



Selected Papers of #AoIR2017:  
The 18<sup>th</sup> Annual Conference of the  
Association of Internet Researchers  
Tartu, Estonia / 18-21 October 2017

## MAPPING TWITTER'S INFORMATION SPHERE IN THE LEAD-UP TO THE BREXIT REFERENDUM: HOW EUROSCEPTIC VIEWS OUTPACED THEIR RIVALS

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(Note: Results are preliminary)

### Short Abstract

How did Eurosceptic (Leave) and pro-European (Remain) activity compare on social media in the run-up to the EU referendum, what kind of information did users share, and did this confine the two camps to informational echo chambers? To answer these questions we collected more than 7.5 million Brexit-related tweets through Twitter's streaming API. We enriched our data using a support vector machine to identify which tweets clearly supported the Leave or Remain camp, mapped twitter users within our data to the location specified in their user profile, and mined URLs shared in tweets. We find that Leave users were more numerous, and individually more active in tweeting to support their cause. Leave users also tended to be less open, and more engaged within their own echo-chamber, something that is reflected in the URLs they shared. URLs pointing to Eurosceptic domains were shared more widely than those pointing to pro-European domains. Surprisingly, The Express was one of the most prominent domains shared on twitter, more than its more prominent Eurosceptic counterpart, the Daily Mail. Overall, twitter users who supported Leave appeared to be much more active and motivated in advancing their cause than Remainers were in advocating continued EU membership. The use of twitter in the Brexit campaign demonstrates how social media users pushed a hitherto marginal political agenda to the front and center of public discourse.

Suggested Citation (APA): Hänska, Max & Bauchowitz, Stefan. (2017, October 18-21). *Mapping Twitter's information sphere in the lead-up to the Brexit referendum: How Eurosceptic views outpaced their rivals*. Paper presented at AoIR 2017: The 18<sup>th</sup> Annual Conference of the Association of Internet Researchers. Tartu, Estonia: AoIR. Retrieved from <http://spir.aoir.org>.

## Extended Abstract

Commentators have not tired of asserting the outsized influence social media supposedly played in the US presidential election and the campaign leading up to the UK's referendum on leaving the European Union; though the campaigns differ in important ways (Curry, 2016; Herrman, 2016; Lapowsky, 2016; Murray, 2016; Ohlheiser, 2016; Polonski, 2016). In particular researchers have asked whether social media confines users to silos of the like-minded (Brundidge, 2010; Feldman, Myers, Hmielowski, & Leiserowitz, 2014; Garrett, 2009; Pariser, 2011).

In this paper we map twitter's info-sphere in the run-up to the UK's Brexit referendum. How did Eurosceptic (Leave) and pro-European (Remain) information compare on social media in the run-up to the EU referendum, what kind of information did leave and remain supporters share, and did this confine the two camps to informational echo chambers which kept feeding them information congenial to their views? And, did those supporting Britain's continued membership in the EU interact with twitter users who sought to end Britain's membership, and vice versa?

To answer these questions we collected more than 7.5 million Brexit-related tweets through Twitter's streaming API. We enriched our data using a support vector machine to identify which tweets clearly supported the Leave or Remain camp, mapped twitter users within our data to the location specified in their user profile, and mined URLs shared in tweets.

To compare the activity of either side in the campaign we plotted the number leave and remain supporting users at different level of of activity: that is, how many users were there in each camp that tweeted once, twice, or a hundred times about the brexit referendum. To control for possible sampling bias that may have resulted from our filter terms, we plot results for sub-samples that containing either 'Brexti', or 'EURef/EU Referendum.' Irrespective of filter term, leave supporters were more numerous and more active on twitter by a factor of 2.3 and 1.75 respectively (see Figure 1).

