ambivalent metaphors, which simplify the scientific terms for the public but do not show a clear inclination to evaluate these entities. Metaphors constructing emission reduction are beneficial, which construct a positive image of emission control.

From the above discussion, it can be seen that in political speeches communicating climate change, metaphors can present topics in a comprehensible manner, connect the speakers with audiences by attracting their attention, present the speakers' worldview, and evoke emotions in the audience that would make them supportive of the speaker, showing metaphors' emotional and ideological functions on top of the informative functions. Thus, repeated exposure to particular metaphors in public speech reinforces ingrained perspectives and eventually molds social cognition (van Dijk, 2008).

6. Conclusion

The study examines metaphors in speeches on climate change at the high-level segment for Heads of State and Governments at COP28. Thirty-two speeches at the opening of the first part of this segment are chosen as the research materials, which are delivered by presidents, kings, sultans, prime ministers, secretaries of the state, ministers of national environment and climate change departments, etc., of thirty-two countries. The study adheres to Lakoff and Johnson's (1980) conceptual metaphor theory and applies Charteris-Black's (2018) framework of critical metaphor analysis to identify, interpret and explain metaphor use. A further step of this study is evaluating the metaphors from an ecolinguistic perspective based on Stibbe's (2021) ecosophy and his classification of metaphors.

The study determines three key concepts in the issue of climate change and probes into the metaphorical construction of these concepts. The three key concepts are climate change, climate efforts and carbon. Climate efforts are further divided into climate actions and climate goals, and carbon is divided into carbon and emission reduction. It is found that various metaphorical keywords and conceptual metaphors are applied to construct climate change. As for the specific categories, seventeen types of metaphorical keywords and seven types of conceptual metaphors are identified in constructing climate change, with the war metaphor and force metaphor most prevalent in this category. Sixteen types of metaphorical keywords and six conceptual metaphors are applied to construct climate efforts, with the living being metaphor and journey metaphor most frequently appearing in constructing climate actions and climate goals respectively. As for carbon, seventeen types of metaphorical keywords and nine conceptual metaphors are used to construct carbon and emission reduction, with the commodity and journey metaphors most commonly used in this category.

The pragmatic purposes of metaphors in these speeches are also determined, and they focus on four aspects, namely, the purpose of gaining attention and establishing trust, heuristic purpose, empathetic purpose, and ideological purpose. Each metaphor has multiple purposes and highlights some of them. From the ecolinguistic perspective, it is found that beneficial and ambivalent metaphors outnumber destructive metaphors, which build a positive and progressing image of dealing with climate change by these nations and serve as an inspiration for the public.

To sum up, metaphors are frequently applied in the comprehension, explanation, and communication of climate change in political speeches, with different aspects highlighted and hidden under the metaphorical construction. Further research can enhance this study by determining more key concepts in this issue and conducting more comprehensive research in the future to understand better how metaphors work in the construction of climate change.

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Authors contributions

Yu Wang was responsible for study design and drafted the manuscript and Assoc. Prof. Dr. Hadina Habil revised it. All authors read and approved the final manuscript.

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