INDIANA UNIVERSITY

OBSERVATORY ON SOCIAL MEDIA

OSoMe Annual Report

Summer 2021 - Summer 2022

Thank you for supporting the Observatory on Social Media at Indiana University (OSoMe, pronounced “awesome”)! This report provides a brief update on our main activities and progress since our last update in May 2021, until the end of August 2022. We hope to produce an annual report on the Observatory each summer.

Our Observatory Team

In December 2021, the OSoMe team suffered an incalculable loss in the passing of Valentin “Val” Pentchev, who served the Observatory as Director of IT. Our close colleagues with the Indiana University Network Science Institute (IUNI) memorialized Val in a touching tribute that echoes our sympathies and sentiments on his lasting legacy. We at OSoMe will always remember his entrepreneurial spirit and enthusiasm in seeing opportunities and possibilities around every corner. Val’s tragic passing impacted our team not only on a professional level, but a profoundly personal one as well.

In March 2022, we were lucky to bring on board Ben Serrette as Director of IT; Ben had worked with Val at IU for six years prior to taking on this role. Our continued progress is positively impacted by Ben's understanding and familiarity with OSoMe’s ongoing work under Val’s supervision. In May 2022, Brea Bailey joined as Associate Director of Research and we welcomed Nick Liu to the IT Team as Systems Developer. This past July, Jacob Shaw came on board as Data Manager; Jacob is our first fully remote employee! Furthermore, we anticipate Pasan Kamburugamuwa to join the IT team as an additional Systems Developer in October 2022.

Finally, congratulations go to our Principal Investigator Betsi Grabe who was promoted to Provost Professor at Indiana University in May 2022.

At present, the Observatory boasts six Principal Investigators, seven Core Staff, and sixteen students working on the many ongoing projects. Check osome.iu.edu for full details and to contact us!

Visit by Former President of the Dominican Republic

We were contacted by Dr Leonel Fernández, Former President of the Dominican Republic, who is interested in building links between U.S. research institutions and the Dominican Republic. Dr Fernández visited on 26th April 2022 with his entourage. We had an instructive and warm meeting discussing opportunities for OSoMe to help Dominican Republic students and researchers develop their skills researching manipulation of social media.

New Undergraduate Course on Disinformation

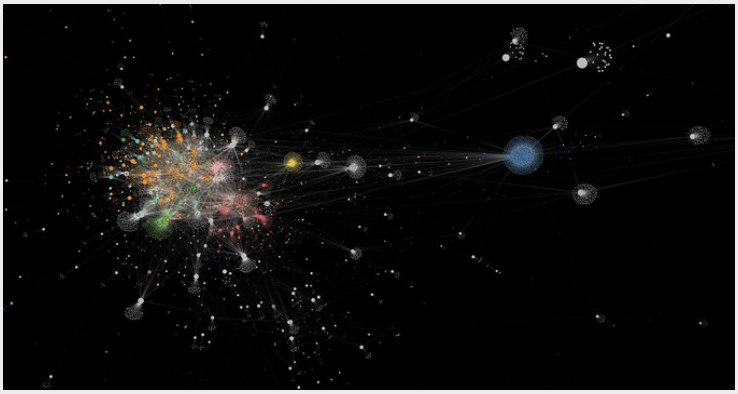
Our Observatory collaborators are co-teaching a new course on mis/disinformation and social media manipulation at IU this fall entitled “Click Here for an Easy A: Social Media Manipulation 101.” Weekly topics will include a history of propaganda and conspiracy theories, varieties of digital misinformation, the almighty algorithm and how it ranks and recommends what we see online, social media abuse including trolls, bots, deepfakes, and more, a review on how to collect and analyze social media data, the keys to slowing the spread of false and misleading information, and the future of social media including artificial intelligence, regulation and ethics, and the supposed metaverse, and much more.

