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How visible are the research of different countries on WoS and Twitter? an analysis of global vs. local reach of WoS publications on Twitter

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Abstract:

The country of authors of 5,9 million Web of Science (WoS) publications with DOI from the years 2012 to 2015 have been compared with the country of Twitter users tweeting these WoS publications in order to study the main scholarly users of Twitter across 10 different countries. For this purpose, the visibility of country's publications in the WoS and geographical distribution of Twitter users tweeting WoS publications have been analysed. The aim is to study how do they differ and what are their preference in tweeting their own vs. other country's publication. The findings show that in general, US and UK with the highest proportion of outputs in the WoS, are among the main users of Twitter as well. Moreover, except for US, users tweet publications affiliated to other country more than those from their own country. Also, similar to WoS, it seems that altmetric providers are not free of international biases in their coverage and collection of metrics. Finally, various possible reasons on why publications from some countries attract more Twitter users than others have been discussed.

Conference Topic

Altmetrics; Twitter users and usage; Geographical distribution; Altmetric.com; Web of Science (WoS)

Introduction:

Sharing and discussing scholarly content on social media platforms and particularly on Twitter has become popular in recent years. With about 20-30% of Scholarly WoS publications mentioned on Twitter (Robinson-García, et al., 2014), this platform is considered to be a prominent source of altmetrics after Mendeley (Haustein et al., 2014). Moreover, mentions of publications on this platform could be interpreted as an 'early indicator of attention or publicity' (Haustein et al., 2014). However, tweets have been proven to have a low correlation with citations (Thelwall, et al., 2013; Costas, Zahedi, Wouters, 2015a). This could be an indication that tweets capture a different type of impact in contrast to citations (Bornmann, 2014). Also, its uptake varies across fields (Costas, Zahedi, Wouters, 2015b) and countries (Alperin, 2015).

The study of the different typologies of Twitter users interacting with the publications has been proposed as a way to better understand Twitter-based metrics (Haustein, Bowman, & Costas, 2015). In this paper we follow-up on the idea of studying the interactions between Twitter users and scientific publications. Thus, here we focus on the analysis of the

geographic distribution of scholarly Twitter users in contrast with the countries of the authors of the scientific publications. Based on the geographic info of Twitter user accounts captured by altmetric.com, the aim of this paper is to study to what extent Twitter users are tweeting papers from their own or different countries. The following main research question is targeted:

- How are countries tweeting WoS publications in relation to their scientific outputs in WoS?

Data and methodology:

We have used a dataset of 5,989,022 million Web of Science publications with DOI published between 2012 and 2015. The publications were matched based on their DOIs with the Altmetric.com database (metrics until Jun 2016) and the Twitter accounts (users) mentioning these papers have been extracted. Altmetric.com provided country information of the Twitter accounts. This information has been analysed in order to study how the country of the Twitter users differs from the country of the authors of the tweeted publications. In this study, we focus on 10 different countries such as United States (US), United Kingdom (UK), Canada (CA), China (CN), Iran (IR), Brazil (BR), South Africa (ZA), Spain (ES), The Netherlands (NL) and Australia (AU). The following indicators have been calculated:

Proportion of twitter users of a country:

$$\frac{n. \text{distinct Twitter users from the country}}{n. \text{of total Twitter users of all countries}}$$

Proportion of twitted papers of a country:

$$\frac{n. \text{of distinct papers tweeted of a country}}{\text{total distinct papers tweeted}}$$

Proportion of tweets of a country:

$$\frac{\text{tweets of a country}}{\text{total tweets}}$$

30% (n=1,747,021) of analysed publications (with an average of 6.27 tweets per paper) were mentioned at least once on the Twitter platform by the 1,327,643 distinct tweeter users, both with known and unknown country information. Table 1 shows the general overview of the share of WoS publications affiliated to authors and tweeted by users across the 10 selected countries. US, China, and UK are the most dominant countries in terms of producing WoS publications (28%, 15.1%, and 8.5% of 2012-2015 WoS publications respectively). Regarding the country of the Twitter users, 36.58% and 25.57% of all tweeted publications (n=1,746,933) are from the US and UK respectively. Moreover, 20.19%, and 9.35% of all Twitter users tweeting any of the publications under study come from the US and the UK respectively.

