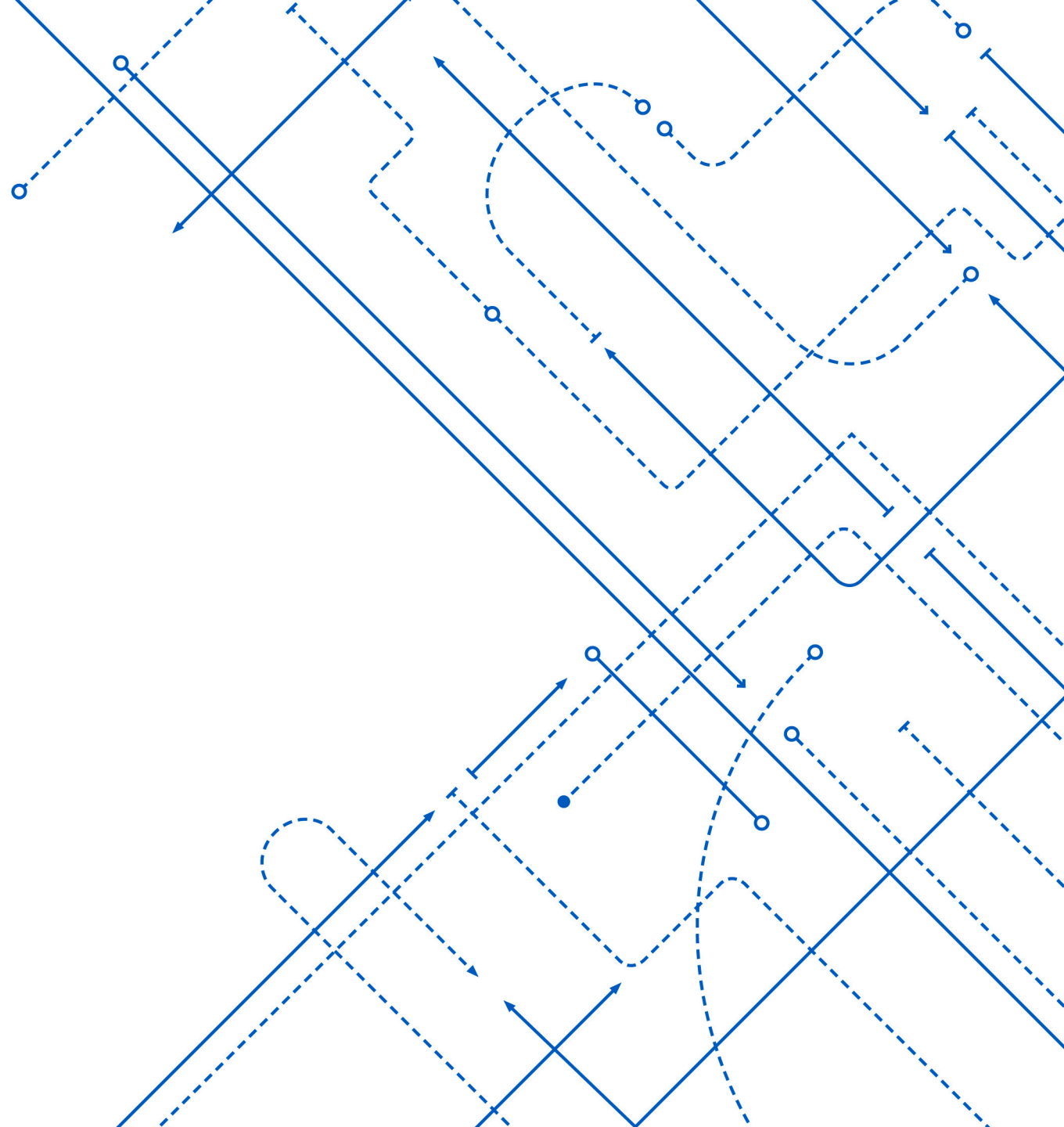


Simulation and Misinformation

Kenneth (Kenny) Joseph

 University at Buffalo
Department of Computer Science
and Engineering
School of Engineering and Applied Sciences



Attendance: Nicky Case



blog · [faq/contact](#) · [toss monies at me](#)

Hi, I'm Nicky! I make shtuff for curious & playful folks.

Wanna know when I make new shtuff? Well, the algorithms would rather show you mental-health-eroding clickbait, so let's get around 'em with...



[my infrequent newsletter!](#) or better yet, [let's do RSS!](#)

max 1 update per month · [see full archive](#)



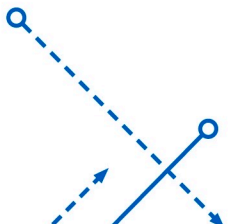
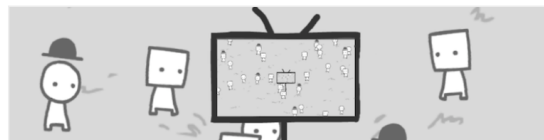
SHTUFF YOU CAN PLAY



adventures with anxiety – an interactive story about anxiety, where *you* are the anxiety

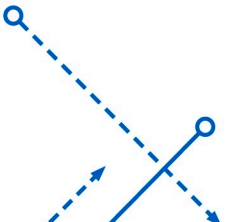


explorable explanations – a hub for learning through play



"Zooming out"

- Why are we doing this stuff like proofs and experiments and simulations at all?!



