

Interpret the meaning of academic tweets: A multi-disciplinary survey

Ehsan Mohammadi^{1, 2}, Mike Thelwall³, and Kristi Holmes^{2, 4}

¹School of Library and Information Science, University of South Carolina, Columbia, SC, USA

²Department of Preventive Medicine, Division of Health and Biomedical Informatics, Northwestern University Feinberg School of Medicine, USA

³Statistical Cybermetrics Research Group, School of Mathematics and Computer Science, University of Wolverhampton, UK

⁴Galter Health Sciences Library, Northwestern University Feinberg School of Medicine, USA

Keywords: Twitter, altmetrics, social media metrics, social impact, survey

Introduction

Although positive correlations between Twitter mentions of academic papers and their citations (Thelwall, Haustein, Larivière, & Sugimoto, 2013; Shuai, Pepe, & Bollen, 2012) suggest that Twitter mentions of publications may be an indicator of their research impact, it is difficult to interpret tweet counts with confidence because the correlations are very low. Therefore, it is important to seek other sources of evidence to help understand the meaning of counts of tweets about academic publications. Some studies have used content analysis for this but due to the short length of Tweets, this approach gives limited insights. Surveys are another way to get a better understanding of the meaning of academic tweets. Previous studies have surveyed a small snowball sample of 28 Twitter-active academics (Priem & Costello, 2010) and 613 academics with a Twitter account at 68 U.S. universities (Bowman, 2015). Systematic investigations with a broader perspective are needed to discover who are behind academic tweets and to explore their motivations and behaviors. In response, this study reports a survey of a large and diverse sample of Twitter users across different disciplines, inside and outside academia and from around the world.

Method

It is not straightforward to identify scientific-related tweets and those who use Twitter to communicate this information (Weller, Dröge, & Puschmann, 2011). In this survey, a new method was developed to recruit people who share scholarly content through Twitter. Using Altmetric.com datasets between January 2011 and December 2015, we identified 4.5 million unique Twitter users who had tweeted/re-tweeted at least one academic paper. To obtain contact information for these users, the sample was limited to users with web links in their Twitter profiles. Around 39% (1,771,520) of the 4.5 million Twitter accounts shared a link in their public profiles. These profiles were downloaded automatically email addresses were extracted from them. This gave 57,125 email addresses (see Table 1). A questionnaire was developed and sent to these Twitter users through Survey Monkey and Northwestern University mail server between July to August 2016.

Overall, 1,912 (4%) users completed the survey, with 4,662 (8%) email invitations bouncing and 707 (1%) of the users opting out. The overall response rate is low but it is normal for email questionnaires (VanGeest, Johnson, & Welch, 2007). Chi-square tests were used to assess the association between categorical covariates and responses, Cochran-Armitage trend tests between ordinal covariates and responses, and Wilcoxon rank sum tests between skewed continuous covariates and responses. All analyses were performed in SAS v. 9.4, and a nominal 5% type I error test was used.

Table 1. Email invitations sent to Twitter users and response rates.

Domain	Email invitations	Bounced	Opted out	Responses
.edu	4508	363	70	460 (11.0%)
.ac.uk	2549	671	30	164 (8.7%)
.ca	2075	208	26	118 (6.3%)
.com	24992	2416	401	737 (3.2%)
.fr	985	78	9	26 (2.8%)
.it	696	67	2	18 (2.8%)
.co.uk	4129	397	52	75 (2.0%)
Gmail	16418	388	102	303 (1.8%)
.nl	773	74	15	11 (1.5%)
Total	57,125	4,662	707	1,912 (3.6%)

Findings and discussions

The responses revealed that academic publications are mostly tweeted by scholars and also other groups of users outside academia, such as engineers, doctors, and managers. Most respondents tweeting scholarly information were from the social sciences or humanities, which is consistent with previous research (Haustein, Costas, & Larivière, 2015; Holmberg & Thelwall, 2014). Most participants agreed or strongly agreed (79%, n=1307) that Twitter has changed the way of reading and disseminating scientific information. More than half of the respondents (52%) believed that Tweet counts for scientific papers can reflect research impact. Most participants agreed or strongly agreed (81%, n=1333) that tweeting scientific papers is a way to share academic findings with the general public. This can help to justify the low correlations between Twitter mentions of scientific articles and citation counts found in former studies (Haustein, Peters, Sugimoto, Thelwall, & Larivière, 2014; Shuai et al., 2012). Twitter mentions of scholarly publications could partly reflect their social impact, which is an important issue in research assessment (Bornmann, 2013).

