

Political Polarization through the Lens of Issue Alignment

A Public Health-Climate Change Case Study and Developments in Methodology

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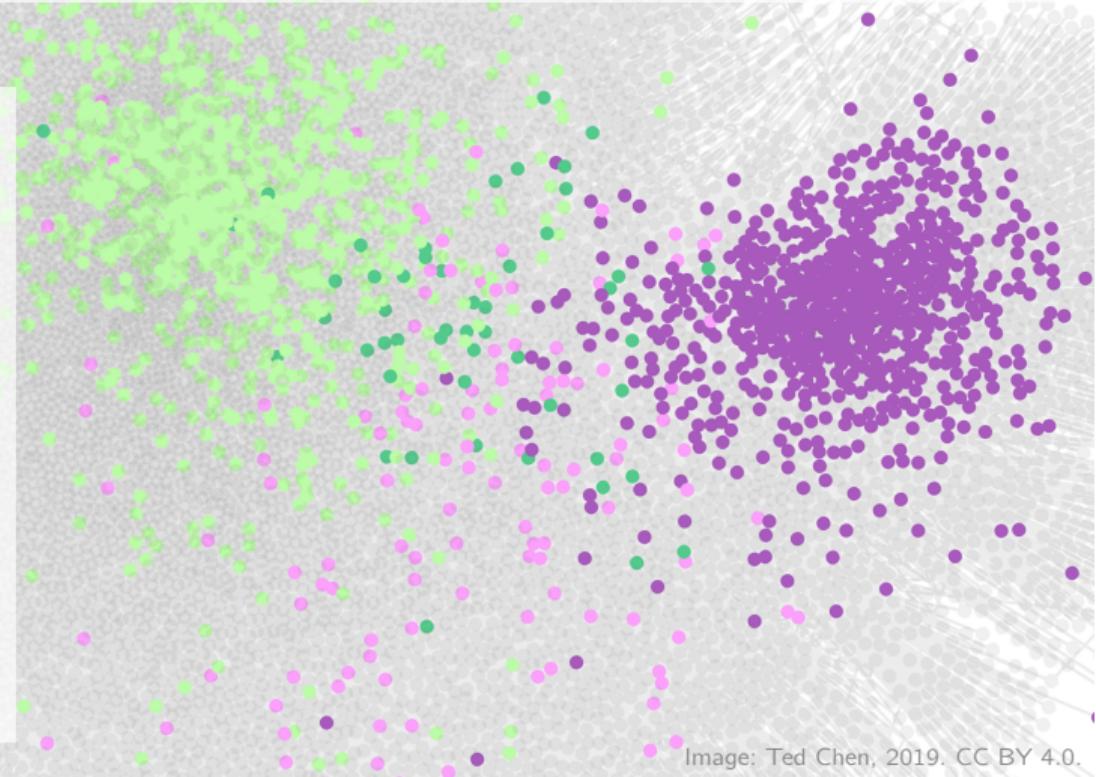


Image: Ted Chen, 2019. CC BY 4.0.

Bundled Political Issues, Alignment, and Political Polarization



(b) Each agency, department, or commission head, in consultation with the Attorney General, the Director of OMB, and the Director of OPM, as appropriate, shall take the following actions within sixty days of this order:

(i) terminate, to the maximum extent allowed by law, all **DEI, DEIA, and "environmental justice"** offices and positions (including but not limited to "Chief Diversity Officer" positions); all "equity action plans," "equity" actions, initiatives, or programs, "equity-related" grants or contracts; and all DEI or DEIA performance requirements for employees, contractors, or grantees.

(ii) provide the Director of the OMB with a list of all:

(A) agency or department **DEI, DEIA, or "environmental justice"** positions, committees, programs, services, activities, budgets, and expenditures in existence on November 4, 2024, and an assessment of whether these positions, committees, programs, services, activities, budgets, and expenditures have been misleadingly relabeled in an attempt to preserve their pre-November 4, 2024 function;

(B) Federal contractors who have provided DEI training or DEI training materials to agency or department employees; and

Trump's executive order cutting DEI, DEIA, and "environmental justice."

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Pentagon Culls Social Science Research, Prioritizes Fiscal Responsibility and Technologies for Future Battlefield

March 7, 2025 | [f](#) [X](#) [p](#)

Cost savings of more than \$30 million in first year through discontinuation of 91 studies

The Office of the Secretary of Defense for Research and Engineering (OUSD(R&E)) is scrapping its social science research portfolio as part of a broader effort to ensure fiscal responsibility and prioritize mission-critical activities. This initiative involves focusing resources on technologies essential for maintaining a strong national defense, aligning with the Administration's commitment to efficient government and ensuring taxpayer dollars are spent wisely.

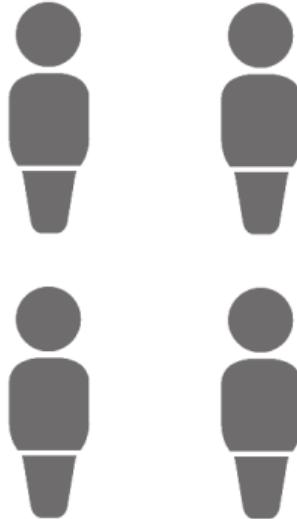
The Department recognizes the value of academic research but – in response to President Trump's Executive Orders and Secretary Hegseth's priorities in his January 25, 2025, "Message to the Force" and January 29, 2025, Memorandum, "Restoring America's Fighting Force" – recognizes that funded research must address pressing needs to develop and field advanced military capabilities. Several studies are affected by this shift, including those focused on [global migration patterns, climate change impacts, and social trends](#). Examples include:

Pentagon cuts Minerva Research Initiatives including migration and climate change.

