Studying Political Discourse at COP Using Text Mining

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Declaration

I, Christina Meletakos, declare that this dissertation is my own, unaided work. It is being submitted for the degree of Master of Arts in the field of e-Science at the University of the Witwatersrand, Johannesburg. It has not been submitted for any degree or examination at any other university.

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Abstract

Climate change has become one of the most pressing issues of our time and it is increasingly important for nations to come together and address the crisis. Every year since 1995, countries from around the world congregate at COP (Conference of the Parties) in the attempt to find consensus on how to tackle the problem. This dissertation studies the political speeches given by country representatives at the conference. 552 transcripts were used to perform multiple analyses. A sentiment study showed that the majority of speeches were overwhelmingly positive, and that the language used by delegates showed that they wanted to come across as being trustworthy and knowledgeable. Wordscores illustrated that prior to 2016, speeches were more alike. At the onset of US President Donald Trump's announcement that he was pulling out of the Paris Agreement, most countries turned away from the US' positioning. While a narrative of marketization was prevalent, it was the nationalist discourse used by the president that deterred countries. Lastly a regression model was run which showed that GDP, population, and region played an important part in how a country positioned itself on the world stage.

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Chapter 1

Introduction

The United Nations Conference of the Parties (COP) is a yearly meeting where around 200 countries come together to discuss issues related to the changing climate. The conference has been held every year since 1995, except for 2020, due to the Covid-19 pandemic. COP is currently in its twenty-seventh iteration and will be hosted again the United Arab Emirates in November 2023. The signing of the Paris Climate Agreement at COP21 in France has been the most successful conference to date. Popular themes at each meeting include adaptation and resilience, nature-based solutions, energy transitions, clean transport, and finance. Adaptation and resilience refer to preparing communities for the impact of the changing environment. Nature-based solutions look to preserve natural habitats and biodiversity. Energy transition looks at the production of renewable energy and storage. Clean transport looks at zero-emission cars and other transport. Lastly, finance encourages the divestment of fossil fuels, the growth of green jobs, and aid needed in developing countries to make a sustainable transition to a greener economy. At each conference, almost every country makes a short speech stating their opinions on the state of the climate catastrophe and what they propose to do to preserve the future. These statements are provided free online on the UN website (United Nations Climate Change: 2023), where many have been translated into English.

This research project looked at the factors determining a country's climate change positioning at the COP conferences between 2011 and 2019 (excluding 2012). A large and diverse group of countries was selected to better illustrate different viewpoints, actions, and trends. The sample size was determined by the availability and legibility of speeches over the period of study and whether the transcripts were offered in English. Although COP started in 1995, transcripts of speeches are only available from COP 17 in 2011 to the present, hence the selected period of study. The speeches were

first digitised in 2011. The year 2012 was left out due to poor legibility of the documents, as speeches were saved as images with hand written notes and blurred writing. The analysis was done by using text mining to calculate Wordscores and sentiment analysis. This was followed by multiple regression models for each year of study. The different Wordscores were the direct variable. This was measured against GDP per capita, population size, CO_2 emissions, voice and accountability score, and region (as dummy data).

Politicians use narrative to advance their agendas, and what they say has certain connotations and political weight. Of course, what they say does not always result in political action, which is why both quantitative and qualitative research was an important part in the study of these transcripts. The speeches were given by a representative from each country. Sometimes it was given by the leader of the country, but more often than not they were given by government representatives. By studying how an issue is framed, discussed, and understood, political agendas become clearer. The debates about climate change are not just about energy supply, sustainable growth, and visions for the future, but also about political objectives and gains. Steering all countries in the same direction of greening their economies has been difficult for this reason. An example of this is seen with the United States (US) which repeatedly failed to ratify agreements related to climate and the environment. Despite the country positioning itself as a world leader that other nations look up to, the country's leadership has only very recently started to take the climate crisis seriously with its signing of the COP Paris Agreement in 2016. This research project is important as it is the first to study COP transcripts using text mining. While there are examples of sentiment analysis relating to COP, they use social and traditional media to study the perspectives of citizens (Patronella: 2021; Brabilla: 2021). This research differs as it studies the opinions of governments and politicians over a long period of time.

COP History

The Intergovernmental Panel on Climate Change (IPPC) was formed in the 1980s, in partnership with the United Nations. The scientific body's focus is on different fields related to climate change such as methane levels, global temperatures, and extreme weather events. The group has become increasingly important in its influence on COP as politicians have used reports to calculate future risk. The first iteration of serious climate action was during COP 3 in 1997, in Japan where the Kyoto Protocol was signed. Countries agreed to stabilise carbon dioxide, however, the United States refused to ratify the document as there was a clause excluding developing countries from the agreement. The US argued that it was unfair as it excused China and India who were rapidly increasing production of carbon emissions. Part of the trouble was that the developing nations refused to take part as they accused developed nations of historically producing most of the emissions and therefore believed they should be exempt from fixing the problem (Seo: 2015). Further, controversy with the European Union (EU) was seen. Its actions were marred by the fact that while they decreased the production of fossil fuels on the continent, the body increasingly imported energy and goods from countries with high emissions. These issues remained prominent and unresolved (Seo: 2015). The next significant COP that produced an agreement was in Paris in 2015.

There was far more optimism in 2015 with the signing of the Paris Agreement at COP 21 (Seo: 2015). This was important as it was signed by 177 countries and was ratified by 144 nations. It was agreed that each country would submit its own climate target on a voluntary basis (UNFCCC: 2015, articles 3 and 4). It was encouraged that global temperatures had to be lower than pre-industrial levels and that countries should limit the increase in temperature to 1.5°C (UNFCCC: 2015, article 2). However, this was not legally binding and instead worked on a "name-and-shame" approach. Importantly, a Green Climate Fund (GCF) was put into place. This recognised that poor countries needed aid to develop sustainably and therefore needed funding and the sharing of skills (Seo: 2017).

Another frequent topic was "loss and damages." Over the years this has become a distinct term used by developing countries to mean that developed nations, which have historically been responsible for emitting the most carbon, should give money to developing or vulnerable countries through reparations. This is different from the GCF as it acts more like an insurance policy where money is released in the aftermath of an environmental disaster. Until recently, the concept was not clearly defined, as "loss" and "damage" signify two separate things (Mayer: 2014). Loss has been described as "the negative impacts of climate change that are permanent." Damage is understood to mean "impacts that can be reversed." (Brownlie: 1983). The concept has been floating around at global conferences since 1991 when the Alliance of Small Island States (AOSIS) proposed the idea. Originally it was aimed at addressing the loss and damages that small island and low-lying coastal developing nations would experience due to sea-level rise. This idea then shifted to compensating all developing countries impacted by climate change. While the idea is brought up every year at COP, there has been little progress in its implementation. It is only recently at COP 26 and 27 in 2021 and 2022 (not covered in this research project, as previously stated) that it has been taken a bit more seriously. Despite this, no agreement has been reached. Developing nations have used the word "reparations" to refer to financial assistance in mending already damaged infrastructure, as well as financing adaptation to cleaner and more durable infrastructure. Developed nations do not like the use of the word "reparations" as they are worried that it would result in legal liability for climate-bearing damages. These counties have actively avoided the topic at the conference and constantly shift the focus on other risk-related issues (Mayer: 2014).

While emissions have lowered since the first COP conference, countries are nowhere near a sustainable level (Jacobs: 2021). Temperatures are set to rise above 2.4°C which will result in the bleaching of coral reefs, extinction of land animals, and a major decrease in drinking water and productive agriculture. However, academic Michael Jacobs (2021) cautions against pessimism toward COP and says that the matter is more complex than meets the eye. He argued that if countries were left to their own

devise, progress would never ensue. Remarkably, the Glasgow Climate Pact was the first time an agreement mentioned the need to reduce fossil fuels (Jacobs: 2021). As fanciful as this sounds, this showed some progress. There was scepticism on the international stage from entities such as the media that dismissed the development of the agreement because of phrasing. China and India refused to sign the agreement unless the text "phasing *out* of coal" was changed to "phasing *down* of coal" (Jacobs: 2021, p. 274). Jacobs said that while this was disturbing, the phrasing is "symbolic" when it comes to impacting real economies. Despite the limitations, the agreement mentioned deforestation, methane emissions, coal, climate finance, green technologies, and electric cars. The most significant progress was seen in the commitment to reducing/stopping deforestation (Jacobs: 2021). Notably, an agreement was made between South Africa, the US, and several countries in the EU to help the developing nation make the transition from its coal-rich economy to renewable energy. It contained commitments to significant policy reforms, and financial assistance (Jacobs: 2021).

Delegates and Negotiations

In this dissertation, transcripts of speeches by government officials at the conferences are analysed. Therefore, it is important to understand the negotiation process and who is in attendance. Delegates are made up of experts, politicians, and negotiators. The number of representatives at COP is different every year and has for the most part increased. COP 15 (2009) was the fourth most attended (27 301), followed by COP 21 in Paris (30 372). This only increased with Glasgow's COP 26, and COP 27 in Egypt (outside scope for this research project). Interestingly, since COPs started in 1995, Brazil has on average brought the most delegates each year. Countries that host COP usually also see an influx of representatives. This may be due to its stakes in the Amazon rainforest, and its status as a developing nation in need of financial and technological support (McSweeney: 2022).

The political speeches studied in this dissertation are separate from the negotiations. The actual negotiation process happens during several formal and informal meetings happening concurrently throughout the conference. COP 24 negotiations were held behind closed doors and took place over 200 hours in total (Susan: 2021). While COP is a form where countries from all backgrounds (developed and developing) can voice their positions and expectations, participation in negotiations is unequal. Elliot Susan (2021) argued that while developing nations are invited to the table, they simply do not have the budget to take part. In order to participate, a large number of delegates are needed to take part in the different meetings that occur simultaneously. A limited budget means that a country can only send a certain number of envoys. It is also argued that due to a lack of expertise in the fields discussed, delegates go into negotiations without the required knowledge to take part. Another concern for developing nations is that the de facto language is in English. While there are translators, negotiations and all documentation are in English (Susan: 2021).

There is distinct gender inequality when it comes to government delegates. Male delegates have always dominated COP. However, there has been an improvement over the years. At the first COP (1995) the split between male and female delegates were 88% male, and only 12% female. Large improvements have been made and by COP 25 (2019), the split was 62% male and 38% female. In 2011, a pledge was made to increase the number of female representatives (McSweeney: 2022). However, the increase of female representatives slowed. In 2022, out of 110 leaders that attended the conference, 7 were women. Further, less than 34% of government negotiation teams were made up of women. An example of almost no progress is seen with Libya with an average of 99% male representatives. The quoted study also showed that some groups were made up of more than 90% male delegates. Lastly, when looking at representation by region, it was found that African and Middle Eastern countries had the largest skew towards male staff (Stallard: 2022).

Ruth Michaelson (2022) wrote about the number of fossil fuel lobbyists at COP. She said that each year showed an increase in the number of these lobbyists. There was an increase of more than 25% between 2021 and 2022. In 2021, there were 503 fossil fuel lobbyists such as Shell. This number increased to 636. This is larger than any country's delegates. While these lobbyists do not give speeches at the conference, they influence the politicians and governments that do. Michaelson quoted activist group, Kick Big Polluters: "the influence of fossil fuel lobbyists is greater than frontline countries and communities." The group emphasised that voices from developing nations and delegates from indigenous communities, are drowned out by the number of lobbyists. Michaelson argued that these lobbyists, as well as others from the private sector, would hold back any real climate action-related goals.