This is a 3-credit course intended for undergraduate students at Indiana University, Bloomington. Though the course is cross-listed with the Luddy School of Informatics, Computing, and Engineering, The Media School, and the Hamilton Lugar School of Global and International Studies, we encourage and welcome students from all majors and academic backgrounds. Our Observatory has performed robust outreach and advertisement to ensure that students from across all disciplines have the opportunity to take part in the course debuting in Fall 2022.

New Tools

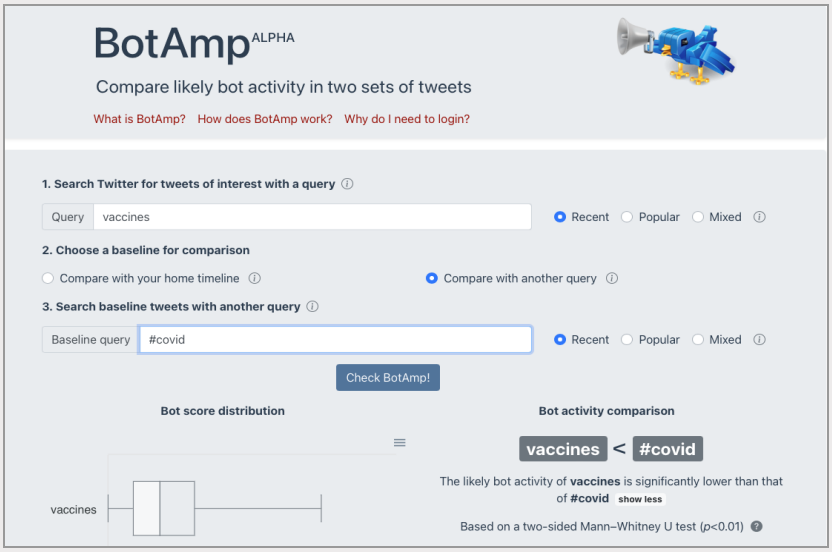
The Observatory recently launched three new free tools that expand our suite of applications for detecting bots, monitoring #hashtags, and observing and identifying diffusion networks to gain insights into how (mis)information spreads.

Network Tool



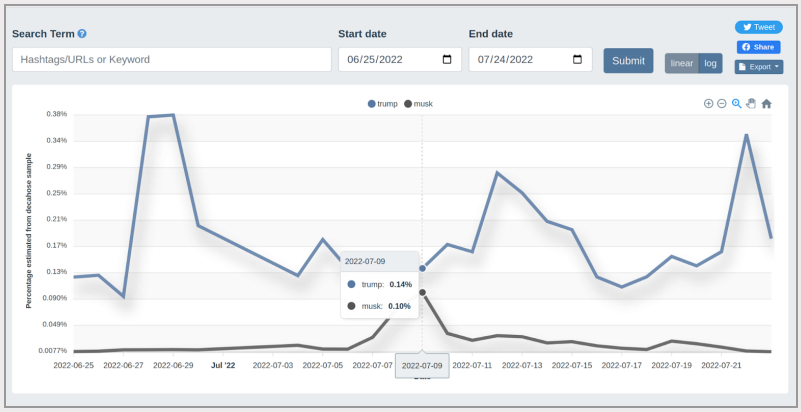
The Network Tool, which has recently been updated, creates an interactive map (now in 3D) to explore how information spreads across Twitter. Users can visualize who is retweeting or mentioning whom on a particular topic, or which hashtags are being used with other hashtags, and all data can now be exported. Using the tool, researchers, educators, journalists and the general public can see, at a glance, the complex networks that drive our online experience. The tool leverages the OSoMe decahose archive, which contains nearly 40 billion public tweets from the past three years. Users may search the archive using a single hashtag or a comma-separated list of hashtags. The network visualizations are created using Helios Web, a web-based library developed by OSoMe associate Filipi Nascimento Silva.