Table 1. Distribution of 2012-2015 WoS publications with DOIs across the 10 countries

Country distribution of WoS publications		Country distribution of Twitter users			
Country	2012-2015 WoS pubs with doi	Total Twitter users (% of distinct twitter users)	Total 2012-2015 WoS Pubs with DOI twitted (% of distinct tweeted papers)	Total tweets (% tw)	Mean tweet (mtw)
Total	5,989,022	1,327,643	1,746,993	10,958,605	6.27
AU	236,333 (3.9%)	27,811 (2.09%)	124,843 (7.15%)	267,076 (2.44%)	2.14
BR	139,483 (2.3%)	9,116 (0.69%)	36,941 (2.11)	53,413 (0.49%)	1.45
CA	269,436 (4.5%)	44,070 (3.32%)	155,398 (8.90%)	342,956 (3.13%)	2.21
CN	905,021 (15.1%)	1,869 (0.14%)	8,180 (0.47%)	9,989 (0.09%)	1.22
IR	93,431 (1.6%)	341 (0.03%)	1128 (0.06%)	1,351 (0.01%)	1.20
ES	225,456 (3.8%)	33,469 (2.52%)	148,945 (8.53%)	356,861 (3.26%)	2.40
NL	162,121 (2.7%)	17,435 (1.31%)	71,584 (4.10%)	132,559 (1.21%)	1.85
UK	509,663 (8.5%)	124,081 (9.35%)	446,645 (25.57%)	1,341,452 (12.24%)	3.00
US	1,676,986 (28.0%)	268,060 (20.19%)	638,998 (36.58%)	2,236,403 (20.41%)	3.50
ZA	44,443 (0.7%)	6,465 (0.49%)	28,741 (1.65%)	41,222 (0.38%)	1.43

**% of the pubs per country per total pubs defined in the column above is presented in the brackets.

Results:

Country distribution of WoS author and Twitter users

Figures 1 and 2 show that the most dominant countries in terms of publications are the US, China, UK, and Germany. According to Figure 1, 28% of WoS publications are affiliated to the US, 11% to China, followed by 6% to UK and less than 5% of publications are affiliated to other countries (Figure 1).

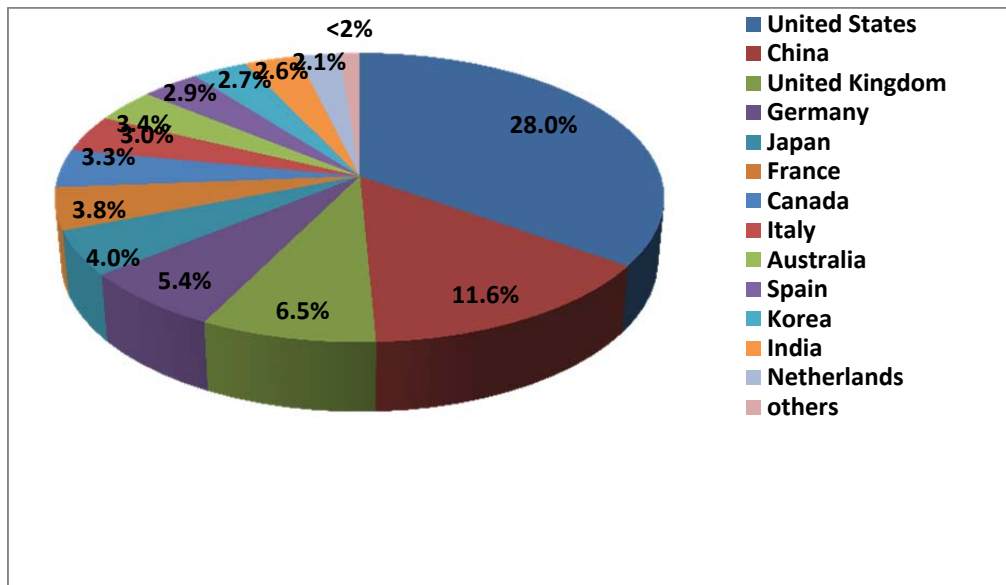


Figure 1. Distribution of country of affiliation of authors of the 2012-2015 WoS publications with DOI

