ECPR Methods Summer School: Automated Collection of Web and Social Data

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Social Media Data

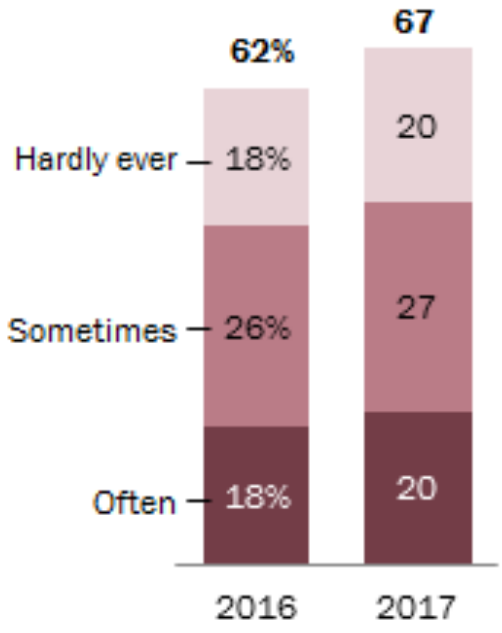
Social media and politics

- 99% of Members of the US Congress have an active social media account
- 90% of governments have a presence on Twitter
- “Traditional” media outlets rely on social media to promote their content
- 50% of social media users in U.S. share information about news stories, images or videos about current events
- 46% have discussed a news issue or event on social media

(Sources: Electionista; Zeitzoff and Barberá, ISQ 2017; Pew Research Center)

In 2017, two-thirds of U.S. adults get news from social media

% of U.S. adults who get news from social media sites ...



Source: Survey conducted Aug. 8-21, 2017. "News Use Across Social Media Platforms 2017"

PEW RESEARCH CENTER

- 67% of Americans get news on social media (Pew Research)
- 58% of EU citizens active on social media & find it useful to get news on national political matters (Eurobarometer, Fall 2017)
- Social media: top source of news for U.S. young adults (Pew)

Social media data

What are the main advantages of using social media data to study human behavior?

1. Unobtrusive data collection at scale, e.g. in study of networks, censorship
2. Homogeneity in data format across actors, countries, and over time, e.g. in study of political rhetoric
3. Temporal and spatial data granularity, e.g. in study of geographic segregation
4. Increasing representativeness of social media users, e.g. in study of political elites

Social media research

Two different approaches in the growing field of social media research:

1. Social media as a new source of data
   - Behavior, opinions, and latent traits
   - Interpersonal networks
   - Elite behavior
   - Affordable field experiments
2. How social media affects social behavior
   - Collective action and social movements
   - Political campaigns
   - Social capital and interpersonal communication
   - Political attitudes and behavior

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Behavior, opinions, and latent traits

- Digital footprints: check-ins, conversations, geolocated pictures, likes, shares, retweets, . . .

→ Non-intrusive measurement of behavior and public opinion

Regular Article

new media & society
2014, Vol. 16(2) 340–358

DOI: 10.1177/1461444813480466
nms.sagepub.com
SAGE

Every tweet counts? How sentiment analysis of social media can improve our knowledge of citizens' political preferences with an application to Italy and France

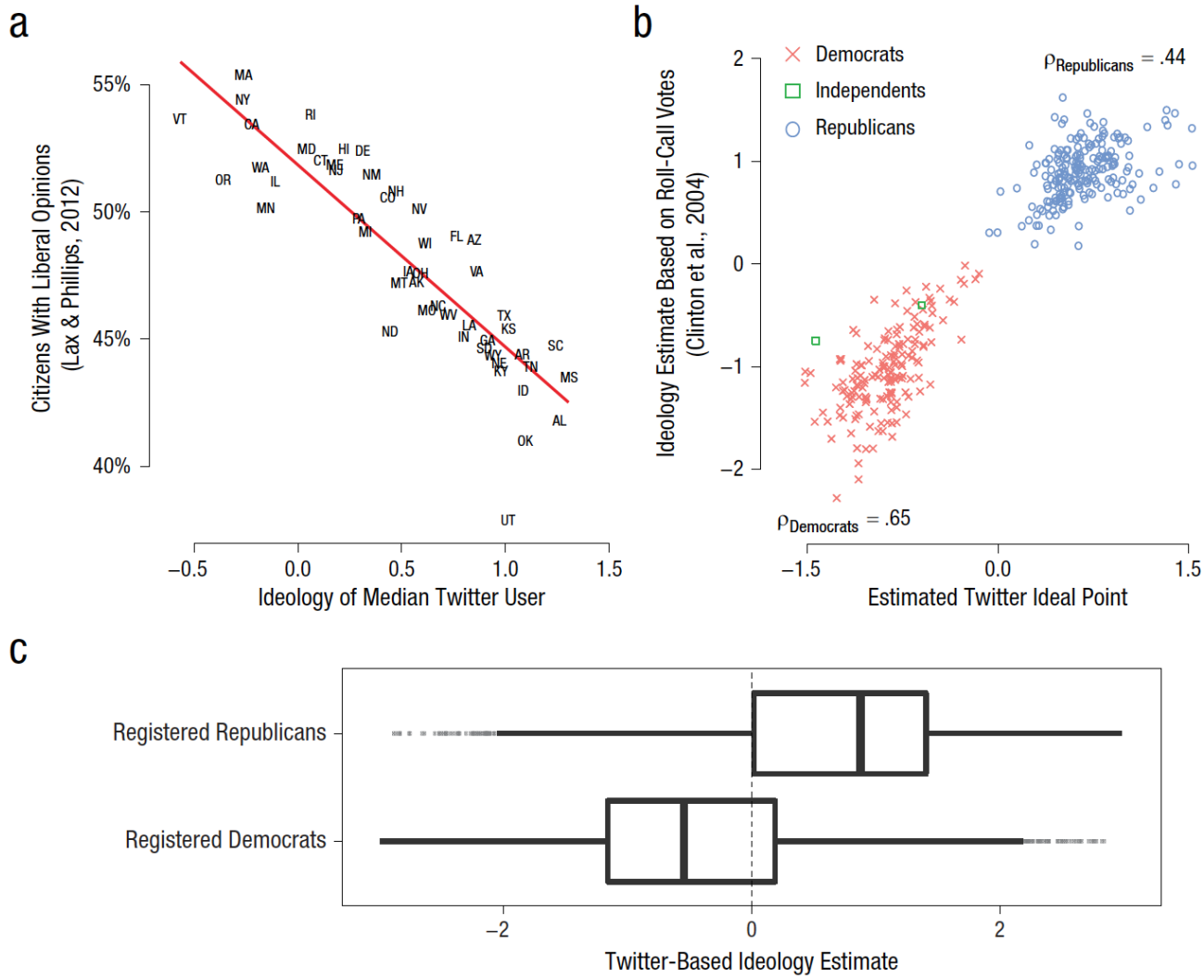
Andrea Ceron, Luigi Curini, Stefano M Iacus
Università degli Studi di Milano, Italy