BotAmp



[BotAmp](#) compares two sets of tweets and estimates which one includes more likely bot activity (tweets or retweets). The second set of tweets is used as a baseline. Queries can contain phrases (example: “war in Ukraine”), a hashtag (example: #Ukraine), or any valid search operators. Currently, BotAmp supports two types of baselines. By default, the user can use recent tweets from their home timeline, which are tweets posted by the user and by accounts the user follows. We have reached over 2K users since inception and the site has been visited by users from over 30 countries.

Trends Tool



The [Trends Tool](#) helps users analyze the volume of tweets within a given hashtag, URL or keyword over a given period of time. This tool shows which topics are trending and what is going viral. It can be particularly valuable to brands and businesses to see if their associated hashtags are trending, and users can even look up stock ticker symbols to see which stocks people are talking about.

Some of these tools are supported by our historical collection of over 150 billion public tweets obtained from Twitter's Decahose. Our old cluster (code-named "Moe") used to store and retrieve this data is aging. We are working on a replacement cluster, code-named "Barney," that will hopefully go online in 2023.

New Grants

We are delighted to have been successful in many grant submissions in the past fourteen months! Our most recent awards total over $2.8M in externally sponsored funding.

Our "Detection Tool for Misinformation Superspreaders" was selected as a finalist for the Information Disorder Prize by the Aspen Tech Policy Hub.

We gratefully received funding from the Vaccines Confidence Fund (VCF) to study vaccines confidence in the U.S. Black community. The project "The Black and Thriving Project: The Use of Message Framing and Social Contagion to Promote Vaccines in African American Communities" worked with two partners, New Georgia Project and Reality Team, to study reasons why Black people are hesitant to take vaccines, and what kinds of messaging might help the community gain confidence. Our focus group data indicated that online grassroots campaigns should work well as there is still a lot of historically-based distrust of the government and scientists. With that in mind, we found that participants would be most likely to share messages that have content related to personal experiences of ordinary people about vaccines. Interestingly, the least shareable messages contained images designed to provoke fear of the consequences of COVID-19 infection. The insights report for all of the VCF studies is available online.

Here is a list of additional new grants awarded in the reporting period:

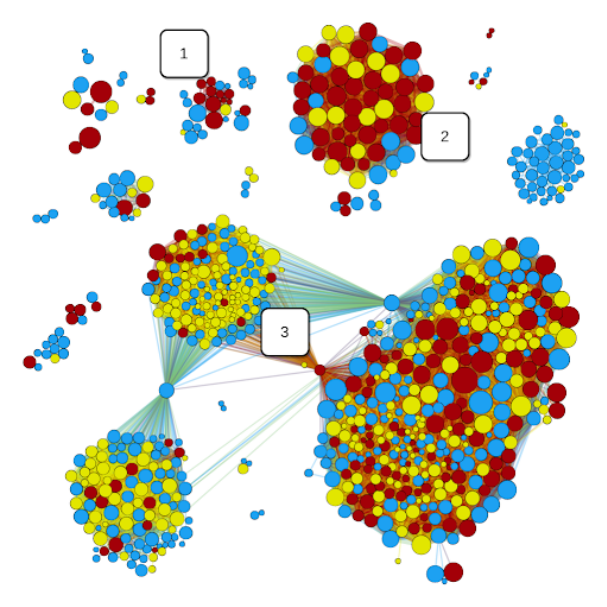
- UPSCALE: Universal Population Segmentation and Characterization Algorithms for OnLine Environments – DARPA INCAS, in partnership with USC
- OSoMe Tool Development – Open Technology Fund
- Novel Approaches and Systematic Techniques for Information Integrity and Trustworthiness of Information Sources – DEFENSEWERX
- Bots Building Bridges (3B): Theoretical, Empirical, and Technological Foundations for Systems that Monitor and Support Political Deliberation Online – Volkswagen Foundation, in partnership with Bielefeld University
- CAll for Regulation Support In Social MediA (CARISMA) – Swiss National Science Foundation, in partnership with SUPSI (to start in January 2023)

We are grateful to these new funders as well as our continuing sponsors, the Knight Foundation and Craig Newmark Philanthropies, for their support of the Observatory.