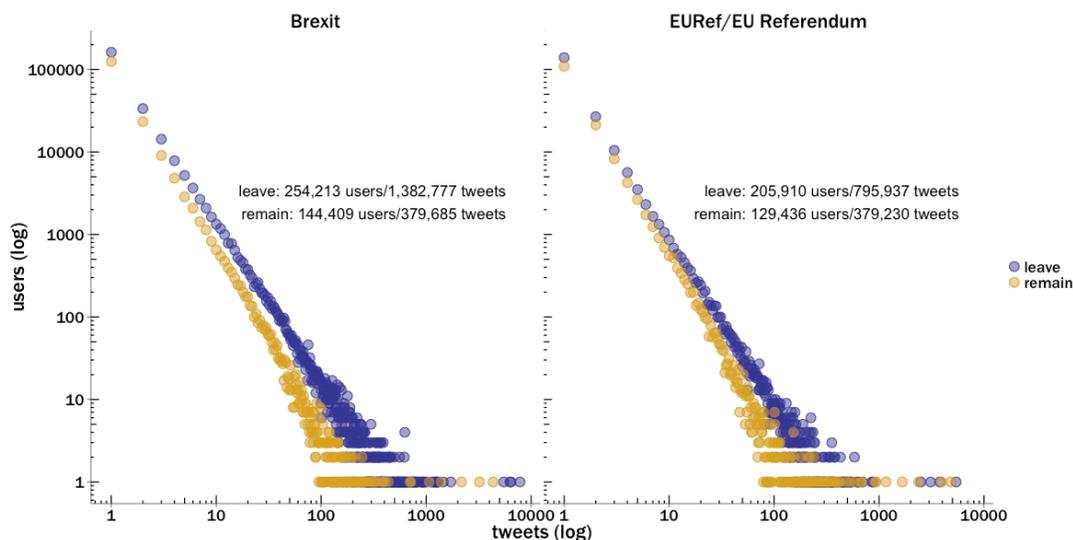
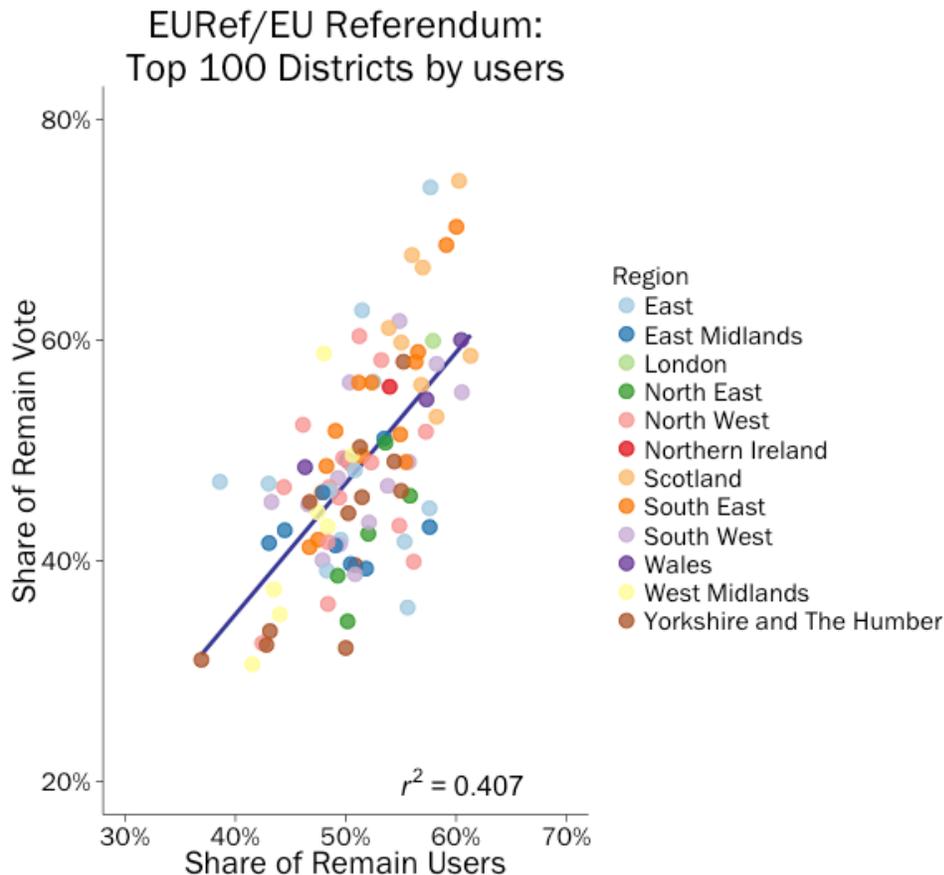


