

"I Have the Best Werds"

A Text-Based Analysis of Executive's Speeches

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12 December 2018

Abstract

Speeches delivered by heads of state are often assigned great significance because they can signal a state's policy agenda, leadership quality, or regime survival. However, leaders will likely posture differently depending on their audience. Current literature does not adequately account for this audience-dependent speech variance. This raises the question: how do state speeches to a domestic audience substantively differ from speeches to an international audience? Using a battery of text-based analysis tools we compare "State of the Union" speeches to United Nations General Debate speeches for six different countries: The United States, China, Russia, the Philippines, South Africa, and Ghana. We find that domestic speeches focus more on economic issues while international speeches focus more on security issues. Additionally, we provide a number of exploratory data tools to accompany the corpus.

Keywords: Text-based analysis, UN General Debates, State of the Nation Speeches, Topic Modeling

Section I: Introduction

Text based analysis is becoming an increasingly common tool in a data scientist's toolkit.¹ During times of crisis, many language variables remain available at the same time that many state-level variables become difficult to track down.² For example, during the 2014 Russian annexation of Crimea, official regime statistics became difficult to ascertain but new transcripts of Putin's speeches and addresses remained abundant. Thus, translating natural language from state leaders' speeches into meaningful data represents a potential treasure trove for research in comparative politics and international relations research.

However, it is important to put speeches within their contexts because speakers will likely present different points to different audiences. Unfortunately, current research has overlooked the influence of a speaker's context when doing text-based analysis. Thus, to fill in this literature gap, the aim of our research paper is to compare state leaders' speeches among different contexts. Our contribution is twofold. First, we argue that international speeches tend to focus more on security issues while domestic speeches tend to focus more on economic issues. Second, we introduce a number of new tools to compare leader speeches.

The remainder of this paper is organized as follows. Section II reviews the current literature on the importance of executive speeches along with gaps in the literature. Section III discusses how we collected our data and assembled the corpus. Section IV explains how we used supervised topic modeling to answer our research question and provides the results of our t-tests. In Section V and Section VI we introduce two additional analytic tools: comparative term frequency analysis and a Shiny Wordcloud application. In Section VII we discuss limitations and avenues for future research.

Section II: Literature Review

There is a wide variety of literature assessing the importance of speeches delivered by heads of state. Speeches range from formal "State of the Union" (SOTU) speeches, (or their foreign equivalents), to informal, spontaneous addresses.

Some authors argue that speeches are important because they signal the policy agenda. Often times, this claim is taken for granted. For example, one study, looking at how European governments' policy agenda shifted in response to a new party coming into power, used SOTU speeches as a proxy

1. Silge and Robinson, *Text mining with R: A tidy approach*.

2. Windsor et al., "Leader Language and Political Survival Strategies."

for the policy agenda.³ This assumed that the speech was indicative of the state's policy agenda. In a similar study of Russia's Presidential Addresses to the Federal Assembly, Ambrosia and Vandrovec 2013 analyzed the themes of the speeches over time under the same assumption.⁴ On an international level, Baturo et al. 2017 introduced a new corpus of all the UNGD speeches since 1970 stating that UNGD speeches were a valuable way to interpret state preferences.⁵

But a substantial portion of the literature has also been dedicated to proving this assumption. In the United Kingdom, Jennings 2011 argued that the UK's speech from the throne is a good indicator of the policy agenda, by demonstrating the issues brought up during the speech translated to actual UK policy.⁶ In the United States, a Congressional Research Service study found that between 1965 and 2013, roughly 41.6 percent of the requests made in the State of the Union speech were turned into legislation passed by Congress.⁷ In essence, these studies show that leader's speeches do lead to real world policy outputs.

Moreover, the policy agenda is not the only way that speeches are potentially important. Some argue that speeches are important because the style in which they are given can be indicative of the quality of the regime or the competency of the leader. In layman terms, it is not what is being said, but how that it is being said that is important. For example, Windsor 2018 examined the relationship between speech and leadership survival in authoritarian regimes in the Middle East and North Africa. The authors used speech to test for executive's rhetorical strategies. Negative and accusatory language was found to be associated with lower rates of leadership survival.⁸ In an earlier study, the same authors analyze famous authoritarian regimes to explore how speeches reflected their strategies in the wake of natural disasters.⁹

One problem with speech analysis literature is a lack of attention to audience driven speech variance. It is counterintuitive and erroneous to assume that leaders present themselves in the same light to all people.