White Papers

We are beginning to release more white papers on our website. In response to the Russian invasion of Ukraine, we studied Twitter to look for suspicious activity and accounts. We released two white papers on this subject. We also looked at attitudes of rural Indiana residents toward Climate Change.

Suspicious Twitter activity around the Russian invasion of Ukraine



In the first white paper Suspicious Twitter Activity around the Russian Invasion of Ukraine we present some preliminary evidence of suspicious activity on Twitter. In collaboration with the Polytechnic University of Milan, we compiled a list of almost 40 English, German, Russian, and Ukrainian keywords relevant to the invasion and used them to collect over 60 million tweets posted since February 1. From analysis of these data, we report on a dramatic spike in the creation of new accounts around the date of the invasion, and on several networks of accounts sharing suspiciously similar content.

Analysis of Twitter accounts created around the invasion of Ukraine

As a follow-up, we produced a second white paper: Analysis of Twitter accounts created around the invasion of Ukraine. In this work, we focus on those accounts created during the first week of the Russian invasion, when new account creation was at its peak. We are motivated by the hypothesis that newer accounts are more likely to be inauthentic. For instance, these new accounts could include automated and sock-puppet accounts put in place to coordinate campaigns and manipulate online conversations. We give an update on the dramatic spike in the creation of new accounts around the date of the invasion, and report on preliminary

analysis of these data, which do not demonstrate evidence of a substantial Russian incursion into the Twittersphere.

How Do Rural Hoosiers View Climate Change? Insights toward Engagement and Policy Design

The report examines how climate change is impacting rural communities in Indiana. It finds that while most residents are concerned about the issue, they are not sure what they can do to help address it. The report recommends that state and local leaders work to engage residents in climate change mitigation efforts, and that they provide resources and support to help rural communities adapt to a changing climate. Full report: Browning, E., Burhans, M., Houser, M., Sandweiss, E., Gazley, B., Reynolds, H., & Shanahan, J. (2022). How do rural Hoosiers view climate change? Insights toward engagement and policy design. Environmental Research Institute.

OSoMe Visitors

We were very pleased to welcome six international visitors to the Observatory who made great contributions both intellectually and socially!

Xénia Farkas

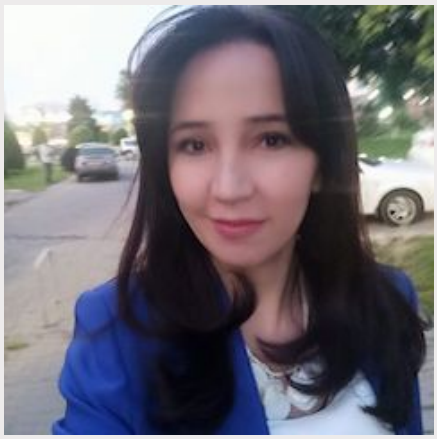
While a Junior Research Fellow at the Institute of Political Science Centre for Social Sciences in Hungary, Xénia Farkas visited the Observatory as a Fulbright Researcher from September 2021 to February 2022. Her research focused on visual political communications on social media through visual content analysis and social semiotics.

Francesco Pierri

Francesco Pierri visited the Observatory as a Ph.D. student at Politecnico di Milano where he worked under the supervision of Prof. Stefano Ceri and Prof. Fabio Pammolli. His research focuses on understanding (dis)information diffusion on online social networks. Francesco worked on vaccine misinformation and predicting its impact on vaccine rollout during his Fall 2021 visit to OSoMe.

Anora Sodikova

Anora Sodikova is a journalist who focuses on subjects like free speech, social justice, and women's rights. She is the editor-in-chief of rost24.uz, one of the most popular news sites in Uzbekistan. She is best known in Uzbekistan for her critical opinion against the established government. She has won national and international awards for covering social inequality, vulnerable groups, and corruption. Ms. Sodikova visited the Observatory through the Hubert H. Humphrey Fellowship Program.