According to Figure 2, for 42% of Twitter accounts no country information is available. For those Twitter users with geographic information available, 20% of users come from the US and about 10% from the UK while other countries have less than 3% of the Twitter users.

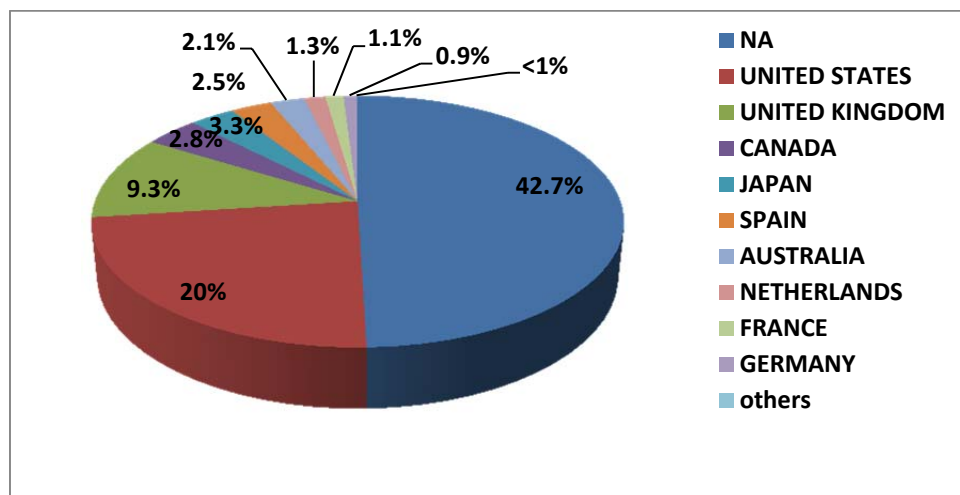


Figure 2. Distribution of country of distinct Twitter users of 2012-2015 WoS with DOI tweeted publications captured by Altmetric.com (NA refers to Twitter account for which the country information is not available by altmetric.com)

Country of Twitter vs. country of authors

Figure 3 shows whether the country of the Twitter users is the same or different from the country of the authors of the tweeted papers (share of tweeting own vs. other country's publications). In general, papers affiliated by authors from the US are the most tweeted papers by the users from all the 10 selected countries. For example, out of the 1,128 WoS publications tweeted from Iran, papers from the US (46%), the UK (17%), Canada (9%) and Germany (9%) are the most tweeted ones by Iranian tweeters (n=341 Iranian tweeters). Iranian tweeters tweet only 4% of papers from their own country. Brazilian users tweet their own papers in the fifth place after those by US (44%), UK (16%), Germany (8%) and Canada (8%), and their own country (BR,7%). Dutch, Spanish, and South African publications usually are the third group of the most tweeted publications from their own nationals. British, Australian, and Chinese tweeters have the second place in tweeting their own publications after US publications. American Twitter users have the first place in tweeting their own papers (47%), followed by papers affiliated to the UK (12%), Germany (7%), Canada (6%), and China (6%).