Research question

The overarching research question is: What factors determine countries' climate change positioning at COP?

a. Does GDP per capita influence climate change positioning?
b. Does population size influence a country's climate change positioning?
c. Does a country's status as a democracy impact its climate change positioning?
d. Does the amount of a countries carbon emission influence its environmental positioning?
e. Does geography impact a country's climate change positioning?

Literature review

This literature review makes use of the scoping methods (Arksey & O'Malley: 2005). The purpose of this examination is to be exploratory in providing the foundation for the targeted study focused on in this research project. The goal was to identify relevant readings that may aid in helping detect research gaps and explain key concepts,

theories, definitions, and sources. This literature review is divided into two parts. The first looks at related history and research, while the second looks at the theory that aids interpretation later in this dissertation.

A prevalent topic at COP is the unequal consequences of climate change around the world. Developed nations are the main emitters of carbon dioxide, yet developing nations face the most significant costs (Snyder & Ruyle: 2020). These countries must deal with multiple issues at the same time such as tackling poverty, improving economic growth, as well as protecting the environment. Grave consequences are amplified for developing nations that are already water-scarce and prone to drought, or low lying and valuable to rising sea levels. Many of these nations argue that to develop they should be exempt from the standards put in place by developed countries (Snyder & Ruyle: 2020).

Brian F. Snyder and Leslie E. Ruyle (2020), wrote on the reduction of coal, oil, and gas production in relation to developing countries. They said that to meet the 2015 Paris Agreement, nations needed to decrease production and eventually not produce, or rely on fossil fuels at all. The authors argued that for this reduction to be made, developed countries should reduce their emissions first and let developing nations carry on emitting for a short period of time as the countries would forgo an opportunity to better their economies. The example of oil extraction at Albertine Graben in Uganda was given to illustrate that extraction would benefit the country's financial returns. Despite this positioning, the authors prefer this extraction to be reduced and ended. They propose that the country should be compensated by the West if they are to stop extraction. The paper proposed ways to determine the value of the resources that need to be compensated. An example of this was the estimation of possible cash flows to the government based on tax.

Involvement with different political bodies such as OPEC (Organisation of Petroleum Exporting Countries), BRICS (Brazil, Russia, India, China and South Africa), and the G7 may influence climate policy. An example of this is with OPEC at

COP 26 in 2021, where committee members from the oil-producing group tried to make a case for the use of oil. The organisation argued that oil producing nations were being targeted and that technologies such as carbon capture and sequestration would allow for the future burning of fossil fuels. The organisation stated that climate solutions are not about changes in policy, but rather the implementation of different and new technologies. The organisation made the argument that the phasing out of oil and natural gas was anti-poor and would affect developing nations negatively in comparison to developed nations (Nasralla: 2021). A country's existing energy mix is important and should always be taken into account in the study of climate change-related policy. If a country generates energy mainly through fossil fuels, it may face a dip in the economy due to the loss of jobs and revenue. If nations are reliant on fossil fuels from other nations, they may find it difficult to find clean alternatives, as they may prove to be more costly.

BP (British Petroleum: 2020) put out an important report showing a world-wide dataset on the planet's energy mix. Some of the key developments surrounded coal and wind. The following was found: The consumption of coal had decreased to its lowest level in 16 years. Despite this, coal is still the main source of power generation, generating at 36% of global power (British Petroleum: 2020). China is the largest contributor to this score. Further, oil consumption has increased, with China again as the leader in consumption (British Petroleum: 2020). However, there has been strong development in renewable energy. Even though renewable energy makes up a smaller portion of the consumption, renewable energy sources saw large increases. This increase has allowed for renewable energy to become more accessible. Wind had the largest contribution to growth, followed by solar. This rapid growth was driven by China, where it holds the lion's share (British Petroleum: 2020). Lastly, according to the 2020 report, prices for cobalt and lithium carbonate have had a steep fall, by 54% and 31% respectively. These resources are key for growth in the renewable sector, again bringing down the price. Interestingly, the countries that are the highest carbon emitters are

also making the largest input to the generation and expansion of renewable energy. This is due to the availability of funding (British Petroleum: 2020).

The Environmental Kuznets Curve (EKC) is a theory which argues that there is a significant relationship between economic development and environmental degradation. As a nation develops, environmental destruction increases and then declines. This results in an inverse-U-shaped relationship between economic growth and environmental damage. The EKC maintains that degradation will get to a point where it decreases, it "only occurs in a stage of economic development in which technologies are available that improve energy efficiency, energy saving, and renewable energy" (Aşici & Acar: 2016). In order for this to take place, funding of Research and Development (R&D) was related to energy needs to take place. This means that wealthier countries are more likely to be able to fund sustainable production and adaptation. If the EKC is true, it means that in order for developing nations to make meaningful improvements related to the fight against climate crisis, they need to develop further and grow their Gross Domestic Product (GDP).

There are various other studies which have expanded on this theory. Johnson and Lener (2023) explored whether environmental protection was the focus of rich-countries or poorer countries. They looked at statements made by politicians at the Committee on Trade and Environment (CTE). The committee studies trade and the environment in order to encourage sustainable development. The study made use of text mining to analyse the transcripts. The authors argued that there are four main reasons why wealthier countries pay more attention to environmentalism. The first is that in order to take action, a country has to be willing to relinquish their short-term economic advantages in order to benefit from long-term growth. The second is that climate action is expensive and many poor nations do not have the resources and money to make the transition. The third point is that poorer countries are more likely to struggle with collective action. Governments may aim to achieve international action for the public good and need contributions. Richer countries have more resources to take part in this. Johnson and Lener (2023) wrote that the last factor was the importance of a middle

class. They argued that richer nations have a larger middle class that can take part in the democratic process. This is due to the ability for citizens to demand change. They also mentioned that exceptions do take place. The example of poor island nations was given as they are at the centre of the threat of climate change. The authors studied what they refer to as the "BASIC" countries. These nations are Brazil, Afrique du Sud (South Africa), India, and China. These nations have seen tremendous growth over the past two decades and often band together when it comes to climate negotiations. The results of the study showed that as GDP per capita increases, so do their environment discussions. It also showed that these countries speak in a more general way in comparison to their richer counterparts. The authors showed that while developing countries such as South Africa and China had focused around 4% of their speeches on climate issues, India had never devoted more than 3%.

In "The environmentalism of the poor" by Joan Martinez-Alier (2014), it is argued that poorer populations are not only the most impacted but are at the forefront of fighting against climate change. Martinez-Alier said that due to globalisation, resource extraction has increased and is usually located near poor or indigenous communities. Wealthier nations, while usually having smaller populations consume far more resources and create far more waste. A case study related to environmentalism in India was given as an example. Martinez-Alier wrote that "The year 2010 was a load year for environmentalism" (Martinez-Alier: 2014, p. 240). This related to a number of revelations that high infrastructure projects such as the building of Lavasa airport did not comply with environmental regulations, yet may increase job production. This also raised the issue of corruption in government. The study said that these local Indian communities are "warriors" of environmentalism as they rely on it for their livelihood. While poorer citizens are often seen as having little education, even if they don't frame things as climate related, groups understand the consequences of topics such as mining, cutting down trees and eventual deforestation. The issue comes that there needs to be a degree of democracy where citizens can express their concerns on these topics.

Marina Povitkina's (2018) "The limits of democracy in tackling climate change" explored how democracies responded to climate change and if they make stronger commitment to climate action than non-democratic countries. She argued that conditions created by democracies are far better suited to restrict CO_2 emissions. Citizens are more likely to be informed under a democratic government as media outlets, and environmental collectives are free to express themselves. Povitkina says that this helps people make more environmentally friendly decisions and demand action from their governments. She also argued that it is not just democracy that leads to better decision making but also the quality of institutions and governance. The fight against climate change may not always be conducive to democracies. The author says that democratic leaders are often short-sighted as they are constantly pursuing electoral success. As a result, they may prioritise short-term gains over long-term goals. Further, business interest may influence decision making by lobbying politicians to uphold their interests.

Povitkina's (2018) is concerned about the impact of corruption on institutions. She outlines five ways corruption hinders democracy and the fight against climate change. The first is that the law is not always followed and as a result bureaucrats are more susceptible to bribery. This results in emission levels not being reported on properly and environmental law not being upheld. This may also impact the competency level of officials as the best hire is not always chosen for the job. The second impact of corruption relates to voluntary compliance. Corruption breaks trust between governments, businesses, and citizens. It's argued that there is little trust between these entities, there are no incentives to comply with the law. Trust also links to the third factor which is that it "obstructs extractive capacity." This may result in lower tax revenues. This impacts the amount of resources that are dedicated for environmental justice. Fourthly, corruption impacts policy making. Due to bribery, officials are likely to pursue their own interests rather than the greater good. Lastly, corruption can impact economic development. It also hinders the investment into greener technologies.

Johnson and Lener (2023) highlighted some difficulties related to studying political speeches about issues such as environmentalism. At international forums there are countries that are both invested as well as unconcerned by climate change. They say that this was because there are countries with different economic standings that interact. Ambivalent nations do not benefit from opting out of these forums and explicitly expressing their positions. These forums also put pressure on governments to show support for the said cause. The authors said that these countries often try to divert the conversation away from the issue at hand. They may do this by making general statements, raise clerical issues, advocate for more research, and emphasise different topics.

Text mining was used to study 3 401 Norwegian parliamentary speeches on Arctic sustainability during the period between 2009 and 2016 (Moilanen & Østbye: 2021). They sought to go beyond the left-right political narrative to study political party positions on the matter. Instead of the left-right narrative, they focused on whether a party was in power or was the opposition. The Norwegian parliament is voted in for a period of four years and is based on proportional representation in nineteen electoral districts. The authors found that depending on whether a party was in power or not, they would opportunistically change their positions. Sustainability was viewed positively when a party was in power. Certain categories such as those pertaining to reindeer-husbandry and ocean management would wax and wane depending on each party's position in power or opposition. The study also found that when coalitions were formed, the discourse changed further. These articles (Moilanen & Østbye: 2021) show how politicians communicate their positions to their citizens, and how opinions change pending certain factors.

What citizens think may also influence government positioning. There are existing examples of using text mining to better understand the COP conferences. However, they are not studying speeches or political positioning. Instead, they study sentiment expressed in the media. Patronella (2021) looked at 2017 articles relating to COP from eleven different newspapers based in the US. Using R's `tidytext` package, she studied

the emotional categories of anger, fear, anticipation, trust, surprise, sadness, joy, and disgust. This lexicon is known as the National Research Council Canada (NRC). Some of her findings included that almost half of the articles that were sorted into the fear category also contained positive messages about efficiency.

Another study by Taufek (2021), used sentiment analysis to examine Malaysian citizen's sentiment towards climate change by looking at the newspaper, The Sun Daily. They used Azure Machine Learning software to classify editorials into positive, neutral, and negative. The top three negative words were "long", "critical," and "serious." The most common positive words were "better", "best", and "hope." The authors found that 90% of the articles were negative, while the remaining 10% was positive. They could not identify any neutral texts.

