Computational History

Last updated: 2022/04/13, 15:02:17 EDT

Principles of Complex Systems, Vols. 1 & 2
CSYS/MATH 300 and 303, 2021–2022| @pocsvox

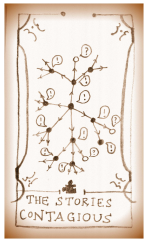
Prof. Peter Sheridan Dodds | @peterdodds

Computational Story Lab | Vermont Complex Systems Center
Vermont Advanced Computing Core | University of Vermont

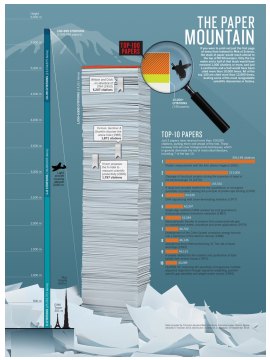
Licensed under the *Creative Commons Attribution-NonCommercial-ShareAlike 3.0 License*.

Outline

Statistics of Surprise
Stories
Mechanics of Fame
Superspreading
Lexical Ultrafame
Turbulent times
Extras
Sociotechnical time series
Adjacent Narratives
Extras
Memory & Turbulence
References



Fame by rank



Nature (2014): Most cited papers of all time

Word frequency:

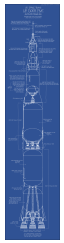
Brown Corpus ($\sim 10^6$ words):

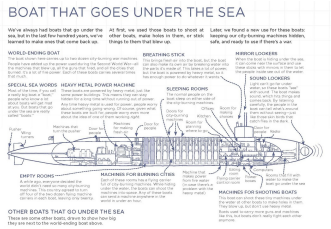
rank	word	% q	rank	word	% q
1.	the	6.8872	1945.	apply	0.0055
2.	of	3.5839	1946.	vital	0.0055
3.	and	2.8401	1947.	September	0.0055
4.	to	2.5744	1948.	review	0.0055
5.	a	2.2996	1949.	wage	0.0055
6.	in	2.1010	1950.	motor	0.0055
7.	that	1.0428	1951.	fifteen	0.0055
8.	is	0.9943	1952.	regarded	0.0055
9.	was	0.9661	1953.	draw	0.0055
10.	he	0.9392	1954.	wheel	0.0055
11.	for	0.9340	1955.	organized	0.0055
12.	it	0.8623	1956.	vision	0.0055
13.	with	0.7176	1957.	wild	0.0055
14.	as	0.7137	1958.	Palmer	0.0055
15.	his	0.6886	1959.	intensity	0.0055

Jonathan Harris's Wordcount:

A word frequency distribution explorer:

"Thing Explainer: Complicated Stuff in Simple Words"
by Randall Munroe (2015). [14]





Up goer five

The everywhereness of algorithms and stories:

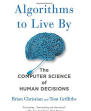
"On the Origin of Stories: Evolution, Cognition, and Fiction"
by Brian Boyd (2010). [3]

"The Storytelling Animal: How Stories Make Us Human"
by Jonathan Gottschall (2013). [10]

"The Written World: How Literature Shaped Civilization"
by Martin Puchner (2017). [17]

Algorithms, recipes, stories, ...

"The Code Economy: A Forty-Thousand Year History"
by Philip E Auerswald (2017). [1]



"Algorithms to Live By"
by Christian and Griffiths (2016). [6]

"Once Upon an Algorithm"
by Martin Erwig (2017). [9]

Also: Numerical Recipes in C [16] and How to Bake π [4]

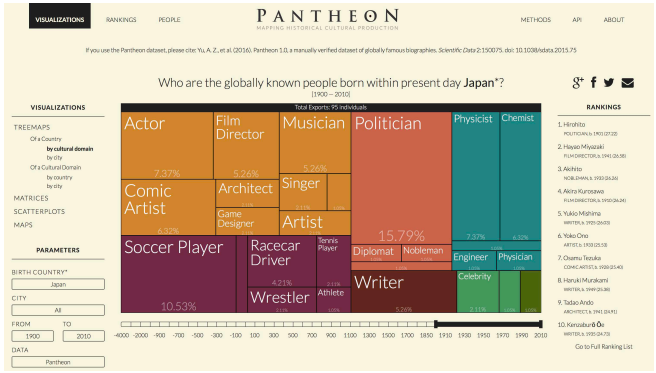
Outline

Statistics of Surprise
Stories
Mechanics of Fame
Superspreading
Lexical Ultrafame
Turbulent times
Extras
Sociotechnical time series
Adjacent Narratives
Extras
Memory & Turbulence
References

Outline

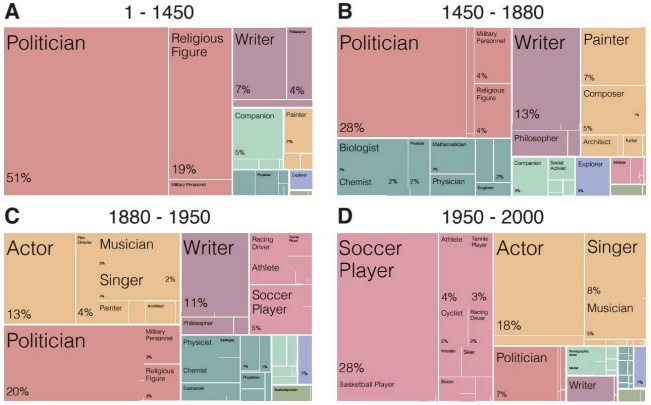
Statistics of Surprise
Stories
Mechanics of Fame
Superspreading
Lexical Ultrafame
Turbulent times
Extras
Sociotechnical time series
Adjacent Narratives
Extras
Memory & Turbulence
References

The famous are storytellers—Japan:



For people born 1950–

http://pantheon.media.mit.edu/treemap/country_exports/JP/all/1900/2010/H15/pantheon



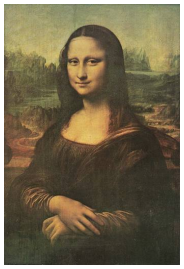
https://www.media.mit.edu/projects/pantheon-new/overview/

Super Survival of the Stories:

The Desirability of Storytellers, The Atlantic, Ed Yong, 2017-12-05.

- Study of Agta, Filipino hunter-gatherers.
- Storytelling valued well above all other skills including hunting.
- Stories encode prosocial norms such as cooperation.
- Like the best stories, the best storytellers reproduce more successfully.

The most famous painting in the world:



The dismal predictive powers of editors .....

Twelve ...

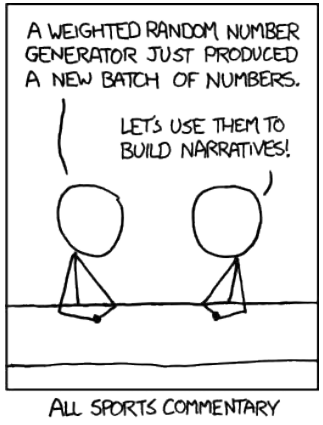
The completely unpredicted fall of Eastern Europe:

Timur Kuran: [12] "Now Out of Never: The Element of Surprise in the East European Revolution of 1989"

We understand bushfire stories:

1. Sparks start fires.
2. System properties control a fire's spread.
3. But for three reasons, we make two mistakes about Social Fires ...

Reason 1—We are Homo Narrativus.



http://xkcd.com/904/

Reason 2—"We are all individuals."

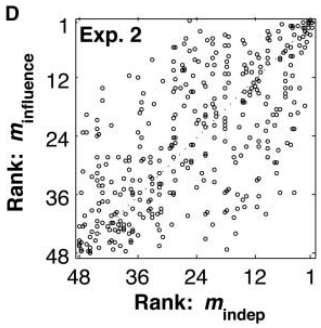
Archival footage:

- Individual narratives are not enough to understand distributed, networked minds.

Reason 3—We are spectacular imitators.

BBC/David Attenborough.

Resolving the paradox:



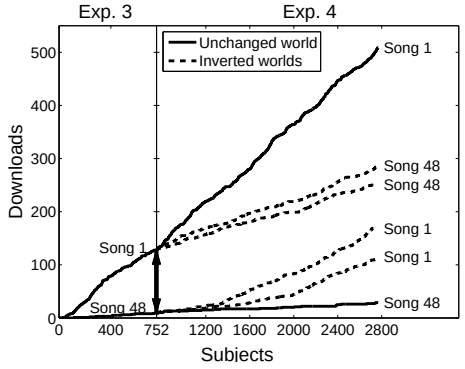
Increased social awareness leads to Stronger inequality + Less predictability.

"This is truly the last time, believe me"

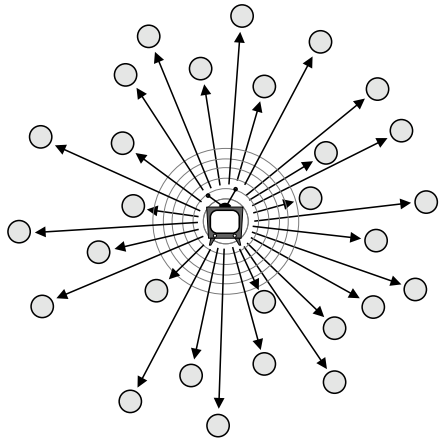
WaPo article

Mistake 1:
Success is due to intrinsic properties

Payola/Deceptive advertising hurts us all:



The hypodermic model of influence:



See "Becoming Mona Lisa" by David Sassoon

48 songs
30k participants

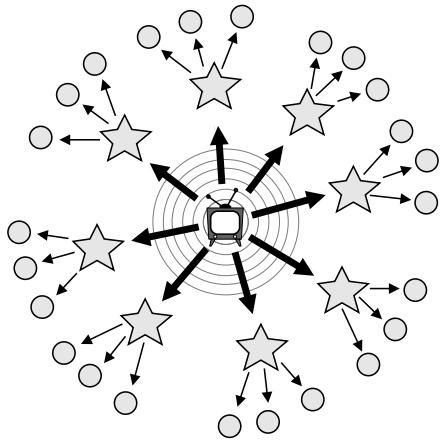
Exp 1— weak social

Exp. 2—strong social

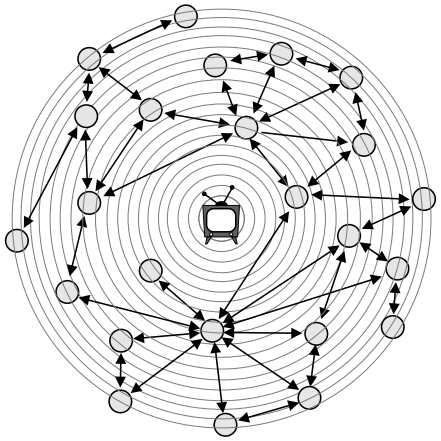
"An experimental study of inequality and unpredictability in an artificial cultural market"
Salganik, Dodds, and Watts, Science, **311**, 854–856, 2006. [18]

"Mistake" 2:
Seeing success is 'due to social' and wanting to say 'all your interactions are belong to us'

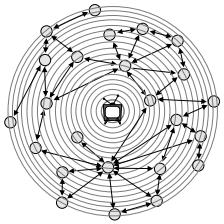
The two step model of influence: [11]



The network model of influence:



The network model of influence:



How superspreading works:

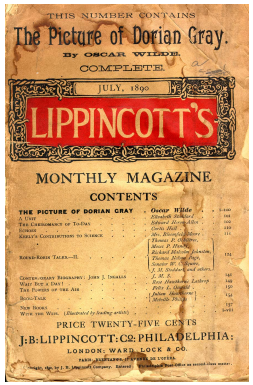
Many interconnected, average, trusting people must benefit from both receiving and sharing a message far from its source.

