Information Manipulation

Lynnette Hui Xian Ng

Lynnette Ng

- PhD in Societal Computing, Carnegie Mellon University
- Advised by Prof Kathleen Carley

- Information Manipulation
  - Influence of humans in the online space

TITLE	CITED BY	YEAR
Analyzing public opinion and misinformation in a COVID-19 telegram group chat LHX Ng, JY Loke IEEE Internet Computing 25 (2), 84-91	62 *	2020
A synchronized action framework for responsible detection of coordination on social media T Magelinski, LHX Ng, KM Carley arXiv preprint arXiv:2105.07454	49	2021
Stabilizing a supervised bot detection algorithm: How much data is needed for consistent predictions? LHX Ng, DC Robertson, KM Carley Online Social Networks and Media 28, 100198	33	2022
Botbuster: Multi-platform bot detection using a mixture of experts LHX Ng, KM Carley Proceedings of the International AAAI Conference on Web and Social Media 17 …	31	2023
Cross-platform information spread during the January 6th capitol riots LHX Ng, IJ Cruickshank, KM Carley Social Network Analysis and Mining 12 (1), 133	30	2022
Coordinating Narratives Framework for cross-platform analysis in the 2021 US Capitol riots LHX Ng, IJ Cruickshank, KM Carley Computational and Mathematical Organization Theory 29 (3), 470-486	26 *	2023
How does fake news spread? Understanding pathways of disinformation spread through APIs LHX Ng, A Taeihagh arXiv preprint arXiv:2109.12865	23	2021
Investigating the spread of Russian disinformation about biolabs in Ukraine on Twitter using social network analysis I Alieva, LHX Ng, KM Carley 2022 IEEE international conference on big data (big data), 1770-1775	21	2022

23 May 2023

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The Editors, Editorial Board, and Publisher are pleased to announce the winner of the 2022 IP&M Ph.D. Paper Award, which is:

Best PhD Paper for 2022

Ng, L. H. X., & Carley, K. M. (2022). Is my stance the same as your stance? A cross validation study of stance detection datasets. *Information Processing & Management*, *59*(6), 103070.https://www.sciencedirect.com/science/article/pii/S0306457322001728

Honorable Mentions

Kaya, K., Yılmaz, Y., Yaslan, Y., Öğüdücü, Ş. G., & Çıngı, F. (2022). Demand forecasting model using hotel clustering findings for hospitality industry. *Information Processing & Management*, *59*(1), 102816.https://www.sciencedirect.com/science/article/abs/pii/S0306457321002909

Zhang, X., Lin, H., Xu, B., Li, C., Lin, Y., Liu, H., & Ma, F. (2022). Dynamic intent-aware iterative denoising network for session-based recommendation. *Information Processing & Management*, *59*(3), 102936.https://www.sciencedirect.com/science/article/abs/pii/S0306457322000590

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2022 IEEE international conference on big data (big data), 1770-1775

Carnegie Mellon University
School of Computer Science

SEARCH

EDUCATION RESEARCH NEWS & EVENTS ABOUT SCS PARTNERSHIPS DEPARTMENTS GIVE

Standardized Data Set Annotations Could Aid in Detecting Social Media Sentiments

Byron Spice | Thursday, August 3, 2023

Social media provides an important window into the public zeitgeist, generating humongous data sets that reflect attitudes on everything from abortion to the latest Taylor Swift concert. Tapping this resource would be impossible without artificial intelligence, but Carnegie Mellon University researchers caution that the machine learning models employed to analyze these data sets — known as stance detection models — have some limitations.

Stance detection models allow AI to identify positive, negative or neutral reactions in large data sets from social media posts. However, a model trained using a data set on one topic will have trouble assessing the attitudes present in data related to a separate topic, according to research by Lynnette Hui Xian Ng, a Ph.D. student in social computing in the School of Computer Science's Software and Societal Systems Department. For example, a model trained to detect public sentiments using a Twitter data set on politics will have trouble discerning whether sentiments are positive, negative or neutral in a Twitter data set on COVID-19 vaccines.

Ng explored the generalizability of stance detection by training models that each used one of seven publicly available data sets on such topics as 2016 politicians, atheism, and company mergers and acquisitions. She then tested each of the

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Zhang, X., Lin, H., Xu, B., L
session-based recommen
102936.https://www.scienc

How Blatantly False Headlines Can Distort What We Believe In

The study's survey methods are "sufficiently rigorous," says Lynnette Hui Xian Ng, a misinformation and disinformation researcher at Carnegie Mellon University. She notes, however, that the respondents were all U.S. residents, and the results may not generalize to the rest of the world. Orchinik, for his part, points out that the implications of his paper (which he emphasizes has not yet gone through peer review) also depend on the volume of moderately implausible information that exists online.

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Technology

Armies of bots battled on Twitter over Chinese spy balloon incident

Large proportions of users posting on Twitter – now X – about the Chinese balloon that drifted over the US and Canada in 2023 were bots attempting to shape the debate

By Chris Stokel-Walker

2 February 2024

erstanding how videos go viral is ators' holy grail — and for obvious sons: Crack it and they're guaranteed fame, and with it, potentially *lots* of

r/science • 4 mo. ago
Wagamaga

Armies of bots battled on Twitter over Chinese spy balloon incident

Around 35 per cent of users geotagged as located in the US exhibited bot-like behaviour, while 65 per cent were believed to be human. In China, the proportions were reversed: 64 per cent were bots and 36 per cent were humans.

Computer Science

Information Manipulation

Lynnette Hui Xian Ng

At its core,

PERSUASION

Ultimate Aim?

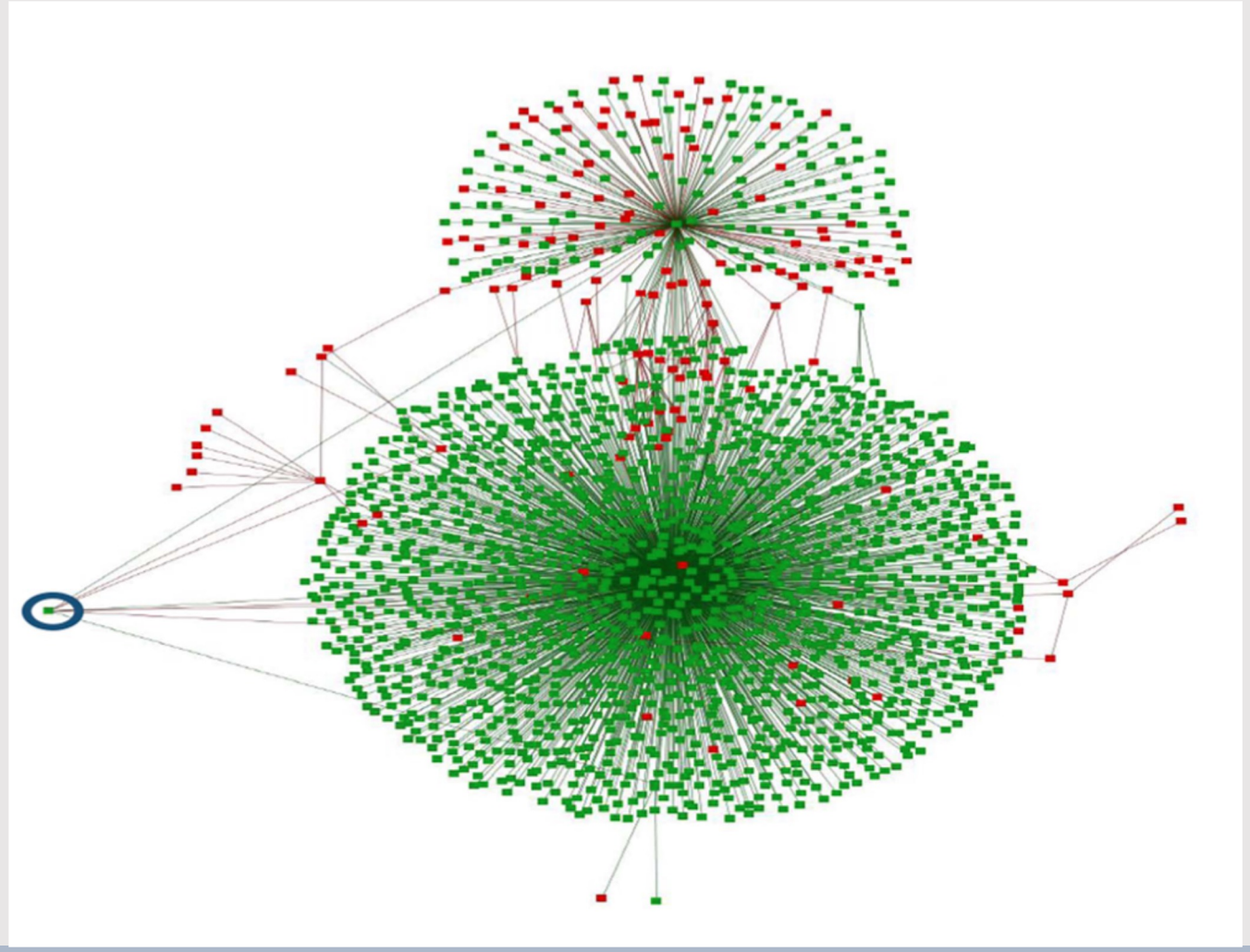
MIND CONTROL
POWER

WHY do we care?

Social Influence Change People's Stances

Ng, Lynnette Hui Xian, and Kathleen M. Carley. "Pro or anti? a social influence model of online stance flipping." *IEEE Transactions on Network Science and Engineering* 10, no. 1 (2022): 3-19.

WHY do we care?

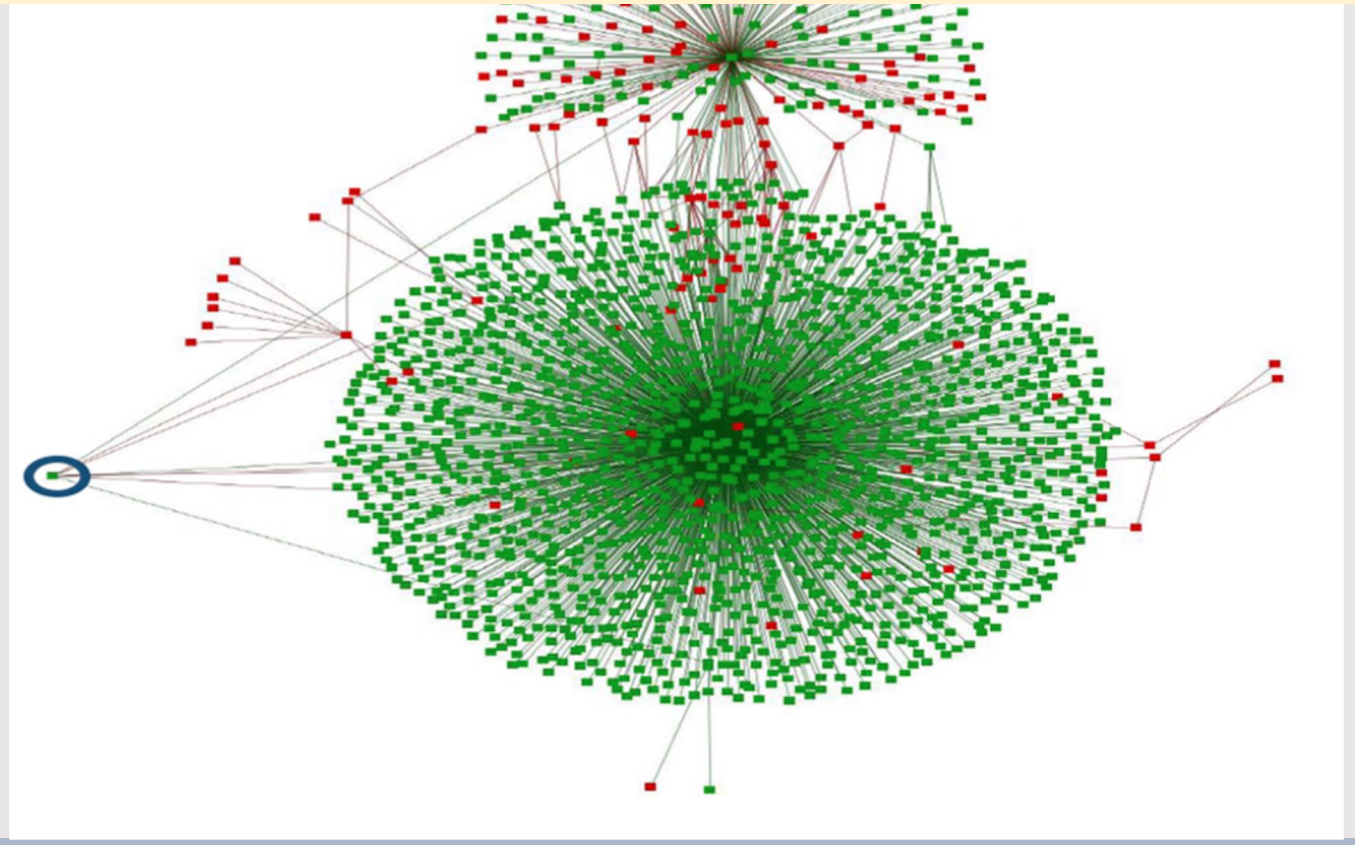


Green = Pro-Vaccine

Red = Anti-vaccine

WHY do we care?

If you apply enough social pressure, people change their stances

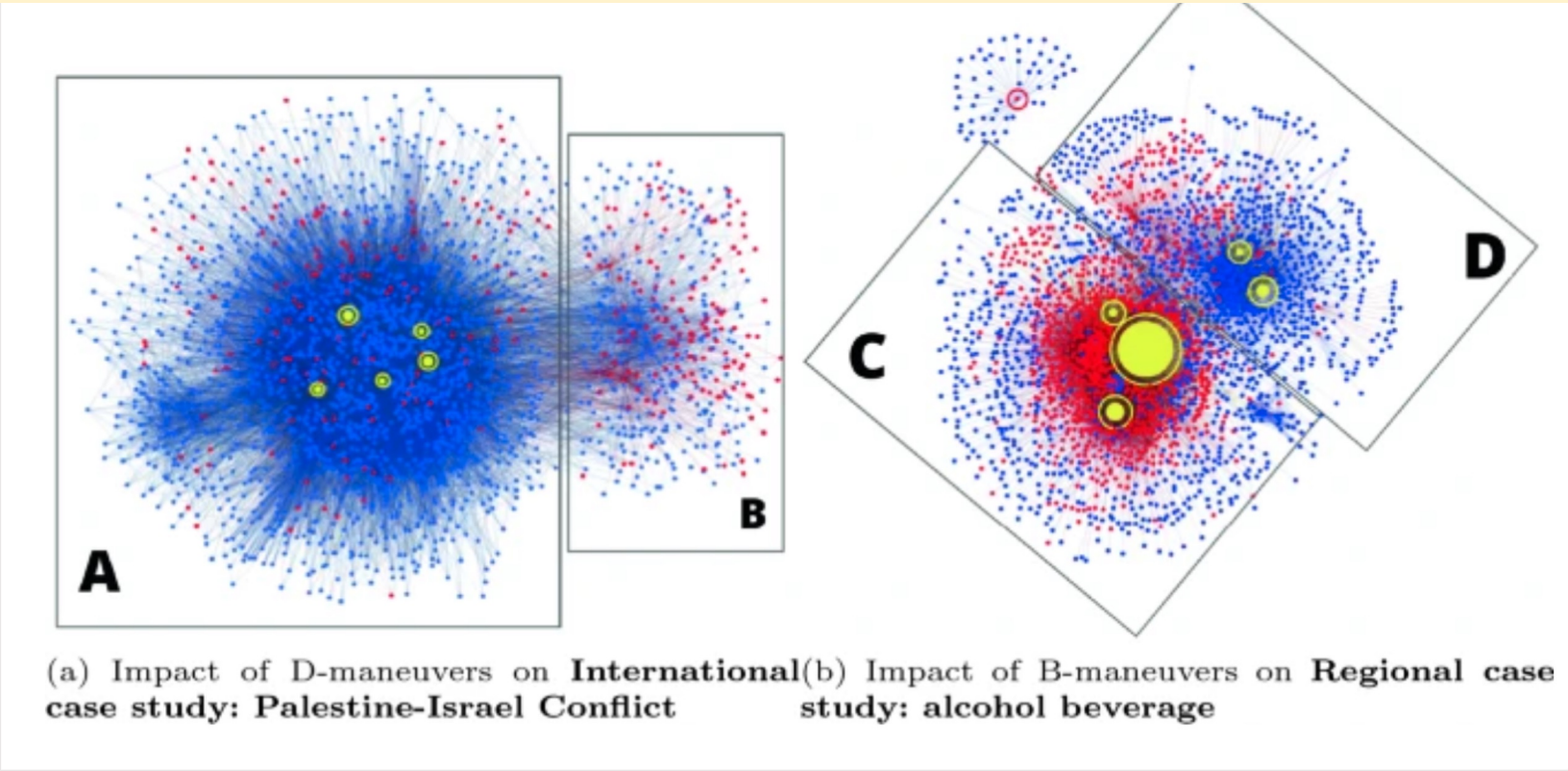


Green = Pro-Vaccine

Red = Anti-vaccine

WHY do we care?