3. Mortensen et al., "Comparing government agendas: Executive speeches in the Netherlands, United Kingdom, and Denmark."

4. Ambrosio and Vandrovec, "Mapping the geopolitics of the Russian federation: The federal assembly addresses of Putin and Medvedev."

5. Baturo, Dasandi, and Mikhaylov, "Understanding state preferences with text as data: Introducing the UN General Debate corpus."

6. Jennings, Bevan, and John, "The agenda of British government: The speech from the throne, 1911-2008."

7. Shogan, *President's State of the Union Address: Tradition, Function, and Policy Implications*.

8. Windsor et al., "Leader Language and Political Survival Strategies."

9. Windsor, Dowell, and Graesser, "The Language of Autocrats: Leaders' Language in Natural Disaster Crises."

Depending on the context, leaders may choose to highlight certain issues more than others or even attempt to conceal their true agenda.

We know that heads of state must often present themselves in different fora, both international and national. Yet the literature does not attempt to compare how the policy agenda is presented in these divergent contexts. Thus, this paper attempts to begin filling in this literature gap by comparing leaders' speeches given to an international audience to their domestic audience.

Section III: Data Collection

To compare the differences in leaders' speeches internationally versus domestically we compared speeches delivered at the United Nations General Debates (UNGD speeches) to State of the Union Addresses or foreign states' equivalents. The United Nations General Debate is held every year in September and provides leaders the opportunity to highlight their interests and concerns. UNGD speeches were obtained from the UNGD corpus.¹⁰

While the State of the Union speech is an American tradition de jure, there are de facto equivalents abroad. For example, in Russia, the president delivers a yearly Presidential Address to the Federal Assembly. For a speech to be considered a "State of the Union" speech, we used the following three criteria: First, the speech must be constitutionally mandated. Second, the speech must occur on a regular basis. Third, the speech must be delivered by or on behalf of the executive to the legislative body. Fourth, the speech must garner massive public attention.

Gathering SOTU speeches was more difficult than gathering UNGD speeches because there was not a singular location containing all SOTU speeches like there was for UNGD. Rather, SOTU speeches had to be gathered from each country's archive. Web scraping governments archives presented a few problems. First, it was often difficult to tease out desired information, like the text and dates without including random html noise and information not said by the leader (such as the word "applause" in some transcripts). Additionally, since we created a loop to scrape the necessary information across all html links to the speeches, some links needed to be manually corrected since they did not lead directly to the speech. Additionally, some speeches, particularly the Philippines, contained non-English speeches, or non-English quotations. Sometimes these limitations were merely annoying, other times they prevented us from including some countries in our dataset entirely.

10. Baturo, Dasandi, and Mikhaylov, "Understanding state preferences with text as data: Introducing the UN General Debate corpus."

Overall, our dataset compares 517 speeches in two contexts from six countries.

Table 1: Speeches

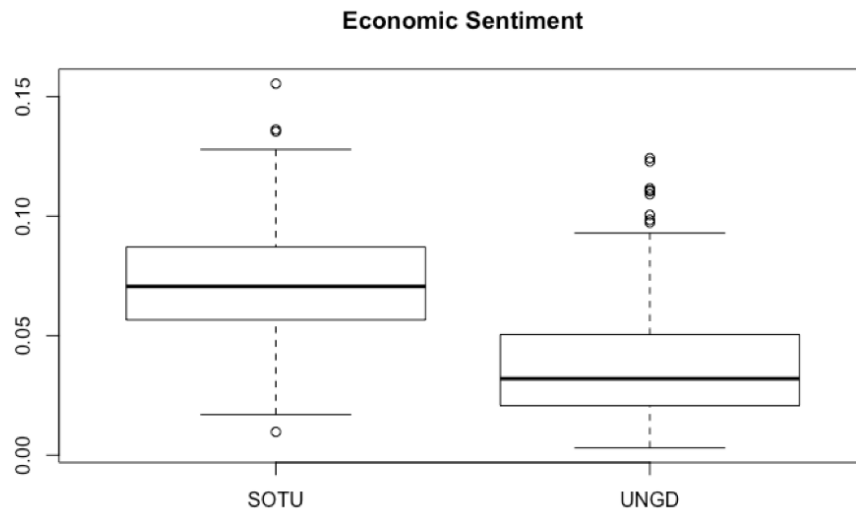
	context	CHN	GHA	PHL	RUS	USA	ZAF
1	SOTU	12	9	80	18	105	26
2	UNGD	47	48	48	47	48	29