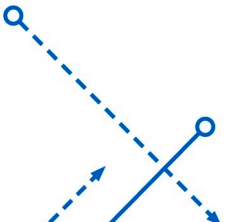
To know and to show

Know

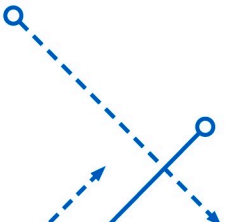
- How big is the problem?
- What are the moving pieces?
- What can we do to fix it?

Show

- See?! Look how big this problem is!
- See?! This problem impacts all of us!



What's wrong with this view?



“

**ONCE UNVAXXED
PLAYERS GET CUT,
THEY'RE LOSING
A DREAM THEY'VE
WORKED THEIR
WHOLE LIVES FOR
OVER A VACCINE
THAT IS PROVEN
TO NOT KEEP
PEOPLE FROM
CONTRACTING
COVID**

—Cole Beasley

SI



HOW TO SPOT A SCIENTIST HAVING AN EXISTENTIAL CRISIS

LOOK FOR THE FIVE SIGNS

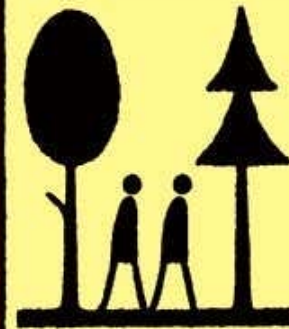
STARING INTO SPACE

INTERMITTENT GROANING

GENERAL DESPONDENCY

NIETZSCHE QUOTES

SCEPTICISM OF REALITY



HELP USING THE FIVE STEPS

STOP THEM WORKING

TAKE THEM TO THE PARK

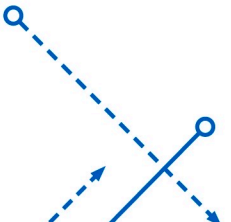
EAT ICE CREAM

PLEASANT CONVERSATION

SUGGEST A SABBATICAL

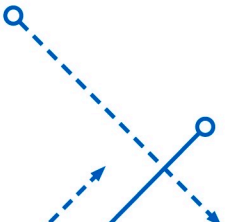
No Existential Crises here!

- Science (and ML, perhaps) can still function in this wild and wacky world.
- Our focus here:
 - Why are people believe/"know" wrong things?
 - Does it matter that people are wrong?
 - If so, how do we change their minds? If not, then what?
 - [How can simulation help us think through this]



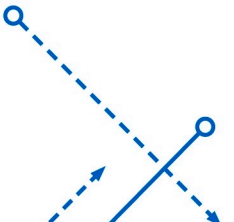
No Existential Crises here!

- Our focus here:
 - Why are people believe/"know" wrong things?
 - Does it matter that people are wrong?
 - If so, how do we change their minds? If not, then what?
 - [How can simulation help us think through this]
- Let's first bring it back to ourselves to humanize a bit
 - When is the last time you changed your mind about something important? Why? How did that impact your behavior?
 - When is the last time you told someone they were wrong? Why? Did it impact them?
 - When is the last time someone said something wrong and you *didn't* say anything? Why?

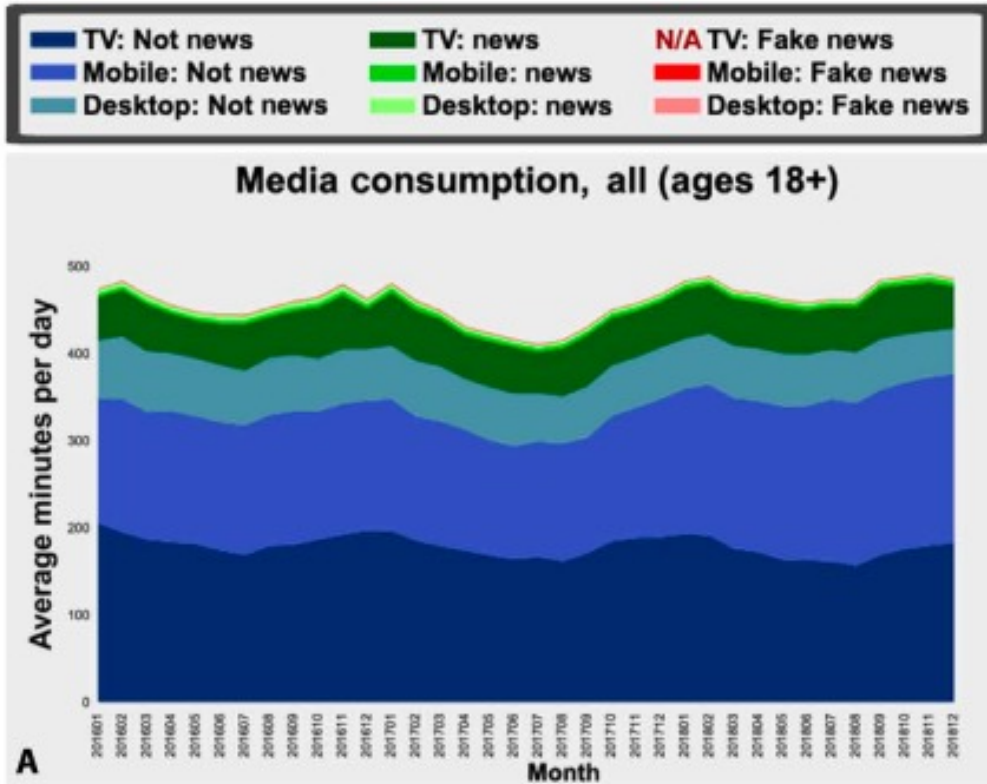


Linking to social media

- In class (and Part 1 of your Unit Midpoint), we'll mostly focus on the overlap between misinformation and social media
- Why?
 - Because I know more about it
 - Because I think it's a critical vector for youz kids
- Things to think about
 - Who do you see posting on social media?
 - Do they change your minds? When and why?

