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Blame It on the Algorithm? Russian Government-Sponsored Media and Algorithmic Curation of Political Information on Facebook

ELIZAVETA KUZNETSOVA
Weizenbaum Institute, Germany

MYKOLA MAKHORTYKH
University of Bern, Switzerland

Previous research highlighted how algorithms on social media platforms can be abused to disseminate disinformation. However, less work has been devoted to understanding the interplay between Facebook news curation mechanisms and propaganda content. To address this gap, we analyze the activities of RT (formerly, Russia Today) on Facebook during the 2020 U.S. presidential election. We use agent-based algorithmic auditing and frame analysis to examine what content RT published on Facebook and how it was algorithmically curated in Facebook News Feeds and Search Results. We find that RT's strategic framing included the promotion of anti-Biden leaning content, with an emphasis on antiestablishment narratives. However, due to algorithmic factors on Facebook, individual agents were exposed to eclectic RT content without an overarching narrative. Our findings contribute to the debate on computational propaganda by highlighting the ambiguous relationship between government-sponsored media and Facebook algorithmic curation, which may decrease the exposure of users to propaganda and at the same time increase confusion.

Keywords: social media, framing, U.S. 2020 election, propaganda, news, algorithms

In the days following the 2020 U.S. presidential election, an internal analysis conducted by Facebook highlighted a worrisome trend: Stories from hyper-partisan sources, such as Breitbart and Occupy Democrats, appeared among the highest trending content on the platform (Roose, Isaac, & Frenkel, 2020). To limit the exposure of its users to misinformation and hyper-partisan narratives after the election, Facebook changed its algorithm to temporarily prioritize "authoritative" news sources (Roose et al., 2020). However, this had not been in effect in the run-up to the presidential election, when the visibility of pages potentially spreading misinformation had been comparable with that of mainstream media.

Facebook's role in shaping the Western news ecosystem has made it a de facto information gatekeeper (DeVito, 2016; Soffer, 2021). The platform has assumed agenda-setting functions traditionally

Elizaveta Kuznetsova: elizaveta.kuznetsova@weizenbaum-institut.de
Mykola Makhortykh: makhortykhn@yahoo.com
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performed by news editors (McCombs & Shaw, 1977). Unlike legacy media, however, the process of selecting and filtering content on Facebook is guided not by journalistic values but by algorithmic mechanisms (DeVito, 2016). According to Facebook (2020), their algorithm prioritizes news that can demonstrate "original reporting" and "transparent authorship" (para. 1). This phenomenon is referred to as "algorithmic information curation," namely the process of "organizing, selecting, and presenting" pieces of information from the platform's content pool, relying on decisions made by algorithms and not human curators (Rader & Gray, 2015, p. 173).

The logic of these algorithmic decisions is often obscure, and curation mechanisms are in constant flux (Karpf, 2012), which can lead to unexpected or even undesirable outcomes (Napoli, 2014). These effects include societal fragmentation caused by the formation of isolated ideological communities (Spohr, 2017; Zollo & Quattrociocchi, 2018) as well as manipulation of publics and distribution of false claims (Badawy, Addawood, Lerman, & Ferrara, 2019; Keller & Klinger, 2019; Shao, Ciampaglia, Varol, Flammini, & Menczer, 2017; Zerback, Töpfl, & Knöpfle, 2020). Some scholars even argue that algorithmic curation is a primary factor in the formation of "echo chambers ringing with false news" that "make democracies ungovernable" (Benkler, Faris, & Roberts, 2018, p. 5).

Following the Cambridge Analytica scandal and the Mueller report (Mueller, 2019), Russian digital interference in the affairs of democratic states has been driving the debate (Orttung & Nelson, 2018; Stukal, Sanovich, & Tucker, 2017). While the existing studies tend to focus just on some forms of such interference, namely deliberate disinformation and fake news, several studies have been raising concerns about the possibility of algorithmic systems increasing exposure to Russian propaganda (Hobbs, 2020; Makhortykh & Bastian, 2022) and proposing ways to address it (Zerback et al., 2020). However, there is still limited understanding of the complex relationship between platform-specific information curation models and the activities of government-sponsored media—in particular, the extent to which pro-Kremlin outlets can manipulate the Western public on social media.

In our article, we seek to move a step closer toward understanding this relationship by asking two research questions:

RQ1: What content did pro-Kremlin media promote on Facebook in the run-up to the 2020 U.S. presidential election?

RQ2: How did the Facebook algorithms affect the distribution of this content?

To answer these questions, we explore the activities of what is known as the key actor of Russian propaganda abroad—its 24-hour news broadcaster RT (formerly, Russia Today)—on Facebook. Our focus on RT is based on the consensual view that the channel is one of the most effective tools of Kremlin propaganda (Kazakov & Hutchings, 2019). Specifically, recent studies looking at Russian influence on social media suggest that RT is more successful at communicating propaganda messages than Russian troll factories (Orttung & Nelson, 2018; Zannettou et al., 2018).