If you apply enough social pressure, you can segregate people into clusters (i.e., polarization, echo-chambers)

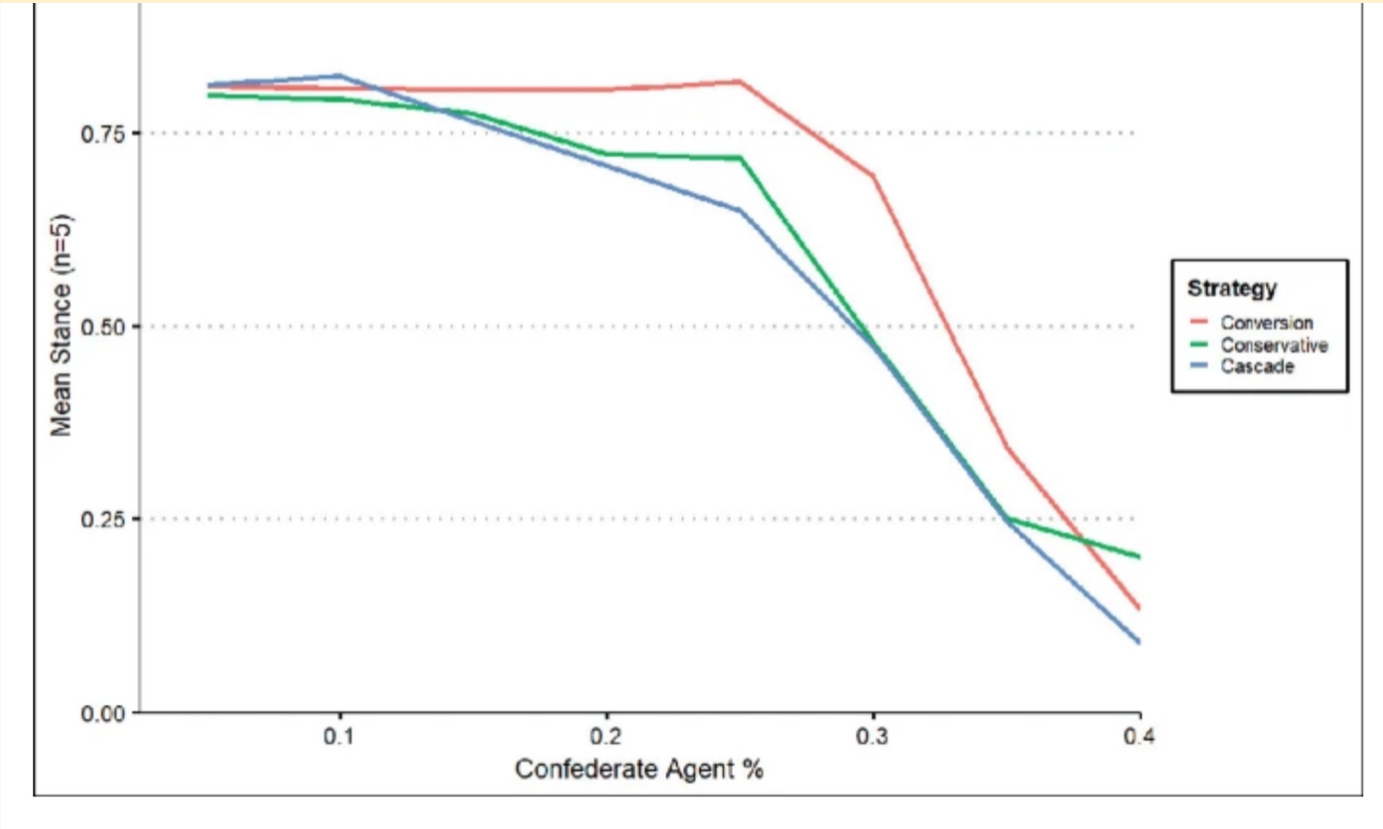


(a) Impact of D-maneuvers on **International case study: Palestine-Israel Conflict**

(b) Impact of B-maneuvers on **Regional case study: alcohol beverage**

WHY do we care?

And stances converge faster if you manage to convert people in a cascade fashion



It doesn’t matter
if it’s foreign or domestic;
if it’s automatic or organic;
if it changes people’s mind,
it’s influence we should watch

HOW do we identify Information Campaigns?

Persuasion Techniques in 2022 Russia invasion of Ukraine

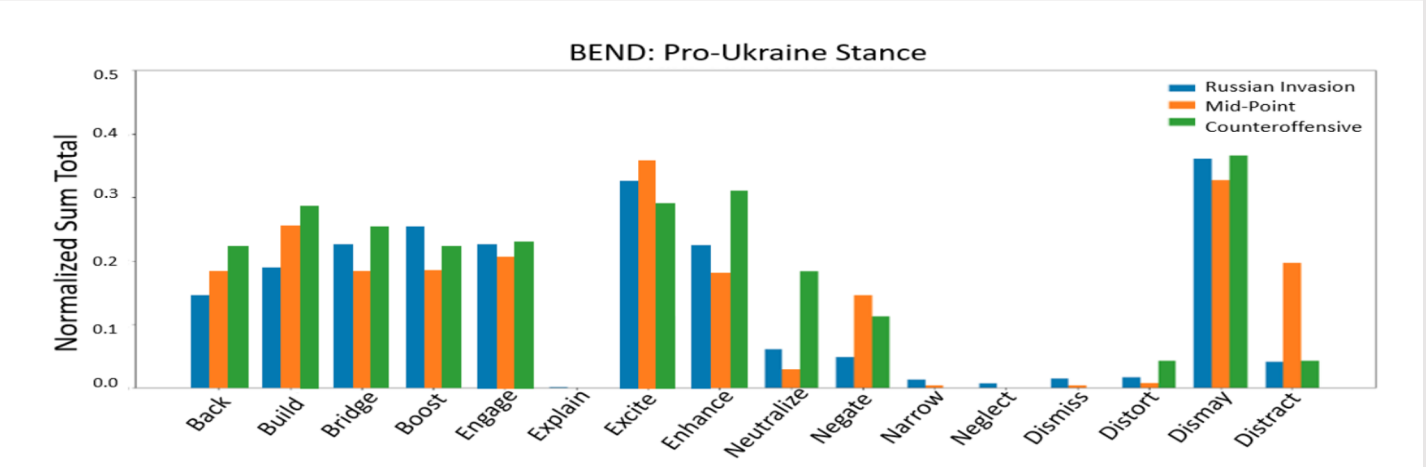
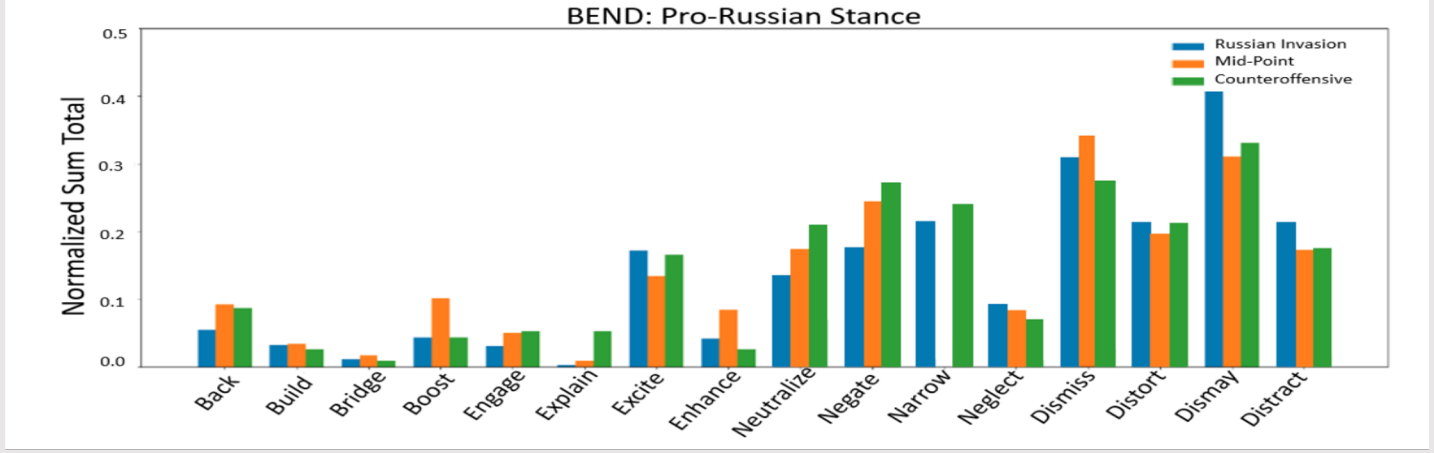
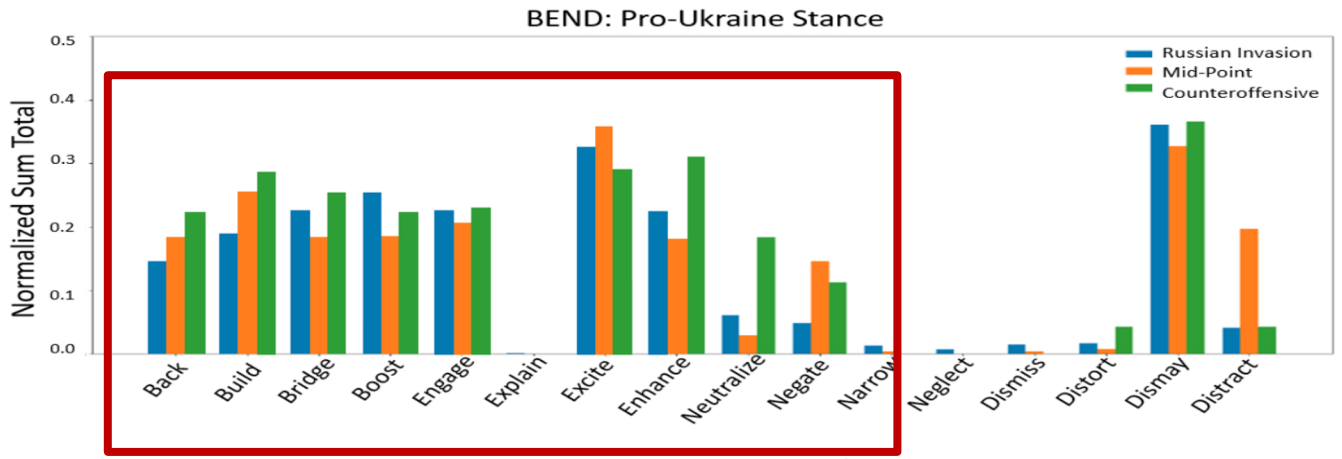


Figure 13. BEND results normalized across all three timeframes for Pro-Ukraine Stance



Persuasion Techniques in 2022 Russia invasion of Ukraine

Pro-Ukraine users consistently perform more positive techniques



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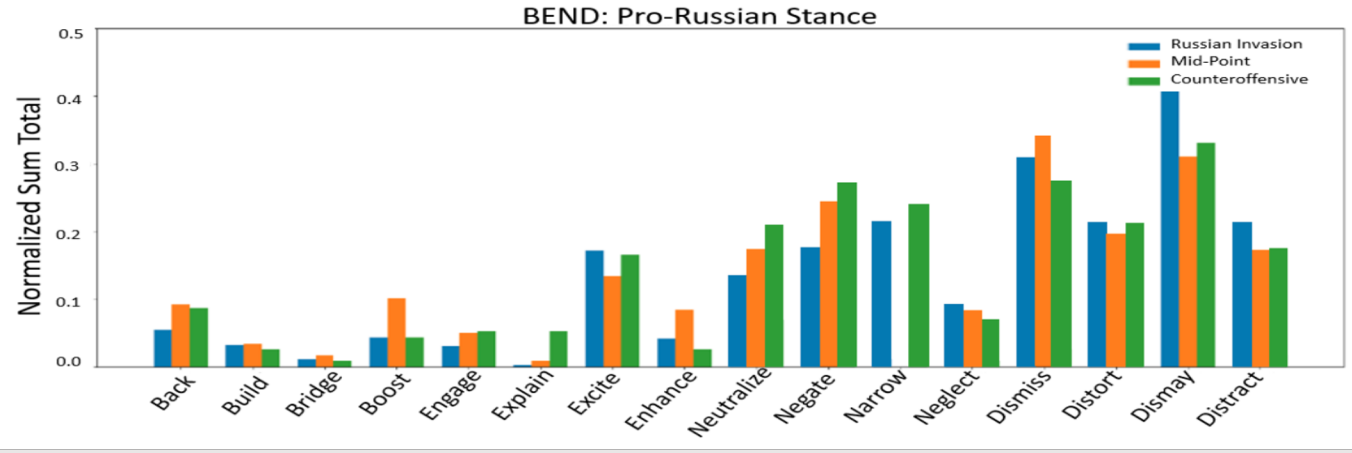


Persuasion Techniques in 2022 Russia invasion of Ukraine

Pro-Ukraine users consistently perform more positive techniques

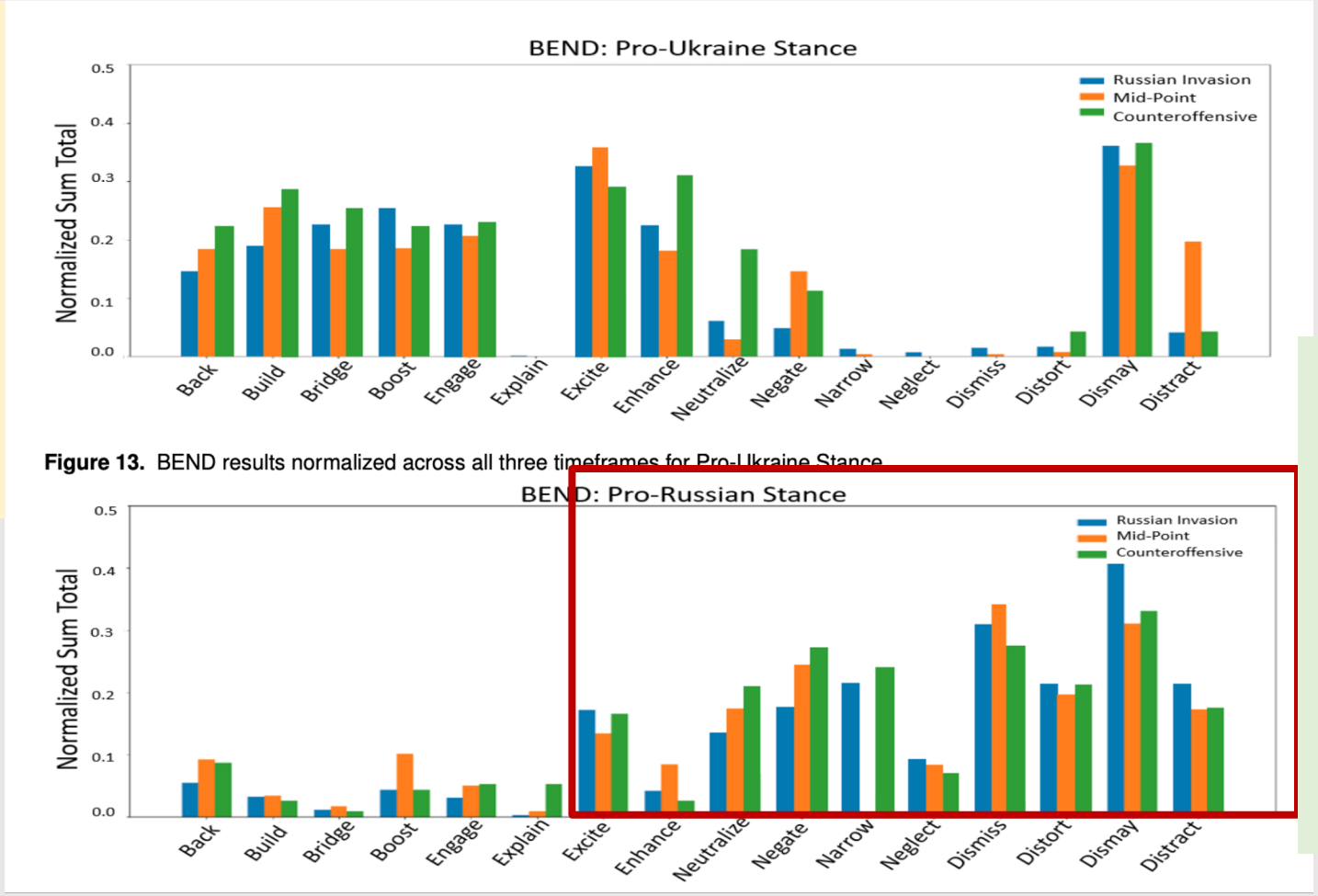


Figure 13. BEND results normalized across all three timeframes for Pro-Ukraine Stance

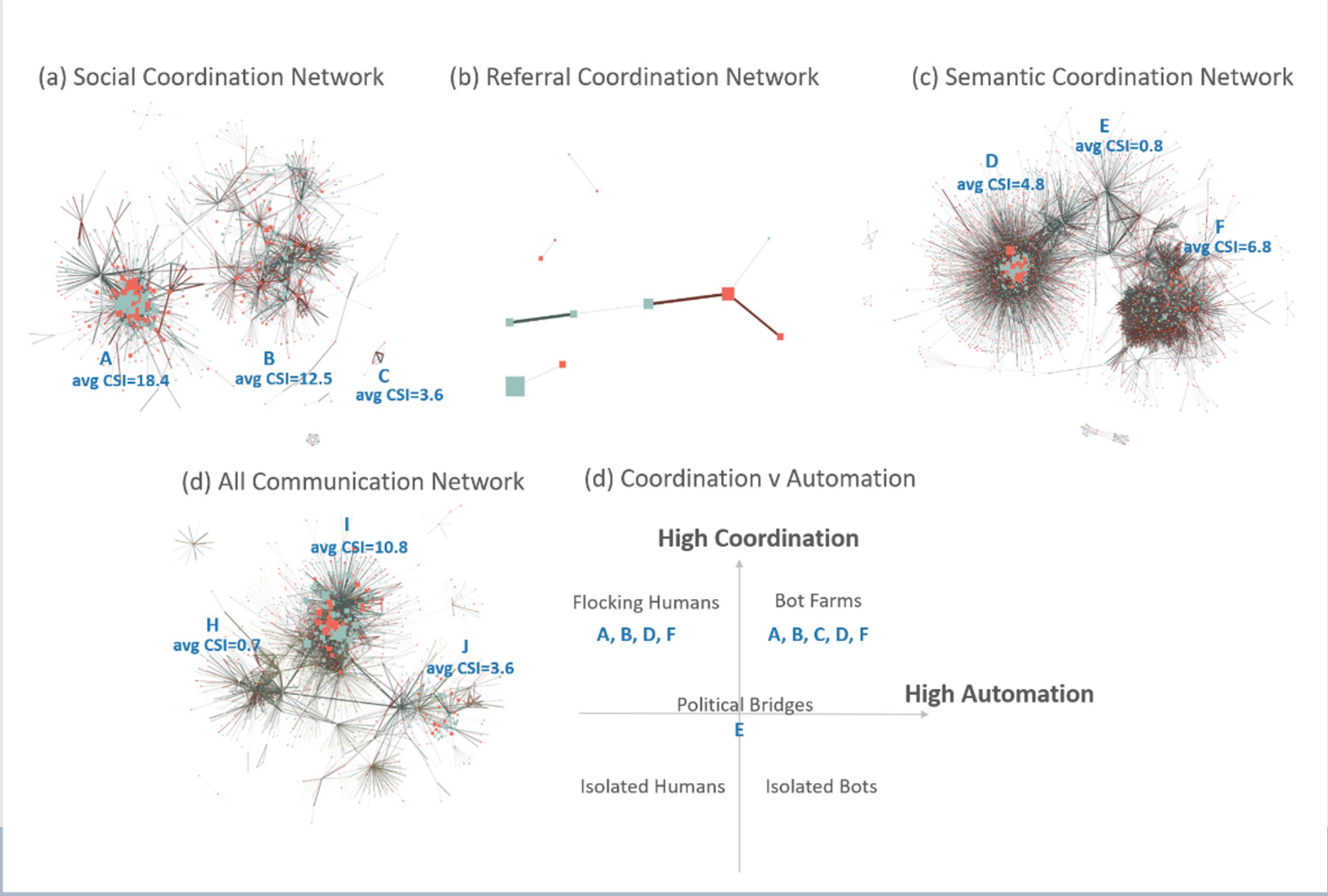
Pro-Russian users consistently perform more negative techniques

HOW do we identify Information Campaigns?

