Post-truth society under the lens of Science

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News·Today
SOCIAL MEDIA:
TAKING OVER
THE WORLD


FAKE NEWS
INVASION


FOX
NEWS
CNN
USA
TODAY
NBC NEWS


FAKE NEWS
QUIET!
THE RED MENACE
IS REAL!
The Washington Post
KNOW YOUR PLACE
SHUT YOUR FACE!
RT

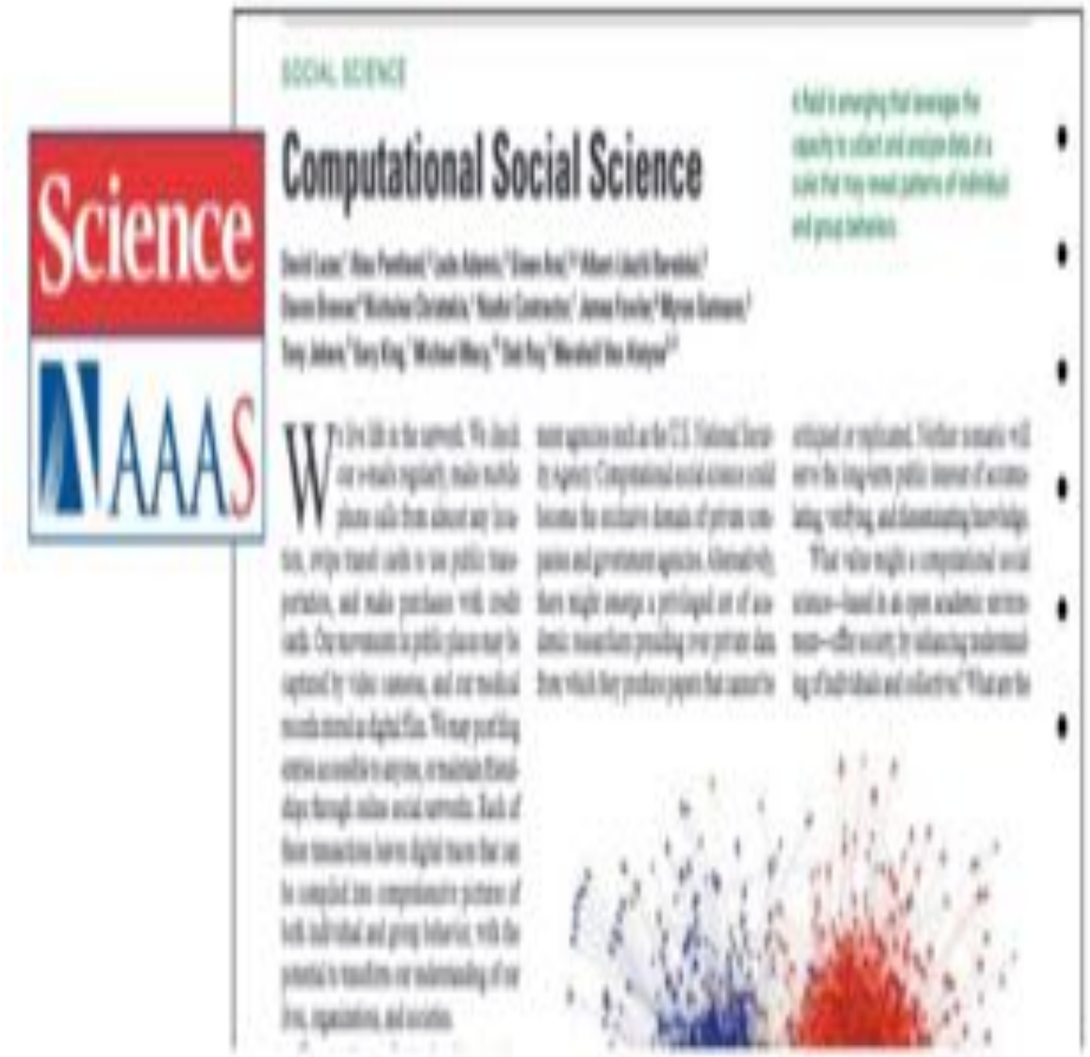
Oxford Dictionaries

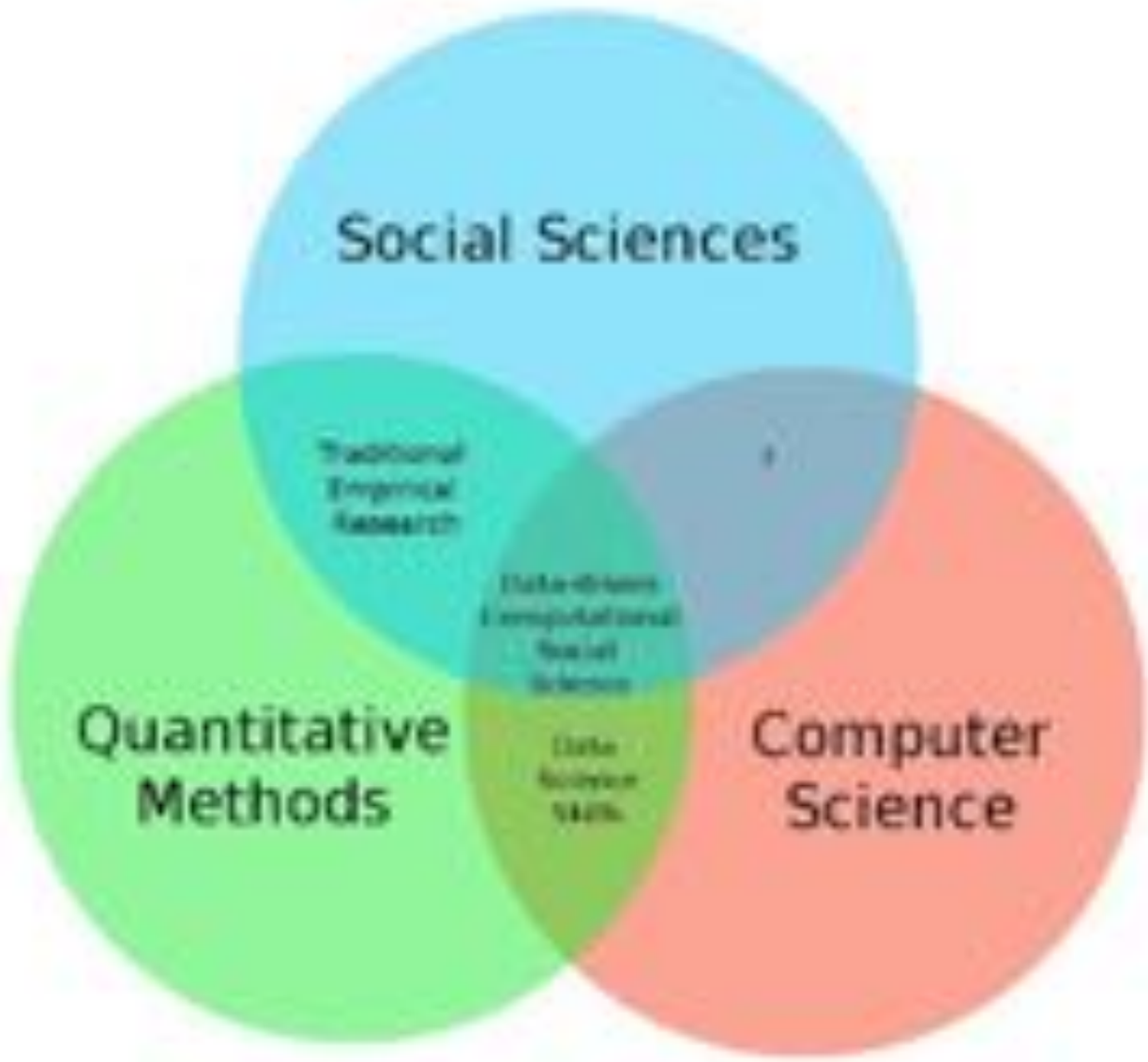
WORD OF THE YEAR

post-truth

"relating to or donating circumstances in which objective facts are less influential in shaping public opinion than appeals to emotion and personal belief."

Computational social science refers to the academic sub-disciplines concerned with **computational approaches** to the **social sciences**.





A SHIFT OF PARADIGM

OLD MEDIA

- Follow the “Ritual of Objectivity”
- Publication patterns are driven by most followed sources (imitation) (Marlow 2005)

MEDIATED

NEW MEDIA

- Information production is the work of interconnected actors spanning over organizations, professional identity and geographical location

DISINTERMEDIATED

FACEBOOK AS A CROWD DRIVEN BROADCASTER

“We're not thinking about ourselves as a community
— we're not trying to build a community — we're not trying to make new connections. [...]
What we're trying to do is just make it really efficient for people to communicate, **get information and share information**.
We always try to emphasize the utility component.”