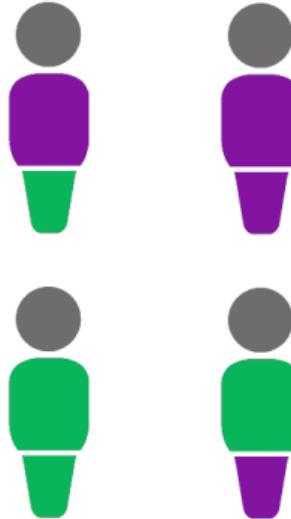
Outline

1. Illustration of why alignment is a problem
2. Public health-climate change case study on affective polarization spillover
3. Moving toward issue alignment networks: framework for multiway alignment

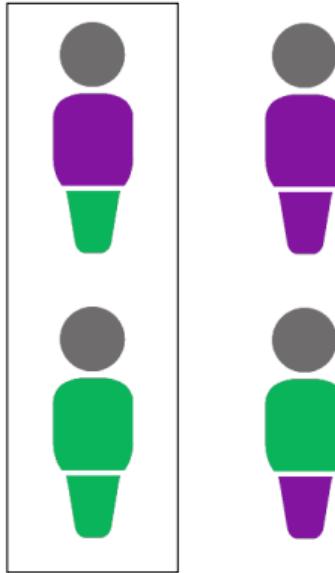
The Importance of *Alignment* in Political Polarization



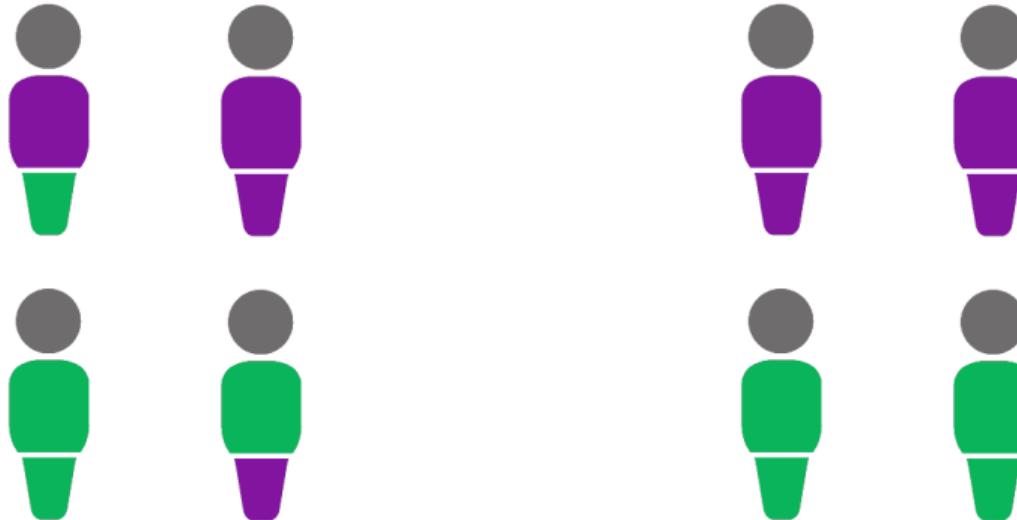
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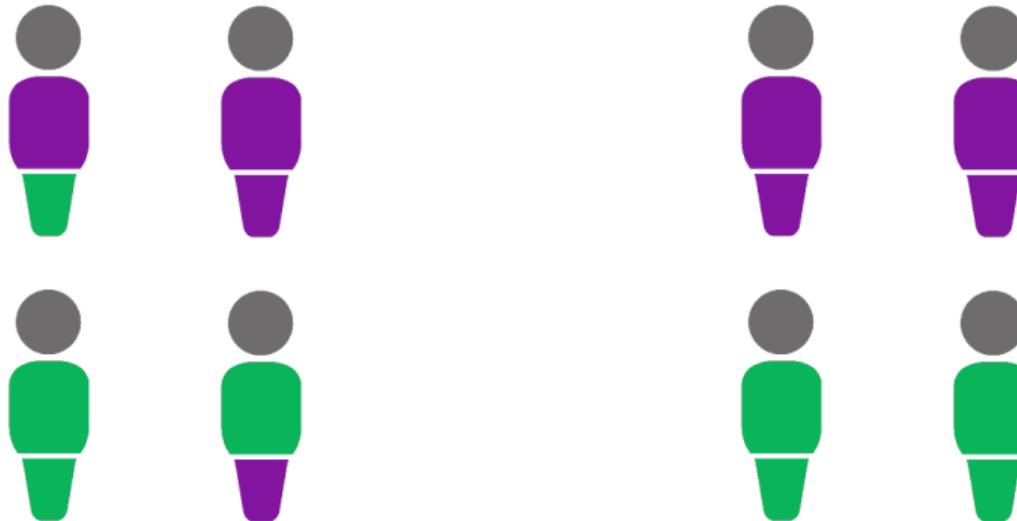
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The Importance of *Alignment* in Political Polarization



Alignment creates entrenched cleavages

Incivility and Contentiousness Spillover in Public Engagement with Public Health and Climate Science

