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Social media, polarization and democracy: A multi-methods analysis of polarized users' interactions on Reddit's r/WallStreetBets

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FOUNDATIONS OF LAW AND FINANCE

LawFin Working Paper No. 28

Social Media, Polarization and Democracy: A Multi-Methods Analysis of Polarized Users' Interactions on Reddit's r/WallStreetBets

Elsa Clara Massoc | Maximilian Lubda

Electronic copy available at: https://ssrn.com/abstract=4010798

Social Media, Polarization and Democracy
A multi-methods analysis of polarized users' interactions on Reddit's r/WallStreetBets

Elsa Clara Massoc * and Maximilian Lubda

Abstract: In times of increased political polarization, the continuing existence of a deliberative arena where people with antagonistic views may engage with each other in non-violent ways is critical for democracy to live on. Social media are usually not conceived as such arenas. On the contrary, there has been widespread worry about their role in increasing polarization and political violence. This paper suggests a more positive impact of social media on democracy. Our analysis focuses on the subreddit "r/WallStreetBets" (r/WSB) - a finance-related forum that came under the spotlight when its users coordinated a financial attack on hedge funds during the Gamestop saga in early 2021. Based on an original method attributing partisanship scores to users, we present a network analysis of interactions between users at the opposite sides of the political spectrum on r/WSB. We then develop a content analysis of politically relevant threads in which polarized users participate. Our analyses show that r/WSB provides a rare space where users with antagonistic political leanings engage with each other, debate, and even cooperate.

„Dialogue seems in itself to constitute a renunciation of aggressiveness"
Jacques Lacan

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Key words: social media, polarization, democracy, investment forum

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Introduction

The rise of durable polarization in American politics has been a major preoccupation for scholars for the past two decades. Research in this area began with a focus on polarization in a narrow segment of highly engaged activists and party elites, but more recent work has emphasized how changes at the mass public level have interacted with elite-level polarization in critical ways (Abramowitz 2010, Fiorina & Abrams 2009, Mason 2018, Margolis 2018, Pierson and Schikler 2019). Increased polarization of ordinary citizens has come hand in hand with the narrowing of the political space where citizens with different views would debate and engage with each other – in a disagreeing yet non-violent way. However, the capacity of people to engage with fellow citizens holding antagonistic views is arguably critical for democracy to live on (Svolik 2012; Arbatli and Rosenberg 2020). The question of the existence/survival of such deliberative spaces is thus primordial from both a scholarly and civic point of view.

Social media are usually not conceived as deliberative spaces where people do engage and discuss with people holding opposite views. On the contrary, there has been widespread worry about the role of social media in increasing polarization or even inciting political violence (Settle 2018; Cho et al. 2020; Kubin and Sikorski 2021, Munn 2021). Forums like Reddit, whose central features are anonymity and a system of up- and down-voting posts, have been shown to sometimes promote "toxic techno-culture" and far-right rhetoric (Leung 2013; Massanari 2017).

Based on a multi-method analysis of interactions between users on the subreddit "r/WallStreetBets" (r/WSB), this paper points to a more positive dimension of such a forum. (r/WSB) is a finance-related forum that came under the spotlight in early 2021 when r/WSB users coordinated to buy shares of the U.S. video game seller Gamestop *en masse* in order to force hedge funds that had been betting on the decline of Gamestop to buy the stocks even as it was rising in value. This strategy resulted in major financial losses for some of those hedge funds.

Building on an analysis of r/WSB submissions and comments posted between January and March 2021 – a time period where the GameStop saga was at its highest peak, we want to answer the following research questions: How do r/WSB users interact? Does the forum foster engagement between individuals holding opposite political views? Or do polarized sub-groups (communities) exist within r/WSB and ignore each other?

We proceed in three steps. *First,* we develop an innovative method to assign a partisan score to each r/WSB's user based on this user's activity on other subreddits which partisan identity is explicit (for example, a user who posts often in the conservative sub-reddit r/Conservative and whose posts are up-voted in this subreddit will be assigned a partisan score identifying them as "Right-Wing"). *Second*, based on those partisan scores, we perform a network analysis of users' interactions on r/WSB to assess whether people that are politically polarized (very left or very right) engage with each other, or not. We find that polarized users do indeed engage with each other extensively. *Third*, a qualitative content analysis of discussions between polarized users shows that these users don't interact only with regard to investment advice, but also with regard to highly political issues as varied as the role of the government in the

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economy, taxation and inequalities or the role of parties in the political system. This analysis also shows that users expressing Anti-Semitic views are widely and actively challenged by other users of the r/WSB community.

Our research suggests that online forums can provide a rare deliberative arena where users with antagonistic political leaning do engage with each other, debate, and even collaborate. Whether these interactions, in the end, result in less polarization or in a deradicalization of ideologically extreme individuals is beyond the scope of this paper. However, the fact that social media may provide an arena for polarized individuals to engage, debate, and even collaborate, has some important implications and opens further research paths for discussions on the role of social media in deliberative democracy.

This paper is structured as follows. First, we present important informational background on Reddit and r/WallStreetBets. Second, we discuss how our paper contributes to the literature on the role of social media on polarization and deliberative democracy. The third section presents the methods and the data used in the paper. The fourth section presents the results of the quantitative analysis. The fifth section presents the results of the qualitative content analysis. The sixth question discusses the limitations of the paper and paths for future research. The last section summarizes the paper and briefly discusses the contributions of this research to the important debates about the role of social media in democracy in the US and beyond.

Background: Reddit and r/Wallstreetbets

Much research has been undertaken to understand the role of information and communication technologies, and social media platforms in particular, in deliberative democracy and social movements. However, which aspects of social movements are supported depends on the idiosyncrasies of the various social media platforms (Buyukozturk et al. 2018). Facebook has been found to enable mobilization (Harlow 2012) and self-organization (Mercea 2013). Twitter allows its users to form networks, broadcast information (Theocharis et al. 2015), and raise awareness about issues using hashtags (Buyukozturk et al. 2018). While the majority of research focuses on the two aforementioned platforms, another very popular site has received little scholarly attention in the past: Reddit (Gaudette et al. 2020).

