(Anti-)Echo Chamber Participation: Examing Contributor Activity Beyond the Chamber

Ella Guest

May 9, 2018

(Anti-)Echo Chamber Participation: Examining Contributor Activity Beyond the Chamber

Ella Guest

University of Manchester

ella.guest@postgrad.manchester.ac.uk

ABSTRACT

The existence of echo chambers as a phenomenon in social media has been widely debated in recent years. Previous research has attempted to alternatively support or refute the claim that online users strongly favour interacting online with people of similar views. Much of this research has been on social networking sites such as Twitter where users directly connect with each other. A common difficulty faced by researchers of those platforms is how to define, and therefore identify, echo chambers. This research examines a different form of social media, the social news website Reddit, where users interact with each other indirectly as part of topic-based communities. These discrete communities can choose to explicitly define how community members should behave. In this paper we examine two communities: r/The_Donald, which demands echo chamber behaviour, and r/changemyview which actively discourages it. By taking communities which self-categorise their (anti-)echo chamber-ness we are able to determine whether users who choose to participate in an echo chamber or an anti-echo chamber show different levels of participation in other communities. Ultimately, our preliminary research suggests participants of the echo chamber, r/The_Donald are no less active across other communities than the average reddit user. However, we find evidence that participants of the anti-echo chamber r/changemyview are more active than the average platform user.

CCS CONCEPTS

• **Applied computing** → Law, social and behavioral sciences → Sociology

KEYWORDS

Social media, social news, echo chamber, reddit

1 INTRODUCTION

The term "echo chamber" has become a serious focus of public and academic attention in recent years, although it was first applied to online discourse much earlier [1]. Much of this discussion has been theoretical and taken for granted the existence of echo chambers on social media without clearly defining what an echo chamber is [2]. To date little empirical evidence has been published to support the widely held belief that online users tend to only interact online with people of similar views. Recent work has provided evidence of echo chamber behaviours on Twitter, where it is heavily theorized to occur [3,4]. Such research often looks at the content of personal content-consumption networks, due to the nature of Twitter's structures. This research also seeks to find empirical evidence for the existence, or lack, of echo chambers on a social media platform – the social news site Reddit.

Reddit is organized into separate topic-based communities, called "subreddits". Users of the platform, "redditors", can contribute relevant content to a subreddit in the form of a post. Other redditors then discuss posts in comment threads. Unlike in social networking sites such as Twitter where users can directly connect themselves via following each other, connections between redditors are less explicit and can be defined in many ways such as browsing or subscribing to the same subreddits. For the purposes of this research we define a connection between redditors conservatively – two redditors are connected if they comment in the same subreddit.

A significant difficulty for research into echo chambers is that they are hard to define and, therefore, identify. However, subreddits are unlike many other online communities in that users congregate around a topic and within a defined space. Each subreddit has a unique nature and can write its on own standards of content and behaviour. Subreddits thus have the ability to define themselves as encouraging (or even demanding) echo chamber behaviours. This research focuses on two subreddits with clearly defined content policies that self classify them as respectively demanding and discouraging such behaviours. As we will see in the next section, r/The_Donald 2 is an echo chamber for supporters of President Donald Trump, while r/changemyview is an anti-echo chamber where redditors ask others to attempt to change their opinions.

We look at the redditors who author comments in each of these subreddits and the collection of other subreddit communities those authors participate in. By comparing the behaviours of redditors who choose to participate in these spaces, we seek to determine whether redditors who are active in an echo chamber interact differently in other spaces than redditors who seek to participate in an anti-echo chamber. However, a direct comparison alone would not allow us to determine whether such differences are actually anomalous across the platform. Therefore we include a random selection of other subreddits in our analysis to determine a baseline of expected behaviours for the platform.