Marco Brambilla (2021) studied the Twitter response to COP 26 by using text mining. He looked at the whole year of 2021 and illustrated that the COP conference generated the most conversation relating to the climate crisis. He argued that most users saw climate change in a negative light, while when looking at COP policies, the conversation was mostly neutral. Further, there were four highlighted COP targets that were seen as important by the public. In descending order, they were decarbonisation, net-zero target, national determined contribution, and 1.5°C.

Kenneth Benoit *et al.* (2005) studied the Convention on the Future of Europe held in 2001. This body was created to negotiate and draft the European Union's constitution. Each political actor showed an inclination towards certain outcomes and would advocate for their positioning. This study was based on the technique developed by Laver *et al.* (2003) known as Wordscores. The method scores documents on a scale between -1 and 139 and shows the similarity between texts. The technique has also been used in other studies in political science. Heike Klüver (2009) also sort to study democratic legitimacy in the European Union using Wordscores. She explored the legislative process for implementing a CO_2 emissions reduction law for cars. The author proposed a polarity of "pro-environmental" versus "anti-environmental" to commence

Wordscores. Actors that were pro-environment had a closer framework to what was being proposed by the Commission. Groups more on the anti-environment side of the scale were seen as being against the proposition.

The concept of ecological modernisation first appeared in climate-related discourse in 1992 (Spaargaren & Mol: 1992). This theory relates to the belief that in order to shield against environmental degradation and move in a sustainable direction, both the free market and the state must play their part. Michael S. Carolan (2004) criticised ecological modernisation and focused on problems about production and consumption. He said that the problem with relying on the free market to address climate change is that it views related issues as "problems of production" that just need to be made more efficient. While proponents of this outlook acknowledge that the cause of climate change and environmental destruction is due to industrialisation, it does not advocate for deindustrialisation, but for more industrialisation. The philosophy asserts that under the right conditions, politics, the economy, and technology can stimulate competition and make capitalist endeavours around eco-efficiency easier. Those who oppose this thinking say that while improved efficiency is important, if consumption increases exponentially, there will never be "enough." Further, while the economy is able to grow, finite resources cannot and therefore there are limits to the ecosystem. Carolan (2004) reminds his readers that efficiency does not always equal sustainability.

David Ciplet and J. Timmons Roberts (2017) looked at the role neoliberalism had in the signing of the Paris Accord. They spoke about the "neoliberal justice principles." This sees justice as being adventitious and made from rational agreements between counterparts to work together out of self-interest. The Paris Agreement was based on this thinking, where countries voluntarily set their own targets according to their own accord. These goals were influenced by economic standing and growth, as well as being political motivated.

Cipet and Roberts then referenced "marketization" of the environment and its attempt at depoliticization. Karen Bakker (2010) wrote extensively about market

environmentalism. She said that this was a particular "variant" of neoliberalism. She quoted Neil Brenner who said it was "a politically guided intensification of market rule." (Brenner *et al.*: 2010) Marketization says that regulations around resources assure that through market means, the best interest of the economy and the environment will be upheld. Bakker said that the outlook promises a blend of economic growth, productivity, efficiency, and environmental protection. By commodifying the environment as an economic good, marketization argues that not only would it be more efficient, but it is the best way to counter environmental degradation. This outlook sees markets as a solution and not as being part of the problem. As a result problematic industries continue to make a profit. Some academics have referred to this as "green imperialism." (Bakker: 2010) The outlook expects that the market will act in the interest of the public. Therefore, there are few regulations. Cipet (2017) also caution that this has often led to human rights violations and environmental injustice. The authors also said that in the past, this has led to an increase in carbon emissions, signifying that the opposite is true of the theory. An example of this was seen with the promotion of emission trading and carbon credits. This was a popular "solution" at COP in 2011 to combat climate change and was promoted by many countries such as China and France (these speeches are explored later in this research). A 2023 article in the Guardian about deforestation and self-regulation of the market, showed how marketization is not always the answer (Horton: 2023). Deforestation was a key feature in the Paris Agreement. The protection of forests was not even a contentious topic amongst dignitaries, and its inclusion was anticipated. Horton's (2023) article highlighted a recently released report by Global Canopy. It said that seven years after the signing of the Paris Agreement, deforestation was still rife and that 31% of largest companies involved (both directly and indirectly), had made no commitments to reduce their footprint. Horton showed that when looking at the largest 100 corporations, only 50% examined their suppliers for signs of deforestation. The study also revealed that more than 60% of financial intuitions that were linked to deforestation had no policy

on future lending and investments. Further, only 32% of financial institutions had acknowledged deforestation as a commercial risk (Horton: 2023).

Cipet and Roberts (2017) speak about a third outlook related to neoliberalism. This was the idea of transparency and voluntarism. While in theory this seems like a good step towards sustainability, they argued that with no regulations entities do not need to disclose anything if they do not want to. They also said that this approach changed the conversation at COP. Conversation at the conference was based on the idea that those that were responsible for the pollution should also be responsible for fixing the problem. This shifted to the idea that all countries should contribute to the fight through voluntary goals.

The last factor mentioned by Cipet and Roberts was exclusive decision-making. This is a shift in power from a top-down government that can act on an international level, to a domestic body or private entity that voluntarily takes action. This was seen with the controversy of US president Donald Trump coming into power. When he announced that his government would be leaving the Paris Agreement there was retaliation by US politicians such as then Speaker of the House, Nancy Palosi, and senators from states such as California. They announced that they would continue the fight against climate change in their own capacity.

Climate justice is often viewed as being at the complete opposite to neoliberalism. Elliot Susan (2021) argued that the idea of what climate justice means has changed over time. The author named three types of climate justice: international justice, intra-societal justice, and intergenerational justice. International justice has been cited many times in this research project. It advocates that those who were responsible for large emissions should bear the cost of the climate crisis and should be at the forefront of remedying the issue. This is called the polluter-pays principle (PPP). Arguments against this is that the culprit is not always easy to identify and many may not exist anymore. They believe that current generations should not have to pay for what their forefathers emitted. PPP argues that those living in developed countries by default

have benefited from previous emissions and therefore should be held responsible. Another angle of this thinking is that wealthy nations, even those without a history of high carbon emission should finance the transition and adaption needed to combat the crisis. Intra-societal justice is derived from human rights. It says that climate change intensifies inequalities amongst vulnerable groups. Issues around gender, class, and race are at the forefront of this conversation about injustice. Scholarship has increasingly encouraged for transformative justice where structural inequities that impact marginalised groups are attended to. They advocate for a more intersectional approach to tackle the climate crisis and argue that understanding feminist theory, colonialism, and capitalism would greatly benefit the cause. Some authors also argue that the transition should also address issues outside of climate change. Another discourse that closely aligns itself with this philosophy is human rights discourse around indigenous justice (Susan: 2021). Indigenous groups are often targeted and pushed out of their homes. An example of this can be seen in the Amazon rainforest, where groups have lived for generations. Due to cattle and farming and agriculture, large areas have been decimated. There are powerful agribusiness' that lobby the Brazilian government. This was particularly the case with the former president and staunch conservative, Jair Bolsonaro (Fishman: 2021). Finally, intergenerational justice looks at how previous generations are responsible for the present and future climate crisis. This outlook says that there is a moral obligation on current generations to conserve the environment for future generations. This is outside of the scope of this dissertation (Susan: 2021).

Rebecca Willis (2017) explored how politicians speak about climate-based issues. Using critical discourse analysis, she studied transcripts of speeches given by British MPs in 2008 about the Climate Change Bill (CCB). This bill sort to address issues related to carbon emissions. The author was interested in how a climate-related topic is framed. Framing is the practise of describing and defining a problem to fit with the goals of a certain party or movement. Willis argued that there was an identifiable pattern to prove this. She said that topics related to the climate crisis often relied on themes around the economy, and "market failure." The politician's may also speak

about it in a very technical way. With regards to the 2008 CCB, this approach was popular across party lines and had the support of the business community. Examples of this in the transcripts for this dissertation is the constant reference to the IPCC and the technical language used to describe the changing climate, as well as the solutions. The speeches also take on the neoliberal tone that is market-focused. Proposed solutions were often related to technological innovation driven by the free market. Due to agenda setting, Willis suggests that what politicians leave out of their speeches is equally important, as they are in control of dialog and can avoid details they don't want to address. In order to undertake her study, she used text mining to identify word frequency and bigrams. Bigrams is the study of two words most likely to be used next to each other. She said that while this was not the focus of her study, it helped to uncover patterns that she would not have been able to identify on her own.

Studies have been made comparing political speech transcripts at COP to that of climate change protesters such as Greta Thunberg (Relative Insight: 2021). Every year, thousands of protesters congregate around the conference demanding more ambitious targets to address the crisis. Using a text analysis tool, words, grammar, phrases, topics, and emotions were studied by Relative Insight. They found that politicians were over 4x more likely to use actionable verbs. Examples of this could be: "It's time to make a change." or "We need to act now." Government representatives spoke about unity, solidarity, and the need for cooperation. "Cooperation" was a term that did not feature in speeches given by activists. The study found that politicians were 2x more likely to have a positive tone and communicate optimism. They made use of techniques in their discourse to stir audiences, where they drummed up hope and assurance. When studying the speech transcripts from activists, they showed a different narrative to that of the politicians. They showed anger at the politicians for not taking real action and accused them of making empty promises and being ignorant. They were almost 16x more likely to use words like "truth," "avoid," and "ignore." Their speeches were far more pessimistic with negative language about destruction of the environment. This discussion was more than 7x more likely to be used by protestors. The words "fighting"

and "fear" were commonly used to describe the present and future. The study also showed that they were 5.4x more likely to ask the audience questions. This helped them gain support from everyday citizens (Relative Insight: 2021). While this study was done by studying COP 26 in 2021, similar scores are predicted to apply to previous years.

As a part of a larger study by Antal Wozniak *et al* (2021), media framing and debates related to COP were explored. They described the conferences as a "staged political media event." Such events disrupt regular media production and shifts focus onto what the conference has set as the agenda. The authors suggest that the frame change is also more likely to take place if what is said impacts policy positioning. Interestingly, the authors found that during the two-week conference, the number of countries referenced in the media decreased. Instead, wealthier nations such as the US were focused on. They described this as a "centralization of media coverage." They argue that while the COP allows for all countries of different circumstances to take part, conversation is still driven by elites and what vulnerable governments say is drowned out, therefore, only continuing inequality.

Limitations

Although COP started in 1995, transcripts of speeches are only available from COP 16 in 2011 to the present. Further, this analysis could only track the conferences up until 2019. This was due to the lack of availability of data from the World Bank for the years that followed. This is unfortunate as the events cannot be studied in their entirety. The years between 2020 to present have seen massive geopolitical shifts around the world. Due to the unavailability of data after 2019, this period was not covered. The two largest events were the Covid-19 pandemic which saw economies around the world halt, and the Russian invasion of the Ukraine. These two proceedings had a massive effect and therefore we cannot assume that the COP conferences after 2019 were business as usual. During lockdown around the world, economies contracted.