"Influentials, Networks, and Public Opinion Formation"
Watts and Dodds,
J. Consum. Res., **34**, 441–458, 2007. [19]

Etymological clarity:

- Fate—from the Latin *fatus*: meaning "spoken".
- Fate is talk that has been done.
  "It is written", fore-tell, pre-dict.
- "There is no such thing as fate, only the story of fate."
- Destiny is probablistic.
- Fame—from the Latin *fāma*: meaning "to talk."
- Fame is inherently the social discussion about the thing, not the thing itself.
- Renown: Repeatedly named, talked about. Old French renon, from re- + non ("name").
- Réclame. "Clamo"—Proto-Indo-European: "to shout" (again). Connected to "lowing".

Oscar Wilde, The Picture of Dorian Gray: Raw Fame



"There is only one thing in the world

worse than being talked about,

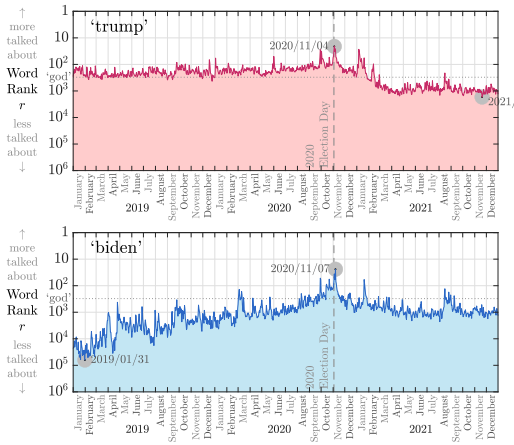
and that is

not being talked about."

"Fame and Ultrafame: Measuring and comparing daily levels of 'being talked about' for United States' presidents, their rivals, God, countries, and K-pop"
Dodds et al.,
Available online at https://arxiv.org/abs/1910.00149, 2019. [7]

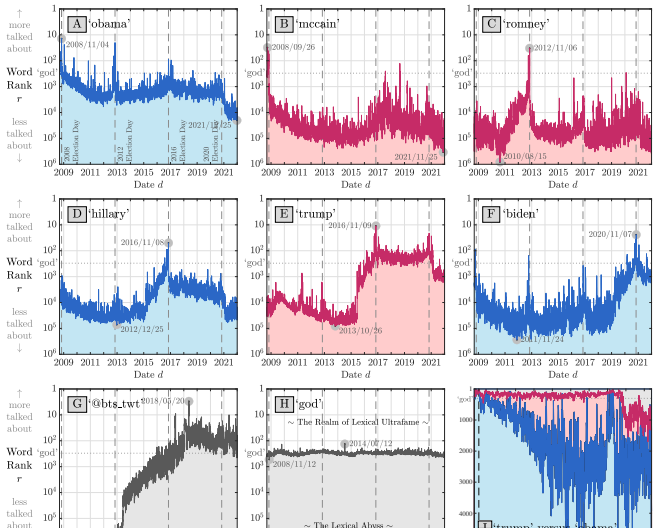
"Computational timeline reconstruction of the stories surrounding Trump: Story turbulence, narrative control, and collective chronopathy"
Dodds et al.,
, 2020. [8]

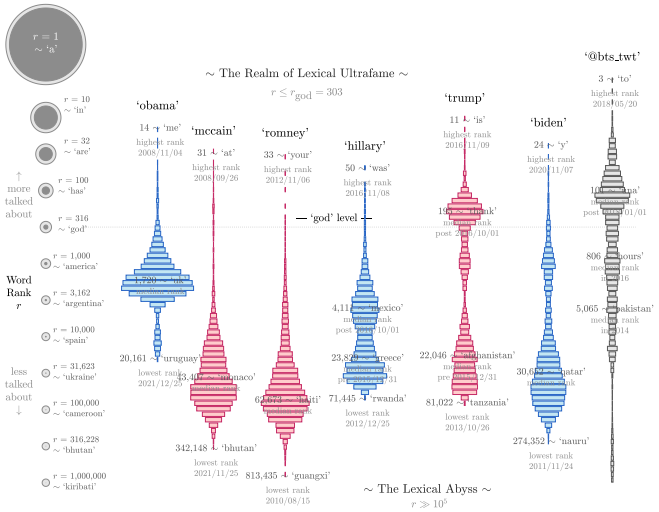
- POTUSometer with the Smorgasdashbord: http://compstorylab.org/potusometer/
- Stories surrounding Trump: http://compstorylab.org/trumpstoryturbulence/

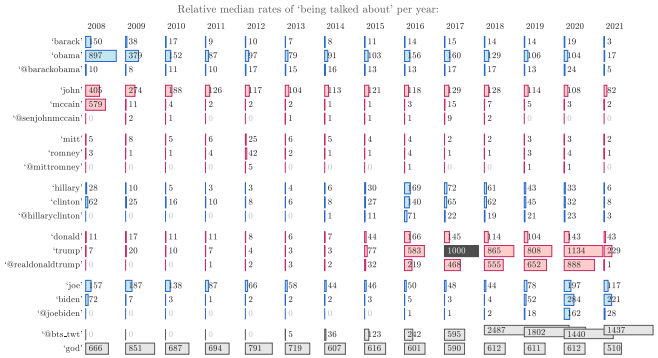


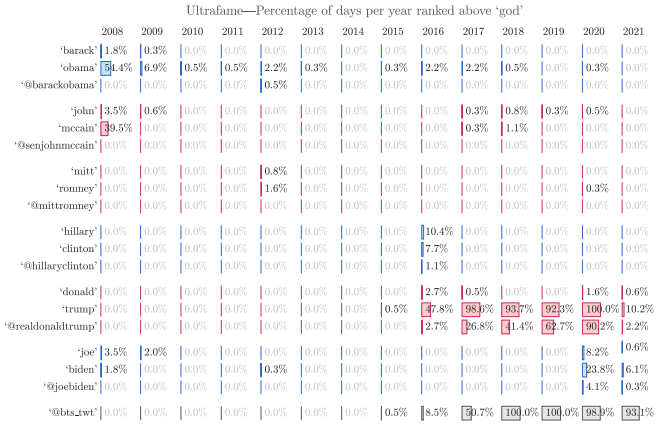
Ultrafame:
Nobody expects ~~the Spanish Inquisition~~ K-pop:

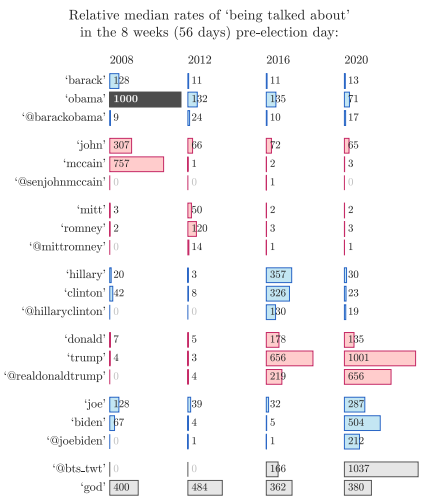
Vox (2019-04-17):
BTS, the band that changed K-pop, explained



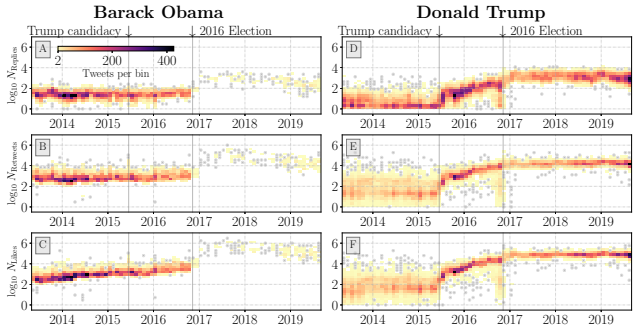






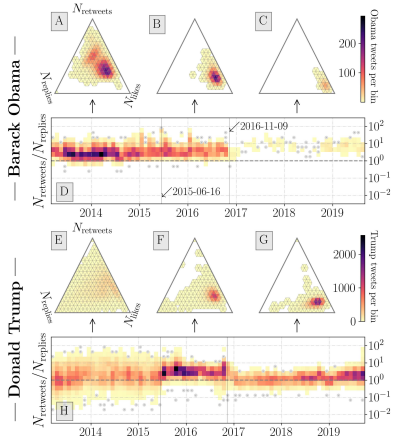


Ratiometrics:



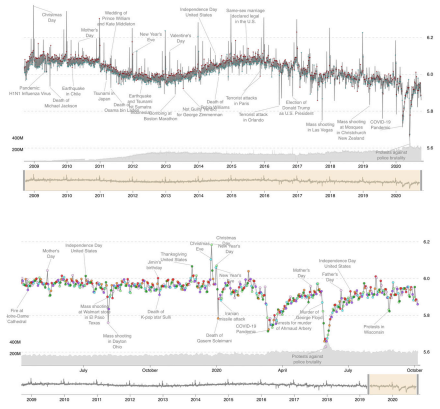
"Ratioing the President: An exploration of public engagement with Obama and Trump on Twitter,"
Minot et al., 2020 [13]

Ratiometrics:



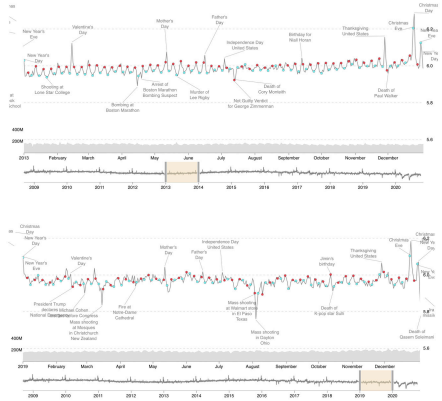
PoCS @pocsvox
Computational History
Statistics of Surprise
Stories
Mechanics of Fame
Superspreading
Lexical Ultrafame
Turbulent times
Extras
Sociotechnical time series
Adjacent Narratives
Extras
Memory & Turbulence
References