Giuseppe Porro
Università degli Studi dell'Insubria, Italy

AJPS AMERICAN JOURNAL of POLITICAL SCIENCE

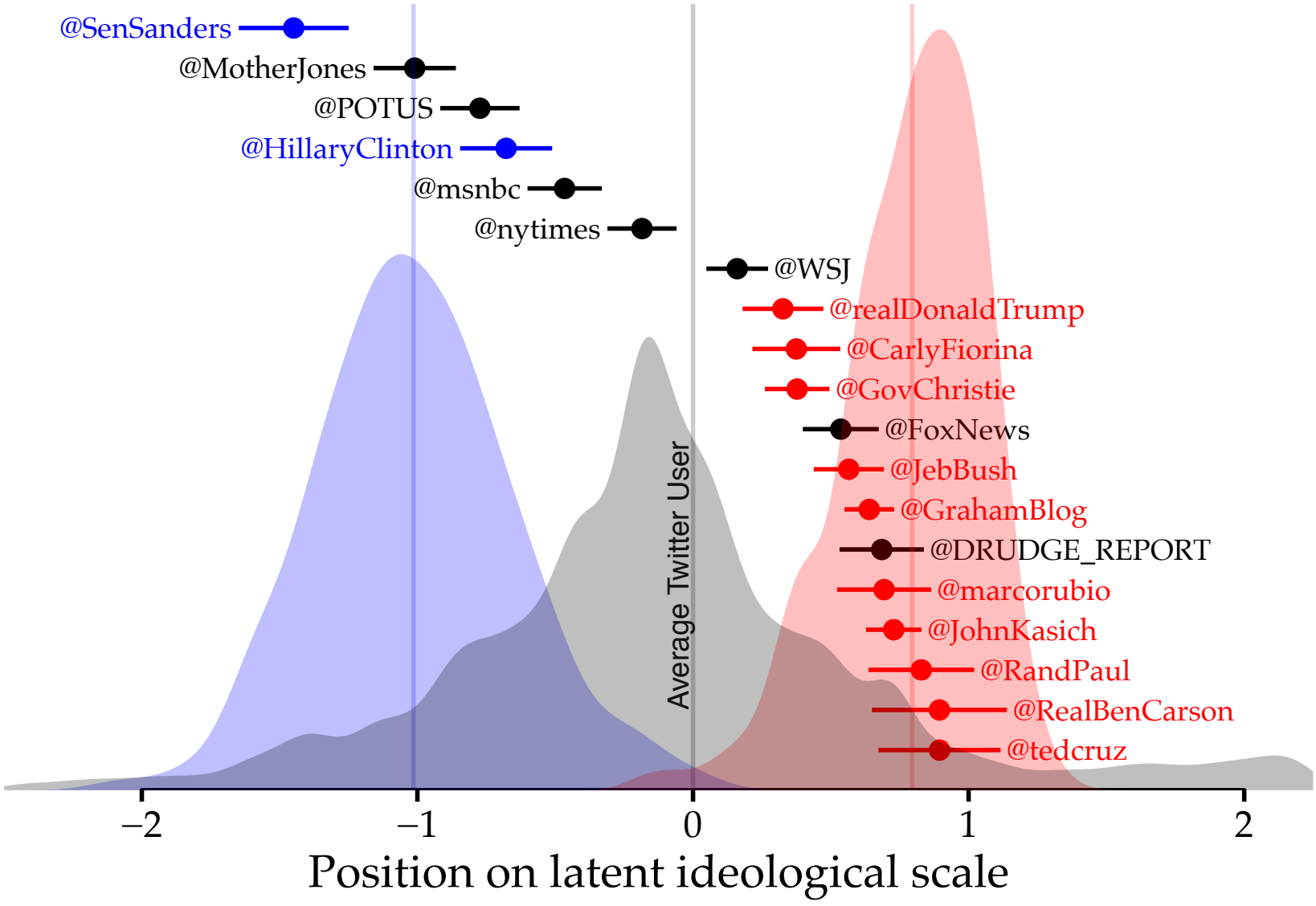
Behavior, opinions, and latent traits

→ Inference of latent traits: political knowledge, ideology, personal traits, socially undesirable behavior, . . .



Barberá, 2015 *Political Analysis*; Barberá et al, 2016, *Psychological Science*

Estimating political ideology using Twitter networks



Barberá "Who is the most conservative Republican candidate for president?" *The Monkey Cage / The Washington Post*, June 16 2015

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Interpersonal networks

- Political behavior is social, strongly influenced by peers

Bond et al, 2012, "A 61-million-person experiment in social influence and political mobilization", *Nature*

- Costly to measure network structure
- High overlap across online and offline social networks

OPEN ACCESS Freely available online

PLOS ONE

Inferring Tie Strength from Online Directed Behavior

Jason J. Jones[1,2*], Jaime E. Settle[2], Robert M. Bond[2], Christopher J. Fariss[2], Cameron Marlow[3],

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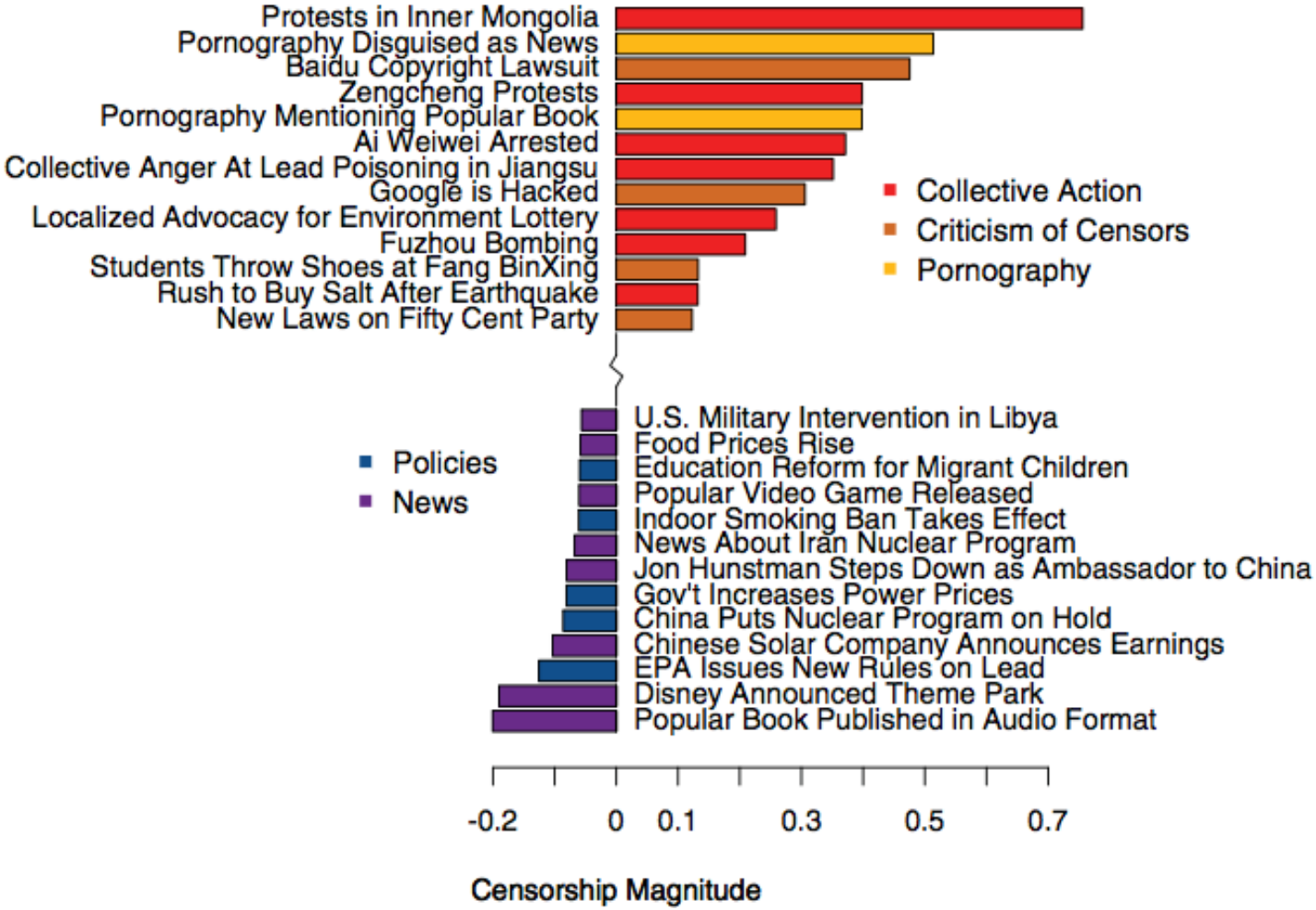
Elite behavior