Mark Zuckerberg Jul. 2007

WHAT ABOUT THE QUALITY OF INFORMATION?

SALON NEWS POLITICS ENTERTAINMENT LIFE TECH BUSINESS

Conspiracy theories running rampant: How misinformation spreads on Facebook

Researchers studied how people interacted with "trolls" posting false information – the results are terrifying

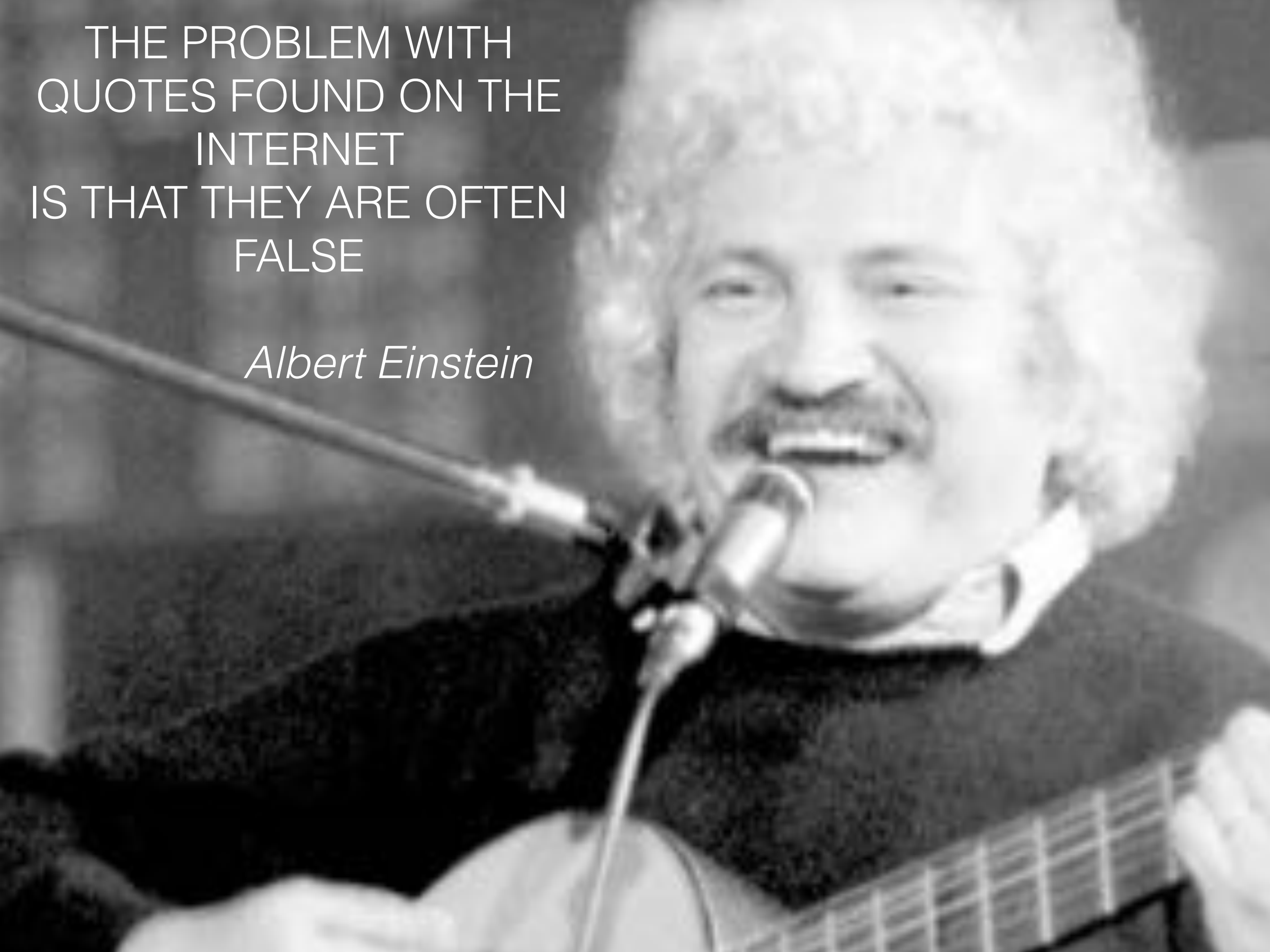
SARAH GRAY

From the steady roll of theories on what happened to Malaysian Airlines Flight 370, to Sarah Palin's "death panels" panic, to Donald Trump's birther theories, misinformation spreads like wildfire in the age of Facebook.

In 2013, professor Walter Quattrociocchi of Northeastern University along with his team studied how more than 1 million Facebook users engaged with political information during the Italian election. During that election a post appeared titled: "Italian Senate voted and accepted (257 in favor and 165 abstentions) a law proposed by Senator Cirenga to provide policy makers with €134 billion Euros to find jobs in the event of electoral defeat."

THE PROBLEM WITH QUOTES FOUND ON THE INTERNET IS THAT THEY ARE OFTEN FALSE

Albert Einstein



JADE HELM 15

The Washington Post

+ More

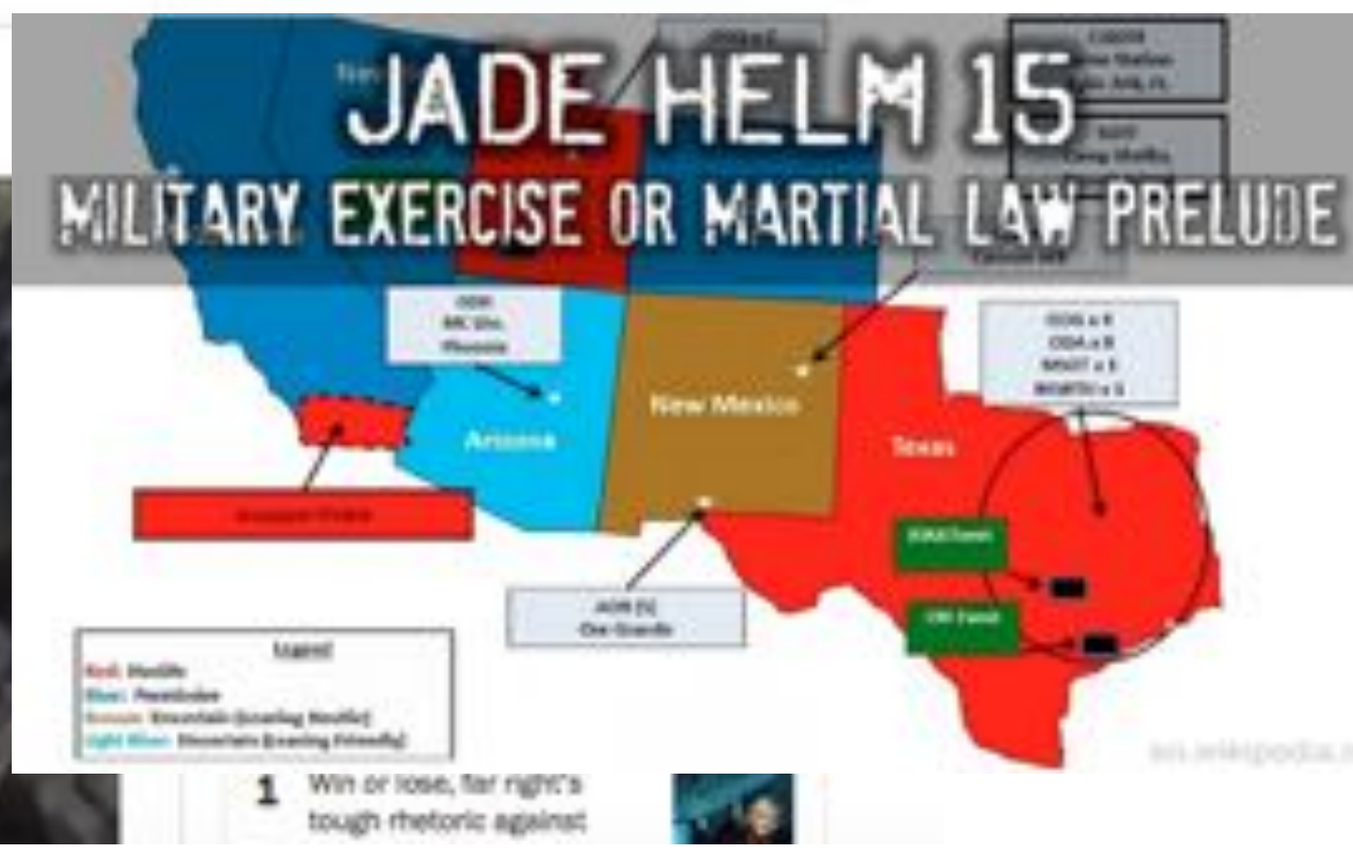
Save

Checkpoint

Why Operation Jade Helm 15 is freaking out the Internet — and why it shouldn't be

A 57

By Dan Lamothe March 31 Follow @danlamothe



1 Win or lose, far right's tough rhetoric against

Wired Italia
22 aprile 2015 ·

Le dinamiche sono sempre le stesse.

