ATAnalysis - Toward a psycholinguistic method to analyze video textual information

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Abstract. *Political statements of world leaders may affect many lives, so it is important to study what they express through language. We propose a method to do psycholinguistic analysis of statements extracted from videos. To show the relevance and some interesting information, we conducted some experiments in video subtitles of world leaders Donald Trump and Kim Jong-un amid imminent agreement that could lead to peace in the Korean peninsula. Results suggest less security in statements of the North Korean leader while threatening to unleash an "unimaginable strike" at the US territory. Moreover, the US president shows less honesty by saying he hopes never to use the nuclear arsenal. This approach may be useful in future studies to reveal what the language used by candidates can show.*

1. Introduction

Social networks applications allow users to share ideas and inform about events, while the platform that provides the service stores sentiment expressions in many formats (e.g., written and video records). For example, YouTube[1] has established itself as a social network providing user-generated content for entertainment and information [Moghavvemi et al., 2018]. YouTube uses content popularity ("thumbs-up" button), comments and number of subscribers to observe social aspects [de Arantes et al., 2015]. Offering users the ability to upload, view, rate, share, and comment on videos, it became an important social media that also enables people to engage more directly with political issues [Howard et al., 2011].

Social networks are also being used to propagate positioning and statements of world leaders. With the attention, credibility and other resources that they have at their disposal, what they say matters because it can show how they intend to set the tone of their administration [Cohen, 1995]. Thereby, it is relevant to watch what has been said by protagonists of one of the most drastic war of words and rhetoric of attacks in the international scene.

Donald Trump (DJT) and Kim Jong-un (KJU), after more than a year of threats and insults, agreed to meet in a summit to discuss the denuclearization of the Korean

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[1]https://www.youtube.com/

peninsula. It can be the first presidential direct talks between the United States and North Korea since the end of Korean War in 1953, and the beginning for a path toward the peace in Northeast Asia. The world leaders face larger and more decisive international crisis, not only for their own nations but also for the future of the humanity.

In this work, we propose a method for the psycholinguistic analysis of oral discourses extracted from videos. Some global leaders, such as the KJU, do not use written language on social networks. However, there are speeches recorded in video format that can be found on YouTube. In this scenario, we conducted experiments using YouTube automatic subtitles extraction to collect DJT and KJU videos subtitles. Next, we submitted these subtitles in the 2015 version of the Linguistic Inquiry Word Count (LIWC2015) [Pennebaker et al., 2015] program for text analysis. The results show higher authenticity and confidence in DJT speeches than in KJU speeches. On the other hand, KJU speeches shows higher analytical thinking. All the values related to analytical thinking were very high in KJU speeches.

This work is structured so that after this introductory section, we present in section 2 works related to how computational linguistics analysis can be applied to obtain information about world leaders. We then explain some aspects of LIWC2015, an available tool for computational linguistics analysis in text, in section 3. In section 4, we describe how we obtained the data. The results are presented in section 5. The conclusion and future work are shown in section 6.

2. Related Work

Recently, studies investigating language analysis of DJT's statements as a political figure can be found in the literature [Ahmadian et al., 2017, Savoy, 2017]. By adopting LIWC2015, Jordan and Pennebaker [2017] intended to determine how US candidates differed across linguistic style categories analyzing the language of political figures from DJT back to George Washington. They found that, compared to other politicians, a very low score in analytic thinking for DJT was indicated in the analysis of documents in text format. It was possible to notice also that presidents and presidential candidates have been becoming less analytic [Jordan and Pennebaker, 2017].

Regarding psycholinguistic behavior in Korean leaders' statements, it is fitting to bring a study using the Korean Key Words in Context (KrKwic[2]) and Korean Linguistic Inquiry and Word Count (K-LIWC) [Chung and Park, 2010]. It tested the literary characteristics of inaugural addresses from linguistic, quantitative and psychological perspectives of two presidential inaugural addresses, Moo-Hyun Roh (2003–2008) and Myung-Bak Lee (2008–2013). It had, according to the authors, significance as an investigative tool to support discovering the relationship between rhetorical substance and style, and also the characteristics of presidents' political and social viewpoints.