- Authoritarian governments' response to threat of collective action



King et al, 2013, "How Censorship in China Allows Government Criticism but Silences Collective Expression", *APSR*

- Estimation of conflict intensity in real time

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Affordable field experiments

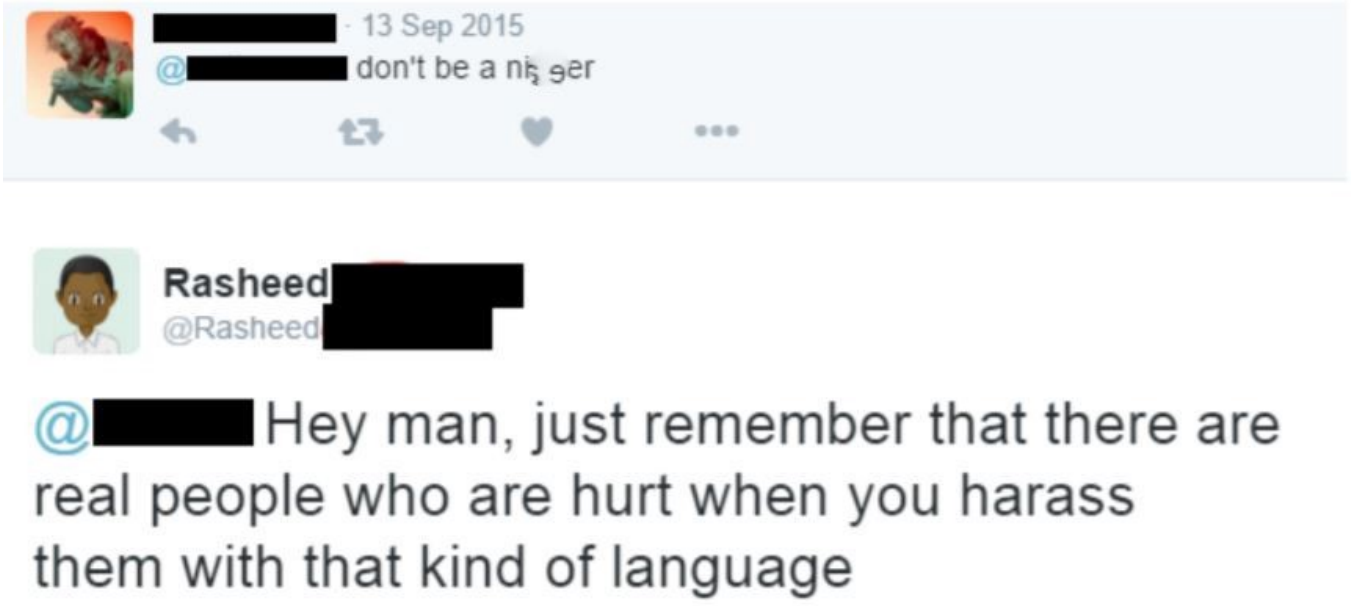
Political Behavior
September 2017, Volume 39, Issue 3, pp 629–649 | Cite as

Tweetment Effects on the Tweeted: Experimentally Reducing Racist Harassment

Authors | Authors and affiliations

Kevin Munger

Original Paper
First Online: 11 November 2016



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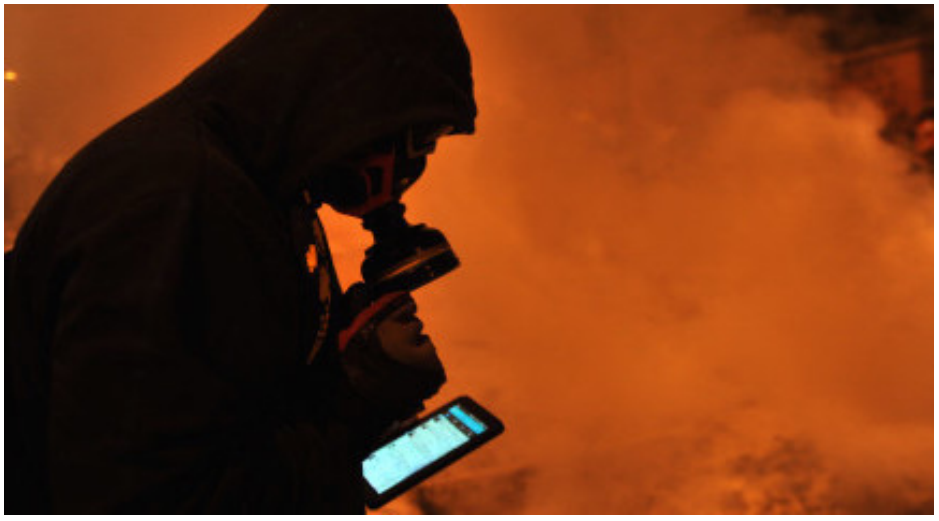
MY BODY
NOT YOURS
NASTY AND PROUD



#OccupyGezi

#OccupyWallStreet

#Euromaidan

#Indignados

slacktivism?

Why the revolution will not be tweeted

When the sit-in movement spread from Greensboro throughout the South, it did not spread indiscriminately. It spread to those cities which had preexisting "movement centers" – a core of dedicated and trained activists ready to turn the "fever" into action.

The kind of activism associated with social media isn't like this at all. [. . .] Social networks are effective at increasing participation – by lessening the level of motivation that participation requires.

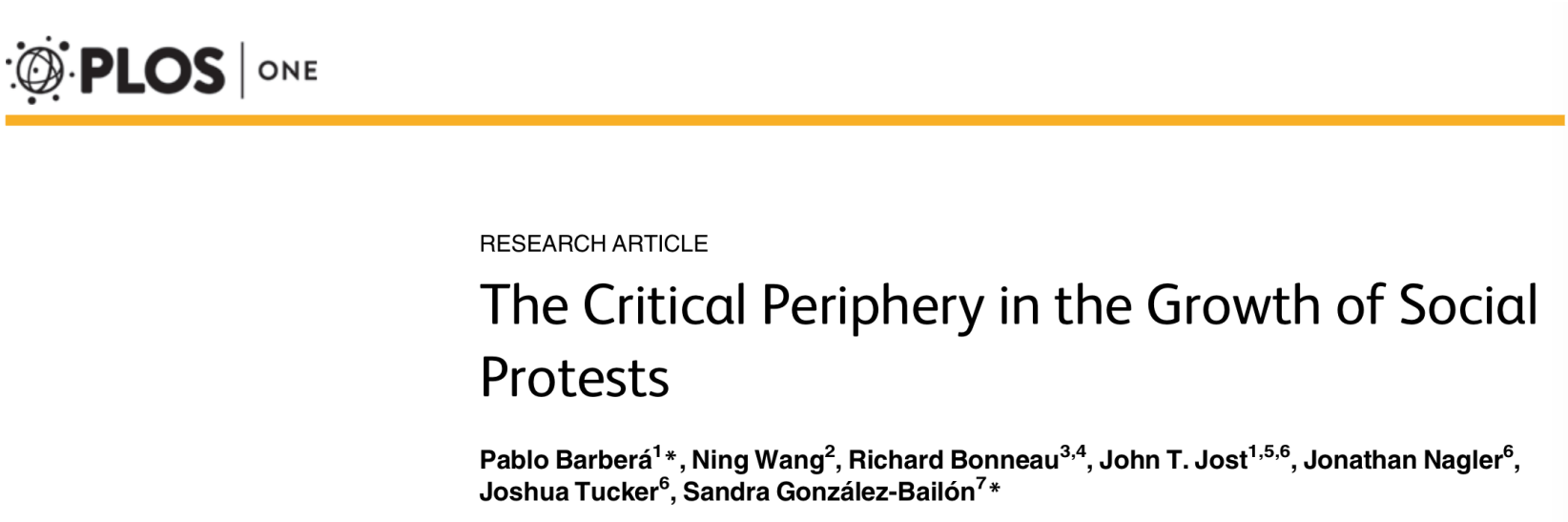
***Gladwell**, Small Change (New Yorker)*

You can't simply join a revolution any time you want, contribute a comma to a random revolutionary decree, rephrase the guillotine manual, and then slack off for months. Revolutions prize centralization and require fully committed leaders, strict discipline, absolute dedication, and strong relationships.

