



HAL
open science

Fake news diffusion in geometrical attitudinal spaces

Pedro Ramaciotti Morales, Manon Berriche, Jean-Philippe Cointet

► **To cite this version:**

Pedro Ramaciotti Morales, Manon Berriche, Jean-Philippe Cointet. Fake news diffusion in geometrical attitudinal spaces. 8th International Conference on Computational Social Sciences, Jul 2022, Chicago, United States. hal-03653473

HAL Id: hal-03653473

<https://hal.science/hal-03653473v1>

Submitted on 27 Apr 2022

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

Fake news diffusion in geometrical attitudinal spaces

Pedro Ramaciotti Morales, Manon Berriche, Jean-Philippe Cointet

médialab, Sciences Po, Paris

Keywords: *misinformation, information diffusion, graph embedding, political polarization, anti-elite sentiment*

Despite initial fears about the amplitude of misinformation phenomena online, recent large-scale studies have shown that the extent of exposure to fake news is limited (Guess, Nagler, and Tucker, 2019), representing, *e.g.*, only 1% of people’s news media diet in the US (Allen et al., 2020). Yet, the spread of fake news still merits closer examination, as its impact is hard to assess and its drivers may be related to larger socio-political troubles, with potential negative implications for trust in media and institutions in general. Many studies have focused on individual drivers such as cognitive skills, media literacy, or demographics to understand why internet users spread fake news online. Other potential drivers behind misinformation require an analysis based on systemic approaches, relating the spread of fake news with how users weave social ties. Recent works have shown the role played by complex socio-political and group dynamics in the spread of fake news. It is now widely accepted that extreme political polarization is linked to a propensity to participate in the dissemination of fake news (Osmundsen et al., 2021). Political polarization, however, has been mostly conceptualized and operationalized as extreme positions in left-right, or liberal-conservative, attitudinal dimensions, motivated by studies focused on the US. Yet, left-right polarization alone is insufficient to study socio-political dynamics when considering non-binary and multi-dimensional party systems, especially in national contexts other than the US in which relevant ideological stances cannot be represented only in a left-right dimension, but must be characterized in additional ones, relating for example to opposition to elites, government, political parties or mainstream media.

In this work we leverage inference of ideologies and political attitudes towards diverse issues on Twitter to characterize the spread of misinformation. Using *attitudinal embedding* methods (Ramaciotti Morales et al. 2021) relying both in graph embedding and political survey data, we position hundreds of thousands of Twitter users in multi-dimensional geometrical spaces where dimensions act as indicators of positive and negative opinions towards different issues of political debate. In particular, we recover positions along two relevant potentials drivers of misinformation: political stances on left-right scales and attitudes towards elites. Leveraging this multi-dimensional approach, we then identify users that have shared URLs rated as misinformation by fact-checkers, which allows us to analyze both, the patterns of ideological and political stances that are connected with a propensity to participate in misinformation, and the circulation of fake news in different directions of attitude space. We illustrate our approach on a Twitter network of French users. We show that most users sharing misinformation hold salient anti-elite sentiments and, among them, more so those with radical left- and right-leaning stances. Our results reinforce the importance of enriching one-dimensional

left-right analyses, showing that other ideological dimensions (such as anti-elite sentiment) are critical when characterizing users who spread fake news and treating hypotheses about socio-political drivers. Because we know the geometrical attitudinal positions or stances of users participating in misinformation, but also the social network they form and their activity, we can link social activity, ideology, and misinformation. Users spreading fake news hold more anti-elite and politically extreme views, but also form less dense social networks (*i.e.* less clustered) compared to those who do not participate in misinformation, despite being more active, following more users and posting more content. Overall, our results highlight the key role of socio-political dynamics in the spread of misinformation, bridging emerging new hypotheses for the spread of fake news with new observables in complex social systems.

References

Guess, Andrew, Jonathan Nagler, and Joshua Tucker. “Less than you think: Prevalence and predictors of fake news dissemination on Facebook.” *Science advances* (2019).

Allen, Jennifer, Baird Howland, Markus Mobius, David Rothschild, and Duncan J. Watts. “Evaluating the fake news problem at the scale of the information ecosystem.” *Science Advances* (2020).

Osmundsen, Mathias, Alexander Bor, Peter Bjerregaard Vahlstrup, Anja Bechmann, and Michael Bang Petersen. “Partisan polarization is the primary psychological motivation behind political fake news sharing on Twitter.” *American Political Science Review* (2021).

Ramaciotti Morales, Pedro, Cointet, Jean-Philippe, and Muñoz Zolotoochin, Gabriel. “Unfolding the dimensionality structure of social networks in ideological embeddings”. *IEEE/ACM International Conference on Advances in Social Networks Analysis and Mining* (2021).