doi.org/10.31235/osf.io/maufz_v1

Hasti Nariman-zadeh, Aalto University

Arash Badie-Modiri, National Research Council, Italy

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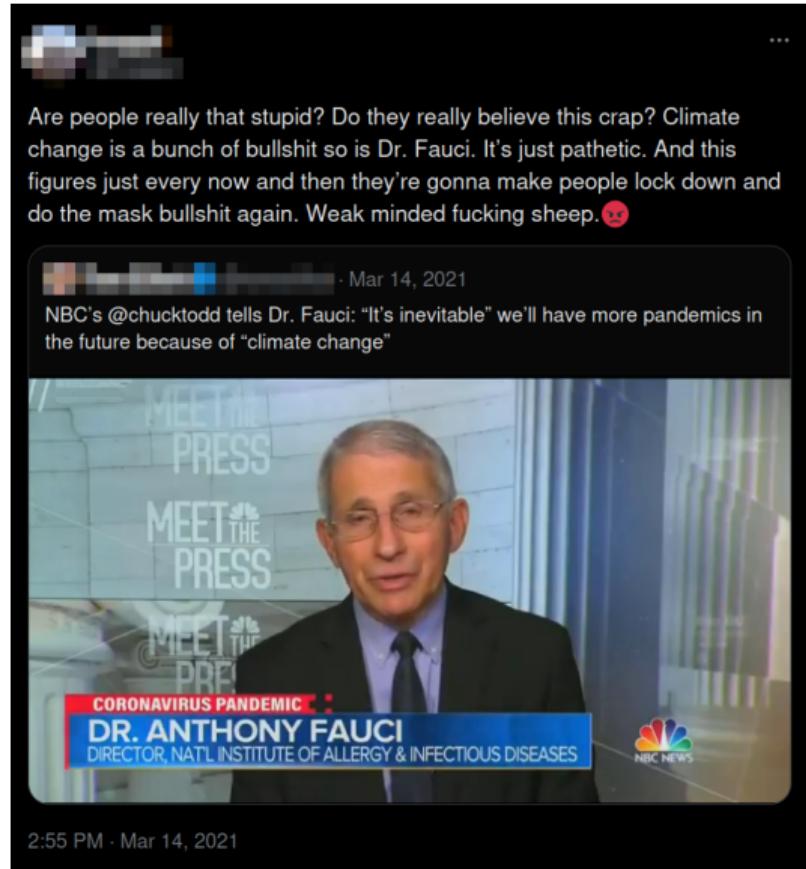
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Research Questions

Can affective polarization (animosity toward members of the political outgroup) toward an issue travel to another one?

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There was strong affective polarization toward science during COVID-19 (Dr. Fauci, COVID-19 policies, e.g., vaccines, lockdown).

1. Can it “spillover” to influence public attitudes toward climate change?
2. What are the conceptual pathways it travels through?



Empirical Approach

What is “spillover”?

Looking at *incivility* and *contentiousness* in climate change discussions

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Looking at *incivility* and *contentiousness* in climate change discussions based on...

Coincidence with pandemic events

- ▶ trend and change point detection

Co-occurrence with COVID-19 content

- ▶ regression and survival models

Empirical Approach

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Co-occurrence with COVID-19 content

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Time period: 134 weeks from Feb 2019–Aug 2021

Data Set	Sample Size	Users
General climate tweets	38.4M	5.5M
Climate science tweets	258K	79K
Reddit climate posts	2.1M	
General climate convos	1.9M	
Climate science convos	181K	

Measurement

- ▶ **COVID-19 content**
- ▶ **Incivility**
- ▶ **Contentiousness**

Measurement

- ▶ **COVID-19 content** Keywords related to 1) COVID-19 and 2) Anthony Fauci
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Temporal Dynamics in Post-level Toxicity

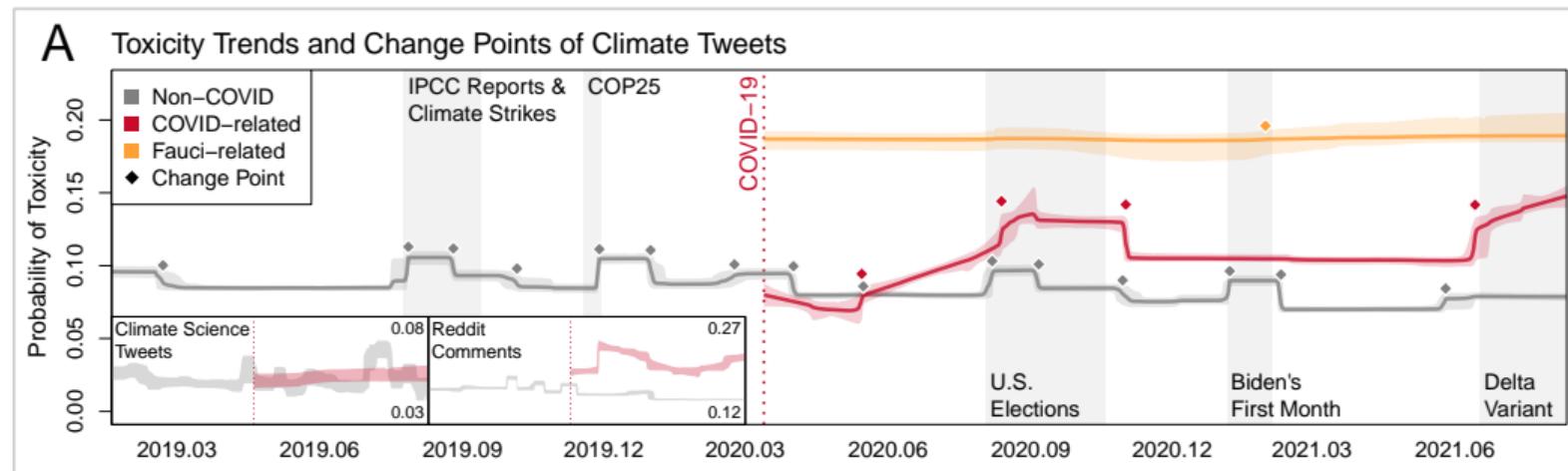
Bayesian Estimator of Abrupt change, Seasonal change, and Trend (BEAST)

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Post-level Toxicity Co-occurrence

Linear probability models for toxicity in climate posts (3 data sets + user fixed effects)

Covariates:

