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# On Presenters and Commenters in YouTube Climate Change Videos

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**Abstract:** Social media videos can promote viewers responsibility to solve social problems such as climate change. Not all aspiring videos, however, are successful in persuading their viewers on the perils involved in climate change and on the need for pro-environmental behaviour. Our study examined attributes that could explain a video's persuasiveness and focused on the video presenter traits. Videos on climate change were sourced from YouTube conjointly with the comments they elicited. The presenters in these videos addressed the negative effects and dangers of climate change and the role of human activity in resolving them. Two attributes were manually coded for each video: the type of presenter in the videos— scientist, politician or celebrity, and their presentation style: blaming, stating the problem, or suggesting a solution. A measure of persuasiveness was computed from the YouTubers comments using sentiment analysis. This computation provided a polarity label – positive, negative, or neutral, for all comments, for each video. Subsets of 50 comments per video were manually coded to validate the computational analysis. The findings indicated that a predominant number of positive-polarity comments was elicited by video presenters who were scientists. Videos that proposed potential solutions to climate change elicited a majority of positive polarity. Politicians and celebrity presenters, as well as blame-oriented videos elicited a larger number of negative-polarity comments. These initial findings imply a potential of sentiment analysis of comments to elucidate which attributes can increase a video's persuasiveness on its viewers. This insight can improve future video production and enhance their influence.

**Keywords:** Netnography, Persuasiveness, YouTube videos, Climate change, Text analytics

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## 1. Introduction

Social media are often harnessed to promote responsible conduct in support of global social initiatives. As focal point where communities access and interact with information, social media platforms have the potential to nurture behavioural changes on a large scale (Park et al., 2014). By the same token these platforms could be used to study and assess the persuasiveness of the information provided on large populations through social network analysis (SNA). These methods can provide online data and deeper insights into consumers' opinions, motives, and concerns, while facilitating an ethical access to social media community members (Fenton and Procter, 2019). The original use of these methods for marketing purposing was sparsely extended to the promotion of social causes and human betterment (Kanter and Fine, 2010).

Netnography is an SNA method that adapts ethnography to the study of online communities (Kozinets, 2017). In a preliminary study, we employed netnography to evaluate the engagement of social media users with online information on safe behaviour during the COVID-19 pandemic (Aharonson et al., 2022). A set of Youtube video interviews that adressed this topic were evaluated in terms of persuasiveness. Netnography was employed to computationally construct a persuasiveness index from the YouTubers "like" and "dislike" counts. Hypothesising that the persuasiveness is substantially governed by the vocal traits of the presenter (Aharonson et al. 2021), the study focused on acoustic attributes in the speakers' voice, and implied that cepstral attributes can predict the netnographic persuasiveness (Aharonson et al., 2022).

This feasibility study had, however, three limitations. First, although the persuasiveness measure of like-to-dislike ratio was shown to provide quantitative metrics for the interactions that viewers and users have with video content (Broekens and Brinkman, 2009, Sui et al. 2022), it does not consider the textual content of the comment. Moreover, practically, since YouTube how hides the number of dislikes for its videos, this measure cannot be readily applied. The second limitation was the focus on acoustic properties, while organic component of the presenters' speech such as textual attributes can further explain the persuasiveness measure. The identity and role of the presenting person, i.e. politician or scientist, may correspondingly have fundamental impact on the community reaction (Malecki et al., 2021). Lastly, the previous study focused on a South African news network YouTube channel and its YouTubers' reactions.

The present study extends the former one to address the three limitations. The analysis extended the persuasiveness index beyond the community's reactions of "likes" and "dislikes". Natural language

understanding methods were employed to extract textual attributes from comments written by the viewers for the persuasiveness index. The study of the presenters' delivery attributes was extended by comparing persuasiveness across three types of presenters, and three types of information delivery styles. Lastly, the videos in the present study were sourced from the global YouTube channel and the netnographic analysis performed on an international community.

