Computational History

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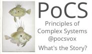
Principles of Complex Systems, Vols. 1, 2, & 3D
CSYS/MATH 6701, 6713, & a pretend number, 2024–2025

Prof. Peter Sheridan Dodds

Computational Story Lab | Vermont Complex Systems Center
Santa Fe Institute | University of Vermont



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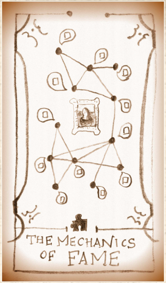
Outline


THE MECHANICS
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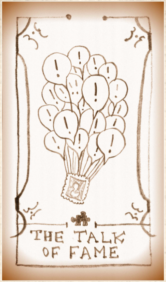
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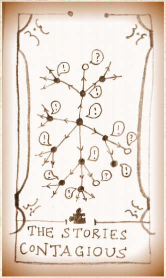
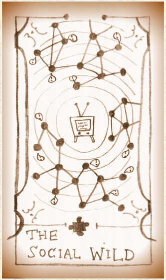
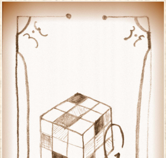
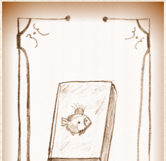
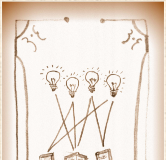
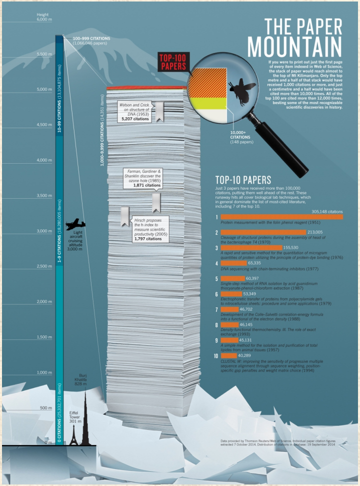
OF FAME

THE STORIES
CONTAGIOUS

THE
SOCIAL WILD





THE STORIES
CONTAGIOUS

Fame by rank



Nature (2014): Most cited papers of all time

Word frequency:

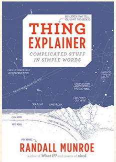
Brown Corpus (~ 10^6 words):

rank	word	% q
1.	the	6.8872
2.	of	3.5839
3.	and	2.8401
4.	to	2.5744
5.	a	2.2996
6.	in	2.1010
7.	that	1.0428
8.	is	0.9943
9.	was	0.9661
10.	he	0.9392
11.	for	0.9340
12.	it	0.8623
13.	with	0.7176
14.	as	0.7137
15.	his	0.6886

rank	word	% q
1945.	apply	0.0055
1946.	vital	0.0055
1947.	September	0.0055
1948.	review	0.0055
1949.	wage	0.0055
1950.	motor	0.0055
1951.	fifteen	0.0055
1952.	regarded	0.0055
1953.	draw	0.0055
1954.	wheel	0.0055
1955.	organized	0.0055
1956.	vision	0.0055
1957.	wild	0.0055
1958.	Palmer	0.0055
1959.	intensity	0.0055

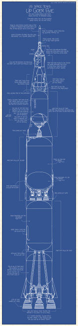
Jonathan Harris's Wordcount:

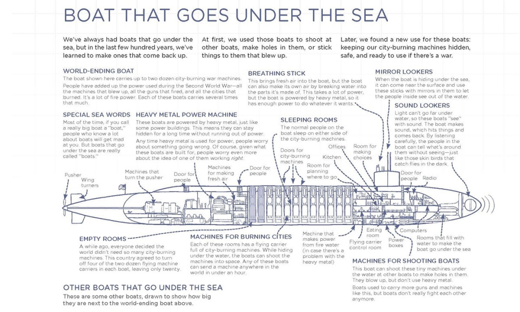
A word frequency distribution explorer:



"Thing Explainer: Complicated Stuff in Simple Words"

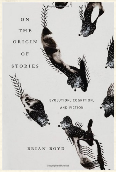
by Randall Munroe (2015). [12]



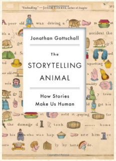


Up goer five

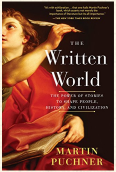
The everywhereness of algorithms and stories:



"On the Origin of Stories: Evolution, Cognition, and Fiction"
by Brian Boyd (2010). [2]

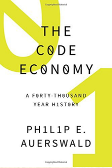


"The Storytelling Animal: How Stories Make Us Human"
by Jonathan Gottschall (2013). [8]

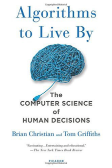


"The Written World: How Literature Shaped Civilization"
by Martin Puchner (2017). [14]

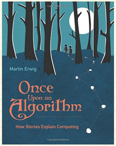
Algorithms, recipes, stories, ...



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



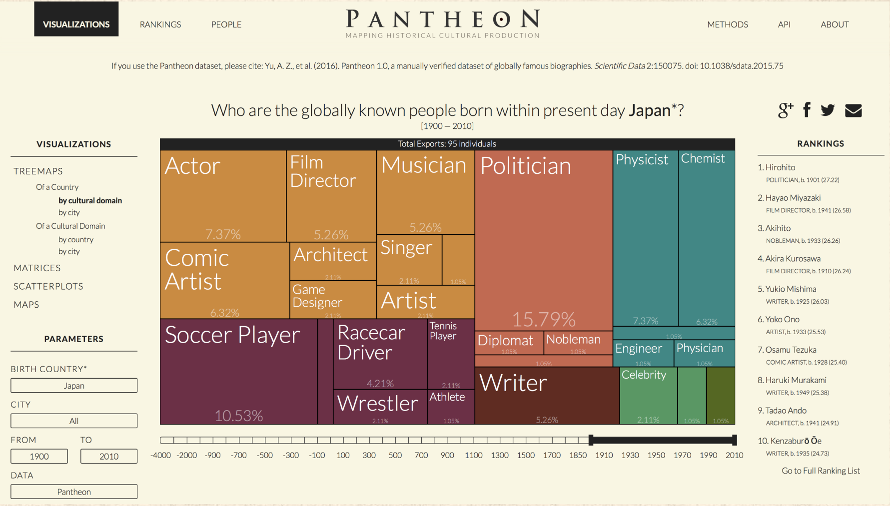
"Algorithms to Live By"
by Christian and Griffiths (2016). [4]



"Once Upon an Algorithm"
by Martin Erwig (2017). [7]

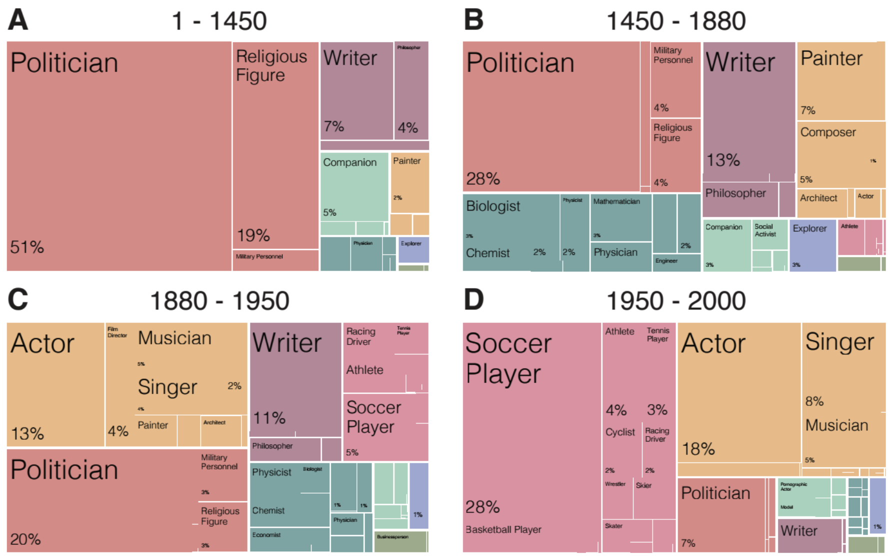
Also: Numerical Recipes in C [13] and How to Bake π [3]

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.

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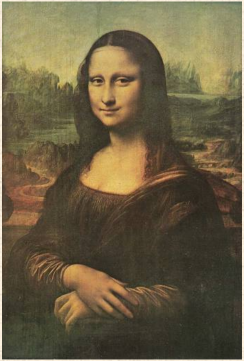
- Study of Agta, Filipino hunter-gatherers.
- Storytelling valued well above all other skills including hunting.
- Stories encode prosocial norms such as cooperation.
- Like the best stories, the best storytellers reproduce more successfully.

The most famous painting in the world:



The dismal predictive powers of editors ......

Twelve ...

The completely unpredicted fall of Eastern Europe:

Timur Kuran: [10] “Now Out of Never: The Element of Surprise in the East European Revolution of 1989”

We understand bushfire stories:

1. Sparks start fires.

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1. Sparks start fires.
2. System properties control a fire's spread.

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3. But for three reasons, we make two mistakes about Social Fires ...

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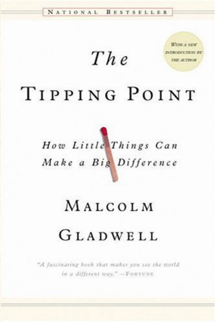
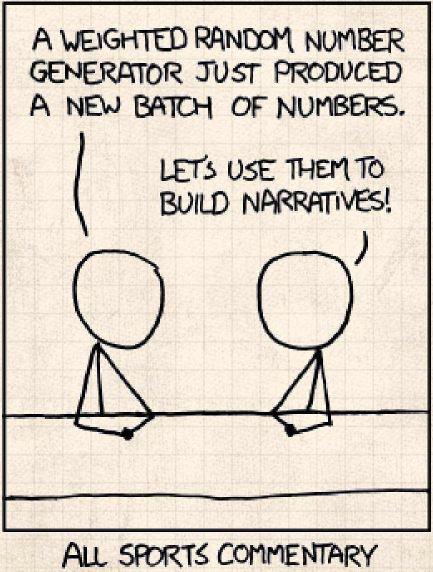


1. Sparks start fires.
2. System properties control a fire's spread.

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.”

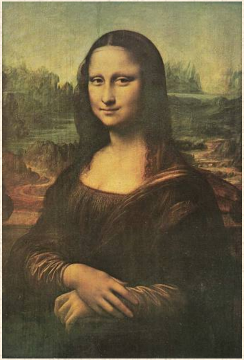
Archival footage:

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

Reason 3—We are spectacular imitators.

BBC/David Attenborough.

Mistake 1:
Success is due to intrinsic properties



See “Becoming Mona Lisa” by David Sassoon

Mistake 1:
Success is due to intrinsic properties

it's just so disappointingly small

See "Becoming Mona Lisa" by David Sassoon

Mistake 1:
Success is due to intrinsic properties

Stolen in 1913, recovered in 1915.

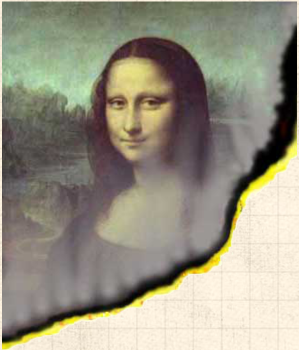
See “Becoming Mona Lisa” by David Sassoon

Mistake 1:
Success is due to intrinsic properties

Hidden during WWII.

See “Becoming Mona Lisa” by David Sassoon

Mistake 1:
Success is due to intrinsic properties

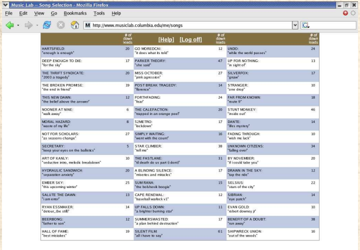


Repeatedly vandalised and attacked.

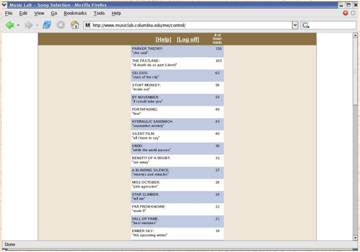
See “Becoming Mona Lisa” by David Sassoon

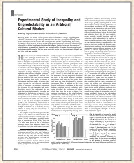
48 songs
30k participants

Exp 1— weak social



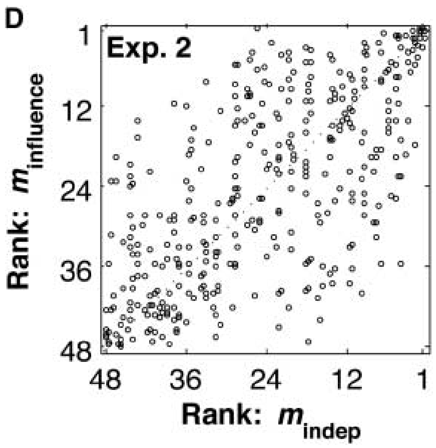
Exp. 2—strong social





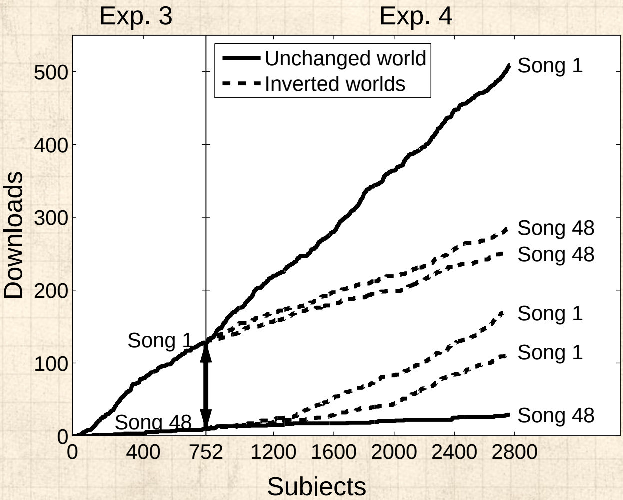
"An experimental study of inequality and unpredictability in an artificial cultural market"
Salganik, Dodds, and Watts,
Science, **311**, 854–856, 2006. [15]

Resolving the paradox:



Increased social awareness leads to Stronger inequality + Less predictability.

Payola/Deceptive advertising hurts us all:



“Mistake” 2:
Seeing success is ‘due to social’ and wanting to say ‘all your interactions are belong to us’

“This is truly the last time, believe me”

The Washington Post

Business • Analysis

14 years of Mark Zuckerberg saying sorry, not sorry

By Geoffrey A. Fowler and Chiqui Esteban April 9, 2018

Do you trust Mark Zuckerberg?

From the moment the Facebook founder entered the public eye in 2003 for creating a Harvard student hot-or-not rating site, he's been apologizing. So we collected this abbreviated history of his public mea culpas.

It reads like a record on repeat. Zuckerberg, who made “move fast and break things” his slogan, says sorry for being naive, and then promises solutions such as privacy “controls,” “transparency” and better policy “enforcement.” And then he promises it again the next time. You can track his sorries in orange and promises in blue in the timeline below.

All the while, Facebook's access to our personal data increases and little changes about the way Zuckerberg handles it. So as Zuckerberg prepares to apologize for the first time in front of Congress, the question that lingers is: What will be different this time?

December 2007

After launching Beacon, which opted-in everyone to sharing with advertisers what they were doing in outside websites and apps.

“ We simply did a bad job with this release, and I apologize for it. ... People need to be able to explicitly choose what they share. ”

February 2009

After unveiling new terms of service that angered users.

“ Over the past couple of days, we received a lot of questions and comments. ... Based on this feedback, we have decided to return to our previous terms of use while we resolve the issues. ”

Commission for deceiving consumers about privacy.

“ I'm the first to admit that we've made a bunch of mistakes. ... Facebook has always been committed to being transparent about the information you have stored with us — and we have led the internet in building tools to give people the ability to see and control what they share. ”

July 2014

After an academic paper exposed that Facebook conducted psychological tests on nearly 700,000 users without their knowledge.

(Apology by Facebook COO Sheryl Sandberg)

Robert Godwin Sr.