Information Maneuvers Framework 2 – Coordination + Automation

Lynnette Hui Xian Ng, Mihovil Bartulovic and Kathleen M. Carley. "Tiny-BotBuster: Identifying Automated Political Coordination in Digital Campaigns" (2024).

2024 Indonesian Elections Campaigns

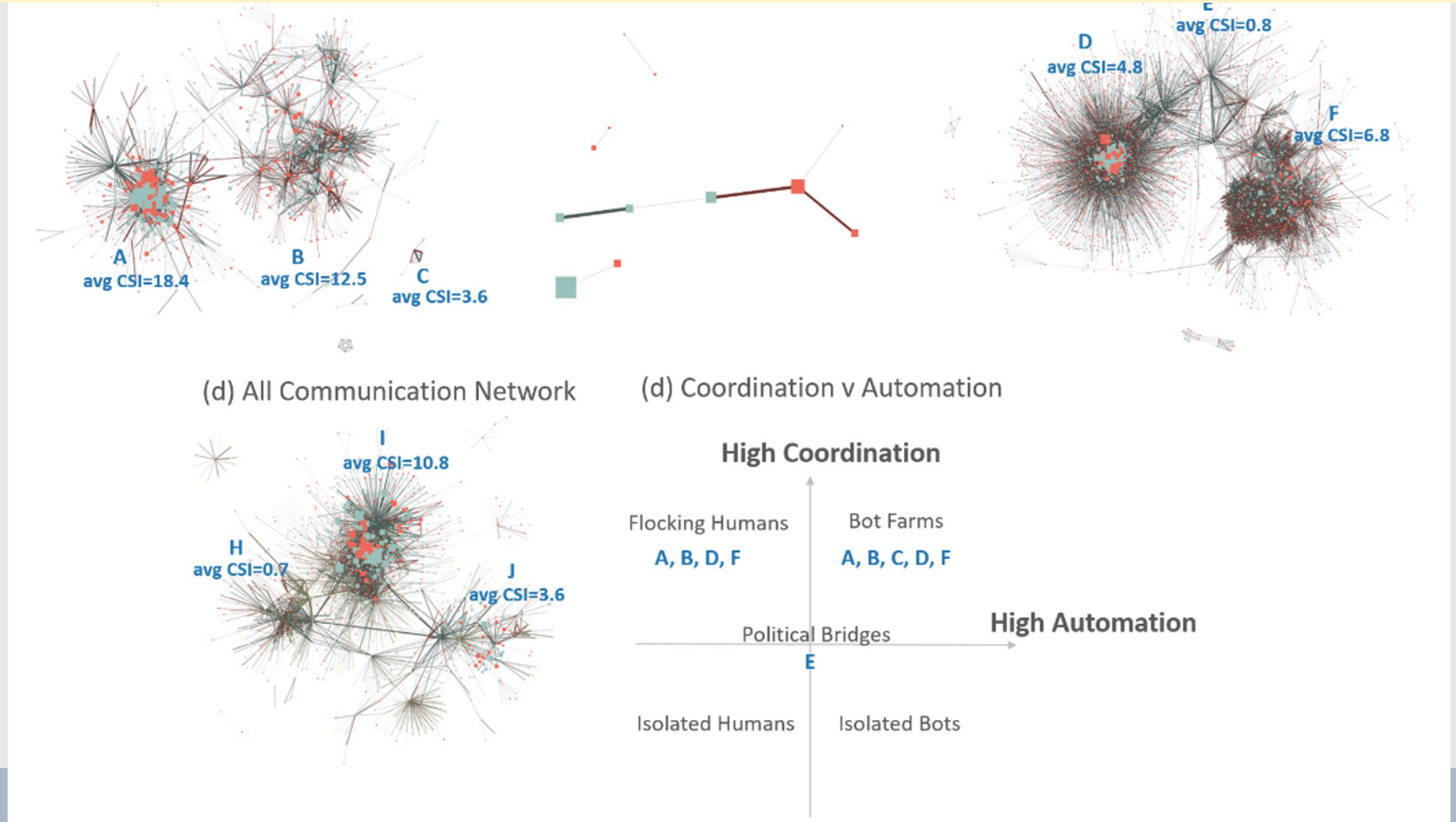


Green = Humans

Red = Bots

2024 Indonesian Elections Campaigns

Three Largest Political Parties have clusters of online information influence

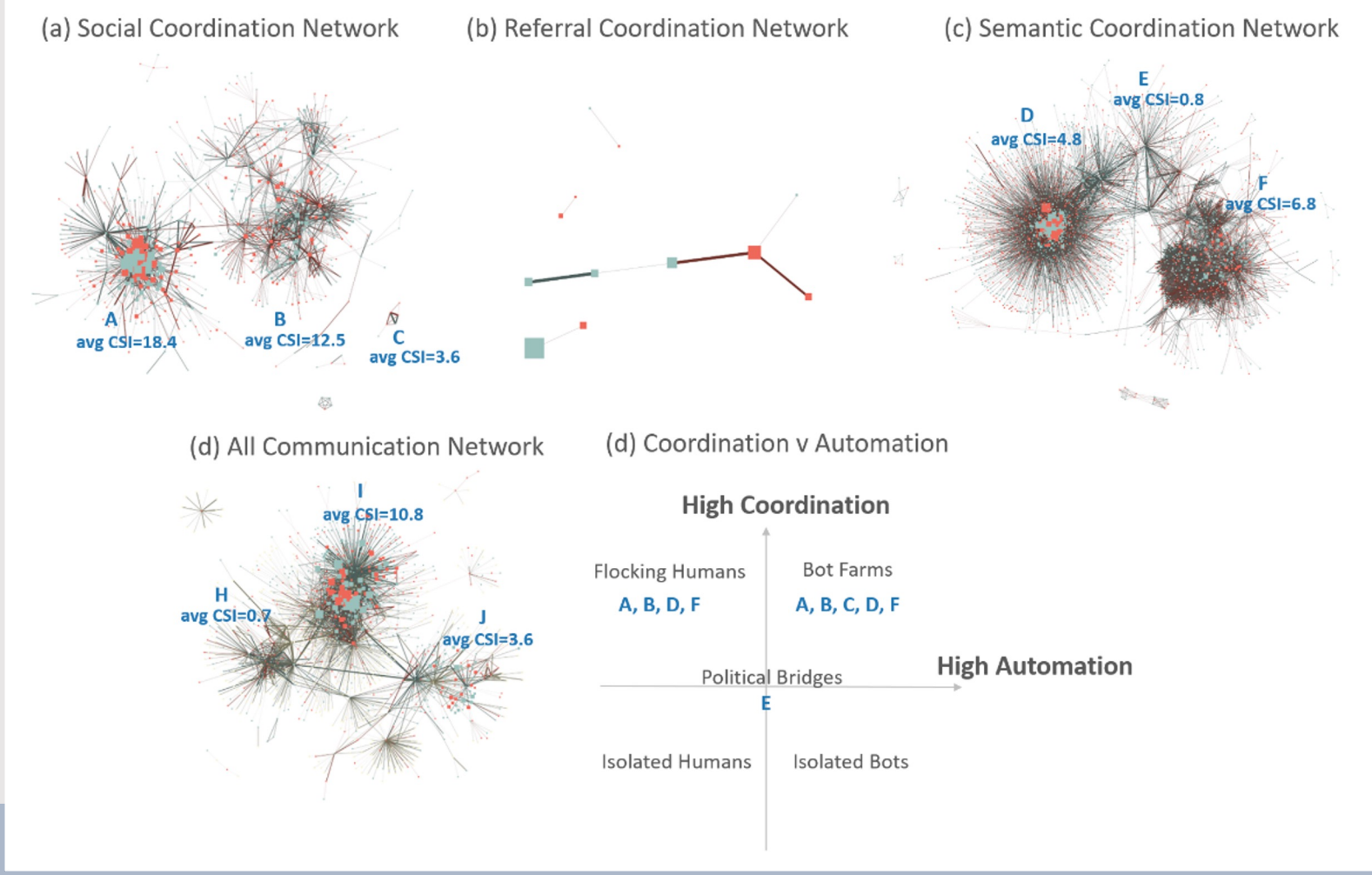


Green = Humans

Red = Bots

2024 Indonesian Elections Campaigns

Largest party (PDI-P) used the most % of bots



Green = Humans

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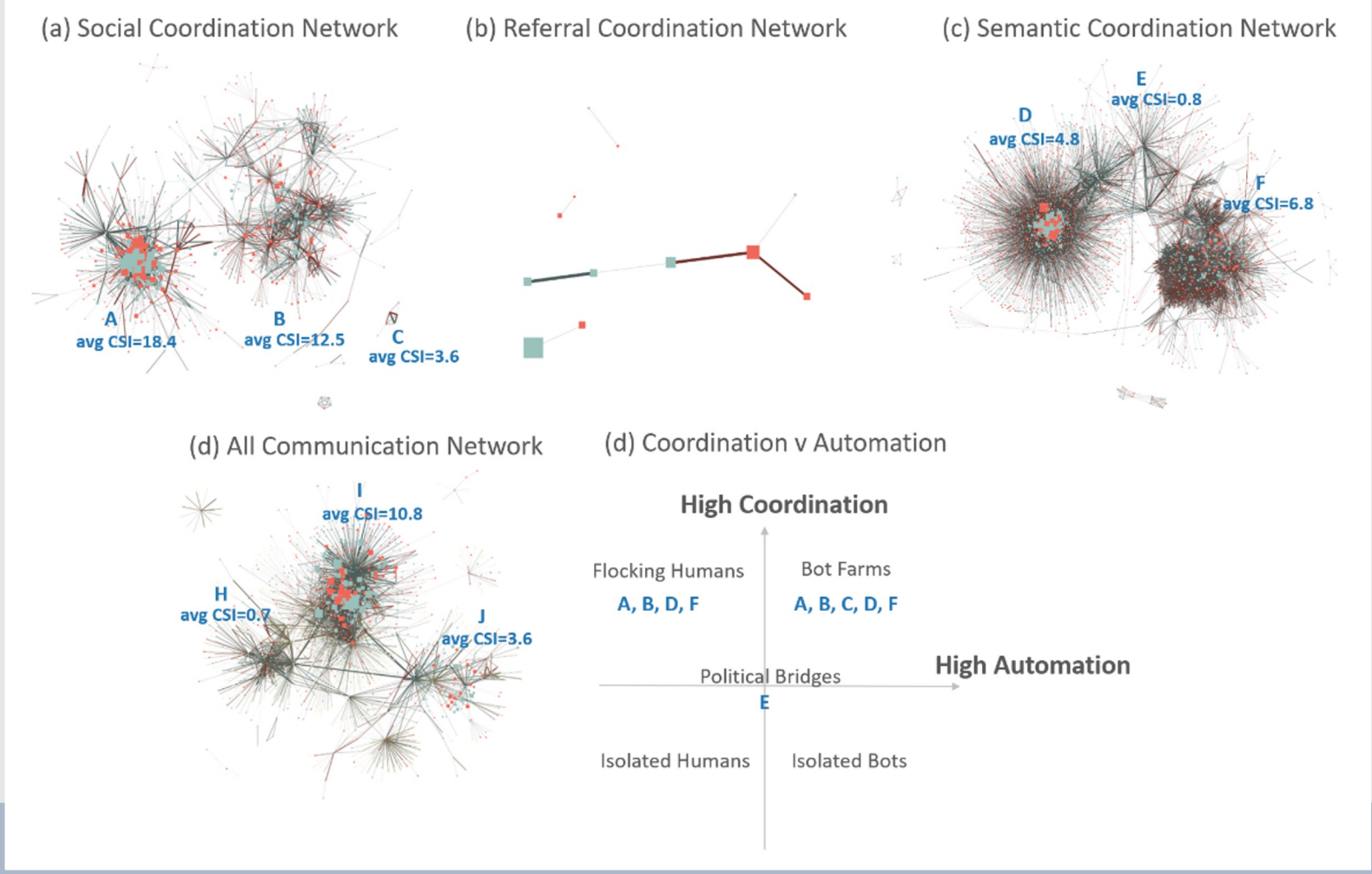
2024 Indonesian Elections Campaigns

Bot farms are everywhere



Green = Humans

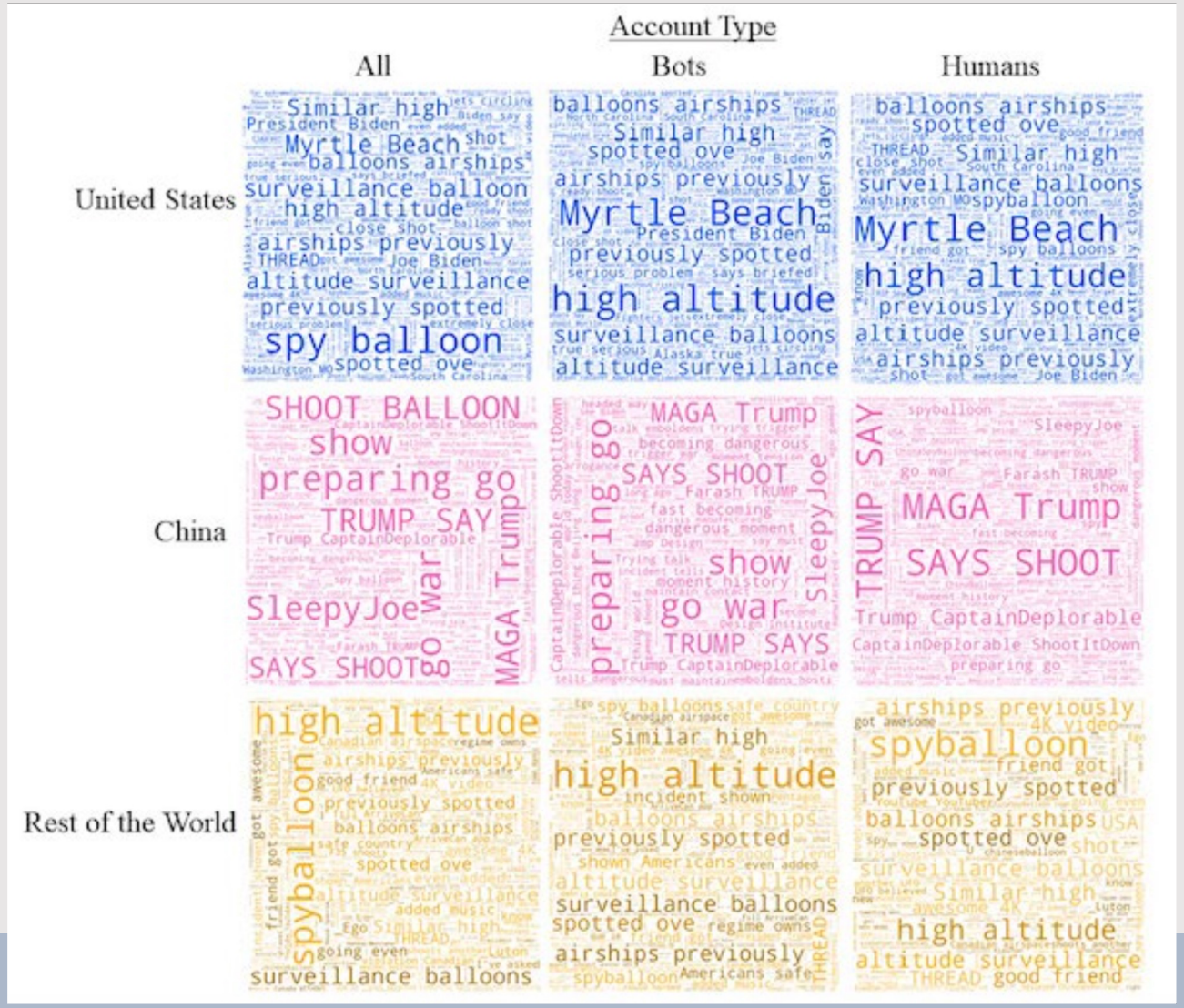
Red = Bots

WHO are spreading information warfare?