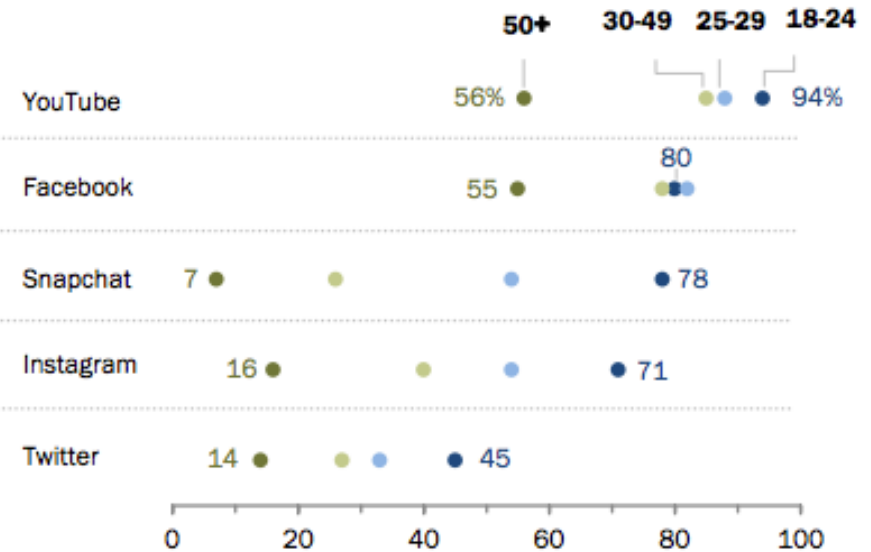


Caveat (to return to...)



Social platforms like Snapchat and Instagram are especially popular among those ages 18 to 24

% of U.S. adults in each age group who say they use ...



Source: Survey conducted Jan. 3-10, 2018.
"Social Media Use in 2018"

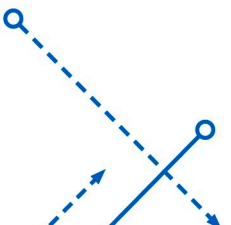
PEW RESEARCH CENTER



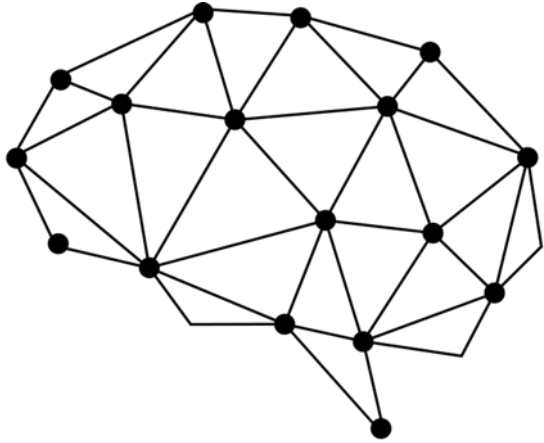
Case Study: the 2016 US Election

Social Media and the 2016 Election

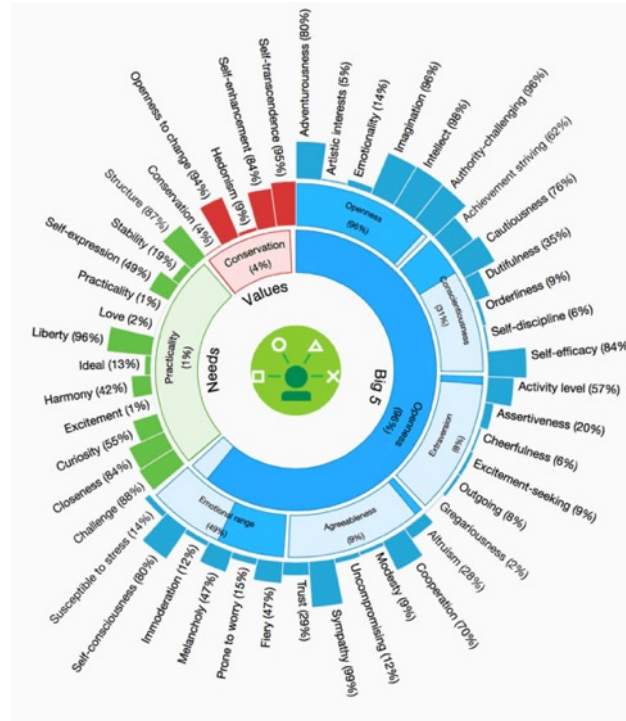
- What we will talk about (briefly)
 - Political ad targeting
 - Manipulation – bots, trolls, fake accounts
 - Fake News
- Did social media cause Trump to be elected?
 - *Did misinformation cause Trump to get elected?*



Political ad targeting



Cambridge Analytica



<https://www.dailykos.com/stories/2017/8/4/1686913/--The-Cambridge-Analytica-Psyops-that-made-both-Trump-and-Brexit-Winners>

Manipulation – How?