“ Our hearts go out to the family and friends of Robert Godwin Sr., and we have a lot of work — and we will keep doing all we can to prevent tragedies like this from happening. ”

September 2017

While revealing a nine-step plan to stop nations from using Facebook to interfere in one another's elections, noting that the amount of “problematic content” found so far is “relatively small.”

“ I care deeply about the democratic process and protecting its integrity. ... It is a new challenge for internet communities to deal with

“ We won't prevent all mistakes or abuse, but we currently make too many errors enforcing our policies and preventing misuse of our tools. ... This will be a serious year of self-improvement and I'm looking forward to learning from working to fix our issues together. ”

March 2018

After details emerged about Cambridge Analytica taking user data.

“ We have a responsibility to protect your data, and if we can't then we don't deserve to serve you. ... We will learn from this experience to secure our platform further and make our community safer for everyone going forward. ”

“ It was my mistake, and I'm sorry. ... There's more we can do here to limit the information developers can access and put more safeguards in place to prevent abuse. ”

Related stories

Facebook: Most users may have had publica data 'scraped'

Facebook COO Sheryl Sandberg on data leak: 'I am really sorry, we are late'

As Facebook confronts data misuse, foreign governments might force real change

What if we paid for Facebook — instead of letting it spy on us for free?

About this story

Photoillustrations based on photos by Tony Avelar/Bloomberg News, Drew Angerer/Getty Images, Jeff Roberson/AP, Jim Watson/Getty Images, Craig Ruttle/AP, Paul Sakuma/AP, Stephen Lam/Reuters, Jose Gomez/Reuters, Richard Drew/AP.

332 Comments

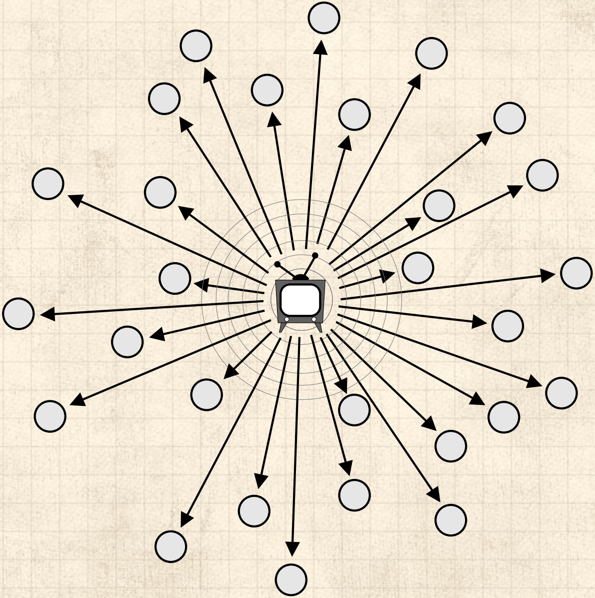
More stories

The Facebook ads Russians showed to different groups

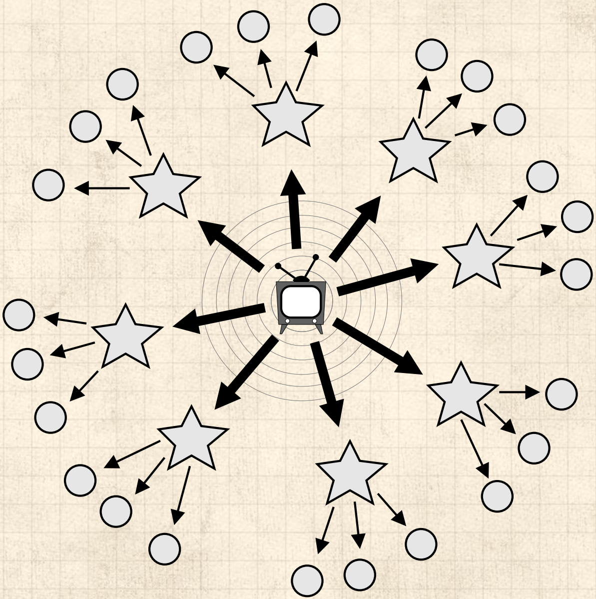
Facebook has said these ads were created by the Internet

WaPo article

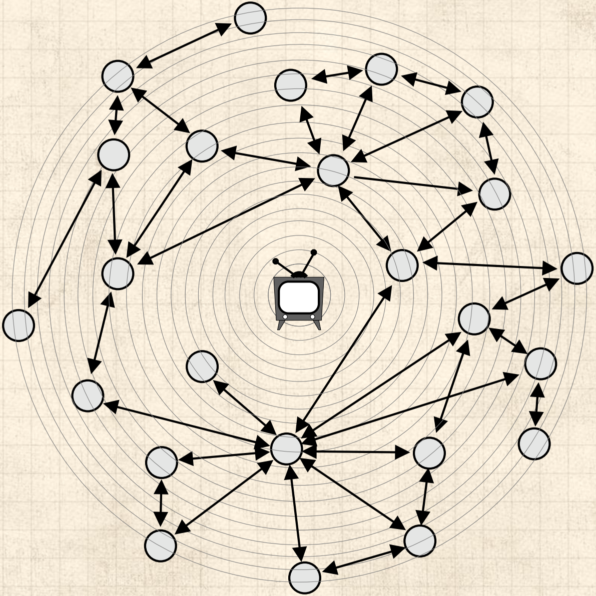
The hypodermic model of influence:



The two step model of influence: [9]



The network model of influence:



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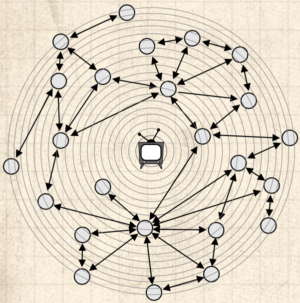
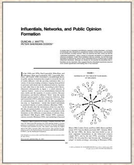


How superspreading works:

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



Influentials, Networks, and Public Opinion Formation

DUNCAN J. WATTS
PETER SHERIDAN DODDS*

"Influentials, Networks, and Public Opinion Formation"
Watts and Dodds,
J. Consum. Res., **34**, 441–458, 2007. [16]

Etymological clarity:

- **Fate**—from the Latin *fatus*: meaning “spoken”.

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- Fate is talk that has been done.
  “It is written”, fore-tell, pre-dict.

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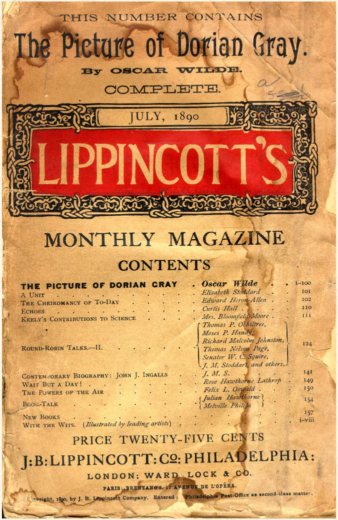
Oscar Wilde, The Picture of Dorian Gray: Raw Fame



THIS NUMBER CONTAINS

The Picture of Dorian Gray.

By OSCAR WILDE.

COMPLETE.

JULY, 1890

LIPPINCOTT'S

MONTHLY MAGAZINE

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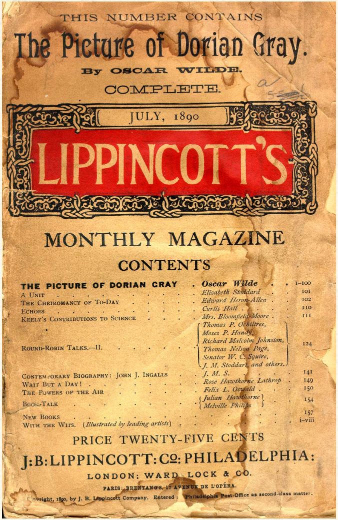
Oscar Wilde, The Picture of Dorian Gray: Raw Fame



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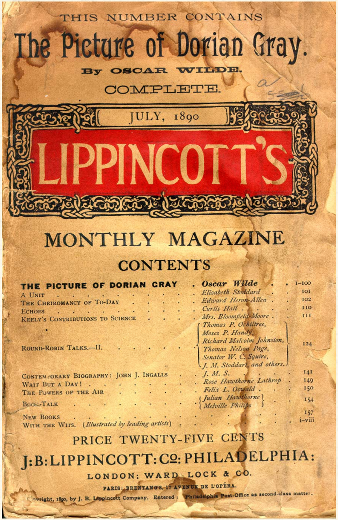
"There is only one thing in the world

Oscar Wilde, The Picture of Dorian Gray: Raw Fame



THIS NUMBER CONTAINS

The Picture of Dorian Gray.

By OSCAR WILDE.

COMPLETE.

JULY, 1890

LIPPINCOTT'S

MONTHLY MAGAZINE

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THE PICTURE OF DORIAN GRAY	*Oscar Wilde*	1–100
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The Cheiromancy of To-Day	*Edward Heron-Allen*	102
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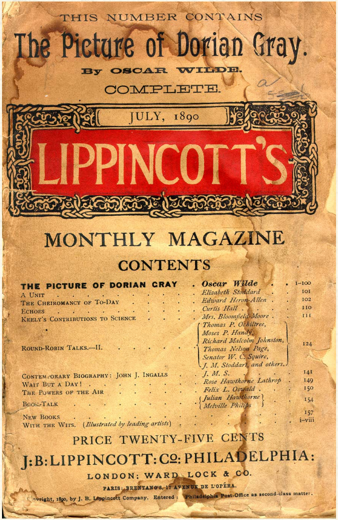
"There is only one thing in the world

worse than being talked about,

Oscar Wilde, The Picture of Dorian Gray: Raw Fame



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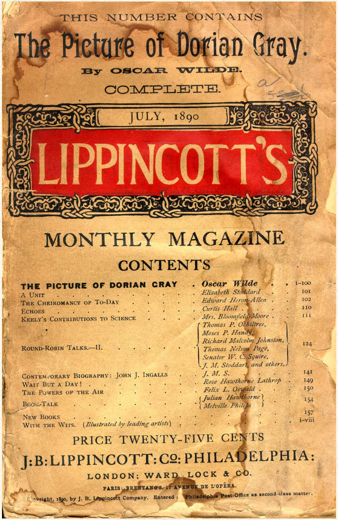
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"There is only one thing in the world

worse than being talked about,

and that is

not being talked about."


THE
DATA POOR

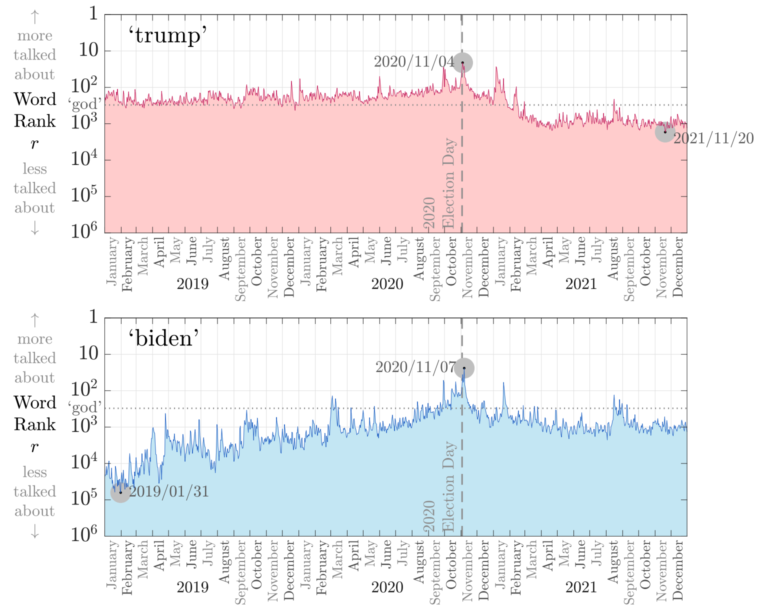

THE POUR,ING
DATA


THE STORIES
CONTAGIOUS

"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. [5]

"Computational timeline reconstruction of the stories surrounding Trump: Story turbulence, narrative control, and collective chronopathy"
Dodds et al.,
, 2020. [6]

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


‘trump’
2020/11/04
2021/11/20
‘god’
2020 Election Day
↑ more talked about
Word Rank r
less talked about ↓
1
10
10^2
10^3
10^4
10^5
10^6
January February March April May June July August September October November December
2019
2020
2021
‘biden’
2020/11/07
2019/01/31

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

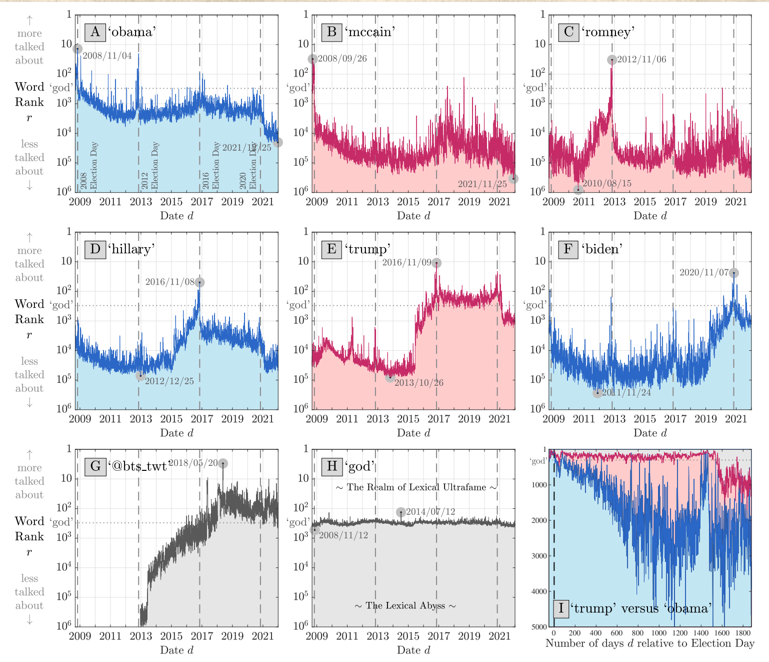
Vox (2019-04-17):
BTS, the band that changed K-pop, explained

Telegnomics

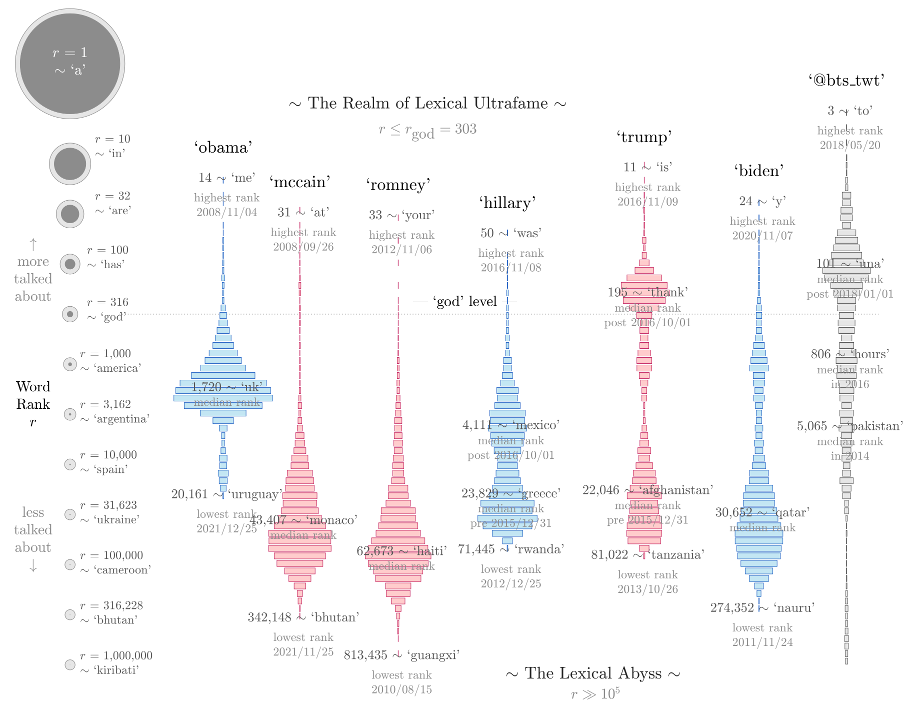
Distant reading by smashing texts into storyons:

```
cd ~/work/stories/2019-10story-turbulence-trump/data/1grams
261G
more updateall.sh
file names:
compute_rank_turbulence_divergence_sweep_the_leg

Zip files:
zless 2018-01-06/1grams/en_*.tar.tsv
zless 2021-01-05/1grams/en_*.tar.tsv
zless 2021-01-06/1grams/en_*.tar.tsv
zless 2021-01-07/1grams/en_*.tar.tsv
```