Figure 1: level of tweet activity by keyword.

Using the location information with which we enriched our data set, we plotted the share of users supporting remain against share of the remain vote, aggregating users to their local authority district. Districts with a greater share of twitter users supporting leave also tended to vote for leaving the EU, so that twitter activity correlates with voting in the Referendum (see Figure 2).



**Figure 2:** Share of remain tweets by share of remain vote.

To analyse the nature of pluralism or homogeneity on twitter—which crucially affords users the ability to interact, share, and engage with each other—we examined the extent to which users who supported leave and remain interacted with each other. To do so we took each tweet that was a retweet, reply or quote of another tweet, and matched it with the corresponding parent tweet (the tweet which the given tweet quoted, retweeted, or to which it was a reply). This allowed us to map interactions between leave and remain supporters. We aggregated all tweets by remain supporters that were retweets, replies or quotes of leave supporters, and vice versa. We find that leave users also tended to be less open, and more engaged within their own echo-chamber. Remain supporters are much more open than leave supporters, with leave supporters predominantly interacting with other leave supporters (83% of their interactions—see Table 1), while remain supporters interact with other remain supporters less than half

the time (only 46% of interactions initiated by a remain supporter were with other remain supporters, while 50% of their replies are to leave users).

	<b>Interacting with</b>	<b>Percentage</b>
<b>Leave user interacting with</b>	leave	82.97%
	remain	8.73%
	NA	8.29%
<b>Remain user interacting with</b>	leave	40.08%
	remain	46.11%
	NA	13.82%

**Table 1:** Who interacts with whom?

We also calculated E-I indices for the leave and remain network. E-I indices range from +1 (network is entirely external in orientation) and -1 (entirely internal in orientation). Lower values indicate more homophile networks, while higher values indicate a more heterophile network. -1 indicates an entirely internally oriented network, while +1 an entirely externally oriented network, and 0 an equal balance between internal and external links. The E-I index for the Leave network was -0.81, while the index for the Remain network is -0.07.

This tendency to interact only with the likeminded is also reflected in the URLs shared. Leave users tended to decisively share Eurosceptic domains, which were also more frequently shared overall than pro-European ones. Surprisingly The Express, a staunchly Eurosceptic tabloid, was one of the most prominent domains shared on twitter—more than the Daily Mail, which is well known for running a hugely successful website that attracts over 14 million unique users a day. However, it is worth noting that weighted for circulation, 82% of newspaper articles in the lead-up to the referendum supported leaving the European Union (Deacon, 2016; Graham, Hale, & Gaffney, 2014). The balance of information on twitter thus appear to be tilted in the same direction as the balance of information in the press.

Overall, twitter users who supported Leave appeared to be much more active and motivated in advancing their cause, than Remainers were in advocating continued EU membership. It seems plausible that leave voters were more motivated, and consequently more active on twitter. It also seems likely that slogans such as vote leave, take control, or even Brexit better lent themselves to simple, sound bite messages (which is particularly useful given the character constraints of a tweet). Furthermore, the press coverage of the referendum also favoured leaving the EU. The use of twitter in the Brexit campaign demonstrates how social media users helped pushed a hitherto marginal political agenda to the front and center of public discourse.

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