Bots



Cyborgs



Coordinated Campaigns



Fake pages



Hijacked accounts

Manipulation of the 2016 election came from a variety of sources

What do today's bots tend to do?

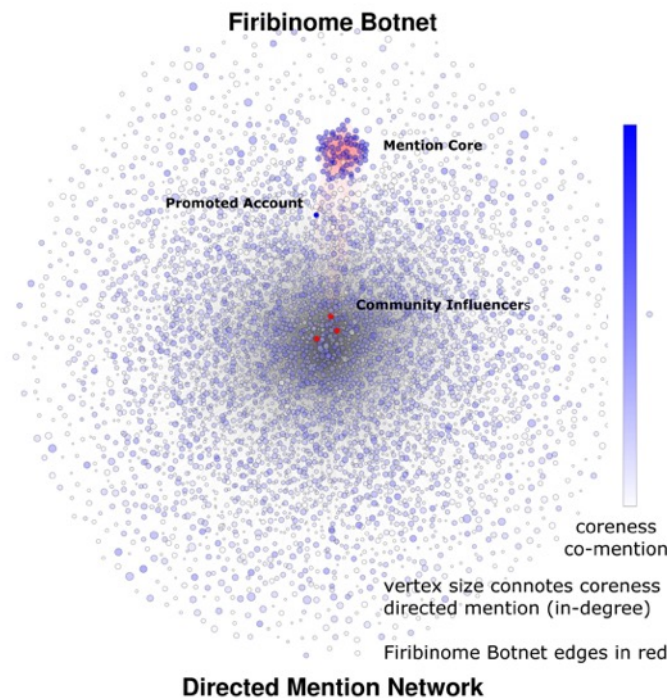
- Manipulate social signals

Battling Fake Accounts, Twitter to Slash Millions of Followers



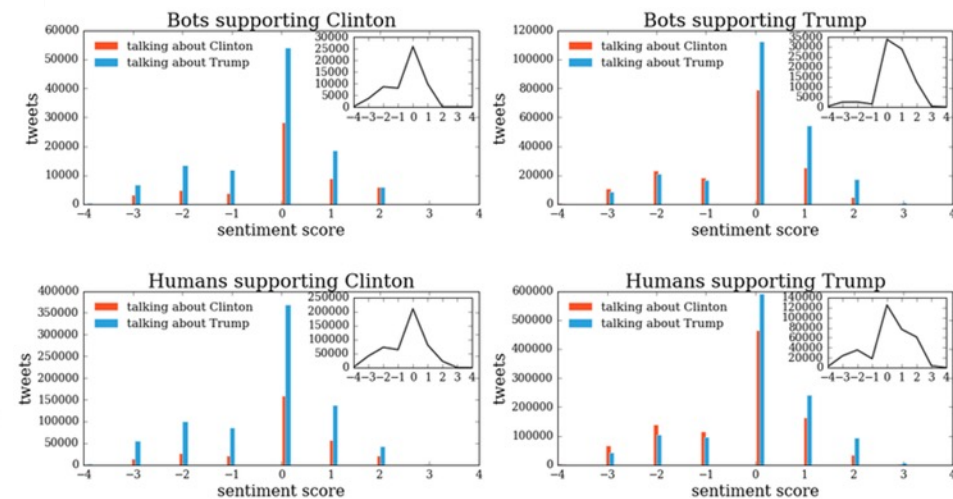
Of follower counts

<https://www.nytimes.com/2018/07/11/technology/twitter-fake-followers.html>



Of RTs/Mentions

<https://link.springer.com/article/10.1007/s10588-017-9255-3>



Of support for candidates

https://papers.ssrn.com/sol3/papers.cfm?abstract_id=298

Bots are increasingly sophisticated, but detectable in some cases

Stolen profile and background images

Jessica Rychly's original profile picture was color-shifted and recompressed, possibly to evade automated detection.



ORIGINAL



FAKE

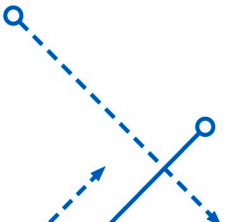
The screenshot shows a bot detection interface for a user named @_kenny_joseph. The interface includes a profile picture, a score of 0.3 / 5, and a gauge. Below the profile information, there are three columns of data:

English-specific features	Language-independent features	Bot score based on
Content: 0.6	Friend: 0.6	All features: 0.3
Sentiment: 0.6	Network: 0.8	Language-independent: 0.2
	Temporal: 0.4	User profile language: en
	User: 0.1	Complete Automation Probability: 0%

Navigation buttons for Profile, Tweet, Details, and Feedback are visible on the right side of the interface.