2011 Whitehouse Correspondents' Dinner



$r = 1$ ~ 'a'
$r = 10$ ~ 'in'
$r = 32$ ~ 'are'
$r = 100$ ~ 'has'
$r = 316$ ~ 'god'
$r = 1{,}000$ ~ 'america'
$r = 3{,}162$ ~ 'argentina'
$r = 10{,}000$ ~ 'spain'
$r = 31{,}623$ ~ 'ukraine'
$r = 100{,}000$ ~ 'cameroon'
$r = 316{,}228$ ~ 'bhutan'
$r = 1{,}000{,}000$ ~ 'kiribati'
↑ more talked about
Word Rank r
less talked about ↓
~ The Realm of Lexical Ultrafame ~
$r \leq r_{\text{god}} = 303$
— 'god' level —
~ The Lexical Abyss ~
$r \gg 10^5$
'obama'
14 ~ 'me' highest rank 2008/11/04
1,720 ~ 'uk' median rank
20,161 ~ 'uruguay' lowest rank 2021/12/25
'mccain'
31 ~ 'at' highest rank 2008/09/26
43,407 ~ 'monaco' median rank
342,148 ~ 'bhutan' lowest rank 2021/11/25
'romney'
33 ~ 'your' highest rank 2012/11/06
62,673 ~ 'haiti' median rank
813,435 ~ 'guangxi' lowest rank 2010/08/15
'hillary'
50 ~ 'was' highest rank 2016/11/08
4,111 ~ 'mexico' median rank post 2016/10/01
23,829 ~ 'greece' median rank pre 2015/12/31
71,445 ~ 'rwanda' lowest rank 2012/12/25
'trump'
11 ~ 'is' highest rank 2016/11/09
195 ~ 'thank' median rank post 2016/10/01
22,046 ~ 'afghanistan' median rank pre 2015/12/31
81,022 ~ 'tanzania' lowest rank 2013/10/26
'biden'
24 ~ 'y' highest rank 2020/11/07
30,652 ~ 'qatar' median rank
274,352 ~ 'nauru' lowest rank 2011/11/24
'@bts_twt'
3 ~ 'to' highest rank 2018/05/20
101 ~ 'una' median rank post 2018/01/01
806 ~ 'hours' median rank in 2016
5,065 ~ 'pakistan' median rank in 2014

Ultrafame—Percentage of days per year ranked above 'god'

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
'barack'	1.8%	0.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
'obama'	54.4%	6.9%	0.5%	0.5%	2.2%	0.3%	0.0%	0.3%	2.2%	2.2%	0.5%	0.0%	0.3%	0.0%
'@barackobama'	0.0%	0.0%	0.0%	0.0%	0.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
'john'	3.5%	0.6%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.3%	0.8%	0.3%	0.5%	0.0%
'mccain'	39.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.3%	1.1%	0.0%	0.0%	0.0%
'@senjohnmccain'	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
'mitt'	0.0%	0.0%	0.0%	0.0%	0.8%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
'romney'	0.0%	0.0%	0.0%	0.0%	1.6%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.3%	0.0%
'@mittromney'	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
'hillary'	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	10.4%	0.0%	0.0%	0.0%	0.0%	0.0%
'clinton'	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	7.7%	0.0%	0.0%	0.0%	0.0%	0.0%
'@hillaryclinton'	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.1%	0.0%	0.0%	0.0%	0.0%	0.0%
'donald'	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	2.7%	0.5%	0.0%	0.0%	1.6%	0.6%
'trump'	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.5%	47.8%	98.6%	93.7%	92.3%	100.0%	10.2%
'@realdonaldtrump'	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	2.7%	26.8%	41.4%	62.7%	90.2%	2.2%
'joe'	3.5%	2.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	8.2%	0.6%
'biden'	1.8%	0.0%	0.0%	0.0%	0.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	23.8%	6.1%
'@joebiden'	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	4.1%	0.3%
'@bts_twt'	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.5%	8.5%	50.7%	100.0%	100.0%	98.9%	93.1%

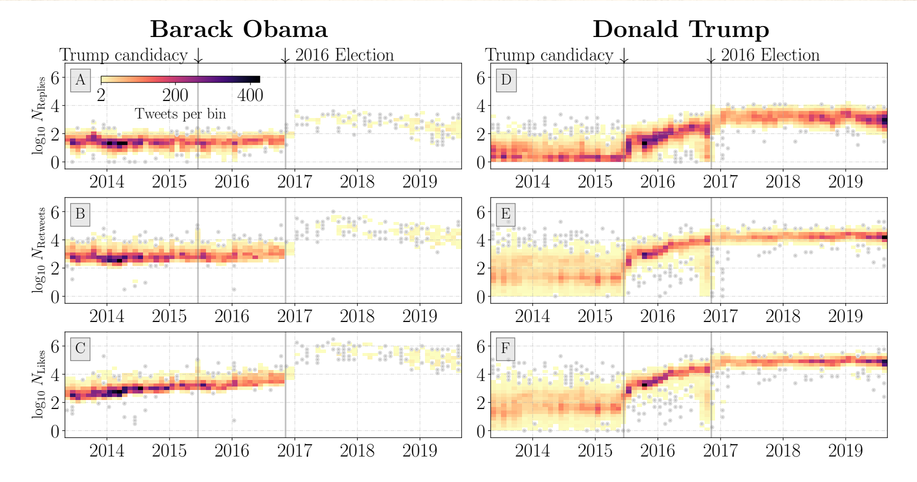
Relative median rates of ‘being talked about’
in the 8 weeks (56 days) pre-election day:

	2008	2012	2016	2020
‘barack’	128	11	11	13
‘obama’	1000	132	135	71
‘@barackobama’	9	24	10	17
‘john’	307	66	72	65
‘mccain’	757	1	2	3
‘@senjohnmccain’	0	0	1	0
‘mitt’	3	50	2	2
‘romney’	2	120	3	3
‘@mittromney’	0	14	1	1
‘hillary’	20	3	357	30
‘clinton’	42	8	326	23
‘@hillaryclinton’	0	0	130	19
‘donald’	7	5	178	135
‘trump’	4	3	656	1001
‘@realdonaldtrump’	0	4	219	656
‘joe’	128	39	32	287
‘biden’	67	4	5	504
‘@joebiden’	0	1	1	212
‘@bts_twt’	0	0	166	1037
‘god’	400	484	362	380

Relative median rates of 'being talked about' per year:

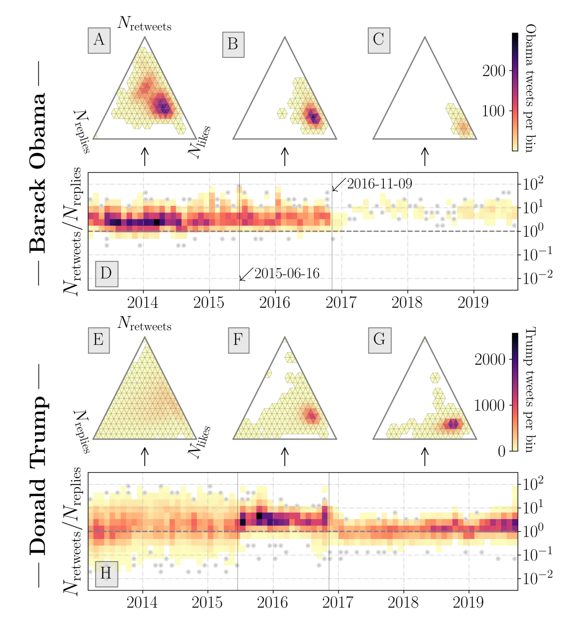
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
'barack'	150	38	17	9	10	7	8	11	14	15	14	14	19	3
'obama'	897	379	152	87	97	79	91	103	156	160	129	106	104	17
'@barackobama'	10	8	11	10	17	15	16	13	13	17	17	13	24	5
'john'	405	274	188	126	117	104	113	121	118	129	128	114	108	82
'mccain'	579	11	4	2	2	2	1	1	3	15	7	5	3	2
'@senjohnmccain'	0	2	1	0	0	1	1	1	1	9	2	0	0	0
'mitt'	5	8	5	6	25	6	5	4	4	2	2	3	3	2
'romney'	3	1	1	4	42	2	1	1	4	1	1	3	4	1
'@mittromney'	0	0	0	0	5	0	0	0	1	0	0	1	1	0
'hillary'	28	10	5	3	3	4	6	30	169	72	61	43	33	6
'clinton'	62	25	16	10	8	6	8	27	140	65	62	45	32	8
'@hillaryclinton'	0	0	0	0	0	0	1	11	71	22	19	21	23	3
'donald'	11	17	11	11	8	6	7	44	166	145	114	104	143	43
'trump'	7	20	10	7	4	3	3	77	583	1000	865	808	1134	229
'@realdonaldtrump'	0	0	0	1	2	3	2	32	219	468	555	652	888	1
'joe'	157	187	138	87	66	58	44	46	50	48	44	78	197	117
'biden'	72	7	3	1	2	2	2	3	5	3	4	52	284	221
'@joebiden'	0	0	0	0	0	0	0	0	1	1	2	18	162	28
'@bts_twt'	0	0	0	0	0	5	36	123	242	595	2487	1802	1440	1437
'god'	666	851	687	694	791	719	607	616	601	590	612	611	612	510

Ratiometrics:

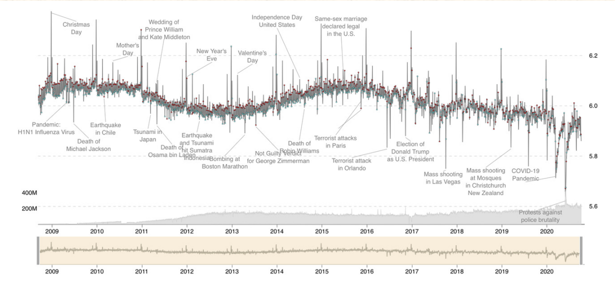


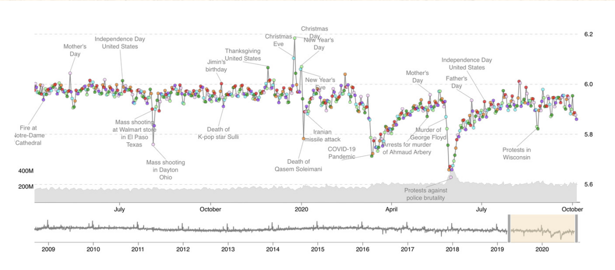
“Ratioing the President: An exploration of public engagement with Obama and Trump on Twitter,” Minot et al., 2020 [11]

Ratiometrics:



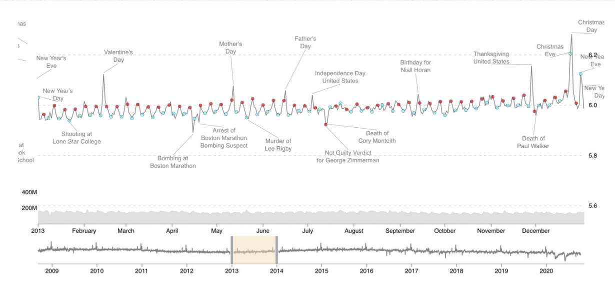
Emotional turbulence:

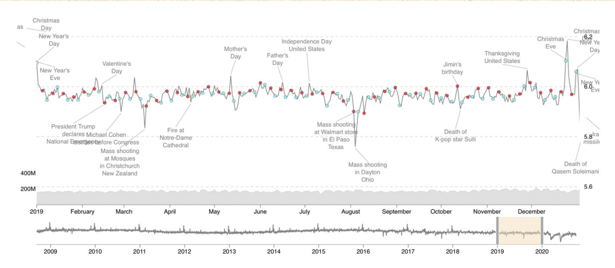




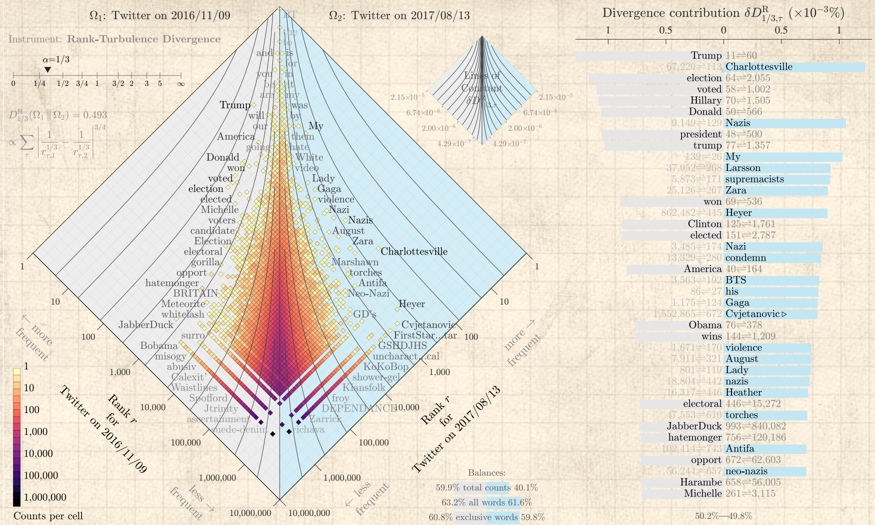
http://hedonometer.org/

Emotional turbulence:



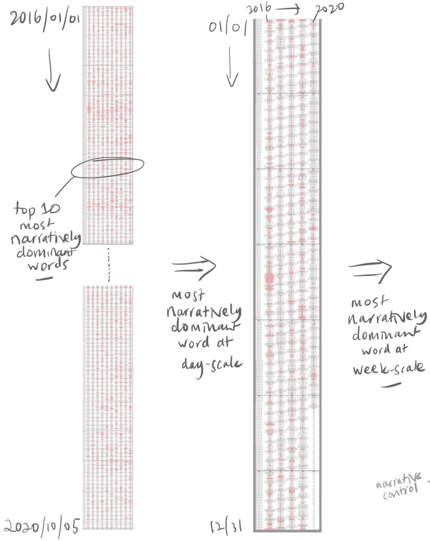


http://hedonometer.org/



Allotaxonometry—
the comparison of complex systems:

http://compstorylab.org/allotaxonometry/



Week	2016	2017	2018	2019	2020
1. 01/01–01/07	Hillary 34.7	hacking 28.6	Bannon 2.2	shutdown 0.0	Iran 9.6
2. 01/08–01/14	Cruz 1.0	Meryl 5.0	Mueller 0.0	shutdown 0.0	Soleimani 5.9
3. 01/15–01/21	Cruz 10.7	inauguration 0.6	DACA 6.7	Pelosi 6.8	Parnas 0.0
4. 01/22–01/28	Cruz 10.6	inauguration 3.1	Mueller 0.0	Pelosi 2.6	Ukraine 5.5
5. 01/29–02/04	Cruz 11.2	ban 2.1	Mueller 0.0	border 0.0	impeachment 0.0
6. 02/05–02/11	Cruz 5.1	Bannon 0.0	memo 2.3	Whitaker 0.0	Vindman 2.5
7. 02/12–02/18	Cruz 6.9	Flynn 0.0	Mueller 0.0	emergency 0.0	Barr 2.2
8. 02/19–02/25	Rubio 3.8	Sweden 4.9	Parkland 0.3	Jussie 0.0	Bloomberg 6.3
9. 02/26–03/04	Rubio 9.2	Russia 6.4	Mueller 0.0	Cohen 3.7	coronavirus 0.0
10. 03/05–03/11	Cruz 1.0	Russian 4.8	Mueller 0.0	Nadler 13.7	coronavirus 0.0
11. 03/12–03/18	Cruz 5.7	tax 1.8	Mueller 2.2	emergency 1.6	coronavirus 0.0
12. 03/19–03/25	Arizona 16.8	Nunes 0.0	Mueller 2.2	Barr 0.0	coronavirus 0.0
13. 03/26–04/01	women 8.3	Russia 9.9	Stormy 0.0	Schiff 5.2	coronavirus 0.5
14. 04/02–04/08	Cruz 1.5	Russia 2.8	Mueller 0.0	returns 0.0	coronavirus 0.0
15. 04/09–04/15	Cruz 1.7	Syria 0.4	Mueller 2.0	Barr 2.4	coronavirus 0.0
16. 04/16–04/22	Cruz 10.5	Russia 0.5	Mueller 0.1	Barr 0.1	coronavirus 0.0
17. 04/23–04/29	Cruz 3.0	days 0.1	Kanye 8.0	Biden 6.0	coronavirus 0.0
18. 04/30–05/06	Indiana 11.5	Trumpcare 0.0	Mueller 0.0	Barr 0.0	coronavirus 0.0
19. 05/07–05/13	Ryan 2.5	Comey 2.8	Iran 6.6	Barr 0.0	coronavirus 0.0
20. 05/14–05/20	Bernie 25.3	Comey 1.0	ZTE 4.5	Barr 0.0	coronavirus 0.0
21. 05/21–05/27	Clinton 9.5	budget 0.0	Korea 18.2	Barr 0.0	pandemic 0.0
22. 05/28–06/03	Hillary 11.9	Kathy 4.4	Roseanne 4.0	USS 3.0	Minneapolis 32.1
23. 06/04–06/10	Clinton 11.1	Comey 0.8	pardon 0.0	Mexico 27.6	police 4.2
24. 06/11–06/17	Orlando 12.4	Mueller 0.0	Kim 4.1	foreign 2.0	Tulsa 4.5
25. 06/18–06/24	Hillary 23.9	Trumpcare 0.0	children 1.0	Iran 12.9	Tulsa 2.1
26. 06/25–07/01	Clinton 13.0	Russia 5.8	Justice 8.3	Moon 29.9	bounties 0.0
27. 07/02–07/08	Crooked 80.6	CNN 0.7	toddlers 0.0	parade 0.0	Rushmore 2.3
28. 07/09–07/15	Crooked 71.5	Russian 1.2	NATO 13.0	Epstein 0.0	coronavirus 0.0
29. 07/16–07/22	Pence 2.9	Mueller 0.0	Helsinki 3.1	racist 0.8	coronavirus 0.0
30. 07/23–07/29	DNC 6.1	Scouts 0.0	Cohen 0.0	Baltimore 13.6	Portland 11.8
31. 07/30–08/05	Khan 6.5	Mueller 0.0	LeBron 0.7	Baltimore 9.4	pandemic 0.0
32. 08/06–08/12	Crooked 55.2	Korea 5.8	Omarosa 0.4	Paso 7.6	USPS 0.0
33. 08/13–08/19	Manafort 0.0	Charlottesville 1.5	Omarosa 9.5	Greenland 6.9	USPS 0.0
34. 08/20–08/26	Clinton 7.6	Charlottesville 3.8	Cohen 2.7	Greenland 8.0	Biden 6.6
35. 08/27–09/02	Crooked 57.4	Harvey 0.0	Ohr 14.0	Dorian 12.2	Kenosha 9.5
36. 09/03–09/09	Bondi 0.0	DACA 2.4	Kavanaugh 2.1	Dorian 12.6	Atlantic 4.8
37. 09/10–09/16	deplorable 0.0	ESPN 2.7	Puerto 7.5	flavored 0.0	Woodward 2.6
38. 09/17–09/23	Clinton 6.5	Kim 4.9	Kavanaugh 1.7	Ukraine 4.5	coronavirus 0.0
39. 09/24–09/30	debate 4.9	Puerto 4.7	Kavanaugh 9.5	Ukraine 6.8	ballots 0.7
40. 10/01–10/07	Pence 4.9	Puerto 2.1	Kavanaugh 6.8	Ukraine 5.1	Covid 0.0
41. 10/08–10/14	sexual 0.3	Puerto 1.8	Kavanaugh 4.3	Kurds 8.2	
42. 10/15–10/21	rigged 10.1	Puerto 0.2	Saudi 5.3	Kurds 3.7	
43. 10/22–10/28	star 0.0	Mueller 0.0	caravan 0.0	impeachment 0.0	
44. 10/29–11/04	FBI 5.9	Mueller 0.0	caravan 0.0	impeachment 0.0	
45. 11/05–11/11	Clinton 0.9	Gillespie 12.0	Whitaker 6.2	Ukraine 6.2	
46. 11/12–11/18	Bannon 0.0	sexual 1.7	caravan 0.0	Ukraine 5.2	
47. 11/19–11/25	Hamilton 12.4	LaVar 21.3	Saudi 1.6	Ukraine 3.5	
48. 11/26–12/02	recount 0.0	Moore 0.0	Moscow 0.1	impeachment 3.1	
49. 12/03–12/09	Taiwan 7.8	Mueller 0.0	Cohen 2.1	impeachment 0.0	
50. 12/10–12/16	Russia 2.9	Mueller 0.0	Cohen 6.9	impeachment 0.0	
51. 12/17–12/23	inauguration 11.8	Mueller 0.0	wall 9.8	impeachment 1.4	
52. 12/24–12/31	inauguration 3.2	Mueller 0.0	wall 20.4	impeachment 7.6	

narrative control

http://compstorylab.org/trumpstoryturbulence/

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open ~/papers/stories/2020-05story-turbulence-trump/package/anc/.
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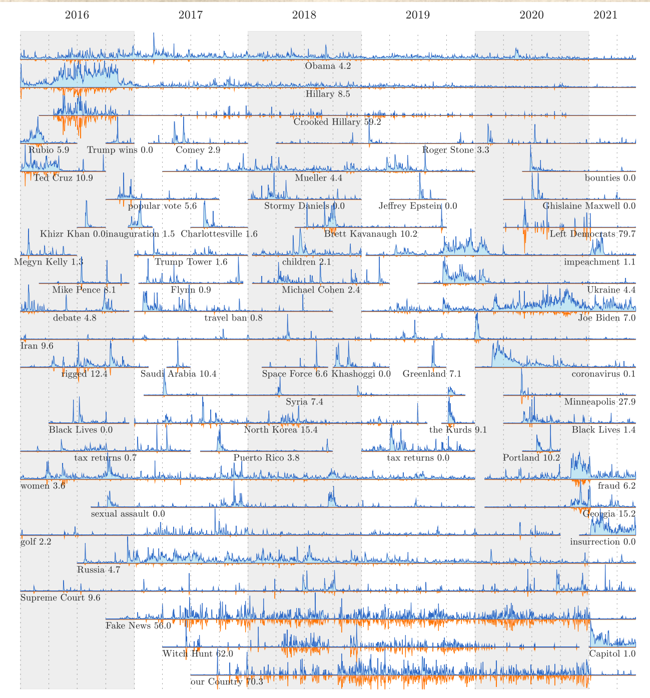
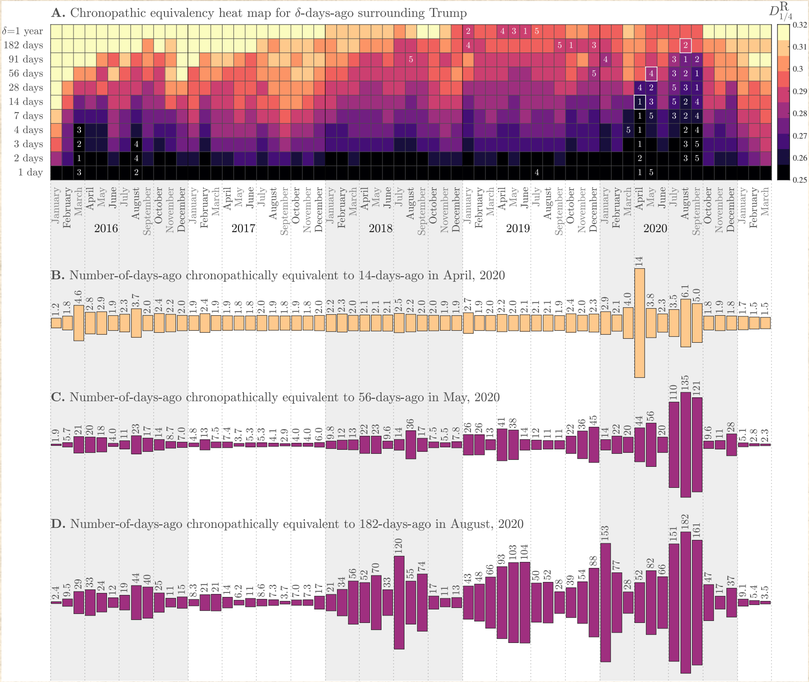
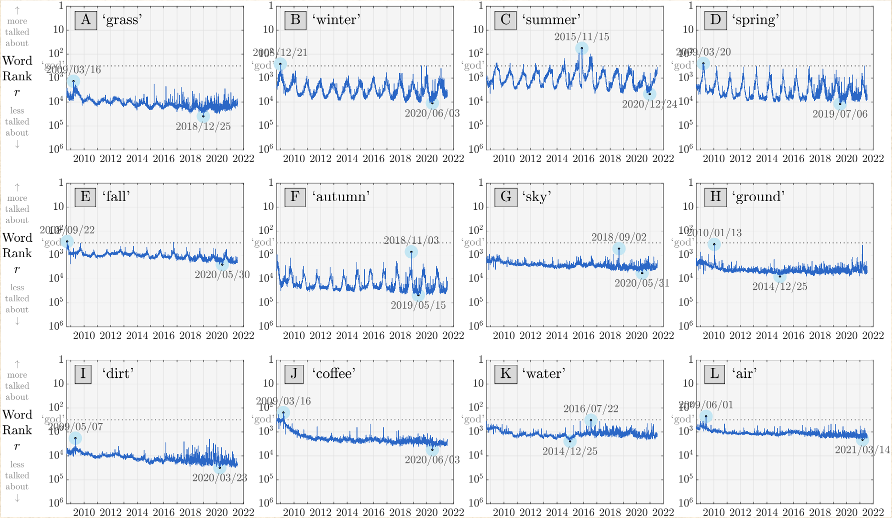
	Week	2016	2017	2018	2019	2020	2021
1.	01/01–01/07	Hillary 34.7	hacking 28.6	Bannon 2.2	shutdown 0.0	Iran 9.6	Georgia 14.7
2.	01/08–01/14	Cruz 1.0	Meryl 5.0	Mueller 0.0	shutdown 0.0	Soleimani 5.9	Capitol 0.1
3.	01/15–01/21	Cruz 10.7	inauguration 0.6	DACA 6.7	Pelosi 6.8	Parnas 0.0	Capitol 0.0
4.	01/22–01/28	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	memo 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	Matt 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	days 0.1	Kanye 8.0	Biden 6.0	coronavirus 0.0	audit 0.0
18.	04/30–05/06	Indiana 11.5	Trumpcare 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	Bernie 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	Roseanne 4.0	USS 3.0	Minneapolis 32.1	reinstated 0.0
23.	06/04–06/10	Clinton 11.1	Comey 0.8	pardon 0.0	Mexico 27.6	police 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	Moon 29.9	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	Russian 1.2	NATO 13.0	Epstein 0.0	coronavirus 0.0	CPAC 0.0
29.	07/16–07/22	Pence 2.9	Mueller 0.0	Helsinki 3.1	racist 0.8	coronavirus 0.0	vaccinated 0.0
30.	07/23–07/29	DNC 6.1	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	Korea 5.8	Omarosa 0.4	Paso 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	Ohr 14.0	Dorian 12.2	Kenosha 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 4.9	Kavanaugh 1.7	Ukraine 4.5	coronavirus 0.0	Eastman 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	rigged 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 10.0	Youngkin 0.0
45.	11/05–11/11	Clinton 0.9	Gillespie 12.0	Whitaker 6.2	Ukraine 6.2	votes 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 24.1	Waukesha 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

Week	2016	2017	2018	2019	2020	2021
1. 01/01–01/07	Hillary Clinton 32.7	plant in 85.1	Steve Bannon 5.7	the government 0.0	a war 6.6	in Georgia 20.2
2. 01/08–01/14	Trump rally 0.0	Meryl Streep 6.6	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 4.9	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 30.1	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	Lyin' 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 Korean 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 Iran 9.0	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 0.0
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 75.1	Jean 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 3.4	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 racist 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 22.2	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	in Detroit 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	North Korea 12.8	Blasey Ford 0.0	a foreign 6.4	Supreme Court 7.3	to overturn 0.0
39. 09/24–09/30	Hillary Clinton 7.5	Puerto Rico 5.2	Brett Kavanaugh 15.7	impeachment inquiry 0.0	Supreme Court 5.7	debt ceiling 0.0
40. 10/01–10/07	Mike Pence 8.9	Puerto Rico 2.6	Supreme Court 6.9	Adam Schiff 13.3	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 0.0
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
52. 12/24–12/31	Trump next 0.0	the FBI 0.1	Border Security 70.6	the Senate 29.1	on January 16.7	Donald Trump 0.0

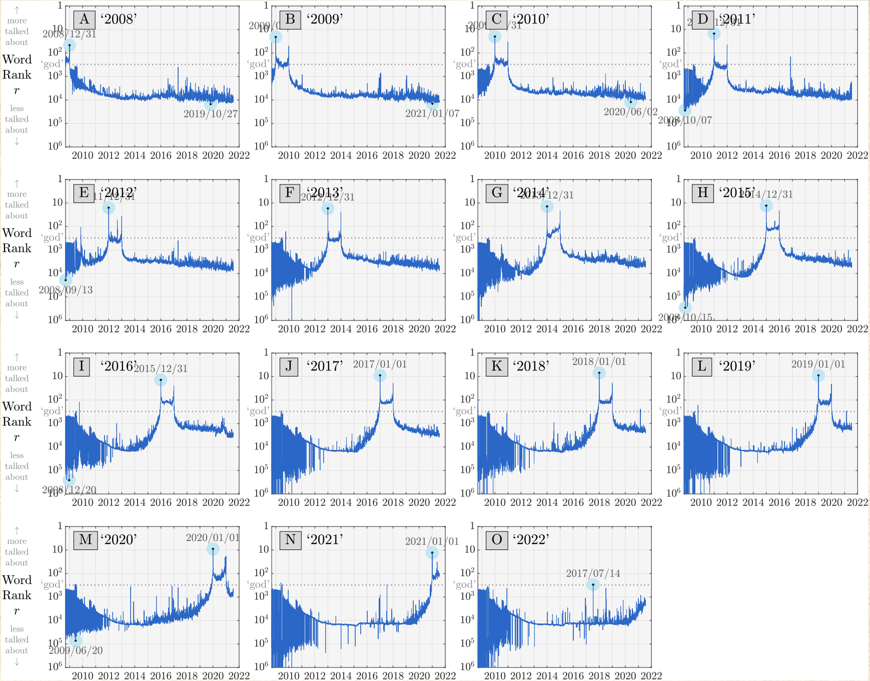

2016
2017
2018
2019
2020
2021
Obama 4.2
Hillary 8.5
Crooked Hillary 59.2
Rubio 5.9
Trump wins 0.0
Comey 2.9
Roger Stone 3.3
Ted Cruz 10.9
Mueller 4.4
bounties 0.0
popular vote 5.6
Stormy Daniels 0.0
Jeffrey Epstein 0.0
Ghislaine Maxwell 0.0
Khizr Khan 0.0
inauguration 1.5
Charlottesville 1.6
Brett Kavanaugh 10.2
Left Democrats 79.7
Megyn Kelly 1.3
Trump Tower 1.6
children 2.1
impeachment 1.1
Mike Pence 8.1
Flynn 0.9
Michael Cohen 2.4
Ukraine 4.4
debate 4.8
travel ban 0.8
Joe Biden 7.0
Iran 9.6
rigged 12.4
Saudi Arabia 10.4
Space Force 6.6
Khashoggi 0.0
Greenland 7.1
coronavirus 0.1
Syria 7.4
Minneapolis 27.9
Black Lives 0.0
North Korea 15.4
the Kurds 9.1
Black Lives 1.4
tax returns 0.7
Puerto Rico 3.8
tax returns 0.0
Portland 10.2
women 3.6
fraud 6.2
sexual assault 0.0
Georgia 15.2
golf 2.2
insurrection 0.0
Russia 4.7
Supreme Court 9.6
Fake News 56.0
Witch Hunt 62.0
Capitol 1.0
our Country 70.3