Bots or Humans?

Ng, Lynnette Hui Xian, Ian Kloo, Samantha Clark, and Kathleen M. Carley. "An exploratory analysis of COVID bot vs human disinformation dissemination stemming from the Disinformation Dozen on Telegram." *Journal of Computational Social Science* (2024): 1-26.

2023 US-China Balloon Incident



2023 US-China Balloon Incident

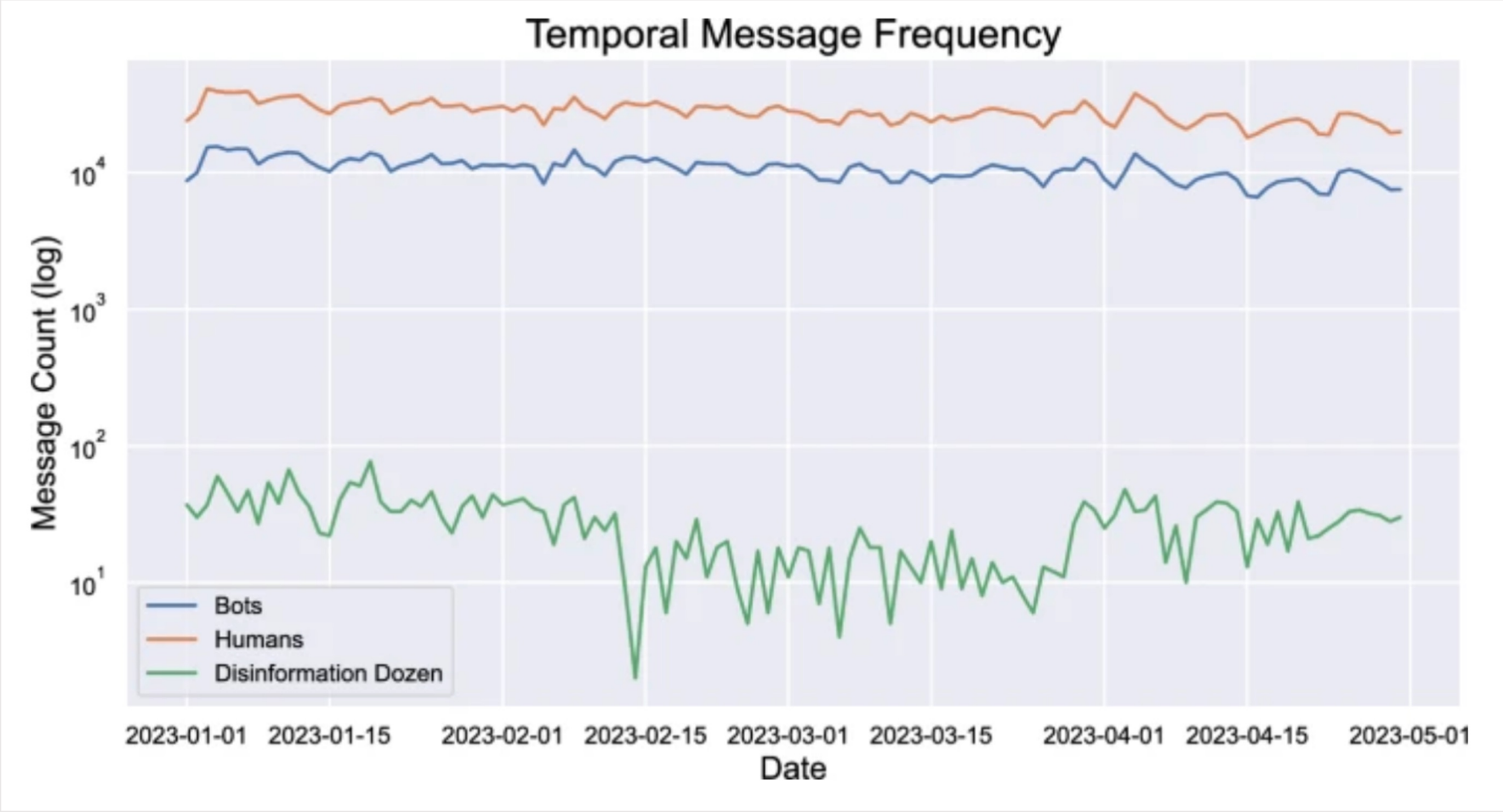
Bots mimic humans, or Humans mimic bots?

2023 US-China Balloon Incident

Bots mimic humans, or Humans mimic bots?

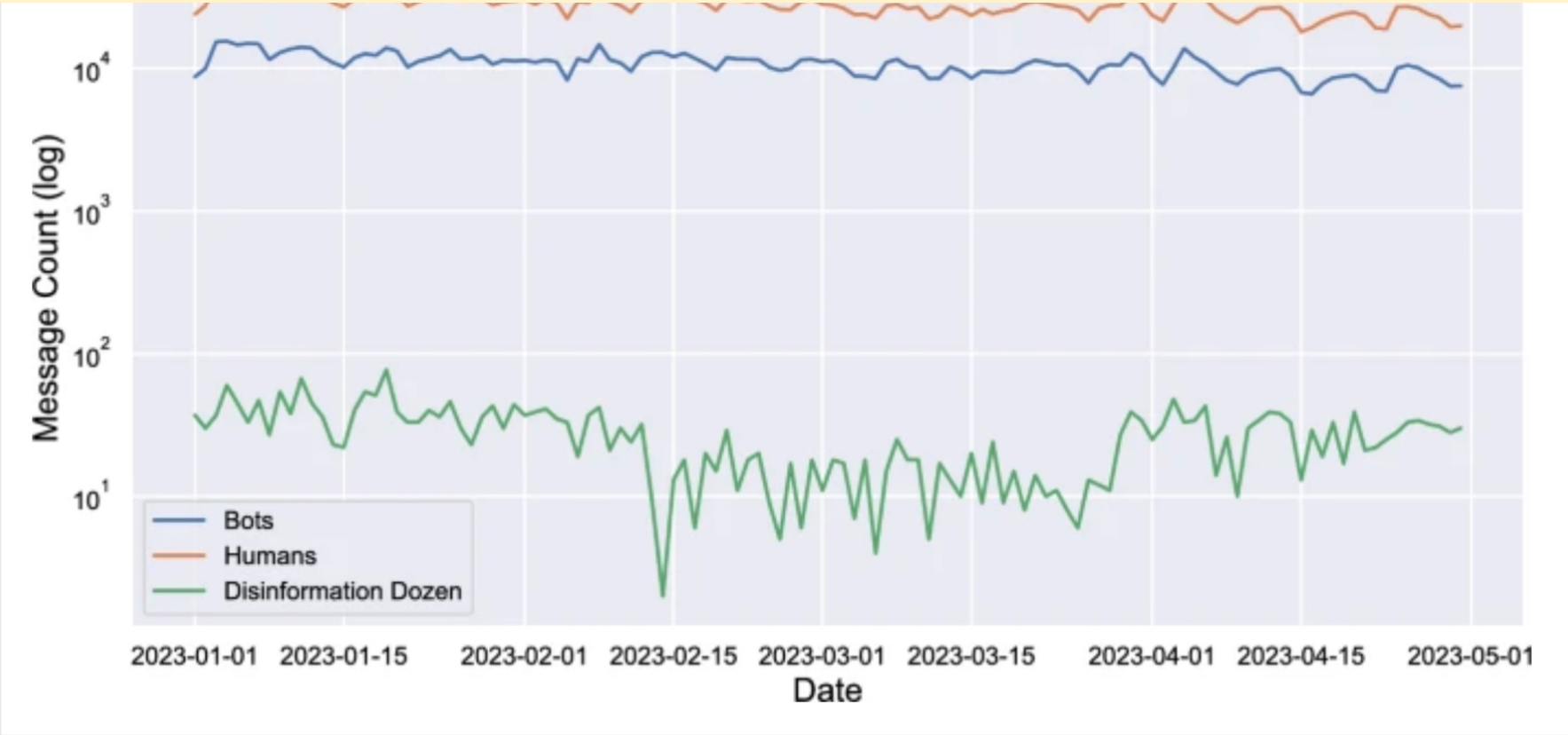
Bots use automation: faster and larger volume

COVID Disinformation on Telegram



COVID Disinformation on Telegram

Larger Proportion of messages coming collectively from humans rather than bots



COVID Disinformation on Telegram

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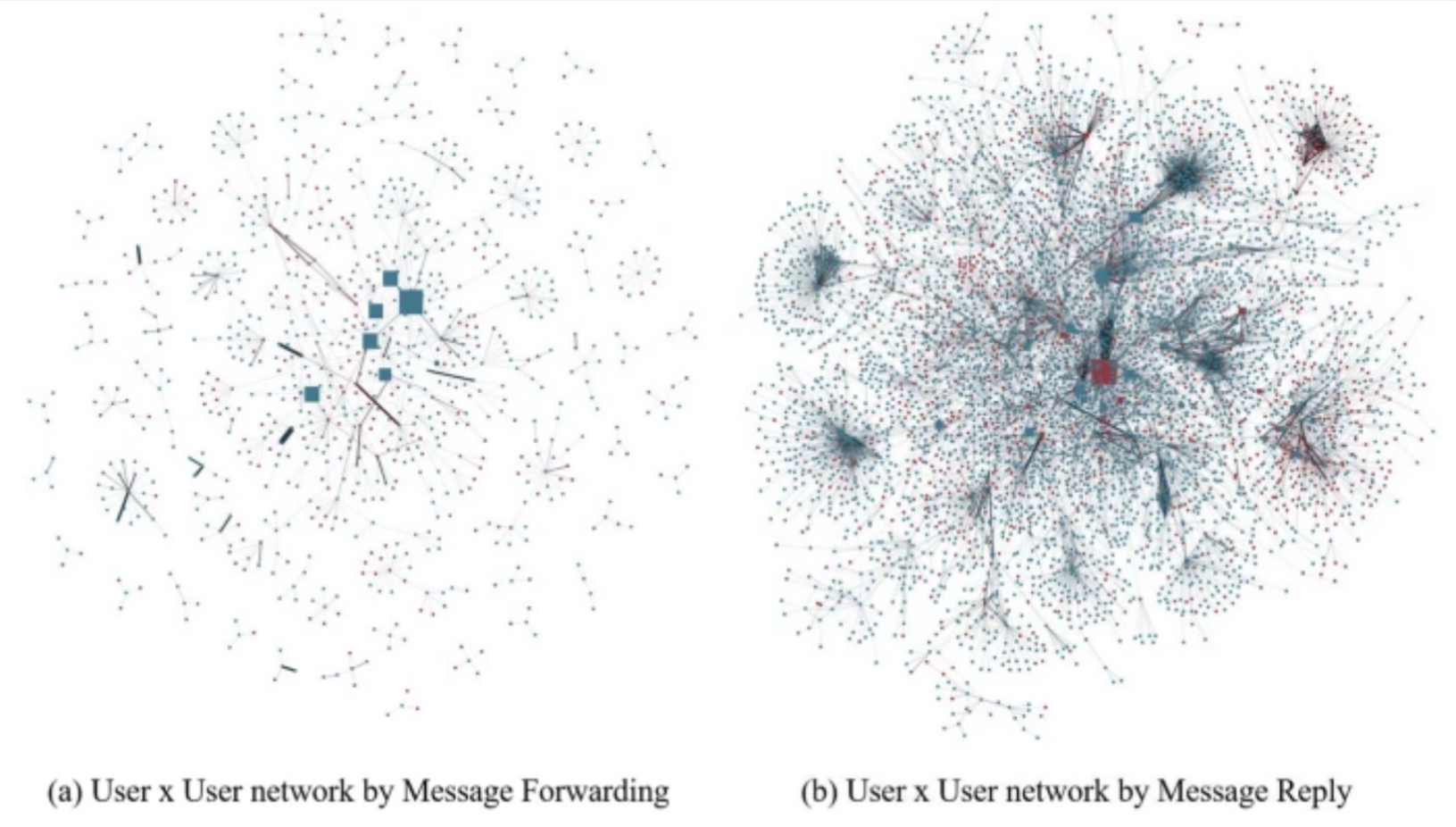
Red = Bots

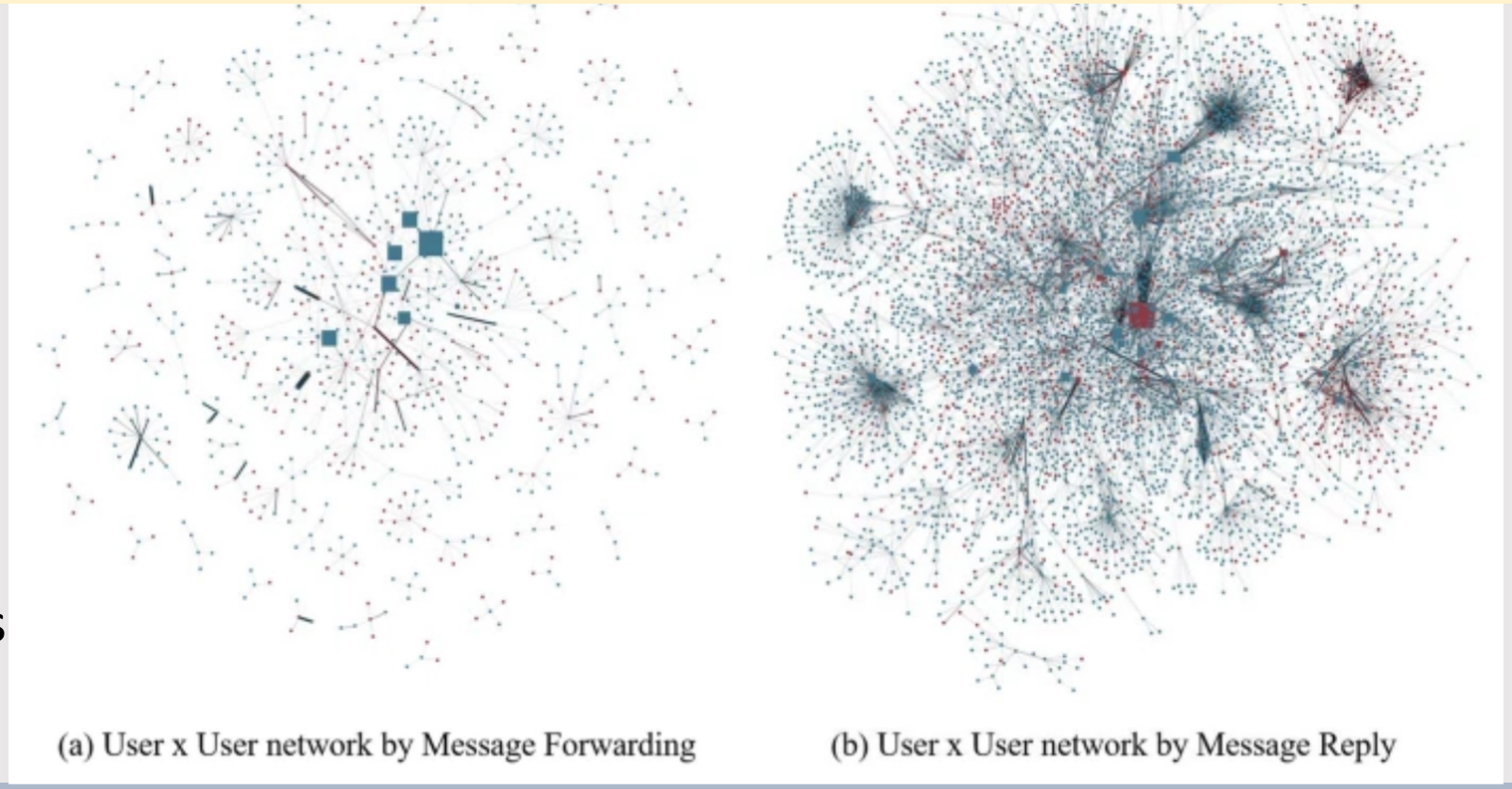


(a) User x User network by Message Forwarding

(b) User x User network by Message Reply

COVID Disinformation on Telegram

Bots continue conversations (replies),
Humans spread disinformation (forwards)