Bufale, i complottisti sono tutti uguali - Wired

Uno studio italiano svela il comportamento degli utenti che seguono pagine che diffondono bufale su Facebook: seguono tutti le stesse dinamiche

WIRED.IT | DI SANDRO JANNACCONE

Mi piace · Commenta · Condividi

Mi piace · Rispondi · 1 · 22 aprile 2015 alle ore 12:18

[redacted] Risalta benissimo come l'utente che si crede informato e illuminato sia la persona meno aperta mentalmente,chiusa com'e nei suo loop di auto(dis)informazione.Patetici.

Mi piace · Rispondi · 25 · 22 aprile 2015 alle ore 12:11

Nascondi 83 risposte

Walter Quattrociocchi perche meglio invece chi si informa sulle fonti ufficiali come cicap o quark? svegliatevi.

Mi piace · Rispondi · 22 aprile 2015 alle ore 12:19

[redacted] Eccalà.Hai letto l'articolo?Mi pare evidente che leggere notizie su pagine che si autocitano e si autorimandano non sia una buonissima cosa.Serve una visione d'insieme, il WEBBE non ha la risposta definitiva. E tranquillo che sono sveglio ed attento A TUTTO, anche alle bufalate deliranti.

Mi piace · Rispondi · 6 · 22 aprile 2015 alle ore 12:22

[redacted] Eccolo è arrivato puntuale il fenomeno che dice sveglia al resto del mondo .Le scie chimiche fanno brutti effetti 🙂

Mi piace · Rispondi · 1 · 22 aprile 2015 alle ore 12:25

Walter Quattrociocchi E la risposta di insieme te la da piero angela (o il figlio)? Non lo sai che da sempre la storia la scrivono i vincitori e i potenti?

Mi piace · Rispondi · 22 aprile 2015 alle ore 12:30

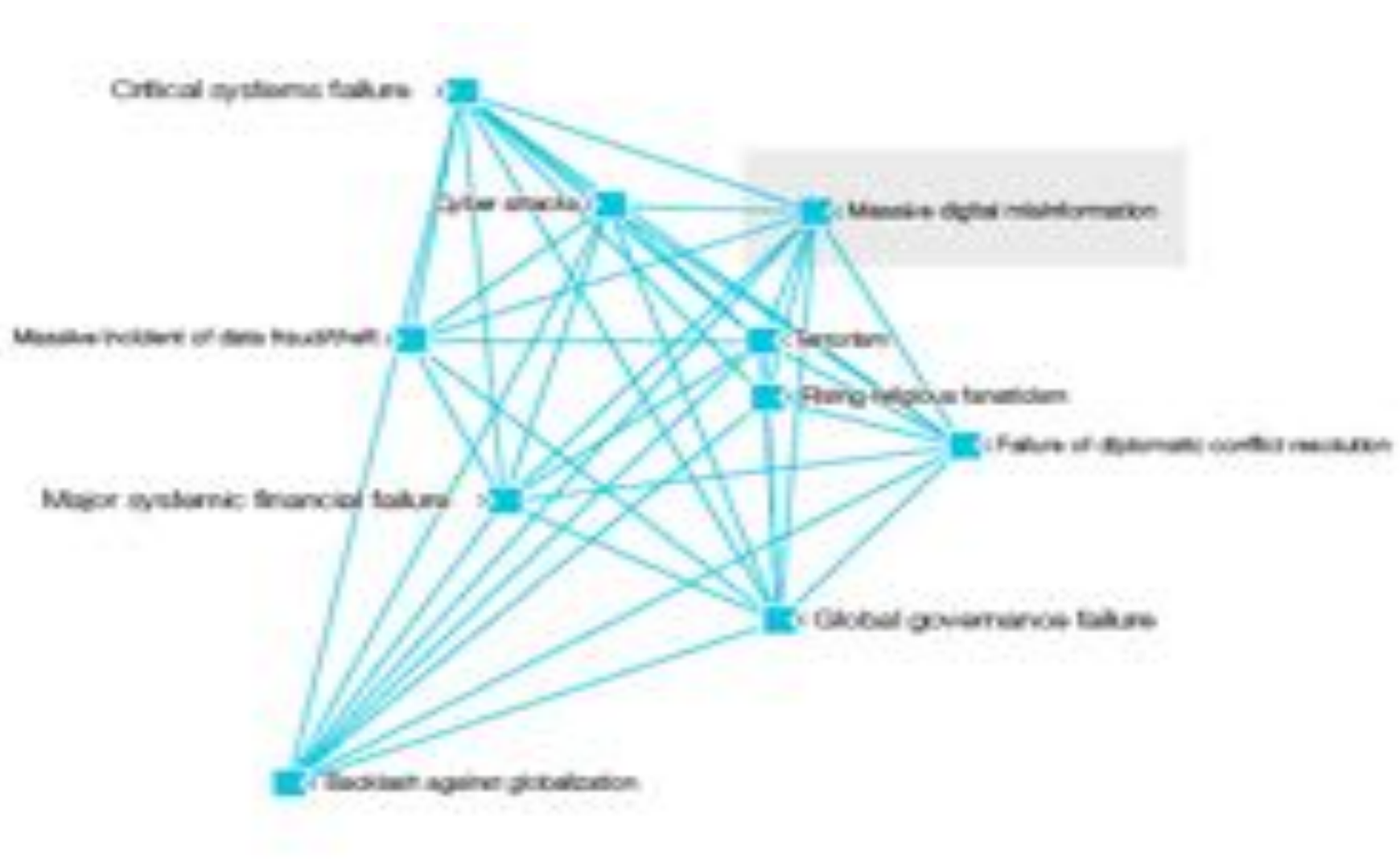
[redacted] Se la "storia" è scritta dai vincitori, lo è anche la "storia" narrata su internet.

Mi piace · Rispondi · 1 · 22 aprile 2015 alle ore 12:33 · Modificato

[redacted] Quello che mi fa piu ridere della gente come te è che rinnegate il confronto, siete un disco rotto, provo più piacere a conversare con un muro

Mi piace · Rispondi · 5 · 22 aprile 2015 alle ore 12:32

MISINFORMATION ONLINE



THE WORLD ECONOMIC FORUM HAS POINTED OUT
MASSIVE DIGITAL MISINFORMATION
AS ONE OF THE MAIN RISKS FOR OUR SOCIETY

CONFIRMATION BIAS

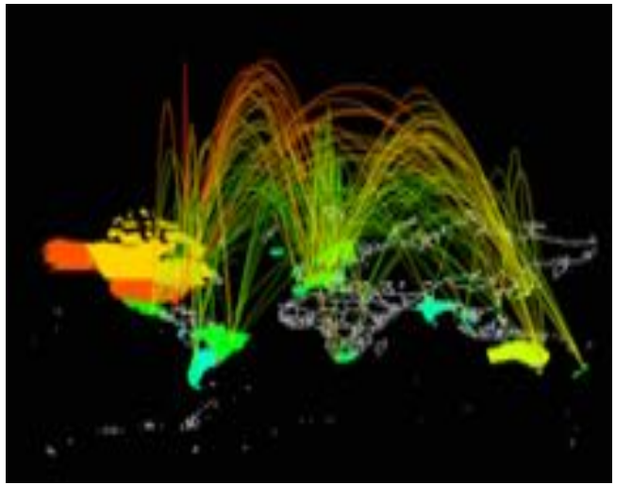
The cognitive attitude to search for, interpret, favor, and recall information in a way that confirms one's beliefs

WHY?