Emotional turbulence:

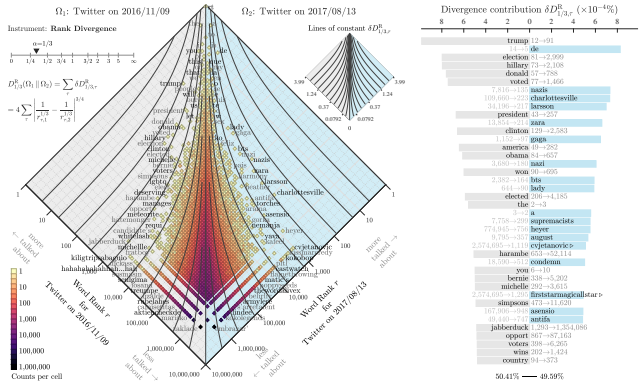


http://hedonometer.org/

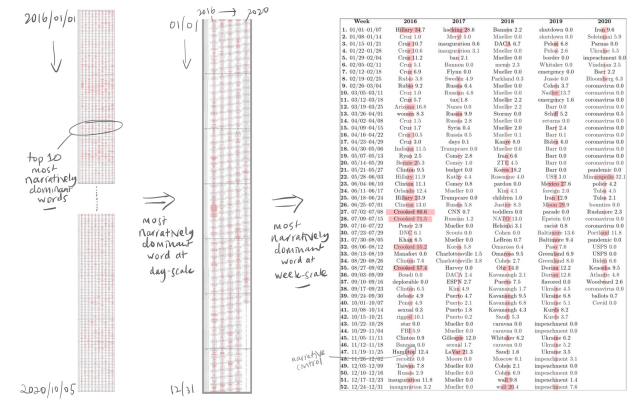
Emotional turbulence:



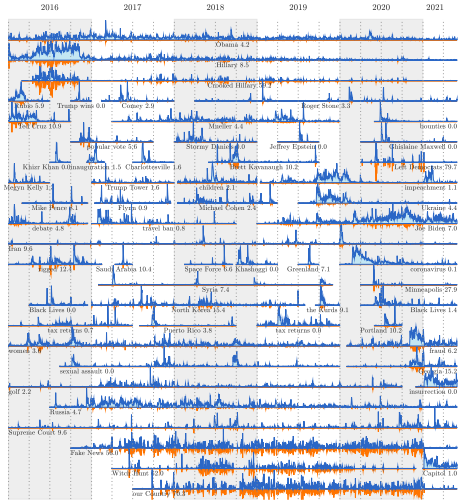
http://hedonometer.org/



Allotaxonometry—
the comparison of complex systems:
http://compstorylab.org/allotaxonometry/



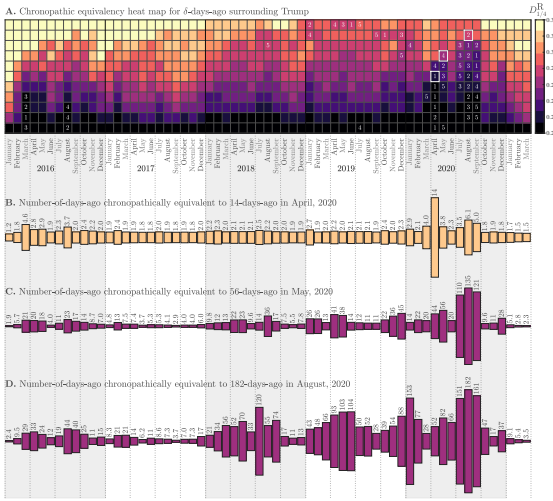
http://compstorylab.org/trumpstoryturbulence/



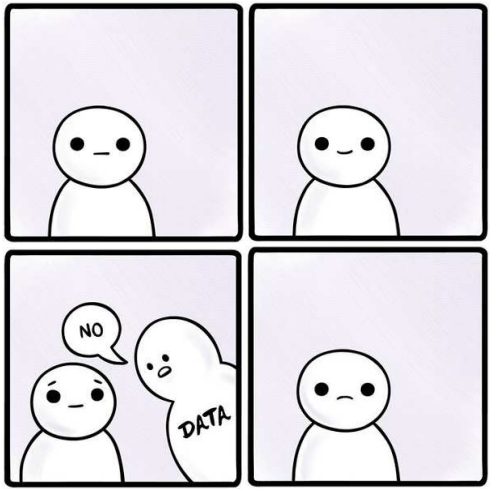
ding!

On Instagram at pratchett_the_cat

Week	2016	2017	2018	2019	2020	2021
1.	01/01–01/07	Hillary 34.7	hacking 28.6	Bannon 2.2	shutdown 0.0	Iran 9.6	Georgia 14.7
2.	01/08–01/14	Cruz 1.0	Meryl 5.0	Mueller 0.0	shutdown 0.0	Soleimani 5.9	Capitol 0.1
3.	01/15–01/21	Cruz 10.7	inauguration 0.6	DACA 6.7	Pelosi 6.8	Parnas 0.0	Capitol 0.0
4.	01/22–01/28	Cruz 10.6	inauguration 3.1	Mueller 0.0	Pelosi 2.6	Ukraine 5.5	insurrection 0.0
5.	01/29–02/04	Cruz 11.2	ban 2.1	Mueller 0.0	border 0.0	impeachment 0.0	Greene 0.0
6.	02/05–02/11	Cruz 5.1	Bannon 0.0	nemp 2.3	Whitaker 0.0	Vindman 2.5	insurrection 0.0
7.	02/12–02/18	Cruz 6.9	Flynn 0.0	Mueller 0.0	emergency 0.0	Barr 2.2	Capitol 0.0
8.	02/19–02/25	Rubio 3.8	Sweden 4.9	Parkland 0.3	Jussie 0.0	Bloomberg 6.3	Capitol 0.0
9.	02/26–03/04	Rubio 9.2	Russia 6.4	Mueller 0.0	Cohen 3.7	coronavirus 0.0	Capitol 0.0
10.	03/05–03/11	Cruz 1.0	Russian 4.8	Mueller 0.0	Nadler 13.7	coronavirus 0.0	insurrection 0.0
11.	03/12–03/18	Cruz 5.7	tax 1.8	Mueller 2.2	emergency 1.6	coronavirus 0.0	Biden 0.0
12.	03/19–03/25	Arizona 16.8	Nunes 0.0	Mueller 2.2	Barr 0.0	coronavirus 0.0	Biden 0.0
13.	03/26–04/01	women 8.3	Russia 9.9	Stormy 0.0	Schiff 5.2	coronavirus 0.5	Capitol 0.0
14.	04/02–04/08	Cruz 1.5	Russia 2.8	Mueller 0.0	returns 0.0	coronavirus 0.0	Capitol 0.0
15.	04/09–04/15	Cruz 1.7	Syria 0.4	Mueller 2.0	Barr 2.4	coronavirus 0.0	Capitol 0.0
16.	04/16–04/22	Cruz 10.5	Russia 0.5	Mueller 0.1	Barr 0.1	coronavirus 0.0	Capitol 0.0
17.	04/23–04/29	Cruz 3.0	Kaepik 8.0	Biden 6.0	coronavirus 0.0	audit 0.0	Capitol 0.0
18.	04/30–05/06	Indiana 11.5	Trumptrain 0.0	Mueller 0.0	Barr 0.0	coronavirus 0.0	Cheney 0.0
19.	05/07–05/13	Ryan 2.5	Comey 2.8	Iran 6.6	Barr 0.0	coronavirus 0.0	Cheney 0.0
20.	05/14–05/20	Bolduc 25.3	Comey 1.0	ZTE 4.5	Barr 0.0	coronavirus 0.0	Cheney 0.0
21.	05/21–05/27	Clinton 9.5	budget 0.0	Korea 18.2	Barr 0.0	pandemic 0.0	Weisselberg 0.0
22.	05/28–06/03	Hillary 11.9	Kathy 4.4	Rosenne 4.0	USS 3.0	Minneapolis 32.1	reinstated 0.0
23.	06/04–06/10	Clinton 11.9	Comey 0.8	pardon 0.0	Mueller 27.6	podcp 4.2	McGahn 0.0
24.	06/11–06/17	Orlando 12.4	Mueller 0.0	Kim 4.1	foreign 2.0	Tulsa 4.5	DOJ 0.0
25.	06/18–06/24	Hillary 23.9	Trumpcare 0.0	children 1.0	Iran 12.9	Tulsa 2.1	Capitol 0.0
26.	06/25–07/01	Clinton 13.0	Russia 5.8	Justice 8.3	Mexico 28.9	bounties 0.0	Organization 0.0
27.	07/02–07/08	Crooked 80.6	CNN 0.7	toddlers 0.0	parade 0.0	Rushmore 2.3	Weisselberg 0.0
28.	07/09–07/15	Crooked 71.5	Russia 1.2	NATO 13.0	Epstein 0.0	coronavirus 0.0	CPAC 0.0
29.	07/16–07/22	Pence 2.9	Helsinki 3.1	racist 0.8	coronavirus 0.0	vaccinated 0.0
30.	07/23–07/29	DNC 0.1	Scouts 0.0	Cohen 0.0	Baltimore 13.6	Portland 11.8	Jan 0.0
31.	07/30–08/05	Khan 6.5	Mueller 0.0	LeBron 0.7	Baltimore 9.4	pandemic 0.0	Capitol 0.0
32.	08/06–08/12	Crooked 55.2	Kavanaugh 5.8	Omarosa 0.4	Pence 7.6	USPS 0.0	Rosen 0.0
33.	08/13–08/19	Manafort 0.0	Charlottesville 1.5	Omarosa 9.5	Greenland 6.9	USPS 0.0	Taliban 0.0
34.	08/20–08/26	Clinton 7.6	Charlottesville 3.8	Cohen 2.7	Greenland 8.0	Biden 6.6	Taliban 0.0
35.	08/27–09/02	Crooked 57.4	Harvey 0.0	Otto 14.0	Dorian 12.2	Kavanaugh 9.5	Taliban 0.0
36.	09/03–09/09	Bondi 0.0	DACA 2.4	Kavanaugh 2.1	Dorian 12.6	Atlantic 4.8	Afghanistan 0.0
37.	09/10–09/16	deplorable 0.0	ESPN 2.7	Puerto 7.5	flavored 0.0	Woodward 2.6	Milley 0.0
38.	09/17–09/23	Clinton 6.5	Kim 4.0	Kavanaugh 1.7	Ukraine 4.5	coronavirus 0.0	Esstrajun 0.0
39.	09/24–09/30	debate 4.9	Puerto 4.7	Kavanaugh 9.5	Ukraine 6.8	ballots 0.7	audit 0.0
40.	10/01–10/07	Pence 4.9	Puerto 2.1	Kavanaugh 6.8	Ukraine 5.1	Covid 1.4	Bannon 0.0
41.	10/08–10/14	sexual 0.3	Puerto 1.8	Kavanaugh 4.3	Kurds 8.2	COVID 1.4	Jan 0.0
42.	10/15–10/21	riggedl 10.1	Puerto 0.2	Saudi 5.3	Kurds 3.7	Biden 8.2	Powell 0.0
43.	10/22–10/28	star 0.0	Mueller 0.0	caravan 0.0	impeachment 0.0	Biden 9.2	Jan 0.0
44.	10/29–11/04	FBI 5.9	Mueller 0.0	caravan 0.0	impeachment 0.0	Biden 110.0	Youngkin 0.0
45.	11/05–11/11	Clinton 0.9	Gillespie 12.0	Whitaker 6.2	Ukraine 6.2	vote 3.4	infrastructure 0.0
46.	11/12–11/18	Bannon 0.0	sexual 1.7	caravan 0.0	Ukraine 5.2	Dominion 23.2	Christie 0.0
47.	11/19–11/25	Hamilton 12.4	LaVar 21.3	Saudi 1.6	Ukraine 3.5	Sidney 0.1	Rittenhouse 0.0
48.	11/26–12/02	recount 0.0	Moore 0.0	Moscow 0.1	impeachment 3.1	votes 23.1	Wankesha 0.0
49.	12/03–12/09	Taiwan 7.8	Mueller 0.0	Cohen 2.1	impeachment 0.0	Georgia 20.2	Meadows 0.0
50.	12/10–12/16	Russia 2.9	Mueller 0.0	Cohen 6.9	impeachment 0.0	vaccine 11.1	Meadows 0.0
51.	12/17–12/23	inauguration 11.8	Mueller 0.0	wall 9.8	impeachment 1.4	vaccine 15.4	Manchin 0.0
52.	12/24–12/31	inauguration 3.2	Mueller 0.0	wall 20.4	impeachment 7.6	Election 60.2	Brandon 0.0