Giulio Cantone

Giulio Cantone visited the Observatory during the 2021-2022 academic year as a Ph.D. student from the University of Catania in Italy. While at OSoMe, he focused on the coordinated manipulation of online review systems.

Antonela Tommasel

Antonela Tommasel is a Researcher at CONICET, working in the Recommender Systems group at ISISTAN Research Institute in Tandil, Argentina. Her main research interests include social computing applications of machine learning and recommender systems. During her Spring 2022 Fulbright visit to the Observatory, Antonela worked on the effects of friend and content recommendation algorithms on online trust and diversity.

Abdullah Alrhmoun

Abdullah Alrhmoun is a Ph.D. candidate in Network Science at the Central European University. His research interests include the real-world use of data analytics, including quantification, text mining, and natural language processing. Abdullah visited the Observatory as a part of the NSF-funded AccelNet-MultiNet exchange program in Spring 2022. During his time with OSoMe, he focused on the analysis of social network interactions between social bots and humans.

Media Highlights

The Observatory and its tools and researchers have been featured in many news articles, podcasts, and other coverage by top media sources during the last year.

Our work on social bot activity and the Botometer tool for bot detection garnered particular attention in the context of the dispute between Elon Musk and Twitter around the acquisition of the popular social media platform:

- Wired: Why It's So Hard to Count Twitter Bots
- Fast Company: Elon Musk says relaxing content rules on Twitter will boost free speech, but research shows otherwise
- Washington Post: Musk's question about bots is nothing new for Twitter
- Reuters: Do spam bots really comprise under 5% of Twitter users? Elon Musk wants to know
- Business Insider: Elon Musk will either pay far less for Twitter or use fake accounts as an excuse to walk away, experts say
- WSJ: Elon Musk's Bot Problem on Twitter Is Extraordinary
- New York Times: Musk Says Twitter Committed Fraud in Dispute Over Fake Accounts
- CNN: Elon Musk cited this tool in his bot dispute with Twitter. Its creator has thoughts
- BBC: Doubts cast over Elon Musk's Twitter bot claims

On our work on vaccines misinformation and countermeasures:

- TIME: Routine Childhood Vaccination Rates Fell as Misinformation About the COVID-19 Shot Rose
- New York Times: The Anti-Vaccine Movement's New Frontier
- AP: How a Kennedy built an anti-vaccine juggernaut amid COVID-19
- Slate: Elon Musk Says He Wants Free Speech on Twitter. But for Whom?

Our tools and analysis were highlighted in articles about the Ukraine invasion:

- ABC: Twitter bot network amplifying Russian disinformation about Ukraine war, researcher says
- Statista: Suspicious Activity on Twitter as Russia Invaded Ukraine

On other papers and interviews:

- Futurity: Political bias on Twitter comes from users, not the platform
- Washington Post: Do a Third of Americans Truly Believe Replacement Theory?
- NiemanLab: How can you judge the quality of a news outlet? Look at how politically diverse its audience is
- Scientific American: Facebook Whistleblower Testified That Company's Algorithms Are Dangerous: Here's Why
- New York Times: On TikTok, Election Misinformation Thrives Ahead of Midterms

Overall we have been mentioned in over a hundred articles from *ABC News, ABC Australia, ABRAJI, Algemeen Dagblad, Ars Technica, Associated Press, Axios, BBC, Bloomberg, Business Insider, Byline Times, CBS News and Affiliates, CNBC, CNN, Coda, Comprova, The Courier, Daily Maverick, Daily Vox, Detikcom, El Tiempo, Engadget, Euronews, Fast Company, Il Foglio, Forbes, Forsal.pl, France 24, Fulcrum, Futurity, Hamodia, Herald Times, The Hill, Huffington Post, Inc. Magazine, The Independent, Indiana Daily Student, Inside Higher Ed, Los Angeles Times, Manila Standard, MarketWatch, National Interest, The New York Times, News 5, Newsy, Nextgov, Nieman Lab, Novosti, NPR, NTV, Perfil, Politico, Politifact, Il Post, PropWatch, Protocol, Quotidiano Nazionale, Repubblica, Reuters, Salon, Scientific American, Sky, Slate, Spectrum News, Stat, Statista, The Street, Sunday Guardian, Tech Times, TheNextWeb, Time, Ukraine World, USA Today, The Wall Street Journal, Washington Examiner, Washington Post, Wired, Yahoo!,* and many other sources.