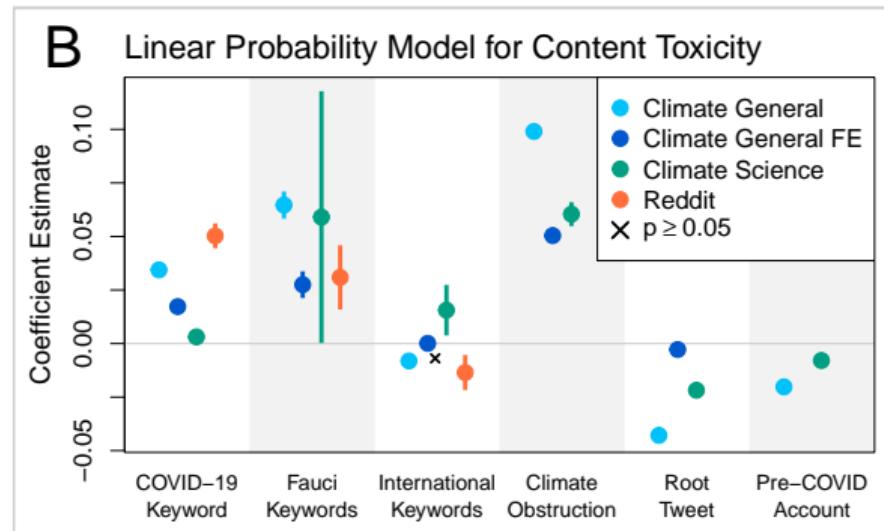
- ▶ international: international regime/figures (e.g., United Nations, George Soros, Bill Gates)
- ▶ climate obstruction: “contrarian” claims about climate science/policy
- ▶ root: tweet that is not a response
- ▶ pre-COVID account: account already active before the pandemic
- ▶ day fixed effects

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Temporal Dynamics in Conversation Disagreement

BEAST analysis for conversation-average disagreement

- ▶ Differences in weekly temporal trend based on co-occurrence of COVID-19 content

Temporal Dynamics in Conversation Disagreement

BE

Tweet-Reply Pairs

Disagreement with climate tweet that references COVID-19

Excited collaboration with 43 authors from 27 institutes shows COVID-19 caused the largest decrease of CO2 emissions since 1900. Larger than that of WWII.

[Link to a *Nature Communications* article.]

→ Let's not fool ourselves with these numbers. In Asia from January to September 2020 the average temperature was 2.30 degrees Celsius. And that's with a baseline of 1841. If you go back to a 1750 baseline, temperatures are even higher.

Invoking COVID-19 to disagree with climate tweet

China's iron & steel industry is a major source of air pollution. In 2015 it brought in tighter standards. From 2014 to 2018 (only 4 years!): Particulate matter (PM) fell by 47%. SO2 fell by 42%. Change can happen quickly.

[Link to a *Nature Sustainability* article.]

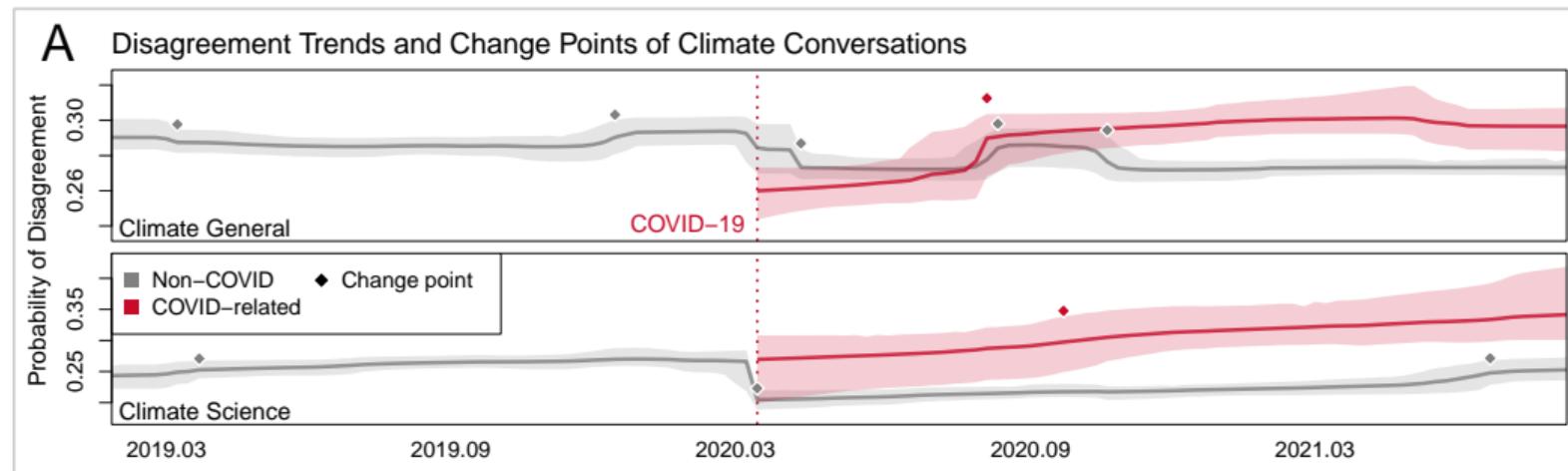
→ Do not believe any of the CCP's "figures". You are being Wuhaned.

Table 4: Examples of high disagreement responses in climate science conversations that reference COVID-19. Disagreement probabilities of these tweet-pairs exceed 0.80. Tweet texts have been edited for typos and formatting.

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Post-pair Disagreement

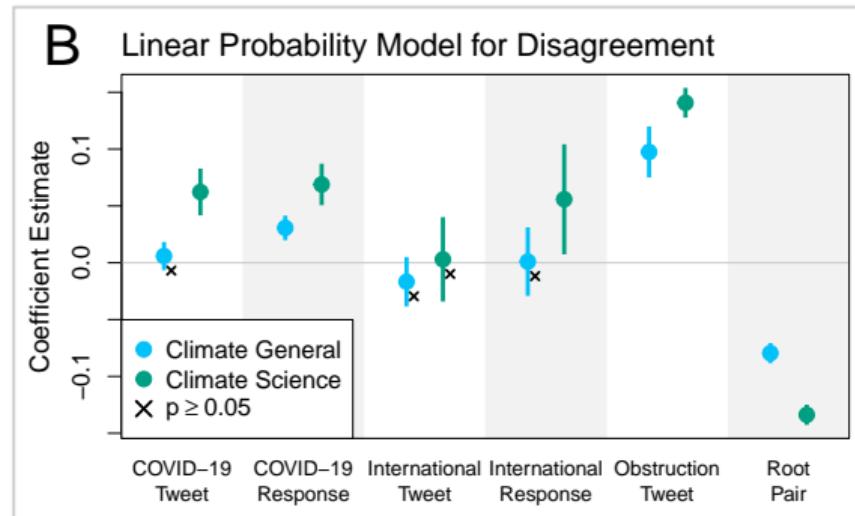
Linear probability models for disagreement between pairs of tweets (Twitter data sets)

- ▶ observations are tweet-response pairs
- ▶ different ways “COVID-19” enters disagreements:
 - when in predecessor tweet:
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Pre-existing Anti-Internationalist Sentiments as Spillover Pathway?