The price of oil also plummeted (Ambrose: 2021). While this did eventually recover, it showed how delicate the market is. The Ukraine-Russia war has resulted in the EU rethinking its energy mix. Many European countries relying on Russian gas being piped to them at a low cost. Due to sanctions and a fear that the countries energy supply is not guaranteed, actions have been made to find power else were (Fisher: 2022). This has resulted in investments in renewable energy as well as further reliance on fossil fuels. While there is interest in increasing the former, the BBC described fossil fuels as going through a "gold rush" as countries struggle for energy security (Fisher: 2022). Despite all this, the transcripts used do cover several years and therefore examination was still possible.

The transcripts used were those provided in English by the UN. While this makes up the majority of the speeches, important players were left out. This is most notable with Arabic texts, which are mostly associated with the Gulf States that are OPEC members. These nations are important in conversation related to energy as they have high stakes in the extraction and processing of oil.

A limitation regarding text mining of these speeches is that nuances are seen with certain information. An example is when watching the speech either live or via recording. The tone of voice and non-verbal communication such as body language and facial expressions are maybe overlooked. The software used in this research project cannot interpret useful information such as applause or silence from the audience. This factor can be useful to understand perception of the speeches given.

The quality of the transcripts varied from year to year. The latter years were of good quality that could easily be processed and used in R. Unfortunately, some of the older speeches (between 2011 and 2014) were saved as images and were often photocopies of the speeches or contained handwritten notes. This meant that a large portion of the data had to be converted from an image to text. This resulted in small errors where the programme could not interpret the script. Due to this reason, the year 2012 was left out as a large portion of the speeches were not legible. Further, because

many of the speeches were not legible, each year varies in how many transcripts are used. An example of this can be seen with COP 17 in 2011, which had 100 texts in total, and COP 24 in 2018, had 43 transcripts. While all texts are useful and valid these differences impact the data.

Lastly, there were some years that key players that did not give speeches. This was most pronounced in the absence of the United States and China in certain years. These countries have the largest economies in the world and are prominent polluters. It is important to note that in the years that they did not take part, the data may have looked different if they delivered speeches.

Overview

The following section discusses the methodology. This chapter will provide more insight into sections such as the research design, sentiment analysis, Wordscores, and the multiple regression models used. This research project then moves into the approach used to undertake the study and the data used where all variables are discussed in detail. Data was collected from the World Development Index (WDI) and the World Wide Governance Indicator (WGI) as they are reliable and accessible to the public. This research made use of text mining in R, sentiment analysis used the AFINN, Bing and NRC lexicons. Afterwards Wordscores were used to quantify these speeches on a scale from -1 to 1, according to reference texts inputted by hand. It should be noted that aspects such as punctuation, numbers and stop words were eliminated from the speeches in order to simplify, as well as extract data. A multiple regression analysis was then run through every year, as well as an aggregate of all of the years in order to pick up patterns and changes. In chapter three, the results are given followed by a discussion on the matter. The research found that aspects such as countries GDP, population and region were significant factors. Interestingly, democratic status and CO_2 emissions were not significant factors. The dissertation then concludes. This

section briefly summarises the research, statistics and findings. Lastly, there was a brief discussion on possible future work and the bibliography.

Chapter 2

Methodology

Research design

The research approach has been one of positivism (Park *et al*: 2020). This follows the view that research should be based on factual knowledge that has been observed and measured. In order to undertake a research project, analysts need to be objective and distance themselves from their personal viewpoints while conducting their work. Research should be quantifiable and should lead to statistical analyses. However, post-positivism acknowledges that while the scientific method is vital when doing research, there are limitations to objective observations. This approach to knowledge production is that research is not always finite and is subject to adjustments based on new evidence.

Going into this study, an assumption was made that political actors pursue their climate related ambitions at COP by making speeches and taking part in negotiations. These preferences can be unpacked by studying their speech transcripts with sentiment analysis, the use of Wordscores, and the running of regression models.

Sentiment Analysis

Sentiment analysis focuses on the grading of texts on a scale from positive to negative. Classification can be done manually by people or automatically via programming. While using humans to hand score documents may be regarded as having a higher degree of accuracy, the method has its flaws such as being time consuming and expensive. It also makes it harder to get through a large dataset (Augustyniak *et al*: 2015).

A sentiment lexicon consists of a list of words and phrases. It assumes that certain words or phrases imply sentiment. While advocating for its use, Bing Liu (2012) cautioned against primarily using it for sentiment analysis. He lists a number of problems. The first is that positive and negative words may have different meanings that sometimes mean the opposite of what is scored. Sometimes words also have no sentiment in certain contexts. An example of this is the word "like" which is typically scored as positive. However, in a sentence where the word is used for comparing something e.g. "A looks like B", no sentiment is implied (Bahrainian, *et al.* 2014). Liu (2012) also highlighted the problem of sarcasm. Sarcasm may mean that what is being said is actually the opposite of what is meant. He said that his experience has indicated that sarcasm is not really prevalent in texts such as product reviews. However, conversation about political opinion is often rife with it. He also lists that there are sentences that have no sentiment but infer opinion. While sentences may contain factual information, many may also be subjective. This means that they can express many kinds of information such as "opinions, evaluations, emotions, beliefs, speculations, judgments, allegations, [and] stances" (Liu: 2012). Texts may also contain conditional sentences. This is when situations and their implications and consequences are used. Typically, two sentences, a condition clause and consequence clause, need each other to suggest meaning and sentiment. The above-mentioned issues are usually difficult for a computer to pick up on. Liu (2012) argued that in order to identify meaning, larger datasets need to be used to identify sentiment.

Sentiment analysis can be divided into two sections: machine learning and data mining by training a model. Scoring is lexicon specific and gives different weights for words, phrases, or documents. The AFINN lexicon is one of the most popular methods for studying sentiment. It was created by Finn Arup Nielsen who manually classified English words on a scale between -5 (negative) and +5 (positive). Mohammed Al-Shabi (2020) did a study where he looked at the accuracy of different lexicons. AFINN was one of the dictionaries analysed, and its performance was tested on two different datasets. The first dataset showed that AFINN was the second most accurate out of

five lexicons. The same study showed that it was more accurate when rating negative words. The second study also ranked the method highly in comparison to its counterparts. It was also revealed that AFINN has a high accuracy for neutral words.

Most lexicons focus on sentiment orientation where words, phrases, or documents are scored on a positive-negative polarity. The NRC lexicon is a form of sentiment analysis that focuses on word-emotion associations. Some psychologists treat human emotions as something that can be divided into taxonomies. Saif Mohammad and Peter Turney (2013) said that emotions are complicated with some being basic and others being more complex. This led them to look at the work of psychologists such as Paul Ekman (1992) and Robert Plutchik (1994) who created theories for basic emotions. Ekman proposed six main emotions: joy, sadness, anger, fear, disgust, and surprise. Plutchik added two more: trust and anticipation. When Mohammad and Turney created the NRC, they decided to use Plutchik's outlook as they felt it was less bias to negative emotions in comparison to Ekman. The lexicon uses lists of words and phrases from the 1986 Macquarie Thesaurus. The categories in the dictionary acted as a first "course sense" of the words. They then made use of Amazon's Mechanical Turk service where humans hand scored the words to better accuracy (Mohammad and Turney: 2013). Samira Zad *et al* (2021) made a strong argument cautioning the use of the NRC lexicon on its own. Alongside this, they also advocated for its improvement. They described the technique as having a large number of "incorrect, nonsensical, pejorative, or otherwise troubling entries." The method's use of handscoring to create the original lexicon was criticised. The authors argued that the lexicon was not only impacted by human error, but also human judgments or bias. Further, there were concerns that the scorers may have been shown terms that they did not understand. Example of words that illustrate clear bias are: *lesbian*→Disgust|Sadness, *women*→Anger, *fat*→Disgust, and *mosque*→Anger. Nonsensical examples are *stone*→Anger, and *mountain*→Anticipation. Zad *et al* (2021) estimate that hundreds of NRC words show these biases and make up roughly 5% of the lexicon. The authors

believe that the NRC is still useful. However, analysis has to be context specific and manual checking needs to be rigorous.

Wordscores

The Wordscores technique was designed to address issues with interpreting political discourse in a systematic way. Before Wordscores, the most popular methods were to score texts by hand, as well as making use of survey data. Difficulties with these methods are that they are resource intensive and require knowledgeable clerks. Computerised coding is also used but often just replicates the "hand-coding" approach. Part of the problem is that well-crafted extensive dictionaries need to be created. This is costly and takes time. As a result, dictionaries tend to be broad and not theme specific. Laver (2003) argued that this computerised method replicates the issues seen with hand scoring such as bias and the changing of meaning over time. Wordscores are different in that it treats texts not as discourse that needs to be interpreted by a human, but rather a collection of word data derived from predefined dimensions based on something known. Typically, opposing political texts that are well defined are chosen and scored. These documents are referred to as "reference" texts and are derived from qualitative observations. The unknown texts that are measured against these are called "virgin" texts. This is time saving as the content of the virgin texts do not need to be known. Naturally, reference texts are more likely to be broad or seen as outliers. As a result, virgin texts are often clustered together. Laver and Benoit acknowledge that the need for human assumptions means that the data will not always be 100% precise. Despite this, they endorse the technique as a more precise way to understanding political discourse and positioning (Laver and Benoit: 2003).

Since its inception, Wordscores have been used in multiple ways to better understand political communication. These are some examples of this: Social media data has been used to place journalists on a scale of liberal to conservative (Barberá & Sood: 2015). Chapp *et al.* used it to see if there was a correlation between politicians

and statements they made online. Author Marzagão (2017) sought to make a "democracy index" by analysing newspaper articles. Bruinsma and Gemenis' 2019 paper showed that when looking at Google Scholar between 2003 and 2017, 156 papers had used Wordscores for their analysis. In a landmark paper Ian Budge and Paul Pennings (2007) criticised Wordscores as they said that the method resulted in a "flat[tening] of the data and replicates the same problems faced by other computational methods". This resulted in a fierce rebuke by Benoit and Laver (2007) where they argued that the method was not tested properly. Authors Robert Klemmensen *et al.* (2007) defended the approach, saying it resulted in similar estimates to other popular methods. They compared Wordscores with the Comparative Manifesto Project (CMP) to study Danish elections. While they acknowledged that CMP produced closer results to expert hand-scored documents, Wordscores were not far off and was described as allowing the data to have "larger swings in party positions". In a similar study, Thomas Bräuninger *et al* (2013) explored Western European countries' left-right ideologies. The authors advocated for the Wordscores method and described it as a valid technique. However, they did acknowledge that the estimates correlated well with the CMP approach for some counties more than others.

Bruinsma and Gemenis (2019) made a case against Wordscores as a reliable computational text analysis method. They said that there were several problems with the method. The first was that Wordscores were greatly dependent on the chosen virgin and reference texts. They said that the method was a poor predictor of party positions compared to other measures used to study discourse. The second issue they highlighted was that the presence of non-informative words was pushing scores to the middle of the scale. They argued that for the technique to be effective, effort needs to be made by an informed human who could manually go through both reference and virgin texts. Bruinsma and Gemenis (2019) said that this defeated the purpose of the claim that the method is a time saving tool. They do however say that the method should not be dismissed completely. They just argued that in order for it to be useful, more human intervention needs to be used.