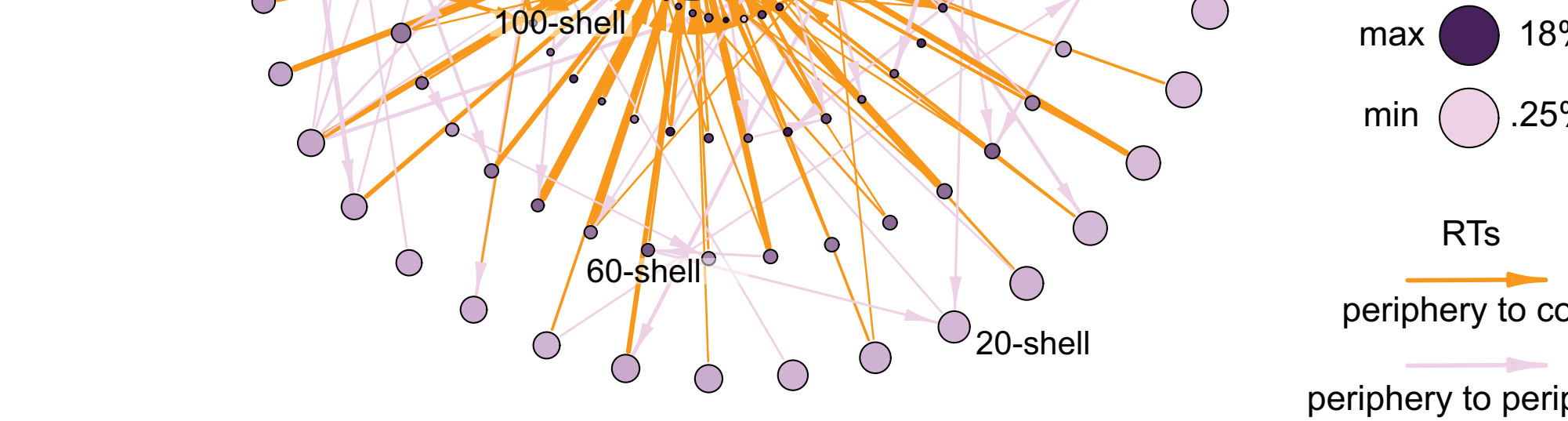
When every node on the network can send a message to all other nodes, confusion is the new default equilibrium.

***Morozov**, The Net Delusion: The Dark Side of Internet Freedom*

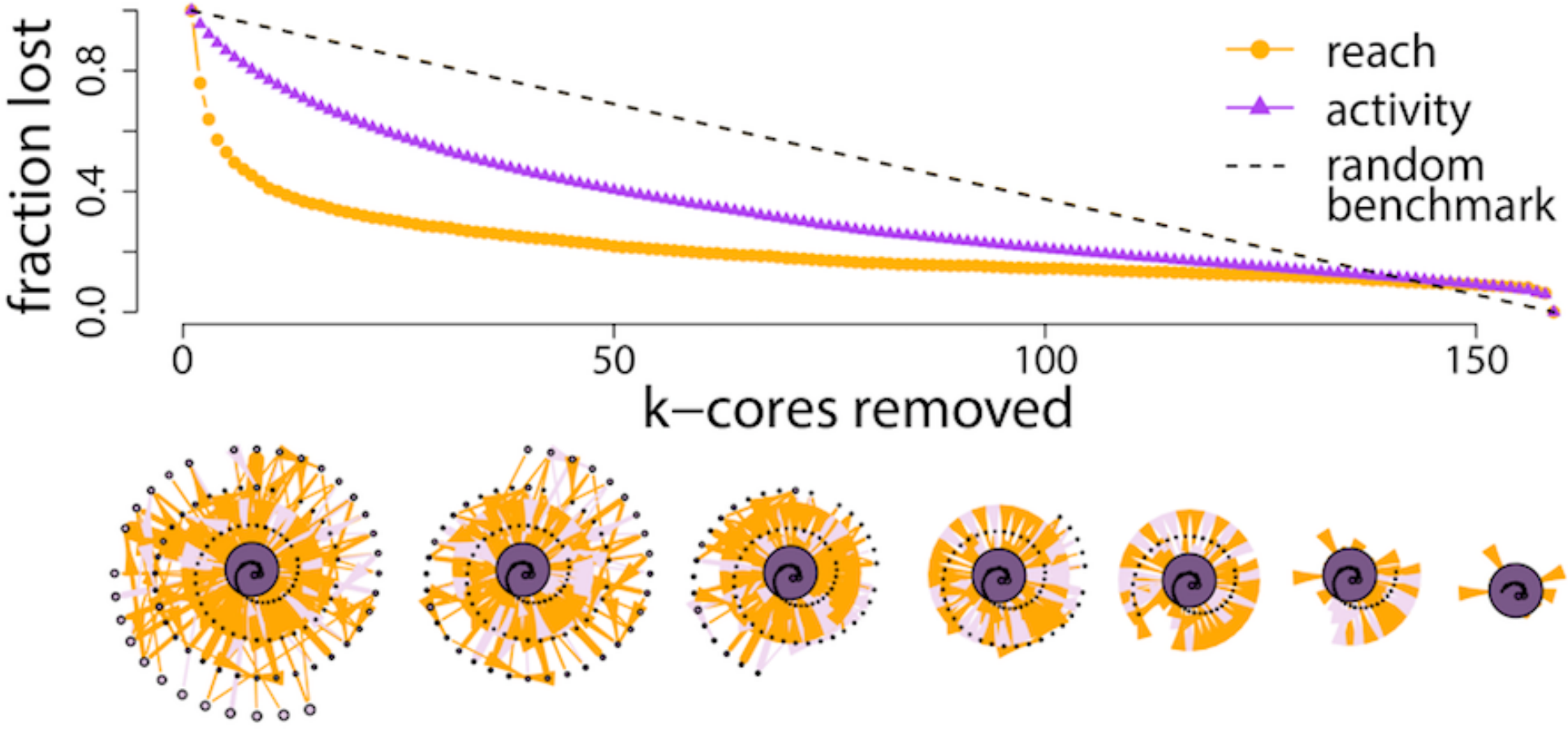
The critical periphery



- Structure of online protest networks:
  1. Core: committed minority of resourceful protesters
  2. Periphery: majority of less motivated individuals
- Our argument: key role of peripheral participants
  1. Increase reach of protest messages (positional effect)
  2. Large contribution to overall activity (size effect)


100-shell
60-shell
20-shell
max
18%
min
.25%
RTs
periphery to co
periphery to perip