In addition, six articles by OSoMe researchers have appeared in *The Conversation* on the topics of algorithmic bias, Twitter moderation, and the prevalence of social bots. Cumulatively, these articles have been read by 180 thousand readers to date.

Presentations

OSoMe was excited to take part in the first Knight Research Network Tool Demonstration Day in October 2021. The talks given by our researchers can be viewed at the link.

Here are some of the other OSoMe presentations given in the reported period:

- An OSoMe Tool: Tracking Online (Mis)information. A Joint Event with the R Street Institute and the Indiana University's Observatory on Social Media. June 2021
- Keynote, NAACL-21 workshop on NLP for Internet Freedom: Censorship, Disinformation, and Propaganda. Menczer, June 2021
- Uncovering Coordinated Networks on Social Media: Methods and Case Studies. Pacheco, 15th International AAAI Conf. on Web and Social Media, June 2021
- CoVaxxy: A Collection of English-Language Twitter Posts About COVID-19 Vaccines. DeVerna/Pierri, 15th International AAAI Conf. on Web and Social Media, June 2021
- Panel and demos, ICWSM CySoc panel on The role of AI in addressing cyber social threats. Menczer & OSoMe students, June 2021
- Keynote, Satellite meeting on Opinion and Language Dynamics. Menczer, Networks 2021, July 2021
- Identifying Super-Spreaders of Misinformation on Social Media. DeVerna, Joint Sunbelt/NetSci Networks Conference, July 2021
- Political audience diversity and news quality. Ciampaglia, International Conference on Computational Social Science, Juy 2021
- Keynote, Data and Algorithm Forum, World Internet Conference. Menczer, Wuzhen, China, September 2021
- Online misinformation is linked to early COVID-19 vaccination hesitancy and refusal. Pierri, 3rd Multidisciplinary International Symposium on Disinformation in Open Online Media, September 2021
- Fakey: A Game Intervention to Improve News Literacy on Social Media. Micallef, 24th ACM Conference on Computer-Supported Cooperative Work and Social Computing, October 2021
- Dagstuhl Seminar on Digital Disinformation: Taxonomy, Impact, Mitigation, and Regulation. Menczer, October 2021

- Online misinformation is linked to early COVID-19 vaccination hesitancy and refusal. Pierri, Truth and Trust Online, October 2021
- Invited speaker, SFI/UBS ACtioN meeting on New Technologies & Risk: Will Speedier and Deliberate Communication Bring Higher Levels of Risk? Menczer, New York, October 2021
- Colloquium, “Frauds and Fakes” talk series, CSRE/IST/CSRAI. Menczer, Penn State University, November 2021
- Discussant, 5th WHO Infodemic Management Conference. Menczer, November 2021
- Open Lab Distinguished Speaker, CUDAN ERA Chair for Cultural Data Analytics. Menczer, Tallinn University, Estonia, November 2021
- Media and contemporary democratic life. Grabe, Government Communication MPA program, National University of Kyiv-Mohyla Academy, Kiev, Ukraine, February 2002
- Invited talk, Harvard/Northeastern Speaker Series on Misinformation. Menczer, February 2022
- Invited Talk, “Hacking Virality.” Menczer, Stripe, March 2022
- Learning Informatics Lab Colloquium and Demo. Menczer and Yang, Univ. of Minnesota, March 2022
- Roundtable on Covid-19 Misinformation: the State of the Research with Surgeon General. Menczer, Harvard, April 2022
- Seminar, Initiative on the Digital Economy & Institute for Data, Systems and Society. Menczer, MIT, April 2022
- Understanding the impact of anger-evoking and efficacy-eliciting tweets in white support for the BLM movement. Top faculty paper award. Grabe, Mass Communication Division at the annual meeting of the International Communication Association, Paris, France, May 2022