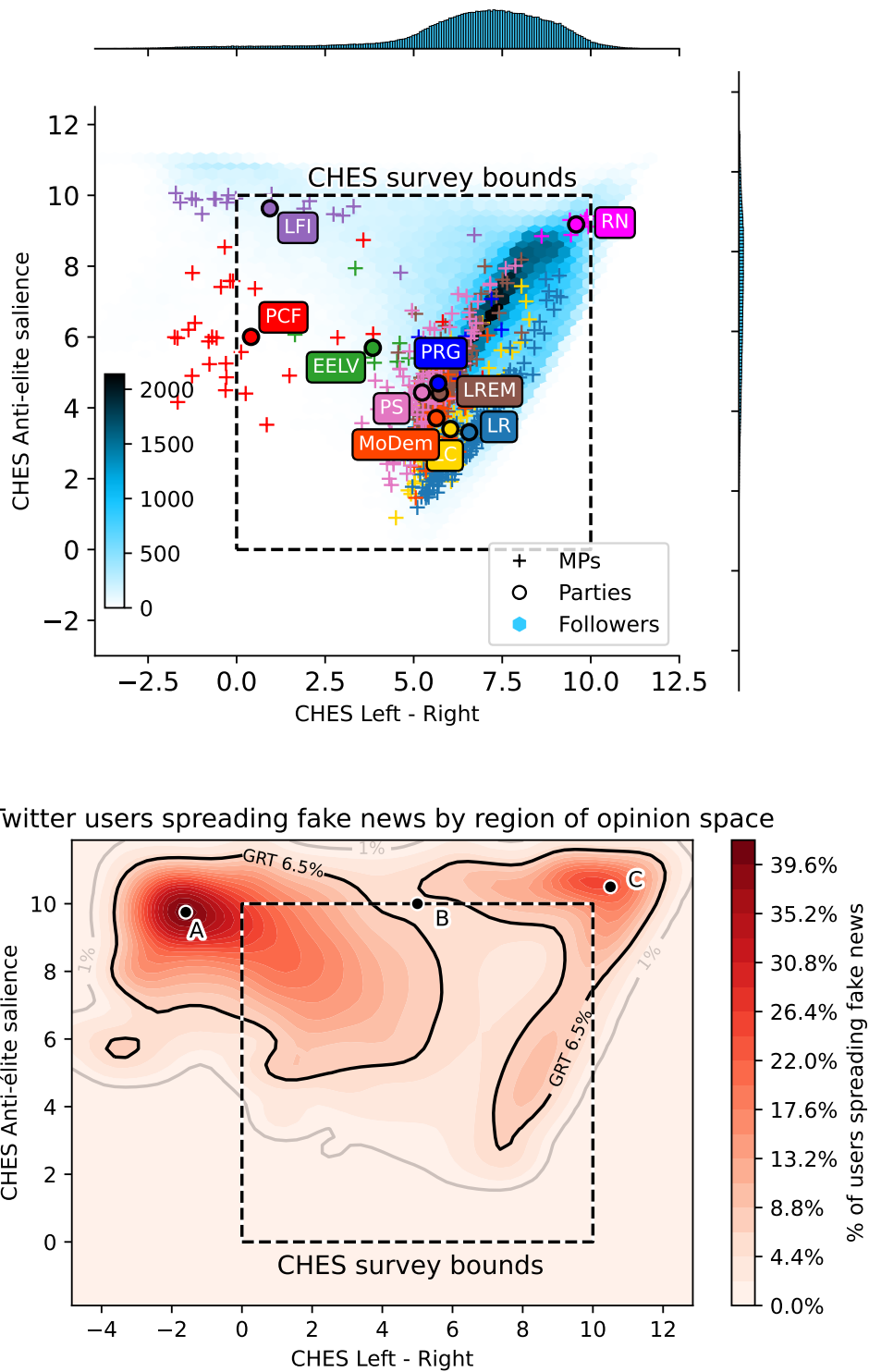


Figure 1: Positions of French political parties, parliamentarians (MPs), and their followers mapped onto two relevant dimensions of the Chapel Hill Expert Survey (CHES) dimensions of interest: Left-Right cleavages and Anti-elite salience (top). Percentage of users that spread misinformation in different regions of the CHES reference attitudinal space made of a left-right, and an anti-elite salience dimension (bottom). Highest density of fake news spreaders occurs among anti-élite far-left (A) and far-right (C) users. Users with high anti-élite sentiment, but low left-right polarization (B) have lower tendency to share misinformation.