Complexity of the world exploded

GLOBALIZATION

INTERCONNECTIVITY



SCIENTIFIC PROGRESS

FUNCTIONAL ILLITERACY

Nazione	Persone funzionalmente analfabete (% con età 16–65) 2003-2008[7]
Italia	47,0
Messico	43,2
Stati Uniti	20,0
Ungheria	17,0
Svizzera	15,9
Canada	14,6
Australia	13,9
Nuova Zelanda	13,4

INFORMATION OVERLOAD

PNAS

The spreading of misinformation online

Michela Del Vicario[a], Alessandro Bessi[b], Fabiana Zollo[a], Fabio Petroni[c], Antonio Scala[a,d], Guido Caldarelli[a,d], H. Eugene Stanley[e], and Walter Quattrociocchi[a,1]

[a]Laboratory of Computational Social Science, Networks Department, IMT Alti Studi Lucca, 55100 Lucca, Italy; [b]IUSS Institute for Advanced Study, 27100 Pavia, Italy; [c]Sapienza University, 00185 Rome, Italy; [d]ISC-CNR Uos "Sapienza," 00185 Rome, Italy; and [e]Boston University, Boston, MA 02115

Edited by Matjaz Perc, University of Maribor, Maribor, Slovenia, and accepted by the Editorial Board December 4, 2015 (received for review September 1, 2015)

The wide availability of user-provided content in online social media facilitates the aggregation of people around common interests, worldviews, and narratives. However, the World Wide Web (WWW) also allows for the rapid dissemination of unsubstantiated rumors and conspiracy theories that often elicit rapid, large, but naive social responses such as the recent case of Jade Helm 15—where a simple military exercise turned out to be perceived as the beginning of a new civil war in the United States. In this work, we address the determinants governing misinformation spreading through a thorough quantitative analysis. In particular, we focus on how Facebook users consume information related to two distinct narratives: scientific and conspiracy news. We find that, although consumers of scientific and conspiracy stories present similar consumption patterns with respect to content, cascade dynamics differ. Selective exposure to content is the primary driver of content diffusion and generates the formation of homogeneous clusters, i.e., "echo chambers." Indeed, homogeneity appears to be the primary driver for the diffusion of contents and each echo chamber has its own cascade dynamics. Finally, we introduce a data-driven percolation model mimicking rumor spreading and we show that homogeneity and polarization are the main determinants for predicting cascades' size.

misinformation | virality | Facebook | rumor spreading | cascades

The massive diffusion of sociotechnical systems and micro-blogging platforms on the World Wide Web (WWW) creates a the main difference between the two is content verifiability. The generators of scientific information and their data, methods, and outcomes are readily identifiable and available. The origins of conspiracy theories are often unknown and their content is strongly disengaged from mainstream society and sharply divergent from recommended practices (22), e.g., the belief that vaccines cause autism.

Massive digital misinformation is becoming pervasive in online social media to the extent that it has been listed by the World Economic Forum (WEF) as one of the main threats to our society (23). To counteract this trend, algorithmic-driven solutions have been proposed (24–29), e.g., Google (30) is developing a trustworthiness score to rank the results of queries. Similarly, Facebook has proposed a community-driven approach where users can flag false content to correct the newsfeed algorithm. This issue is controversial, however, because it raises fears that the free circulation of content may be threatened and that the proposed algorithms may not be accurate or effective (10, 11, 31). Often conspiracists will denounce attempts to debunk false information as acts of misinformation.

Whether a claim (either substantiated or not) is accepted by an individual is strongly influenced by social norms and by the claim's coherence with the individual's belief system—i.e., confirmation bias (32, 33). Many mechanisms animate the flow of false information that generates false beliefs in an individual, which, once adopted, are rarely corrected (34–37).

SETTING UP THE (DATA) EXPERIMENT

Focus:

The role of confirmation bias in the diffusion of (mis)information

Methodology:

a) Analyze users' behavior on specific contents Conspiracy and Science News (cont)
b) Response to intentional false claims (Trolls)
c) Response to contrasting information (Debunking)

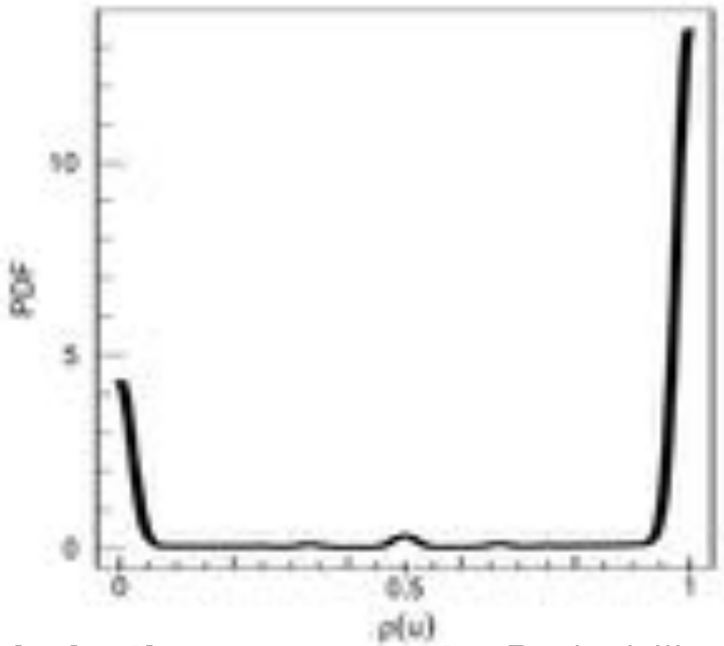
THE DATASET(s)

Facebook ITALY and **USA** from Jan 2010 to Dec 2014

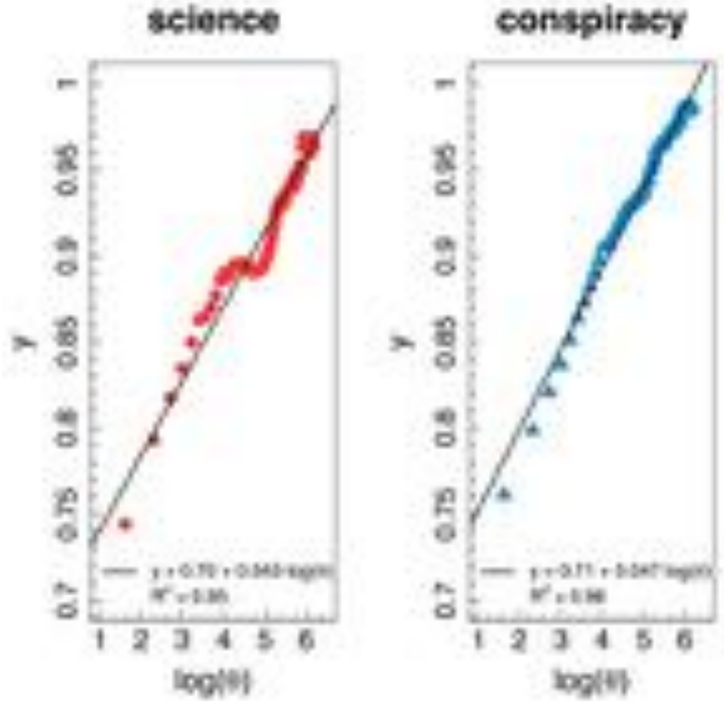
FB ITALY	TOTAL	SCIENCE	CONSPIRACY	**TROLL**
Pages	73	34	39	**2**
Posts	271,296	62,705	208,591	**4,709**
Likes	9,164,781	2,505,399	6,659,382	**40,341**
Comments	1,017,509	180,918	836,591	**58,686**
Likers	1,196,404	332,357	864,047	**15,209**
Commentsers	279,972	53,438	226,534	**43,102**

FB USA	TOTAL	SCIENCE	CONSPIRACY	**DEBUNKING**
Pages	478	83	330	**66**
Posts	679,948	262,815	369,420	**47,780**
Likes	603,332,826	453,966,494	145,388,117	**3,986,922**
Comments	30,828,705	22,093,692	8,304,644	**429,204**
Likers	52,172,855	39,854,663	19,386,131	**702,122**
Commentsers	9,790,906	7,223,473	3,166,726	**118,996**

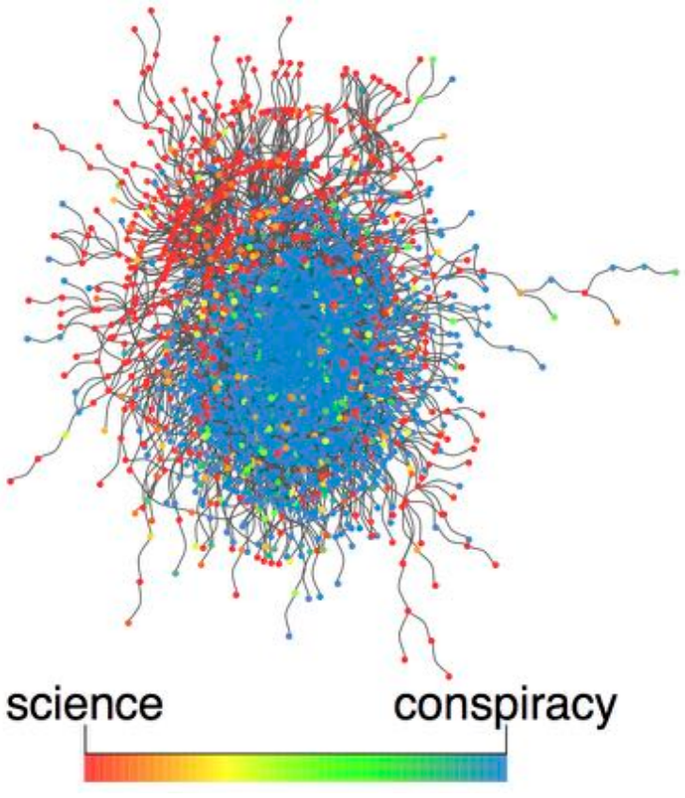
CONTENT CONSUMPTIONS AND FRIENDS



Polarization on contents. Probability density function (PDF) of users' polarization. Notice the strong bimodality of the distribution, with two sharp peaks localized at $0 < \rho < 0.005$ (science users) and at $0.95 < \rho < 1$ (conspiracy users).