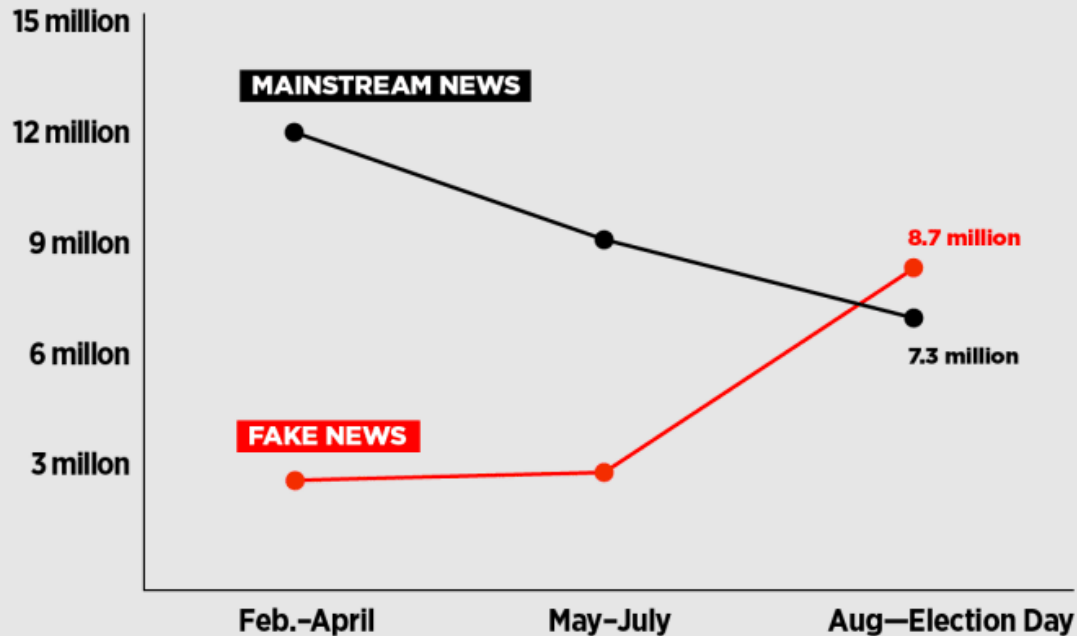
<https://botometer.iuni.iu.edu/#!/>

<http://delivery.acm.org/10.1145/2820000/2818717/p96-ferrara.pdf>



Fake News

Total Facebook Engagements for Top 20 Election Stories



ENGAGEMENT REFERS TO THE TOTAL NUMBER OF SHARES, REACTIONS, AND COMMENTS FOR A PIECE OF CONTENT ON FACEBOOK SOURCE: FACEBOOK DATA VIA BUZZSUMO

Top 5 Fake Election Stories by Facebook Engagement (three months before election)

“Pope Francis Shocks World, Endorses Donald Trump for President, Releases Statement” (960,000, *Ending the Fed*)

“WikiLeaks CONFIRMS Hillary Sold Weapons to ISIS... Then Drops Another BOMBHELL! Breaking News” (789,000, *The Political Insider*)

“IT’S OVER: Hillary’s ISIS Email Just Leaked & It’s Worse Than Anyone Could Have Imagined” (754,000, *Ending the Fed*)

“Just Read the Law: Hillary Is Disqualified From Holding Any Federal Office” (701,000, *Ending the Fed*)

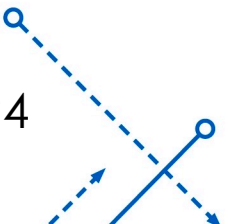
“FBI Agent Suspected in Hillary Email Leaks Found Dead in Apparent Murder-Suicide” (567,000, *Denver Guardian*)

ENGAGEMENT REFERS TO THE TOTAL NUMBER OF SHARES, REACTIONS, AND COMMENTS FOR A PIECE OF CONTENT ON FACEBOOK SOURCE: FACEBOOK DATA VIA BUZZSUMO

<https://www.buzzfeednews.com/article/craigsilverman/viral-fake-election-news-outperformed-real-news-on-facebook#.jepaXOx1m>

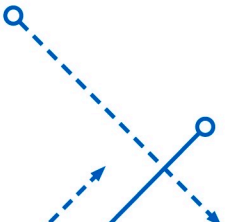
What *is* fake news?

- What do you think?
- One increasingly accepted definition:
 - Fake news is content produced with all the trappings of a legitimate news organization but without any of the actual journalistic scrutiny
- How is “fake news” different from misinformation?



Why did fake news come about?

- Thoughts?



Apache 2 Test Page

powered by **CentOS**

This page is used to test the proper operation of the Apache HTTP server after it has been installed. If you can read this page it means that the Apache HTTP server installed at this site is working properly.

If you are a member of the general public:

The fact that you are seeing this page indicates that the website you just visited is either experiencing problems or is undergoing routine maintenance.

If you would like to let the administrators of this website know that you've seen this page instead of the page you expected, you should send them e-mail. In general, mail sent to the name "webmaster" and directed to the website's domain should reach the appropriate person.

For example, if you experienced problems while visiting www.example.com, you should send e-mail to "webmaster@example.com".

About CentOS:

The Community ENTERprise Operating System (CentOS) Linux is a community-supported enterprise distribution derived from sources freely provided to the public by Red Hat. As such, CentOS Linux aims to be functionally compatible with Red Hat Enterprise Linux. The CentOS Project is the organization that builds CentOS. We mainly change packages to remove upstream vendor branding and artwork.

For information on CentOS please visit the [CentOS website](http://www.centos.org).