A. Chronopathic equivalency heat map for δ-days-ago surrounding Trump
$D^{\mathrm{R}}_{1/4}$
δ=1 year
182 days
91 days
56 days
28 days
14 days
7 days
4 days
3 days
2 days
1 day
2016
2017
2018
2019
2020
B. Number-of-days-ago chronopathically equivalent to 14-days-ago in April, 2020
C. Number-of-days-ago chronopathically equivalent to 56-days-ago in May, 2020
D. Number-of-days-ago chronopathically equivalent to 182-days-ago in August, 2020

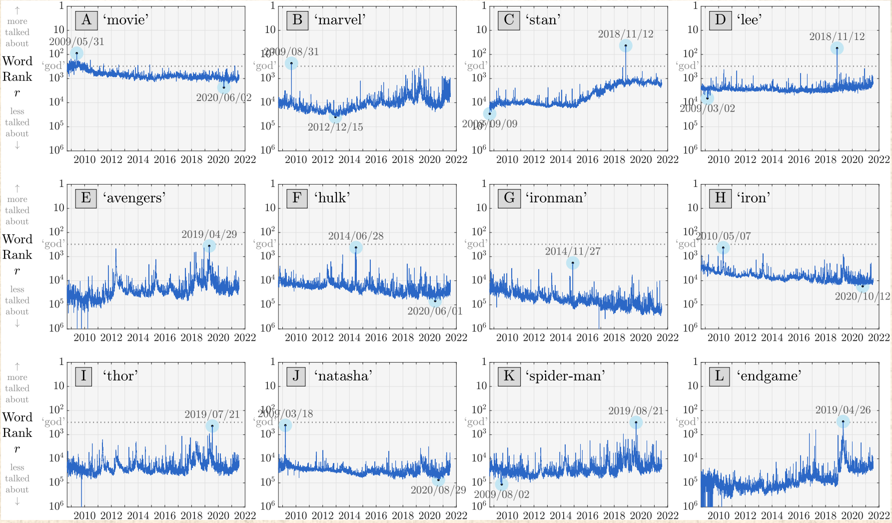
Outline



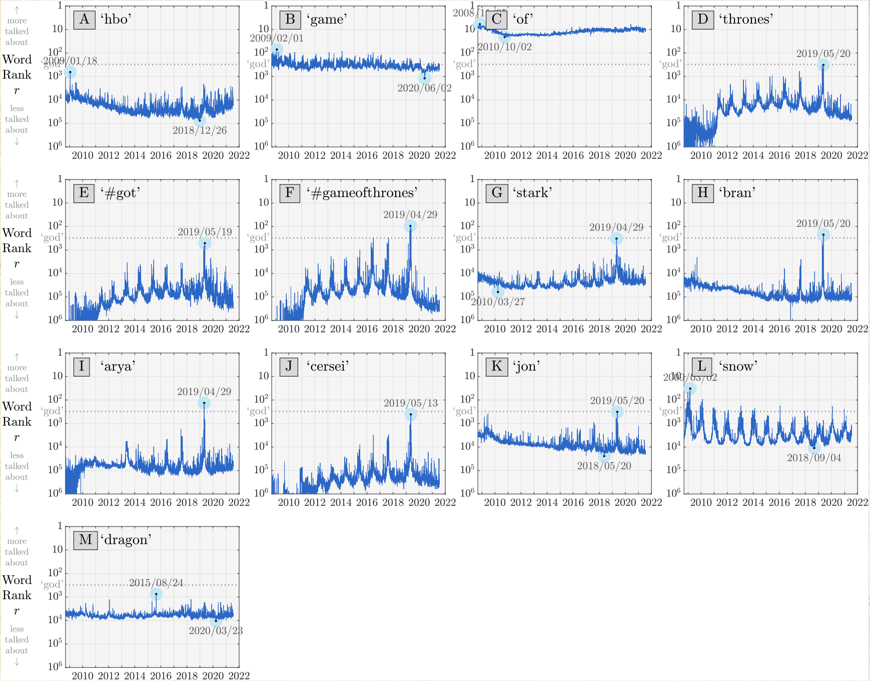
A ‘grass’
2009/03/16
2018/12/25
B ‘winter’
2008/12/21
2020/06/03
C ‘summer’
2015/11/15
2020/12/24
D ‘spring’
2009/03/20
2019/07/06
E ‘fall’
2008/09/22
2020/05/30
F ‘autumn’
2018/11/03
2019/05/15
G ‘sky’
2018/09/02
2020/05/31
H ‘ground’
2010/01/13
2014/12/25
I ‘dirt’
2009/05/07
2020/03/23
J ‘coffee’
2009/03/16
2020/06/03
K ‘water’
2016/07/22
2014/12/25
L ‘air’
2009/06/01
2021/03/14
‘god’
↑ more talked about
Word Rank r
less talked about ↓
1
10
10^2
10^3
10^4
10^5
10^6
2010
2012
2014
2016
2018
2020
2022



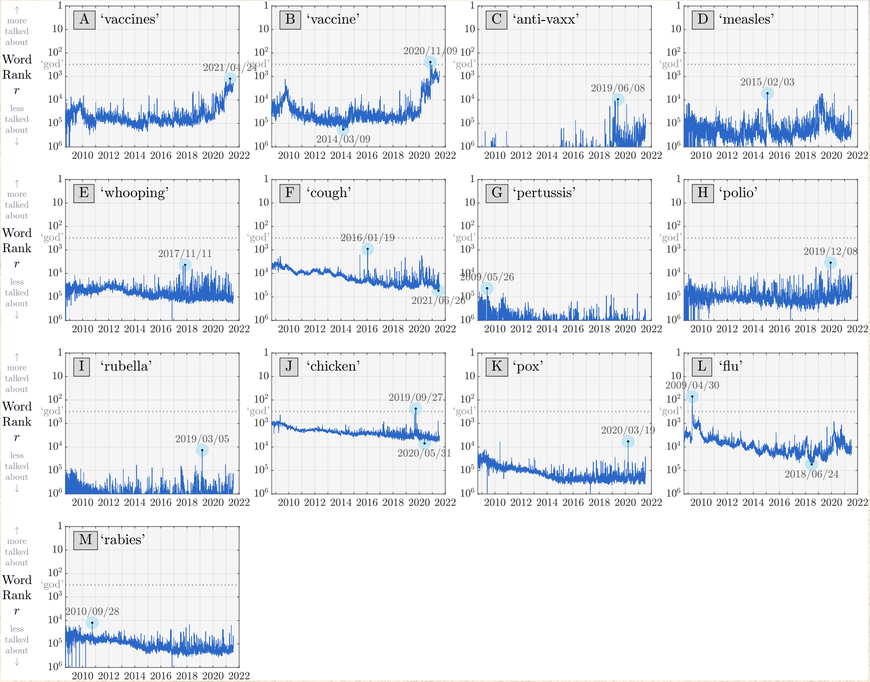
A '2008'
2008/12/31
2019/10/27
B '2009'
2021/01/07
C '2010'
2020/06/02
D '2011'
E '2012'
2008/09/13
F '2013'
G '2014'
H '2015'
2014/12/31
I '2016'
2015/12/31
J '2017'
2017/01/01
K '2018'
2018/01/01
L '2019'
2019/01/01
M '2020'
2020/01/01
2009/06/20
N '2021'
2021/01/01
O '2022'
2017/07/14
'god'
↑ more talked about
Word Rank r
less talked about ↓
2010 2012 2014 2016 2018 2020 2022

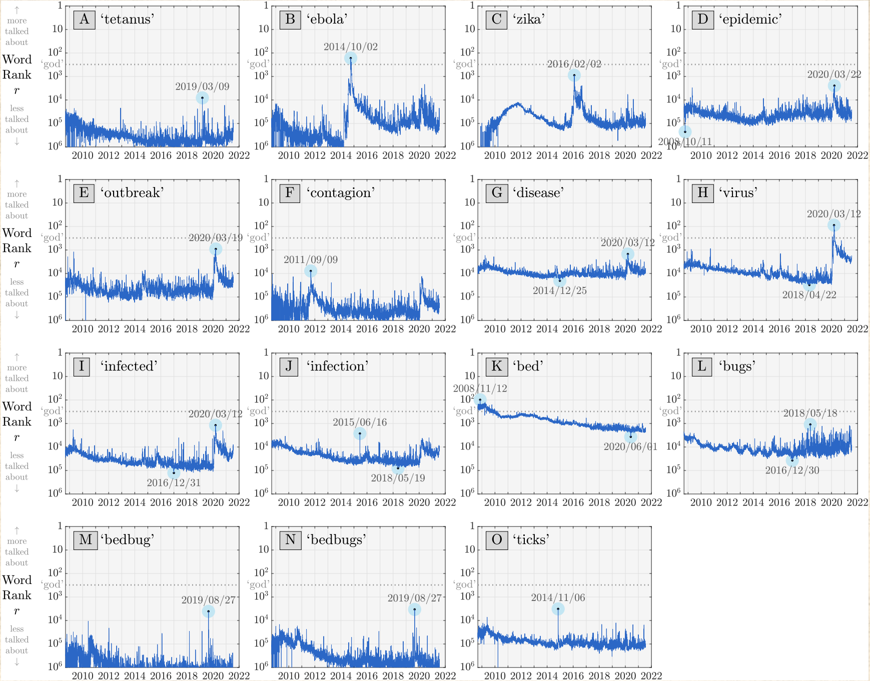


A 'movie'
2009/05/31
2020/06/02
B 'marvel'
2009/08/31
2012/12/15
C 'stan'
2018/11/12
2008/09/09
D 'lee'
2018/11/12
2009/03/02
E 'avengers'
2019/04/29
F 'hulk'
2014/06/28
2020/06/01
G 'ironman'
2014/11/27
H 'iron'
2010/05/07
2020/10/12
I 'thor'
2019/07/21
J 'natasha'
2009/03/18
2020/08/29
K 'spider-man'
2019/08/21
2009/08/02
L 'endgame'
2019/04/26
↑ more talked about
Word Rank r
less talked about ↓
'god'

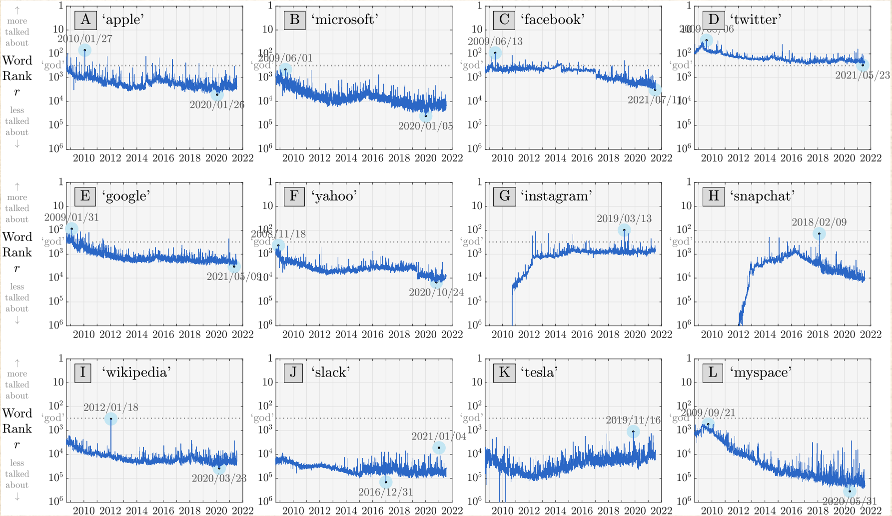


more talked about
Word Rank r
less talked about
A 'hbo'
2009/01/18
2018/12/26
B 'game'
2009/02/01
2020/06/02
C 'of'
2010/10/02
D 'thrones'
2019/05/20
E '#got'
2019/05/19
F '#gameofthrones'
2019/04/29
G 'stark'
2019/04/29
2010/03/27
H 'bran'
2019/05/20
I 'arya'
2019/04/29
J 'cersei'
2019/05/13
K 'jon'
2019/05/20
2018/05/20
L 'snow'
2018/09/04
M 'dragon'
2015/08/24
2020/03/23
'god'
2010 2012 2014 2016 2018 2020 2022

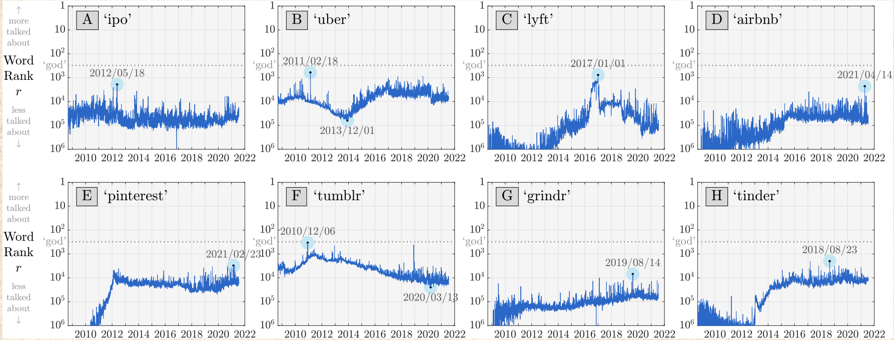

↑ more talked about
Word Rank r
less talked about ↓
'god'
2010 2012 2014 2016 2018 2020 2022
A 'vaccines'
2021/04/24
B 'vaccine'
2020/11/09
2014/03/09
C 'anti-vaxx'
2019/06/08
D 'measles'
2015/02/03
E 'whooping'
2017/11/11
F 'cough'
2016/01/19
2021/06/26
G 'pertussis'
2009/05/26
H 'polio'
2019/12/08
I 'rubella'
2019/03/05
J 'chicken'
2019/09/27
2020/05/31
K 'pox'
2020/03/19
L 'flu'
2009/04/30
2018/06/24
M 'rabies'
2010/09/28



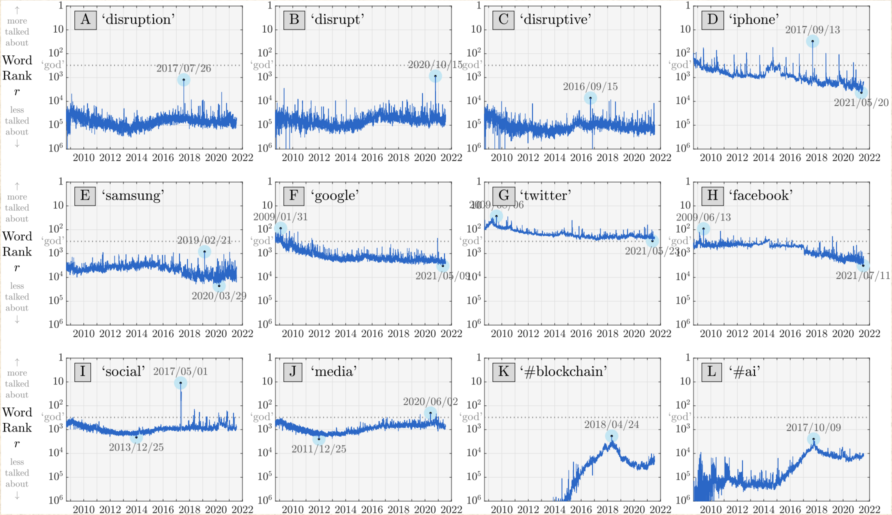
↑ more talked about
Word Rank r
less talked about ↓
A ‘tetanus’
2019/03/09
B ‘ebola’
2014/10/02
C ‘zika’
2016/02/02
D ‘epidemic’
2020/03/22
2008/10/11
E ‘outbreak’
2020/03/19
F ‘contagion’
2011/09/09
G ‘disease’
2020/03/12
2014/12/25
H ‘virus’
2020/03/12
2018/04/22
I ‘infected’
2020/03/12
2016/12/31
J ‘infection’
2015/06/16
2018/05/19
K ‘bed’
2008/11/12
2020/06/01
L ‘bugs’
2018/05/18
2016/12/30
M ‘bedbug’
2019/08/27
N ‘bedbugs’
2019/08/27
O ‘ticks’
2014/11/06
‘god’
1
10
10^2
10^3
10^4
10^5
10^6
2010 2012 2014 2016 2018 2020 2022