Anti-internationalist populist sentiments and related conspiracy theories are prevalent in both climate change and COVID-19 discussions.

Examples of Uncivil Climate Tweets that Mention International Organizations

Pre-COVID

Climate change “scientists” are not stupid. They are on the biggest ever gravy train. Politicians are the stupid ones for allowing them and UN bodies to rip us off. All part of the Soros funded New World Order.

Post-COVID

We won’t be in deep shit because of non-existent climate change. We’ll be in deep shit because dumb fucks like these people are in charge, and are pushing a hoax for more total control. Klaus Schwab, Fauci, Gates, etc.

Toxicity of International Content before and during COVID-19

1. Anti-internationalist sentiment → greater incivility in climate discussions
 2. COVID-19 → greater anti-internationalist sentiment
- Spillover should lead to greater incivility in climate-international content

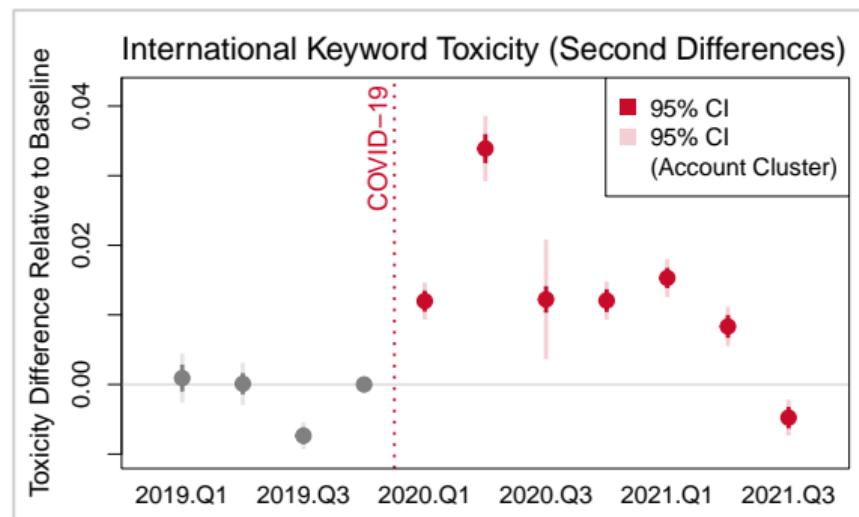
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 2. “Second differences” model: quarterly difference in int'l/non-int'l toxicity compared to baseline (2019 Q4)

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Takeaways (and remaining questions for future research)

1. There is spillover of affective polarization.
 - ▶ But what explains the difference between general and science tweets?
2. Pathways for spillover occur through existing cleavages.
 - ▶ But what happens in cases where there is less “synergy” between the issues?



Methodology Developments

Iannucci et al. 2025. "Multiway Alignment of Political Attitudes." Preprint.
doi.org/10.48550/arXiv.2408.00139

Chen and Belman. 2025. "Measuring Individual-level Belief System Networks Using Surveys." In progress.

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Networks of Issue Alignments

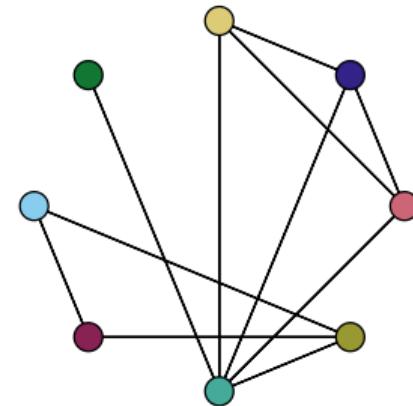
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This is clearly a network.

- ▶ Nodes: attitudes or preferences
- ▶ Edges: connections (e.g., spillover, constraint)

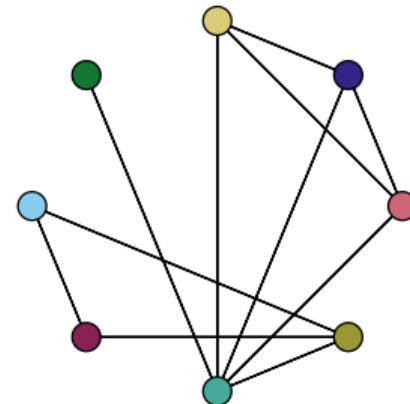


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Even if you only care about pairwise alignment, networks matter.