Reddit was created in 2005 and has become the seventh most popular website in the United States (21st in the world) (alexa.com 2021). The site describes itself as a "social news aggregation website" and is structured as a collection of topic-specific forums rather than friends (Facebook) or follower (Twitter) networks. Here, users form like-minded communities, so-called subreddits, focusing on specific (niche) topics - ranging from r/cats to r/communism101 and post topic-related content. Unlike Facebook and Twitter, users do not directly connect with one another, deemphasizing individual users' profiles while highlighting each Subreddit's topic and community.

An essential feature of Reddit is its voting mechanism. Users can choose to upvote content they appreciate or downvote posts that they dislike. Upvoted content then gets promoted within the Subreddit and especially liked posts are shown on Reddit's front page where they reach millions of users from outside their original niche community. Downvoted content receives

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less promotion. Based on these non-linear voting dynamics, submissions can amass rapid attention.

It has been shown that these features (anonymity and voting) make it less likely for users to censor themselves (Leung 2013) and promote so-called 'toxic techno-cultures' (Massanari 2017). Consequently, some cases of such Subreddits have gained wide attention due to extreme views they promoted. Prominently, the Subreddit "r/The_Donald", a community centered around Donald Trump's presidency that represented a variety of extreme right-wing views, led Reddit to quarantine (users have to specifically opt-in to access this content and it does not get promoted on the front page) or even delete such Subreddits (Gaudette et al. 2020).

This paper points to another consequence of such a forum: it provides a unique arena where politically polarized individuals can engage with each other, debate, and even cooperate. A phenomenon that is unlikely to occur on other, user-focused sites.

The subreddit that this study focuses on is called r/WallStreetBets (r/WSB) which describes itself as *"Like 4chan found a Bloomberg terminal"* and has become extremely popular with its 11.2 million users (November 2021) that grew almost ten-fold over the past year (subredditstats.com 2021). Users in this subreddit post finance-related content and are known to emphasize highly speculative investment strategies. In January 2021 one of these strategies has put r/WSB into the spotlight of the general public, making it the third most visited website on January the 28th 2021, and leading it to be the target of a congressional probe (Bradley 2021).

r/WSB users coordinated to buy shares of the U.S. video game seller Gamestop *en masse*. The action was aimed at attacking hedge funds that had taken large "short" positions on Gamestop, meaning that they had bet that Gamestop stock would fall. By buying up Gamestop shares, r/WSB retail investors organized what is known as a "short squeeze". In other words, they forced hedge funds that had been betting on the decline of Gamestop to buy the stocks even as it was rising in value. This strategy resulted in major financial losses for some of those hedge funds. This attack on financial elites and hedge funds by retail investors has been called the "digital version of occupy wall street" by outlets such as CNN. But while Occupy Wall Street participants largely shared similar political stances (Munncih 2018), we show that r/WSB users come from different sides of the political spectrum.

Social media and democracy: their role on polarization, social violence and radicalization

The US is experiencing increasing levels of political polarization (Kubin and Sikorski 2021) to such an extent that partisan identification predicts social policy preference three times better than any other demographic factor (Dimock and Carroll 2014). While it was long thought that democratic institutions would in the end mitigate extreme polarization, recent scholarship has suggested that existing institutional designs may intensify such polarization instead of correcting it (Pierson and Schikler 2020). While increased polarization itself can be beneficial to society by increasing political participation (Wagner 2021), it has many detrimental effects on democracy in creating congressional gridlock (Jones 2001), making citizens less satisfied (Wagner 2021), and inducing an unwillingness to interact with political opponents (Frimer et al. 2017). Unwillingness to interact with political opponents could be particularly detrimental as it is an essential feature of deliberative democracy (Svolik 2012; Arbatli and Rosenberg 2020).

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The role of social media on political polarization is much debated. Some evidence points to the fact that that polarization is related to (social) media exposure (Kubin and Sikorsk 2021). Particularly, exposure to like-minded media, like the interest groups constituted by Subreddit communities, has been shown to increase polarization. It has been argued that social media sites tend to employ curation and personalization algorithms that expose users to like-minded content, creating so-called "filter bubbles" (Dylko et al. 2017; Bozdag 2013). Beyond "filter bubbles", Bail et al.'s (2018) found that exposure to opposing political ideologies on Twitter pushes individuals further towards their preexisting political camp, increasing ideological polarization and contrasting the evidence from the interpersonal studies. Polarization research differentiates between ideological (distance between policy preferences) and affective (disliking supporters of opposing parties) polarization. While there is mixed evidence for the link between social media exposure and ideological polarization, the recent rise in affective polarization is likely to be related to the toxic nature of online interactions (Tucker et al. 2018).

Some evidence has pointed out that social media may even incite and enable political violence. Through an examination of the "free speech" social media network Parler in the days leading up to the attack on the United States Capitol in January 2021, Munn argued that social media worked to forge connections between disparate camps, to incite participants toward violent activity, and to legitimize this attack as moral or even spiritual. He argues that preparatory social media framed the event, established the targets, and set the agenda, providing a degree of order and working against disaggregation online. Rather than prosocial or emancipatory, the Capitol storming demonstrates the far darker potential of this work performed by social media (Munne 2021)

Another important question is the role of social media in the process of (de)radicalization of individuals with extreme (sometimes violent) ideological views. There has been a growing scholarship on the negative role of social media in the radicalization of individuals in the context of religious Islamist extremism online (Bastug et al., 2018). While interpersonal conversations have been shown to de-radicalize individuals, reducing exclusionary attitudes offline (Kalla and Broockman 2020), less is understood about (discursive) deradicalization in the digital domain.

In highlighting the depolarizing potential of Reddit, we aim to contribute to the important research agenda that wants to understand the differentiation between social media platforms and their impacts on polarization, political violence, and radicalization (Yarchi et al. 2020). In the same line, our paper also contributes to filling the gap in the online polarization literature that tends to overemphasize the adverse, polarizing effects of social media (Kubin and Sikorski 2021).