Section IV: Supervised Topic Modeling

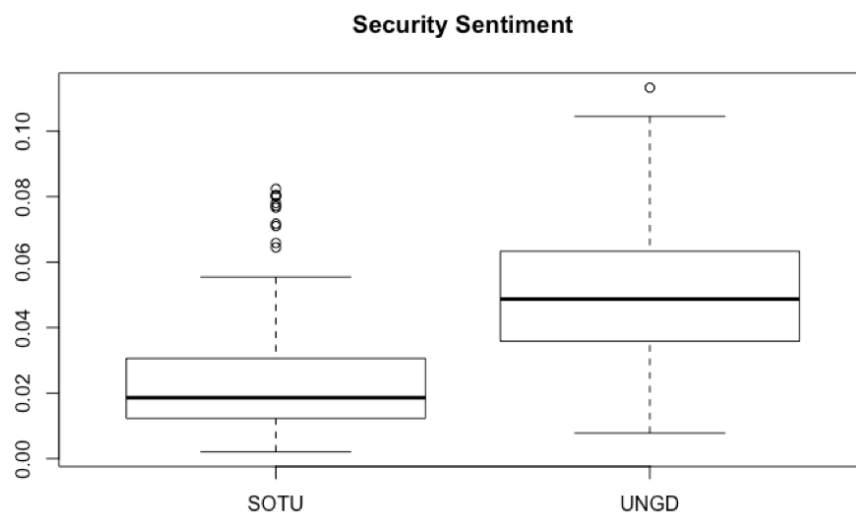
The first text-based tool we used to analyze our corpus was supervised topic modeling. The first step in supervised topic modeling was to create a lexicon of words sorted by topic. We created a list of words that were sorted into four topic areas: economic, security, environmental, and moral. All words not included in our four topic areas were considered neutral.

Using our lexicon, we were then able to assign each speech a score in each of the four topic areas. These scores represented the percent of non-stop words in the speech that were in each respective topic area.¹¹ For example, if a speech had an economic sentiment score of .5 and a security sentiment score of .25, then half of the non-stop words were related to the economy, and a quarter of the non-stop words were related to security. We then plotted and compared the distributions of UNGD speeches and SOTU speeches for each of the four topic areas. To test whether the means of each distribution was significant, we used a t-test.

11. A stop word is a common word such as 'the', 'a' and 'and', which does not contribute to the substance of the text.

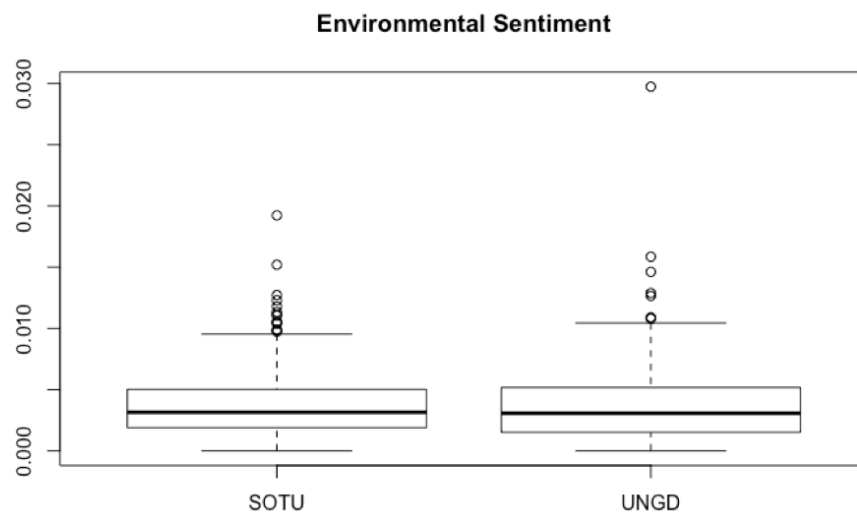


The box plot above compares the relative frequency of economic terms in SOTU speeches and UNGD speeches. Based on the plot, economic terms are mentioned significantly more in SOTU speeches than in UNGD speeches. In fact, the 25th percentile SOTU speech contains more economic terms than the 75th percentile of UNGD speeches. Indeed, a t-test confirms that SOTU speeches' mean economic term frequency is greater than UNGD speeches' mean economic term frequency at the 5 percent level.