With the `quanteda` package in R, Wordscores can be calculated. This is done by selecting two or more reference texts with opposing opinions and scoring them as either -1 or 1. The virgin texts are then algorithmically placed on this scale. The main use of Wordscores in political science has been to categorise ideological perspectives of politicians.

Multiple regression

The study of regression is a quantitative research method that looks at the relationship between dependent and independent variables. John Dudovskiy (2022) stated that a linear regression has four main assumptions:

1. Linearity: "There is a linear relationship between dependent and independent variables."
2. Homoscedasticity: "Data values for dependent and independent variables have equal variances."
3. Collinearity: "There is no correlation between two or more independent variables."
4. Normal distribution: "The data for the independent variables and dependent variable are normally distributed."

The following equation represents regression:

$$Y\iota = f(X\iota, \beta) + e\iota$$

Were,

$Y\iota$ = dependent variable

f = function

$X\iota$ = independent variable

β = unknown parameters

$e\iota$ = error term

Regression is made a lot easier in R. The language uses the base library "stats" to provide the "lm()" function.

There are disadvantages with using multiple regression that one needs to be cognisant of. The first is the possibility of overfitting. This is when a model becomes too complicated and the data fits too closely. The second difficulty is the prospect of multicollinearity. This is when variables are highly correlated with one another. This may result in coefficients that are difficult to interpret. Thirdly, the model is sensitive to outliers. These are data points that are significantly different from the rest of it. This may skew the data and result in a model that is poorly fitted. Non-linearity may also be a problem when using multiple regression. The model assumes that there is a relationship between the dependent and independent variable. However, if this is not the case, the method is not appropriate for the study. The fifth disadvantage of the model relates to "assumption violation." Multiple regression assumes normality, homoscedasticity, and independence of the errors. If this is not upheld it may result in biased estimates and incorrect conclusions (Krushnamoorthy & Alok: 2022).

Approach

The following methods will be used to study the political speeches given at the COP Conferences between 2011 and 2019. Predominantly two methods will be used. The first is a sentiment analysis of the transcripts using the AFINN, Bing, and NRC lexicons. The second stage of the project will make use of Wordscores which will then be used in conjunction with multiple regression models.

The `quanteda` package in R will be used for this text mining study. Pre-processing included the removal of stopwords, punctuation, and numbers. All years will be studied both together and individually to better understand the data in more detail.

The structure of the data is in many ways uniform. They are formally written, and don't use colloquialism. Most speeches do not have any spelling or grammatical errors. Such mistakes are only seen in the data between 2011 and 2014 where an image-to-text conversation was done. Where visibility was not clear, the software may have read the text incorrectly. Further, the theme of the conferences means that all actors are talking about the same or similar problems.

Multiple regression was used for each year. The dependent variable was the Wordscores while the independent variables were the log of GDP per capita, log population, CO_2 emissions, and voice and accountability. The dummy variable "region" was also included. Seven regions were accounted for: Africa, Asia, Europe, Oceania, and North and South America. There are n amount of levels available and therefore only n-1 dummy variables are needed. R automatically dealt with this by removing one of the variables – Asia.

Data

Transcripts collected were political speeches by heads of state at the different COP conferences. They typically gave an indication of the positioning and attitudes of each country relating to climate change each year. Eight years were used with varying numbers of transcripts collected. The speeches were between 2011 and 2019. 2012 was left out due to the poor legibility of the texts. This resulted in the inability for R to read the data. 2021 and 2022 were not used due to the unavailable data on CO_2 emissions from the World Bank.

Regression variables

Wordscores: Used as the dependent variable.

The below table (table 1) consists of a summary statistics showing the number of transcripts used, and which countries were used to calculate the Wordscores.

Table 1: Transcripts for Wordscores

Conference	Virgin texts	Reference texts
COP 17 (2011)	98	China | France
COP 19 (2013)	72	China | United States
COP 20 (2014)	55	Iran | United States
COP 21 (2015)	63	China | United States
COP 22 (2016)	86	China | United States
COP 23 (2017)	75	Iran | United States
COP 24 (2018)	41	Canada | South Africa
COP 25 (2019)	50	Canada | South Africa
Combined analysis	550	Iran (2017) | United Sates (2017)

GDP per capita: Typically, a high GDP per capita is associated with a high-income country and a low GDP with a low-income country. Many studies argue that a high GDP per capita correlates with high CO_2 emissions due to growth in the production sector. However, some argue the opposite, as most developed countries move towards a service economy (Povitkina: 2018). The GDP per capita data was gathered from the World Development Indicators (WDI). This indicator was logarithmically transformed to account for the possibility that income affects positioning. If the Environmental Kuznets Curve is correct, wealthier countries may promote energy-related projects in renewable energy as affluence leads to an emphasis on environmental quality.

Population: This data was also collected from the WDI and was logarithmically transformed. This information was derived by countries nation censuses. Errors may

occur particularly with developing countries. Factors that influence the gathering of the data include limited transportation and communication, as well as a lack of funds.

CO_2: CO_2 emissions (kg per PPP $ of GDP) was collected from the WDI website. These emissions related to the burning of fossil fuels as well as the manufacturing of cement.

Voice and Accountability: The perceptions of the extent to which a country's citizens are able to participate in selecting their government, as well as freedom of expression, freedom of association, and a free media. In essence, this measures a countries relationship to democracy. This was collected from the Worldwide Governance Indicator (WGI). If Johnson *et al.* (2023) are correct, democracy may impact government involvement in environmental issues.

Region: The continent of each country was used as a dummy variable.

Chapter 3

Results and Discussion

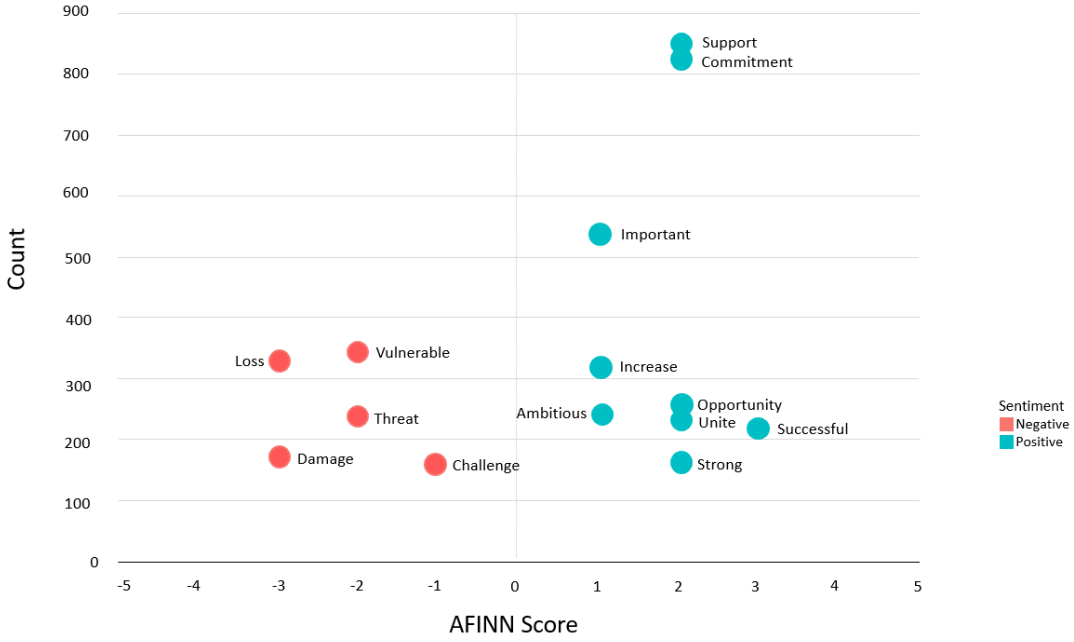
The following section is divided into two. The first segment will look at COP as a whole from 2011 to 2019 (excluding 2012). This will be followed by a closer study of each individual year. Going into this study, it is important to know that speeches may be more strategic than true. However, what is said can be understood more as a proxy to accurate policy positioning.

It is imperative for politicians to build a positive national and international reputation. There are different techniques that speakers may use when making speeches. They often try to sound more personal by using the words "we," "our," or "us." They may also use repetition and quotes (Atkinson: 1984). This is prevalent throughout the transcripts. Speeches focus on a global issue that impacts everyone. As a result, politicians communicate a message of unity and strength. Examples of quotations was seen in 2011 in South Africa where a number of countries quoted Nelson Mandela and writer Nadine Gordimer. Repletion is seen particularly in parts where there is a call to action for countries to unite and agree on a commitment to take action against climate crisis.

Graph 1 depicts the AFINN lexicon results. It shows the 14 most used words in the data. It also illustrated that the majority of these words were positive. The sentiment word "support" had the highest frequency and had a positive sentiment with a score of 2. It occurred 848 times across all speeches. When studying bigrams the two most common words used alongside "support" were "developing" and "adaption." This is most likely in relation to supporting developing nations and climate adaption plans. The negative word with the highest frequency was "vulnerable." It had a frequency of 335, and a score of -2. Negative words "loss" and "damage" are likely to be the result of the persistent topic of reparations. The words "countries" and "climate" were the most recurrent bigrams. This too is probably in relation to developing nations who are most

at risk and vulnerable to climate change. With the exception for "successful," the most frequent words lay between -2 and 2. This shows that politicians are not using extreme words. There were no words with a score of -5 or 5, and there were only two words that had a score of -4 and 4. "Catastrophic" was used 35 time and was scored -4. "Wonderful" was used 7 times and had a score of 4. This may mean that politician avoided using sensationalist words.

Graph 1: AFINN lexicon score



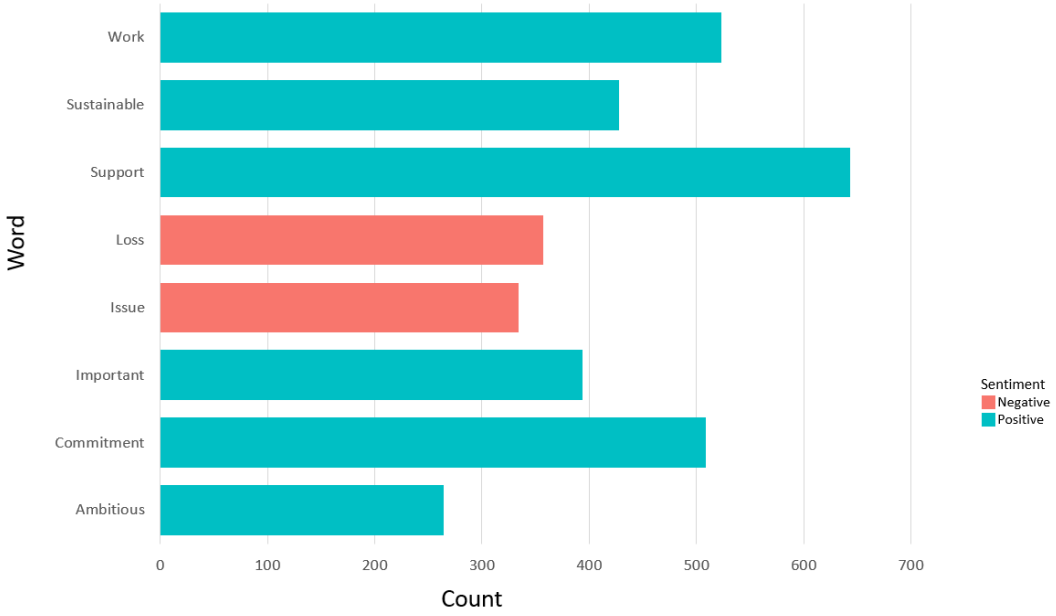
Words do not always fit into the positive-negative split. The following example shows both the positive and negative words "support" and "vulnerable" in one sentence. In this context, "vulnerable" is a part of a larger positive sentence.