We hypothesize that a unique feature of the r/WSB movement, given this polarized environment and in contrast to other (online and offline) political platforms, is the heterogeneous composition of political identities of the actors that collaborate within it. Other social media sites such as Twitter or Facebook put too much attention on the user's profile and network to allow such collaboration. We argue that it is precisely the subject-focused nature of Reddit and thus of r/WSB that allows people from opposite sides of the ideological spectrum to communicate effectively and even to take (costly) collective action.

Methods

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In this section, we introduce the methodology and dataset employed to answer our research questions. First, we propose a methodology assigning users a partisan score that positions them on the left-right political spectrum. This analysis shows the heterogeneity in the subreddit's users' political identities. Second, based on this partisan score, we construct a graph that connects users that have directly interacted with one another to investigate whether they engage preferably with others that share similar or opposing political identities. This graph shows that there is no partisan bias in interactions: users engage with antagonistically opinionated users at the same rate as they engage with users with similar views. Lastly, we perform a qualitative analysis of politically charged discussions based on a selection of sub-threads. This analysis shows that users with opposite views actively engage each other on topics as varied as the role of the government in the economy, taxation, inequalities, the relations with China, or the role of parties in the political system.

Our results are based on data acquired with the pushshift.io API (Baumgartner et al. 2020), also called PSAW, a third-party database that collects submissions and comments (posts) from Reddit. We rely on this external API, not the one provided by Reddit itself, as Reddit disabled the possibility to extract data from specific time frames, allowing direct access only to the most recent posts (Baumgartner et al. 2020). We have collected all submissions and comments starting on the first of January 2021 until the 31st of March 2021 from the Subreddit r/wallstreetbets, covering the emergence of the movement and short-squeeze. In addition to the content (body), we enrich our dataset with information about the author, DateTime, parent comment (if a comment replies to another comment or submission), score, and upvote-ratio of each post. Due to our reliance on pushshift.io, our dataset is not guaranteed to be exhaustive and is missing data from 18 days. The incompleteness does not inhibit our analysis since we are not interested in any particular day, user, or temporal dynamics.

To clean the raw data we remove comments and users that have been deleted by the user themselves or have been removed due to violation of the subreddit's rules but were still collected by pusshift.io. We also remove all comments made by the AutoModerator bot. The final dataset consists of 425,499 submissions, 9,602,156 comments, and 978,502 users.
As we are interested in the engagement patterns between the active members of the subreddit (we have no data on inactive users that merely consume the content of r/WSB), we construct an undirected user graph where we connect all users A and B if either A has directly replied to a post of B or vice versa (See Figure ???), the edge is weighted by the number of interactions between A and B. This information can be derived from the parent_id attribute provided by PSAW. While this graph enables us to investigate the general network properties of the subreddit (clusters, degrees, or density), we are primarily interested in the distribution of political leanings and polarization within the network and to what extent they show preferential interaction patterns based on partisanship.

As we have no direct means of identifying the political leaning of the users, we propose a method to assign users a *partisan score* based on their activity in other subreddit communities. The score takes negative values for right-wing users, positive values for left-wing users, and is equal (or close to) zero for users we have no data on or that can be associated with either side equally. Higher scores indicate higher politicization of the user.
This method consists of three distinct parts:

First, we collect two sets of subreddits that can be either clearly identified as right-wing (e.g. r/Conservative, r/Republican, etc.) or left-wing (e.g. r/socialism, r/Anarchy101, etc.) (see Table

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??? for full list). In recognizing that the collective user base of the left-wing set is greater than the one of the right-wing subreddits, we incorporate an overall left-wing prior that can be found on Reddit in general (Statista 2016).

Left-wing Subreddits	Right-wing Subreddits
socialism, communism, anarchism, IWW, LateStageCapitalism, GenZedong, debateCommunism, DebateAnarchism, Communism101, Anarchy101, demsocialists, democrats, progressive, Ultraleft, enlightenedcentrism, BreadTube, Socialism_101, DemocraticSocialism, ToiletPaperUSA, accidentallycommunist, antifastonetoss, TheRightCantMeme, capitalism_in_decay, SocialistRA, ABoringDystopia, DankLeft, FULLCOMMUNISM, Communismworldwide, antiwork, dsa, LeftistGamersUnion, LeftWithoutEdge, SocialistGaming, LateStageColonialism, centerleftpolitics, liberal	TheRedPill, Imgoingtohellforthis, Conservative, ShitPoliticsSays, LouderWithCrowder, progun, Republican, Capitalism, askthe_donald, SocialJusticeInAction, pussypassdenied, SargonofAkkad, whiteknighting, CollegeRepublicans, prolife

Second, we leverage the official API of Reddit (PRAW) to collect the 100 most recent comments and the subreddits these were posted in for each user in our dataset.

The third and last step in identifying the political identity of users is more involved. While we could simply assign each user a score based on the intersection between their active subreddits (Step 2) and the left-wing and right-wing subreddits (Step 1), there are several drawbacks that need addressing. This approach only assigns scores to relatively few users which is unsatisfactory. This is the case as there exists an enormous range of subreddits (100,000+ (https://www.redditinc.com/ 2021)), some of which have only small communities, and we have only identified some of the most popular right and left-wing hubs. To address this challenge, we find the similarity (user overlap) between the many subreddits the users of r/WSB are active in and those that are clearly left or right-wing. When a subreddit has a substantial overlap of its user base with one (or many) of the partisan subreddits identified by us, we also consider it to indicate that political leaning.