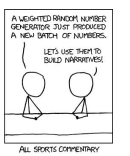


Theories bloom in darkness



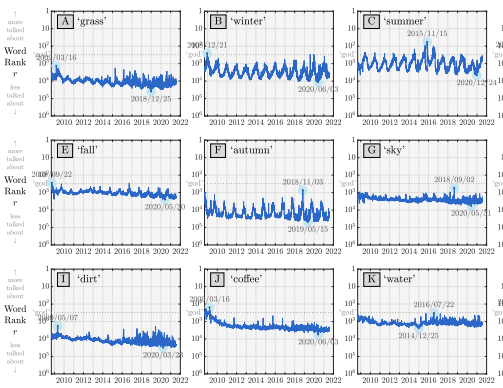
Week	2016	2017	2018	2019	2020	2021
1.	01/01–01/07	Hillary Clinton 32.7	plant is 85.1	Steve Bannon 5.7	the government 0.0	a wig 6.6	in Georgia 20.2
2.	01/08–01/14	Trump rally 0.0	Meryl Streep 0.6	shithole countries 0.0	the border 1.0	impeachment trial 0.0	the Capitol 0.0
3.	01/15–01/21	Ted Cruz 26.0	Trump's inauguration 0.0	the government 1.4	Cohen to 0.0	impeachment trial 0.0	the Capitol 0.0
4.	01/22–01/28	Megyn Kelly 4.0	executive order 0.0	the FBI 5.6	the government 0.0	impeachment trial 0.0	the Capitol 0.0
5.	01/29–02/04	Ted Cruz 19.7	travel ban 1.6	the FBI 9.4	Ralph Northam 26.0	impeachment trial 0.0	the Capitol 0.0
6.	02/05–02/11	New Hampshire 19.5	travel ban 1.1	military parade 0.0	El Paso 4.7	Alexander Vindman 0.0	the Capitol 0.0
7.	02/12–02/18	Ted Cruz 15.7	Michael Flynn 0.0	school shooting 3.1	national emergency 0.0	Roger Stone 4.0	the Capitol 0.0
8.	02/19–02/25	Ted Cruz 20.1	Trump administration 0.0	the NRA 0.0	Jussie Smollett 0.0	Bernie Sanders 13.6	the Capitol 0.0
9.	02/26–03/04	vote for 4.4	to Russia 22.0	Hope Hicks 0.0	Michael Cohen 5.3	the coronavirus 0.0	the Capitol 0.0
10.	03/05–03/11	Ted Cruz 2.4	travel ban 0.0	Stormy Daniels 0.0	Tim Apple 0.0	the coronavirus 0.0	voted for 0.0
11.	03/12–03/18	Trump is 0.1	Meals on 0.0	Stormy Daniels 0.0	New Zealand 17.9	the coronavirus 0.0	Lara Trump 0.0
12.	03/19–03/25	Lets' Ted 66.2	health care 0.0	Cambridge Analytica 0.0	Mueller report 0.0	the coronavirus 0.0	the border 0.0
13.	03/26–04/01	Trump is 0.0	Freedom Caucus 20.8	Stormy Daniels 0.0	Mueller report 0.0	the coronavirus 0.0	Matt Gaetz 0.0
14.	04/02–04/08	Ted Cruz 3.9	Susan Rice 0.3	National Guard 0.0	tax returns 0.0	the coronavirus 0.0	Matt Gaetz 0.0
15.	04/09–04/15	New York 19.3	in Syria 0.2	Michael Cohen 0.0	sanctuary cities 5.3	the coronavirus 0.0	Matt Gaetz 0.0
16.	04/16–04/22	Ted Cruz 28.1	turnout for 0.0	Michael Cohen 2.4	Mueller report 0.0	the coronavirus 0.0	Maxine Waters 0.0
17.	04/23–04/29	Trump rally 0.0	tax plan 0.0	the Koran 0.0	Mueller report 0.0	the coronavirus 0.0	Liz Cheney 0.0
18.	04/30–05/06	Ted Cruz 5.5	health care 0.0	Stormy Daniels 0.0	Mueller report 0.0	treated worse 0.0	Liz Cheney 0.0
19.	05/07–05/13	Paul Ryan 2.0	James Comey 6.7	the FBI 0.0	tax returns 0.0	tested positive 0.0	Liz Cheney 0.0
20.	05/14–05/20	Hillary Clinton 26.5	Saudi Arabia 12.5	are animals 0.0	Lindsey Graham 0.0	the pandemic 0.0	Kevin McCarthy 0.0
21.	05/21–05/27	Hillary Clinton 24.8	Saudi Arabia 8.2	the FBI 23.3	Nancy Pelosi 12.5	a mask 6.3	the January 6.0
22.	05/28–06/03	Trump University 3.4	Kathy Griffin 5.7	Samantha Bee 4.4	John McCain 0.0	photo-op 0.0	Memorial Day 0.0
23.	06/04–06/10	Hillary Clinton 18.6	James Comey 0.2	Justin Trudeau 8.5	with Mexico 39.2	Left Democrats 78.1	Joan Carroll 0.0
24.	06/11–06/17	Trump is 0.0	obstruction of 12.6	their parents 0.0	the FBI 8.5	in Tulsa 7.4	Trump DOJ 0.0
25.	06/18–06/24	Hillary Clinton 20.6	Karen Handel 16.6	their parents 2.5	need soap 0.0	in Tulsa 2.2	the Capitol 0.0
26.	06/25–07/01	Hillary Clinton 20.5	Fake News 37.6	Supreme Court 3.7	Jean Carroll 0.0	American soldiers 0.0	Trump Organization 0.0
27.	07/02–07/08	Crooked Hillary 82.8	North Korea 28.6	Trump administration 0.0	Jeffrey Epstein 0.0	Mount Rushmore 3.9	Ashli Babbitt 0.0
28.	07/09–07/15	Crooked Hillary 73.3	Trump Jr 0.0	Supreme Court 7.9	Jeffrey Epstein 0.0	Roger Stone 0.0	the Capitol 0.0
29.	07/16–07/22	Mike Pence 6.8	Secret Service 0.0	in Helsinki 1.7	a race 0.0	in Portland 0.0	Tom Barrack 0.0
30.	07/23–07/29	Crooked Hillary 79.6	Boy Scouts 0.0	Walk of 0.0	Elijah Cummings 27.2	in Portland 8.9	the Capitol 0.0
31.	07/30–08/05	Khizr Khan 0.0	Maxine Waters 0.0	enemy of 2.8	El Paso 11.1	the election 3.4	the Capitol 0.0
32.	08/06–08/12	Hillary Clinton 10.5	North Korea 5.7	Space Force 11.1	El Paso 7.7	Social Security 0.0	overturn the 0.0
33.	08/13–08/19	Trump campaign 0.0	white supremacists 0.0	security clearance 0.0	New Hampshire 26.5	the USPS 0.0	the Taliban 0.0
34.	08/20–08/26	Hillary Clinton 19.1	Joe Arpaio 3.5	Michael Cohen 4.3	Prime Minister 28.7	Joe Biden 5.9	the Taliban 0.0
35.	08/27–09/02	Crooked Hillary 61.8	Hurricane Harvey 0.1	John McCain 0.2	Hurricane Dorian 9.6	Joe Biden 2.7	the Taliban 0.0
36.	09/03–09/09	tax reform 0.0	to end 0.0	Brett Kavanaugh 7.6	the Taliban 3.0	Joe Biden 3.4	Robert E 0.0
37.	09/10–09/16	tax returns 0.0	white supremacist 0.0	Puerto Rico 8.4	Dan Bishop 37.7	Joe Biden 13.3	the Taliban 0.0
38.	09/17–09/23	Trump Jr. 0.0	Puerto Rico 12.8	a border 6.4	Supreme Court 7.3	Supreme Court 5.7	to overturn 0.0
39.	09/24–09/30	Hillary Clinton 7.5	Puerto Rico 5.2	Brett Kavanaugh 15.2	impeachment inquiry 0.0	Supreme Court 5.7	debt ceiling 0.0
40.	10/01–10/07	Mike Pence 8.9	Puerto Rico 2.2	Supreme Court 6.9	Adam Schiff 11.3	Walter Reed 5.7	the debt 0.0
41.	10/08–10/14	sexual assault 0.0	Puerto Rico 2.2	Kanye West 0.0	the Kurds 11.3	Biden is 26.5	the January 6.0
42.	10/15–10/21	Hillary Clinton 19.9	families of 0.0	Saudi Arabia 6.6	the Kurds 3.8	Joe Biden 12.1	the January 0.0
43.	10/22–10/28	Hillary Clinton 11.7	Myeshia Johnson 0.0	the bombs 0.0	World Series 0.0	Joe Biden 10.1	Alec Baldwin 0.0
44.	10/29–11/04	Hillary Clinton 6.5	Twitter employee 0.0	birthright citizenship 0.0	the impeachment 0.0	Joe Biden 12.6	in Virginia 0.0
45.	11/05–11/11	Trump wins 0.0	mental health 0.0	Jim Acosta 0.0	pro quo 8.1	the election 2.2	infrastructure bill 0.0
46.	11/12–11/18	Steve Bannon 0.0	ban on 0.0	president who 0.0	impeachment inquiry 0.0	the election 7.5	Chris Christie 0.0
47.	11/19–11/25	Mike Pence 24.3	Roy Moore 0.0	Saudi Arabia 2.5	quid pro 1.3	the election 6.7	Kyle Rittenhouse 0.0
48.	11/26–12/02	popular vote 17.4	Native American 0.1	Trump Tower 2.5	Hong Kong 0.0	voter fraud 32.2	Donald Trump 0.0
49.	12/03–12/09	Air Force 18.2	Roy Moore 3.5	campaign finance 0.0	to impeach 7.7	in Georgia 12.9	Donald Trump 0.0
50.	12/10–12/16	of State 7.6	of sexual 0.0	Michael Cohen 7.8	articles of 0.0	the election 9.0	Mark Meadows 0.0
51.	12/17–12/23	Electoral College 5.8	tax bill 0.0	the wall 13.7	Christianity Today 8.1	election fraud 13.9	the Capitol 0.0