Example from 2016 speech from Cyprus: "We are also collectively providing the adequate means of implementation for mitigation and adaptation action in developing countries, including a particular focus on *support* to the poorest, most *vulnerable* and those with the least ability to mobilise other resources."

This illustrates that sentiment analysis should be context dependent.

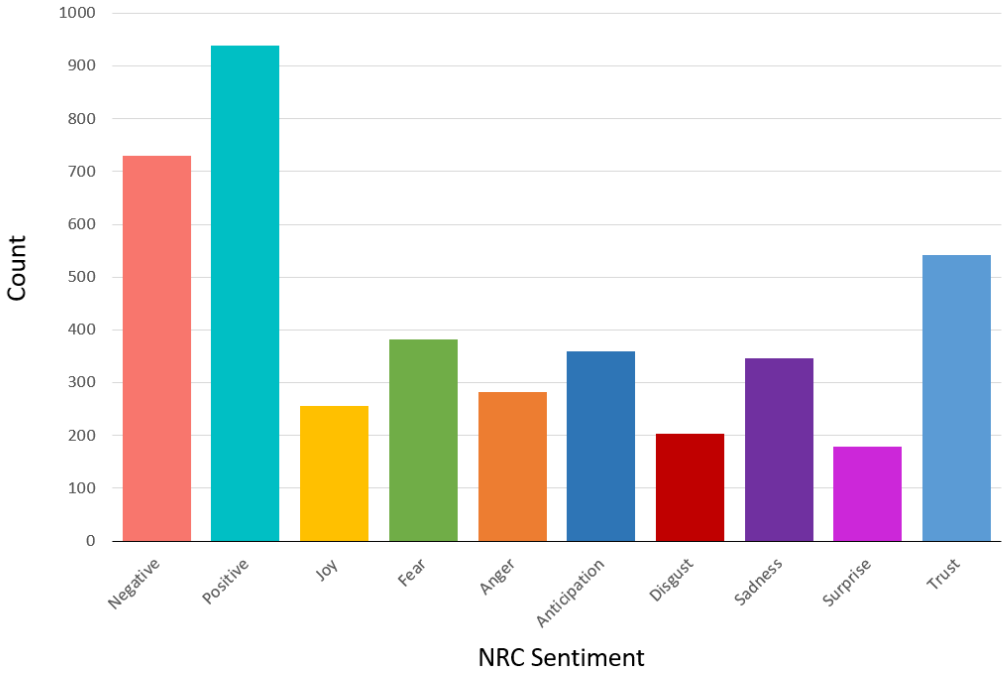
The Bing Lexicon revealed very similar results to the AFINN lexicon. This is illustrated in Graph 2 where the 8 most used words were given a sentiment score of positive or negative. Most of these words were positive.

Graph 2: Bing lexicon score



Graph 3 shows the NRC lexicon results. The data showed that words were mostly positive. This was largely due to *trust* being the most prominent emotion seen in the transcripts.

Graph 3: NRC lexicon score



Bettinghaus and Cody (1994) studied how speakers gain the trust and credibility from their audiences. They said that orators need two factors to do this: trustworthiness and expertise. In an online article, George Vella (2013) mirrored this study and argued that in order for audiences to trust speakers they must come across as "credible and acceptable, [arguments must be] based on knowledge of related circumstances, [they must make] objective unprejudiced assessment[s], good judgment, and clear decisions." They also need to come across as selfless and having the interests of the group at hand. The transcripts follow these factors by citing the IPCC report. They then speak to a narrative of how climate change has impacted their own country such as wild fires, droughts, and harsh summer and winter seasons. While they demonstrate that climate change may be something to fear, a narrative of strength and a united front is communicated. They reiterate that they are committed to work on solving the problem and that everyday citizens can trust them. COP is also a unique and rare forum where all countries of different standings such as developed and developing nations, have equal opportunity to express their positions. As a result, speeches are not just aimed at ordinary citizens, but also other nations. They may communicate different attitudes such as strength and vulnerability.

Table 2 depicts the descriptive statistic for the Wordscores. The reference texts were the 2017 speeches given by the United States and Iran. The virgin texts were all the transcripts between 2011 and 2019. The speech by the US official was broad and non-committal. This was the first COP that fell under the newly elected US president Donald Trump. He was a prominent climate change denier, and spouted nationalist rhetoric. When he came into power he announced that the country would no longer take part in the Paris Agreement. This was evident in the transcripts and is a good example of how the speeches are positive even if the county is not entirely on board or even interested in the cause. The speech was broad and avoidant. The politician said that the country was willing to rejoin the agreement but only under new terms that favoured the US. He also outlined a few ways in which the country had made positive strides towards environmental protection. However, he emphasised that this was the result of work by the private sector and he advocated for an increase in marketization. In contrast, Iran acknowledged the climate crisis and emphasised the importance of the Paris Agreement. It highlighted what it saw as the most important feature of the agreement: providing financial and technological assistance to poorer nations. While it said the West was to blame for the majority of emission, it emphasised the importance of developing nations to take climate action. The representative used words such as "together," "fair," and "balanced." However the speech did divert to the topic of sanctions from mostly western countries. Despite this, the speech was very positive.

These two speeches were chosen due to how they contrasted each other. The US was evasive and uninterested. It also promoted a nationalist and capitalist approach and placed its faith in the private sector. Iran showed concern for the situation and emphasised the need to fight environmental injustice. However, these speeches were by no means extreme. While elements of neoliberalism and social justice were identified they were not acute to the narratives. This was done to avoid the transcripts being extreme outliers. Despite this, the majority of countries' Wordscores bunched up around 0, and leaned more towards the Iranian speech. The average score was -0.15. When undertaking this study, the Wordscores function was run multiple times with

different reference texts. This process did confirm one of the criticisms of the technique that it is heavily reliant on the chosen reference texts to showcase a certain narrative.

Table 2: Descriptive Statistics

	Wordscores
Min.	-1
Max.	1
Mean	-0.15
Std.Dev.	1.41

The Wordscores were used as the dependent variable to run a regression model. The results can be seen below in table 3. The model showed that there was strong evidence that GDP per capita played an important role in the similarity of the transcripts to the reference score, Iran. The lower a countries GDP, the more likely it would be similar to Iran. This was also seen with population where the larger a countries population was, the more likely it would sound like Iran. The model illustrated the importance of the region the country came from. North America and Oceania were both statistically significant in this study. North America is typically viewed as being prosperous because of the US and Canada. However, many forget that Central America and the Caribbean are considered part of the continent. These areas are some of the most at risk places in the world. This is also the case with islands nations in Oceania. Both regions are predominantly made up of developing countries and would greatly benefit from the Green Climate Fund (GCF). This is where financial support would be given to developing nations to help with adaption and mitigation for a cleaner environment. Europe was less significant but important. The European Union has made public pledges to the fight against climate change. This is in contrast to the 2017 US speech which avoided the issue. The EU also showed some support for the GCF and had made efforts to promote renewable energy. If the study by Johnson and Lener

(2023), as well as the Environmental Kuznets Curve (Aşici & Acar: 2016) are correct, wealthier nations are more likely to tackle issue around the climate and fight degradation of the environment. The model showed that democracy had no impact on countries speeches. This goes against what Marina Povitkina's (2018) said about democracies being more invested in fighting climate change. This may be due to the impact of the Paris Accord. The agreement brought countries of different standings together under a unified plan. It was a space where developed and developing nations, as well as democratic and non-democratic countries came together. The regression model showed that CO_2 emissions were irrelevant in how a country positioned its speech. Once again, this may have been impacted by the Paris Agreement which was adopted by countries with different background. This was the first time that developing countries, China and India, agreed to a plan. Similarly, under US president Barack Obama, the country also signed an agreement for the first time.

Table 3: Regression Estimates

	Dependent variable:
	Wordscores
log(GDP per capita)	0.017 ***
	(0.003)
log(Population)	-0.007 *
	(0.004)
CO_2 emissions	-0.00
	(0.001)
Voice and Accountability	0.006
	(0.006)
Africa	0.014
	(0.012)
Europe	0.025 *
	(0.013)
Oceania	0.065 ***
	(0.019)
North America	0.067 ***
	(0.019)
South America	0.035
	(0.026)
Constant	-0.484
	(0.051)
Observations	544
R^2	0.150
Adjusted R^2	0.136
Residual Std. Error (df = 544)	0.092
F Statistics (df = 9; 544)	10.693***
Notes:	*p<0.1; **p<0.05; ***p<0.01

COP by year

COP 17 (2011)

COP 17 was hosted in South Africa. The conference did not result in a treaty or any legally binding deals. However, the formation of the Green Climate Fund (GCF) was outlined and adopted. This was an initiative to help finance the transition to a cleaner and more sustainable economy for developing nations. It was argued that western industrialised countries were responsible for the majority of greenhouse gas emissions and therefore should take on the responsibility of fixing the problem. Developing countries argued that they were bearing the brunt of the climate catastrophe and were too poor to transition in a sustainable way. Some argued that without the adoption of the GCF, the 2011 conference would have been viewed as a failure (Down To Earth: 2022).

Transcripts from France and China were used to calculate the Wordscores. The French representative's speech focused on the urgency to enforce a climate action plan and argued for more ambitious targets. The country promoted the need for all major economies to take part in producing a balanced and comprehensive plan to reduce carbon emissions. It cited the scientific facts from the IPCC report published during that period as a reason for solidarity and action. The speaker referenced work that the country had already done with the Kenyan government, and praised developing nations for voluntarily stepping up to fight climate change. France also praised the motions already underway by the European Union.

The Chinese had a different focus where it highlighted the difficulties faced by developing nations. It expressed its support for the Kyoto Protocol of 1997 and quoted the treaty by saying that the country was in favour of "common but differentiated responsibilities". It argued that developed nations should be setting higher practical targets to reduce CO_2, and the focus should not be on what developing nations emit. The nation emphasised that while it produced the most emissions, its GDP per capita

was low in comparison to the United States and EU countries. China was in favour of launching the GCF and stated that it was important that poorer countries received financial support and the transfer of greener technology. It was also in favour of emissions trading. This is when a market is created, where a certain amount of emissions are allowed. This is typically determined by a government or industry with the goal of progressively decreasing emissions. Carbon credits are bought and sold that permit the entity to emit a certain amount of greenhouse gasses. France was also in favour of this initiative.

The 2011 data had the largest number of speeches given in English and the year included more European states than other years. When looking at the Wordscores we see that scores were varied between being more French or Chinese. The regression model revealed that most countries had more in common with the French speech given. However, the margins were thin. The model showed that high CO_2 emissions made it more likely for a country to be similar to the French speech.