2 RESEARCH OUTLINE

2.1 r/The_Donald as an Echo Chamber

2.1.1 Selecting a Definition. Bruns' recent work to contribute empirical evidence currently lacking in the echo chamber literature provides a useful description of the key term. "An echo chamber comes into being where a group of participants choose to preferentially connect with each other, to the exclusion of outsiders" [2]. In the context of Twitter, on which Bruns et al based their research, participants preferentially connect by following each other [3]. As reddit is not a social networking site, redditors connect indirectly with each other via content. Thus for the purposes of this research a subreddit-community is considered to be an echo chamber if outsiders are excluded because of their views, allowing the dominant view to be reinforced without being questioned. *2.1.2 r/The_Donald Content Policy.* r/The_Donald has a strict list of ten well-defined rules of acceptable behaviours for the community [5]. The sixth rule states

"Trump Supporters ONLY – This sub is for supporters of Donald J. Trump ONLY. This is not a place for you to debate with us about Donald Trump, or to ask us to convince you to like Donald Trump. This is not a neutral place – we are 100% in support of Donald J. Trump. Moderators reserve the right to ban non-supporters as we see fit". This rule defines r/The_Donald as a space where only people with a particular opinion – complete support of President Donald Trump – are allowed to participate. Anyone with an alternative opinion is excluded from the community by first being greatly discouraged from contributing, then being banned if they choose to contribute an undesired view to the community. This clear exclusion of dissenting opinions means r/The_Donald's readily fits our working definition of an echo chamber.

2.2 r/changemyview as an Anti-Echo Chamber

2.2.1 r/changemyview Content Policy. The moderators of r/changemyview describe the subreddit as "dedicated to the civil discourse of opinions, and is built around the idea that in order to resolve our differences, we must first understand them" continuing to assert that "anyone can post [there] so long as they have an open-mind and are looking to consider other perspectives" [6]. These statements summarize the goal of r/changemyview as a place for people to post opinions they know may be controversial, or are simply willing to have changed, inviting other contributors to try to persuade them to change their mind. No one is denied entry in the space based on their opinions (within the limits of legal speech, ex hate speech, inciting violence). Contributors are encouraged to provide conflicting opinions and to rationally debate. r/changemyview can thus be considered as actively trying to resist the echo chamber tendency to reinforce particular opinions. For the purposes of this research it is thus referred to as an "anti-echo chamber".

2.3 Research Questions & Methodology

This research seeks to determine whether people who participate in echo chambers show echo chamber like behaviours in other spaces3. Do they also only participate in spaces with other like-minded people outside of the chamber? Consequently, do they participate in fewer other communities? We are also interested in the comparative behaviour by those who choose to participate in an anti-echo chamber. Do they also engage with people from a variety of viewpoints outside of the chamber? Is

---

2 Subreddit names start with 'r/' to show they are subreddits. This comes from the url format to access subreddit homepages. Ex. www.reddit.com/r/The_Donald

3 It is important to note that one person can maintain multiple reddit accounts therefore we cannot assume that an individual is represented by a single reddit account [7,8]. This can of course limit the ability to analyze user behaviour across subreddits as it is common for people to user different accounts for different subreddits, For example, participants in r/The_Donald are banned from contributing in some subreddits. This issue will be addressed in further research (See section 3.3.2)

this reflected in participating in a wider range of other communities? This raises our first hypothesis. If we assume that people practice their echo chamber-like behaviour across communities:

Hypothesis 1: Contributors to the echo chamber r/The_Donald will participate in a smaller range of other communities than contributors to the anti-echo chamber r/changemyview as the former will have more limited options. By being more open, r/changemyview authors are expected to have a larger number of subreddits they are willing to participate in than r/The_Donald authors.

We are also interested in how much participants of the echo chamber and anti-echo chamber engage with their respective chambers, relative to other communities. Following on from Hypothesis 1, if r/changemyview participants are active in a wider range of other subreddits we expect them to give more attention to other communities than r/The_Donald contributors. In addition, as a wider range of topics are discussed in r/changemyview, contributors will only participate in those topics that interest them. Conversely, for r/The_Donald, contributors are expected to be at least partially interested in most conversations, and thus will be drawn to participate in more conversations. This leads to our second hypothesis:

Hypothesis 2: Contributors to the anti-echo chamber r/changemyview will make relatively less of their total contributions on the platform within the anti-chamber, because they will be pulled towards more other communities and only be engaged with some topics within the anti-chamber. Contributors to r/The_Donald will be relatively more committed to the echo chamber than r/changemyview authors are to the anti-echo chamber.

