How to Measure the Effects of Algorithms

Luke Thorburn March 2024

- PhD student in computer science at King's College London.
- Various projects:
 - Bridging-Based Ranking bridging.systems
 - Understanding Recommenders
 CHAI, UC Berkeley
 medium.com/understanding-recommenders

- PhD student in computer
- Various projects:
 - Bridging-Based Rai bridging.systems
 - Understanding Rec CHAI, UC Berkeley <u>medium.com/under</u>



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 - Bridging-Based Ranking bridging.systems
 - Understanding Recommenders CHAI, UC Berkeley <u>medium.com/understanding-recommenders</u>
 - Social media regulation
 - AI governance
 - De-escalation of AI policy discourse

Recommender Systems



Recommender Systems



Recommender Systems

value = $1 \cdot Pr(like) + 3 \cdot Pr(comment) + 10 \cdot Pr(share)$

+ 4 \cdot (expected dwell time) - 6 \cdot Pr(fake account)

- 7 · Pr(low quality news) - 10 · Pr(clickbait)

Questions people care about

- Are recommenders harming mental health?
- Are recommenders **shortening attention spans**?
- Are recommenders making politics more divisive?
- Are recommenders **politically biased**?
- Are recommenders **incentivising misinformation**?
- Are recommenders ...

Relevance to your work

- Are recommenders harming mental health?
- Are recommenders **shortening attention spans**?
- Are recommenders making politics more divisive?
- Are recommenders **politically biased**?
- Are recommenders **incentivising misinformation**?
- Are recommenders ...

Relevance to your work



harming mental health?
shortening attention spans?
making politics more divisive?
politically biased?
incentivising misinformation?

Relevance to your work



Methods How platforms do it Regulation Methods How platforms do it Regulation

	AVAILABLE STUDY TYPES	MAJOR LIMITATIONS
Without access	★ Simulations★ Off-platform experiments	 Ecological validity
With platform data	All of the above, plus ★ Observational studies	 Data scope & quality Causal inference
With on-platform experiments	All of the above, plus ★ On-platform experiments	 Ability to generalize Isolation of cause/effect Ethical considerations

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With on-platfo experiments

Without acces





PR LIMITATIONS



With

Do We Need a Social Media Accelerator?

Christopher A. Bail^{1,2,3}, D. Sunshine Hillygus^{2,3}, Alexander Volfovsky^{4,5}, Max Allamong⁶, Fatima Alqabandi^{1,4}, Diana M.E. Jordan², Graham Tierney⁴, Christina Tucker², Andrew Trexler^{3,2}, and Austin van Loon^{1,4}

> ¹Department of Sociology, Duke University ²Department of Political Science, Duke University ³Sanford School of Public Policy, Duke University ⁴Department of Statistical Science, Duke University ⁵Department of Computer Science, Duke University ⁶Duke Initiative on Survey Methodology, Duke University

> > December 22, 2023

Social media platforms are central to many of the most pressing questions in public debates today. Have photo and video sharing sites such as TikTok. YouTube, and Instagram

With on-platforn experiments Il of the above, plus

On-platform experiments



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Political content and news are polarized but other content is not in YouTube watch histories

Without access

With platform da

With on-platfor experiments

Magdalena Wojcieszak UC Davis. U of Amsterdam

Rong-Ching (Anna) Chang

Ericka Menchen-Trevino

DOI: https://doi.org/10.51685/jqd.2023.018

Keywords: polarization,, news, YouTube, echo chambers, partisanship, exposure, selectivity, computational methods

Abstract

Research on ideological biases and polarization on social media platforms primarily focuses on news and political content. Non-political content, which is vastly more popular, is often overlooked. Because partisanship is correlated with citizens' non-political attitudes and non-political content can carry political cues, we explore whether ideological biases and partisan segregation extend to users' non-political exposures online. We focus on YouTube, one of the most popular platforms. We rely online data from American adults (N = 2,237). From over 129 million visits to over 37 million URLs, we analyze 1,037,392 visits to YouTube videos from 1,874 participants. We identify YouTube channels of 942 news domains, utilize a BERT-based classifier to identify political videos outside news channels, and estimate the ideology of all the videos in our data. We compare ideological biases in exposure to (a) news, (b) political, and (c) non-political content. We examine