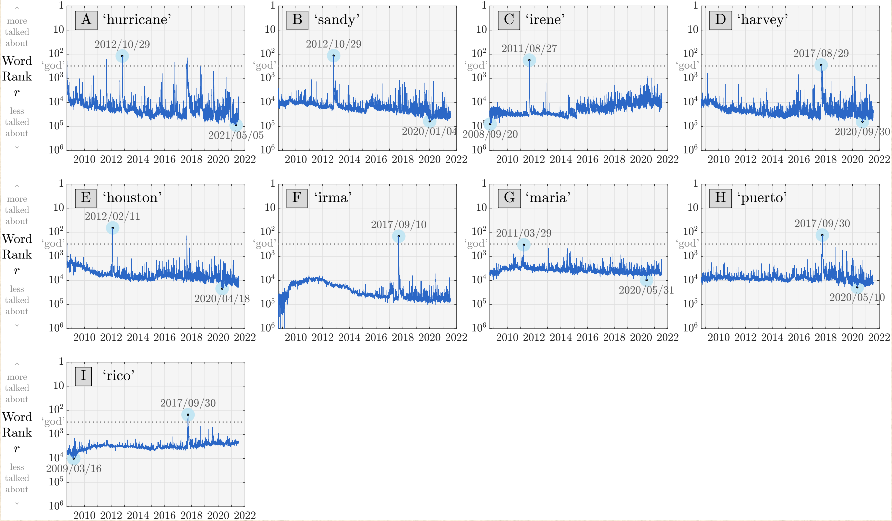
A 'apple'
2010/01/27
2020/01/26
B 'microsoft'
2009/06/01
2020/01/05
C 'facebook'
2009/06/13
2021/07/11
D 'twitter'
2021/05/23
E 'google'
2009/01/31
2021/05/09
F 'yahoo'
2008/11/18
2020/10/24
G 'instagram'
2019/03/13
H 'snapchat'
2018/02/09
I 'wikipedia'
2012/01/18
2020/03/23
J 'slack'
2021/01/04
2016/12/31
K 'tesla'
2019/11/16
L 'myspace'
2009/09/21
2020/05/31
more talked about
Word Rank r
less talked about
'god'



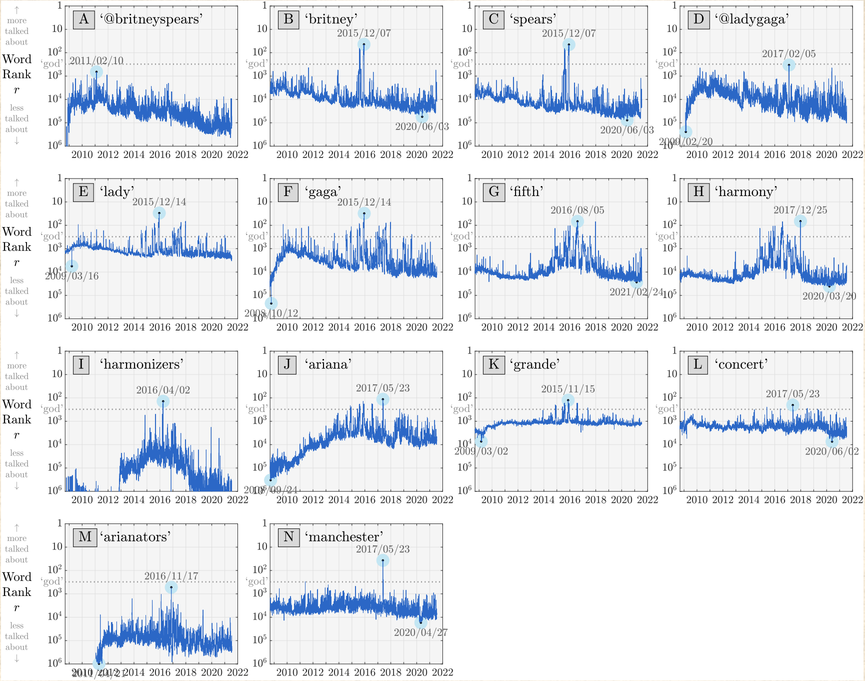
A ‘ipo’
B ‘uber’
C ‘lyft’
D ‘airbnb’
E ‘pinterest’
F ‘tumblr’
G ‘grindr’
H ‘tinder’
↑ more talked about
Word Rank r
less talked about ↓
‘god’
2012/05/18
2011/02/18
2013/12/01
2017/01/01
2021/04/14
2021/02/23
2010/12/06
2020/03/13
2019/08/14
2018/08/23

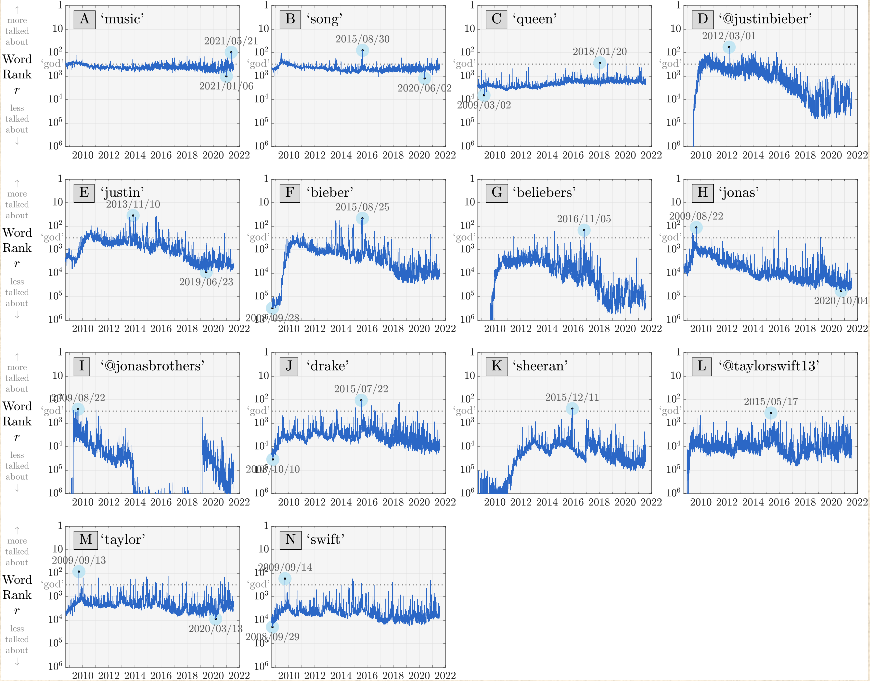


more talked about
Word Rank r
less talked about
A 'disruption' 2017/07/26
B 'disrupt' 2020/10/15
C 'disruptive' 2016/09/15
D 'iphone' 2017/09/13 2021/05/20
E 'samsung' 2019/02/21 2020/03/29
F 'google' 2009/01/31 2021/05/09
G 'twitter' 2021/05/23
H 'facebook' 2009/06/13 2021/07/11
I 'social' 2017/05/01 2013/12/25
J 'media' 2020/06/02 2011/12/25
K '#blockchain' 2018/04/24
L '#ai' 2017/10/09
'god'

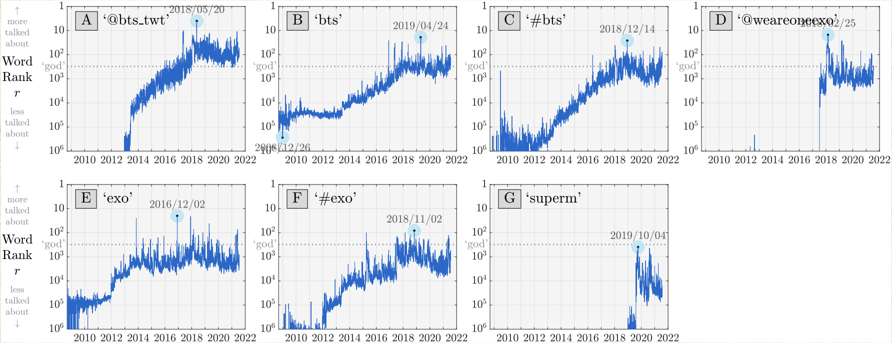


A 'hurricane'
2012/10/29
2021/05/05
B 'sandy'
2012/10/29
2020/01/04
C 'irene'
2011/08/27
2008/09/20
D 'harvey'
2017/08/29
2020/09/30
E 'houston'
2012/02/11
2020/04/18
F 'irma'
2017/09/10
G 'maria'
2011/03/29
2020/05/31
H 'puerto'
2017/09/30
2020/05/10
I 'rico'
2017/09/30
2009/03/16
'god'
↑ more talked about
Word Rank r
less talked about ↓
1
10
10^2
10^3
10^4
10^5
10^6
2010
2012
2014
2016
2018
2020
2022

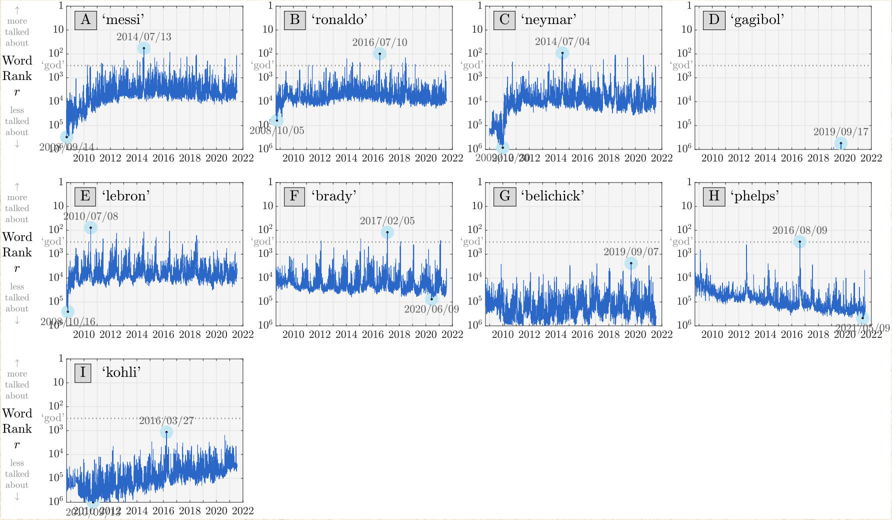

A ‘@britneyspears’
2011/02/10
B ‘britney’
2015/12/07
2020/06/03
C ‘spears’
2015/12/07
2020/06/03
D ‘@ladygaga’
2017/02/05
2009/02/20
E ‘lady’
2015/12/14
2009/03/16
F ‘gaga’
2015/12/14
2008/10/12
G ‘fifth’
2016/08/05
2021/02/24
H ‘harmony’
2017/12/25
2020/03/20
I ‘harmonizers’
2016/04/02
J ‘ariana’
2017/05/23
2008/09/24
K ‘grande’
2015/11/15
2009/03/02
L ‘concert’
2017/05/23
2020/06/02
M ‘arianators’
2016/11/17
2010/04/21
N ‘manchester’
2017/05/23
2020/04/27
more talked about
Word Rank r
less talked about
‘god’
1
10
10^2
10^3
10^4
10^5
10^6
2010
2012
2014
2016
2018
2020
2022



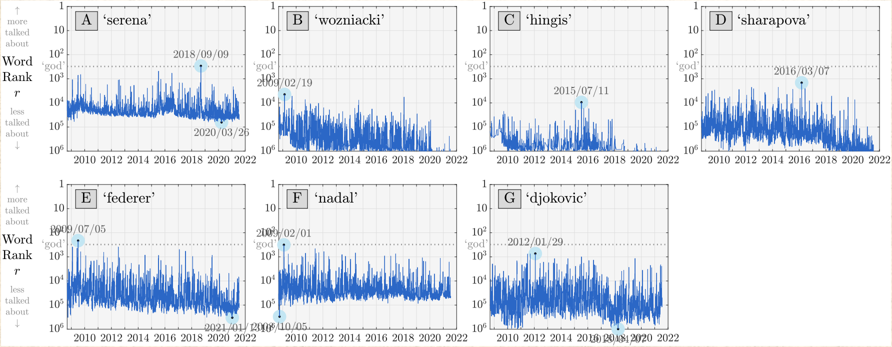
A 'music'
2021/05/21
2021/01/06
B 'song'
2015/08/30
2020/06/02
C 'queen'
2018/01/20
2009/03/02
D '@justinbieber'
2012/03/01
E 'justin'
2013/11/10
2019/06/23
F 'bieber'
2015/08/25
2008/09/28
G 'beliebers'
2016/11/05
H 'jonas'
2009/08/22
2020/10/04
I '@jonasbrothers'
2009/08/22
J 'drake'
2015/07/22
2008/10/10
K 'sheeran'
2015/12/11
L '@taylorswift13'
2015/05/17
M 'taylor'
2009/09/13
2020/03/13
N 'swift'
2009/09/14
2008/09/29
↑ more talked about
Word Rank r
less talked about ↓
'god'

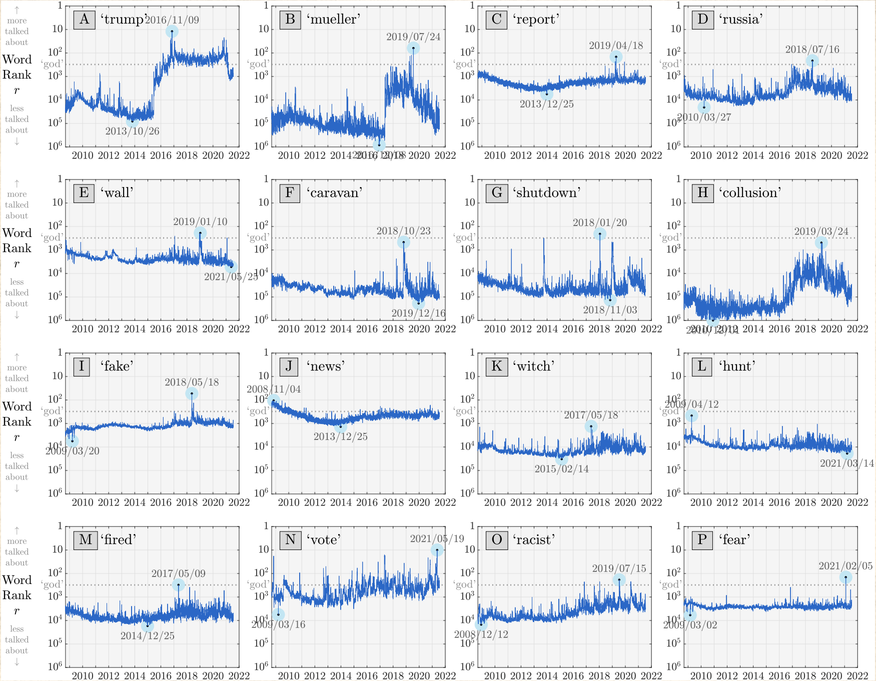


A ‘@bts_twt’
2018/05/20
B ‘bts’
2019/04/24
2008/12/26
C ‘#bts’
2018/12/14
D ‘@weareoneexo’
E ‘exo’
2016/12/02
F ‘#exo’
2018/11/02
G ‘superm’
2019/10/04
more talked about
Word Rank r
less talked about
‘god’