Homophily. Fraction of polarized friends with the same polarization respect to the number of likes $\log(\theta(u))$ of user u.

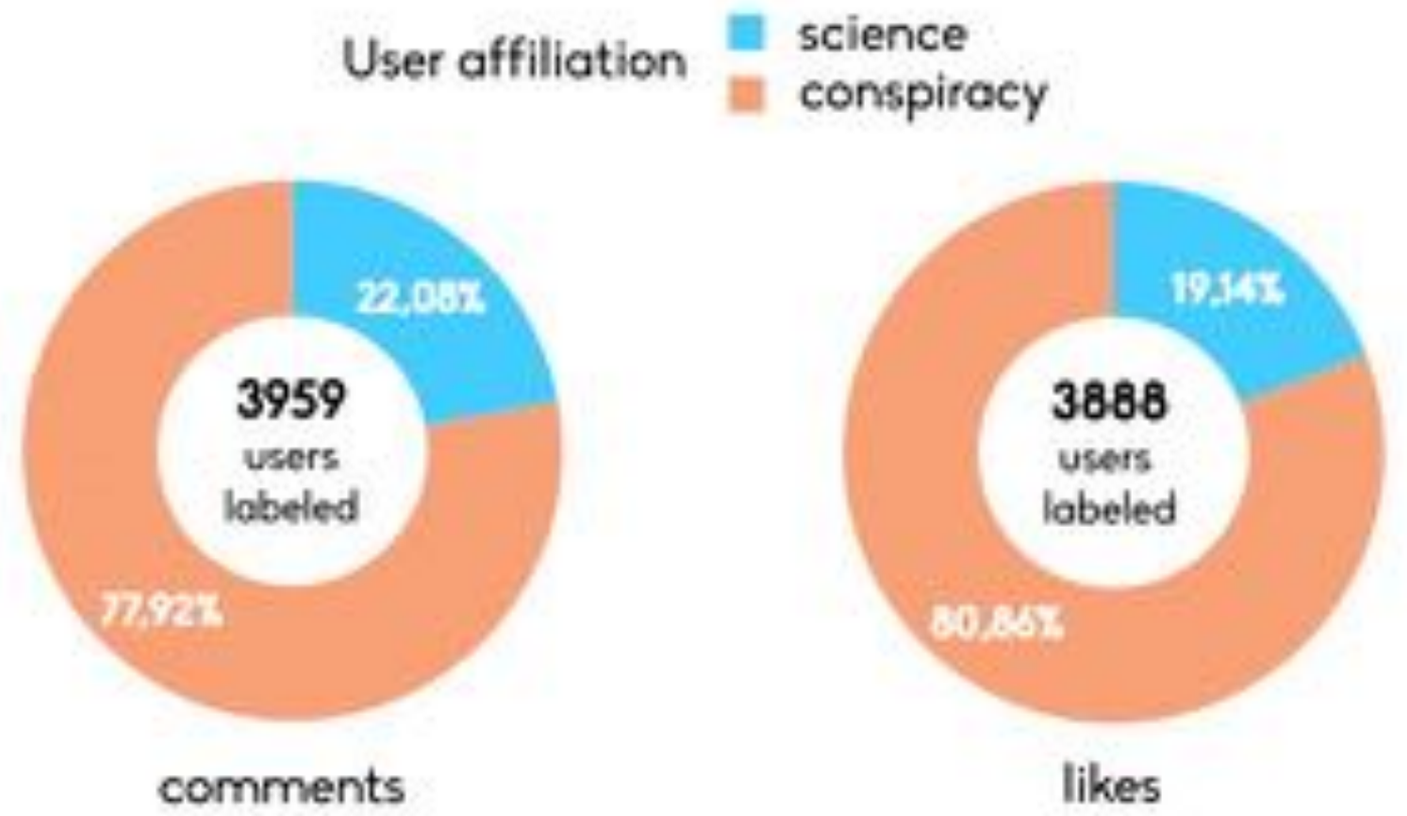


ECHO-CHAMBERS

- Highly separated activity on the 2 categories
- The more the liking activity the higher the probability to have friends with the same attitude
- The more the activity on the narrative, the more the exposure to it

Viral Misinformation: The Role of Homophily and Polarization
webSci@WWW (Bessi *et al. 2015*)
Homophily and Polarization in the age of misinformation
EPJ Special Topics (*Bessi et al. to appear*)

RESPONSE TO **4,709** INTENTIONAL FALSE CLAIMS (TROLLS)

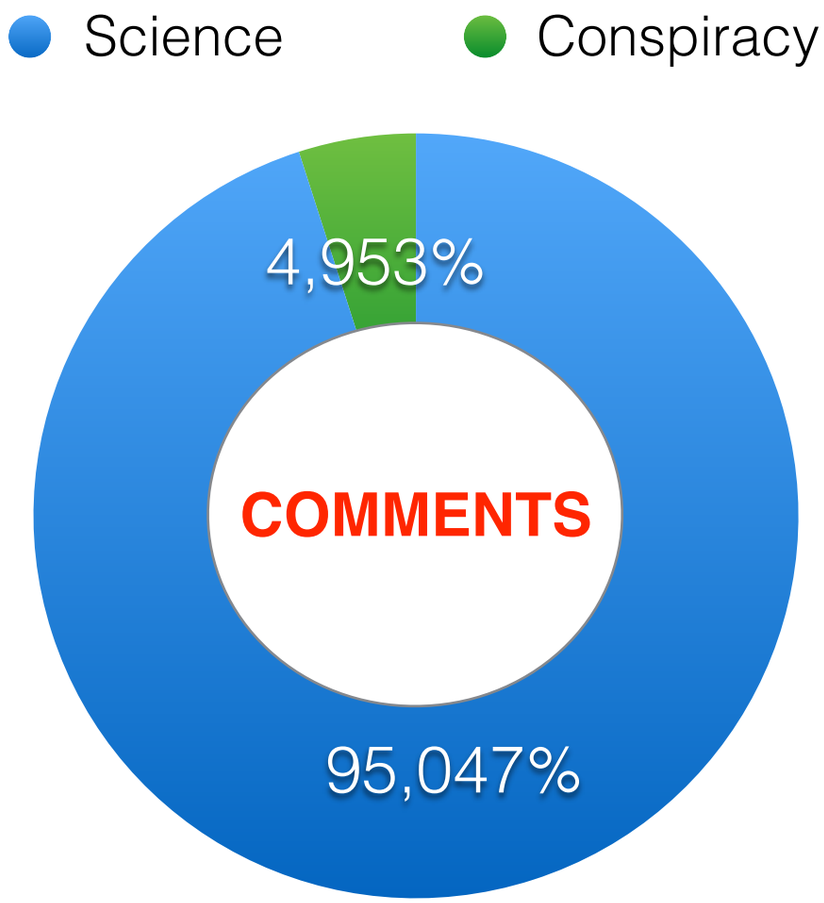


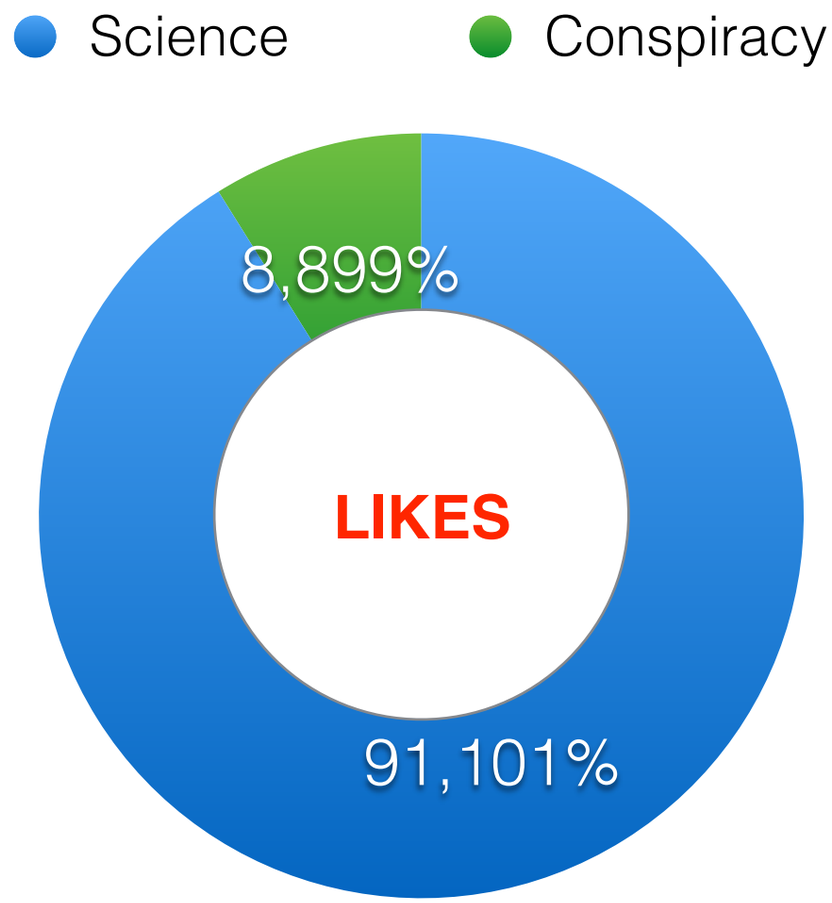
Polarized users on false information.