(a) User x User network by Message Forwarding

(b) User x User network by Message Reply

Green = Humans

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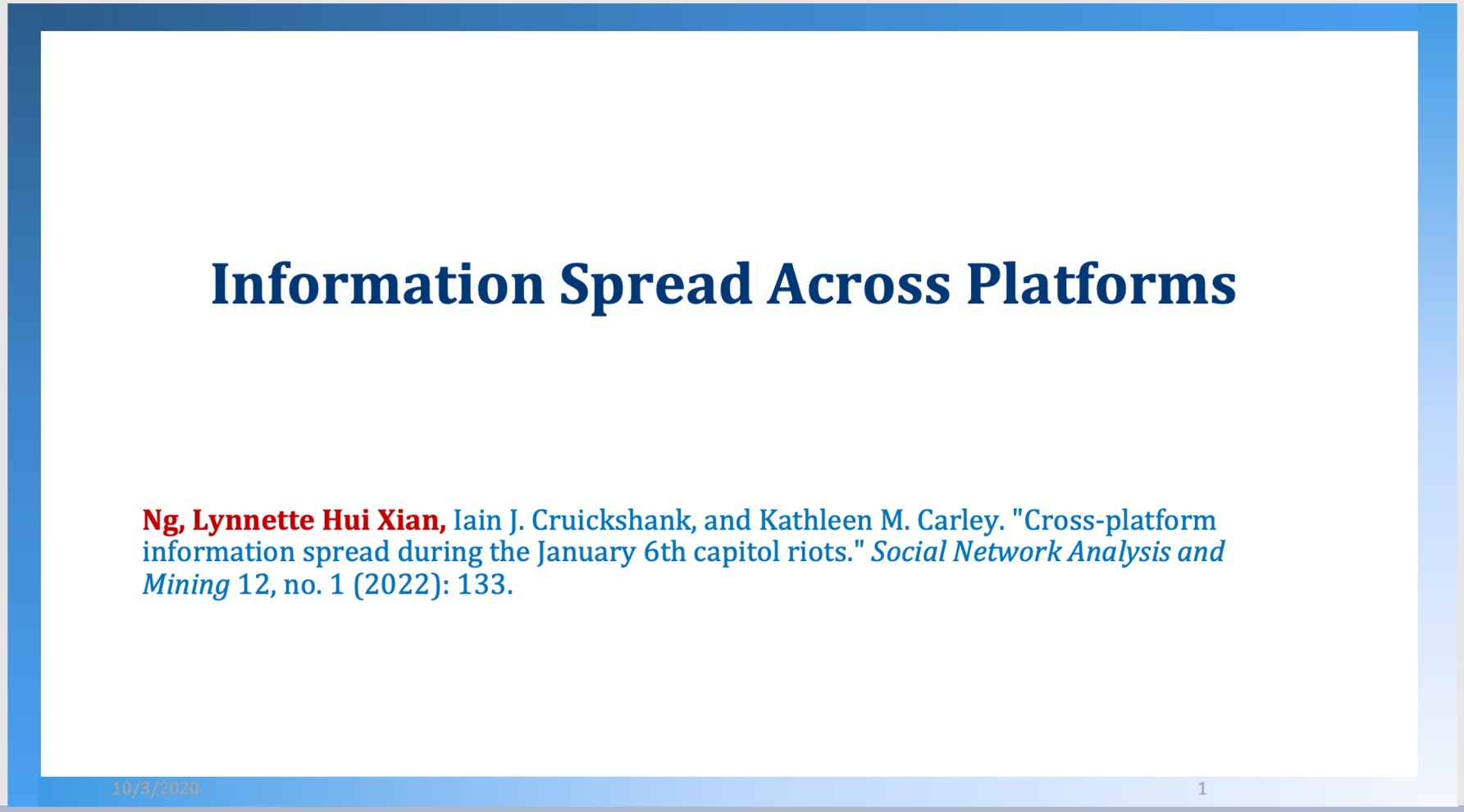
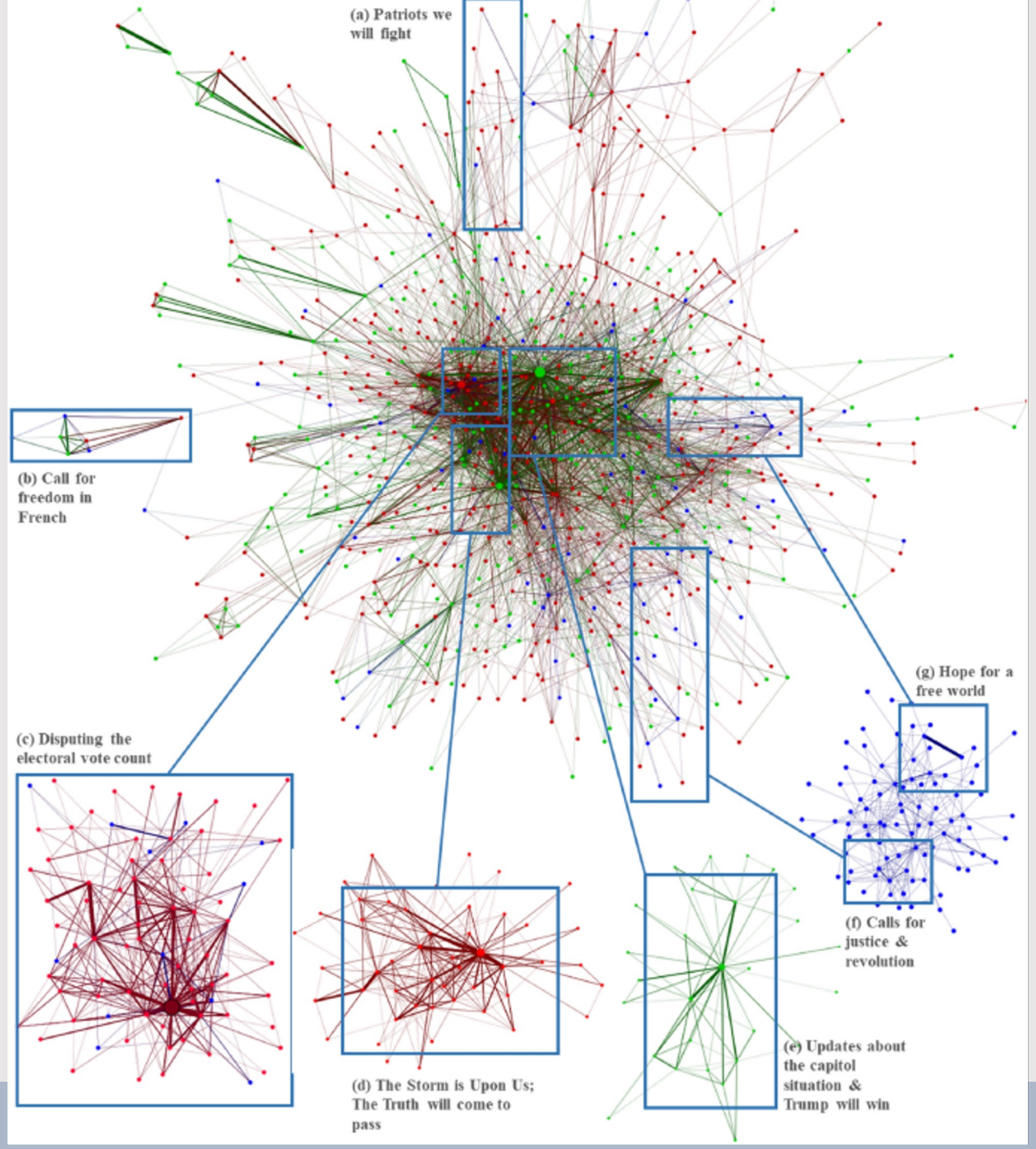
WHAT narratives are being spread?

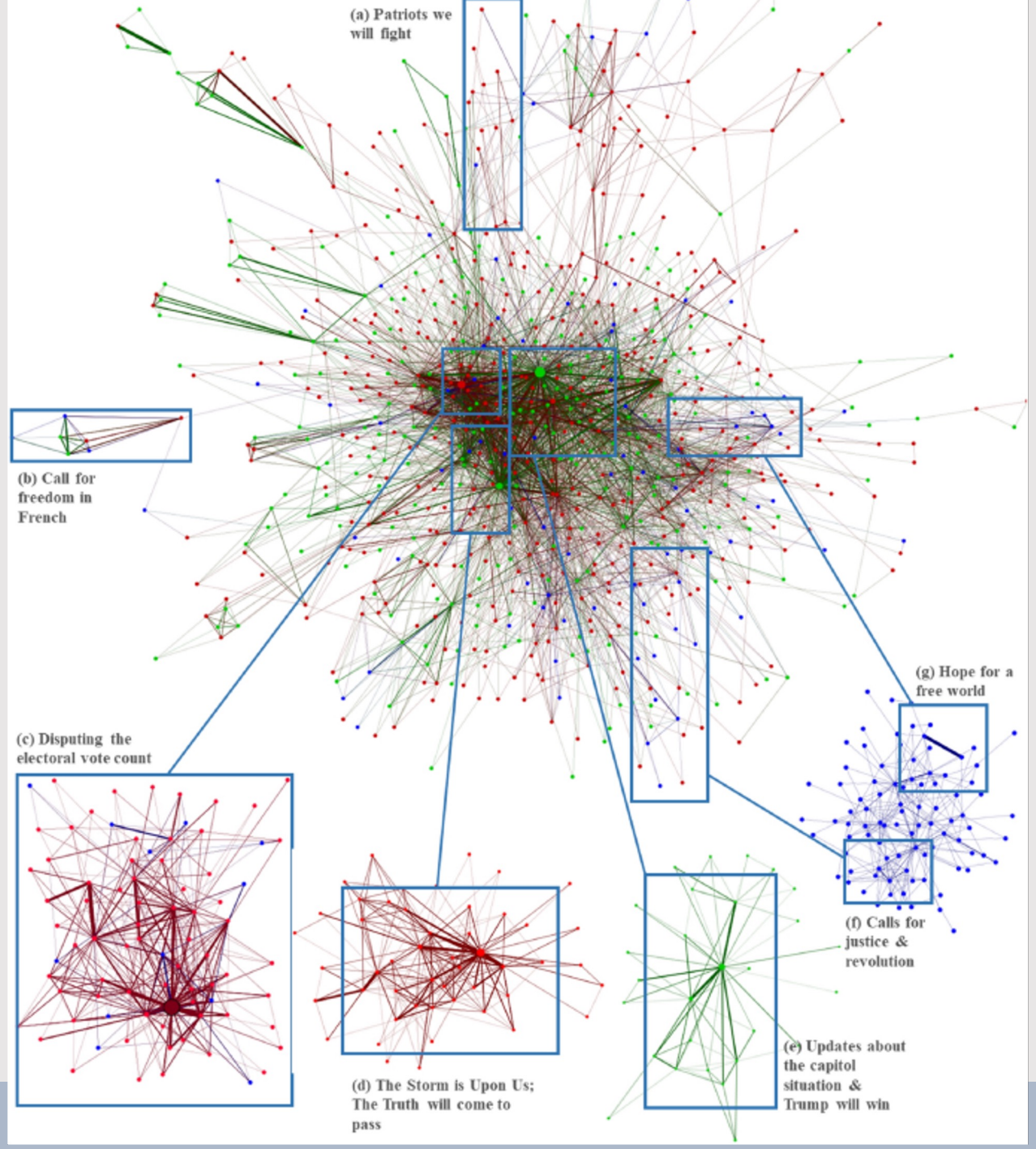


2021 US Capitol Riots



2021 US Capitol Riots

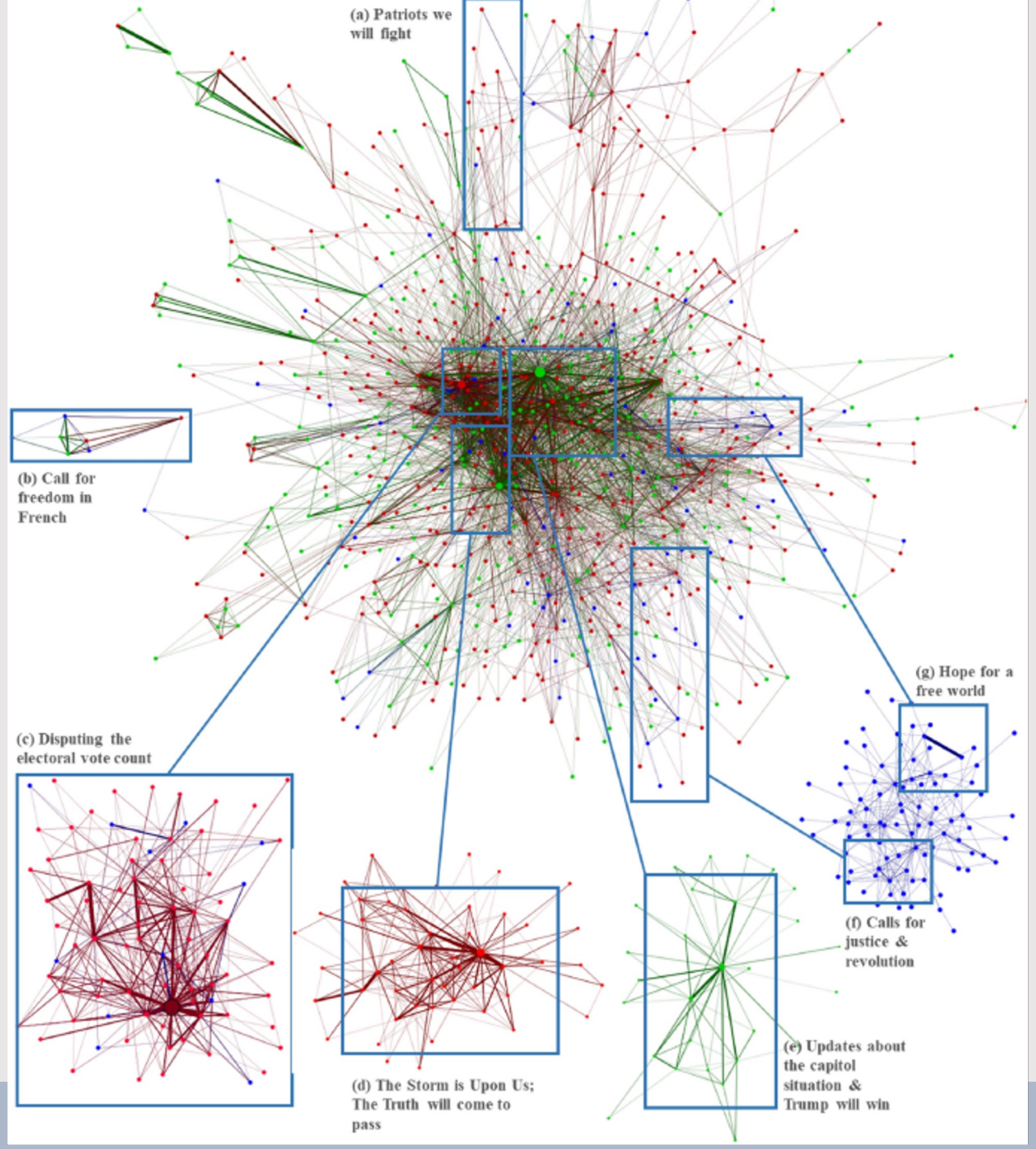
Three main groups of users:
Military, Patriot, QAnon



2021 US Capitol Riots

Three main groups of users: Military, Patriot, QAnon

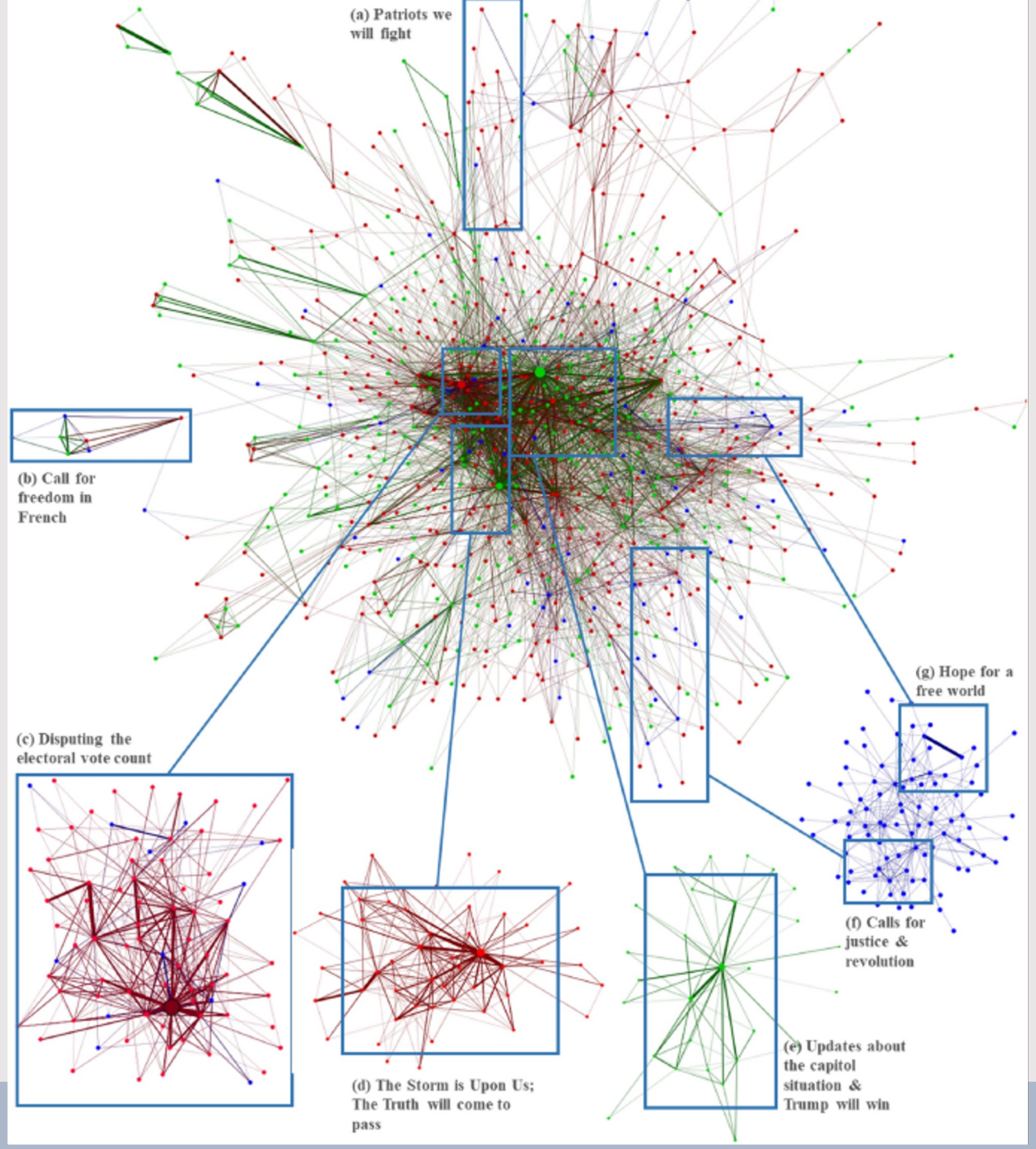
Segregated communication for each set of users