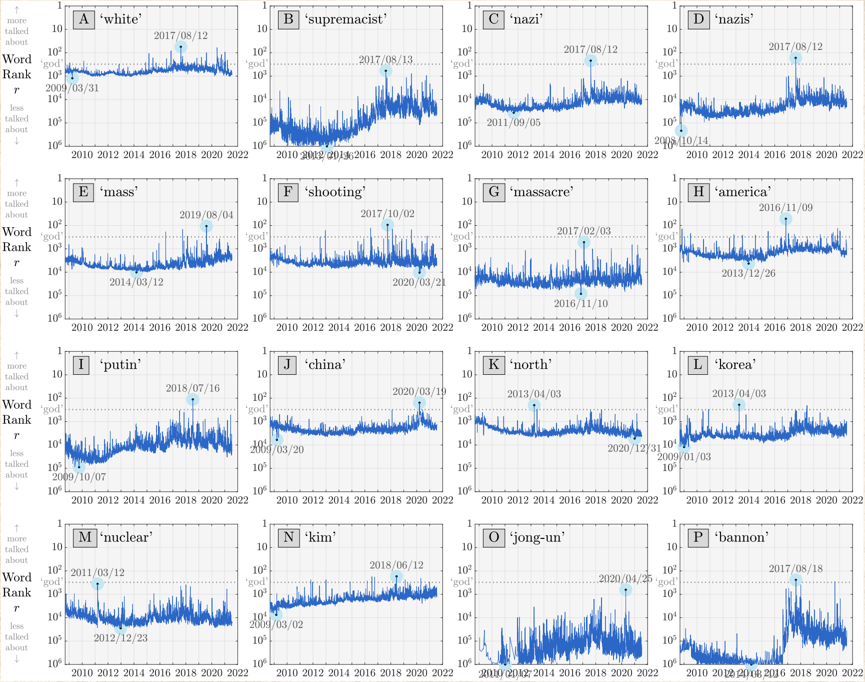


↑ more talked about
Word Rank r
less talked about ↓
‘god’
A ‘messi’
2014/07/13
2008/09/14
B ‘ronaldo’
2016/07/10
2008/10/05
C ‘neymar’
2014/07/04
D ‘gagibol’
2019/09/17
E ‘lebron’
2010/07/08
2008/10/16
F ‘brady’
2017/02/05
2020/06/09
G ‘belichick’
2019/09/07
H ‘phelps’
2016/08/09
2021/05/09
I ‘kohli’
2016/03/27
1
10
10^2
10^3
10^4
10^5
10^6
2010
2012
2014
2016
2018
2020
2022

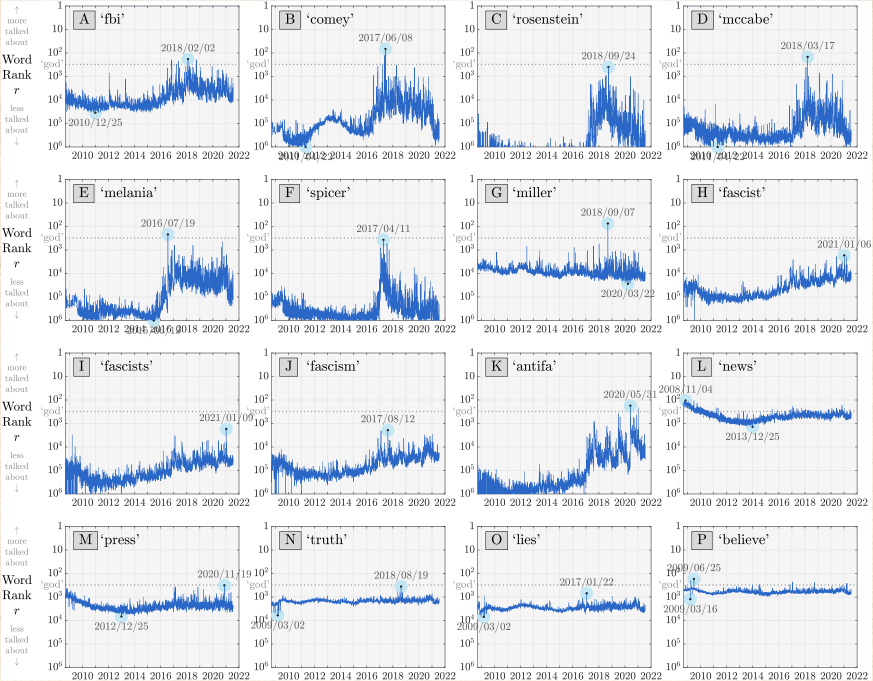

A 'serena'
2018/09/09
2020/03/26
B 'wozniacki'
2009/02/19
C 'hingis'
2015/07/11
D 'sharapova'
2016/03/07
E 'federer'
2009/07/05
2021/01/13
F 'nadal'
2009/02/01
2008/10/05
G 'djokovic'
2012/01/29
2018/01/07
'god'
more talked about
Word Rank r
less talked about
2010 2012 2014 2016 2018 2020 2022



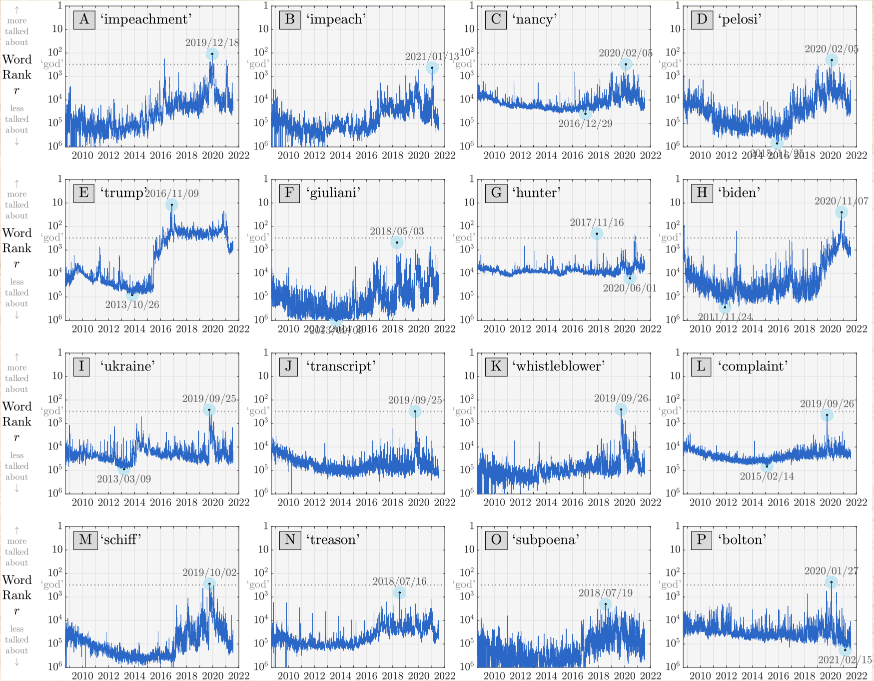
↑ more talked about
Word Rank r
less talked about ↓
A ‘trump’
2016/11/09
2013/10/26
B ‘mueller’
2019/07/24
C ‘report’
2019/04/18
2013/12/25
D ‘russia’
2018/07/16
2010/03/27
E ‘wall’
2019/01/10
2021/05/25
F ‘caravan’
2018/10/23
2019/12/16
G ‘shutdown’
2018/01/20
2018/11/03
H ‘collusion’
2019/03/24
I ‘fake’
2018/05/18
2009/03/20
J ‘news’
2008/11/04
2013/12/25
K ‘witch’
2017/05/18
2015/02/14
L ‘hunt’
2009/04/12
2021/03/14
M ‘fired’
2017/05/09
2014/12/25
N ‘vote’
2021/05/19
2009/03/16
O ‘racist’
2019/07/15
2008/12/12
P ‘fear’
2021/02/05
2009/03/02
‘god’
2010 2012 2014 2016 2018 2020 2022

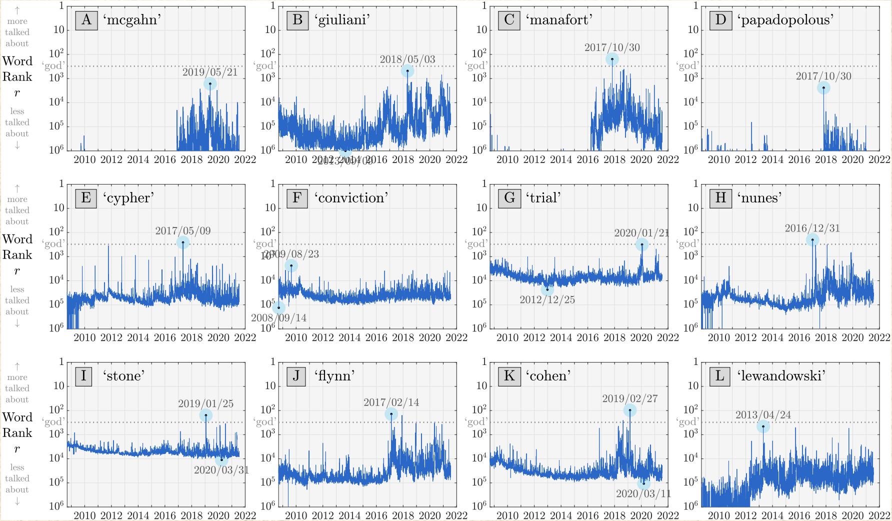


Word Rank r
↑ more talked about
less talked about ↓
'god'
A 'white'
2017/08/12
2009/03/31
B 'supremacist'
2017/08/13
C 'nazi'
2017/08/12
2011/09/05
D 'nazis'
2017/08/12
2008/10/14
E 'mass'
2019/08/04
2014/03/12
F 'shooting'
2017/10/02
2020/03/21
G 'massacre'
2017/02/03
2016/11/10
H 'america'
2016/11/09
2013/12/26
I 'putin'
2018/07/16
2009/10/07
J 'china'
2020/03/19
2009/03/20
K 'north'
2013/04/03
2020/12/31
L 'korea'
2013/04/03
2009/01/03
M 'nuclear'
2011/03/12
2012/12/23
N 'kim'
2018/06/12
2009/03/02
O 'jong-un'
2020/04/25
P 'bannon'
2017/08/18
2010 2012 2014 2016 2018 2020 2022

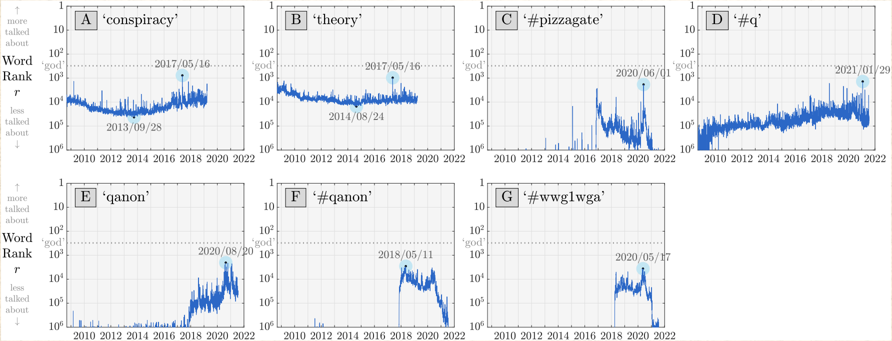


A 'fbi'
2018/02/02
2010/12/25
B 'comey'
2017/06/08
2011/04/22
C 'rosenstein'
2018/09/24
D 'mccabe'
2018/03/17
2011/04/22
E 'melania'
2016/07/19
2015/06/13
F 'spicer'
2017/04/11
G 'miller'
2018/09/07
2020/03/22
H 'fascist'
2021/01/06
I 'fascists'
2021/01/09
J 'fascism'
2017/08/12
K 'antifa'
2020/05/31
L 'news'
2008/11/04
2013/12/25
M 'press'
2020/11/19
2012/12/25
N 'truth'
2018/08/19
2009/03/02
O 'lies'
2017/01/22
2009/03/02
P 'believe'
2009/06/25
2009/03/16
↑ more talked about
Word Rank r
less talked about ↓
'god'
2010 2012 2014 2016 2018 2020 2022

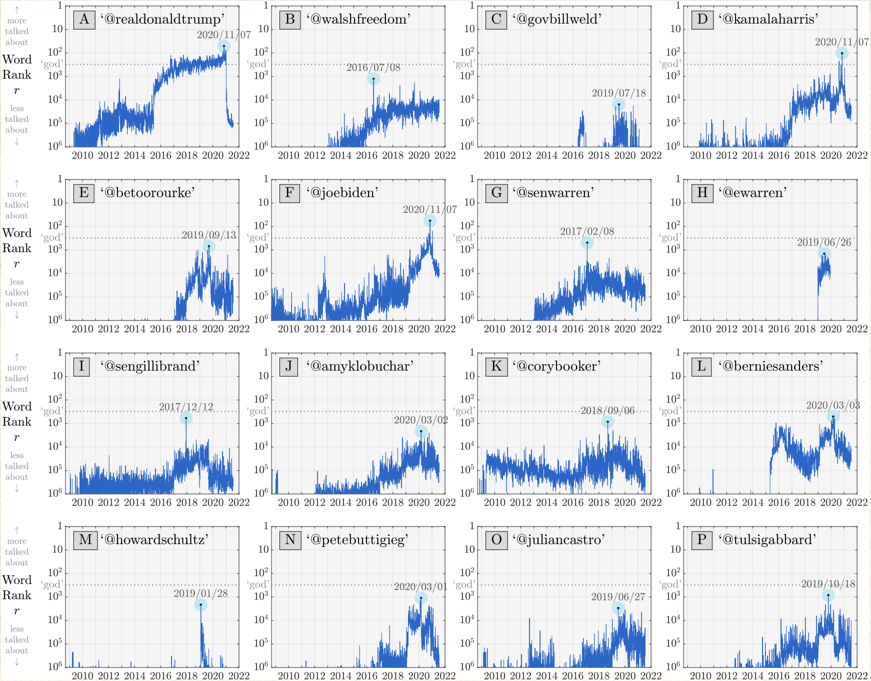

↑ more talked about
Word Rank r
less talked about ↓
'god'
A 'impeachment'
2019/12/18
B 'impeach'
2021/01/13
C 'nancy'
2020/02/05
2016/12/29
D 'pelosi'
2020/02/05
2015/11/25
E 'trump'
2016/11/09
2013/10/26
F 'giuliani'
2018/05/03
2013/06/05
G 'hunter'
2017/11/16
2020/06/01
H 'biden'
2020/11/07
2011/11/24
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'
2020/01/27
2021/02/15
1
10
10^2
10^3
10^4
10^5
10^6
2010 2012 2014 2016 2018 2020 2022