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D	ubliched	

2023-11-10

How to Cite

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Section Articles

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Copyright (c) 2023 Magdalena Wojcieszak, Rong-Ching (Anna) Chang, Ericka Menchen-Trevino

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RESEARCH ARTICLE | PSYCHOLOGICAL AND COGNITIVE SCIENCES |

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Emotion shapes the diffusion of moralized content in social networks

 William J, Brady

 Julian A, Wills, John T, Jost, H, and Jay J, Van Bavel
 Muthors Info & Affiliations

 Edited by Susan T. Fiske, Princeton University, Princeton, NJ, and approved May 23, 2017 (received for review November 15, 2016)

 June 26, 2017

 114 (28) 7313-7318

 https://doi.org/10.1073/onas.1618923114

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Significance

Twitter and other social media platforms are believed to have altered the course of numerous historical events, from the Arab Spring to the US presidential election. Online social networks have become a ubiquitous medium for discussing moral and political ideas. Nevertheless, the field of moral psychology has yet to investigate why some moral and political ideas spread more widely than others. Using a large sample of social media communications concerning polarizing issues in public policy debates (gun control, samesex marriage, climate change), we found that the presence of moral-emotional language in political messages substantially increases their diffusion within (and less so between) ideological group boundaries. These findings offer insights into how moral ideas spread

Article Published: 10 June 2021

Reconsidering evidence of moral contagion in online social networks

Jason W. Burton [™], Nicole Cruz & Ulrike Hahn

Nature Human Behaviour 5, 1629-1635 (2021) Cite this article

14k Accesses | 15 Citations | 146 Altmetric | Metrics

Abstract

The ubiquity of social media use and the digital data traces it produces has triggered a potential methodological shift in the psychological sciences away from traditional, laboratory-based experimentation. The hope is that, by using computational social science methods to analyse large-scale observational data from social media, human behaviour can be studied with greater statistical power and ecological validity. However, current standards of null hypothesis significance testing and correlational statistics seem ill-suited to markedly noisy, high-dimensional social media datasets. We explore this point by probing the moral contagion phenomenon, whereby the use of moral-emotional language increases the probability of message spread. Through out-of-sample prediction, model comparisons and specification curve analyses, we find that the moral contagion model performs no better than an implausible XYZ contagion model. This highlights the risks of using purely correlational evidence from large observational datasets and sounds a cautionary note for psychology's merge with big data.



With platform data

With on-platform experiments

MAJOR LIMITATIONS

All of ★	<i>the above, plus</i> Observational studies	Data scope & quality Causal inference
	<i>the above, plus</i> On-platform experiments	



With platform data

With on-platform experiments



AVAILABLE STUDY TYPES



MAJOR LIMITATIONS

ata scope & quality ausal inference

bility to generalize olation of cause/effect thical considerations



AVAILABLE STUDY TYPES

MAJOR LIMITATIONS





With platform data



AVAILABLE STUDY TYPES

Interventional Non-interventional

Natural experiments...

All of the above, plus

★ Observational studie If all confounders are known and measurable...

All of the above, plus

If some confounders are unknown or unmeasurable...

MAJOR LIMITATIONS AVAILABLE METHODS

experiments

differences-in-differences

regression discontinuity

instrumental variable ity

• Causal inference

subclassification

matching

propensity scoring synthetic control

	AVAILABLE STUDY TYPES	MAJOR LIMITATIONS
Without access	★ Simulations★ Off-platform experiments	• Ecological validity
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Engagement, User Satisfaction, and the Amplification of Divisive Content on Social Media

Smitha Milli^{a,*}, Micah Carroll^b, Yike Wang^b, Sashrika Pandey^b, Sebastian Zhao^b, Anca D. Dragan^b

> ^aCornell Tech ^bUniversity of California, Berkeley ^{*}Corresponding author: smilli@cornell.edu

In a pre-registered randomized chronological baseline, Twitter' emotionally charged, out-group worse about their political out-g fer the political tweets selected 1 based algorithm underperforms explore the implications of an a users' stated preferences and fi hostile content but also a potent

With on-platform experiments

Carmel Richardson 🔮 @carmelelizabeth · Follow

The Senate will once again debate the ERA next week. The debate is not, and never has been, about valuing women and men equally.