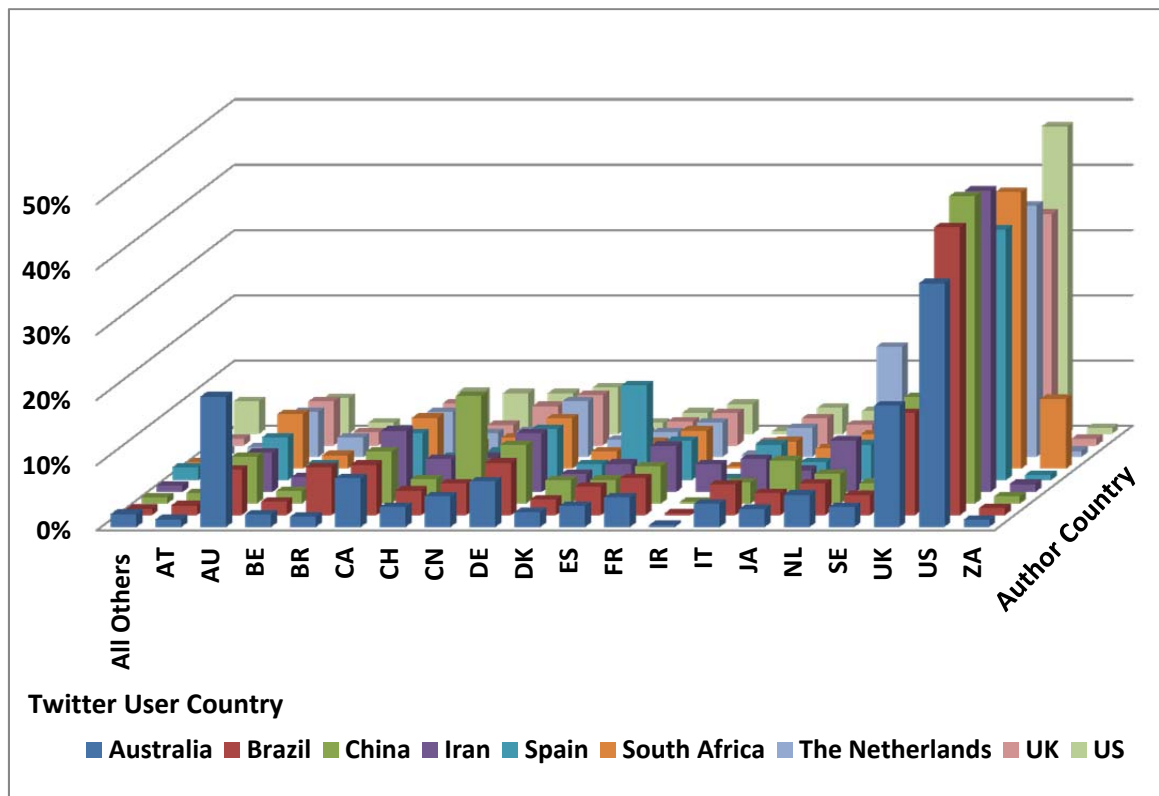


Figure 3. WoS author country (vertical line) vs. Twitter user country (horizontal line)

Figure 4 shows the relationship between the outputs of each country with the share of the Twitter activity coming from the same country (i.e., the proportion of tweeted papers by users from a given country). Regarding the output, 28% of the 2012-2015WoS publications with DOIs (n= 5,989,022) are authored by US and in case of Twitter activity, 36.6% of all tweeted WoS publications (n= 1,746,993) are tweeted by users from the US. About 15% of WoS publications have a Chinese author but only 0.47% of all tweeted WoS publications are tweeted by users from China. The third country is the UK having 8.51% of the WoS publications authored by them and 25.57% of all tweeted WoS publications tweeted from the UK. Other countries show both less than 5% presence in the WoS and less than 10% Twitter

activity although the relationship between their output and their activity on Twitter is relatively aligned.