The Bing and AFINN lexicon were used to study sentiment. Bing revealed that there was a more positive tone than negative. The most used positive terms were "commitment", "support", and "balanced". The AFINN lexicon showed that sentiment was mixed. However, the terms most used were more favourable and had a positive slant. Bigrams illustrated the terms most likely to appear next to each other. This was a good way to better understand themes. Popular bigrams were "Kyoto Protocol", "climate fund", "developing countries", and "legally binding". This showed which of the topics countries were interested in and focused on the signing of a comprehensive plan that was enforceable. Topics about funding developing countries were also prominent.

COP 19 (2013)

The 2013 COP was held in Poland. The conference proposed the Warsaw International Mechanism. This focused on the loss and damage associated with climate change. It

would help countries financially recover from events caused by climate change such as natural disasters. This was aimed at helping developing nations. However, richer nations were apprehensive to sign any agreements related to this. The "China block" which consisted of just over 130 countries walked out in protest as they described the western world as not taking it seriously. Again, the GCF was spoken about with little success. While developed countries had made a commitment in previous years related to this fund, the initiative failed to raise the funds needed for a financial and technological transfer (Down To Earth: 2022).

China and the United Sates were chosen to complete the 2013 Wordscores. China's speech unpacked the dangerous reality of the effects of climate change and called for more proactive targets to be made. It put pressure on developed countries to ratify agreements and take responsibility for their historical emissions. It argued that richer countries needed to action their promises to capitalise the GCF and support developing countries. China maintained that while it was a massive polluter, when looking at its large population, and it's GDP per capita, a different story was painted. South-South cooperation's were encouraged with the country saying that it had already helped poor countries through training, providing expertise, and financing green projects.

The US speech struck a different tone. It emphasised that *all* countries should be taking part in the fight against climate change. In the past, the US had criticised China and India for being large polluters that used their status as developing nations to continue emitting CO_2. The speech was focused heavily on what the US had already done. The tone was very individualistic in comparison to the Chinese speech that spoke about solidarity. The US emphasised the development of different technologies to help curb emissions but fell short of making ambitious commitments. An example of this was the refusal to speak about electric transportation, and instead spoke about the need to make internal combustion engines more efficient.

Multiple regression showed that the majority of countries studied sounded more like the Chinese speech. This may have been due to the encouragement of solidarity

and action. The continents of North America and Oceania were significant. This is probably because the Caribbean and other island nations stand to lose the most. These countries have low emissions but have to bear the costs of increasing temperatures.

The Bing lexicon indicated that most speeches were positive. "Support" was the most spoken about positive term with a count of 84. This was followed by words such as "commitment", "sustainable", and "progress". Negative terms were emotive with conversation related to loss and damage faced by developing countries. The AFINN lexicon showed that most terms were neutral with some leaning more positive. Again, "support" came up as a highly emotive score that was positive. "Growth" and "progress" also scored high. "Loss" and "damage" had the lowest scores at -3. When studying consecutive words for 2013, the top three bigrams are "developing nations", "developed countries", and "loss damage". This ties closely to what we know were key themes for COP 19.

COP 20 (2014)

Peru hosted the 2014 COP. The participating parties did not come to any conclusions however the conversation about lowering greenhouse gas emissions was described as "genuine". Some said that the conversation laid the groundwork for the next COP conference held in France (Down To Earth: 2022).

Iran and the US were used for the Wordscores. Iran spoke about the importance of fighting climate change and highlighted the impact of rising temperatures. The statesman expressed concern with what he described as the developed world's inability to lead in the fight, considering they had historically emitted high volumes of CO_2. Iran expressed frustration with the West as countries were not reaching their targets and not being ambitious enough. Further, they were not fulfilling their promises such as the commitment to finance the GCF. The nation voiced the need for capitalisation of this fund, as well as the transfer of sustainable technology to developing countries.

The country also emphasised that aiding the developing world had a greater knock off effect as it had the ability to address hunger and poverty.

The United States' emphasis was on tackling climate change through technological innovations. It stated that it was a leader in the transfer to a sustainable economy. Three aspects of this were highlighted. They were the promotion of building efficiency, a shift to renewable energy, and implementing efficiency standards for light and heavy duty vehicles.

Multiple regression revealed that countries giving speeches were closer in similarity to Iran than they were to the US. Further, being from North America was significant in how a country's speech sounded. The Bing lexicon revealed that there were more positive terms than negative. As seen in previous years, "support" was the word most used that had a positive connotation. This was followed by "commitment" and "sustainable". The AFINN lexicon showed a more nuanced story. Most terms were neutral, but emotive words were seen that were either positive or negative. Popular bigrams included "climate fund", "new agreement", and "long term". A clear narrative for COP 20 was difficult to identify. This may be because it was largely seen as a transition COP before the Paris Agreement in the year that followed.

COP 21 (2015)

COP 21 is seen as a huge milestone as countries signed the Paris Agreement. Through diplomatic manoeuvring, 196 representatives came to a consensus to reduce carbon emissions. This agreement was important as both developed and developing nations took part. In the past, many developed nations such as the United States refused to sign any agreements. They often cited that while China and India were developing nations, they were some of the largest emitters in the world. The Paris Agreement was that each country would set its own targets that were not binding (UNFCCC: 2015, articles 3 and 4). Further, it was settled that richer counties needed

to help the developing world transition to a more sustainable economy (Down To Earth: 2022).

The Chinese and the United States transcripts were used to calculate the Wordscores. While there were differences, the two countries both approved the Paris Agreement and promoted its signing. China's focus was on aid for developing nations to make a just transition to a greener economy that is circular and low carbon. It stated that there needed to be a flexible plan as no "one size fits all". The nation upheld its commitment to South-South cooperation and said that it would keep its goal of financial and technical support to vulnerable countries.

The United States had a slightly different tone to China. It focused on progress it had already made and described climate action as a responsibility for all nations, regardless of their past. Despite this, the US recognised its role as the second largest emitter in the world. It also acknowledged that developing nations needed more support. However, in comparison to the Chinese speech, this was not as prominent a topic. The main focus was on sustainable economic growth, the importance of innovation, and the role of businesses in creating greener jobs.

The regression model revealed more countries were similar to China. Voice and Accountability was very statistically significant. The higher a country's democracy score, the more likely it would sound similar to China. GDP per capita and population were also significant where lower GDP scores and larger populations were associated with China. The continents of North America and Oceania also stood out as key influences. Considering that Oceania and islands in the Caribbean are most at risk, it is no wonder that most countries in these regions leaned more towards receiving support as they were not responsible for the natural disasters they were being impacted by. A sentiment analysis was also undertaken. Words were overwhelmingly positive with the words: "ambitious", "clean", "commitment", "sustainability", and "support" being prominent. "Support" was the most positive term used across all speeches. While negative words were less common, emotive terms such as "vulnerable" and "difficult"

were prominent. The AFINN lexicon showed that the speeches were overwhelmingly neutral with an underlying positive tone. Bigrams also helped highlight different themes and concerns at the conference. "Legally binding", "long term", and "sustainable development" were key points of interest, indicating ambitions related to the Paris Agreement.

COP 22 (2016)

The Paris COP was followed by the Marrakech, Morocco conference. This event focused on the rules and implementation of the Paris Agreement. It was agreed that the signatories would relook emissions every five years with the goal of setting more ambitious targets. During this period, many countries were coming together and had similar rhetoric. However, there was fear regarding the outcomes of the incoming US president Donald Trump, who was not only a climate denier, but increasingly promoted nationalistic discourse. Despite this, countries were not deterred by the superpower's positioning. Some of the poorest countries in the world such as Bangladesh, Philippines, and Ethiopia announced major emissions reduction targets and proclaimed that they would aim to achieve 100% renewable energy (Neslen: 2016). The results of Trump coming into power, meant that the US was no longer seen as a leader in the fight to save the environment. As a result, others stepped up to fill the power vacuum. This was seen with China and the EU.

The United States speech was uncharacteristically short and mostly focused on what the Obama administration had achieved in the previous years. The president was praised for the increase in solar and wind energy in the country as well as the falling cost of renewable energy. The economy and the possibility of creating green jobs through the building of sustainable infrastructure was also spoken about.

China's representative spoke about unity and the signing of the Paris Agreement as being a milestone achievement in diplomacy. He said that there was a clear trend towards a green and low-carbon transition and encouraged countries to speed up their

targets and act more boldly. Again, the developed world's responsibility in fighting climate change was highlighted, and the country encouraged these nations to keep to their commitments. China then announced that it would be starting its own fund that would be similar to the GCF. The China Fund for South-South Cooperation on Climate Change was launched to transfer funding as well as R&D. The country did this as it saw the GCF as a failure.

The regression model showed that while the margins were thin, most countries were more similar to China. Again, being from North America and having a high population was significant. The thin margins are no surprise as the Paris Agreement was seen as a unifying cause. GDP per capita was statistically significant where the higher a country's GDP, the more likely it would sound similar to China. The Bing lexicon illustrated that words were mostly positive with key terms such as "contribution", "progress", and "resilient" being prevalent. Negative words showed that the conversation around loss and damage had not subsided from the previous COPs. The AFINN lexicon showed that 2016 was far more nuanced than previous years. The term mentioned the most was "commitment" which had a high positive score. Similarly, conversation related to "loss" and "damage" had very low scores. Bigrams better illustrated what was being discussed. The top bigrams were: "Paris Agreement", "climate action", "long term", and "low carbon".

COP 23 (2017)

COP 23 was held in Germany in 2017. The conference focused on the technical details related to the Paris Agreement. Further, conversation related to what the next steps in the climate agreement would be post-2020 (Down To Earth: 2022). This was also the year that the US president, Donald Trump announced that the United States would leave the agreement. Due to elements of the signed contract, the president could only formally apply for resignation from the agreement in 2019.

Iran and the US were used to calculate the Wordscores. Iran congratulated the ongoing success of the Paris Agreement but cautioned countries against thinking it was enough and said that more ambitious targets needed to be actioned. It reiterated the importance of developed nations taking responsibility for the bulk of climate action where financial assistance and technological transfers needed to be focused on. Iran repeated that a transition to a sustainable economy in the developing world can only take place until poverty is alleviated. A key aspect in the speech was the ongoing sanctions against the country which it credited for environmental degradation in Iran.

The US speech was made during the Trump era. As a result, its narrative focuses on the nationalistic rhetoric of "America first", and the representative expressed that the country would only rejoin the Paris Agreement "under terms more favourable to the American people". It said that it was still the leader in combating climate change. The nation argued that to address the climate problem, economic growth needed to take place, and a free competitive market needed to decide the path forward. The US endorsed the conservation of forestry as its key focus.

Multiple regression showed that more speeches were similar to Iran than the US. The Wordscores were particularly important this year as it was viewed as being divisive due to the America president's opinions. This was the first year where a clear division could be identified. The split was between two groups. The first took climate change seriously and acknowledged the atrocities that had already happened and what was to come. These countries spoke about unity and providing funds and support to those countries who could not make the transition to a more sustainable economy. The second group had a nationalistic tone and did not speak much about unity. They had a neoliberal undertone that praised the private sector. These countries were not in favour of programs such as the GCF. The Wordscores showed that this split persisted until 2019, a slanted away from this rhetoric. A country's GDP was also statistically significant in the conversation where higher GDP scores were more likely to be similar to Iran. Further, North America was an important contributing factor. The Bing lexicon showed that the word most used was "support" which had a positive

connotation. The word was used 119 times. Further, terms such as "progress and "ambitious" were also repeated extensively. Negative words continued to show concern over loss and damage as well as vulnerability. The AFINN lexicon showed that sentiment was mixed. Emotive terms such as hope and commitment were used in a positive manner, while loss and damage continued to dominate negative conversation. Bigrams showed that conversation was steered towards "sustainable development", "small islands", and "low carbon".