Percentage of likes and comments on intentional false information posted by a satirical page from polarized users of the two categories.

Science vs Conspiracy: Collective Narratives in the age of Misinformation
PLOS ONE (*Bessi et al. 2015*)

RESPONSE TO **47,780** DEBUNKING POSTS (1)





Debunking information are ignored by users in the conspiracy echo-chamber
(out of 9,790,906 polarized conspiracy users only 5, 831 interact)

Debunking in a World of Tribes
submitted (*Zollo et al. 2016*)

RESEARCH IMPACT

SOCIAL SCIENCE

INSIDE THE ECHO CHAMBER

COMPUTATIONAL SOCIAL SCIENTISTS ARE STUDYING HOW CONSPIRACY THEORIES SPREAD ONLINE—AND WHAT, IF ANYTHING, CAN BE DONE TO STOP THEM

By Walter Quattrociocchi

376 Million of Facebook Users (Jan 2010- Dec 2015)

Anatomy of news consumption on Facebook

Ana Lucia Schmidt[a], Fabiana Zollo[a,1], Michela Del Vicario[a], Alessandro Bessi[b], Antonio Scala[a,c], Guido Caldarelli[a,c], H. Eugene Stanley[d], and Walter Quattrociocchi[a,2]

[a]Laboratory of Computational Social Science, Networks Department, IMT Alti Studi Lucca, 55100 Lucca, Italy; [b]IUSS Institute for Advanced Study, 27100 Pavia, Italy; [c]ISC-CNR Uos "Sapienza," 00185 Rome, Italy; and [d]Department of Physics, Boston University, Boston, MA 02115

Edited by Susan T. Fiske, Princeton University, Princeton, NJ, and approved January 31, 2017 (received for review October 14, 2016)

The advent of social media and microblogging platforms has radically changed the way we consume information and form opinions. In this paper, we explore the anatomy of the information space on Facebook by characterizing on a global scale the news consumption patterns of 376 million users over a time span of 6 y (January 2010 to December 2015). We find that users tend to focus on a limited set of pages, producing a sharp community structure among news outlets. We also find that the preferences of users and news providers differ. By tracking how Facebook pages "like" each other and examining their geolocation, we find that news providers are more geographically confined than users. We devise a simple model of selective exposure that reproduces the observed connectivity patterns.

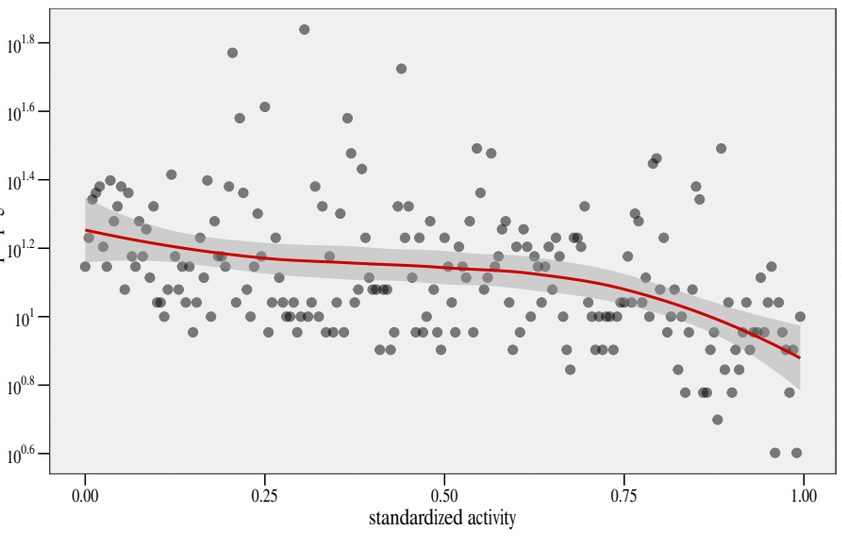
computational social science | Facebook | news consumption | misinformation

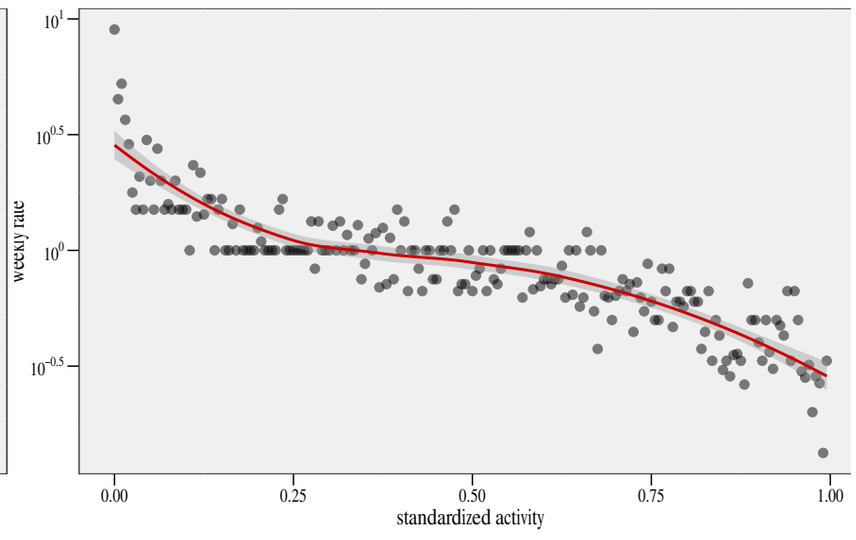
A large body of research has addressed news consumption

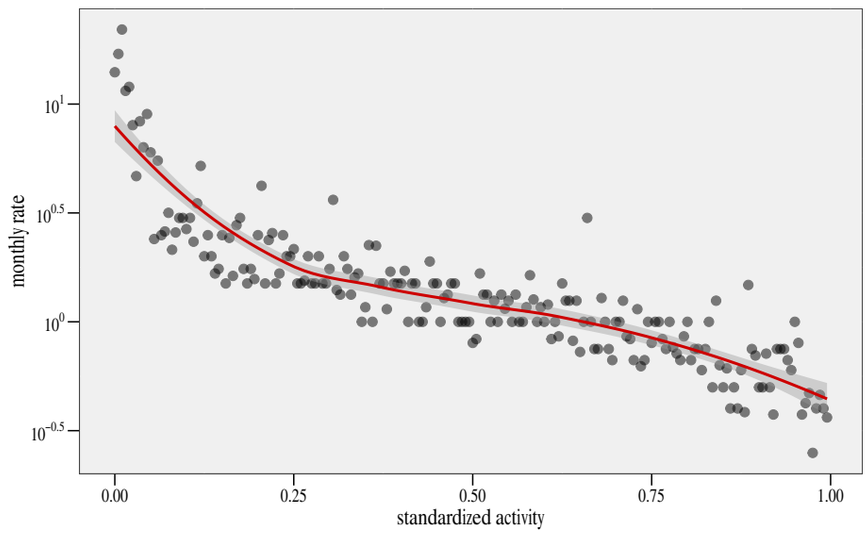
mation diffusion is the polarization of users on specific narratives rather than the lack of fact-checked certifications.