Due to an augmented public interest, the present study reverts the analysis to another pertinent global issue – climate change. Social media videos and their communities' reactions on this topic are prolific and long standing. Fundamentally, this topic resembles the COVID-19 one by being universal, and spreading out beyond specific social groups and nations. Both topics entail controversy and elements of fear and blame, as social media users cannot ascertain the scientific information provided by the presenters. Still, in both cases there is a consensus that simple behavioural changes, can potentially do good and make a difference. Video presenters thus need to employ their presentation skills and persuade the viewers of the need for and importance of behaviour change. Systematic SNA can facilitate and improve these presentation skills.

## **2. Methods**

### **2.1 Dataset Collection**

The dataset included YouTube videos, from which presenters' attributes were extracted, and the comments posted under the videos, that served to compute a netnographic community reaction. A list of 200 videos returned when using the keyword "climate change" in YouTube's search engine were sourced. The viewers' comments of each video were scraped using an open-source Python script. The list of 200 videos was sorted by the video number of views using the platform's sorting tool. The database videos were selected from this list based on two criteria: The video had to have at least 200 comments/replies, and at least 90% of the video's comments were in English. A manual selection process was employed to apply an additional criterion – controversial and anti-environmental behavior videos were discarded.

The 150 most popular comments of each video were selected for the dataset. The popularity selection criteria was based on YouTube's "Top comments" sorting function, which considered likes/dislikes, the date the comment was posted, and the number of replies that the particular comment received (Feng and Chen, 2022). Each comment's text data was tagged by the video it was posted under. Data privacy was considered in discarding the identity of the video publisher and personal details of the comment writers from the analysis.

### **2.2 Videos Attributes Selection**

Two presenters' attributes were chosen for the analysis and were manually coded: the role of the presenter and the presentation style. Three categories of presenters were observed in the videos and were manually coded: politicians, high-profile public figure ('celebrities') such as business leaders, artists or social media personalities, and scientists. Similarly, three categories of presentation styles were coded: Videos explicitly blaming an entity, such as political party or country, in the problem, videos suggesting solutions to the problem, and videos stating the effects of climate change.

### **2.3 Comments Text Analysis**

Sentiment analysis was employed on the comments' text using Python's TextBlob package (Loria, 2018). Negative, neutral, or positive sentiment labels were computed for each comment, based on a list of positive and negative words and their semantic orientation. The automated analysis was validated by a human manual coding of 50 randomly chosen comments for each video. A comment was coded as "positive" if its content was in agreement with the negative effects and dangers of climate change and/or expressed the need to change human behaviour. A comment was coded as "negative" if it disagreed with climate change or its effects and/or the need to change human behaviour. A "neutral" label was assigned to comments which did not address the topic of climate change, or did not express neither a positive nor negative stance on the on whether climate change is real and/or on the need to change human behaviour. The congruence between the computerized polarity and the manually coded one was evaluated using Cohen's kappa.

### **2.4 Video Persuasiveness Labelling**

The sentiments polarity extracted from the comments served as proxy for the construction of a persuasiveness label for each video. A video was labeled persuasive if the majority count of its comments were positive, and non-persuasive otherwise. The labels resulted from the manual coding and those computed using sentiment analysis were then compared using Cohen's kappa.

The relations between the video presenters' attributes and their persuasiveness labels were computed using the frequency of each attribute among the two video-label classes – persuasive or non-persuasive.

### 3. Results

The video selection yielded a dataset of 129 videos.

Cohen's kappa for the agreement between the automated and manual rating of polarity in individual comments was 0.63. The labels of persuasive and non-persuasive videos based on the majority count of positive and negative polarity of their comments, yielded an agreement of 0.78. Sixty-five videos had a majority count of positive-polarity comments and 57 had a majority count of negative-polarity comments. Seven videos had equal quantity of positive and negative polarities, or a majority count of neutral polarity and were omitted from the analysis.

The presenter-attributes frequencies among the persuasive and non-persuasive videos are portrayed in figures 1 and 2, for the presenter role and presenter text style, respectively.