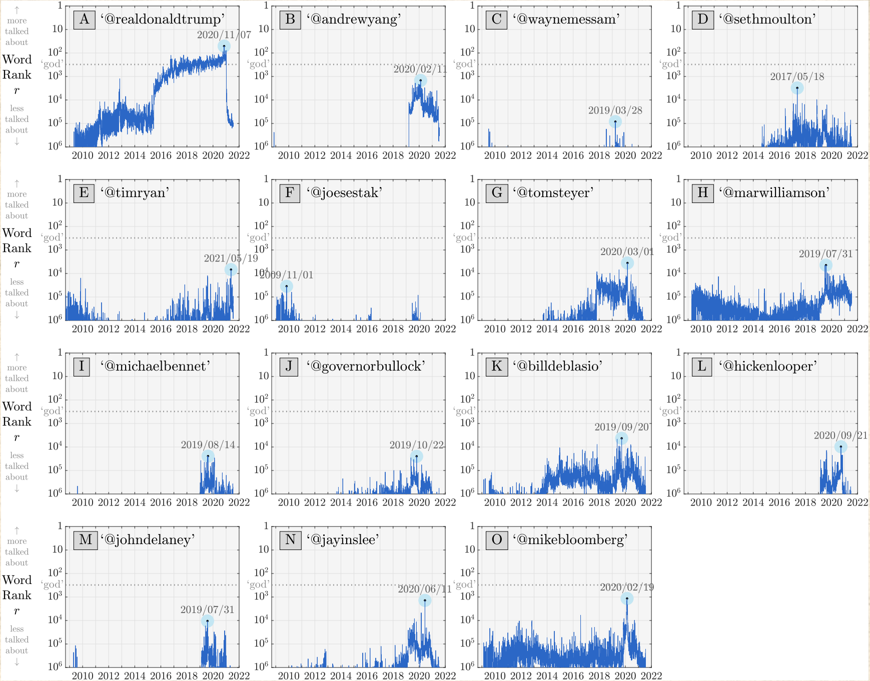
more talked about
Word Rank r
less talked about
'god'
A 'mcgahn'
2019/05/21
B 'giuliani'
2018/05/03
C 'manafort'
2017/10/30
D 'papadopolous'
2017/10/30
E 'cypher'
2017/05/09
F 'conviction'
2009/08/23
2008/09/14
G 'trial'
2020/01/21
2012/12/25
H 'nunes'
2016/12/31
I 'stone'
2019/01/25
2020/03/31
J 'flynn'
2017/02/14
K 'cohen'
2019/02/27
2020/03/11
L 'lewandowski'
2013/04/24
2010 2012 2014 2016 2018 2020 2022



more talked about
Word Rank r
less talked about
A 'conspiracy'
2017/05/16
2013/09/28
B 'theory'
2017/05/16
2014/08/24
C '#pizzagate'
2020/06/01
D '#q'
2021/01/29
E 'qanon'
2020/08/20
F '#qanon'
2018/05/11
G '#wwg1wga'
2020/05/17
'god'
1
10
10^2
10^3
10^4
10^5
10^6
2010 2012 2014 2016 2018 2020 2022



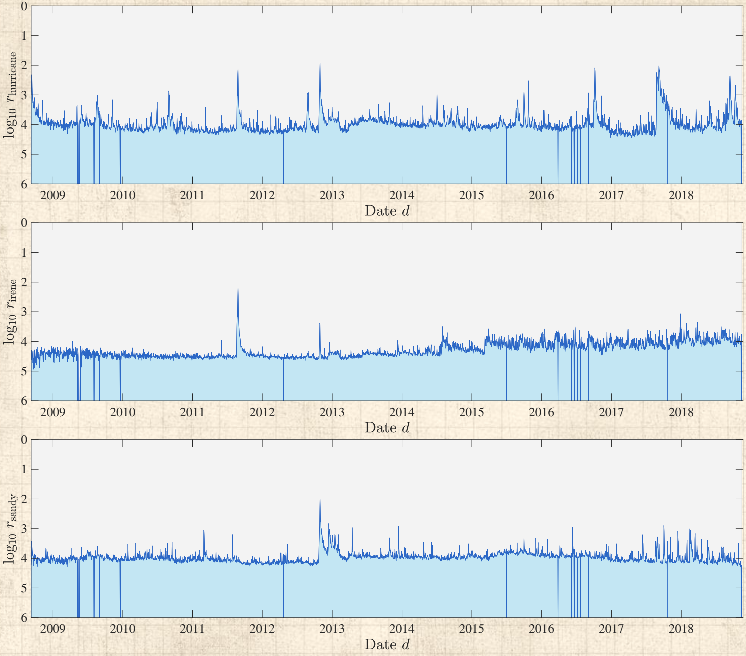
↑ more talked about
Word Rank r
less talked about ↓
'god'
1
10
10^2
10^3
10^4
10^5
10^6
2010 2012 2014 2016 2018 2020 2022
A '@realdonaldtrump'
2020/11/07
B '@walshfreedom'
2016/07/08
C '@govbillweld'
2019/07/18
D '@kamalaharris'
2020/11/07
E '@betoorourke'
2019/09/13
F '@joebiden'
2020/11/07
G '@senwarren'
2017/02/08
H '@ewarren'
2019/06/26
I '@sengillibrand'
2017/12/12
J '@amyklobuchar'
2020/03/02
K '@corybooker'
2018/09/06
L '@berniesanders'
2020/03/03
M '@howardschultz'
2019/01/28
N '@petebuttigieg'
2020/03/01
O '@juliancastro'
2019/06/27
P '@tulsigabbard'
2019/10/18



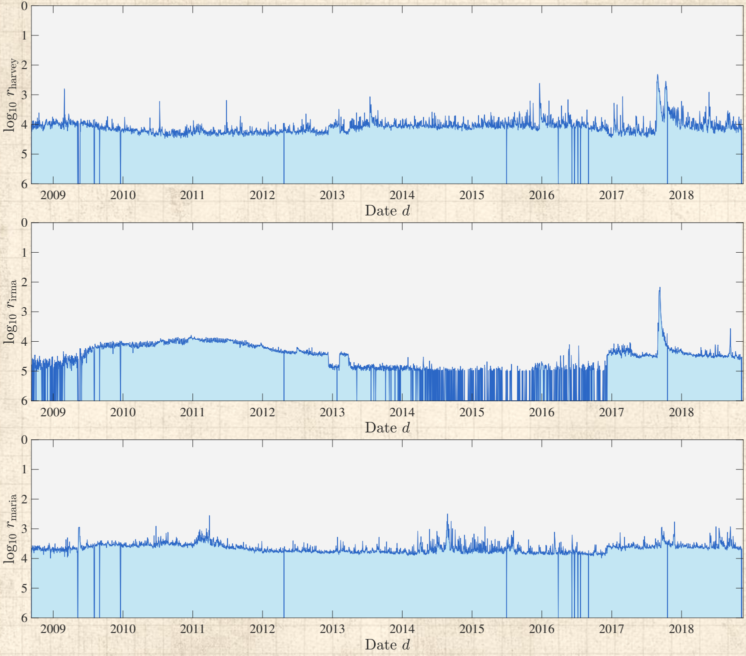
↑ more talked about
Word Rank r
less talked about ↓
'god'
A '@realdonaldtrump'
2020/11/07
B '@andrewyang'
2020/02/11
C '@waynemessam'
2019/03/28
D '@sethmoulton'
2017/05/18
E '@timryan'
2021/05/19
F '@joesestak'
2009/11/01
G '@tomsteyer'
2020/03/01
H '@marwilliamson'
2019/07/31
I '@michaelbennet'
2019/08/14
J '@governorbullock'
2019/10/22
K '@billdeblasio'
2019/09/20
L '@hickenlooper'
2020/09/21
M '@johndelaney'
2019/07/31
N '@jayinslee'
2020/06/11
O '@mikebloomberg'
2020/02/19
1
10
10^2
10^3
10^4
10^5
10^6
2010 2012 2014 2016 2018 2020 2022

Outline

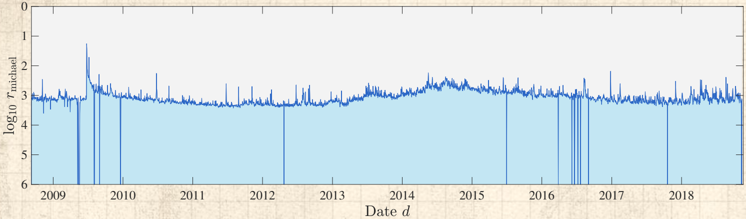
Awareness and Memory: Hurricanes

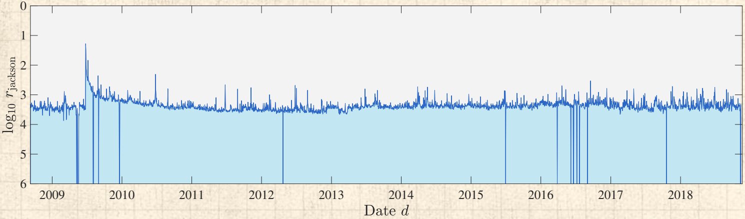


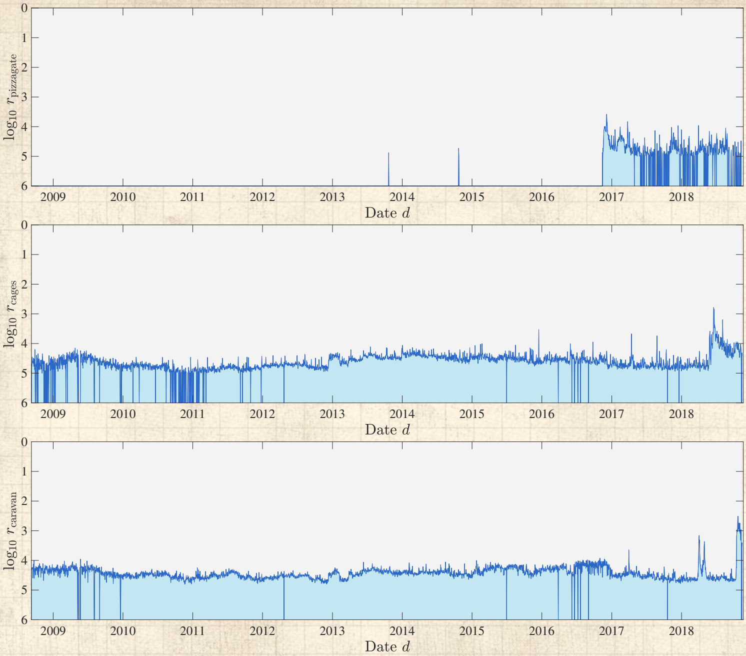
Awareness and Memory: Hurricanes

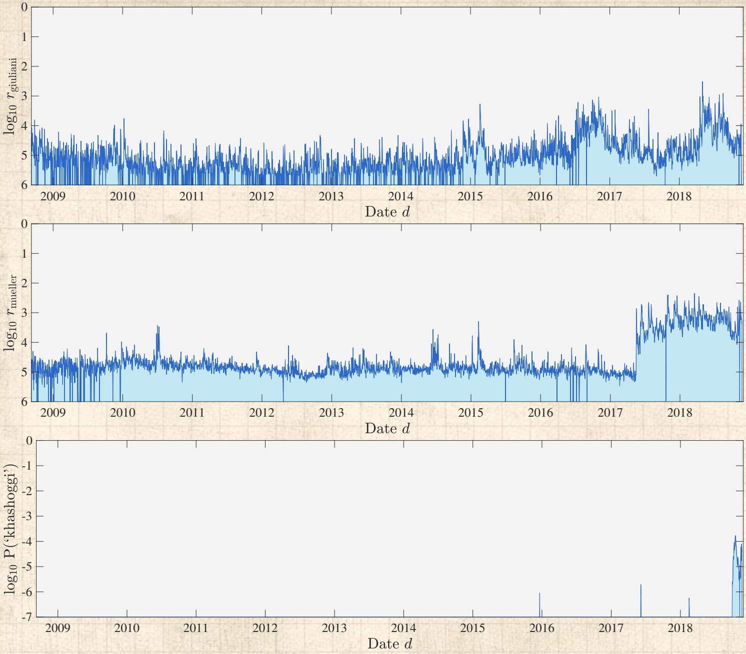


Michael Jackson

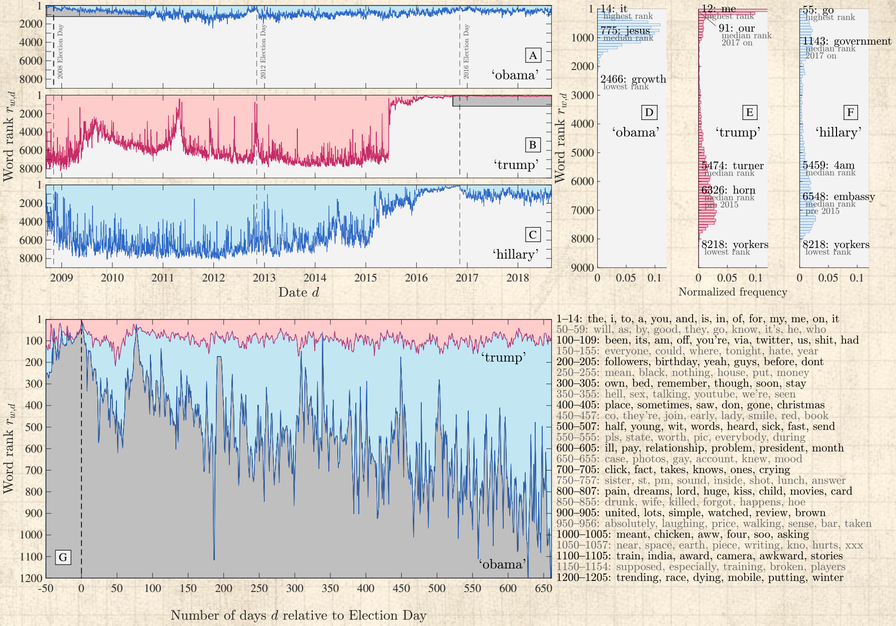




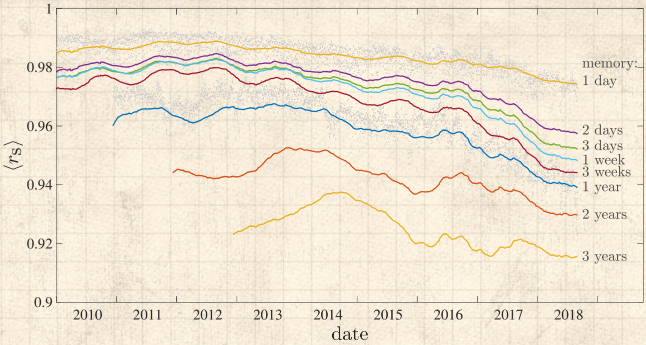

$\log_{10} r_{\text{pizzagate}}$
Date d
$\log_{10} r_{\text{cages}}$
Date d
$\log_{10} r_{\text{caravan}}$
Date d
0
1
2
3
4
5
6
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018

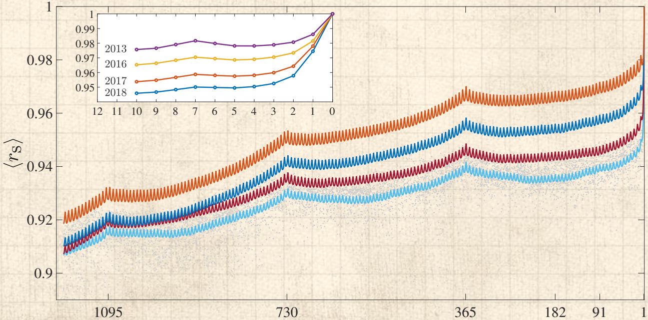

$\log_{10} r_{\text{giuliani}}$
$\log_{10} r_{\text{mueller}}$
$\log_{10}$ P('khashoggi')
Date d
2009 2010 2011 2012 2013 2014 2015 2016 2017 2018

Lexical fame of POTUSes and possible POTUSes:

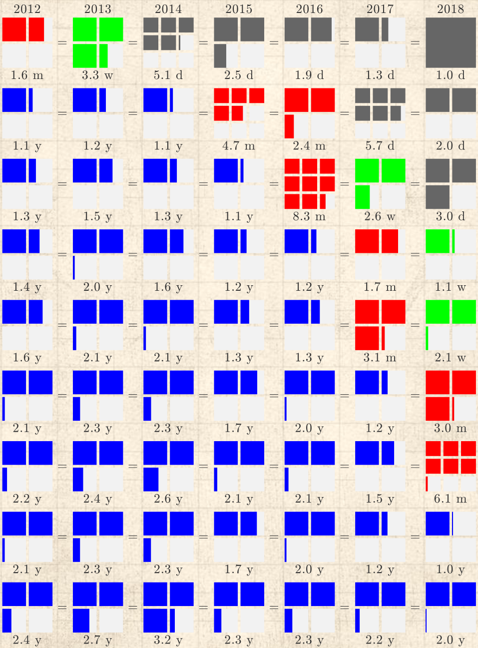


Story turbulence:





Story turbulence:



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[2] B. Boyd.
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