Our approach in this work is different from those previous publications as it uses exclusively speech and statements from content available in video format on YouTube. The process involves also, in KJU case, the automatic translation before submitting it to LIWC2015. Another difference is that it compares the speeches of two distinct current world leaders which have been trading threats during the last times, and recently DJT has publicly agreed to meet KJU.

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[2]https://www.leydesdorff.net/krkwic/

3. Computational Text Analysis

Content analysis is a methodology that uses categorization and classification of communication such as speech, written text, pictures, audio or video [Bryman and Bell, 2015]. All around the world, an increasing number of people is using communications and social network applications, uninterruptedly generating text, images, audio and video files by recording a lot of events, feelings and emotions. As a result, researchers are using computer-assisted methods, like text analysis, in social sciences studies to address many issues. Not only that, but also official documents, technical reports, theatre play scripts, lesson plans, books and a variety of texts are of social scientific interest [Brier and Hopp, 2011].

LIWC2015 is an available tool for computerized text analysis. It consists of the main program, which has a text analysis module with a user interface, and the dictionary file. This dictionary is used to associate words from any given text under the categories of important linguistic, psychological, and social processes.

In addition to the dictionary developed at 2001, two more were produced for the English language: one in 2007, containing 4,500 words; the other in 2015, with a total of 6,400 words. The 2015 version also brings summary variables, which are percentiles based on other categories, rather than raw frequencies. The summary categories refer to aspects like analytical thinking (Analytic), clout, authenticity (Authentic) and emotional tone (Tone) [Pennebaker et al., 2015].

Analytic is drawn through the high use of nouns, articles, and prepositions, indicating how people use words that suggest thought patterns that are formal, logical and hierarchical. Clout reflects the confidence, which is indicated by higher use of first person plural pronouns and words related to social processes, like the ones in the categories "family" and "friend". On the other hand, it is related to a lower use of first person singular pronouns, negations and swear words. Authentic is related to when people reveal themselves in an authentic or honest way, being more personal, humble and vulnerable (i.e., words with I, me, my and present tense verbs). Emotional tone uses values from categories of positive and negative emotions in a single summary variable.

4. Materials and procedures used to obtain psycholinguistic behavior in statements

For this study, we used speeches and statements of DJT and KJU from YouTube videos. The illustration in Figure 1 shows the process used in this study. It starts with the transcription of videos containing DJT and KJU speeches using a free web application (DownSub[3]) that can download and save subtitles directly from YouTube.

After the extraction of subtitles, the Korean text was submitted to a computer-assisted translation from Korean to English using a free online tool named NAVER[4]. This was chosen to use a sole method of computerized text analysis at the end, since translation to English does not significantly interfere with the accuracy or comprehensiveness of methods for text analysis [Reis et al., 2015]. In Table 1, we present basic information about the text content submitted into LIWC2015.

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[3]Available at downsub.com

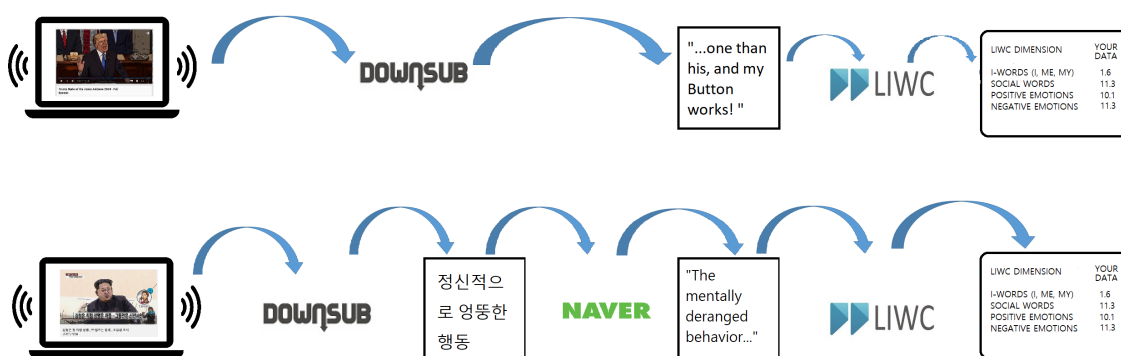[4]Available at translate.naver.com; a free online language translation service.