There are many websites that provide information about the similarity between subreddits. We decided to use the data provided by the Reddit discovery project (https://github.com/anvaka/redsim 2021) since it is transparently documented and comparatively convenient to scrape. This website reports the most similar subreddits to a given subreddit X. It does so by computing the Jaccard Index (a measure of user overlap) between X and all other subreddits, computing the mean and standard deviation of the 100 most similar (sorted) subreddits, and returning those with Jaccard Index larger than one standard deviation above the mean. Additionally, it also reports all subreddits where X is listed as being similar, based on the same procedure but taking all other subreddits as queries. We determine the partisan score of each subreddit by summing the number of left-wing subreddits that are similar to it and deducting the number of right-wing subreddits that are similar (see Figure ???). If the

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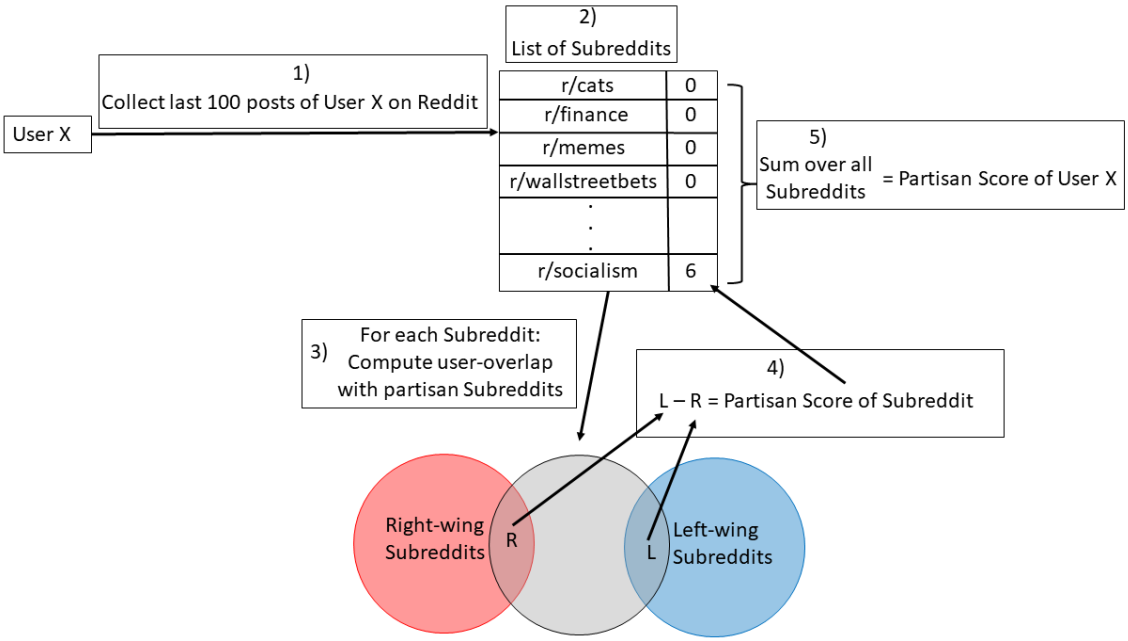
subreddit is part of our sets of left-wing and right-wing subreddits, we add 1 or deduct 1 to emphasize that these were particularly polarized. As the partisan score of the users, this metric is positive for subreddits that have large user overlap with left-wing subreddits and negative if they overlap with right-wing subreddits.

We collect similarity data about the 5000 most visited subreddits by the users in our sample. Given our left and right-wing subreddits and the partisan scores of these 5000 popular subreddits, we assign each user the partisan score. The partisan score is the sum over the partisan scores of all subreddits in which a user has commented, under the condition that their posts received a positive rating on average. By excluding negatively rated activities we ensure that we don't associate a user with a subreddit they are actively opposing by posting unpopular comments.



To validate our method we qualitatively evaluate 50 randomly sampled subreddits from the 5000 we collected data about. Based on the Subreddits' descriptions and their top posts from the past year we find no false classifications. Subreddits we consider left-wing received positive scores, right-wing subreddits received negative scores, and unpoliticized subreddits were correctly evaluated at 0. For example, the Subreddit r/conservativesonly was not part of our right-wing set but through its associations with r/louderwithcrowder, r/republican, r/capitalism, r/askthe_donald, and r/collegerepublicans it received a partisan score of -5. Slight misclassifications are made for news-related subreddits that were associated with r/Conservative and thus got a score of -1.

Results

This section consists of two parts. First, we present descriptive results of the political identities that our method identifies within r/WSB's community and show exemplary political discussions. Second, we show that there is no preferential engagement between users of the same political position.

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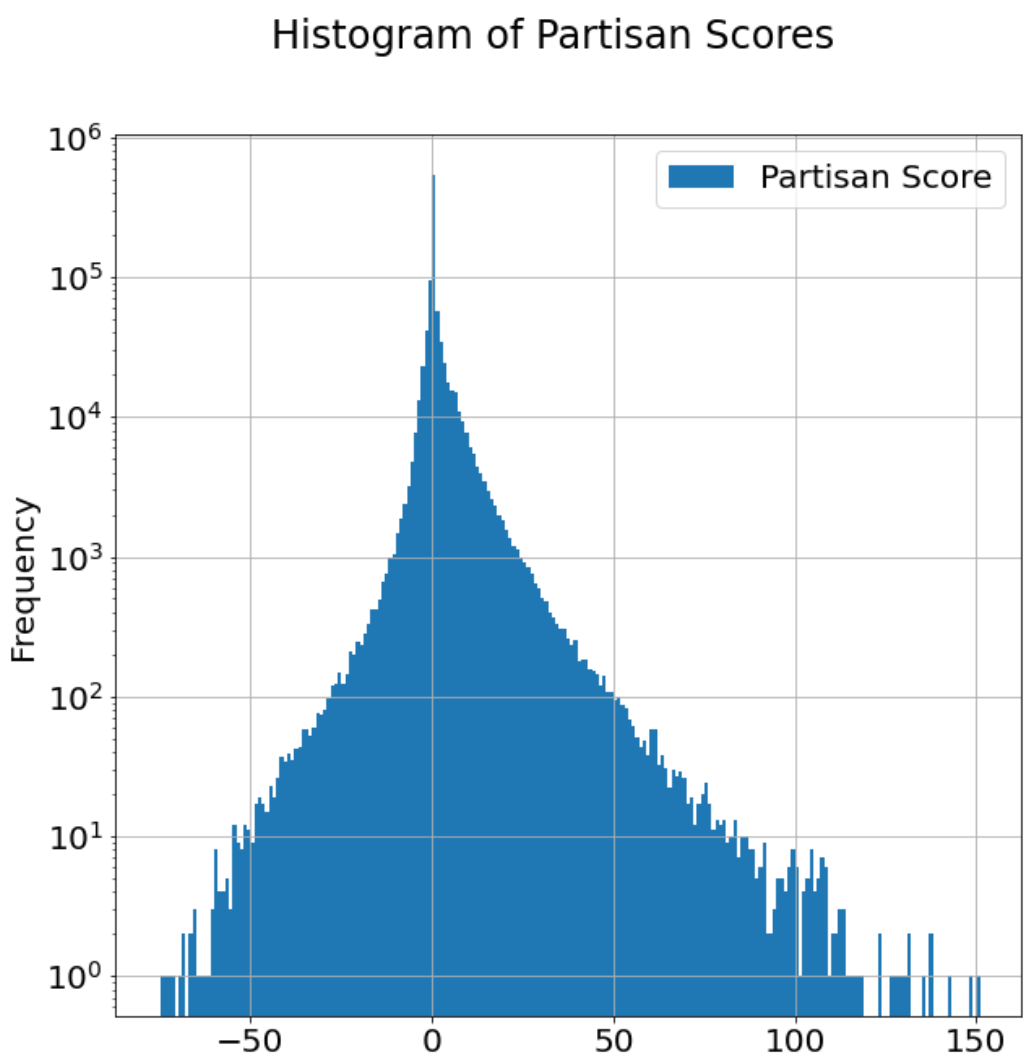

