

RESEARCH

SOCIAL SCIENCE

The spread of true and false news online

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We investigated the differential diffusion of all of the verified true and false news stories distributed on Twitter from 2006 to 2017. The data comprise ~126,000 stories tweeted by ~3 million people more than 4.5 million times. We classified news as true or false using information from six independent fact-checking organizations that exhibited 95 to 98% agreement on the classifications. Falsehood diffused significantly farther, faster, deeper, and more broadly than the truth in all categories of information, and the effects were more pronounced for false political news than for false news about terrorism, natural disasters, science, urban legends, or financial information. We found that false news was more novel than true news, which suggests that people were more likely to share novel information. Whereas false stories inspired fear, disgust, and surprise in replies, true stories inspired anticipation, sadness, joy, and trust. Contrary to conventional wisdom, robots accelerated the spread of true and false news at the same rate, implying that false news spreads more than the truth because humans, not robots, are more likely to spread it.

*TURNS
OUT... TRUTH IS
MORE BORING
THAN FICTION*

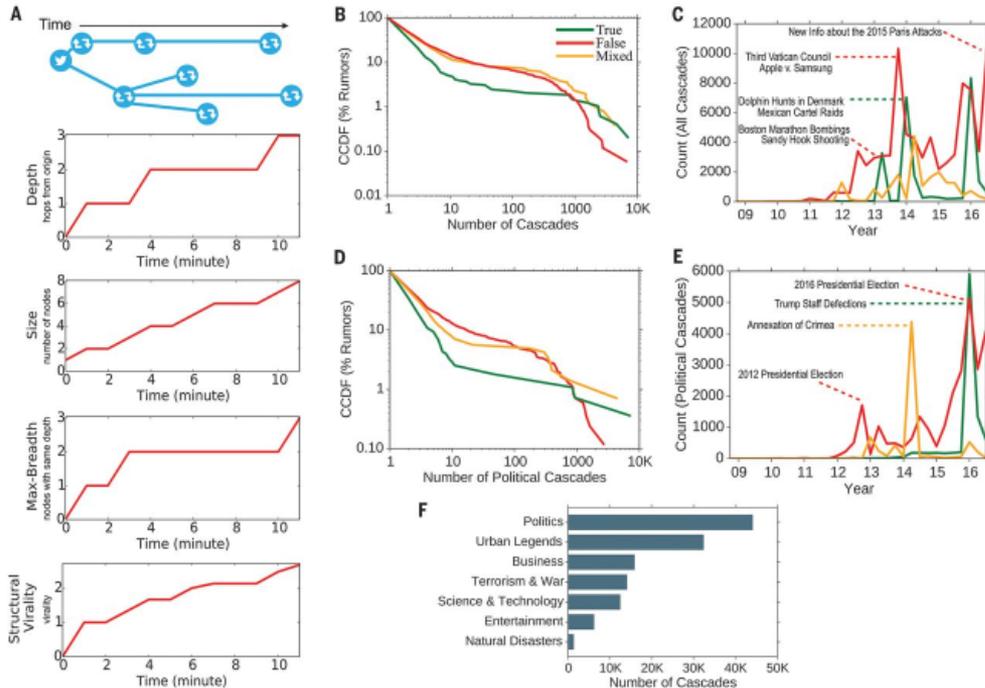
Joel Johnson

The Data and Methods

126,000 Assertions Tweeted by ~3m People > 4.5m times

Classified news as T/F using fact-checking organizations (95 - 98% agreement)

Also used hand-annotation to test robustness



Important Terms:

News: an asserted claim made on Twitter

Cascade: instance of a rumor-spreading pattern that exhibit an unbroken retweet chain with a common, singular origin

Depth: # of retweet hops from origin tweet

Max Breadth: max # of users involved in the cascade at any depth

Structural Virality: interpolation measure between content spread through a single, large broadcast and that which spreads through multiple generations

The Objections

“One issue I found with this experiment was the employment of undergraduate students who used web search queries to independently fact-check rumor cascades (aside from the 6 organizations). I question the reliability of the content they used from the results of these queries, especially as there is an inherent temporal bias in judging which results are more important and accurate” - Anjali Ragupathi

How do we feel about the dataset and annotations?

“Another issue I take with the paper’s definitions is that of the categories of cascades. The paper categorizes cascades into the following areas: politics, urban legends, business, terrorism & war, science & technology, entertainment, and natural disasters. However, each of these categories might intersect with the other in news.” - Hannah Levin

What other categorization schemes would you use?

Daft Punk Diffusion Dynamics

Falsehoods:

- More false cascades than true cascades reach depth of 10*
- Top 0.01% of false cascades diffused eight hops deeper than the truth*
- Truth rarely diffused to 1000 people, the top 1% of false-news diffused to 1000 - 100k people*

Political Falsehoods:

- Reached > 20k people 3x faster than other categories reached 10k*



* we've got some discussion to do

Ah, but surely the networks of the falsity spreaders must be the reason why!
- probably you at some point reading the paper

Plot Twist: The Networks/Characteristics Falsity Spreaders Are:

- Smaller, Less Active, Less Verified (), and Less Old

Truth Purveyor Network



Falsity Purveyor Network



The True Suspect? Novelty

- Approx. 5000 users, ~25000 tweets they were exposed to in the 60 days prior
- Calculated information distance between rumor tweets and “context” tweets
- KS, KL Divergence, Bhattacharya Distance support this theory

Additionally...

- Bucketed words into emotional categories to calculate an emotion vector
[anger, fear, anticipation, trust, surprise, sadness, joy, disgust]
- Compared vectors and found SURPRISE and DISGUST to be more aligned with false than true

Ok,

Novelty Attracts Human Attention

- Falsehoods are *more* novel

False Rumors:

- More surprise and disgust

True Rumors:

- More Sadness, anticipation, joy, trust

But,

Did you find the approach towards measuring novelty compelling?

Can't the truth...be novel? Other than novelty, what else could be an explanation?

What does our intuition/knowledge about emotional contagion tell us, what other factors that we've read about are at play here?

Some Other Important Responses:

In reference to Juul, Jonas L., and Johan Ugander. "Comparing information diffusion mechanisms by matching on cascade size." *Proceedings of the National Academy of Sciences* 118.46 (2021): "The authors find the speed, depth, and breadth of a news item can largely be explained by its reach -- how far it goes. **After controlling for the size of the cascade, true and false news is statistically indistinguishable with respect to the other diffusion characteristics. This result also held for political news!**" - Adhitya Venkatraman

"I wonder if this paper or future work could do an analysis similar to the paper we read on persuasion, i.e., making an almost exhaustive list of factors that make some news more viral vs. others, and then see what are the features that are correlated with the news being fake. **This would also have useful insights on how to make "truthful" news framed in such a way that it is more exciting to read and share**" - Akhila Kovvuri

"I think these findings point to the potential need to moderate social media in order to prevent the dissemination of misinformation, although **the line between regulating false news and restricting free speech can be blurry**" - Helen Gu

Additional Discussion (if we make it here)

How do we view regulating ongoing “news” and speculation – especially in evolving events that nearly impossible to fact check?