a) no connection



b) direct connection



c) indirect connection



d) robust connection



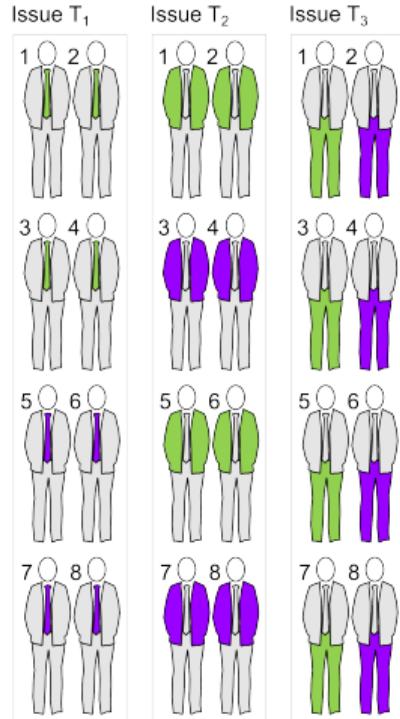
e) higher order connection



Multiway Alignment: Higher Order Connection between Attitudes

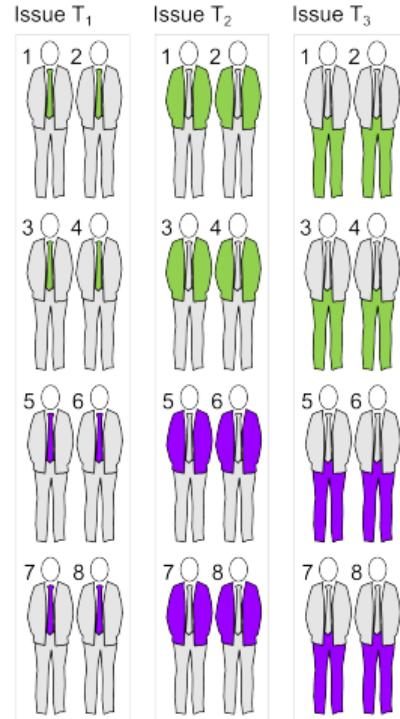
(a)

Completely Unaligned System

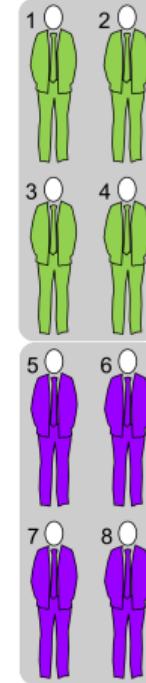


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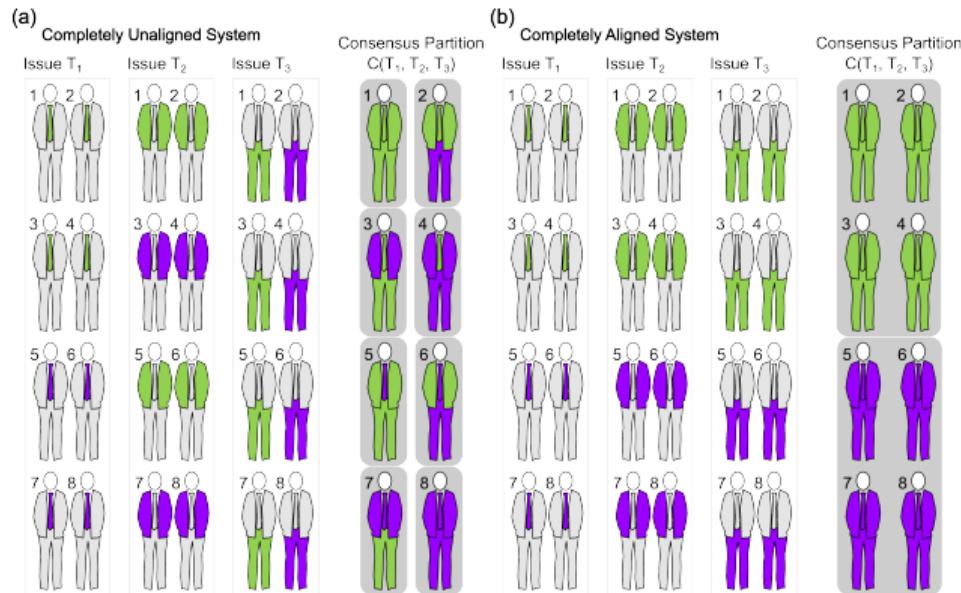
Completely Aligned System



Consensus Partition
 $C(T_1, T_2, T_3)$



Multiway Alignment: Higher Order Connection between Attitudes

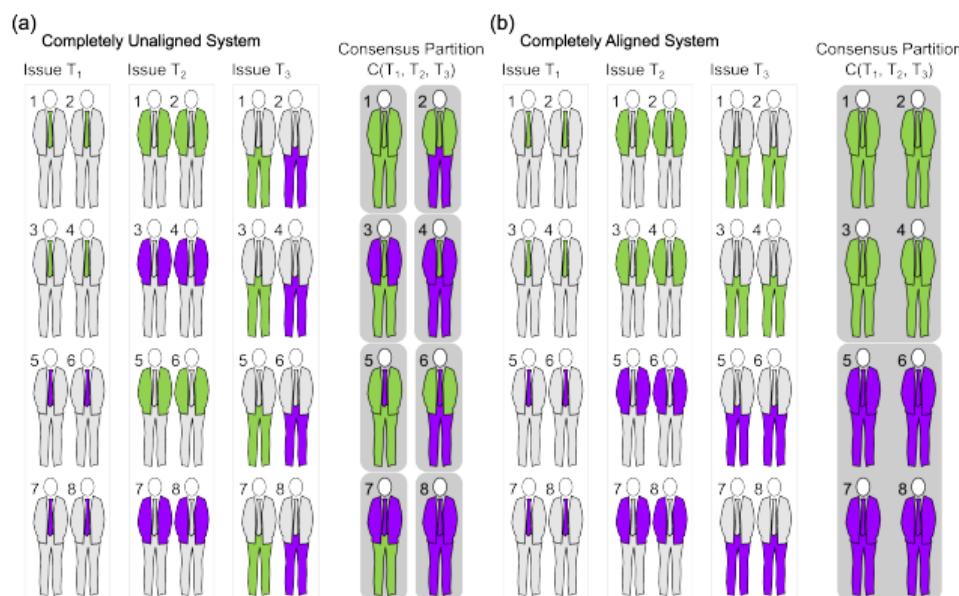


Consensus partitions:

Groups of units that have identical positions on all relevant issues

Census partitions of a system captures how polarized it is.