The majority of users in our dataset get classified as politically neutral with -3 <= partisan score <= 3 (Figure ???). Members of this group are active in non-political subreddits related to hobbies or video games, they post only in mildly political communities such as r/worldnews, or ones that are political but non-partisan (e.g. r/politics). However, a substantial mass of the active user base lies outside this range. For example, the rightmost classified user in our sample is active in Subreddits such as r/Anarcho_Capitalism, r/AskThe_Donald, r/Conservative, and r/tucker_carlson to name just a few, indicating a far-right political identity. In contrast, the leftmost user is part of subreddits such as r/Anarchism, r/AntifascistsofReddit, r/Socialism_101, and r/alltheleft among others, portraying a similarly extreme identity towards the left.

It is important to note that it is not merely these two exemplary users who actively contribute to Subreddits located at the political extremes (See Table ???).

Far-Left Subreddits	#Users from our Sample	Far-Right Subreddits	#Users from our Sample

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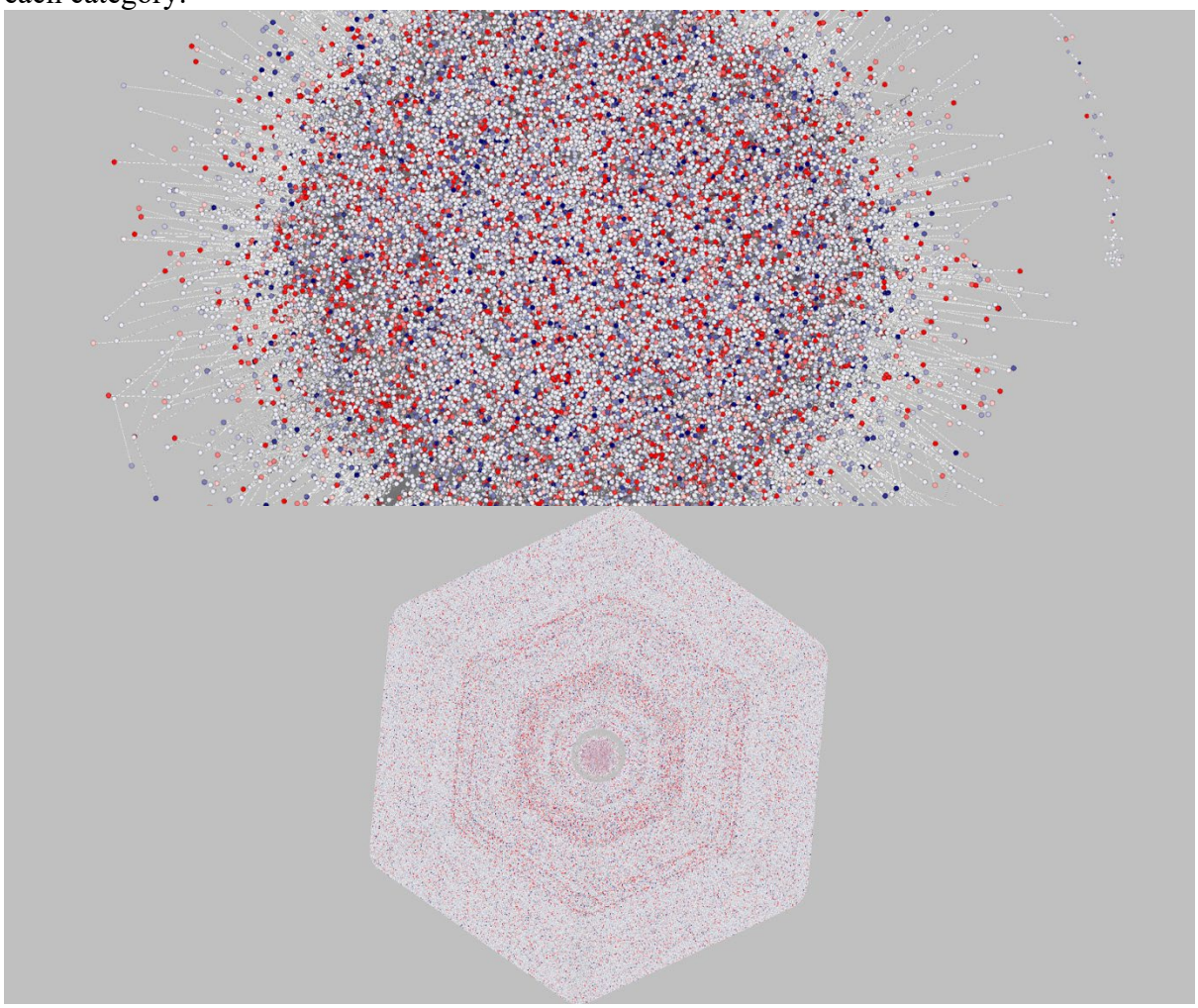
dankleft	1671	walkaway	3400
socialism_101	585	louderwithcrowder	4773
completeanarchy	1246	conservatives	2174
shitliberalssay	1921	republican	2810
socialism	2029	anarcho_capitalism	4713

As the user graph created through comment interactions is very large (978502 nodes (users) and 5263973 edges), neither exemplary threads nor visualization of the graph can directly illuminate questions about the user interactions within our sample (see Figure ???). To understand whether users exhibit preferential engagement with either like-minded or politically opposed individuals, we examine the distances between users and their immediate neighborhoods.