My latest @amconmag



theamericanconservative.com The Equal Rights Amendment Is Still About Punishing Women - The A... Men and women, despite our best efforts, are different, and "the same for both" is a shabby standard of treatment.

10:50 AM - Feb 25, 2023

Read more on Twitter

MAJOR LIMITATIONS

Ecological validity

How does Carmel Richardson's tweet make you feel about people or groups on the Left?

Much worse -2	Worse -1	The same as before 0	Better 1	Much bette
		•		
How does Car	nel Richardson's	s tweet make you feel about pe	eople or groups of	on the Right?
How does Car	nel Richardson 's	s tweet make you feel about pe	eople or groups of	on the Right?
How does Carr Much worse	mel Richardson 's Worse	tweet make you feel about pe	eople or groups o Better	on the Right? Much bette

AVATI ARI F STUDY TYPES

MAJOR LIMITATIONS

Article

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Check for updates

With on-platfo experiments

Like-minded sources on Facebook are prevalent but not polarizing

ttps://doi.org/10.1038/s41586-023-06297-w	Brendan Nyhan ¹²⁵ , Jaime Settle ²²⁵ , Emily Thorson ^{3,25} , Magdalena Wojcieszak ^{4,5,25} ,
eceived: 21 December 2022	Pablo Barberá ^{6,25} , Annie Y. Chen ⁷ , Hunt Allcott ⁸ , Taylor Brown ⁶ , Adriana Crespo-Tenorio ⁶ , Drow Dimmon ^{6,24} , Doop Fronton ⁹ , Matthew Contribution Standar Contribution Paulos, Adriana Crespo, Adri
ccepted: 7 June 2023	Andrew M. Guess ^{11/2} , Edward Kennedy ¹³ , Young Mie Kim ⁴⁴ , David Lazer ¹⁵ , Neil Malhotra ¹⁶ ,
ublished online: 27 July 2023	Devra Moehler ⁶ , Jennifer Pan ¹⁷ , Daniel Robert Thomas ⁶ , Rebekah Tromble ^{18,19} ,
pen access	Annie Franco ^{6,26} , Winter Mason ^{6,26} , Natalie Jomini Stroud ^{20,21,26} & Joshua A. Tucker ^{22,23,26}

Many critics raise concerns about the prevalence of 'echo chambers' on social media and their potential role in increasing political polarization. However, the lack of available data and the challenges of conducting large-scale field experiments have made it difficult to assess the scope of the problem12. Here we present data from 2020 for the entire population of active adult Facebook users in the USA showing that content from 'like-minded' sources constitutes the majority of what people see on the platform, although political information and news represent only a small fraction of these exposures. To evaluate a potential response to concerns about the effects of echo chambers, we conducted a multi-wave field experiment on Facebook among 23,377 users for whom we reduced exposure to content from like-minded sources during the 2020 US presidential election by about one-third. We found that the intervention increased their exposure to content from cross-cutting sources and decreased exposure to uncivil language, but had no measurable effects on eight preregistered attitudinal measures such as affective polarization, ideological extremity, candidate evaluations and belief in false claims. These precisely estimated results suggest that although exposure to content from like-minded sources on social





	AVAILABLE STUDY TYPES	MAJOR LIMITATIONS
→ WHAT IS ENGAGED WI	THAN	→ WHAT IS THOUGHT
User engages with some ty of content more than othe	vpes Obse System shows more ers. of that content.	User's preferences and beliefs align with what is shown.
With on-platform experiments	All of the above, plus ★ On-platform experiments	 Ability to generalize Isolation of cause/effect Ethical considerations

ORIGINAL ARTICLE

Reinforcing Spirals: The Mutual Influence of Media Selectivity and Media Effects and Their Impact on Individual Behavior and Social Identity