Twitter was also used in academia to acquire and share real-time information and to develop connections to others, which is again consistent with previous studies (Gruzd et al., 2012; Knight & Kaye, 2016). Motivations for using Twitter vary by discipline, occupation, and employment sector. These factors also influence the sharing of different types of academic information. Respondents to the survey mainly followed specific accounts and hashtags to find academic information rather than keyword searching. This supports the fact that people tend to leverage social ties on Twitter to find information, which is not surprising for social media platforms.

References

- Bornmann, L. (2013). What is societal impact of research and how can it be assessed? a literature survey. *Journal of the American Society for Information Science and Technology*, 64(2), 217–233. <https://doi.org/10.1002/asi.22803>
- Bowman, T. D. (2015). *Investigating the use of affordances and framing techniques by scholars to manage personal and professional impressions on Twitter*. Indiana University, Bloomington, IN, USA.
- Gruzd, A., Staves, K., & Wilk, A. (2012). Connected scholars: Examining the role of social media in research practices of faculty using the UTAUT model. *Computers in Human Behavior*, 28, 2340–

2350. <https://doi.org/10.1016/j.chb.2012.07.004>
- Haustein, S., Costas, R., & Larivière, V. (2015). Characterizing social media metrics of scholarly papers: The effect of document properties and collaboration patterns. *PLoS ONE*, *10*(3), 1–21. <https://doi.org/10.1371/journal.pone.0120495>
- Haustein, S., Peters, I., Sugimoto, C. R., Thelwall, M., & Larivière, V. (2014). Tweeting biomedicine: An analysis of tweets and citations in the biomedical literature. *Journal of the Association for Information Science and Technology*, *65*(4), 656–669. <https://doi.org/10.1002/asi.23101>
- Holmberg, K., & Thelwall, M. (2014). Disciplinary Differences in Twitter Scholarly Communication. *Scientometrics*, *101*(2), 1027–1042.
- Knight, C. G., & Kaye, L. K. (2016). “ To tweet or not to tweet ?” A comparison of academics ’ and students ’ usage of Twitter in academic contexts. *Innovations in Education and Teaching International*, *53*(2), 145–155. <https://doi.org/10.1080/14703297.2014.928229>
- Priem, J., & Costello, K. L. (2010). How and why scholars cite on Twitter. *Proceedings of the American Society for Information Science and Technology*, *47*(1), 1–4. <https://doi.org/10.1002/meet.14504701201>
- Shuai, X., Pepe, A., & Bollen, J. (2012). How the Scientific Community Reacts to Newly Submitted Preprints: Article Downloads, Twitter Mentions, and Citations. *PLoS ONE*, *7*(11), e47523. <https://doi.org/10.1371/journal.pone.0047523>
- Thelwall, M., Haustein, S., Larivière, V., & Sugimoto, C. R. (2013). Do Altmetrics Work? Twitter and Ten Other Social Web Services. *PLoS ONE*, *8*(5), e64841. <https://doi.org/10.1371/journal.pone.0064841>
- VanGeest, J. B., Johnson, T. P., & Welch, V. L. (2007). Methodologies for improving response rates in surveys of physicians: A systematic review. *Evaluation & the Health Professions*, *30*(4), 303–21. <https://doi.org/10.1177/0163278707307899>
- Weller, K., Dröge, E., & Puschmann, C. (2011). Citation analysis in twitter: Approaches for defining and measuring information flows within tweets during scientific conferences. In *CEUR Workshop Proceedings* (Vol. 718, pp. 1–12).