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"From Global Indicators to Local Applications"

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#STI22GRX

Meta-analysis of studies on Twitter users disseminating scholarly publications

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Introduction

As Twitter is one of the main sources of altmetrics, several studies have focused on investigating who are sharing scientific articles on Twitter and various approaches have been developed for that purpose. A comparison of these earlier approaches reveals considerable diversity in the used methodologies and therefore it can be difficult to form a generalizable view about who the tweeters are that share and discuss scientific content on Twitter. The present research will use a meta-analytical approach to investigate and summarize the results from earlier studies.

Research Background

Earlier studies have coded the Twitter users based on the profile descriptions and thus, the categories have been dependent on what the users have decided to share about themselves. Some studies have used a binary categorisation, for instance, *bots* or *non-bots* (e.g. Haustein et al., 2016a; Didegah, Mejlgaard, and Sørensen, 2018), or *academic* and *non-academic* (e.g. Htoo and Jin-Cheon, 2017). Some studies have categorized the Twitter accounts into three categories, such as *individual*, *organization*, and *the rest*, which has included unknown accounts or accounts that the researchers haven't been able to determine to belong to the other categories (Haustein et al., 2016b). Other studies have taken a more detailed approach and categorized the Twitter users into multiple categories, such as *scientists*, *practitioners*, *members of the public*, and *science communicators* (Maleki, 2016).

Method

A systematic search was conducted in various indexing databases. The number of studies found was 87, of which only 53 articles presented some statistics about Twitter users. Articles, tweets or users as percentage values were found in 15 studies. Relevant statistics at user level were extracted from the content or the tables and figures in the studies and coded again to fit our meta-analysis (Table 1). This new categorization is in structured form consisting of two levels, i.e. unit/entity (*Individual*, *Organization* and *Science communicator*) and function (*Academic*, *Professional*, *Mixed/Other*), with the remaining unclear categories collected in the category named “*Mixed Groups*”.

After assigning new categorization, the statistics were recalculated when two or more study-level categories needed to be combined into a single user category or the average occurrence

had to be calculated across subject fields. Articles could be shared by users from different user categories at the same time and thus article level percentages could overlap.

Table 1. Twitter user categories as in the studies and our recategorization (the new categories in bold, examples of categories used in earlier studies in normal text)

Function of Interest/Unit	Individual	Organization	Science Communicator
Academic	Scientist/Researcher Faculty member	University Research Institutions	Library/Librarian
Professional	Practitioner Entrepreneur	Associations Business	Journal/Publisher Media/news/Journalist
Other/Mixed	Student; citizen; unspecified individual	Organizational account	Bots Science communicators
Mixed	Member of the public; Non-bot; Non-academic		

Findings and Discussion

Table 2 shows a comparison of the averages calculated from the percentages of tweeted articles (5 studies), tweets (5 studies), and Twitter users (11 studies), across users' categories as mapped on the structured Twitter user categorization. The overview of unit level statistics suggests that more than half of *individuals* account for Twitter users (53%) and tweets (58%). Nevertheless, the reverse is true for *Science communicators* which constitute minority of Twitter users (5%) and tweets (9%).

Table 2. Average proportion of publications, tweets, and unique Twitter users contributed by Twitter users across the structured user categorization

Twitter User Categories		Average % in function level			Average % in unit level		
Unit	Function	Articles	Tweets	Twitter users	Articles	Tweets	Twitter users
Individual	Academic	36.2%	19.9%	21.2%	≥36%	58%	53%
	Professional	22.5%	6.9%	3.0%			
	Other/Mixed	12.7%	30.7%	28.7%			
Organization	Academic	10.5%	5.5%	1.4%	≥10.5%	18%	11%
	Professional	10.0%	6.2%	1.9%			
	Mixed	-	6.4%	7.8%			
Science Communicator	Academic	-	-	0.4%	≥32.5%	9%	5%
	Professional	8.9%	3.3%	0.9%			
	Bot	26.4%	5.6%	3.0%			
	Mixed	32.5%	-	0.6%			
Mixed Groups		64.0%	15.5%	31.1%	64%	15%	31%
Total		-	100.0%	100.0%	-	100%	100%

The results show that *Individual Academics* are tweeting the highest proportion of articles (36.2%) and clearly contribute to majority of Tweets (19.9%) and constitute largely to the count of unique Twitter accounts (21.2%). *Organizations* categorized as *Academic* and *Professional* both have on average tweeted about 10% of articles, while their combined proportion of tweets at the unit level is 18%. The majority of articles investigated in earlier studies have been tweeted by users outside the main interest or focus of the studies, almost two-thirds (64%) of the accounts have been categorized into the unspecified *Mixed groups*. However, the proportion of tweets (15.5%) and Twitter users (31.1%) categorized into *Mixed*

groups have been less substantial, perhaps suggesting that the chosen categorizations have been better at identifying the users.

Conclusion

The current study took a meta-analytical approach to summarize the results from earlier studies that had attempted to answer the question about who is tweeting scientific content. The methodological challenges of our approach stemmed from the earlier studies using different data and somewhat different categorizations. Our results demonstrate the importance of individuals, and in particular individual academics, in the dissemination of scientific articles on Twitter. Our results also highlight the need for a more structured and unified categorization, as a significant proportion of the results in earlier studies have been unclear.

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