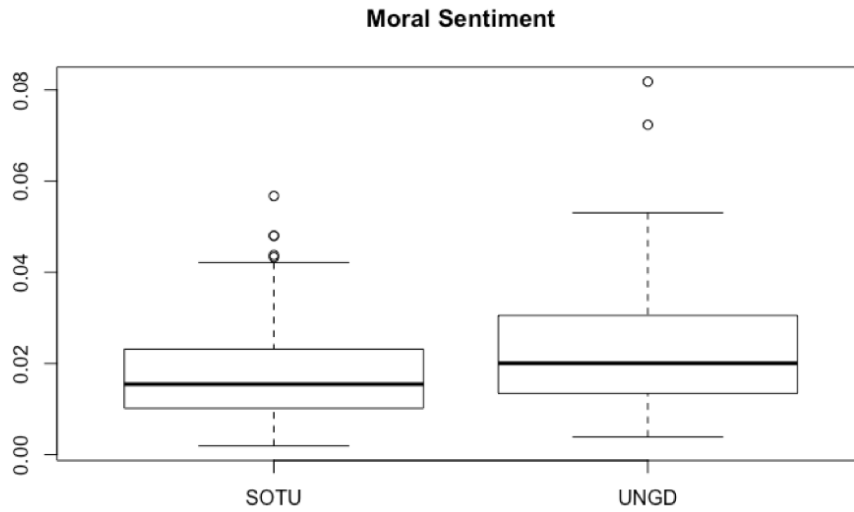


The next box plot above compares the relative frequency of security

terms in SOTU speeches and UNGD speeches. Based on the plot, we see the opposite trend compared to the prior plot where security terms are mentioned significantly more in UNGD speeches than in SOTU speeches. In fact, the 25th percentile UNGD speech contains more security terms than the 25th percentile of UNGD speeches. A t-test confirms that UNGD speeches' mean economic term frequency is greater than that of SOTU speeches' at the 5 percent level.



The box and whisker plot above compares the relative frequency of environmental terms in SOTU speeches and UNGD speeches. We would like to highlight two observations. First, the overall frequency is low in both contexts. In over 75 percent of the speeches, environmental terms did not constitute even one percent of the non-stop words. Second, the distribution of both SOTU and UNGD speeches appear to be relatively similar. Indeed, a t-test confirms we cannot reject the null hypothesis that SOTU and UNGD speeches' environmental term frequency have the same mean. In short, discussions of the environment are simultaneously infrequent and not context-dependent.