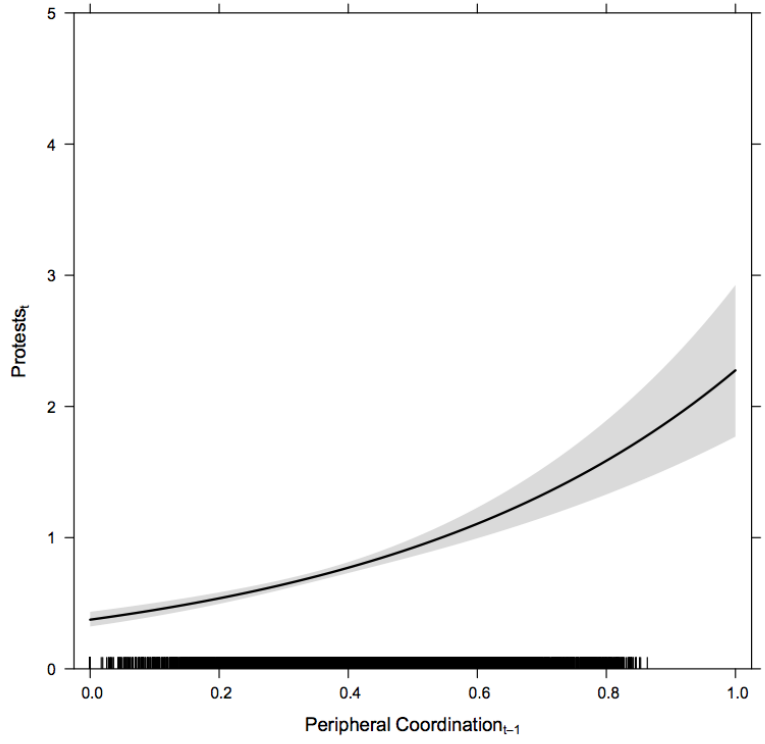
Relative importance of core and periphery



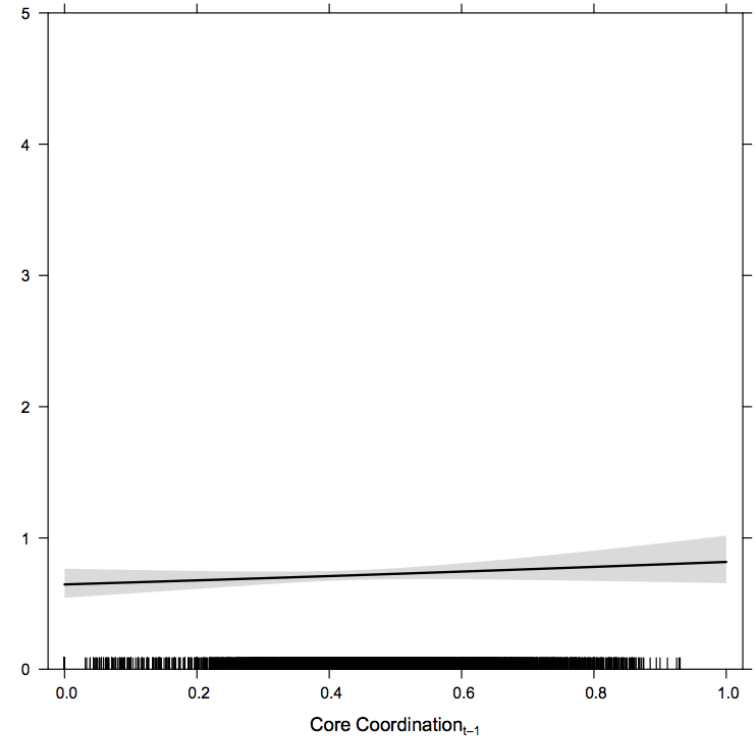
reach: aggregate size of participants' audience

activity: total number of protest messages published (not only RTs)

Peripheral mobilization during the Arab Spring



(a) Increase in protest as peripheral coordination increases



(b) Coordination does not come through core individuals

Steinert-Threlkeld (APSR 2017) “Spontaneous Collective Action”

Social media and democracy

FROM LIBERATION TO TURMOIL: SOCIAL MEDIA AND DEMOCRACY

Joshua A. Tucker, Yannis Theocharis, Margaret E. Roberts, and Pablo Barberá

"How can one technology – social media – simultaneously give rise to hopes for liberation in authoritarian regimes, be used for repression by these same regimes, and be harnessed by antisystem actors in democracy? We present a simple framework for reconciling these contradictory developments based on two propositions: 1) that social media give voice to those previously excluded from political discussion by traditional media, and 2) that although social media democratize access to information, the platforms themselves are neither inherently democratic nor nondemocratic, but represent a tool political actors can use for a variety of goals, including, paradoxically, illiberal goals."

***Journal of Democracy**, 2017*

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Barack Obama
@BarackObama

Follow

Four more years.

RETWEETS
756,411

FAVORITES
288,867

11:16 PM - 6 Nov 2012

Post Politics

By the end of the 2012 campaign, every Mitt Romney tweet had to be approved by 22 people

Political persuasion

Social media as a new campaign tool:

> *"Let me tell you about Twitter. I think that maybe I wouldn't be here if it wasn't for Twitter. [...] Twitter is a wonderful thing for me, because I get the word out... I might not be here talking to you right now as president if I didn't have an honest way of getting the word out."*
>
> ***Donald Trump**, March 16, 2017 (Fox News)*

- Diminished gatekeeping role of journalists
  - Part of a trend towards citizen journalism (Goode, 2009)
- Information is contextualized within social layer
  - Messing and Westwood (2012): social cues can be as important as partisan cues to explain news consumption through social media
- Real-time broadcasting in reaction to events
  - e.g. *dual screening* (Vaccari et al, 2015)
- Micro-targeting
  - Affects how campaigns perceive voters (Hersh, 2015), but unclear if effective in mobilizing or persuading voters

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Social capital

- Social connections are essential in democratic societies, but online interactions do not facilitate creation and strengthening of social capital (Putnam, 2001)
- Online networking sites facilitate and transform how social ties are established

American Politics Research
1–31

DOI: 10.1177/1532673X14557942
apr.sagepub.com
SAGE

Tweeting Alone? An Analysis of Bridging and Bonding Social Capital in Online Networks

Javier Sajuria[1], Jennifer vanHeerde-Hudson[1], David Hudson[1], Niheer Dasandi[1], and Yannis Theocharis[2]

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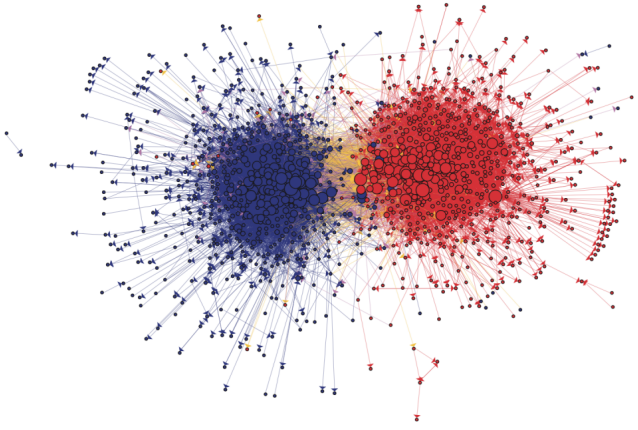
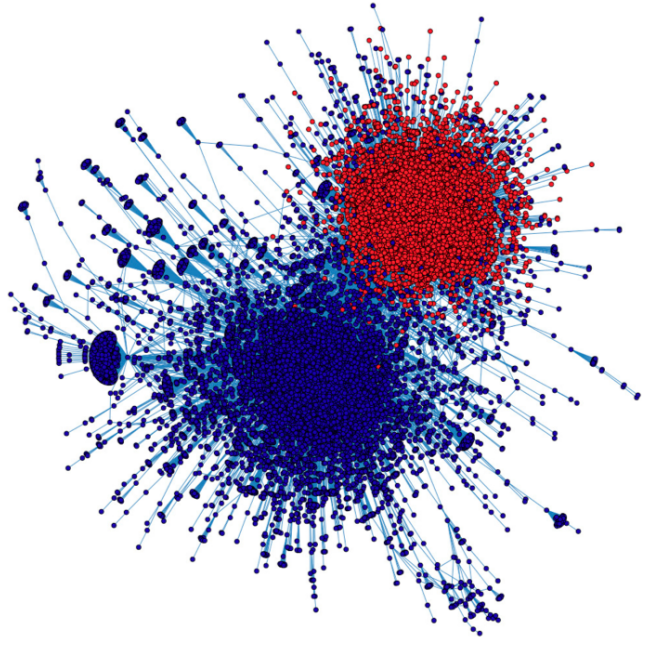
Social media as echo chambers?