Results and Discussion

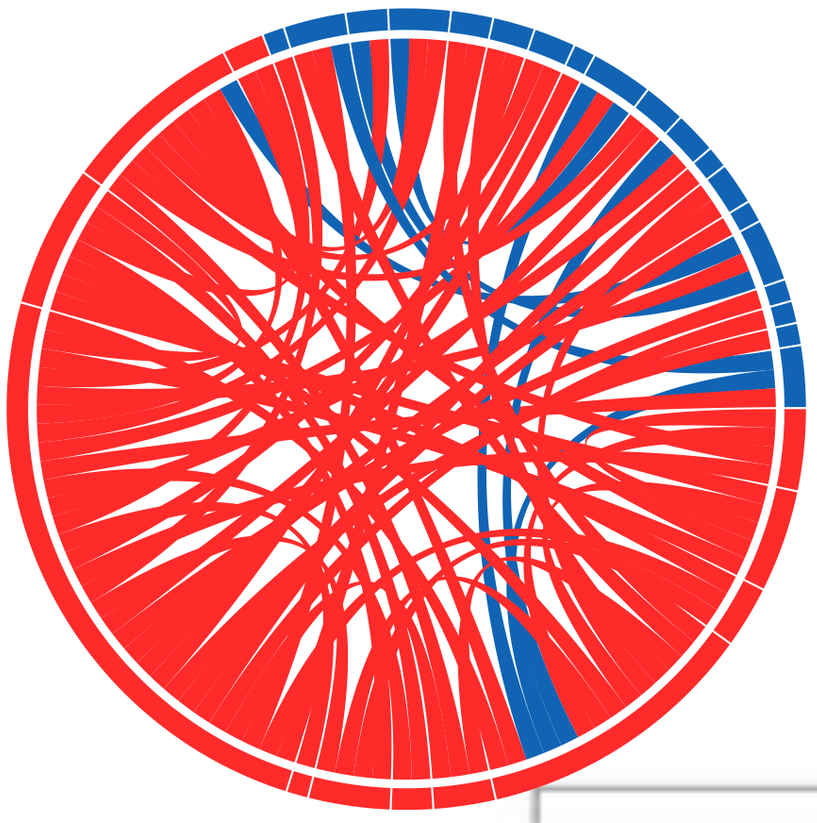
Users' Attention. News items on Facebook appear in posts that can be liked, commented, or shared by users. A like is usually a positive feedback on a news item. A share indicates a desire to spread a news item to friends. A comment can have multiple features and meanings and can generate collective debate. The likes, shares, and comments on Facebook posts present a heavy-tailed distribution (*SI Appendix, 2. Attention Pattern*). The lifetime of a post is the time period between the first and the last comment, and it presents a peak at 24 h. User activity is heterogeneous and the number of likes and comments ranges from very few (the majority) to hyperactivity. The Complementary Cumulative Distribution Function of the number of likes and comments for single users exhibits heavy tails (*SI Appendix*). The overall number of likes of each user is a good proxy for their engagement with Facebook news pages and the lifetime of each user can be


$10^{1.8}$
$10^{1.6}$
$10^{1.4}$
$10^{1.2}$
10^{1}
$10^{0.8}$
$10^{0.6}$
0.00
0.25
0.50
0.75
1.00
standardized activity


weekly rate
10^{1}
$10^{0.5}$
10^{0}
$10^{-0.5}$
0.00
0.25
0.50
0.75
1.00
standardized activity

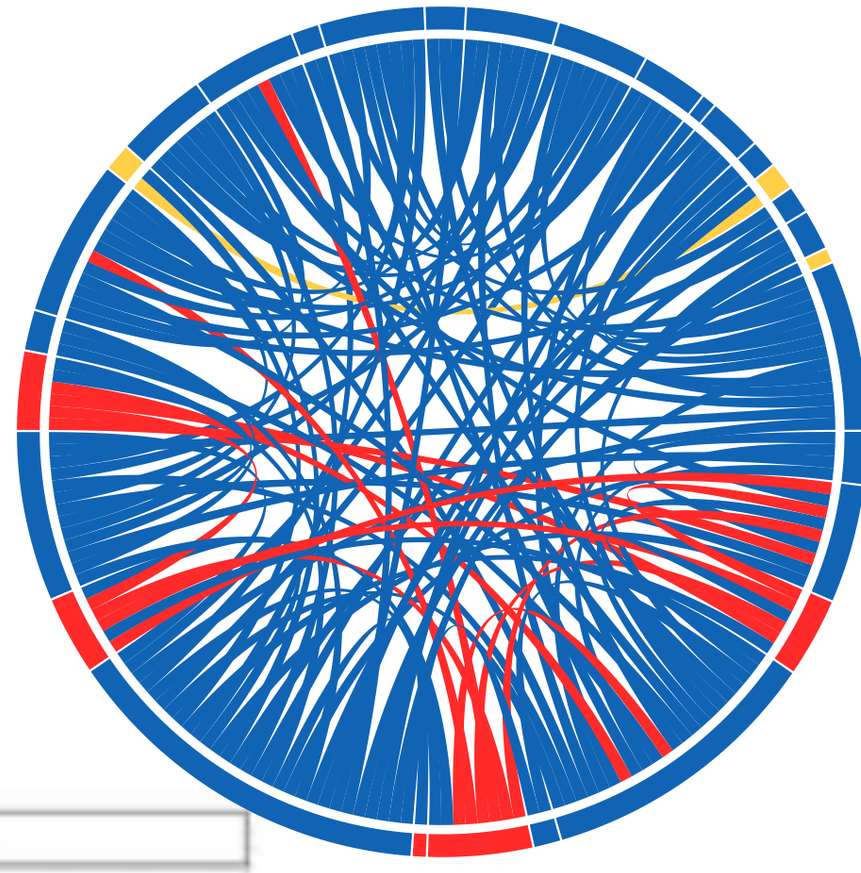

monthly rate
10^{1}
$10^{0.5}$
10^{0}
$10^{-0.5}$
0.00
0.25
0.50
0.75
1.00
standardized activity