- Black leadership: Did the political leaning of online news platforms matter in the emotional tone of coverage for Kamala Harris and Cory Booker during the 2020 primaries? Kilgo, Gruszczynski, Grabe, Political Communication Division at the annual meeting of the International Communication Association, Paris, France, May 2022
- Invited presentation, Government Accountability Office. Menczer, May 2022
- Capitol Hill Roundtable on Researcher Access to Data. Menczer, DC, May 2022
- A few thoughts on doing research about contemporary media ecosystems and democracy. Grabe, Centre for Film and Media Studies, University of Cape Town, South Africa, June 2022
- The Manufacture of Partisan Echo Chambers by Follow Train Abuse on Twitter. Torres-Lugo, International AAAI Conference on Web and Social Media, June 2022
- The impact of online misinformation on the COVID-19 vaccination campaign in the United States. Pierri, International AAAI Conference on Web and Social Media, June 2022
- Manipulating Twitter through Deletions. Torres-Lugo, International AAAI Conference on Web and Social Media, June 2022
- Invited speaker on “Malicious coordination to manipulate social media”, NSF Augmented Intelligence Workshop. Menczer, July 2022
- Following the Trail of Fake News Spreaders in Social Media: A Deep Learning Model. Tommasel, 30th ACM Conference on User Modeling, Adaptation and Personalization, July 2022
- Online misinformation is linked to early COVID-19 vaccination hesitancy and refusal. Pierri, International Conference on Computational Social Science, July 2022
- News Sharing Networks Expose Information Polluters on Social Media. Truong, International Conference on Computational Social Science, July 2022

Publications

- Hunt, K., & Gruszczynski, M. (2021). The influence of new and traditional media coverage on public attention to social movements: The case of the Dakota Access Pipeline protests. *Information, Communication & Society*, *24*(7), 1024–1040. doi:10.1080/1369118x.2019.1670228

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- Grabe, M. E., & Bas, O. (2021). Reconsidering informed and participatory citizenship in the current media ecosystem. In *The Psychology of Journalism* (pp. 87–110). Oxford University Press

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- Paolillo, J., Harper, B., & Axelrod, D. (2022). COVID-19 information on YouTube in the early pandemic. *Proceedings of the Annual Hawaii International Conference on System Sciences*. doi:10.24251/hicss.2022.511

- Truong, B., Allen, O. M., & Menczer, F. (2022). *News sharing networks expose information polluters on social media.* Preprint doi:10.48550/arXiv.2202.00094

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- Torres-Lugo, C., Pote, M., Nwala, A. C., & Menczer, F. (2022). Manipulating Twitter through deletions. *Proceedings of the International AAAI Conference on Web and Social Media*, *16*(1), 1029-1039

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- Yang, K.-C., Hui, P.-M., & Menczer, F. (2022). How Twitter data sampling biases U.S. voter behavior characterizations. *PeerJ Computer Science*, *8*(e1025). doi:10.7717/peerj-cs.1025

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- Yang, K.-C., Ferrara, E., & Menczer, F. (2022). Botometer 101: Social Bot Practicum for computational social scientists. *Journal of Computational Social Science*. doi:10.1007/s42001-022-00177-5

- Grabe, M. E. & Bucy, E. P. (2022). Moral panics about the integrity of information in democratic systems: Comparing tabloid news to disinformation. *Journal of Broadcasting & Electronic Media.* doi:10.1080/08838151.2022.2120482