

Peer-review science is taking off on Twitter, but who is tweeting what and why?

The most tweeted peer-reviewed articles published between 2010 and 2012, and the trends associated with their social media success, have been identified by Stefanie Haustein at the Univ. of Montreal's School of Library and Information Science. She and her colleagues from the US, UK and Germany took 1.4 million articles held in the PubMed and Web of Science databases and determined how many times they appeared on Twitter.

"Being based on 1.4 million documents, this is the largest Twitter study of scholarly articles so far," Haustein said. The top two were articles on the effect of radiation on humans, and the top 15 includes articles on acne in teenage athletes, penile fracture, and the links between physical activity and mortality rates. Number 12 was in fact an article on autism by Laurent Mottron, a professor at the University of Montreal. The findings were published in the *Journal of the Association for Information Science and Technology (JASIST)*.

The study looked at tweets that were directly related to the peer-reviewed article in question. The tweets either contained a link directly to the article in a scientific database or contained highly specific bibliographic information that would enable anyone to find the study immediately (such as DOI or PMID numbers).

The analysis shows that a high number of tweets does not correspond to a high number of citations in peer-reviewed journals—a method of measuring impact that is generally accepted by the scientific community. As a result, the number one article on the list of researchers, dealing with an altered gene during radiation exposure, was tweeted 963 times but only received nine academic citations. An article on a similar topic, in the wake of the Fukushima explosion, had 30 citations compared to its 639 tweets. "The most popular scientific articles on Twitter stress health implications or have a humorous or surprising component. This suggests that articles having the broadest scientific impact do not have the widest distribution," Haustein said.

The study was supervised and co-authored by Univ. of Montreal Professor Vincent Larivière, holder of the Canada Research Chair on the Transformation of Academic Communication. "For the time being, Twitter cannot be considered a good marker of scientific impact—but it could indicate a certain social impact. When we look at the top articles, many have a surprising or humorous character. Articles are often tweeted anecdotally," Larivière said.

The traditional way of calculating the impact of a scientific article is based on the number of citations it has received in other scientific articles—it reflects impact on the scholarly community of citing authors. Peer review ensures a certain level of

quality. "In the case of social networks, anyone can mention an article to anyone, there is no quality control," Haustein said.

Nonetheless, even if two-thirds of the tweeted articles were mentioned only once, Twitter is increasingly used to disseminate scientific articles. Over the three years studied, there was an increase in the proportion of articles cited on the network, reaching 20.4% in 2012. And despite the general finding regarding the number of citations, many of the articles most mentioned on Twitter are from journals such as *PNAS*, *Science*, *Nature*, *The Lancet*, and *New England Journal of Medicine*. The journal that received the most tweets was *Nature*, with 13,430 mentions of 1,083 papers (42%).

The researchers point out that the recent evolution of social networks offers new prospects for scientific communication. "The fact that more and more articles are tweeted is good news because it helps scientific communication. Regardless of whether non-scientists are sending this information, it proves that science is an aspect of general culture," Larivière said. Barely 15% of university graduates in Quebec are active on Twitter. The researchers would like to question scientists' resistance to the social network as a tool for communications. "Considering the correlations revealed from our sample [...], we assume that the number of mentions on the Twitter network is not a good indicator of an article's impact. This could be due to many factors, including the fact that Twitter is not yet very popular among researchers and that the viability of Twitter as a tool for scientific communication remains underestimated," the authors wrote.

The Twitter Top 15 Peer-Reviewed Studies

1. Hess et al. (2011). Gain of chromosome band 7q11 in papillary thyroid carcinomas of young patients is associated with exposure to low-dose irradiation Hess is affiliated with German Research Center for Environmental Health.
2. Yasunari et al. (2011). Cesium-137 deposition and contamination of Japanese soils due to the Fukushima nuclear accident. Yasunari is affiliated with the Universities Space Research Association, Goddard Earth Sciences Technology and Research
3. Sparrow et al. (2011). Google Effects on Memory: Cognitive Consequences of Having Information at Our Fingertips. Sparrow is is affiliated with Columbia University.
4. Onuma et al. (2011). Rebirth of a Dead Belousov-Zhabotinsky Oscillator. Onuma is affiliated with Mito Dai-ni Senior High School.
5. Silverberg (2012). Whey protein precipitating moderate to severe acne flares in 5 teenaged athletes. Silverberg is affiliated with St. Luke's-Roosevelt Hospital Center.
6. Wen et al. (2011). Minimum amount of physical activity for reduced mortality and extended life expectancy: a prospective cohort study. Wen is affiliated with National Health Research Institutes (Taiwan).

7. Kramer (2011). Penile Fracture Seems More Likely During Sex Under Stressful Situations. Kramer is affiliated with the University of Maryland School of Medicine
8. Newman & Feldman (2011). Copyright and Open Access at the Bedside. Newman and Feldman are affiliated with the University of California San Francisco and University of California Hastings College of the Law, respectively.
9. Reaves et al. (2012). Absence of Detectable Arsenate in DNA from Arsenate-Grown GFAJ-1 Cells. Reaves is affiliated with Princeton University.
10. Bravo et al. (2011). Ingestion of Lactobacillus strain regulates emotional behavior and central GABA receptor expression in a mouse via the vagus nerve. Bravo is affiliated with University College Cork.
11. Park et al. (2012). Penetration of the Oral Mucosa by Parasite-Like Sperm Bags of Squid: A Case Report in a Korean Woman. Park is affiliated with the Kwandong University College of Medicine.
12. Mottron (2011). Changing perceptions: The power of autism. Mottron is affiliated with Université de Montréal.
13. Villeda et al. (2012). The ageing systemic milieu negatively regulates neurogenesis and cognitive function. Villeda is affiliated with Stanford University School of Medicine.
14. Merchant et al. (2011). Integrating Social Media into Emergency-Preparedness Efforts. Merchant is affiliated with the University of Pennsylvania.
15. Ho et al. (2011). A Low Carbohydrate, High Protein Diet Slows Tumor Growth and Prevents Cancer Initiation. Ho is affiliated with the BC Cancer Agency.

Nature article: [Peer review: Trial by Twitter](#) [1]

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<http://www.rdmag.com/news/2013/12/peer-review-science-taking-twitter-who-tweeting-what-and-why>

Links:

[1] <http://www.nature.com/news/2011/110119/full/469286a.html>

[2] <http://bit.ly/mNqklw>