2021 US Capitol Riots

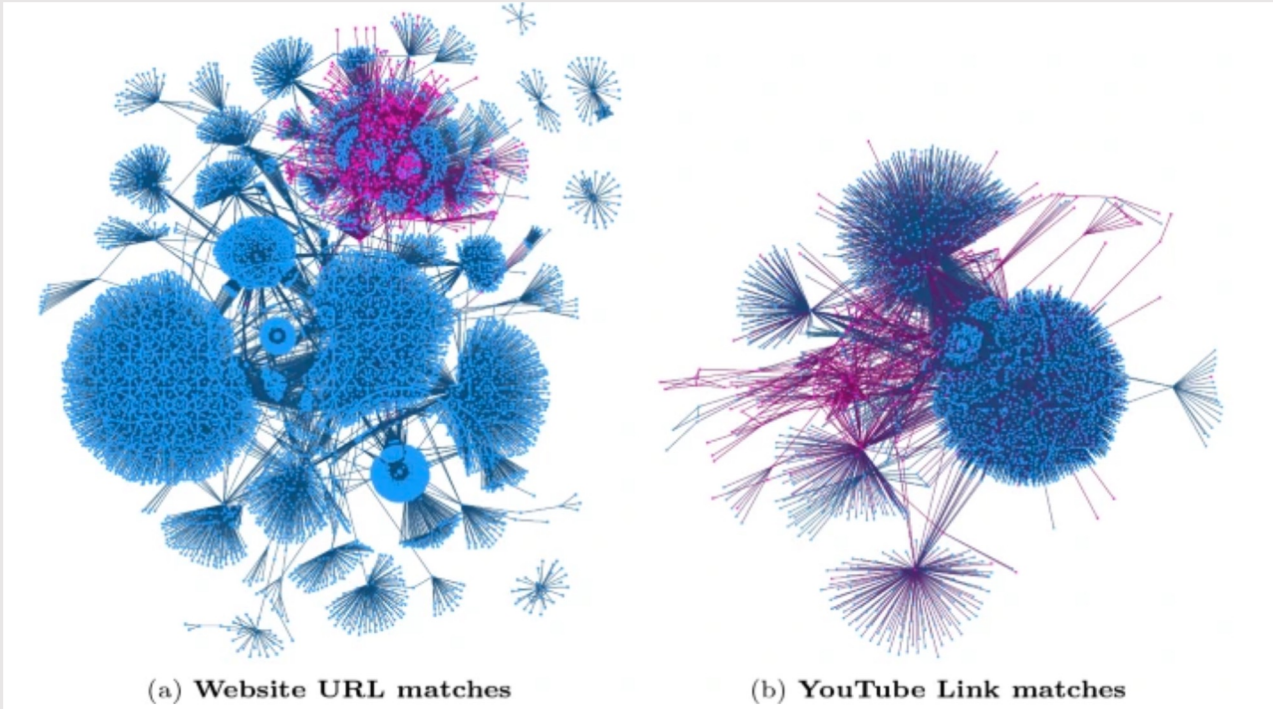
Three main groups of users: Military, Patriot, QAnon

Separate communication spheres for sets of users



2021 US Capitol Riots

Comparison of website URLs across Parler & Twitter



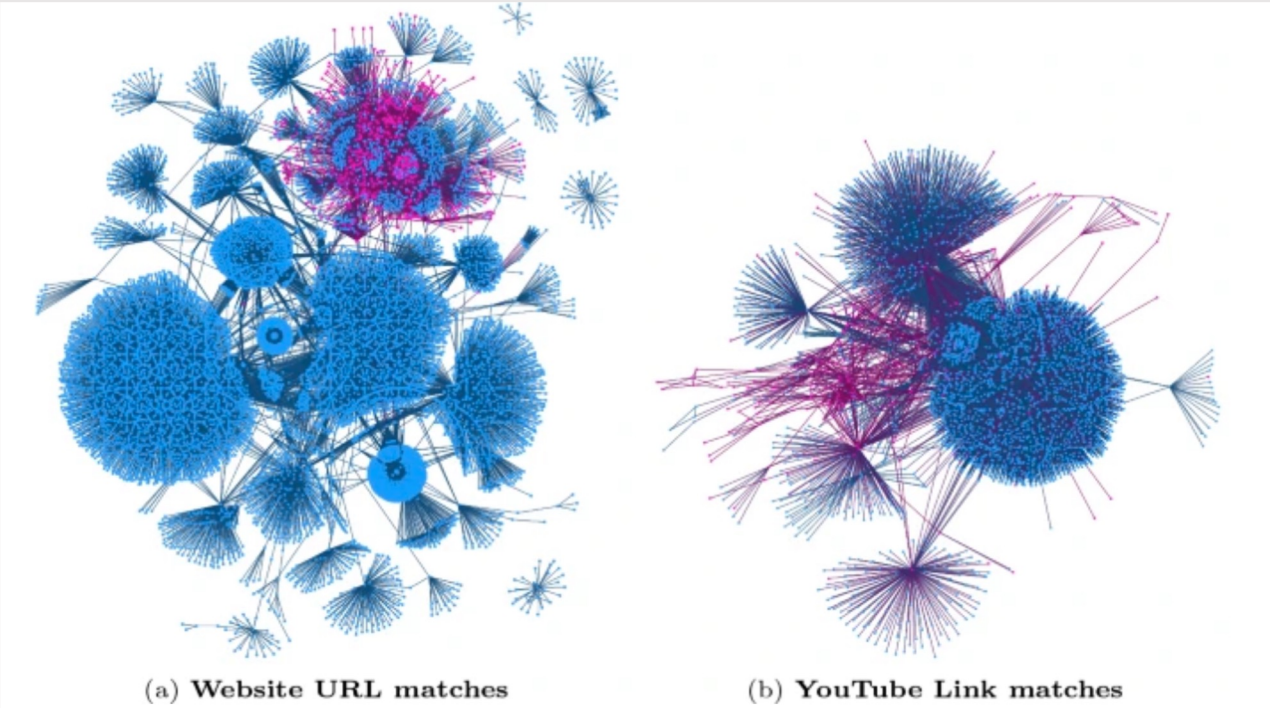
(a) Website URL matches (b) YouTube Link matches

Similar link sharing networks. Pink nodes are Parler users, Blue nodes are Twitter users. The width of the links represents the strength of the link similarity, calculated by the number of links shared between both users

2021 US Capitol Riots

Comparison of website URLs across Parler & Twitter

Separate communication spheres for sets of users



(a) Website URL matches (b) YouTube Link matches

Similar link sharing networks. Pink nodes are Parler users, Blue nodes are Twitter users. The width of the links represents the strength of the link similarity, calculated by the number of links shared between both users

WHEN are the narratives spread?

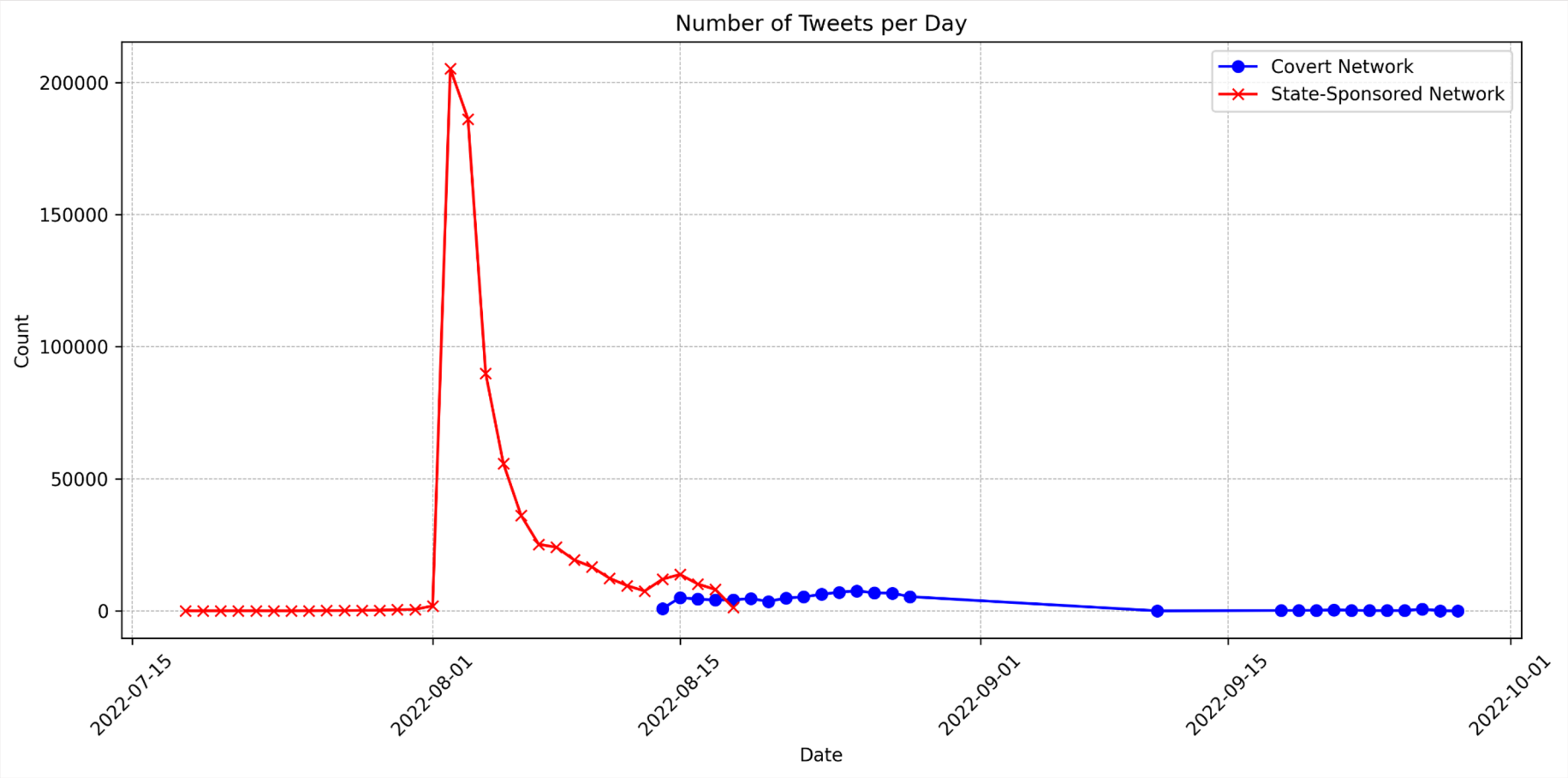
Critical National and International Events

Danaditya, Adya, **Lynnette Hui Xian Ng,** and Kathleen M. Carley. "From curious hashtags to polarized effect: profiling coordinated actions in indonesian twitter discourse." *Social Network Analysis and Mining* 12, no. 1 (2022): 105.

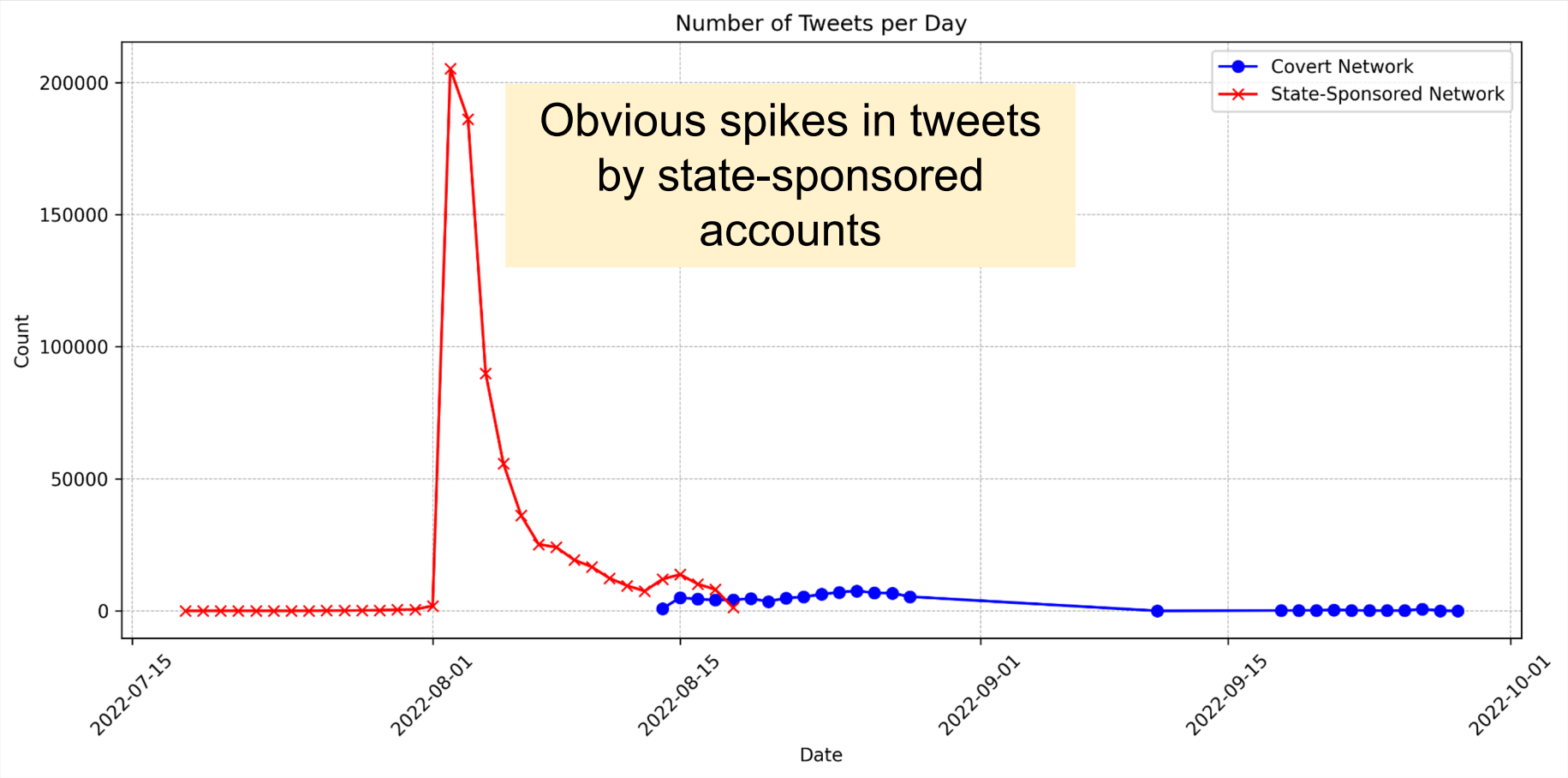
Ng, Lynnette Hui Xian, and Kathleen M. Carley. "A combined synchronization index for evaluating collective action on social media." *Applied network science 8,* no. 1 (2023): 1.