Michael D. Slater

School of Communication, The Ohio State University, Columbus, OH 43210

The attitudinal or behavioral outcomes of media use can be expected tion of and attention to media content. This process can be concept mutually reinforcing spirals akin to positive feedback loops in gene This reinforcing spirals perspective highlights the need for longitu mutually influencing media selection and effects processes; study of processes in youth and adolescent identity development; and analysis chological factors that control, dampen, or eventually extinguish the spirals. This perspective may also, more speculatively, be extended to tenance of social identity for political, religious, and lifestyle groups a reinforcing spirals model to theories including spiral of silence, age ing, cultivation, selective attention, and uses and gratifications is also

doi:10.1111/j.1468-2885.2007.00296.x



MAJOR LIMITATIONS



	AVAILABLE STUDY TYPES	MAJOR LIMITATIONS
Often th	e overall (average) effects are neglig	ible, but:
With platform data su • cu	bgroup effects mulative effects	
With on-platform experiments	All of the above, plus ★ On-platform experiments	 Ability to generalize Isolation of cause/effect Ethical considerations

AVAILABLE STUDY TYPES

MAJOR LIMITATIONS

Without access

Simulations Off-platform experi

external validity.

In contrast, RCTs or natural experiments make no claim to global knowledge. But simply taking the results of one of these intensively internally validated studies and assuming that they will hold in a "similar" context---perhaps one with blunt covariate adjustments---is an absurd allocation of rigor. It's like designing and executing a moon landing and then sending the same ship to Mars with triple the fuel and assuming things will work out.

So: the biggest problem in quantitative methodology is about external validity / generalizability / transportability: how does the knowledge generated in one context

With on-platform experiments

kevinmunger.substack.com/p/meta-science-is-political-methodology

🖈 🛛 On-platform experiment:

Ability to generalize

- Isolation of cause/effect
- Ethical considerations

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With or experimental with or experimental with the second second

Quantitative description is cheap, and much of the cost is fixed. In contrast, causal knowledge is expensive and much of the cost is marginal. The marginal cost of updating [a political] database and the [some modeled] scores for each session of Congress is much lower than the fixed cost of creating those models in the first place. In contrast, the marginal cost of rerunning a Twitter RCT every time Twitter's userbase or platform policies change is very high.

- Kevin Munger, In Favor of Quantitative Description (2020)

Without acc

With platfo

With on-plate experiments

Objecting to experiments that compare two unobjectionable policies or treatments

PSYCHOLOGICAL AND COGNITIVE SCIENCES

Michelle N. Meyer ☐, Patrick R. Heck , Geoffrey S. Holtzman, +3, and Christopher F. Chabris Authors Info & Affiliations Edited by Dalton Conley, Princeton University, Princeton, NJ, and approved April 8, 2019 (received for review December 5, 2018) May 9, 2019 116 (22) 10723-10728 https://doi.org/10.1073/pnas.1820701116

VIEW RELATED CONTENT + THIS ARTICLE HAS A REPLY +

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Significance

Randomized experiments—long the gold standard in medicine—are increasingly used throughout the social sciences and professions to evaluate business products and services, government programs, education and health policies, and global aid. We find robust evidence—across 16 studies of 5,873 participants from three populations spanning nine domains—that people often approve of untested policies or treatments (A or B) being universally implemented but disapprove of randomized experiments (A/B

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Methods How platforms do it Regulation Methods How platforms do it Regulation

Measurement

Facebook is testing its 'less political' News Feed in 75 new countries

The company introduced the changes in the US in August.



Karissa Bell Senior Editor Thu, Oct 14, 2021 • 1 min read





Managing Trade-Offs

Ranking by Engagement

AUTHOR Tom Cunningham, Integrity Institute PUBLISHED May 8, 2023

Six observations on ranking by engagement on social media platforms:

- 1. **Platforms rank content primarily by the predicted probability of engagement.** Platforms choose for each user the items they are predicted to click on, or reply to, or to retweet, etc.¹
- 2. Platforms rank by engagement because it increases user retention. In experiments which compare

engagement-ranked feeds to unranke consistently show substantially highe engagement not in itself but as a mea retention would choose retention.