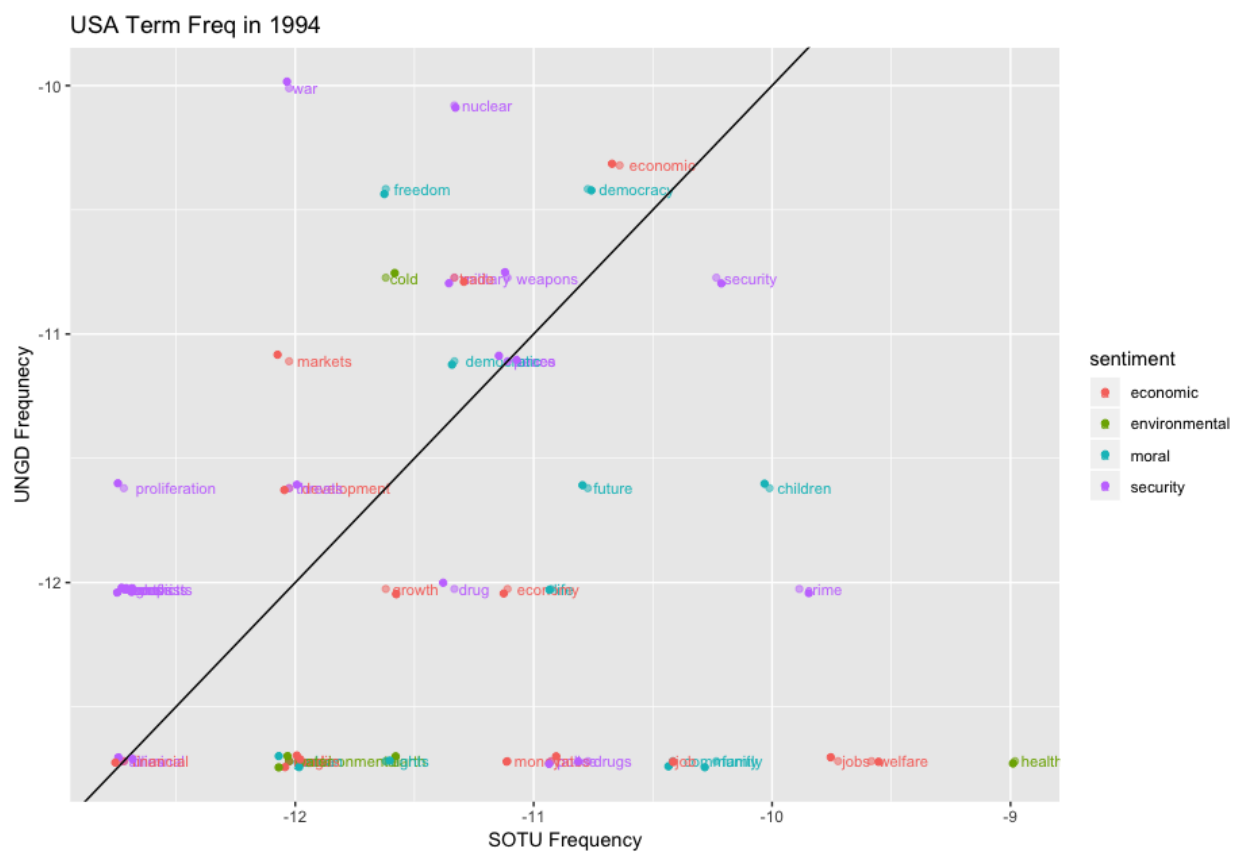


The final box and whisker plot compares the relative frequency of moral terms in SOTU speeches and UNGD speeches. While economic, security, and environmental terms are fairly self-descriptive, moral terms are less intuitive. To code moral terms, we looked at words that appealed to ideals and ideology rather than substantive or practical outputs. Moral terms could be political (democracy, socialist, revolutionary, culture, communism) or apolitical (family, children, future, community). According to the plot, UNGD speeches mean frequency of moral terms is higher than that of SOTUs.

Section V: Term Frequency Analysis

In addition to supervised topic modeling we also used term frequency plots to analyze our data on a more granular level. To assemble a term frequency plot we graph a term's frequency in SOTU speeches on the x-axis and the term's frequency in the UNGD speeches on the y-axis. The term frequencies are logged because the distribution of term usage tends to be highly right-skewed. Additionally, we plotted the $y=x$ line to easily demarcate which terms are more frequent in UNGD speeches and which are more frequent in SOTU speeches. Terms falling below the line are more common in SOTU speeches, while terms falling above the line are more frequent in UNGD speeches. Finally, terms were color coded by their topic area with neutral terms excluded for legibility.

One drawback of term frequency analysis is a lack of formal hypothesis testing like we used for topic modeling. However, term frequency analysis



does have two advantages. First, term frequency analysis visualizes changing clusters of words over time. Second, term frequency analysis also allows us to view how individual words are moving over time. This is important because words in the same topic area could have different implications for the policy agenda. Both "education" and "infrastructure" are economic terms but frequent mentions of one and not the other would signal different different policy agendas.

To demonstrate these advantages, we can look at the term frequency plot for the United States in 1994. Based on the distribution of the topic area clusters, it appears that there is not a noticeable difference between the mention of each topic area in SOTU and UNGD speeches. However, what is of interest is that within the topic areas certain words fall below and above the line in clusters. For example, while security words are used frequently in both speeches, words like "nuclear", "proliferation" and "war" appear more commonly in UNGD speeches. On the other hand, security words such as "drug" and "drugs" appear more commonly in SOTU speeches. Thus, while security issues are important in both speeches, there is a different focus in each speech.