2.4 Data Collection & Sampling

2.4.1 Data source. Redditor u/Stuck_In_the_Matrix uses the Reddit API to collect all comments made across the platform and stores them in monthly subsets which can be accessed via Google BigQuery [9-10]. For this initial analysis we used one month of comments, those from June 2017. Comments are used instead of posts because comments are more frequently, thus providing more data, and because they better reflect interactions between redditors. First the usernames of all redditors to comment in r/The_Donald or r/changemyview in June 2017 were collected. Then data on all comments made by those redditors across all subreddits were collected. For each comment details of the authoring redditor, the local subreddit, and the timestamp were collected.

Table 1: Data Counts by Level

Number of	Authors	Subreddits	Comments
Full Dataset			
The_Donald	52,203	22,722	3,781,523
changemyview	8,469	17,062	1,135,816
Known bots removed			
The_Donald	52,195	18,616	3,652,079
changemyview	8,464	11,939	1,037,434

2.4.2 Selection of Control Subreddits. Data was also collected for a selection of other subreddits for comparison. First a random sample of 1000 subreddit names was selected from the June 2017 comments dataset. Then up to 1000 random redditor names were selected for each subreddit. Where a subreddit had fewer than 1000 contributing redditors all were collected. Only the 578 subreddits with 1000 or more authors were included in the analysis. Author samples were taken independently so one author could be sampled for multiple subreddits. In total 746,212 subreddit-author pairs were sampled including 598,326 unique authors. Finally all comments from across the platform made by the randomly selected redditors were selected.

2.4.3 Removal of Known Bots. Bot redditors are frequently used on Reddit to perform automated tasks. Bot accounts cannot be automatically identified, thus it is impossible to remove all bots from the dataset. For the purposes of this preliminary work only accounts that we could conclusively identify were removed. As bots can post much more frequently than human redditors, the majority of most frequently commenting authors in the dataset were manually identified as bots. The 20 authors with the most comments were manually checked and 17 were identified as bots. Table 1 shows how the removal of the bots affects the size of the datasets for the main subreddits. All analysis excluded the identified bots.

3 RESULTS AND DISCUSSION

3.1 Author Alter-Subreddit Frequencies

We refer to the original subreddit as the "ego-subreddit". For each ego-subreddit, the "alter-subreddits" refer to the other communities that ego's authors comment in. For example, when looking at the ego-subreddit r/The_Donald, all of the other communities its authors comments in are considered the alter-subreddits [Figure 1].

Ego subreddit → author → alter-subreddit

Figure 1: Diagram of relationship between authors and subreddit types

Table 1 shows the breakdown of total author and total alter-subreddit counts for r/The_Donald and

r/changemyview after the removal of bots. r/The_Donald has more than 6 times as many authors as r/changemyview, but those authors represent only 1.6 times as many alter-subreddits and 3.6 times as many comments. This suggests that authors in r/The_Donald tend to comment relatively less in other subreddits than r/changemyview authors. However, there is a great amount of variation in alter-subreddit counts in all subreddits due to some highly prolific authors (see Section 3.3.1).

Here we refer to the total number of subreddits an author commented in as their "subreddit count". Authors in r/The_Donald have a median subreddit count of 22 (interquartile range of 6-72). r/changemyview authors have a median subreddit count of 52 (IQR 16-142). This provides some support for Hypothesis 1, that authors of r/changemyview tend to engage with more other communities than those of r/The_Donald. However, to determine whether greater median number of alter-subreddits per author corresponds with engagement in a greater diversity of topics, further analysis must be done to examine the network structures of authors and alter-subreddits (see Section *3.3.2*).
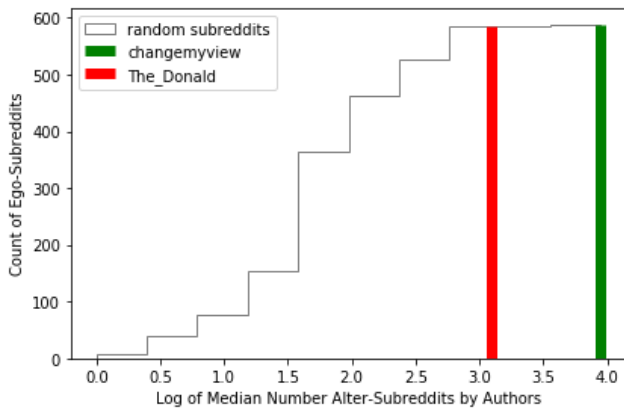