The average distance (the shortest unweighted path) between users that share the same political views is not significantly smaller than the average path between nodes of opposing views (see Table ???). The reported distances are not the average computed for all pairs of nodes as this procedure is computationally infeasible but are based on a sample of 10,000 pairs of nodes for each category.



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To avoid misclassification we only consider users with a partisan score > 3 as belonging to the left-wing group and users with a partisan score < -3 as belonging to the right-wing group. Additionally, we only sample from the greatest component of the graph (Center of Figure ???) that contains 814,800 users, since some users are part of only very small, independent components consisting of (1-5) users.

This result indicates that political partisanship, as identified by our methodology, does not lead to separation or polarization within r/WSB. If users were more likely to engage with others that share their political position, the right-wing and left-wing samples would have shorter average distances from each other than the random or cross-group samples. If, on the other hand, opposing political views induced more interaction the relation would be reversed. If both effects were present simultaneously, the standard deviations would be meaningfully affected. These findings are not changed when we consider the edge weights that represent the interaction frequency between users. Weighting the edged creates less interpretable results, which is why they are not reported.

Sample Group	Mean Distance	Standard Deviation
Random	3.6817	0.7948
Left-wing	3.7053	0.7709
Right-wing	3.7285	0.7470
Cross-group	3.7022	0.7673

As the distances, shown in Table ???, represent indirect connections between users, they may obscure patterns in the direct interactions between users. As there exist many users that are politically neutral or have small absolute partisan scores, they might bridge between polarized users, obscuring that they don't engage directly with each other.

To address this possibility, we again sample left-wing and right-wing nodes as well as nodes from the entire graph (random) and compute summary statistics of the political leaning within the union of the direct neighborhood of these nodes (See Table ??? and Figure ???).

However, the direct neighborhoods of the sampled nodes show no systematic differences, confirming the earlier results. Left-wing users are just as likely to interact with other left-wing users as right-wing users and vice versa.

Sample Group	Mean Partisan Score (Neighborhood)	Standard Deviation
Random	1.1538	5.8247
Left-wing	1.4501	6.3187
Right-wing	1.2416	6.1534

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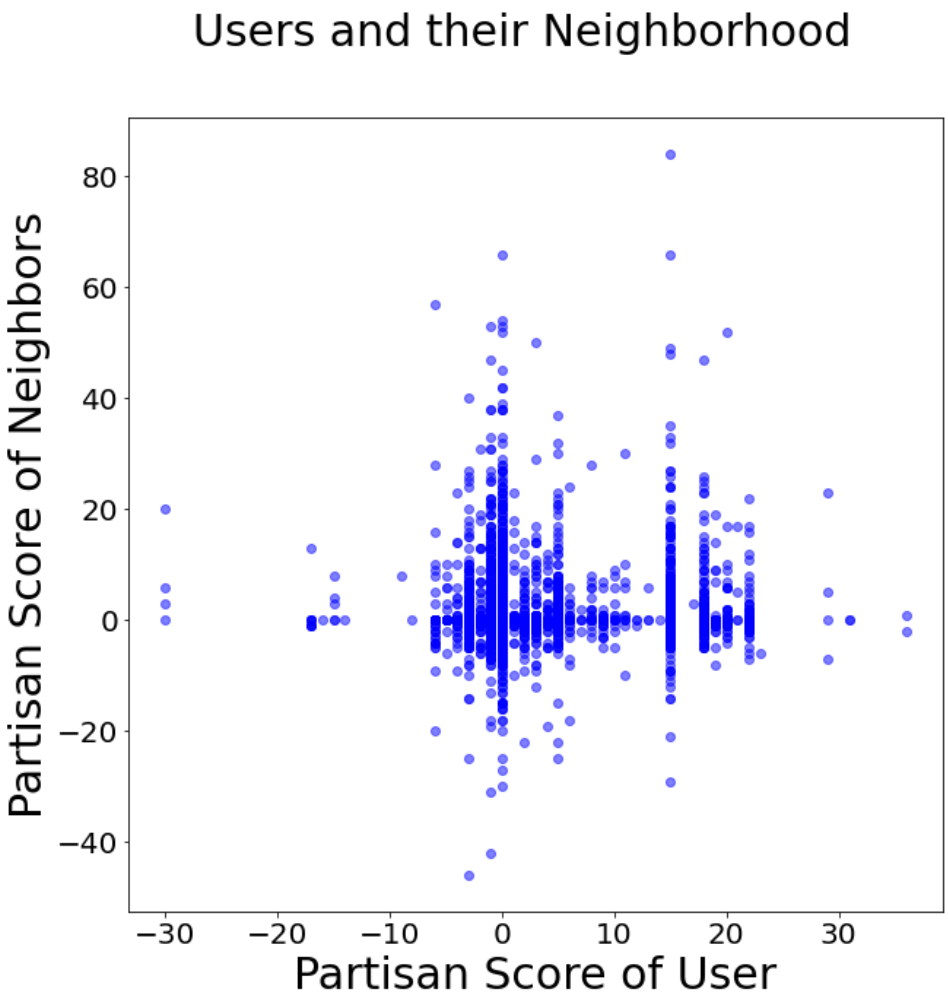
Despite the widely heterogeneous political identities of r/WSB's userbase, there is no indication that these factors affect interactions between users. These findings support our hypotheses that r/WSB provided an arena for polarized individuals to engage, debate and even to go as far as to collaborate effectively enough to sustain an online social movement.