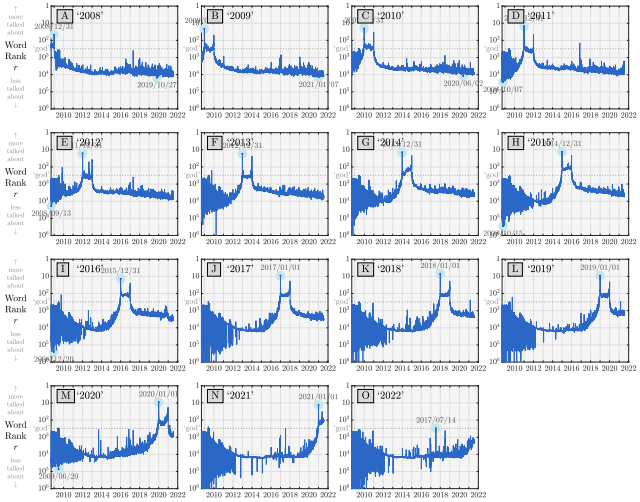
Understanding the Sociotechnocene—Stories:

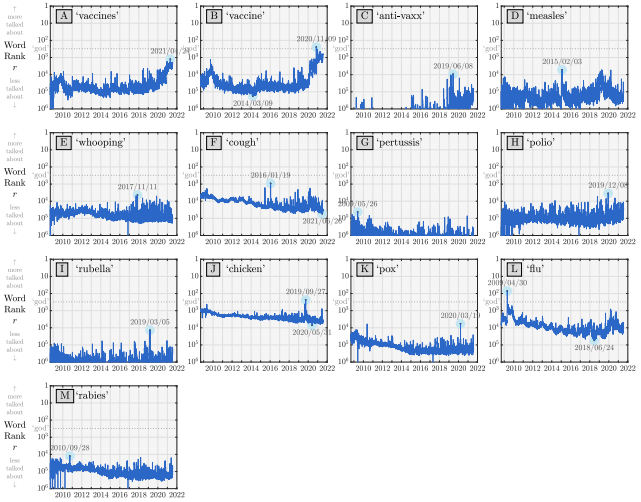


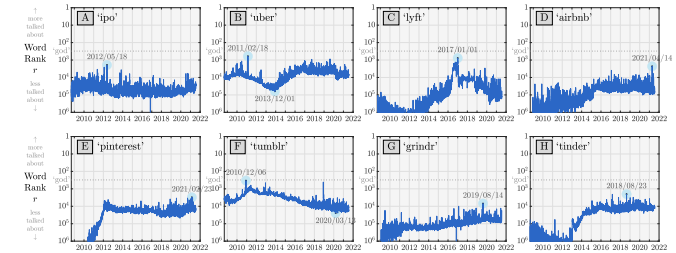
xkcd.com/904/

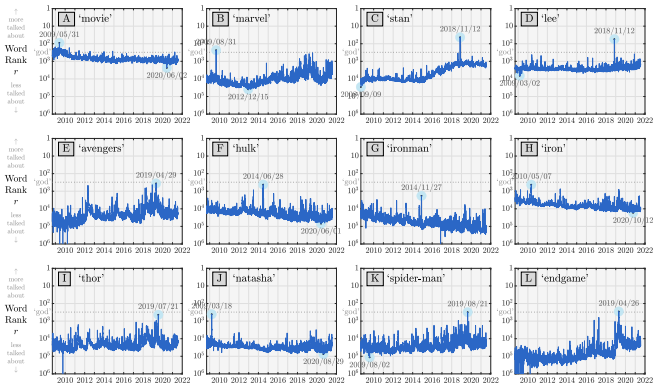
- Toward a Science of Stories.
- Claim: Homo narrativus—we run on stories.
- "What's the John Dory?"
- "They've lost the plot/thread"
- Narrative hierarchies and scalability of stories.
- Research: Real-time and offline extraction of metaphors, frames, plots, narratives, conspiracy theories, and stories from large-scale text.
- Research: The taxonomy of human stories.
- To be built: Storyscopes—improvable, online, interactive instruments.

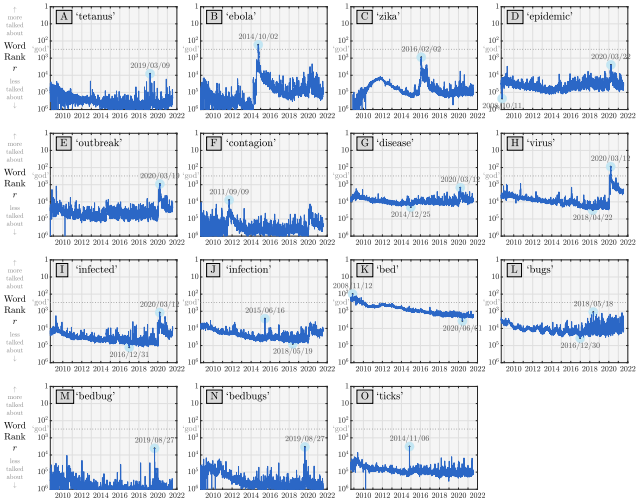


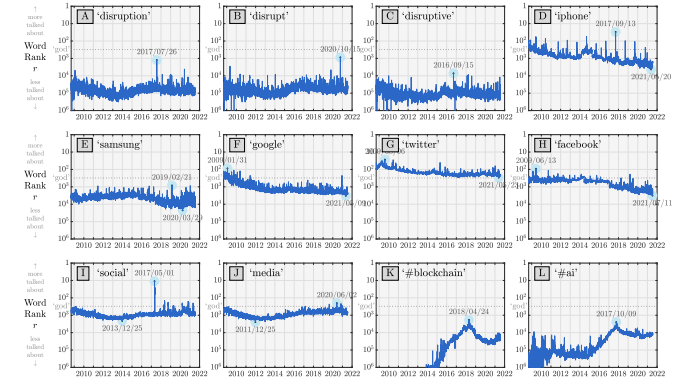

A '2008'
B '2009'
C '2010'
D '2011'
E '2012'
F '2013'
G '2014'
H '2015'
I '2016'
J '2017'
K '2018'
L '2019'
M '2020'
N '2021'
O '2022'
Word Rank r
more talked about
less talked about

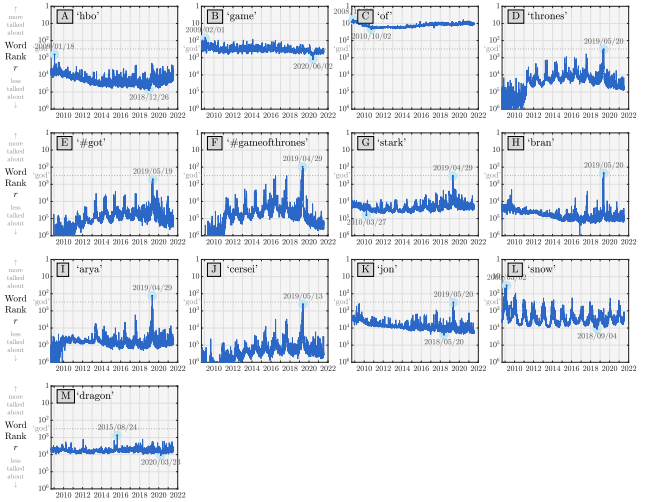

A 'vaccines'
B 'vaccine'
C 'anti-vaxx'
D 'measles'
E 'whooping'
F 'cough'
G 'pertussis'
H 'polio'
I 'rubella'
J 'chicken'
K 'pox'
L 'flu'
M 'rabies'
Word Rank r
more talked about
less talked about

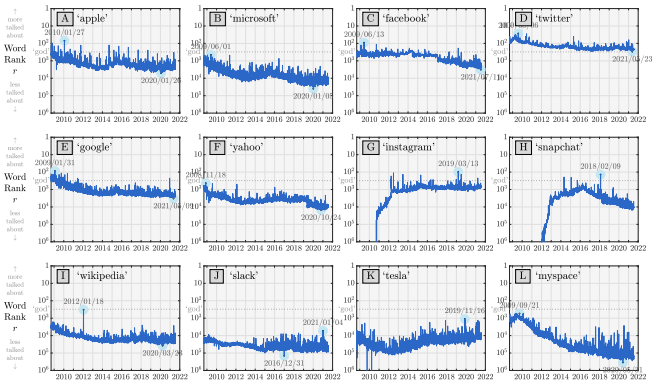

A 'ipo'
B 'uber'
C 'lyft'
D 'airbnb'
E 'pinterest'
F 'tumblr'
G 'grindr'
H 'tinder'
Word Rank r
more talked about
less talked about

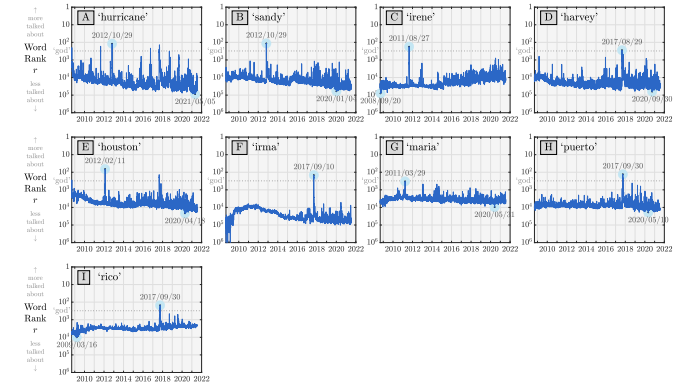

A 'movie'
B 'marvel'
C 'stan'
D 'lee'
E 'avengers'
F 'hulk'
G 'ironman'
H 'iron'
I 'thor'
J 'natasha'
K 'spider-man'
L 'endgame'
Word Rank r
more talked about
less talked about