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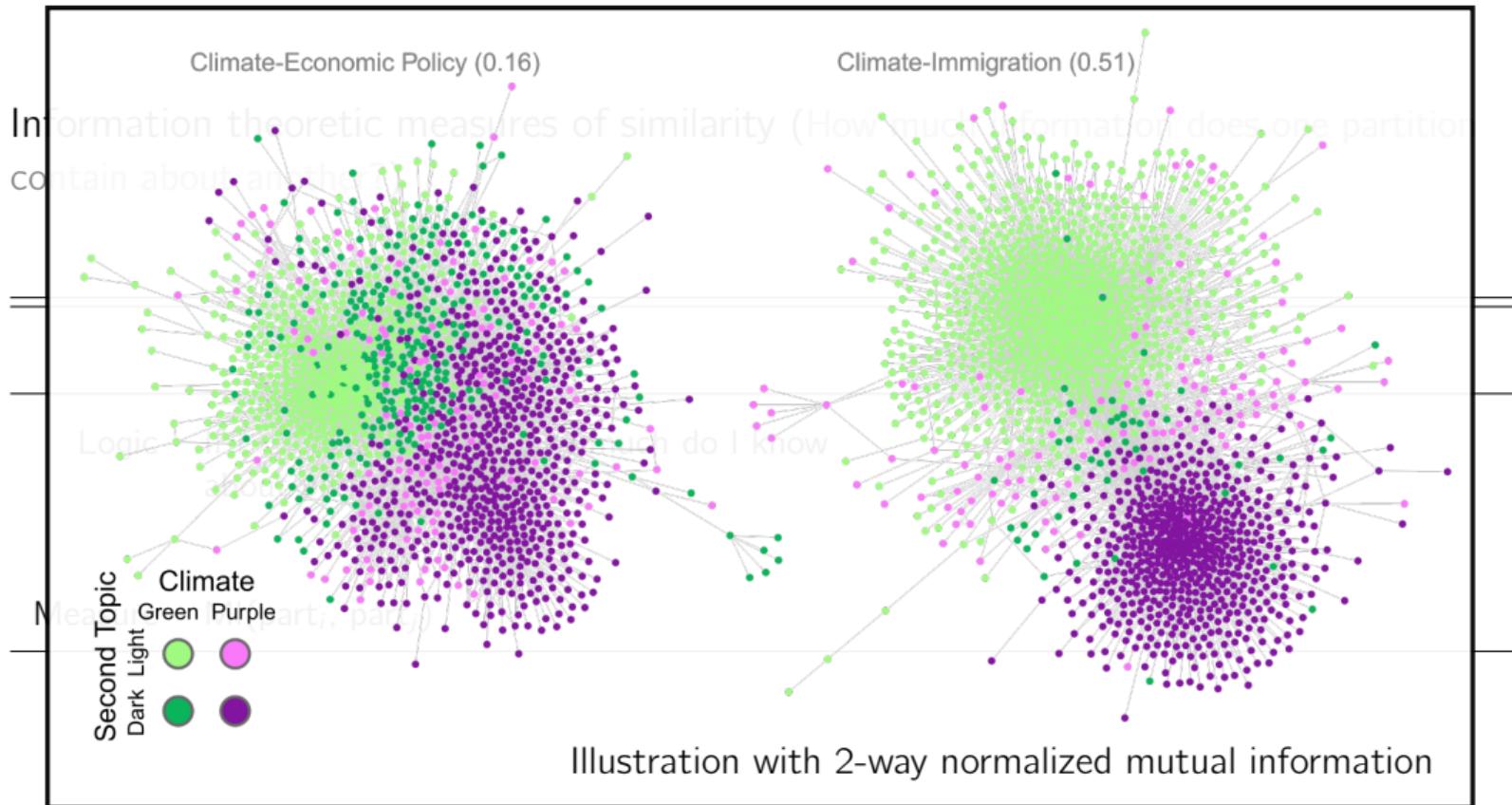
- ▶ Greater number of groups → mix of smaller groups with diverse viewpoints
- ▶ Fewer number of groups → larger groups with little overlapping preferences

Information Theoretic Measure of Multiway Alignment

Information theoretic measures of similarity (How much information does one partition contain about another?)

	2-way	k -way
Logic	If I know partition i , how much do I know about partition j ?	
Measure	$\text{MI}(\text{part}_i, \text{part}_j)$	

Information Theoretic Measure of Multiway Alignment

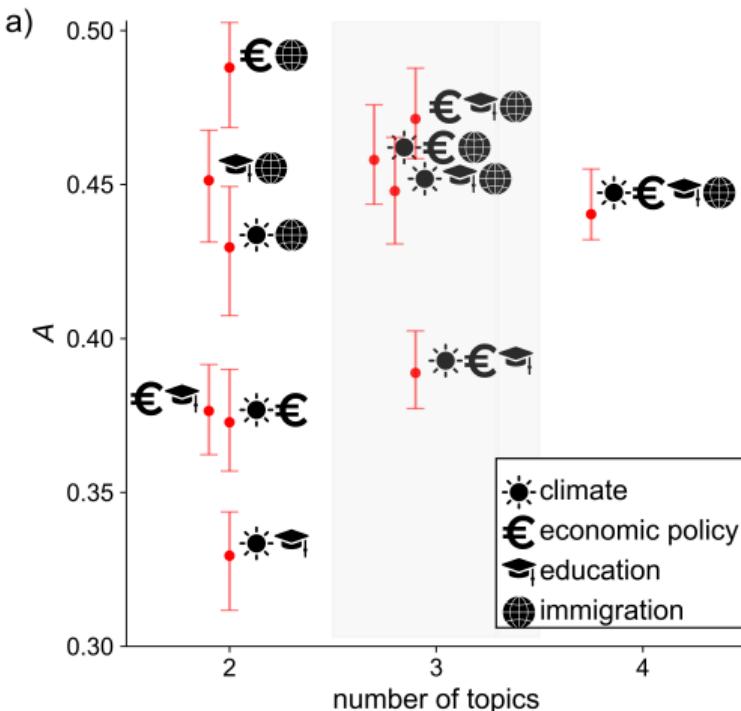


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	2-way	k -way
Logic	If I know partition i , how much do I know about partition j ?	If I know about partition i , how much do I know about consensus partition $\{1, 2, \dots, -i, \dots, k\}$
Measure	$MI(part_i, part_j)$	$\frac{1}{k} \sum_{i=1}^k MI(part_i, \text{consensus part}_{1,\dots,-i,\dots,k})$