Note:

CentOS is an Operating System and it is used to power this website; however, the webserver is owned by the domain owner and not the CentOS Project. **If you have issues with the content of this site, contact the owner of the domain, not the CentOS Project.**

Unless this server is on the CentOS.org domain, the CentOS Project doesn't have anything to do with the content on this webserver or any e-mails that directed you to this site.

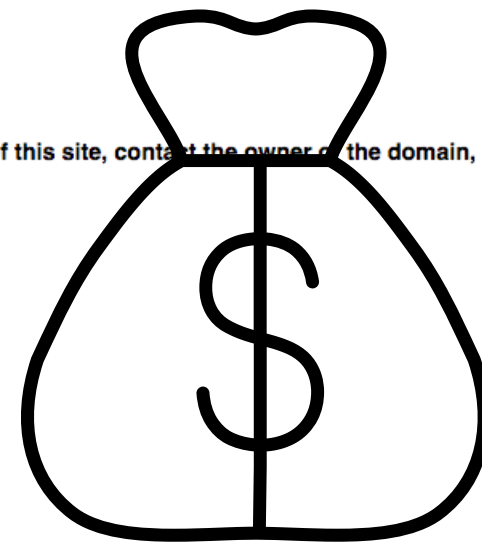
For example, if this website is www.example.com, you would find the owner of the example.com domain at the following WHOIS server:

<http://www.internic.net/whois.html>

If you are the website administrator:

You may now add content to the directory `/var/www/html/`. Note that until you do so, people visiting your website will see this page and not your content. To prevent this page from ever being used, follow the instructions in the file `/etc/httpd/conf.d/welcome.conf`.

You are free to use the images below on Apache and CentOS Linux powered HTTP servers. Thanks for using Apache and CentOS!



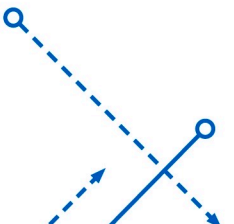
THE SEVEN COMMANDMENTS OF FAKE NEWS

OPERATION INFEKTION PART 2/3



Why did fake news come about?

- Why was/is there fake news?
 - Money and power!
 - Imagine that...
- Who saw fake news in 2016?
 - What percent of **timelines** do you think contained link to fake news?
 - What percent of **people** saw fake news?