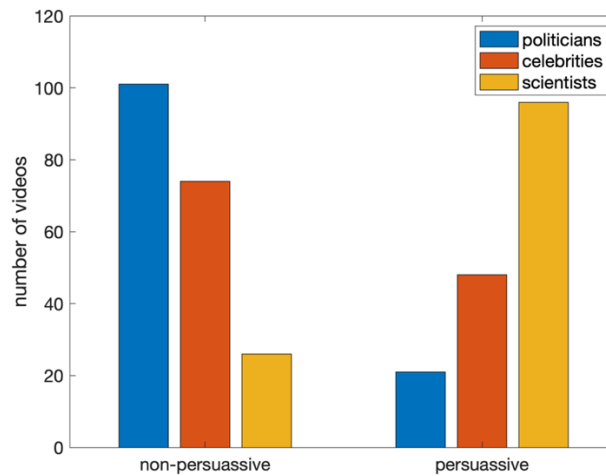


Figure 1: Frequencies of the presenter types in persuasive and non-persuasive videos

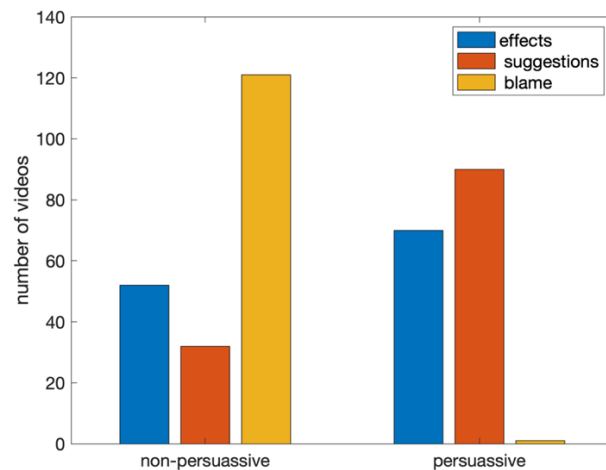


Figure 2: Frequencies of the narrative style types in persuasive and non-persuasive videos

### 4. Discussion and Conclusions

This study provides a proof of concept for the identification of persuasive and non-persuasive videos on climate change, based on two of their presenters' attributes. Extensive previous research applied social media analysis to extract presenters' attributes in the context of marketing. Our studies follow a growing trend and strive to harness this analysis for promoting responsible behaviour in pertinent global challenges. Whereas most studies involved human participants, and employ either qualitative analysis, or manual coding schemes (Fenton and Procter, 2019), our studies aim to automate this analysis and enable a quantitative view of the entire social media communities' reactions, which could both expedite and improve the analysis. The present study follows our previous ones in elucidating computational measures of persuasiveness based on YouTubers' comments on

videos, and the attributes of the videos that contribute to this persuasiveness. The comments polarity, extracted through automated sentiment analysis, yielded a kappa reliability coefficient of 0.63 to the human rating of this polarity. This may result from the fact that the manual coding entailed inference of attitudes from the text, which the preliminary sentiment analysis did not consider. A more comprehensive textual analysis of the individual comments can be applied to test this hypothesis. On the other hand, the persuasiveness label of the *videos*, based on a majority of positive sentiments amongst its comments, yielded a larger agreement of 0.78 between automated and manual coding. This may be explained by the summative nature of this label that overcomes the inner, per-comment, rating disagreement and reflected the overall reaction of the video's viewers' community.

Our preliminary analysis indicate that scientists are more persuasive presenters, and that politicians or other high-profile public figures ("celebrities") are the least persuasive presenters in climate change videos. This implies that viewers may trust scientists more than politicians or celebrities and that scientists are most persuasive presenters in eliciting discussions for taking actions to deal with the climate change problem. This finding is in line with literature showing that scientists are perceived as more trustworthy compared to politicians (Hendriks et al., 2022; Reif et al., 2020, Jin et. al, 2020). The analysis of the video content attribute indicates that videos containing direct blame and quoting the fault in political party, groups or nations, are not persuasive. Videos that contain suggestions and possible solutions to combat climate change were found as more persuasive than videos that only state the effects of climate change rather than providing solutions to help combat the problem.

The full potential of the method proposed in the study, needs to be extended to a plethora of additional persuasive video attributes. This goal, however, necessitates a larger videos dataset. The potential of the methods should be extended to other video platforms such as TikTok to investigate possible platform differences.

Although preliminary, these results offer additional insight into the mechanisms behind online persuasion, within the important context of pro-environmental behaviour. These preliminary findings can channel the future creation of persuasive social-media videos and expand their influence capabilities.

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