A 'tetanus'
B 'ebola'
C 'zika'
D 'epidemic'
E 'outbreak'
F 'contagion'
G 'disease'
H 'virus'
I 'infected'
J 'infection'
K 'bed'
L 'bugs'
M 'bedbug'
N 'bedbugs'
O 'ticks'
Word Rank r
more talked about
less talked about

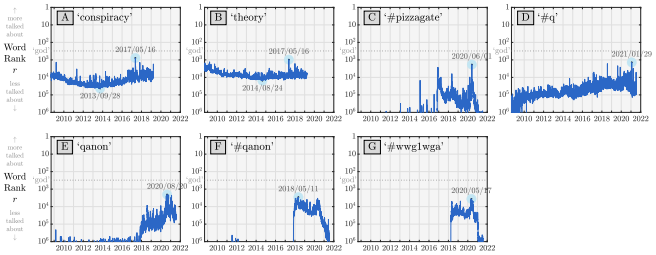

A 'disruption'
B 'disrupt'
C 'disruptive'
D 'iphone'
E 'samsung'
F 'google'
G 'twitter'
H 'facebook'
I 'social'
J 'media'
K '#blockchain'
L '#ai'
Word Rank r
more talked about
less talked about

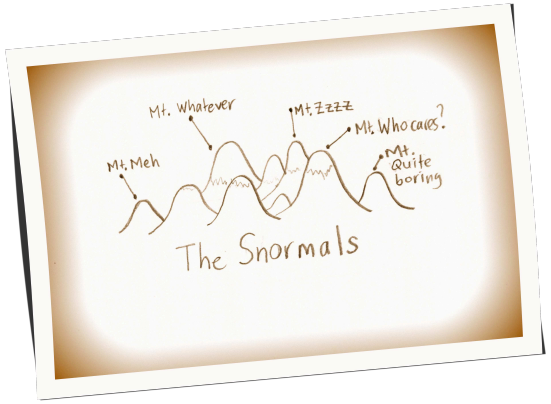

A 'hbo'
B 'game'
C 'of'
D 'thrones'
E '#got'
F '#gameofthrones'
G 'stark'
H 'bran'
I 'arya'
J 'cersei'
K 'jon'
L 'snow'
M 'dragon'
Word Rank r
more talked about
less talked about

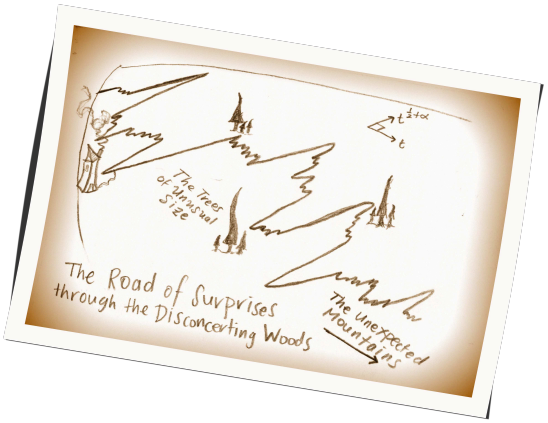

A 'apple'
B 'microsoft'
C 'facebook'
D 'twitter'
E 'google'
F 'yahoo'
G 'instagram'
H 'snapchat'
I 'wikipedia'
J 'slack'
K 'tesla'
L 'myspace'
Word Rank r
more talked about
less talked about

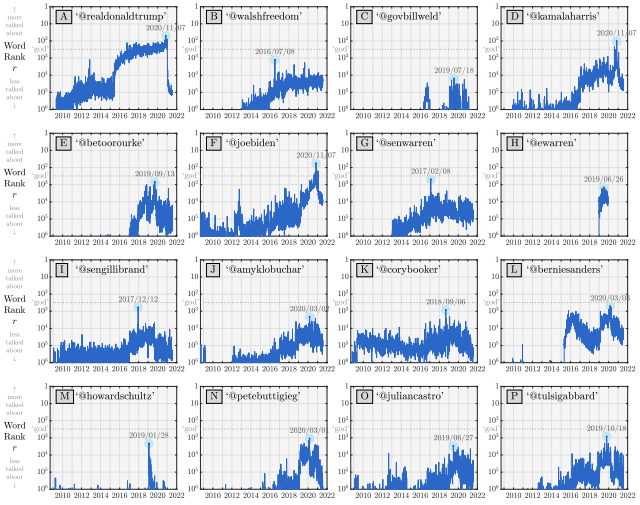

A 'hurricane'
B 'sandy'
C 'irene'
D 'harvey'
E 'houston'
F 'irma'
G 'maria'
H 'puerto'
I 'rico'
Word Rank r
more talked about
less talked about

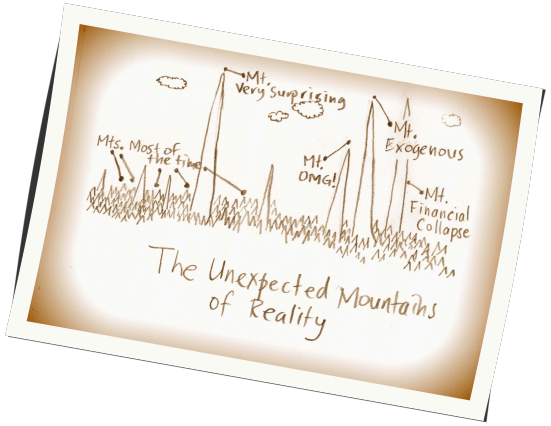
A '@britneyspears'
2011/02/10
B 'britney'
2015/12/07
2020/06/03
C 'spears'
2015/12/07
2020/06/03
D '@ladygaga'
2017/02/05
E 'lady'
2015/12/14
F 'gaga'
2015/12/14
G 'fifth'
2016/08/05
2021/02/24
H 'harmony'
2017/12/25
2020/03/29
I 'harmonizers'
2016/04/02
J 'ariana'
2017/05/23
K 'grande'
2015/11/15
L 'concert'
2017/05/23
2020/06/22
M 'arianators'
2016/11/17
N 'manchester'
2017/05/23
2020/04/27
A 'messi'
2014/07/13
B 'ronaldo'
2016/07/10
C 'neymar'
2014/07/04
D 'gagibol'
2019/09/17
E 'lebron'
2010/07/08
F 'brady'
2017/02/05
2020/06/09
G 'belichick'
2019/09/02
H 'phelps'
2016/08/09
I 'kohli'
2016/03/27
A 'serena'
2018/09/09
2020/03/25
B 'wozniacki'
2017/02/19
C 'hingis'
2015/07/11
D 'sharapova'
2016/03/07
E 'federer'
F 'nadal'
G 'djokovic'
A 'fbi'
2018/02/02
2010/12/25
B 'comey'
2017/06/08
C 'rosenstein'
2018/09/24
D 'mccabe'
2018/03/17
E 'melania'
2016/07/19
F 'spicer'
2017/04/11
G 'miller'
2018/09/07
2020/03/22
H 'fascist'
2021/01/06
I 'fascists'
2021/01/06
J 'fascism'
2017/08/12
K 'antifa'
2020/05/21
L 'news'
2008/11/04
2013/12/25
M 'press'
2020/11/10
2012/12/25
N 'truth'
2018/08/19
2008/03/02
O 'lies'
2017/01/22
P 'believe'
2020/06/25
2008/03/16
A 'music'
2021/05/21
2021/01/06
B 'song'
2015/08/30
2020/06/12
C 'queen'
2018/01/20
2008/03/02
D '@justinbieber'
2012/03/01
E 'justin'
2013/11/10
2019/06/23
F 'bieber'
2015/08/25
G 'beliebers'
2016/11/05
H 'jonas'
2019/08/22
2020/10/04
I '@jonasbrothers'
2020/08/22
J 'drake'
2015/07/22
2020/10/10
K 'sheeran'
2015/12/11
L '@taylorswift13'
2015/05/17
M 'taylor'
2009/09/13
2020/03/11
N 'swift'
2009/09/14
2020/09/29
A 'trump'
2016/11/09
2013/10/26
B 'mueller'
2019/07/24
C 'report'
2019/04/18
2013/12/25
D 'russia'
2018/07/16
2010/03/27
E 'wall'
2019/01/10
2021/05/12
F 'caravan'
2018/10/23
2019/12/10
G 'shutdown'
2018/01/20
2018/11/03
H 'collusion'
2019/03/24
I 'fake'
2018/05/18
2008/03/20
J 'news'
2008/11/04
2013/12/25
K 'witch'
2017/05/18
2015/02/14
L 'hunt'
2015/04/12
2021/05/14
M 'fired'
2017/05/09
2014/12/25
N 'vote'
2021/01/19
2008/03/16
O 'racist'
2019/07/15
2008/12/12
P 'fear'
2021/02/05
2007/03/02
A 'impeachment'
2019/12/18
B 'impeach'
2021/07/12
C 'nancy'
2020/02/06
2016/12/29
D 'pelosi'
2020/02/02
E 'trump'
2016/11/09
2013/10/26
F 'giuliani'
2018/05/03
G 'hunter'
2017/11/16
2020/06/01
H 'biden'
2020/11/07
2016/11/28
I 'ukraine'
2019/09/25
2013/03/09
J 'transcript'
2019/09/25
K 'whistleblower'
2019/09/26
L 'complaint'
2019/09/26
2015/02/14
M 'schiff'
2019/10/02
N 'treason'
2018/07/16
O 'subpoena'
2018/07/19
P 'bolton'
2020/01/22
2021/02/15
A '@bts_twt'
2019/05/20
B 'bts'
2019/04/24
2020/12/26
C '#bts'
2018/12/14
D '@weareoneexo'
2017/12/25
E 'exo'
2016/12/02
F '#exo'
2018/11/02
G 'superm'
2019/10/07
A 'white'
2017/08/12
2008/03/31
B 'supremacist'
2017/08/13
C 'nazi'
2017/08/12
2011/09/05
D 'nazis'
2017/08/12
2008/10/14
E 'mass'
2019/08/04
2014/03/12
F 'shooting'
2017/10/02
2020/03/23
G 'massacre'
2017/02/03
2016/11/10
H 'america'
2016/11/09
2013/12/26
I 'putin'
2018/07/16
2009/10/07
J 'china'
2020/03/17
2008/03/20
K 'north'
2013/04/03
2020/12/23
L 'korea'
2013/04/03
2009/01/03
M 'nuclear'
2011/03/12
2012/12/23
N 'kim'
2018/06/13
2008/03/02
O 'jong-un'
2020/04/25
P 'bannon'
2017/08/18
A 'mcgahn'
2019/05/21
B 'giuliani'
2018/05/03
C 'manafort'
2017/10/30
D 'papadopolous'
2017/10/30
E 'cypher'
2017/05/09
2009/08/23
F 'conviction'
2009/09/14
G 'trial'
2020/01/24
2012/12/25
H 'nunes'
2016/12/31
I 'stone'
2019/01/25
2020/03/31
J 'flynn'
2017/02/14
K 'cohen'
2019/02/27
2020/03/11
L 'lewandowski'
2013/04/24
Word Rank r
more talked about
less talked about