- communities of like-minded individuals (homophily, influence)



Adamic and Glance (2005)

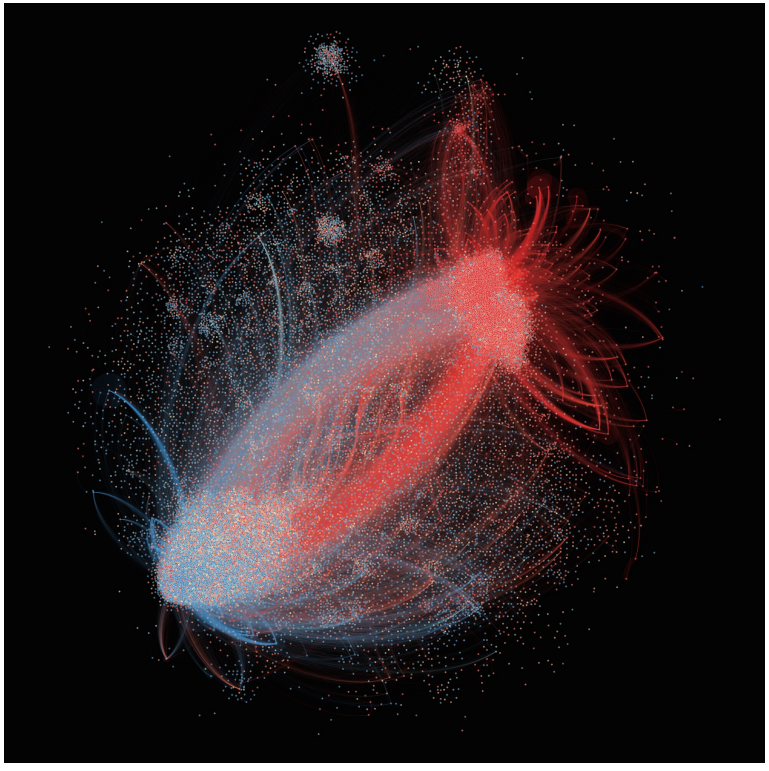


Conover et al (2012)

- ...generates selective exposure to congenial information
- ...reinforced by ranking algorithms – “filter bubble” (Parisier)
- ...increases political polarization (Sunstein, Prior)

Social media as echo chambers?

2013 SuperBowl

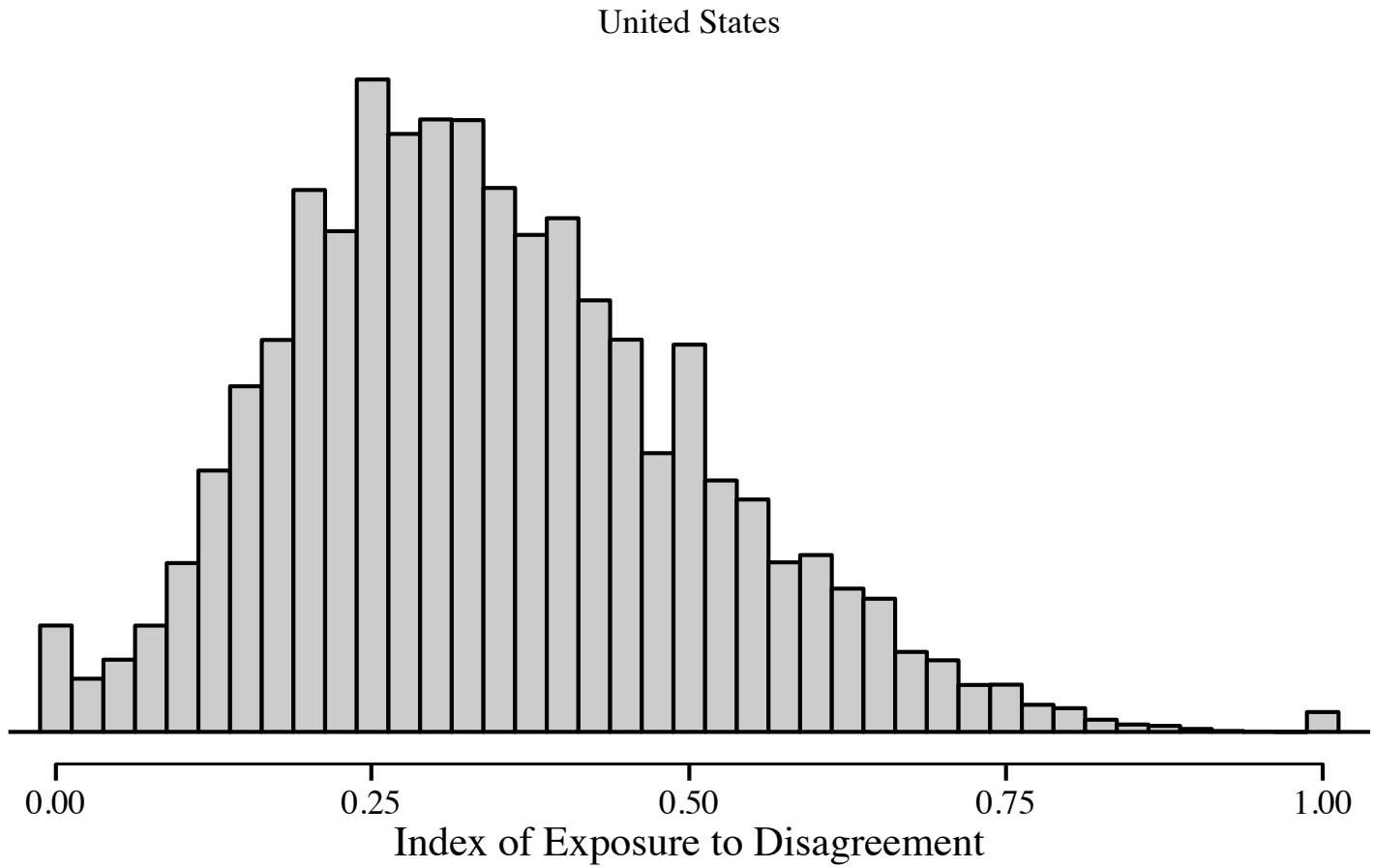


2012 Election

Barberá et al (2015) “Tweeting From Left to Right: Is Online Political Communication More Than an Echo Chamber?” *Psychological Science*