Ng, Lynnette Hui Xian, and Kathleen M. Carley. "Deflating the Chinese balloon: types of Twitter bots in the US-China balloon incident." *EPJ Data Science* 12, no. 1 (2023): 63

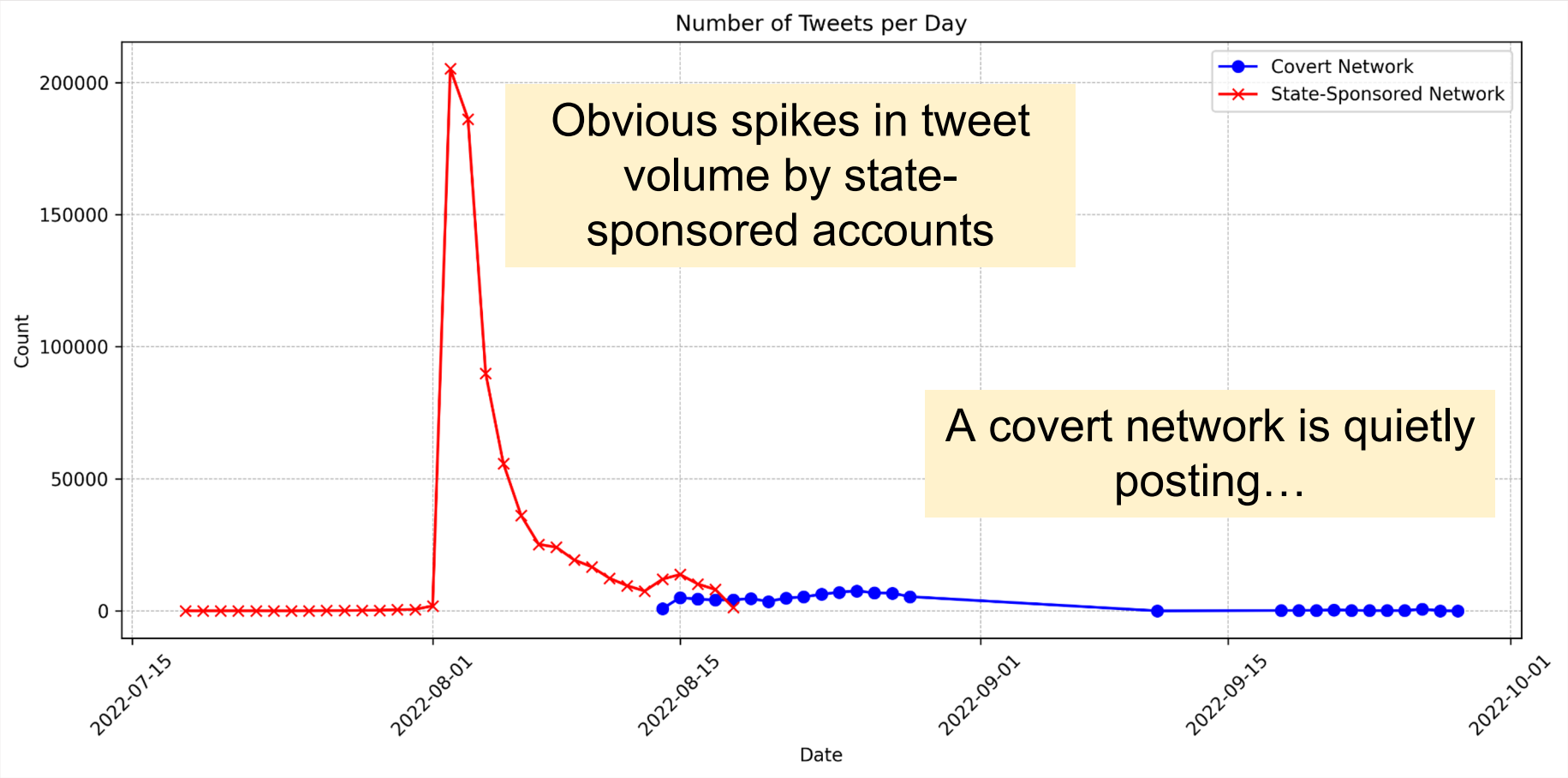
2022 Nancy Pelosi Visit to China



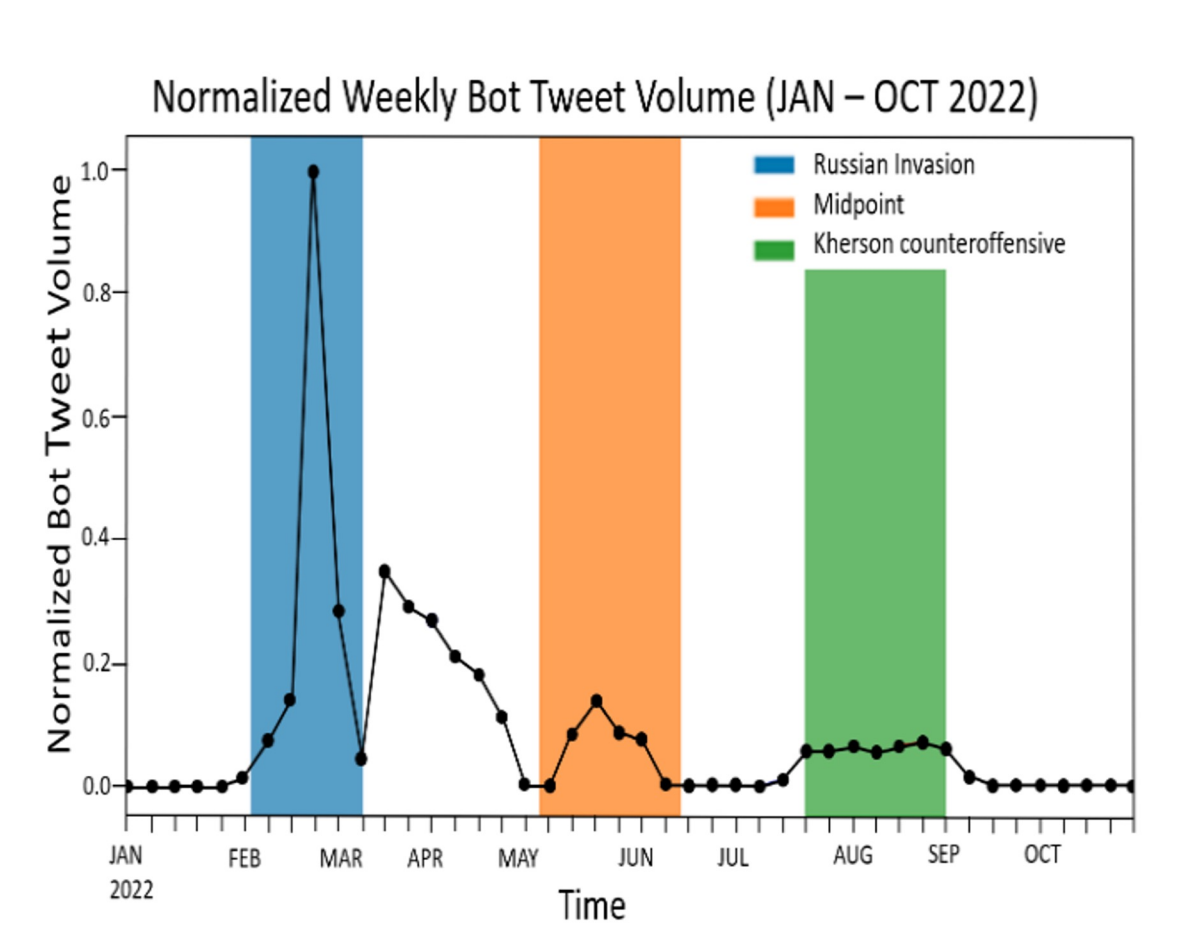
2022 Nancy Pelosi Visit to China



2022 Nancy Pelosi Visit to China

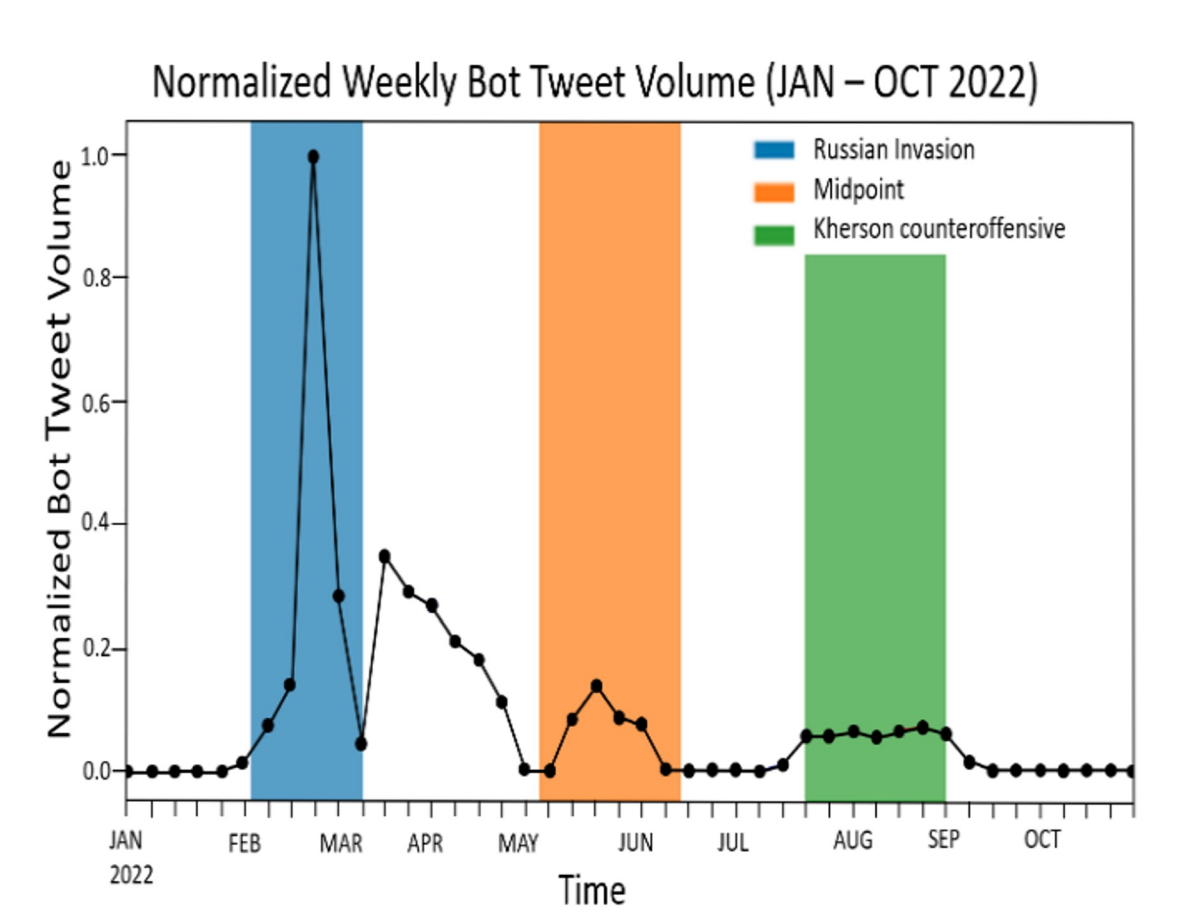


2022 Russian Invasion of Ukraine



2022 Russian Invasion of Ukraine

Spikes in tweet volume of bots during key points of the invasion



2022 Russian Invasion of Ukraine

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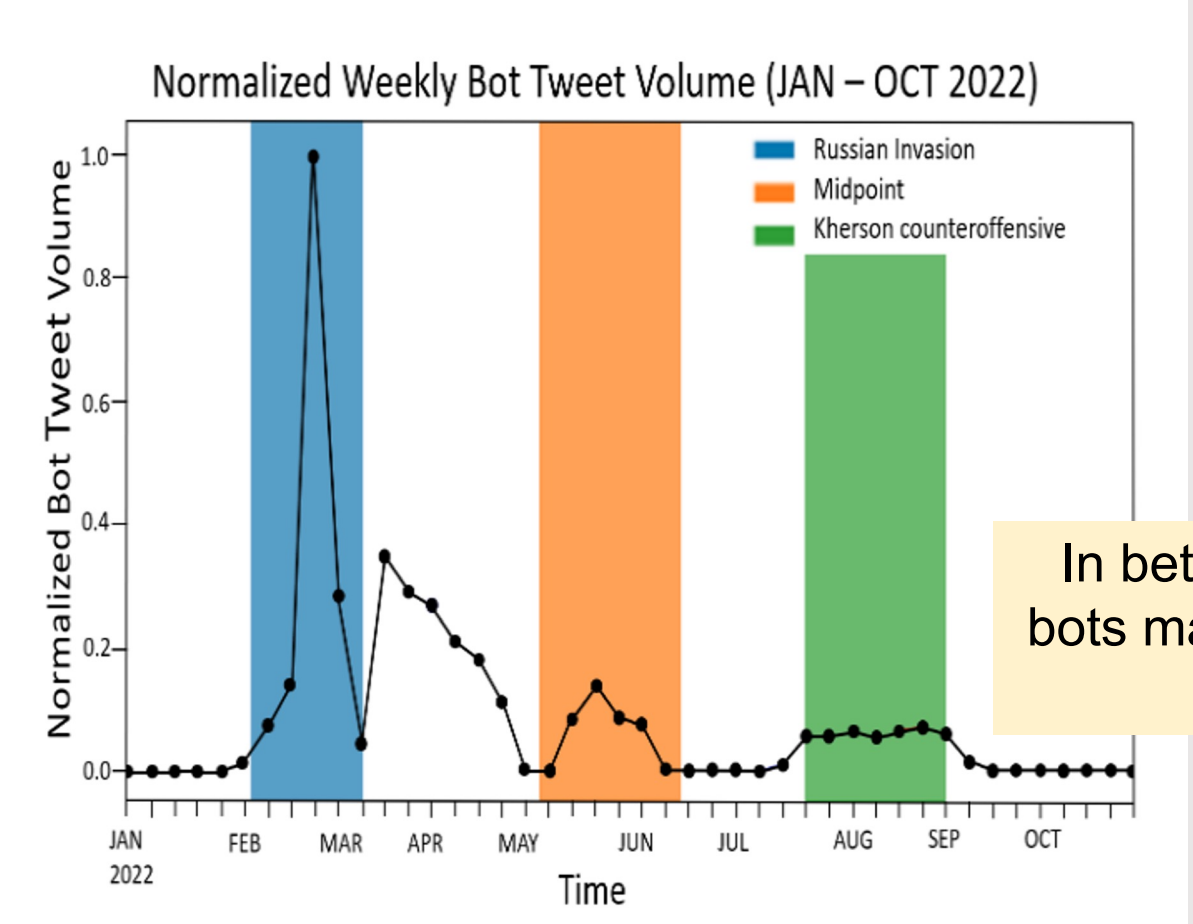


In between key points, the bots maintain activity but at a lower rate

WHERE are the narratives targeting?

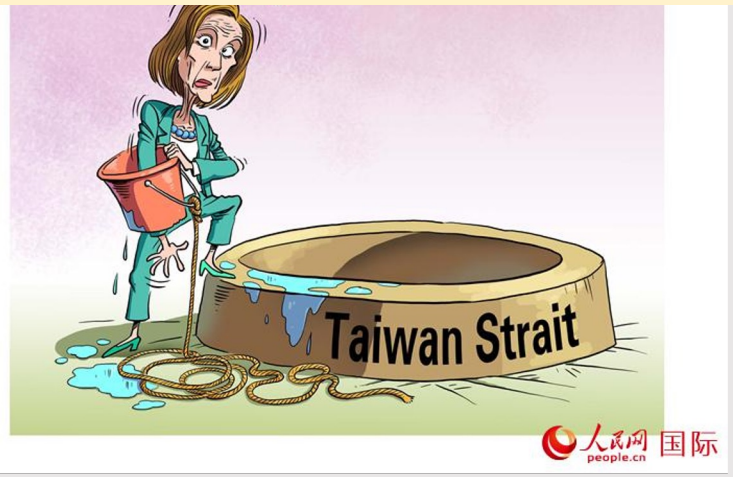
Tracking China's Cross-Strait Bot Networks against Taiwan

Jacobs, Charity S., **Lynnette Hui Xian Ng,** and Kathleen M. Carley. "Tracking China's cross-strait bot networks against Taiwan." In *International conference on social computing, behavioral-cultural modeling and prediction and behavior representation in modeling and simulation*, pp. 115-125. Cham: Springer Nature Switzerland, 2023.