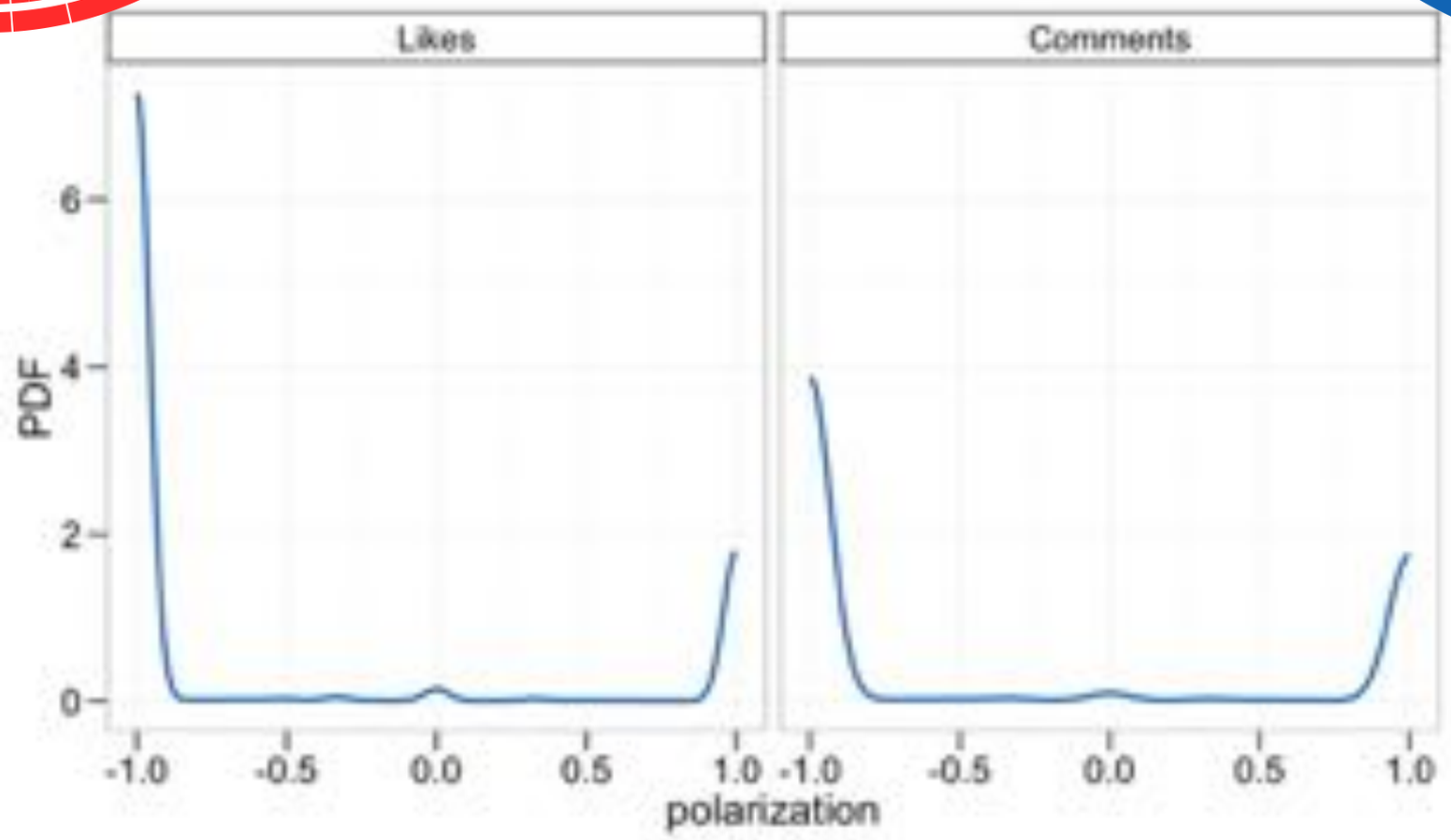
Brexit on Facebook



Community Structure

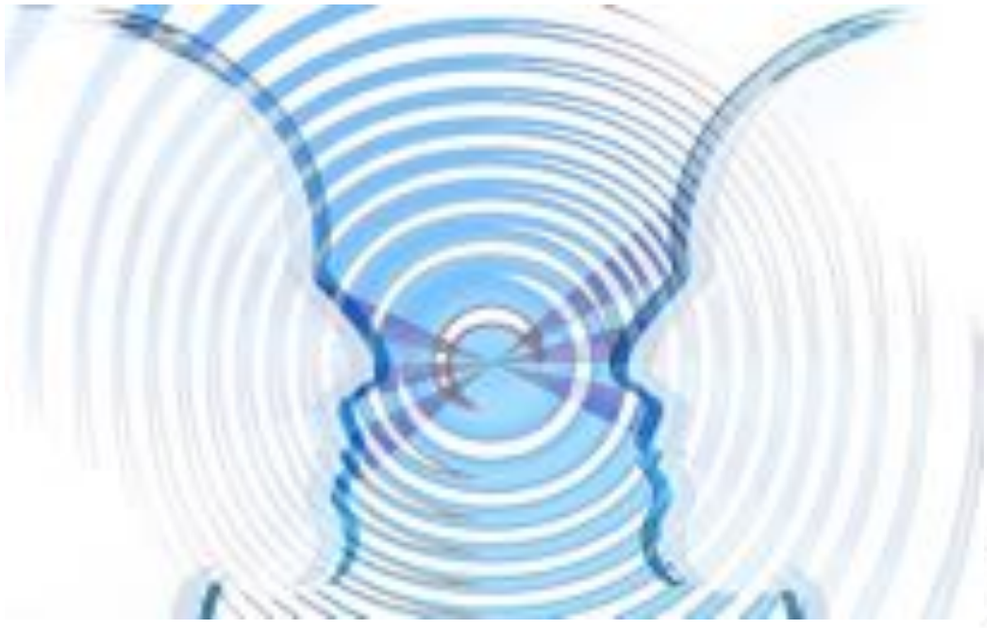
Backbone of the projections on pages of the users likes (left) and comments (right).

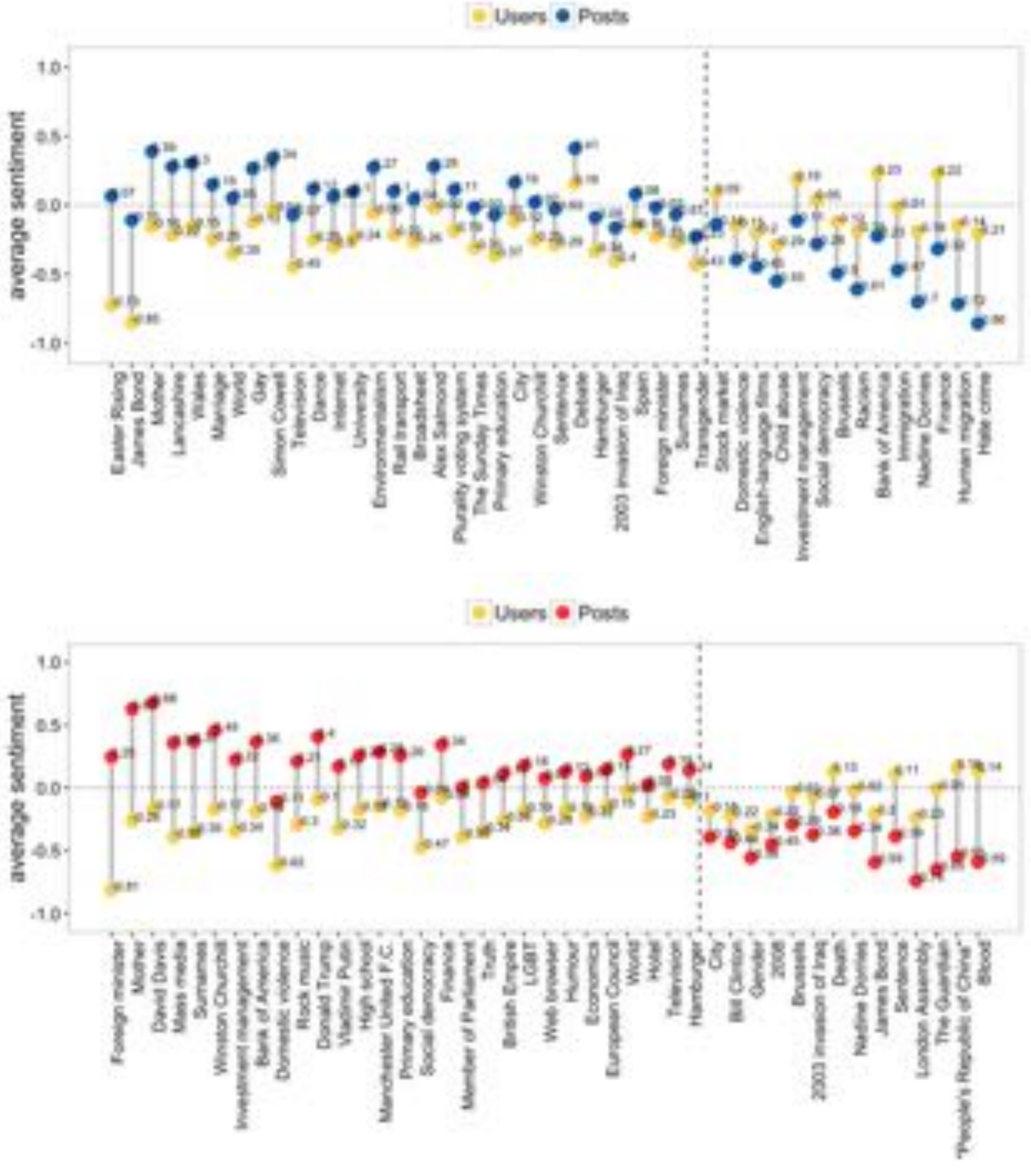




Polarization: Distribution of Users likes and comments on the 2 communities

Perceptions inside the echo chamber





How does misinformation spread online?

Image: A man poses with his iPad tablet as he sits in a bar, in this photo illustration taken in Rome September 20, 2012. REUTERS/Tony Gentile

Written by

Walter Quattrociocchi, Head of the Laboratory of Computational Social Science, IMT Lucca in Italy

Published

Thursday 14 January 2016

In the run up to the 2013 Italian elections, a social media post exposing the corruption of parliament went viral. Italian politicians were quietly certain that, win or lose, they would be financially secure by taking money from the taxpayer. Parliament had quietly passed a special welfare bill specially designed to protect policy-makers by ensuring them an incredible unemployment package should they lose their seat in the upcoming election. The bill, proposed by Senator

THE BOOK

Walter Quattrociocchi, Antonella Vicini

MISINFORMATION

Guida alla società dell'informazione e della credulità

pp. 176, € 23,00
cod. 666.9 (V)
ISBN 9788891742254
Collana: NEO

Previsto in libreria: 5 ottobre 2016 – SN 13

Potenziale di vendita: €€€
Argomento: Attualità / Comunicazione e media
Livello: Saggi, scenari, interventi
Promozione: Digital e social media marketing. Interviste. Recensioni.

Il World Economic Forum ha inserito la disinformazione digitale (casuale o costruita ad arte) nella lista dei 'rischi globali': capace di avere risvolti politici, geopolitici e, perfino, terroristici.

I social network sono il terreno di coltura e di diffusione perfetta del virus della dis-informazione, con conseguenze che vanno ben al di là del recinto del mondo digitale. Perché?

Questo libro offre una panoramica sui meccanismi sociali e cognitivi di un fenomeno che ormai è sotto gli occhi di tutti, anche di quelli meno attenti.

“So you have to find a way to break out of your echo chambers.
This is tougher than it sounds — especially when it comes the issues you care most about. But it’s in your interest to engage the people you disagree with, rather than shutting them out or shutting them up. Not only because it gives you a chance to challenge their views, and maybe even change them. But also because sometimes they might just be right.“

Samantha Power, Ambasciatore USA all’ONU

The problem behind misinformation spreading is
POLARIZATION

PANDOORS

Permanent Observatory on News Spreading on Social Media

Creating synergies among Institutions, Scholars and Communicators to reframe the information system

- Disseminating the awareness of the problem
- Determining the polarizing issues
- Exploiting Science to Create Bridges

THANK YOU