- Engagement is negatively related t has low scores by various measures o misinformation. Intuitively this is bec appealing content is often the most d consequence platforms often suppler for content quality.
- Sensitive content is often both eng prevalence of various types of "sensiti politics, etc.. However unlike low-qual retention, implying that sensitivity is prevalence.
- Sensitive content is often preferred directly for their preferences over con

retentiveness engagement quality sensitivity preference retentiveness 0 4 + + engagement + + quality 0 0 sensitivity + preference

Thanks to comments from Jeff Allen, Jacquelyn Zehner, David Evan Harris, Jonathan Stray, and others. If you find this note useful for your work send me an email and tell me :).

Managing Trade-Offs

"If a candidate has a significant impact on an important Feed-level metric ... then we present that candidate for review at the main Feed experiment review meeting

If a candidate has a significant impact to an IFR guardrail ... then that can be a blocker, depending on our backtest and the benefits of the launch.

If a candidate significantly impacts an XFN metric ... then we discuss the impact and cost/benefit with the appropriate XFN partner..."

- Facebook, Evaluating News Feed Ranking Experiments

Managing Trade-Offs



Methods How platforms do it Regulation Methods How platforms do it Regulation

E.U. Digital Services Act

Official Journal of the European Union

L 277

	27 October 2022	
ontents		
I Legislative acts		
REGULATIONS		
 Regulation (EU) 2022/2065 of the European Parliament and of the Council of 19 October 2022 on a Single Market For Digital Services and amending Directive 2000/31/EC (Digital Services Act) (²) 	1000	
II Non-legislative acts		
INTERNATIONAL AGREEMENTS		
 Council Decision (EU) 2022/2066 of 21 February 2022 on the conclusion, on behalf of the European Union, of the Implementing Protocol to the Fisheries Partnership Agreement between the Calonover Republic and the European Community (2021-2016) 	10	
REGULATIONS		
 Commission Implementing Regulation (EU) 2022/2067 of 25 October 2022 amending Annex I to Implementing Regulation (EU) 2021/605 laying down special control measures for African swine fever (*) 	10	
 Commission Implementing Regulation (EU) 2022/2068 of 26 October 2022 imposing a definitive anti-dumping dury on imports of cerrain cold+rolled flas steel products originaring in the Poople's Republic of China and the Russian Iceleration of Moving an earbyr verse prevensant to Article 11 		
(2) от кедоналов (EU) 2019/1939 от це своренат газаниета ана от не Сонкл		

• Article 40

"Upon a reasoned request from the Digital Services Coordinator of establishment, **providers of very large online platforms** or of very large online search engines shall, within a reasonable period, as specified in the request, **provide access to data to vetted researchers** who meet the requirements in paragraph 8 of this Article, for the sole purpose of conducting research that contributes to the detection, identification and understanding of systemic risks in the Union, as set out ..."

U.S. Platform Accountability & Transparency Act

117TH CONGRESS 2D SESSION



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To support research about the impact of digital communication platforms on society by providing privacy-protected, secure pathways for independent research on data held by large internet companies.

IN THE SENATE OF THE UNITED STATES

DECEMBER 21, 2022 Mr. COONS (for himself, Mr. PORTAX, Ms. KLOBUCHAR, and Mr. CASSIDY) introduced the following bill; which was read twice and referred to the Committee on Health, Education, Labor, and Pensions

A BILL

- To support research about the impact of digital communication platforms on society by providing privacy-protected, secure pathways for independent research on data held by large internet companies.
- 1 Be it enacted by the Senate and House of Representa-
- 2 tives of the United States of America in Congress assembled,

3 SECTION 1. SHORT TITLE; TABLE OF CONTENTS.

- 4 (a) SHORT TITLE.—This Act may be cited as the
- 5 "Platform Accountability and Transparency Act".
- 6 (b) TABLE OF CONTENTS.—The table of contents for
- 7 this Act is as follows:
 - Sec. 1. Short title; table of contents.

• Data access.

Independent researchers submit proposals to the National Science Foundation. If approved, platforms required to provide the necessary data, subject to privacy + cybersecurity protections.

• Safe harbor for automated data collection.

Prevents social media companies from suing or criminally accusing public interest researchers who scrape public-facing platform data, so long as the researcher uses appropriate privacy safeguards.

Proposals relating to product experiments



