Response to reviewer reports:

" Disentangling the Climate Divide with Emotional Patterns: a Network-Based Mindset Reconstruction Approach".

Dear reviewers,

We thank you for your careful reading of our manuscript and your many insightful comments and suggestions. Below we respond to each of the comments in detail, with reviewer comments in blue. We provide a revised manuscript that reflects your suggestions and comments.

Anonymous Referee #1, general comments.

In this manuscript, the authors use a forma mentis network analysis to evaluate the structure and emotional content of a series of speeches from two key figures of both climate activism (Greta Thunberg) and climate change denial (Christopher Monckton). They show in particular how a difference in emotional enrichment in climate denial discourse may underlie their propensity to spread, resulting in infodemics. The manuscript is well-written and clear on its objectives and findings. I have a few specific comments however, as well as technical comments, that I believe might help clarify some methodological points in the manuscript before publication.

Response: Thanks, we appreciate your mention of a well-written text with clarity in the objectives and findings.

Anonymous Referee #1, specific comment 1.

the manuscript is a descriptive endeavor, leveraging the forma mentis approach to then elaborate about the intepretation of the observed semantic and emotional reconstructions. It is to note however, that the sample size is relatively small, at least in breadth (only 2 individuals analysed), and potentially in width (the total number of sentences analysed for each individual is not reported, but should be). This will surely affect the probability to observe certain (co-)occurences of words, and results in some statistical uncertainty that is for now hard to assess. An example of this uncertainty would be the emotional variation from speech to speech, with some of them potentially being situated in a context or platform promoting some emotions above others. I would find the analysis strengthened if the authors could evaluate the statistical significance of their observed outcomes, or at least comment upon this.

Response: Thanks a lot for this comment. It is obviously true that 2 individuals, despite their centrality in the respective arenas, is a limitation. In the light of the restrained character of our objectives, it does we incorporated these valuable insights into the discussion and suggestions for further work.

Anonymous Referee #1, specific comment 2.

More generally, the limit of the low sample size should be discussed in perspective, in particular the potential limit of representativeness with regards to the general discourse from each "side.

Response: thanks, we agree with you and introduced this item int the discussion.

Anonymous Referee #1, specific comment 3.

Finally, I feel that more precise details should be given in the methods section as to the network reconstruction method, in addition to the reference provided, to help guide the reader. While Eq1 is useful to describe closeness centrality, it does not really give information on network computation itself. How are links defined and weighted? Are these number of co-occurences, or over-representations? Are weights used in the centrality computation? How is emotional richness computed exactly? When referring to reconstructions around a given word, what the authors mean are ego-centered networks, with ties between neighbors?.

Response: A much larger description of the network reconstruction and computation has been introduced, that covers the details suggested in this comment. Thanks for the stimulating metaphor with ego-centered networks, which we have added in the main manuscript.

Anonymous Referee #1, technical correction comment 1.

Abstract: "emotional patterns linked to a quick and pervasive spread of falsehoods" -> maybe "emotional patterns intended to trigger a quick and pervasive..." would be more precise

Response: Thanks, while we personally might agree with you, it is also true that with our method we cannot infer whether the speakers "intend" to trigger anything. Please let us mention that the text aims to be neutral — even innocuous — when describing the speakers, because doing otherwise could have legal consequences beyond our intentionally cautious approach. Because it is an established fact that there is a link to the spread of falsehoods, we kept the original phrasing

Anonymous Referee #1, technical correction comment 2.

Abstract could end with a take home / summary sentence opening perspectives, such as the ones in the conclusion, e.g. "mindset reconstruction could be an important tool to deal with infodemic communication materials facilitating the climate divide "

Response: Thanks for this great suggestion to improve the abstract, we proceeded accordingly.

Anonymous Referee #1, technical correction comment 3.

the networks are a bit hard to interpret because of their relatively density, and because of the fact that they might have a same word that can be laid out in different places. I wonder whether it would be possible to either use the same layout using all possible words from both cases, or to guide the eye with some arrows or boxes to highlight important results that are discussed in main.

Response: Thanks, as network scientists our duty is to find a balance between plotting a network "hairball" with too much information and no possibilities for interpretation, and plotting too little details. We find that using all possible words would be too much information. We believe that the range in the number of words included, the colors in both links and words, and the size of the words, they all offer quite a density of information.

Our approach here is to bring the reader to the figures with some analysis only as entry point. Our comments on each figure along the text are rather an entry point to the figures for the reader to go into greater detail if they wish so, and because there is little confusion potential justifying specific arrows or boxes, we prefer the reader to use our entry point and then let them find their way towards the relations that they could find relevant beyond our initial focus of interest.

Anonymous Referee #1, technical correction comment 4.

p5 l110 "from to key public speeches" -> "from key..."

Response: Greatly appreciated, edited accordingly.