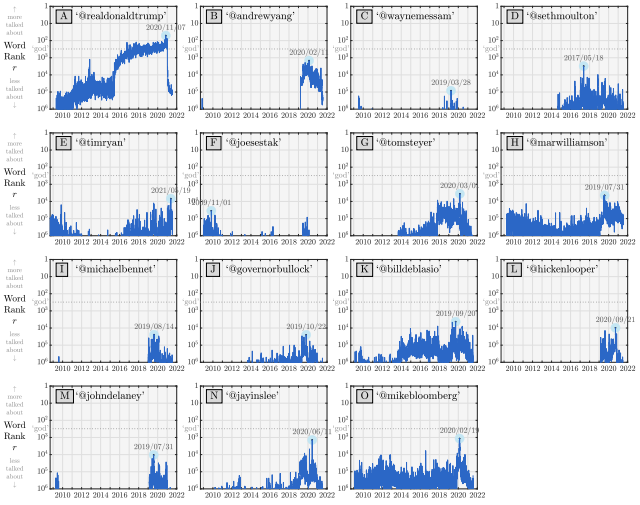
The long tail:

Money
≡
Belief

Two questions about wealth distribution in the United States:

1. Estimate the percentage of all wealth owned by individuals when grouped into quintiles.
2. Estimate what you believe each quintile should own, ideally.
3. Extremes: 100, 0, 0, 0, 0 and 20, 20, 20, 20, 20

"Building a better America—One wealth quintile at a time" Norton and Ariely, 2011. [15]



Wealth distribution in the United States: [15]

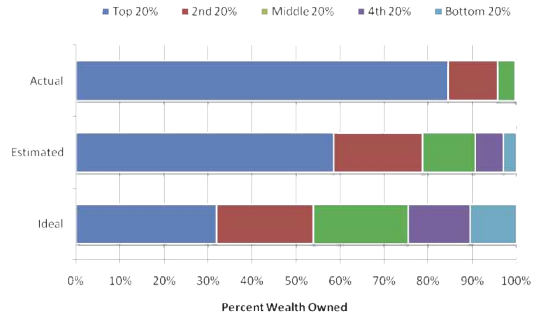


Fig. 2. The actual United States wealth distribution plotted against the estimated and ideal distributions across all respondents. Because of their small percentage share of total wealth, both the "4th 20%" value (0.2%) and the "Bottom 20%" value (0.1%) are not visible in the "Actual" distribution.

"Building a better America—One wealth quintile at a time" Norton and Ariely, 2011. [15]

Wealth distribution in the United States: [15]

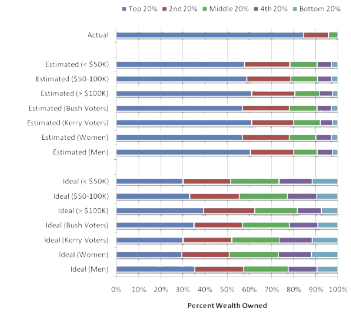
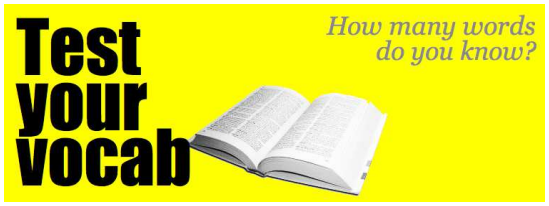


Fig. 3. The actual United States wealth distribution plotted against the estimated and ideal distributions of respondents of different income levels, political affiliations, and genders. Because of their small percentage share of total wealth, both the "4th 20%" value (0.2%) and the "Bottom 20%" value (0.1%) are not visible in the "Actual" distribution.

Aside: The 1% framing may be effective but makes no sense.

Statistics of Surprise
Stories
Mechanics of Fame
Superspreading
Lexical Ultrafame
Turbulent times
Extras
Sociotechnical time series
Adjacent Narratives
Extras
Memory & Turbulence
References

My, what big words you have ...

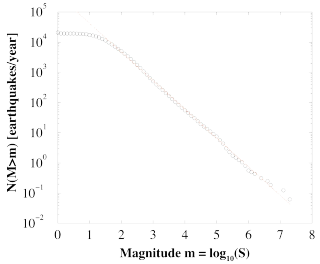


- Test capitalizes on word frequency following a heavily skewed frequency distribution with a decaying power-law tail.
- This Man Can Pronounce Every Word in the Dictionary (story here)
- Best of Dr. Bailly

Statistics of Surprise
Stories
Mechanics of Fame
Superspreading
Lexical Ultrafame
Turbulent times
Extras
Sociotechnical time series
Adjacent Narratives
Extras
Memory & Turbulence
References

The statistics of surprise:

Gutenberg-Richter law



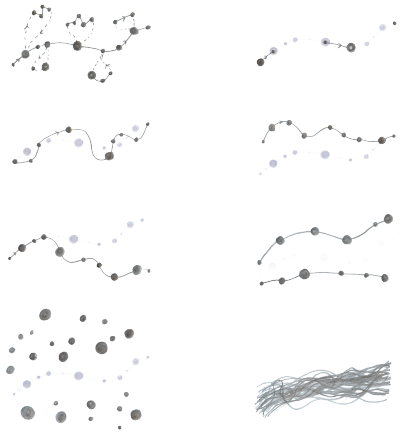
- Log-log plot
- Base 10
- Slope = -1

$N(M > m) \propto m^{-1}$

- From both the very awkwardly similar Christensen et al. and Bak et al.:
  "Unified scaling law for earthquakes" [5, 2]

Statistics of Surprise
Stories
Mechanics of Fame
Superspreading
Lexical Ultrafame
Turbulent times
Extras
Sociotechnical time series
Adjacent Narratives
Extras
Memory & Turbulence
References

- Adjacent narratives—why mistruths and conspiracy theories exist and flourish:

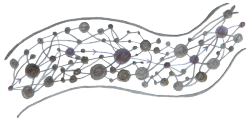


Statistics of Surprise
Stories
Mechanics of Fame
Superspreading
Lexical Ultrafame
Turbulent times
Extras
Sociotechnical time series
Adjacent Narratives
Extras
Memory & Turbulence
References

Why adjacent narratives exist and untrue stories flourish:

1/4. A real story is never recorded and retold completely

- Impossible to record every detail.
- Recording entails compression to scale of medium (narrative hierarchy).
- Story logic will be favored, and seemingly irrelevant aspects discarded.

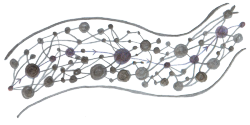


Statistics of Surprise
Stories
Mechanics of Fame
Superspreading
Lexical Ultrafame
Turbulent times
Extras
Sociotechnical time series
Adjacent Narratives
Extras
Memory & Turbulence
References

Why adjacent narratives exist and untrue stories flourish:

2/4. The infinitude of adjacent stories will afford "better" stories

- Better = More engaging, more motivating to spread, more durable under spreading.
- Better stories exist for truthful recorders and retellers (journalists).

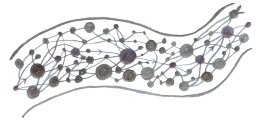


Statistics of Surprise
Stories
Mechanics of Fame
Superspreading
Lexical Ultrafame
Turbulent times
Extras
Sociotechnical time series
Adjacent Narratives
Extras
Memory & Turbulence
References

Why adjacent narratives exist and untrue stories flourish:

3/4. The infinitude of adjacent stories means "better" stories exist for those who would disinform

- Adjacent stories may be truth-limited and/or falsehood-bearing.
- There may exist adjacent stories that conform to a world view/ideology.
- Even the seemingly non-adjacent must have some plausibility (Pizzagate).

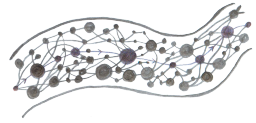


Statistics of Surprise
Stories
Mechanics of Fame
Superspreading
Lexical Ultrafame
Turbulent times
Extras
Sociotechnical time series
Adjacent Narratives
Extras
Memory & Turbulence
References

Why adjacent narratives exist and untrue stories flourish:

4/4. Character is the short cut to story

- The barely implausible can be believed if the character can make it so.
- A believe-to-be evil character can do anything.
- Iterate between character and story to make the character fixed.



Statistics of Surprise
Stories
Mechanics of Fame
Superspreading
Lexical Ultrafame
Turbulent times
Extras
Sociotechnical time series
Adjacent Narratives
Extras
Memory & Turbulence
References

Things that spread quickly:

+ News + Conspiracy Theories ...

buzzfeed.com:

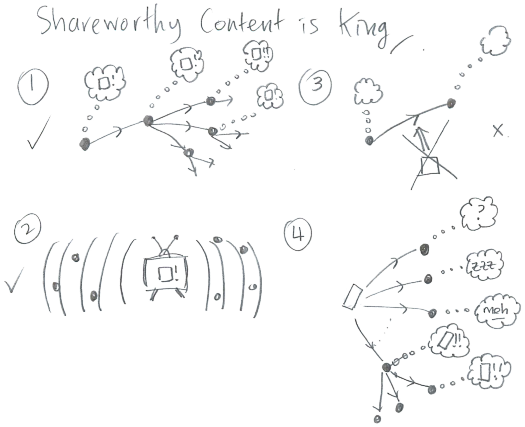
Statistics of Surprise
Stories
Mechanics of Fame
Superspreading
Lexical Ultrafame
Turbulent times
Extras
Sociotechnical time series
Adjacent Narratives
Extras
Memory & Turbulence
References

The boiled-down essence of stories:

The three fundamental events of (non-clone) life:

- Hatchings, Matchings, and Dispatchings.
- Stories encode survival algorithms.
- Survival algorithms are for both individuals and groups.
- Stories are dynamic paths of the true, the possible, the unlikely.
- The unifying theme of existence is existence.