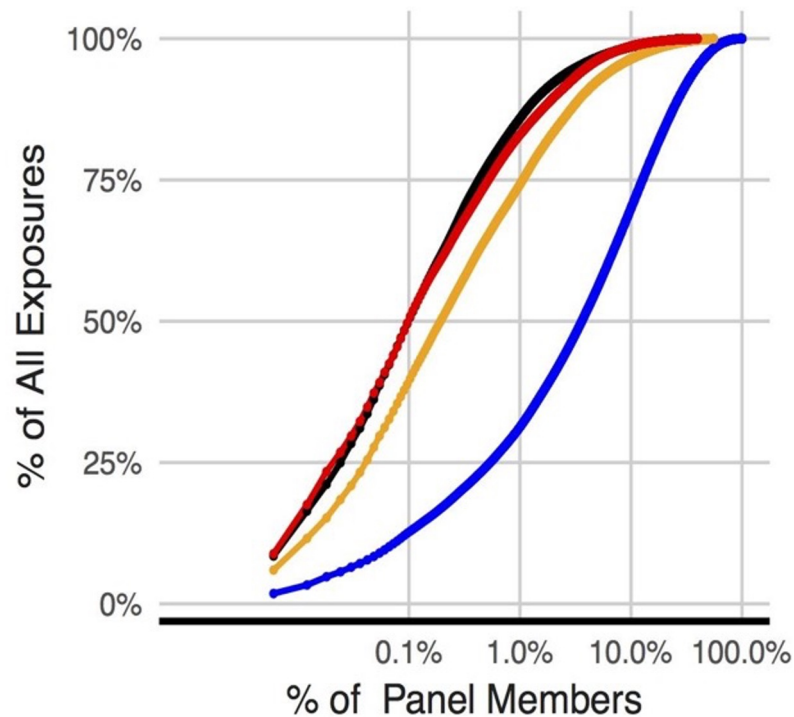


5.1%

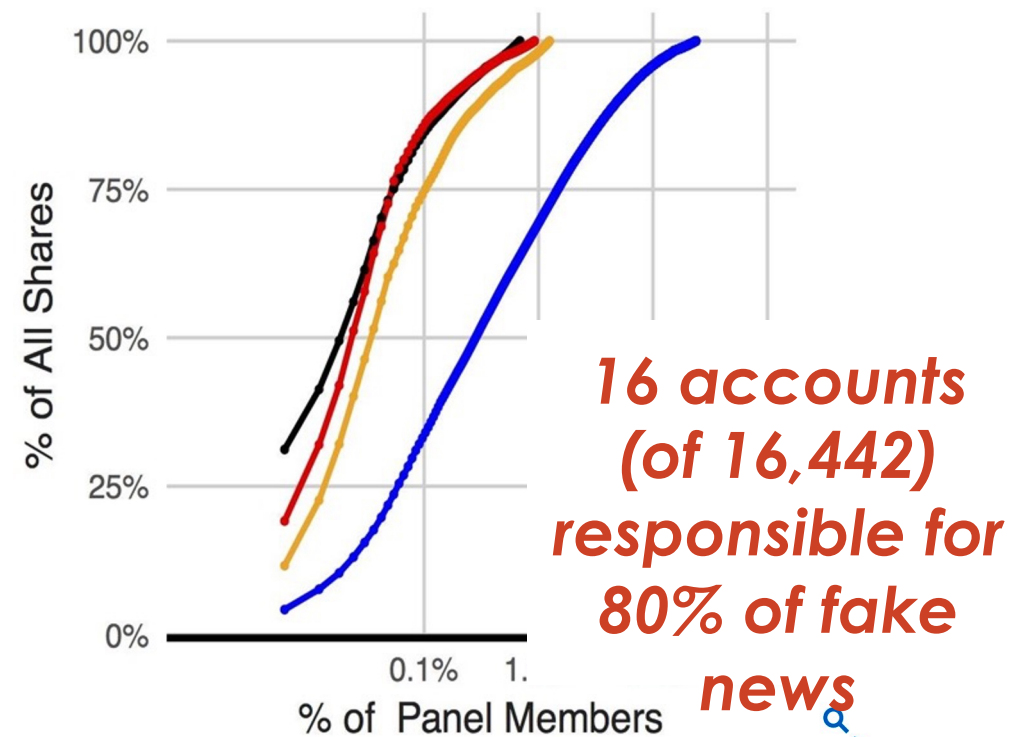
of political content in voters' Timelines
was fake news

Fake news is highly concentrated!

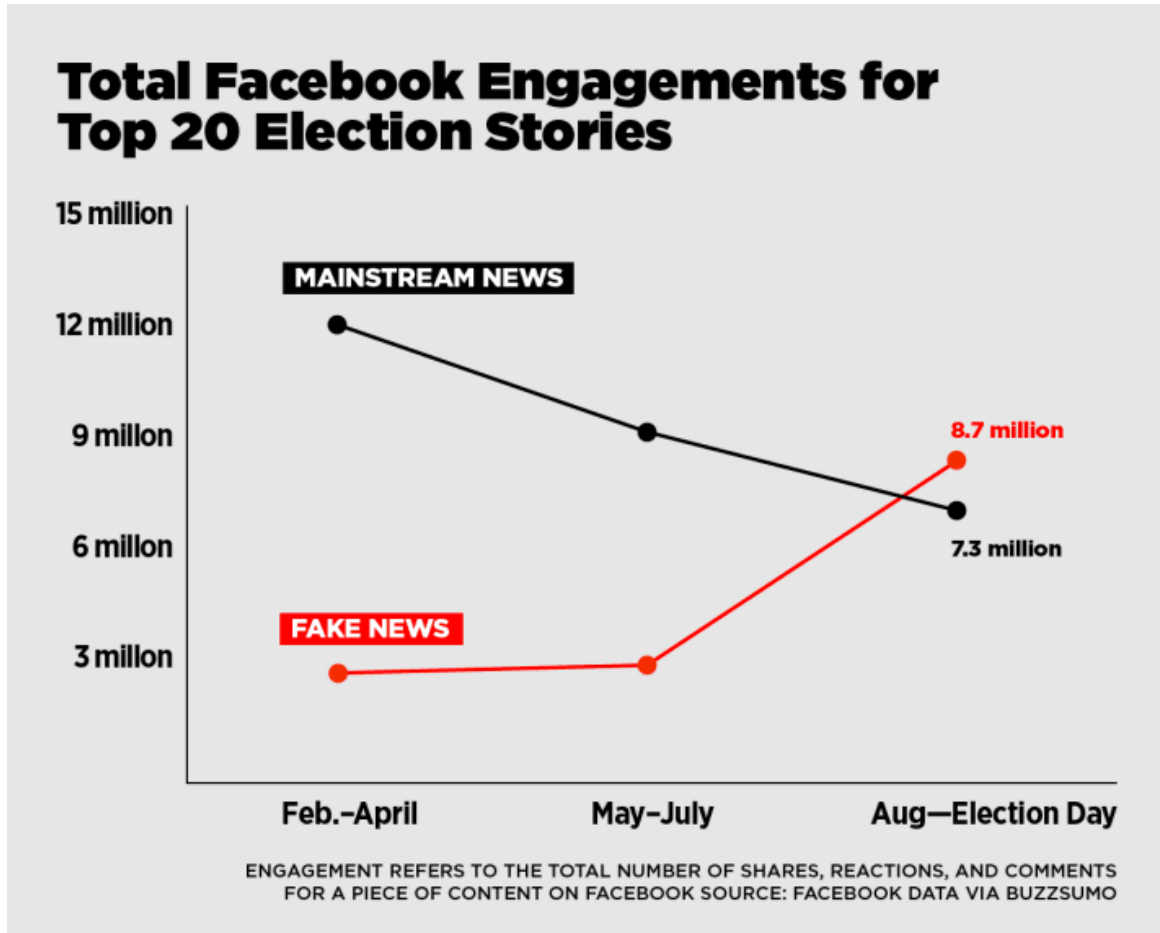
Exposures



Sharing

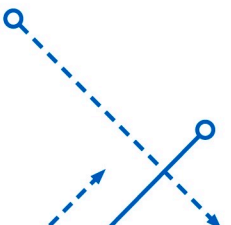


Did you see fake news?