Anonymous Referee #1, technical correction comment 5.

p7 l152 Closeness centrality is defined as the inverse average distance between a word and all its neighbours (Metcalf & Casey, 2016). -> you mean and all other words in the full network, or in the ego-centered subnetwork?

Response: We refer to the full network and added this important nuance to the text, thanks a lot!

Anonymous Referee #1, technical correction comment 6.

p19 l358 in vivo flagging *of* online...

Response: Greatly appreciated, edited accordingly.

Mary Sanford, general comment.

I really love the idea of reconstructing forma mentis/mindset networks from text. I think it's super innovative and a really interesting and important deep dive into the communication strategies of key influencers. Great work. Nonetheless, I do think a few things could be better emphasised and/or made more clear. I describe these points below.

Response: Thanks a lot for this comment. Thanks for highlighting the innovativeness of our work.

Mary Sanford, specific comment 1

The abstract could offer more clarity as to what you do in the study and what you find. It seems some of the content you currently have there might be better suited to the introduction as it pertains more to the background of the study instead of what it does.

Response: Thanks, we truly try to summarize the landscape thus offering certain valuable introductory content, still your comment signals an important issue and we introduced more content about what do we do and find, and reworded some sentences to make clear we are explaining what we find and show.

Mary Sanford, specific comment 2

Perhaps there could be more discussion of how and why you chose your key influencers, including alternative choices? You do this really well in your discussion of how and why you chose to you closeness centrality later in the presentation of the network analysis.

Response: Thanks, we included this aspect in section 2.1.

Mary Sanford, specific comment 3

You say you have 11 Thunberg speeches and 3 Monckton: is the total volume per influencer roughly equivalent? It seems you might have a lot more content to work with for Thunberg relative to Monckton. It might be good to add a bit more detail on how long the speeches are in total, how many words, if you undertake any pre-processing steps to prepare the texts for analysis (e.g. removing stopwords, stemming/lemmatizing,...), etc.

Response: Thanks. The speeches from Monckton are much longer. The amount of sentences is roughly equivalent. We included a sentence with a more detailed description of the pre-processing steps in the methods.

Mary Sanford, specific comment 4

Perhaps a personal preference but I would also like to see details on what tools you used to process the texts, build the networks, and then visualise them.

Response: Thanks, we include now a reference to the software libraries used in the methods.

Mary Sanford, specific comment 5

In the method section, it might be good to clarify what you mean by 'concepts' in the networks. I assume you mean the emotions from the NRC Emotion Lexicon?

Response: Because we analyze the text word by word, by concept we ultimately mean words. We improved our explanation in Section 2.3, and further clarified this point to avoid potential confusions.

Mary Sanford, specific comment 6

Throughout the paper, I would pick one of "climate infodemics" and "climate disinformation" and stick with it instead of switching between them. I might also consider referring specifically to Thunberg and Monckton instead of generalising to climate activism and climate infodemics/disinformation, respectively, as you are specifically analysing those two.

Response: Thanks, this is very helpful to make our manuscript clearer! Our results show marked differences that align with the literature and media presence of both sides of the climate divide, thus we will keep the terms climate activism and climate disinformation to refer to each side of

this divide, and use the term infodemics (defined early on) to refer to the phenomena that emerge at a larger scale.

Mary Sanford, specific comment 7

Related to text box 1, the information contained there could be easily translated to a table with three columns: one for the term, one for what it means for climate activism, and one for climate disinformation/infodemics. You could also consider a fourth column to contain the references for the explanation of the content you provide for each term. This format may make the content more digestible and less repetitive.

Response: Thanks, we find this is a matter of opinion, and we must confess that we do not find an obvious way to put this knowledge at large. In our humble opinion, the beauty of transmitting knowledge in a dictionary fashion in a "lexicon" cannot be easily brought into a table, because there is no 0/1 or yes/no clear translation for how each part uses each word, the reality is a bit more convoluted and the lexicon transmits this perspective quite efficiently.

Mary Sanford, specific comment 8

The discussion and conclusion section currently seems to reiterate content from the introduction. I would consider emphasising your results more and their implications given the literature and contributions to future work.

Response: Thanks, we have rewritten portions of the discussion to accommodate this and other comments by another referee.

Mary Sanford, editorial comment 1

At the end of sentences, you commonly put quotations only around the word and not including the punctuation, e.g. "like this". instead of "like this." — something to consider revising.

Response: Thanks for trying to help improving our manuscript. Please consider that the punctuation does not apply just to the content of the quotation in any the cases we used. In these cases of quotation use, the punctuation applies to the entire sentence including the quotation, hence our use is correct. We are most grateful for your time and insights in any case, truly thanks again!

Mary Sanford, editorial comment 2

Line 82-83: I think there is a preposition missing where the X is: "climate communication linked X the climate divide"

Response: Greatly appreciated!, edited accordingly.

Mary Sanford, editorial comment 3

Line 144: Should "network neighbourhood" be plural?

Response: Greatly appreciated!, edited accordingly.