2022 Nancy Pelosi Visit to China

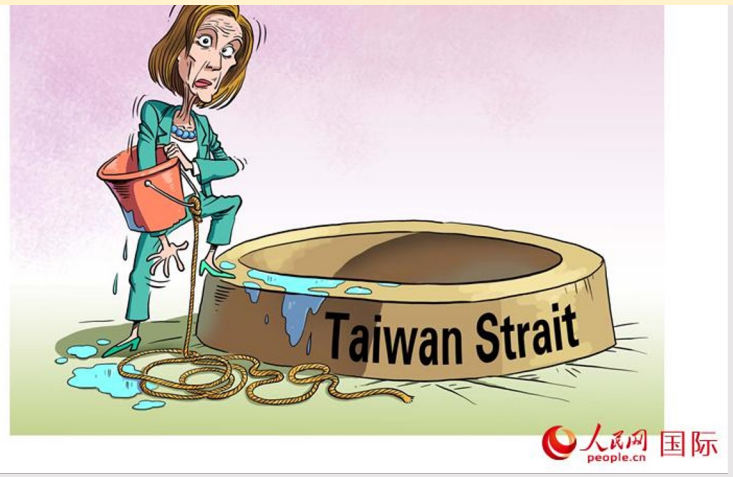
2022 Nancy Pelosi Visit to China

Hashtag Hijacking by spammy accounts

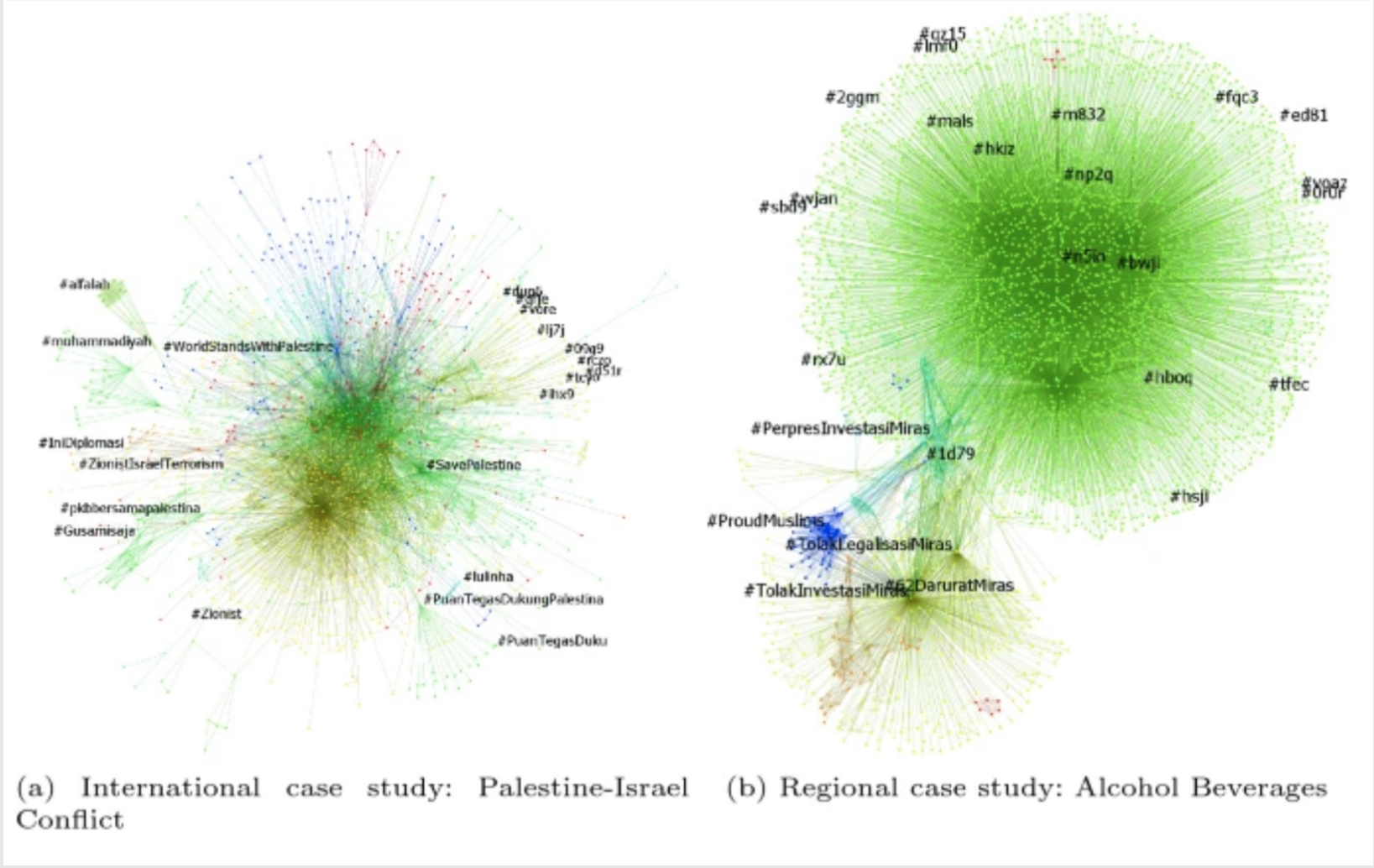


2022 Nancy Pelosi Visit to China

Topics point to Chinese military (propaganda) videos



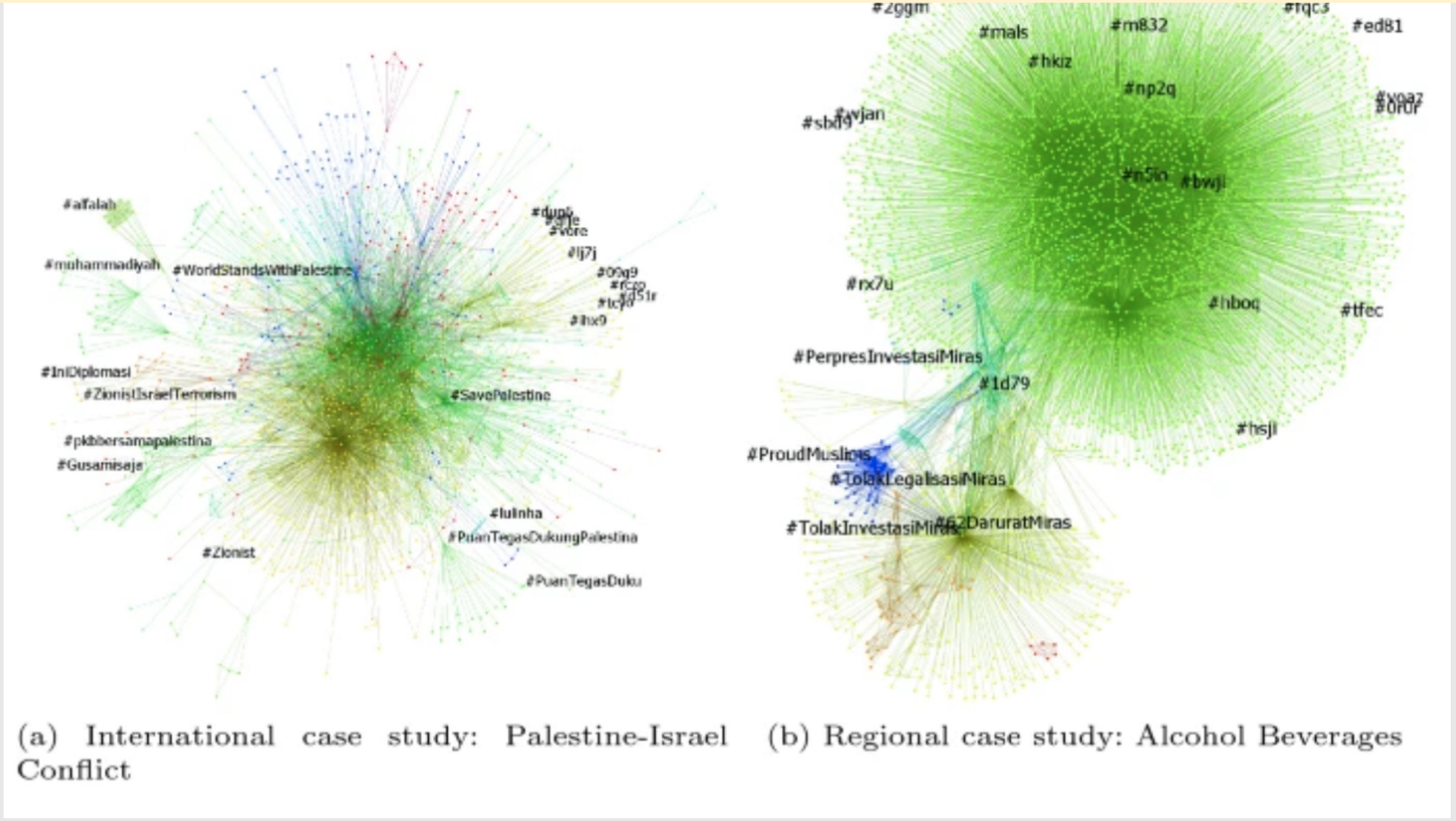
2021 Indonesian Twitter discourse



(a) International case study: Palestine-Israel Conflict (b) Regional case study: Alcohol Beverages

2021 Indonesian Twitter discourse

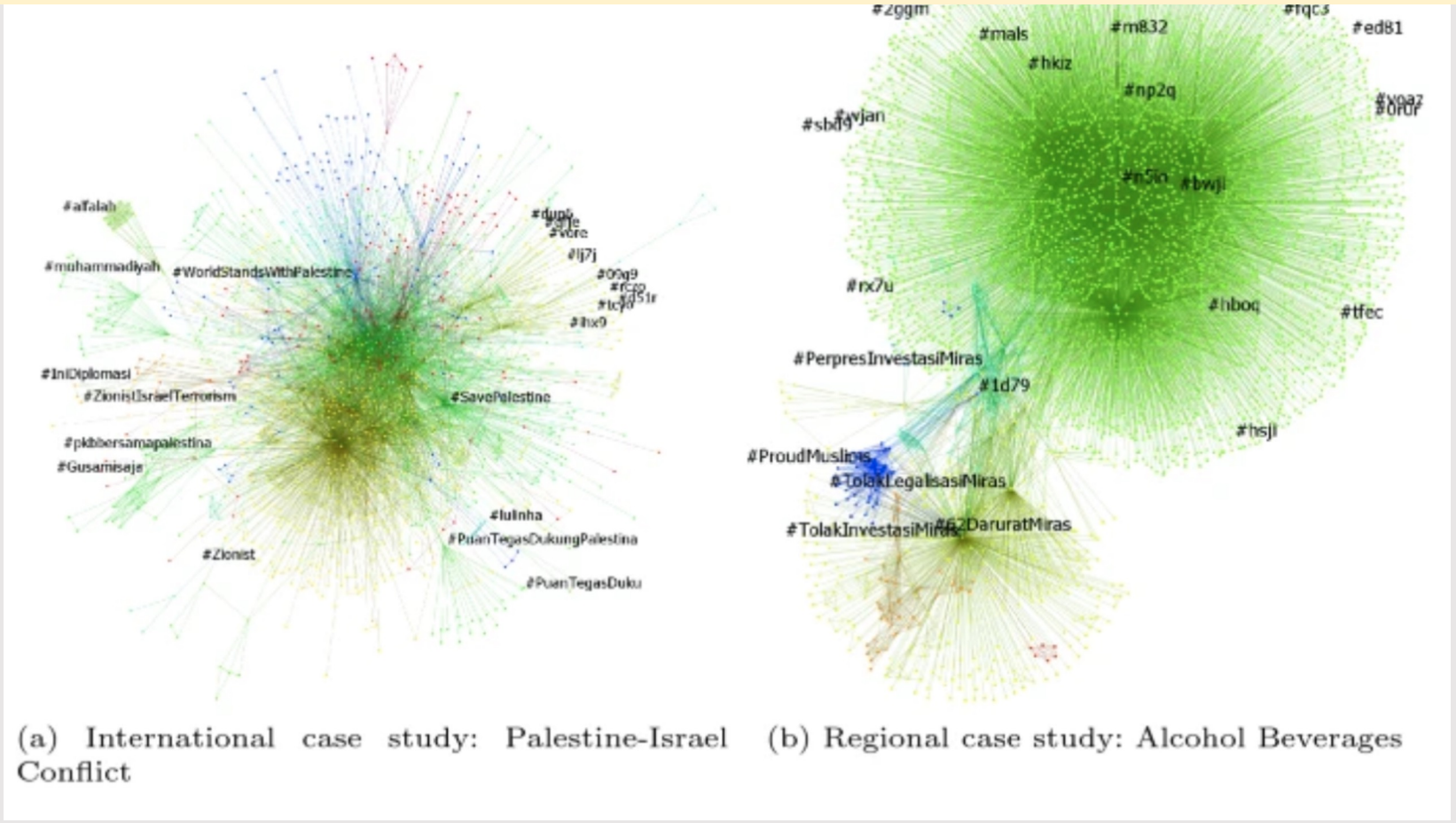
Hashtag Hijacking by bot farms



(a) International case study: Palestine-Israel Conflict (b) Regional case study: Alcohol Beverages

2021 Indonesian Twitter discourse

Topics that can divide (majority-Muslim) society



(a) International case study: Palestine-Israel Conflict (b) Regional case study: Alcohol Beverages

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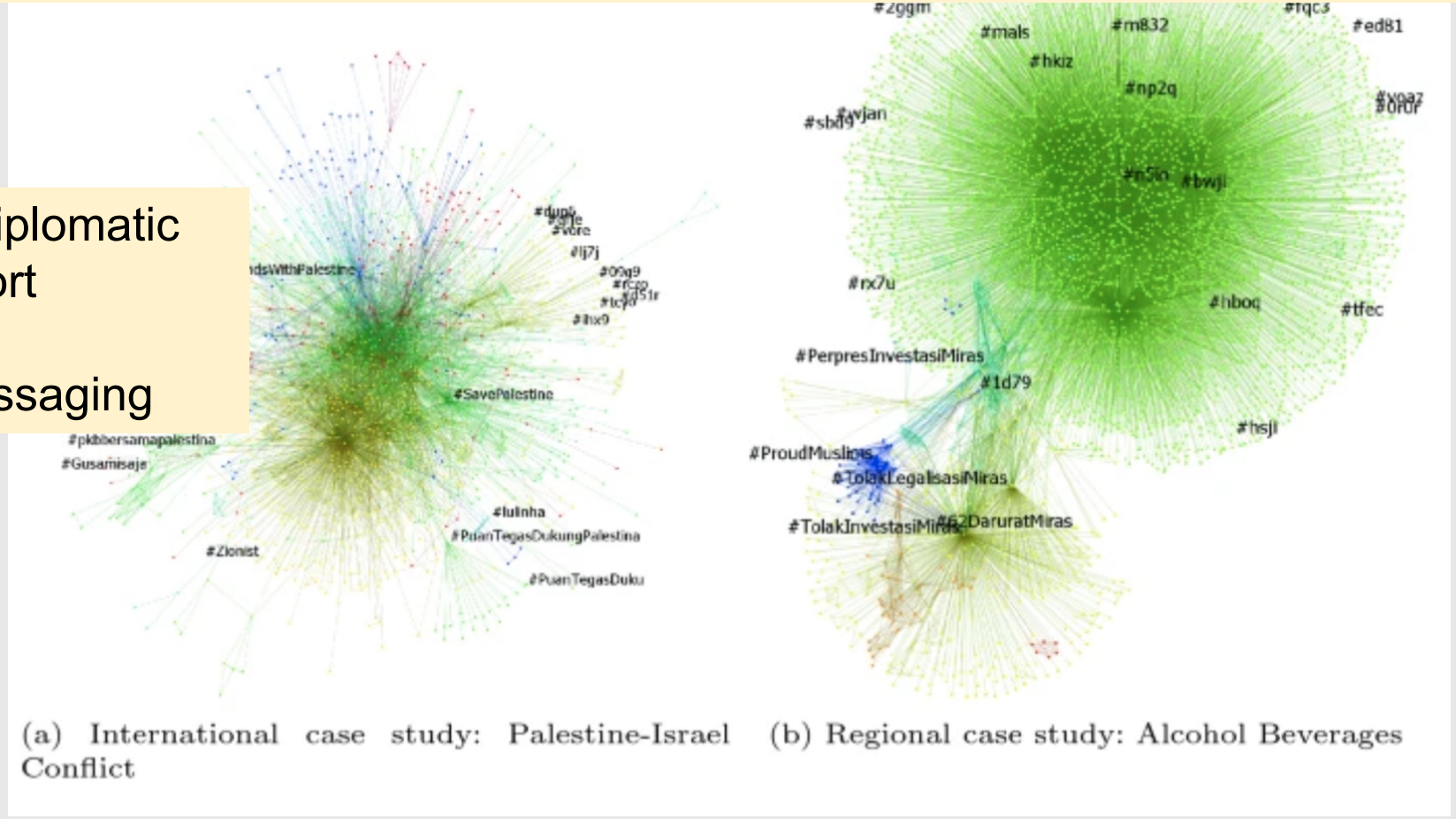
Topics that can divide (majority-Muslim) society

Strong but Diplomatic Support

Radical Messaging



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2021 Indonesian Twitter discourse

Topics that can divide (majority-Muslim) society

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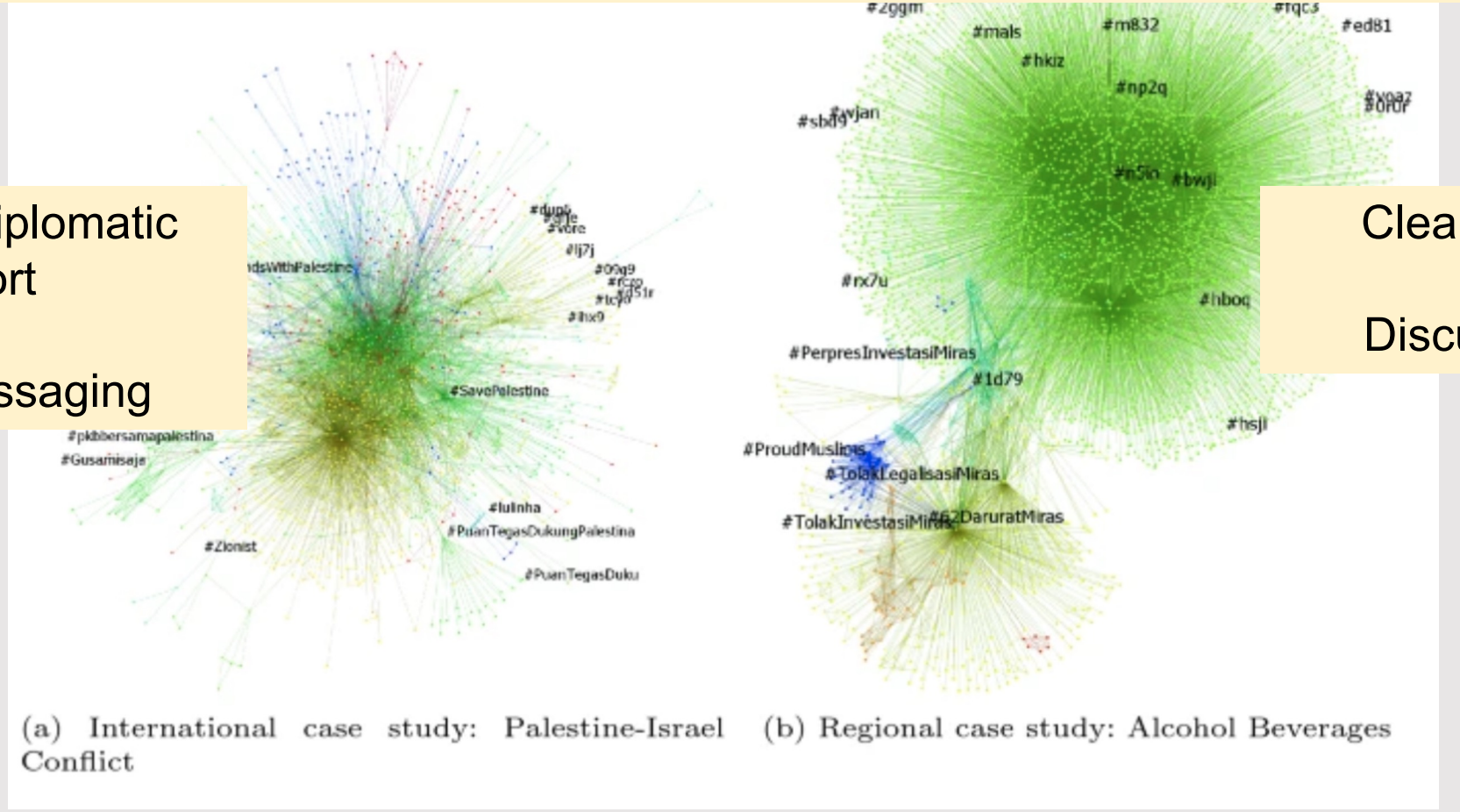

(a) International case study: Palestine-Israel Conflict (b) Regional case study: Alcohol Beverages

Clear call to action

Discursive Tweets

Absolute Power Corrupts Absolutely

Multi Pronged Approach