Measuring exposure to cross-cutting content

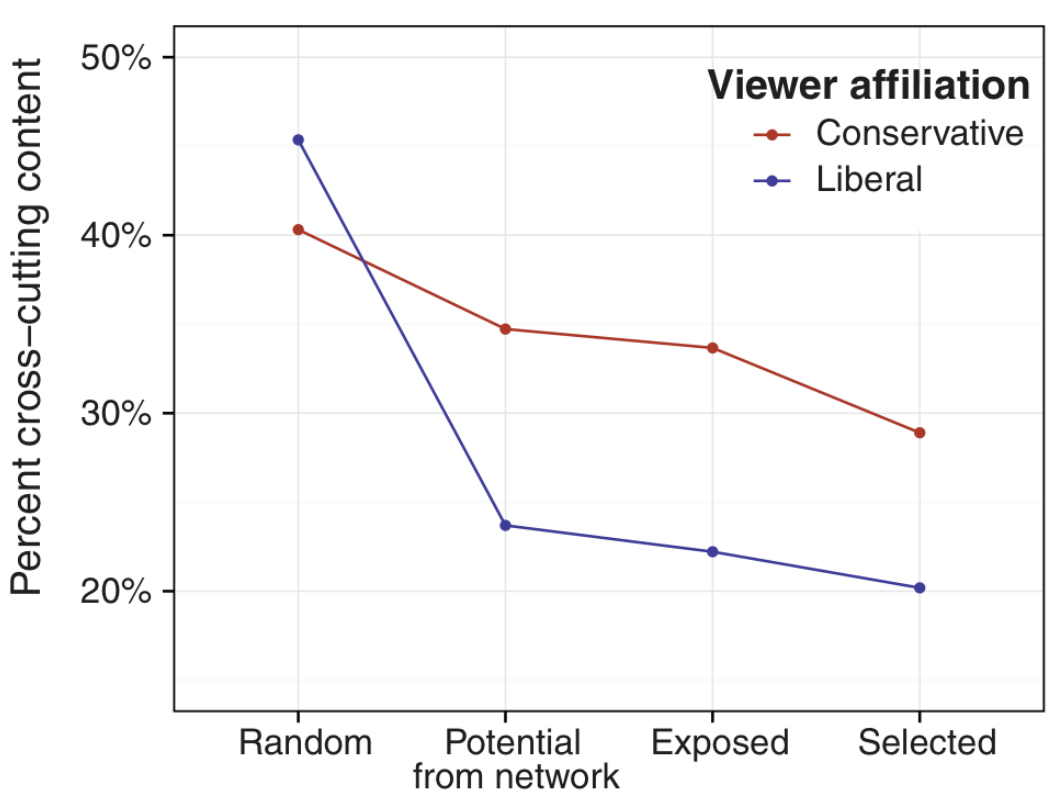
Most Twitter users are exposed to high levels of political disagreement



Data: friend networks of $\sim$ 100,000 Twitter users in the US matched with voter file and following 3+ political accounts

Social media as echo chambers?

Fig. 3. Cross-cutting content at each stage in the diffusion process. (**A**) Illustration of how algorithmic ranking and individual choice affect the proportion of ideologically cross-cutting content that individuals encounter. Gray circles illustrate the content present at each stage in the media exposure process. Red circles indicate conservatives, and blue circles indicate liberals. (**B**) Average ideological diversity of content (i) shared by random others (random), (ii) shared by friends (potential from network), (iii) actually appeared in users' News Feeds (exposed), and (iv) users clicked on (selected).



Bakshy, Messing, & Adamic (2015) "Exposure to ideologically diverse news and opinion on Facebook". *Science.*

Fake news?

- Guess et al (2018): who consumes misinformation?
  - Web tracking data: 25% Americans visited fake news websites during the 2016 campaigns
  - Older, conservative people more likely to be exposed
  - Facebook key vector of exposure
  - Fact-check does not reach consumers of misinformation

- Allcott and Gentzkow (2017): does it matter?
  - Survey experiment with real and placebo fake news stories
  - Most people do not remember seeing fake news stories
  - Unlikely to affect citizens' behavior

Social Media, Political Polarization, and Political Disinformation: A Review of the Scientific Literature

By Joshua A. Tucker, Andrew Guess, Pablo Barberá, Cristian Vaccari, Alexandra Siegel, Sergey Sanovich, Denis Stukal, and Brendan Nyhan

WILLIAM + FLORA Hewlett Foundation

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What are the most important challenges when working with social media data?

Social media data and social science: challenges

1. Big data, big bias?
2. The end of theory?
3. Spam and bots
4. The privacy paradox
5. Generalizing from online to offline behavior
6. Ethical concerns

1. Big data, big bias?

SOCIAL SCIENCES

Social media for large studies of behavior

Large-scale studies of human behavior in social media need to be held to higher methodological standards

By **Derek Ruths**[1]* *and* **Jürgen Pfeffer**[2]

On 3 November 1948, the day after Harry Truman won the United States presidential elections, the *Chicago Tribune* published one of the most famous erroneous headlines in newspaper history: "Dewey Defeats Truman" (*1*, *2*). The headline was informed by telephone surveys, which had inadver-

different social media platforms (*8*). For instance, Instagram is "especially appealing to adults aged 18 to 29, African-American, Latinos, women, urban residents" (*9*) whereas Pinterest is dominated by females, aged 25 to 34, with an average annual household income of $100,000 (*10*). These sampling biases are rarely corrected for (if even acknowledged).

Proprietary algorithms for public data. Platform-specific sampling problems, for example, the highest-volume source of pub-

The rise of "embedded researc searchers who have special rela with providers that give them ele cess to platform-specific data, al and resources) is creating a divic media research community. Such ers, for example, can see a platfor workings and make accommodat may not be able to reveal their c or the data used to generate their f

Ruths and Pfeffer, 2015, "Social media for large studies of behavior", *Science*

Big data, big bias?

Sources of bias (Ruths and Pfeffer, 2015; Lazer et al, 2017)

- Population bias
  - Sociodemographic characteristics are correlated with presence on social media
- Self-selection within samples
  - Partisans more likely to post about politics (Barberá & Rivero, 2014)
- Proprietary algorithms for public data
  - Twitter API does not always return 100% of publicly available tweets (Morstatter et al, 2014)
- Human behavior and online platform design
  - e.g. *Google Flu* (Lazer et al, 2014)

1. Big data, big bias?

Reducing biases and flaws in social media data

DATA COLLECTION

- 1. Quantifies platform-specific biases (platform design, user base, platform-specific behavior, platform storage policies)
- 2. Quantifies biases of available data (access constraints, platform-side filtering)
- 3. Quantifies proxy population biases/mismatches

METHODS

- 4. Applies filters/corrects for nonhuman accounts in data
- 5. Accounts for platform and proxy population biases
  a. Corrects for platform-specific and proxy population biases
  OR
  b. Tests robustness of findings
- 6. Accounts for platform-specific algorithms
  a. Shows results for more than one platform
  OR
  b. Shows results for time-separated data sets from the same platform
- 7. For new methods: compares results to existing methods on the same data
- 8. For new social phenomena or methods or classifiers: reports performance on two or more distinct data sets (one of which was not used during classifier development or design)

Issues in evaluating data from social media. Large-scale social media studies of human behavior should i address issues listed and discussed herein (further discussion in supplementary materials).

Ruths and Pfeffer, 2015, "Social media for large studies of behavior", *Science*

2. The end of theory?

Petabytes allow us to say: "Correlation is enough." We can stop looking for models. We can analyze the data without hypotheses about what it might show. We can throw the numbers into the biggest computing clusters the world has ever seen and let statistical algorithms find patterns where science cannot.

***Chris Anderson**, Wired, June 2008*

Correlations are a way of catching a scientist's attention, but the models and mechanisms that explain them are how we make the predictions that not only advance science, but generate practical applications.

***John Timmer**, Ars Technica, June 2008*

(Big) social media data as a complement - not a substitute - for theoretical work and careful causal inference.

3. Spam and bots

"Follow your coordinators. We need to start tweeting, all at the same time, using the hashtag #ItsTimeForMexico. . . and don't forget to retweet tweets from the candidate's account..."

Unidentified PRI campaign manager

minutes before the May 8, 2012 Mexican Presidential debate

3. Spam and bots

Ferrara et al, 2016, *Communications of the ACM*

4. The privacy paradox

Online data present a paradox in the protection of privacy: Data are at once too revealing in terms of privacy protection, yet also not revealing enough in terms of providing the demographic background information needed by social scientists.