Mary Sanford, editorial comment 4

Line 179: It seems "infodemics" should not be plural?

Response: thanks, we revised the entire use of the word and corrected some uses into singular and plural, both cases apply in different sections. We base our answer on this snippet here: "WHO explains that infodemics are an excessive amount of information about a problem, which makes it difficult to identify a solution. They can spread misinformation, disinformation and rumours during a health emergency. Infodemics can hamper an effective public health response and create confusion and distrust among people." (source: https://www.un.org/en/un-coronavirus-communications-team/un-tackling-'infodemic'-misinformation-and-cybercrime-covid-19).

Furthermore, we also had doubts and solved them in the best way we saw, because while climate change can be perceived as a single "problem", as experts we see several "problems" being differently impacted by different misinformation in this debate: the economics of responses to climate change and the misinformation targeting it (e.g. justifying delays in climate policy) could be considered another infodemic by itself, while yet another very different aspect of climate disinformation related to the physical science behind climate change could be considered another infodemic. We believe there is no single infodemic in the climate "problem", but did not want cover this in the manuscript because it is beyond the goals of our manuscript. We hope to be able to work on this in the near future.

Mary Sanford, editorial comment 5

Line 213: Same thing as in line 179

Response: Thanks, ditto above.

Mary Sanford, editorial comment 6

Line 214: "activism" has an apostrophe; perhaps you meant climate activists'?

Response: Thanks, we edited adding the missing "s".

Mary Sanford, editorial comment 7

Line 227: Should the "on" at the end of the line be "in" instead?

Response: Thanks for let us notice that there was something wrong here, we simply removed the "on".

Mary Sanford, editorial comment 8

Line 240: Should the "to" at the end of the line be "within" instead?

Response: Thanks, we found "in" was a suitable edition for this issue.

Mary Sanford, editorial comment 9

Line 247: "resorts" should not be singular if you are referring to "climate infodemics" in the plural.

Response: Greatly appreciated!, in several cases, we have changed the use of "infodemics" to "disinformation" responding to suggestions above, and edited the verbs to accommodate also this suggestion.

Mary Sanford, editorial comment 10

Line 251: The "in" at the end of the line should be "on"

Response: Thanks!, edited accordingly.

Mary Sanford, editorial comment 11

Line 256: "concentrates" should not be singular if you are referring to "climate infodemics" in the plural.

Response: Greatly appreciated!, as mentioned above, in several cases, we have changed the use of "infodemics" to "disinformation" responding to suggestions above, and edited the verbs to accommodate also this suggestion.

Mary Sanford, editorial comment 12

Line 257: The "to" at the end of the line be "within."

Response: Thanks for your great attention to detail, this one we believe is a matter of style, thus no change was implemented.

Mary Sanford, editorial comment 13

Line 259: "associates" should not be singular if you are referring to "climate infodemics" in the plural.

Response: Greatly appreciated!, as mentioned above, in several cases, we have changed the use of "infodemics" to "disinformation" responding to suggestions above, and edited the verbs to accommodate also this suggestion.

Mary Sanford, editorial comment 14

Line 263: "displays" should not be singular if you are referring to "climate infodemics" in the plural.

Response: Greatly appreciated!, as mentioned above, in several cases, we have changed the use of "infodemics" to "disinformation" responding to suggestions above, and edited the verbs to accommodate also this suggestion.

We confirm we checked all text for more issues with the singular/plural.

Mary Sanford, editorial comment 15

Line 268: Same thing for "projects"

Response: Greatly appreciated!, as mentioned above, in several cases, we have changed the use of "infodemics" to "disinformation" responding to suggestions above, and edited the verbs to accommodate also this suggestion.

Mary Sanford, editorial comment 16

Line 272: Same thing for "appears"

Response: Greatly appreciated!, as mentioned above, in several cases, we have changed the use of "infodemics" to "disinformation" responding to suggestions above, and edited the verbs to accommodate also this suggestion.

Mary Sanford, editorial comment 17

Line 292: "entwined to" —> "entwined with"

Response: Thanks!, edited accordingly.

Mary Sanford, editorial comment 18

You may want to provide a source for the claim beginning on line 298 and ending line 301

Response: Greatly appreciated!, edited accordingly.

Mary Sanford, editorial comment 19

Line 336: "alike" —> "like"

Response: Thanks!, edited accordingly.

Mary Sanford, editorial comment 19

Meant to also mention that perhaps some of the comments (especially the editorial ones), those might just stem from my personal style, so feel free to take them with a grain of salt!

Response: your comments were very helpful and provided us with new valuable lens to alternative writing styles, thanks a lot!

Dear Referees,

We would like to thank you for taking the time and effort necessary to carefully review the manuscript! Your insights were very helpful!!!

We sincerely appreciate all valuable comments and suggestions, which helped us to improve the quality of the manuscript.

Best regards,

Roger Cremades and Massimo Stella.