Figure 1. Automatic subtitles of the DJT videos were extracted by DownSub and then analyzed with LIWC2015. The process was the same in KJU videos, however, it needed to be translated from Korean into English using Naver Translator and then analyzed by LIWC2015.

Table 1. Text content from statements of DJT and KJU from YouTube videos submitted into LIWC2015.

Code	Speech	Date	Words
DJT1	Trump meeting North Korean defectors	Feb 2018	322
DJT2	Trump's address to the UN General Assembly	Sep 2017	494
DJT3	Trump about North Korean missile launch	Nov 2017	762
DJT4	Trump Speech in the State of the Union	Feb 2018	957
DJT5	Trump announcing new sanctions against North Korea	Sep 2017	637
DJT6	Trump speaking at the South Korean National Assembly	Nov 2017	2014
KJU1	New Year Speech 2018	Jan 2018	4529
KJU2	Reply to Trump's first speech	Sep 2017	605
KJU3	New Year's Speech 2017	Jan 2017	3959
KJU4	Speech National Army Day	Feb 2018	1385

5. Results

Table 2 shows the values found for text content analysis on DJT and KJU addresses using LIWC2015. The selected categories reflect, along with percentages values of words associated to positive and negative emotions, the four summary categories: analytic, clout, authentic and tone.

Figure 2 illustrates analytic values as the size of the plot marker, against values for authentic category in the X axis and clout in the Y axis. In the discourse style of DJT, lower values were observed in the variables reflecting analytical thinking, where higher values of authenticity and confidence were associated. In the speeches of KJU, on the other hand, all the values related to analytical thinking were very high.

Analyzing the results, during the New Year's speech (KJU1), which provides the country's guideline for this year, KJU had the lowest Clout revealing his uncertainties regarding the goals of the country in 2018. Speaking with less confidence compared to other speeches, KJU expressed that the entire United States territory is under the range of North Korean nuclear missiles emphasizing a secured powerful deterrence against the nuclear threat from the United States.

The most recent speech of the North Korean leader (KJU4), just on the eve of

Table 2. Percentual values found in the text content analysis on DJT and KJU addresses using LIWC2015.

Speech	Analytic	Clout	Authentic	Tone	posemo	negemo
DJT1	8,47	87,47	60,98	4,13	1,55	3,73
DJT2	78,37	67,91	13,47	29,15	4,66	4,45
DJT3	40,82	77,27	56,07	72,46	3,67	1,18
DJT4	83,07	87,48	15,21	36,83	3,87	3,24
DJT5	63,85	66,98	41,95	58,44	3,92	2,2
DJT6	88,38	77,02	25,4	33,48	3,62	3,18
KJU1	97,28	67,77	25,84	61,36	4,22	2,34
KJU2	96,43	73,5	9,29	16,34	2,81	3,47
KJU3	96,63	74,61	32,72	49,76	3,33	2,05
KJU4	97,36	83,34	24,68	84,4	5,2	1,88