Qualitative content analysis

An arena to engage and disagree

Our interactions' network analysis supports the claim that on r/WSB, people with antagonistic views do not form impermeable communities ignoring each other but do indeed engage with each other. However, the analysis doesn't allow us to assess whether these interactions are not purely concerned with investment-related questions. r/WSB is the locus of investment discussions and advice mainly. However, it is also a forum where various political topics are extensively discussed and debated. Do politically polarized users also engage with each other with respect to politically charged topics?

In order to answer this question, we perform a qualitative content analysis of politically charged threads on r/WSB. The selection of these threads builds on a methodology developed in a working paper by Erin Lockwood and Elsa Massoc. Based on a word frequency analysis of

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submissions and comments posted on r/WSB, they identified different political topics of interest to the users (Lockwood and Massoc, unpublished working paper). One of them gathers comments concerned with the role of the government. There are 106110 comments in this category. Each comment is linked to its parent comment/submission (the comment or submission to which it answers) and to its child comment(s) (the comments that answer to it), allowing us to read through whole threads in their original arrangement.

The content analysis bears on 500 randomly selected comments and corresponding threads within this sample. We pay particular attention to those direct interactions between two or more users who received a polarized partisan score as per our previous analysis.

We find that polarized users directly engage with each other on topics as various as the role of the government in the economy, taxation and inequalities, free speech, lobbying and interest groups, state surveillance and police violence, racism, the relations of the US with China or the role of political parties in democracy. Some rarer conversations are grounded in highly theoretically grounded arguments about the nature of socialism and capitalism.

On all these topics, the views of polarized users diverge. But the point is that they are engaging and arguing with each other nonetheless – a necessary condition for deliberative democracy to live on. Sarcasm and crude language – even insults, should not be perceived as particularly aggressive here. On the contrary, they should be perceived as shared social codes fostering a sense of community among users even during these exchanges of antagonistic views. For example, the pejorative term "retard" is often used to express disagreement, but the term is also used to describe positively the members of the whole r/WSB community and their collective endeavor to take on the hedge funds that speculated against Gamestop.

Below, we reproduce a discussion about a particularly radical and violent event in US politics - the attack of the Capitol by Trump's supporters in January 2021, to illustrate the politically charged discussions between polarized users in r/WSB. In the following transcriptions, the letter refers to the partisan score of the user: (R) when the user has received a right-wing score, and (L) when the user has received a left-wing score.

> **User 1 (R)***: "It was definitely a mostly peaceful protest"*
>
> **User 2 (L):** *"dude ok i see you've been commenting this all day. seriously i want you to take a long, hard look in the mirror and do some introspection. you don't have to think this way and believe this conservative lunacy. i know it may be hard to believe with all my "leftist" talking points but i was conservative once too. i woke up to the fact it was just total manipulation, and you can too. good luck man"*
>
> **User 3 (R***): you fragile fucking retard. government buildings were being burnt to the ground during the blm riots but that was seen as ok. the only reason there is outrage is because it is trump supporters doing the retard thing this time.*
>
> **User 4 (L):** *bruh a government building was not only attacked, but briefly overrun. i think there's reason for the outrage.*
>
> **User 3 (R**): ***mostly peaceful protests are the language of the unheard sweety. don't judge the protesters by a few bad apples. it's only property and can be replaced, insurance will pay for it.***

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User 4 (L): *what you're doing there, i see it. but the protesters have heavily armed 'militia' and they attacked the government, not property. literally congress cowering in tunnels. fuck false equivalence retard.*

User 5 (L)*: fuck it. but if they burned down my favorite restaurant, i'm ready to grab pitchforks.*

The question of whether these exchanges have changed users' attitude is beyond the scope of this paper. The danger of extreme polarization is not so much that people disagree with each other, but that they end up thinking that no compromise is possible with the other camp. Political opponents quit being fellow citizens to confront and compromise with, they become fundamentally enemies. Our findings point to the fact that forums such as Reddit may provide a rare remaining arena where citizens with antagonistic views may speak to each other and build a sense of community, despite their disagreement.

Engagement with radicalized users: the case of anti-Semitism

The critique of finance has been shown to be a privileged vehicle for anti-cosmopolitan and anti-semitic tropes via historical association of Jew with money and credit (Hirshfield 1981, Gerber 1982, Cremoni 2010, Goldman 1984, Platt 2018; Lipstadt 2019). The public perceptions of financial power illuminates both the difficulty of adequately attributing responsibility for the harms and dislocations caused by financial innovation and crisis and the malign ways responsibility is displaced onto racial, ethnic, and religious others (Funke et al 2016; Lockwood 2020).

During the Gamestop saga, the explicit objective of r/WSB was to take on Wall Street hedge funds. As such, we can expect to find anti-Semitic tropes and discourses in the forum. This is indeed the case. Following the same methodology as in the previous section, we performed a content analysis of posts containing anti-Semitic key words. There are 4727 comments in this category. As before, each comment is linked to its parent comment (the comment or submission to which it answers) and to its child comment(s) (the comments that answer to it), allowing us to read through whole threads as a discussion.

Some r/WSB users express satires or (self)derision jokes based on Jewish stereotypes, others reproduce anti-Semitic tropes loosely associating Jews and money, while others develop straightforward anti-Semitic discourses linking Jews to conspiracy theories of world domination (Lockwood and Massoc, forthcoming).

The literature on ideological radicalization has shown that people who remain exposed to discourses from like-minded communities that include radicalized individuals are more likely to radicalize themselves. On the contrary, "social contact" tends to reduce prejudice (Broockman and Kalla 2016; Muldoon 2016; Lowe 2021). Social contact can take the form of personal communication encouraging people to take perspective of others or the form of confrontation of radicalized individuals by people they deem trustworthy or to whom they are emotionally close. Through shared social codes based on sarcasm and self-derision, as well as the construction of a collective movement against Wall Street hedge funds, r/WSB fosters a sentiment of collective identity and community among its users. As such, it is plausible that it may help foster such positive "social contact" on ideologically radicalized individuals.