Figure 2: Cumulative Distribution Function of Log of Median Alter-Subreddit Counts by Ego-Subreddit

Figure 2 shows the cumulative distribution function of median author subreddit counts by ego-subreddit for the sample subreddits. The median value of those medians is 6 (IQR 4-9). Only 5 of the 586 subreddits have a median author subreddit count greater than r/The_Donald (22). The largest in the sample is 26 which is twice as many as r/changemyview (52). This shows that authors in both subreddits tend to contribute to more subreddits than collections of authors from other subreddits. This provides partial support for Hypothesis 1 as r/changemyview authors do engage with more subreddits than those of other ego-subreddits, including r/The_Donald. However, authors of r/The_Donald still

tend to engage with more communities than those of other ego-subreddits. Thus the second part of Hypothesis 1, that authors of r/The_Donald will engage less, is not supported.

3.2 Author Ego-Subreddit Engagement

The author in-subreddit ratio is the number of comments the author made in the ego-subreddit divided by the total number of comments the author made across all subreddits [11]. The median in-subreddit ratio for r/changemyview is 0.06 (IQR 0.02-0.2), meaning that for the median author of r/changemyview 6% of all comments they made in June 2017 were in the ego-subreddit. The median in-subreddit ratio for r/The_Donald is 0.28 (IQR 0.07-0.84) – the median author made 28% of their total comments in the ego-subreddit. This provides preliminary evidence in support of Hypothesis 1, that r/The_Donald author are relatively more engaged with the ego-subreddit than r/changemyview authors. However, to understand whether these findings are meaningful beyond the chamber context they must be compared to the control subreddits.
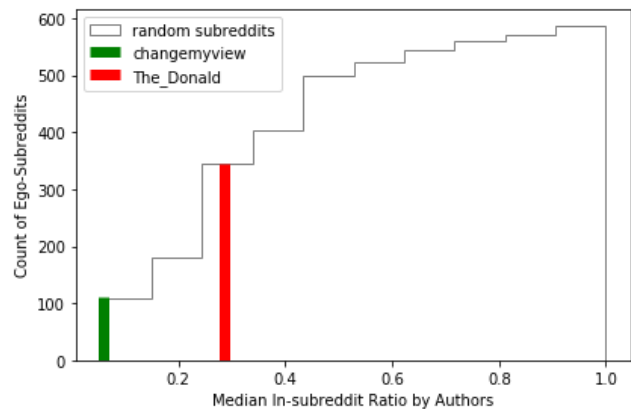

Figure 3: Cumulative Distribution Function of Median In-subreddit Ratios by Ego-Subreddit

Figure 3 shows the cumulative distribution function of author in-subreddit ratios for the sampled ego-subreddits. The overall median is 0.33 (IQR 0.2-0.5), meaning in half of the sampled subreddits authors tend to make 1/3 or less of their comments in the ego-subreddit. Thus the 28% for r/The_Donald falls on the lower end of the interquartile range for sample ego-subreddits. This offers evidence partially against Hypothesis 2. Though r/The_Donald authors have a much larger median in-subreddit ratio than those in r/changemyview, the former do not appear to comment relatively more within the echo chamber than authors of other ego-subreddits. However, there is evidence that authors in r/changemyview are relatively much more active in other subreddits than within the anti-echo chamber. Only 5 subreddits in the

analysis had a smaller median in-subreddit ratio than r/changemyview's 6%, suggesting that authors of the subreddit are relatively more engaged with other alter-subreddits, compared to most ego-subreddits.