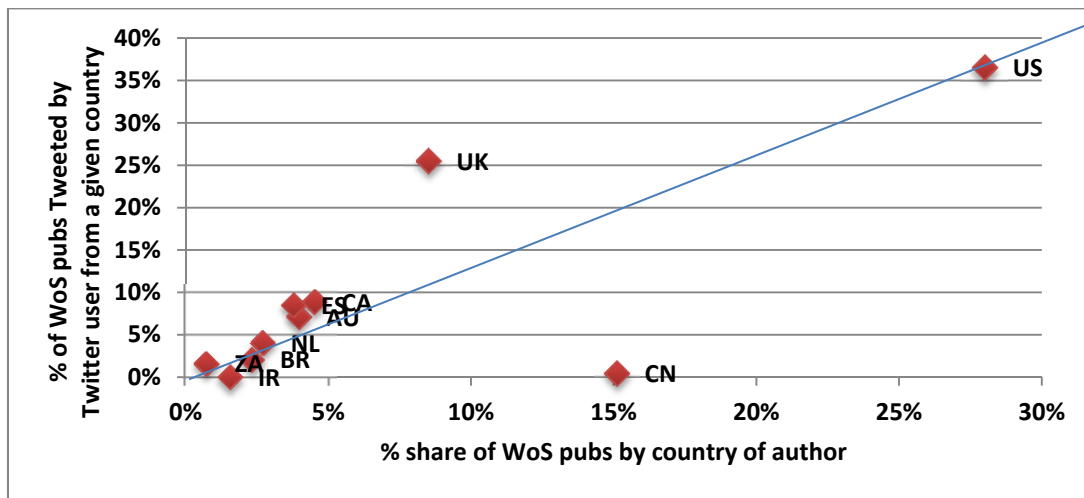


Figure 4. Difference between 2012-2015 publication's presence in the WoS and Twitter activity

Conclusions and discussions:

In this study we have compared the country of authors of WoS publications with the country of Twitter users tweeting these publications in order to explore the main scholarly Twitter users across the world. The idea is to study how scholarly tweeters are distributed worldwide, and whether any country biases in tweeting scientific publications similar to those previously observed for citation databases (Van Leeuwen, et al., 2011) exists. A special focus has been paid on how users tweet publications from their own or other countries. The results show that the US and the UK are both high in their proportions of outputs in the WoS and users discussing scientific publications on Twitter. These two countries have been also reported to be the top countries of Twitter users in the study of Haustein and Costas (2015). China is the second most important country in terms of WoS publications, however Chinese tweeters are not very active in discussing scholarly outputs. This may have to do with the low uptake of Twitter among Chinese users as they use their local tool (Weibo). Publications from the US are observed to be the most important set of publications tweeted from non-US tweeters. This can be related to the overall size of the US as a scientific producer. This result is in contrast to that obtained for Mendeley in the study of comparing country of authors and readers of Scopus publications by Thelwall and Maflahi (2015). This study showed that, although the higher proportion of US authors leads to the higher proportion of a given country readers in some fields, it seems that in general, Mendeley users tend to select articles from their own country more often than publications from any other country (Thelwall & Maflahi, 2015).

However, based on the above results, the main question is what explains the difference in the country's publication reach on Twitter and in the general scholarly Twitter usage across different countries. In other words, it is not clear why publications from some countries attract more Twitter users than others. Possible explanations for this could be due to biases in the coverage of Altmetric.com and WoS towards English sources and international publications (Mas-Bleda & Thelwall, 2016) as well as specific publishers or publications with digital identifiers (DOIs). Hence, it seems that local publications are underrepresented and similar biases towards developed countries as those observed for citation indicators can also be expected for Twitter indicators. Thus, the ideal of altmetrics serving scholars from developing countries (the so-called 'alternative scholars') is missed, as argued by Alperin (2013). Other

reasons for the observed differences could include cultural, technological, economical and political differences among countries. Among others, technological infrastructures, levels of user's access to technology, education, information literacy, information behaviour, etc. could play a role here (Zahedi, 2016). Clearly, factors such as the familiarity with the Twitter platform of citizens from specific countries, as well as the extent to which they are oriented, adopted or motivated to use this platform for sharing and disseminating scholarly outputs could have an influence on a country's scholarly Twitter usage. Hence, all these factors need further investigation on how they could influence scholarly Twitter usage across countries. In addition, understanding the different reasons and motivations of users from different countries to interact with scientific results, could give a better insight of the true potential and relevance of altmetric indicators to study national differences in the reception of scientific publications on social media platforms.

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