COP 24 (2018)

The 2018 COP in Poland concentrated on the third iteration of the Paris Agreement. The meeting further outlined the rules of the agreement and promoted discussion for a future agreement beyond the agreed accord. Popular topics this year related to the pledge by developed nations to fund the GCF, and the increase of targets to reduce emissions. The host country also emphasised the need to conserve forests (Down To Earth: 2022). COP 24 also saw the retreat of the US government as a leading power. This was replaced by China which hosted talks before the conference. The US was quoted saying: "We strongly believe that no country should have to sacrifice economic prosperity or energy security in pursuit of environmental sustainability" (Courtright: 2018). The US did not give a formal speech at the conference.

Canada and South Africa were used for the 2018 Wordscores. Canada spoke about its own situation and what it was doing to combat climate change. It described their approach as "made-in-Canada solutions". It highlighted how the country had been impacted by heatwaves, droughts, and forest fires. It then showed its plan to address the situation. It included: investment in renewable energy, public transportation, and green infrastructure. Canada said that this would result in new jobs.

South Africa spoke about the importance of multilateralism and solidarity in the fight for climate action. It encouraged comprehensive commitments in the Paris Agreement and said that support for developing nations should be continued. It said

that this forward thinking would urge poorer countries with fragile economies to take part in the fight. The country ended its speech by saying "We need to support each other and not abandon one another".

The regression model run showed that countries were more similar to the South African speech than the Canadian one. Being a country from North America was also significant. Discourse about nationalism during this time was rife. The rhetoric coming out of the US influenced other nations. Considering the country's power, a need for discourse related to unity was needed. While not as prominent in Canada, the nationalist tone would have turned many countries away. The Bing and AFINN lexicon showed that conversation was mostly positive. It highlighted each country's desire for commitment as well as support. The conversation about the Paris Agreement was still a prevalent topic. Conversation was mostly neutral to positive. Bigrams emphasised that there was conversation about "economic growth", "climate finance", "renewable energy", and "island nations".

COP 25 (2019)

The 2019 COP was met with controversy before the conference even started. US president Donald Trump formally applied for the resignation of his country from the agreement. This was followed suit by Brazil's far-right president Jair Bolsonaro. On the matter, French president Emmanuel Macron said in a speech outside of the event that Trump's decision would "only lead to them being edged out [and] marginalis[ed]." (Macron: 2019) Despite this, US democrat and then Speaker of the House, Nancy Pelosi led a delegation in support of the agreement (Harvey: 2019). While conversation about the reduction of CO_2 emissions continued, resolutions were not made. The conference was described as a disappointment that lacked the urgency necessary to address the climate problem.

Canada and North Korea were chosen for calculating the Wordscores. Canada expressed its concern about the impact the changing climate had already made. It said

that in the last year alone, the nation had faced several disasters, and the IPCC had said that Canada was warming at twice the global rate. The country announced that it was going to put a price on carbon, phase out coal, and invest in renewables and public transport. This was the first year that it stated that it was putting a goal in place to be net-zero.

North Korea reinforced its commitment to the Paris Agreement and advocated for all countries to take part in protecting the planet. It reiterated that the industrialised west needed to aid poorer countries regarding loss and damages due to climate change. The country also pleaded for climate action not to be politicised. This would mean the lifting of sanctions on North Korea by many developed countries. The nation also highlighted that it was focused on conserving forestry and shifting to cleaner energy and sustainable agriculture.

The 2019 regression model indicated that most countries sounded more like North Korea than Canada. Carbon emissions were statistically significant where higher CO_2 levels made it more likely for countries to sound similar to North Korea. Being from North America also made it more likely for the country to be similar to North Korea. Voice and accountability played no role at all. North Korea is considered to be one of the least democratic countries in the world. This further illustrates that the variable of democracy had no impact. Wordscores continued to show a shift away from nationalist rhetoric.

*

In summary, GDP per capita did play a role in a countries climate change positioning. Countries with a low GDP per capita were more likely to sound similar to Iran. However, this should not be seen as only developing countries positioning themselves around this narrative. While not as significant as GDP, population was also important where a higher population was also more likely so be similar to Iran. A countries democracy score played no role in how a country positioned itself. However, geography did. Being from North America and Oceania were significant due to being

predominantly made up of developing nations as well as have a large amount of island nations that bear the brunt of climate change.

While a countries' Wordscores were important, they were heavily dependent on the chosen reference texts. One must acknowledge that while objectivity was the goal when choosing the reference texts, bias was unavoidable and therefore influenced the narrative. The Wordscores did reveal that after the Paris Agreement there was more unity. However, when Trump came into power, the scores shifted away from the US positioning and outlook. Throughout COP, elements of neoliberalism and social justice are observed. The Paris Agreement unified positioning under a neoliberal framework. An example of this was seen with the change in conversation from wealthy developing countries needing to remedy climate change due to historical negligence, to everyone contributing to the fight. Throughout the agreement there is the promotion of marketization. However, ideas related to social justice, such as the GCF, and issues about loss and damages, did creep into the conversation. Trump disrupted the status quo at COP and as a result was ostracized by most countries. While the US representative was a proponent of marketization, it was the nationalist rhetoric that turned other countries away. Nations would look to new leadership such as that from China and/or the European Union.

It should be noted that further research is needed to infer whether what has been said by politicians during their broadcasted speeches, tie into what has been negotiated and agreed. It is during these negotiations, where most of the ground work is done, as a result, the final speeches are simply a positive redirection of the negotiations. It can be assumed that not all negotiations are positive in nature, however all speeches are then run through professionals, in order to ensure they elude to positivity and action in the future. Smaller and poorer countries are also not represented in all of the negotiations. As said before, they are the nations which will suffer most in regards to climate change. This should be studies, however there is at this time, little data from said negotiations. This is concerning, as it is the everyday citizens which politicians are representing, and yet there is no way to decipher what has been agreed upon.

Chapter 4

Conclusion

Language is the means by which politicians communicate their messages to citizens and world leaders alike. Countries frequently negotiate and sign treaties, and the language used indicates the motivations and positioning of nations involved. By studying this discourse, matters related to international relations can provide a clearer portrait of cooperation and conflict. As seen throughout the research project, language has become one of the ways in which politicians communicate. It is important to remember that there is a difference between the negotiation process and political speeches given at the COP conference. While the first serves as a discourse for decision making and implementations, speeches are often overwhelmingly positive, regardless of their interest, care or dedication to fighting climate change. This may be due to the fact that the speeches are televised and recorded for all citizens to see, whereas negotiations are held behind closed doors. In saying this, future research should look deeper into the negotiation process.

Chapter one outlined the introduction. It then drew upon relevant literature to understand the key narratives and methods that were important for this research project. Chapter two shifted to conversation about methodology where research design, sentiment analysis, Wordscores, and regression models were discussed. Following this, the approach to the study, as well as a detailed description of the data was explored. Lastly, a discussion on the results was given.

An assumption was made going into this study. The assumption was that political actor's speeches, reflected what had been discussed in the negotiation process at the COP conference. These preferences can be identified in their public statements. This dissertation showed the following.

There were three stages to the analysis. The first was a sentiment analysis which made use of the AFINN, Bing, and NRC lexicons. These were used, as they proved to be the best way to extract information for this particular research. These methods found that speeches were predominantly positive, as stated above. Delegates frequently used positive words such as "support," "commitment" and "important." When looking at the 14 most common used words, only 5 were negative. AFINN also revealed that most words had a score between 2 and -2. This meant that sensationalist language was not common. This is surprising as often political speeches are assumed to be sensational in order to garner a reaction. This might be explained as having sensationalist language, might hold delegates to a higher standing with regards to the implementation of change. As mentioned in the study, it is unwise for a country to be seen as not taking part in the discourse, and therefore often convey a positive message, regardless of their standing. The Bing lexicon mirrored the AFINN results where the most frequent words used were mostly positive. The NRC lexicon showed that the overall emotion given by the speeches was positive. Further, it illustrated that most speeches fall into the "trust" emotion category. The sentiment analysis highlighted that politicians wanted to come across as being trustworthy and having expertise in all aspects related to climate change, whilst having their citizen's best interests at heart. This was seen with them sighting scientific studies such as the IPPC report. They usually followed this with something personal that happened in their individual country, and then gave a call to action.

Wordscores reference texts were chosen to represent contrasting sounding speeches by two different countries. The analysis was used to determine how similar the virgin texts were to either reference texts. The study of Wordscores showed that prior to 2016, scores were more diverse. After US President Donald Trump's announcement that he would be withdrawing his country from the Paris Agreement, scores shifted away from US sounding speeches. While both the Paris Agreement, and US speeches show an affinity for marketization, the US's nationalist rhetoric turned countries away.

Instead narratives of solidarity and ambitious action was preferred. This discourse was prevalent among countries such as China and groups such as the EU.

Regression was used to understand the relationship between the listed variables (GDP per capita, population, CO_2 emissions, voice and accountability, and region) and Wordscores. The regression analysis was divided into two parts. The first was a study of all the years between the years of 2011 and 2019 with the reference texts form the 2017 US and Iranian COP speeches. The second part of the analysis looks at each individual year. When looking at all years combined, GDP per capita played an important part in a countries similarity to Iran. The lower a country's GDP, the more likely it would sound like the Iranian speech. Population also played an important role where countries with larger populations tended to sound more similar to Iran than the US. The continents of Oceania and North America were seen as being very important. This is most likely due to the number of small island nations that are found in both regions. Further, these nations are predominantly developing countries and therefore are more vulnerable to the climate crisis. CO_2 emissions and democracy status had no influence on how a country sounded. Further research is needed to understand and examine why this is.

Future work

There are multiple paths that this research can take. A large hindrance for this study was the legibility of certain transcripts. Due to some of the text not being able to be read by R, certain texts such as the whole of 2012, were left out or were processed through an image to text processor. These transcripts were often poorly photocopied images of the speeches and often contained handwritten notes. A result of this is that some important transcripts may have been left out. If this research were to be continued the scripts would either need better software to read the documents, or they would have to be transcribed by hand.

This project only went up to 2019 because of the availability of the data for the CO_2 emissions from the World Bank website. The newer data would give a better indication of more recent positioning. Recent data would give more insight into the impact of global events such as Covid-19 and the Russia-Ukraine war.

The fact that this analysis could only be done with English speeches limited its capabilities. Future work would possibility need certain key scripts translated into English from Arabic, Spanish, and French. An example of this would be a focus on OPEC countries.

The region category could also be broken down further into regions such as the Caribbean and the Middle East. The Caribbean is a part of the North American continent. However, the area is very different from its most northern countries: the US and Canada. Similarly, countries in the Middle East fall under Asia. Considering that the Middle East is known for its oil extractions, this may tell a different and more in-depth story. Lastly, future work would take one step further and study whether what was promised and said were actually actioned by countries.

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