3.3 Future Steps

3.3.1 Addressing Outliers. So far this preliminary analysis had done little to account for major outliers, and issues of weighting in the data during sampling and analysis. Any given subreddit is likely to have many redditors who only author a few comments, and a few authors who make exponentially more comments than average. This is currently addressed by taking the median instead of mean. However the next step in this stage of analysis will be to more thoroughly consider the range of redditor activity in how authors are sampled, and how author, comment, and alter-subreddit counts are weighted. This will allow for the consideration of more precise measures.

3.3.2 Network Analysis. Here was have only looked at the frequency of authors and alter-subreddits connected to ego-subreddits, but not yet examined their relationships. The next stage of analysis will begin examining the network structures of these connections. Each ego-subreddit networks will be conceived of as a two-mode structure of ties between the commenting authors and their alter-subreddits. Analysis of the strength of ties between ego- and alter-subreddits, whether certain subreddits cluster by topic, and the overall network density will allow a more thorough understanding of author content engagement. Online then can it be determined whether users preference to participate in echo chamber environments is reflected in their activity outside of the chamber.

4 CONCLUSIONS

We have found evidence that authors of r/changemyview tend to comment in many more subreddits than those who congregate in other subreddits. This suggests that redditors who chose to participate in this anti-echo chamber also sought to participate in a range of other communities. We also found that authors of r/The_Donald comment in more subreddits than those of most communities, though not as many for r/changemyview. Contrary to expectations, redditors who chose to participate in the echo chamber also participated in a greater range of other communities. Further analysis is needed to determine whether range in the number of subreddits corresponds with engagement with a range of other topics. For example, do r/The_Donald authors comment in the same other subreddits and, if so, do those subreddits represent a change of content or do they cluster by topic?

In the second part of analysis, we found that r/The_Donald had a slightly lower than average median in-subreddit ratio. This suggests that those authors are relatively no more devoted to commenting in r/The_Donald than those of other communities. However r/changemyview had a very low median in-subreddit ratio, suggesting that authors who choose to participate in the anti-echo chamber still engage much more with other communities. However, we have not yet accounted for the range of activity level of commenting redditors. Further research must be done to unpack the different levels of activity of both infrequent and highly active authors.

REFERENCES

[1] Cass Sunstein. 2002. *Republic.com.* Princeton University Press, Princeton, NJ.

[2] Axel Bruns. 2017. Echo chamber? What echo chamber? Reviewing the evidence. In *6th Biennial Future of Journalism Conference (FOJ17),* Cardiff, UK. https://eprints.qut.edu.au/113937/

[3] Axel Bruns, Brenda Moon, Felix Munch, & Troy Sadkowsky 2007. The Australian Twittersphere in 2016: Mapping the Follower/Followee Network. *Social Media + Society* 3(4).

[4] Cristian Vaccari, Augusto Valeriani, Pablo Barbera, John T Jost, Jonathan Nagler, and Joshua A Tucker. 2016. Of Echo Chambers and Contrarian Clubs: Exposure to Political Disagreement Among German and Italian Users of Twitter. *Social Media + Society* 2(3).

[5] r/The_Donald. r/The_Donald Wiki. 2018. Retrieved from: https://www.reddit.com/r/The_Donald/wiki/index

[6] r/changemyview. r/changemyview Wiki. 2018. Retrieved from: https://www.reddit.com/r/changemyview/wiki/index

[7] Bernie Hogan. 2010. The presentation of self in the age of social media: Distinguishing performances and exhibitions online. *Bulletin of Science, Technology & Society* 30(6): 377-386.

[8] Alex Leavitt. 2015. This is a throwaway account: Temporary technical identities and perceptions of anonymity in a massive online community. *18th ACM Conference on Computer Supported Cooperative Work & Social Computing.*

[9] r/Stuck_in_the_Matrix. 2015. I have every publicly available Reddit comment for research. *Reddit.* Retrieved from: https://www.reddit.com/r/datasets/comments/3bxlg7/i_have_every_publicly_available_reddit_comment/

[10] r/Stuck_In_the_Matrix. 2017. June 2017 Reddit comments dataset. *BigQuery.* Retrieved from: https://bigquery.cloud.google.com/table/fh-bigquery:reddit_comments.2017_06

[11] Alex Hogan. 2017. Understanding Slacktivism in the Era of Trump Supporters. [personal communication]