Deep fame:



Shareworthy Content is "King":

1. Build entities/messages/stories that have intrinsic and social value out in the Social Wild.
2. Advertise but lay off the social interactions.
3. Just keep trying and be trustworthy.
4. Of course it can all go wrong and be used for any purpose: good, stupid, bad, evil, ...
5. Essential implication: Billions of people can be harmoniously wrong.
6. Beware the evil, payola version.
7. Challenge: What's the societal vaccine for conspiracy theories?

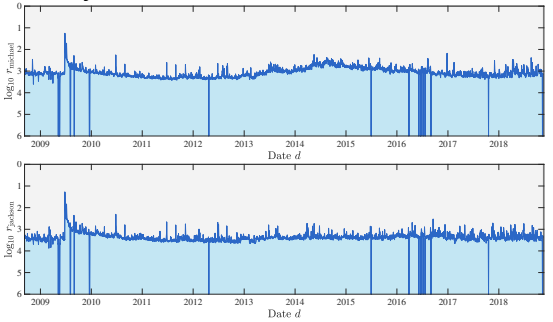
Fame: Zipfian rank-frequency plots

George Kingsley Zipf:

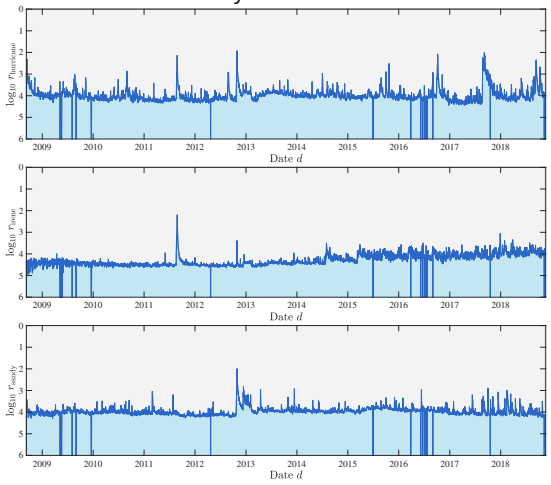
- Noted various rank distributions have power-law tails, often with exponent near -1 (word frequency, city sizes, species numbers, ...)
- Zipf's 1949 Magnum Opus:

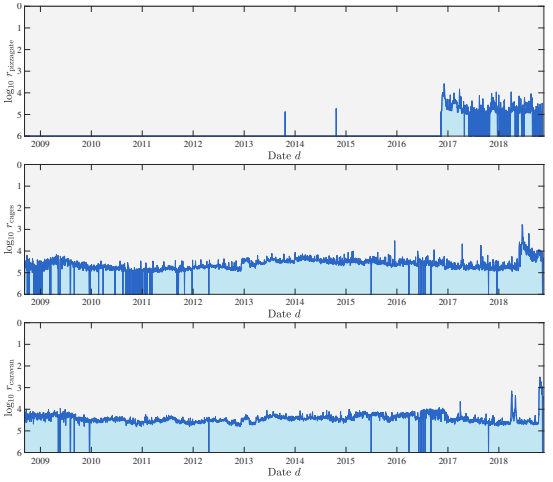
"Human Behaviour and the Principle of Least-Effort" by G. K. Zipf (1949). [20]

Michael Jackson

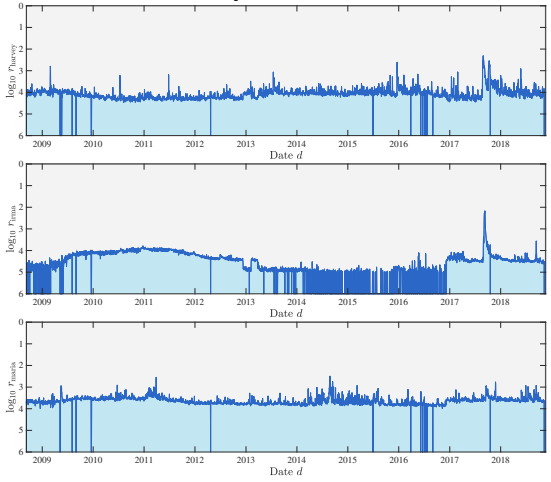


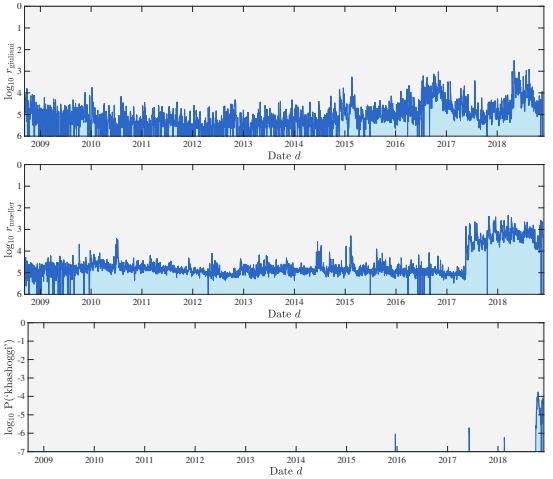
Awareness and Memory: Hurricanes



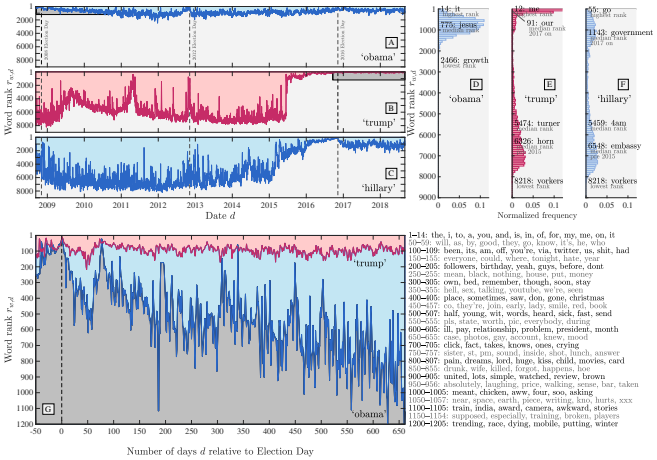


Awareness and Memory: Hurricanes

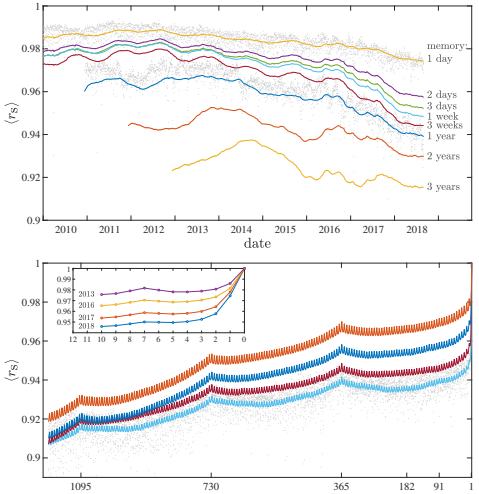




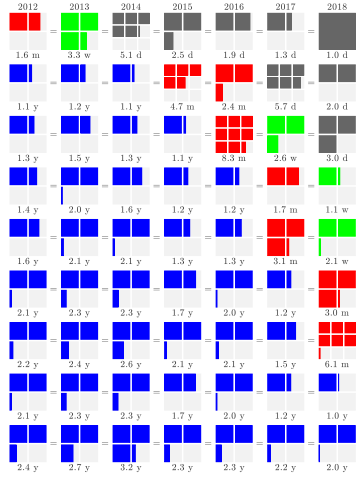
Lexical fame of POTUSes and possible POTUSes:



Story turbulence:



Story turbulence:



References I

[1] P. E. Auerswald.
The Code Economy: A Forty-Thousand Year History.
Oxford University Press, 2017.

[2] P. Bak, K. Christensen, L. Danon, and T. Scanlon.
Unified scaling law for earthquakes.
Phys. Rev. Lett., 88:178501, 2002. pdf

[3] B. Boyd.
On the Origin of Stories: Evolution, Cognition, and Fiction.
Belknap Press, 2010.

[4] E. Cheng.
How to bake pi: An edible exploration of the mathematics of mathematics.
Basic Books, 2015.

References II

[5] K. Christensen, L. Danon, T. Scanlon, and P. Bak.
Unified scaling law for earthquakes.
Proc. Natl. Acad. Sci., 99:2509–2513, 2002. pdf

[6] B. Christian and T. Griffiths.
Algorithms to Live By.
Macmillan, 2016.

[7] P. S. Dodds, J. R. Minot, M. V. Arnold, T. Alshaabi, J. L. Adams, D. R. Dewhurst, A. J. Reagan, and C. M. Danforth.
Fame and Ultrafame: Measuring and comparing daily levels of 'being talked about' for United States' presidents, their rivals, God, countries, and K-pop, 2019.
Available online at https://arxiv.org/abs/1910.00149. pdf

References III

[8] P. S. Dodds, J. R. Minot, M. V. Arnold, T. Alshaabi, J. L. Adams, A. J. Reagan, and C. M. Danforth.
Computational timeline reconstruction of the stories surrounding Trump: Story turbulence, narrative control, and collective chronopathy, 2020.
https://arxiv.org/abs/2008.07301. pdf

[9] M. Erwig.
Once Upon an Algorithm.
MIT Press, 2017.

[10] J. Gottschall.
The Storytelling Animal: How Stories Make Us Human.
Mariner Books, 2013.

References IV

[11] E. Katz and P. F. Lazarsfeld.
Personal Influence.
The Free Press, New York, 1955.

[12] T. Kuran.
Now out of never: The element of surprise in the east european revolution of 1989.
World Politics, 44:7–48, 1991. pdf

[13] J. R. Minot, M. V. Arnold, T. Alshaabi, C. M. Danforth, and P. S. Dodds.
Ratioing the President: An exploration of public engagement with Obama and Trump on Twitter, 2020.
Available online at https://arxiv.org/abs/2006.03526. pdf

References V

[14] R. Munroe.
Thing Explainer: Complicated Stuff in Simple Words.
Houghton Mifflin Harcourt, 2015.

[15] M. I. Norton and D. Ariely.
Building a better America—One wealth quintile at a time.
Perspectives on Psychological Science, 6:9–12, 2011. pdf

[16] W. H. Press, S. A. Teukolsky, W. T. Vetterling, and B. P. Flannery.
Numerical Recipes in C.
Cambridge University Press, second edition, 1992.

References VI

[17] M. Puchner.
The Written World: How Literature Shaped Civilization.
Random, 2017.

[18] M. J. Salganik, P. S. Dodds, and D. J. Watts.
An experimental study of inequality and unpredictability in an artificial cultural market.
Science, 311:854–856, 2006. pdf

[19] D. J. Watts and P. S. Dodds.
Influentials, networks, and public opinion formation.
Journal of Consumer Research, 34:441–458, 2007. pdf

References VII

[20] G. K. Zipf.
Human Behaviour and the Principle of Least-Effort.
Addison-Wesley, Cambridge, MA, 1949.