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Below, we reproduce a discussion between three members: “User 1 (FR)” is classified as very right-wing (score -28), “User 2 (FL)” is classified as very Left-Wing (22), and “User 3 (R)” is classified as moderate right-wing (-3) and intervenes at the end of the conversation.

> **User 1 (R)***: "it's not really a conspiracy if it can be easily verified. also, bankers are disproportionately of "bankers" jewish origin and central banks run this world. it's not preposterous to suggest that "bankers" do in fact control the world's economy and, therefore, most countries"*
>
> **User 2***: “name a single jewish member of the federal reserve board of governors. can’t? so much for control. who appoint the board of governors. it isn’t the banks. it’s the president. there hasn’t been a single jewish president in american history. if the jews are trying to take control of the financial system they sure are bad at it.*
>
> **User 1***: “alan greenspan, benjamin shalom bernarke and janet yellen weren’t all jewish? yeah they were. 3 in a row"*
>
> **User 2***: ""jay powell is a catholic. what do the warburgs or rothschilds have to do with the fed? they have no power over what it does-- it's officers are appointed by the president, who has never been jewish.",*
>
> **User 1***: “i didn’t say anything about powell, did i? the president is a huge proponent of israel and has advanced israeli and jewish interest throughout his administration. aipac is the most powerful lobby in washington and many members of the house and senate serve israeli/jewish interests”*
>
> **User 2***: "the adl hates trump, and 76% of jews voted against him. if the jews control the government, how come their favored party, the dems, is not always in power? and how come that same democratic party is the supporter of more bank regulation? your theory doesn't make any sense.”*
>
> **User 3***: “wow so wsb just hates jews that’s cool”*

The question of whether such interactions on r/WSB contributes to the deradicalization of users with anti-Semitic discourses is beyond the scope of this paper. However, the paper shows that users with extreme ideological views are indeed confronted by and do engage with differently minded people. This is of course not a sufficient condition, yet it is a necessary condition, in the process of mitigating ideologically radicalized individuals.

Discussion

- limitations of method, sentiment tools are thrown off by slang (retard etc.)
- further research and validation
- we consider every user as part of movement

Evaluating the political composition of a movement with as many members as r/WSB presents many challenges. The approach we present enables such an analysis at scale and clearly identifies users at the extremes of the political spectrum through their activities in openly left-

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wing or right-wing communities. However, there are four weaknesses of the method that need addressing.

First, we have not validated the classifications with ground-truth data that indicates the true political identity of the users. Ground-truth data could be gathered by surveying a sample from the community of interest. Second, while extreme users are identifiable, we cannot make confident assessments about users that have a partisan score close to zero. Users that are not actively contributing to political subreddits might still be politicized but use Reddit for non-political purposes only. Our decision to consider users' position to be identified when their absolute partisan score is greater than three was informed only by practical constraints in order to avoid classifying someone as right-wing for their usage of r/news. r/news and similar communities have significant overlap with r/conservative which induces this bias.
Third, the sheer scale of the dataset makes an exhaustive analysis costly. For example, we only gathered similarity-data about the 5000 most popular Subreddits (users from our sample are active in over 100,000 communities) which leads directly to the last challenge.
Lastly, we relied on external service providers for parts of our dataset. Due to reliance on pushshift.io a significant amount of days were missing from the dataset. We also do not compute the similarities between subreddits ourselves. There is potential to optimize the method by adjusting the heuristics employed by the Reddit discovery project and using the raw Jaccard index instead of a cutoff value or adding other similarity metrics.

Additionally, we assume every member of the Subreddit to be part of the OSM in all our analyses. However, we do not have information about the trades made by the users or their general involvement in the movement at scale. Key drivers of the movement may be identifiable by their position in the user graph but the involvement of less central, fringe members remains elusive.

Conclusion

Building on a multi-method analysis of politically polarized users' interactions on r/WSB, our paper has shown that online forums can sometimes provide a rare deliberative arena where users with antagonistic political leaning do engage with each other, debate, and even collaborate. We proceeded in three steps. *First,* we developed an original method to assign a partisan score to each r/WSB's user based on this user's activity on other subreddits. Based on these scores' distribution among users, we showed that the r/WSB community is politically very heterogeneous. *Second*, based on those partisan scores, we performed a network analysis of users' interactions on r/WSB. We found that polarized users do indeed engage with each other extensively on the forum. *Third*, we performed a qualitative content analysis of politically charged discussion. We found that users actively engaged in topics as varied as the role of the government in the economy, taxation and inequalities or the role of parties in the political system. This analysis also showed that users expressing Anti-Semitic views are widely and actively challenged by other users of the r/WSB community.

There have been important debates both in academia and in the larger public about the role of social media in increasing polarization, inciting social violence or fostering ideological radicalization. Social media forums such as r/WSB fosters a sense of community among its users, despite their very different political leaning. We argued that such a forum can provide a deliberative space where citizens with different views accept to debate and engage with each

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other – in a disagreeing yet non-violent way. The question of whether the polatization of users engaging with each other on r/WSB have decreased and the question of whether challenges to anti-Semitic users on r/WSB contributed to deradicalize such users are beyond the scope of this paper. However, there is consensus in the literature that the first step to depolarization and de-radicalization is to accept speaking with fellow citizens who hold different - indeed opposite, views.

The continued existence of such deliberative arenas is essential to the good workings of democracy. From this point of view, our paper contributes to filling the gap in the literature on the relationships between social media and democracy, which tends to overemphasize the adverse and polarizing effects of social media. We are not claiming that social media are, *per se,* good for democracy. That would be a naive claim contradicting evidence provided by other authors. However, in highlighting the depolarizing potential of Reddit, we aim to contribute to the important research agenda that wants to understand the differentiation between social media platforms and their impacts on polarization, political violence and radicalization. We see our contribution as a first stone in the important research agenda that will assess what different features or usages of social media foster positive or negative dynamics for the sustainability of deliberative democracy.

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