***Golder & Macy**, Digital footprints, 2014*

5. Generalizing from online to offline behavior

What makes online behavior different:

- Platform affordances may distort behavior (e.g. anonymity encourages vitriol)
- Tools extend innate capacities (e.g. Dunbar's number)
- Asymmetries in data availability

6. Ethical concerns

1. Shifting notion of *informed consent*

Experimental evidence of massive-scale emotional contagion through social networks

Adam D. I. Kramer[a,1], Jamie E. Guillory[b,2], and Jeffrey T. Hancock[b,c]

[a]Core Data Science Team, Facebook, Inc., Menlo Park, CA 94025; and Departments of [b]Communication and [c]Information Science, Cornell University, Ithaca, NY 14853

Edited by Susan T. Fiske, Princeton University, Princeton, NJ, and approved March 25, 2014 (received for review October 23, 2013)

Emotional states can be transferred to others via emotional contagion, leading people to experience the same emotions without their awareness. Emotional contagion is well established in laboratory experiments, with people transferring positive and negative emotions to others. Data from a large real-world social network, collected over a 20-y period suggests that longer-lasting moods (e.g., depression, happiness) can be transferred through networks [Fowler JH, Christakis NA (2008) *BMJ* 337:a2338], although the results are controversial. In an experiment with people who use Facebook, we test whether emotional contagion occurs

demonstrated that (*i*) emotional contagion occurs via text-based computer-mediated communication (7); (*ii*) contagion of psychological and physiological qualities has been suggested based on correlational data for social networks generally (7, 8); and (*iii*) people's emotional expressions on Facebook predict friends' emotional expressions, even days later (7) (although some shared experiences may in fact last several days). To date, however, there is no experimental evidence that emotions or moods are contagious in the absence of direct interaction between experiencer and target.

On Facebook, people frequently express emotions, which are

2. Most personal data can be de-anonymized

Ethics and Information Technology

December 2010, Volume 12, Issue 4, pp 313–325

"But the data is already public": on the ethics of research in Facebook

Authors Authors and affiliations

Twitter data

Twitter APIs

Two different methods to collect Twitter data:

1. REST API:
   - Queries for specific information about users and tweets
   - Search recent tweets
   - Examples: user profile, list of followers and friends, tweets generated by a given user ("timeline"), users lists, etc.
   - R library: tweetscores (also twitteR, rtweet)
2. Streaming API:
   - Connect to the "stream" of tweets as they are being published
   - Three streaming APIs:
     - 2.1 Filter stream: tweets filtered by keywords
     - 2.2 Geo stream: tweets filtered by location
     - 2.3 Sample stream: 1% random sample of tweets
   - R library: streamR

Important limitation: tweets can only be downloaded in real time (exception: user timelines, $\sim$ 3,200 most recent tweets are available)

Anatomy of a tweet

Anatomy of a tweet

Tweets are stored in JSON format:


```
{ "created_at": "Wed Nov 07 04:16:18 +0000 2012",
  "id": 266031293945503744,
  "text": "Four more years. http://t.co/bAJE6Vom",
  "source": "web",
  "user": {
    "id": 813286,
    "name": "Barack Obama",
    "screen_name": "BarackObama",
    "location": "Washington, DC",
    "description": "This account is run by Organizing for Action staff.
        Tweets from the President are signed -bo.",
    "url": "http://t.co/8aJ56Jcemr",
    "protected": false,
    "followers_count": 54873124,
    "friends_count": 654580,
    "listed_count": 202495,
    "created_at": "Mon Mar 05 22:08:25 +0000 2007",
    "time_zone": "Eastern Time (US & Canada)",
    "statuses_count": 10687,
    "lang": "en" },
  "coordinates": null,
  "retweet_count": 756411,
  "favorite_count": 288867,
  "lang": "en"
}
```

Streaming API

- Recommended method to collect tweets
- Potential issues:
  - Filter streams have same rate limit as spritzer: when volume reaches 1% of all tweets, it will return random sample
  - Good to restart stream connections regularly.
- My workflow:
  - Amazon EC2, cloud computing
  - Cron jobs to restart R scripts every hour.
  - Save tweets in .json files, one per day.

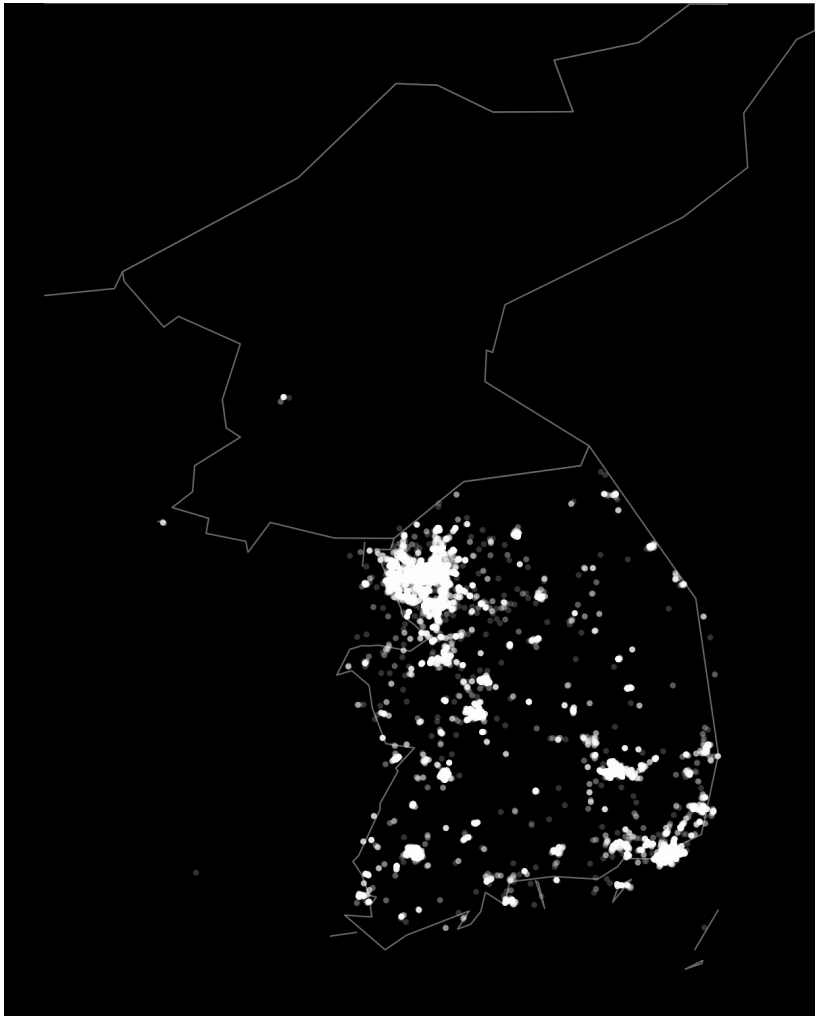
Sampling bias?

Morstatter et al, 2013, *ICWSM*, "Is the Sample Good Enough? Comparing Data from Twitter's Streaming API with Twitter's Firehose":

- 1% random sample from Streaming API is not truly random
- Less popular hashtags, users, topics... less likely to be sampled
- But for keyword-based samples, bias is not as important

González-Bailón et al, 2014, *Social Networks*, "Assessing the bias in samples of large online networks":

- Small samples collected by filtering with a subset of relevant hashtags can be biased
- Central, most active users are more likely to be sampled
- Data collected via search (REST) API more biased than those collected with Streaming API



Tweets from Korea: 40k tweets collected in 2014 (left)
Korean peninsula at night, 2003 (right). Source: NASA.

Who is tweeting from North Korea?

Twitter user: @uriminzok_engl

Facebook data

Collecting Facebook data

Facebook used to allow access to public pages' data through the Graph API:

1. Posts on public pages and groups
2. Likes, reactions, comments, replies...

Currently not available.)

Aggregate-level statistics available through the FB Marketing API. See the code by Connor Gilroy (UW)

Access to other (anonymized) data used in published studies requires permission from Facebook or from users.

Social Science One as a new model for academic partnerships with Facebook.