Application: Multiway Alignment across Different Political Systems

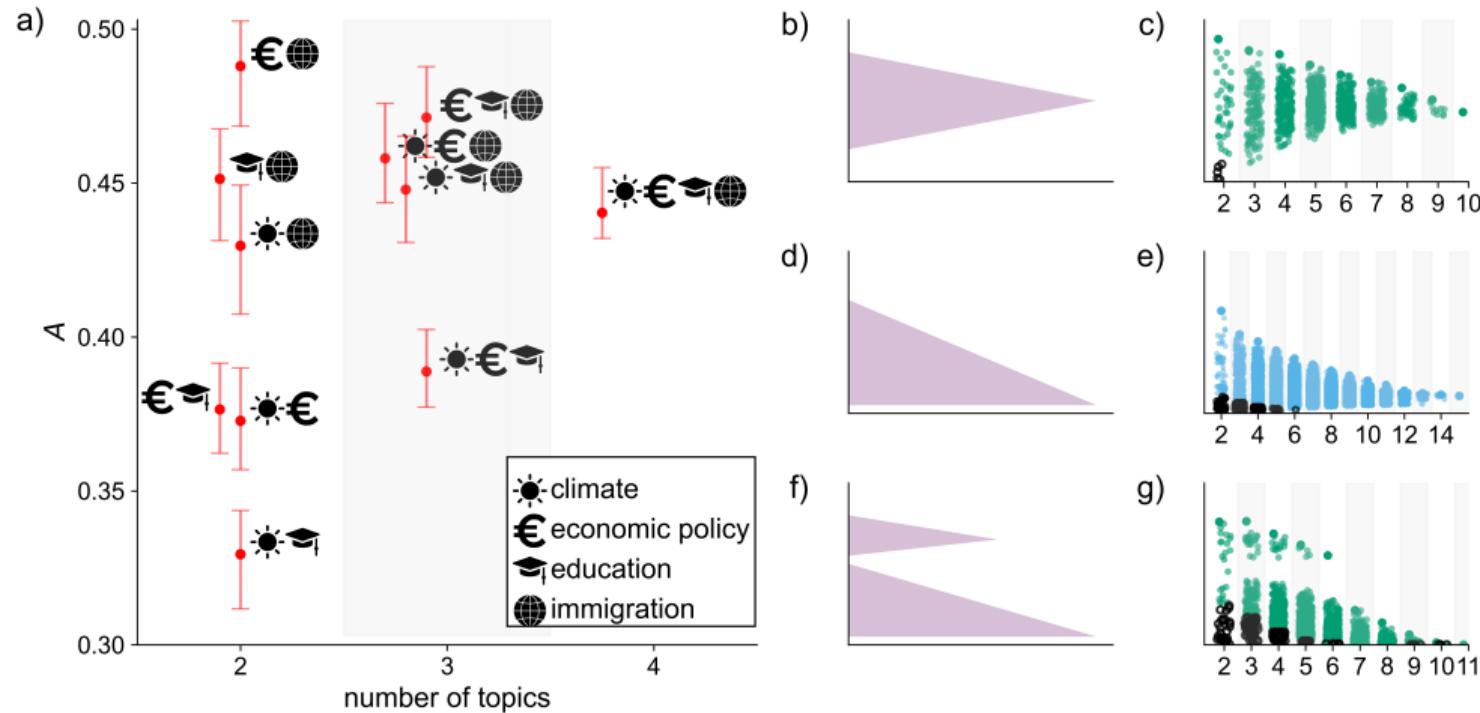


Multiway alignment for all topic combinations up to the largest number of topics

Applied to different political systems (e.g., legislatures, social media, surveys)

Observed different types of “shapes” across different types of systems

Application: Multiway Alignment across Different Political Systems



Thank you!

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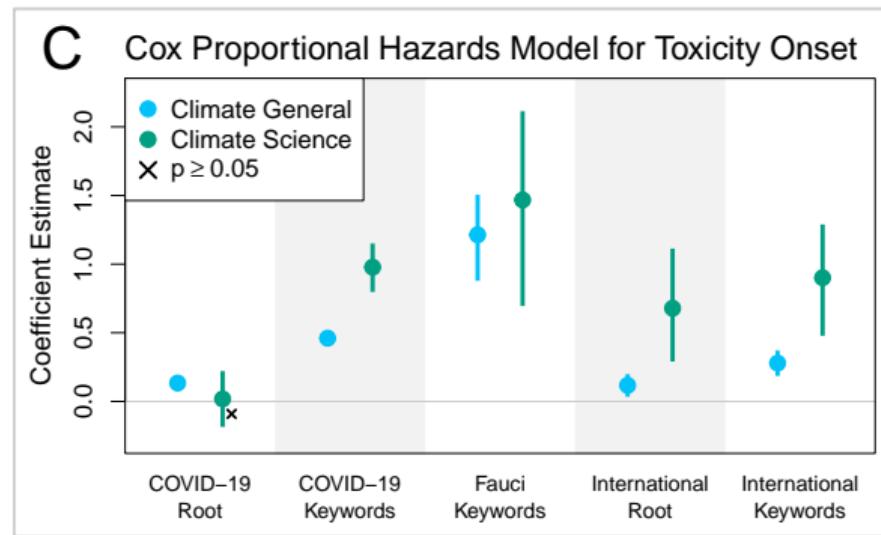
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Conversation-level Toxicity Onset

Cox proportional hazards model for first toxic tweet in a convo (Twitter data sets)

- ▶ units are conversations
- ▶ “death”: occurrence of toxic tweet
- ▶ right-censored if no toxicity observed
- ▶ “root”: conversation-level variable
- ▶ “keywords”: time-dependent variable



Sidebar: What's so bad about disagreement?

1. The overwhelming majority of climate tweets contains mainstream, science-supported content (estimated using “Augmented CARDS” classifier model; Rojas et al. 2024)
2. Disagreements are generally much more likely to contain obstructionist content (linear probability model of obstructionist content; disagreement probability as primary predictor)