Similarly, while there are appeals to morality in both speeches, the moral terms are different. In the UNGD context, there are more references to politically salient moral terms, such as "democracy", "rights" and "freedom." However, in the US context, there are more references to apolitical moral terms, such as "children", "family", and "future." The use of term frequency analysis helps to disaggregate much of the data that was aggregated in supervised topic modeling.

Section VI: Shiny

Our final method of exploratory data analysis resulted in the creation of a [Shiny word cloud web application](#). These interactive word clouds allow one to see what terms were most frequently used by a specific country, specific type of speech, over a given time period. We also added a comparison word cloud that enables a user to compare two countries and the top words used by each.

The first tab of the application shows a word cloud given the user's selected country, type of speech, years, minimum amount of times a word had to appear, and the max amount of words displayed.



For example, the above word cloud shows Russia's UNGD speeches from 1974 to 2018. The most frequent word is "united" with "nations" falling in the second most frequently appeared category. This occurs mostly because the speech is given at the "United Nations" and thus would be mentioned often. Other commonly used words are "international", "world", "soviet", and "nuclear."

The second tab labeled "Comparison Wordclouds" provides the same options but with inputs for a second country. There are two useful ways to utilize comparison clouds.



First, it allows easy comparisons between two countries as shown in the graph above. The top purple represents Ghana's "State of the Union" while the bottom red text shows South Africa's "State of the Union" speech from the years 1951 to 2018. This cloud allows the user to see what a country's top words were compared to the other's. From this example we note Ghana's top words were "Ghana", "speaker", "house", "roads", "project", and "region." In contrast, South Africa's top words were "South" with "Africa", "government", "people", "economic", "national", "development", and "society."



Second, it allows comparisons between a country's UNGD and SOTU speech as shown above for US speeches from 1913 to 2018. Compared to supervised topic modeling, this allows us to see the individual words used and their frequency. Aside from "United Nations", other popular words used abroad by US leaders include "peace", "human", "world", "international", "rights", and "nuclear." Compare these terms to the most frequently used words at home: "congress", "government", "federal", and "tax."

This approach has its advantages and disadvantages. Disadvantages include the lack of formal hypothesis testing and the visualization of substantively unimportant words. For example, the word "government" is not a stopword, but in the context of politics it does not have a substantive contribution to the overall meaning of the text. The major advantage of the Shiny is that it is incredibly flexible and allows other users to investigate their own unique questions.

Section VII: Conclusion and Discussion

Executive speeches are a window into the the preferences and agenda of the state. However, a scarce amount of literature observes how these preferences

are expressed or hidden depending on the audience. Our contribution to the literature is twofold. First, we demonstrate that speeches delivered at the United Nations General Debates focus disproportionately on security issues and moral issues while SOTU speeches focus disproportionately on economic issues. Second, we provide a wide array of open-ended analytical tools to qualitatively assess more granular aspects of context-driven speech differences. While we are confident of the research we have done, we are aware that it is limited in its scope. Thus, to conclude we would like to discuss ways in which we can expand this project.

First, adding more countries. While time was a major constraint, the accessibility of state archives was another. Many countries do not have transcripts of their "State of the Union" speeches up in either a raw text format, or in an archive that is easy to web scrape. However, adding more countries would allow for more rigorous testing and also actor-dependent variation, not just audience dependent variation. For example: do authoritarian regimes focus on different issues than democratic ones? Do developing countries focus on different issues than developed ones? We do not have a sufficient sample size to test these questions but believe they are pertinent and could hopefully be answered with future expansions to the project.

Second, our lexicon is general and there are several ways that we could improve it. First, our lexicon only looks at single words, but it could be expanded to look at bigrams or other n-grams. For example, the word 'cold' is an environmental word, but put in the context of 'cold war' it is clearly a security word. Second, our lexicon could categorize words within subcategories as well. As demonstrated by our term frequency plots, several subcategories exist within our general topic areas. For example, while "cartel" is a security word, would also sub-categorize it as an anti-drug word as well.

Finally, we would like to apply additional text-data tools as well. First, with unsupervised topic modeling for each country and each type of speech to see its predicted topic areas. We could then compare this new addition to our supervised topic modeling to potentially improve our lexicon. Second, we could combine sentiment analysis with our lexicon to see how words are being discussed. For example, when Russia is mentioning "democracy" is it with a positive or negative sentiment, as indicated by the surrounding words. Doing so would allow us a clearer picture of how a state is presenting its policy agenda in each speech.

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