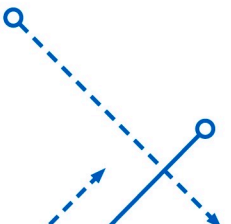
Summarizing

- For Political Ad targeting, Bots, & Fake News, we see the same story:
 - Its not new
 - Ad targeting existed for centuries
 - Bots were impacted elections at least as early as 2010
 - Fake news has been around since the Romans
 - But, it came into focus because of new/increased use in 2016
 - Ad targeting – via FB and semi-private data
 - Bots – because there were so many, and because we know Russia was behind some of them
 - Fake news - a vast increase in its spread
- And they likely had an impact
- But...



Would Trump have been elected without “fake news”?

- Its quite likely...
 - The demographics most likely to vote for Trump were the least likely to be online
 - Fake news was very concentrated
 - Best estimates are that targeted ads would have had to be tens of times more effective than TV ads to have swayed enough voters
- But, we don't really don't know!
 - some academics disagree with this
 - and it is likely impossible for us to ever figure it out

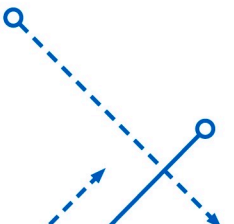




Team case study: the 2024 US Election

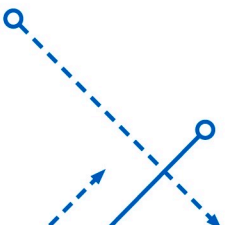
8 years is a long time

- What do we think has changed?
- What has stayed the same?



More specifically... what role can *our tools* play?

- Answer these in **one sentence**:
 - What is the **utility** of
 - causal diagrams for your project?
 - Causal inference for your project?
 - theoretical modeling for your project?
 - What are the **limitations** of
 - causal diagrams for your project?
 - Theoretical modeling for your project?



Why simulate? Vs. Diagramming/Theory

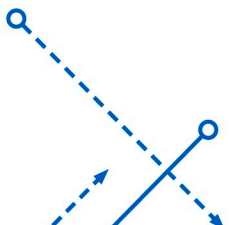
Too complex
and too much
drawing –
limited
computation
possible

Too simple –
can prove
things but
you're
making
overly bold
assumptions

**Causal
diagramming**

**Theoretical
Modeling**

Simulation



Why simulate?

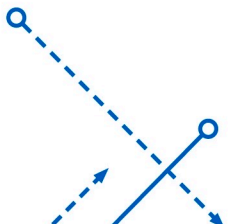
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**Causal
diagramming**

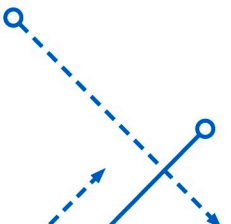
**Theoretical
Modeling**

Simulation



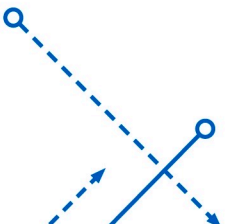
Why simulate? Vs. Using Real data

- Unethical to do otherwise
- Impossible to do otherwise
- As a first step
 - To show that unexpected things happen
 - To estimate how much data you need



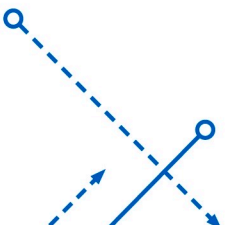
Simulation

- Can help us understand how *micro-level behaviors* impact *macro-structure*, and vice versa, in potentially non-obvious ways
 - Prisoner's Dilemma
 - HW: Contagions
- Can help us “experiment” quickly and/or when it is impossible/unethical to do so otherwise
 - How might we “fix social media”?
- Can help us imagine new possibilities
 - How do we intervene to eradicate misinformation?



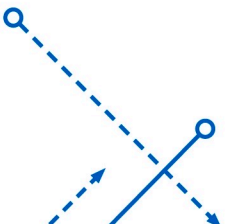
Concepts we'll talk about

- Parameters and justifying parameter choices
- Virtual experiments, outcome metrics, and research questions
- Types of simulations
 - Agent-based models and “the simulation loop”
 - Make up some things people do, and then explore how those function *at scale*
 - System dynamics models – variables, their levels, and stocks and flows
 - Make up some rules for how things move through a system, then explore



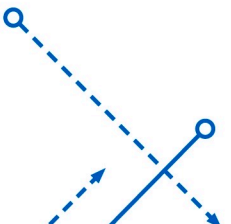
A Brief Example (from 199!)

- Head over to the [Parable of the Polygons](#), a cute demonstration of one of the more famous simulation models of human behavior ([Schelling's dynamic model of segregation](#)).
- Assuming that you begin with an initially random board. What does this model show about what can *cause* segregation?
 - This represents an **assumption** of the model
- All models are wrong, but some are useful. Identify at least one model assumption that is **wrong**, and at least one way the model is useful.



Schelling's model (con't)

- A **parameter** is a thing that can vary in a simulation model
 - Identify each of the **parameters** that can vary in this final simulation model.
 - Then, detail how that variable generally impacts the level of segregation in the simulated society, *holding all other factors constant at their default value*.
- The initial values for a parameter are called its **defaults**. What do you think are reasonable defaults for each parameter? Why?



Extending a model / Virtual Experiments

- **What** is one **additional** parameter we could vary, and why might we vary it (i.e. what is a relevant research question?)