the Winter Olympic Games also known as Olympics for Peace, showed higher values in Tone and Clout representing his most confident and positive declaration. In that one, KJU declared North Korea as a global military power and asked for the military permanent high alert to ensure the sovereignty and national security against any foreign threat, revealing his behavior even in an apparent moment of progress in reducing military tensions in the region. Even with the pause in North Korean nuclear launches and the recent opening for diplomatic negotiations on peace and security in Northeast Asia, the North Korean strategy and alert remain the same.
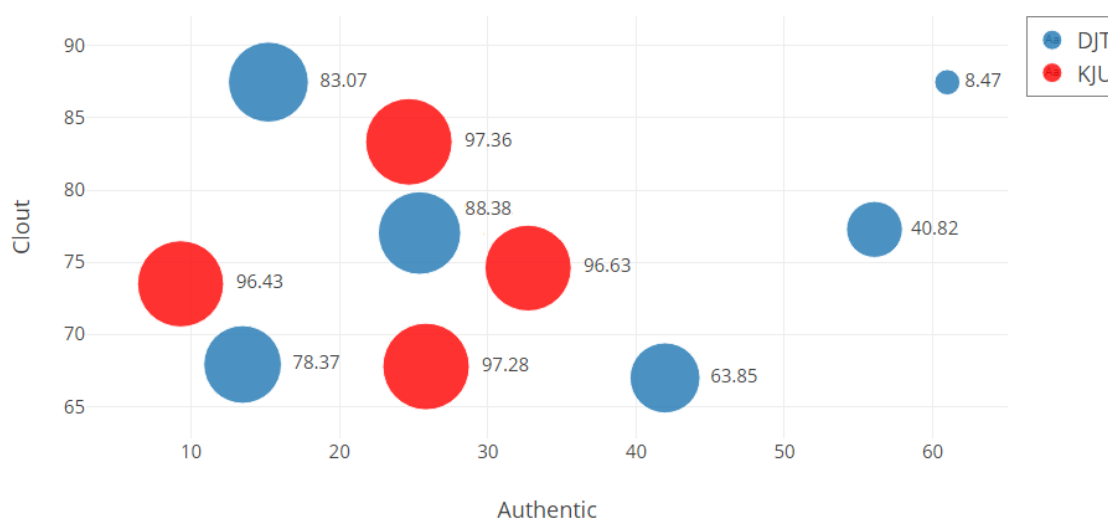

Figure 2. Graphical representation of selected percentual values from LIWC2015 categories, with analytic values as the size of the plot marker, X axis representing values of the authentic and Y axis the clout categories.

Also, comparing the speeches of both leaders, it is possible to observe that KJU maintains a more analytical style while DJT reveals to be more intuitive suggesting that he is more impulsive in making decisions. For example, in December 2017, the US Senate Foreign Relations Committee examined the DJT allusion to the use of military force or a preventive strike against North Korea, when DJT said North Korean threats would be met

with "fire and fury like the world has never seen". Some US Senators took attention for the words and personality of the US president raising the discussion on the importance of the US Congress to impose limits in DJT sole decisions that could harm the US security interests [Reif, 2017].

6. Conclusion

We conducted experiments in which we extracted subtitles and performed psycholinguistic analysis from text of an important world leader that does not use social networks, like KJU. This demonstrated the relevance of the approach, and some interesting information could be integrated examining dimensions of each speech. Studies from the international relations fields could benefit from the identification of text dimensions like thinking style, clout, and authenticity to see how these expressions in words by leaders may suggest an ulterior political aggression.

International relations scholars agree that states opt for developing nuclear weapons when facing security threats and do not find other solutions [Sagan, 1997]. This can essentially explain part of one of the main North Korean policy, the *byungjin* line, which results in nuclear and economic development [Han and Joo, 2014]. However, they have the will to remain non-nuclear states once potential threats are solved [Sagan, 1997].

Given the recent military tensions in Northeast Asia, the work sought to use LIWC2015 to identify the psycholinguistic behavior of world leaders DJT and KJU by analyzing their recent speeches. The results of LIWC2015 suggest that KJU is less secure in discourses in which he threatens nuclearly the entire US territory. On the other hand, he reveals more confidence and sense of certainty in describing his country as a global military power and by demanding continued readiness from its military, even in a moment that the international community observes as conducive to advances in diplomatic negotiations for the denuclearization of the Korean peninsula.

In relation to DJT, results show his narrative style as more intuitive, revealing impulsiveness in his decision making. Also, during the State of the Union speech, a high value for clout was observed (i.e., speaking confidently with a sense of certainty), when he emphasized the need to increase the national defense sector spendings to allow modernization and reconstruction of the US nuclear arsenal. A lower value for authenticity, which may suggest a lesser degree of honesty, was observed when DJT stated his hopes of never needing to use the nuclear arsenal.

As future studies, we intend to analyze verbal expression of candidates in Brazilian presidential election debates, looking at how these candidates compare on three dimensions: thinking style, clout, and authenticity. We also intend to analyze tone of voice and non-verbal expressions in videos as a complementary approach. The results can be used to compare the emotions expressed verbally to the ones that appear in expressions and gestures.

Acknowledgments

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