To conduct our study, we choose framing theory as our overarching framework. Using a mixed-methods approach combining agent-based algorithmic auditing (Feuz, Fuller, & Stalder, 2011; Unkel & Haim, 2021) and news frame analysis (D'Angelo & Kuypers, 2010), we examine interactions between the content posted by RT's Facebook accounts and the two systems of Facebook algorithmic curation: the platform's internal Facebook Search and the News Feed. By doing so, we highlight the ambiguous role of algorithmic curation in the context of computational propaganda, namely its ability to take away control over strategic framing from the government-sponsored media, which may decrease the exposure of users to propaganda but at the same time contribute to confusion and misinformation.

This article proceeds as follows: The first section positions our study within the ongoing discourse on computational propaganda. The second section reviews related work on logic and mechanisms of algorithmic curation. The third section looks at the use of strategic framing and algorithmic auditing for studying propaganda in online environments. The fourth section outlines the methods we used to analyze interactions between the Facebook algorithms and RT. The fifth section presents the findings of our case study on the activities of RT on Facebook in the run-up to the 2020 U.S. presidential election and the role of Facebook algorithmic curation in its RT content distribution. We conclude with a discussion of the findings and implications for future research.

Locating Government-Sponsored Media Framing in the Platform-Driven Environment

Computational propaganda has been a burgeoning field of research (Howard & Woolley, 2018). However, akin to research on traditional propaganda, studies on its computational successor have been fragmented (Benkler et al., 2018). The focus of the recent works has been primarily directed at the use of digital affordances for spreading misinformation and disinformation. In general terms, misinformation is used to refer to content that is not in line with the expert knowledge and evidence (Vraga & Bode, 2020). While misinformation usually refers to information distributed without the intention to deceive the public, disinformation assumes intentional manipulation (Mena, Barbe, & Chan-Olmsted, 2020). However, these terms together with the "fake news" label are often used interchangeably in media as well as in academic discourse (Buchanan & Benson, 2019). This is particularly problematic as unlike disinformation, if we use the terms accurately, misinformation cannot be theoretically linked to propaganda.

Therefore, the focus of the recent studies on algorithms amplifying the distribution of false information is limiting. To remedy this, we expand the focus of this study to consider interpretations of facts as a powerful tool of influence. Outlets such as RT can use platforms to (re)interpret uncontested "facts" that are not false per se (Guter-Sandu & Kuznetsova, 2020). Similar to the dissemination of false facts, these state-sanctioned narratives can be amplified by platform mechanisms (Sanovich, 2017), further widening political polarization (Kuznetsova, 2018; Szostek, 2018). These tactics deserve more attention from academic research, particularly in relation to the activities of Russian international outlets (Oates, 2016).

A nuanced approach to studying the activities of government-sponsored media can be achieved through framing theory (Entman, 1993). Framing can be defined as a process of singling out elements of social reality and packaging them in a set formula that conceptualizes the event and promotes a certain interpretation of it (Entman, 1993). Frames serve as reference points to the already accepted social context, which enables its

advocates to create resonance in the target audience in relation to subjects that vary from international politics (Charnysh, Lloyd, & Simmons, 2015) to armed conflicts (Makhortykh & Sydorova, 2017). In recent years, framing has been used to study digital communication (Joyce & King-Wa, 2015; Meraz & Papacharissi, 2013), highlighting the fluidity and hybridity of communication processes on social media.

Framing theory views any story as an interpretation of facts (D'Angelo & Kuypers, 2010). With the rise of social media, framing theory has evolved to better account for the change that platforms, algorithms, and hyper-partisan media have caused in contemporary political communication (Entman & Usher, 2018). The revised "cascading network activation" hypothesis theorizes on the place of pro-government media within the general political communication model in the United States. It highlights that such actors can "both enhance (pump) and diminish (valve) communication flows" (Entman & Usher, 2018, p. 299). Foreign-sponsored media are seen as a deliberative "polluter" of communication pathways, undermining democratic frame consumption. Within this framework, we focus both on the pathways of communication and the "pump-valves" in the form of platform algorithms that distribute frames to the audience in an unpredictable and often unaccountable manner (Bradshaw, 2019; Makhortykh, Urman, & Ulloa, 2022).

In the context of research on government-sponsored media, frame analysis is a particularly suitable analytical tool for understanding the process of strategic meaning construction. Frames are understood as strategic devices that define the significance of social events and provide clear recommendations on how to read them (Payne, 2001). Often used in the comparative perspective, framing helps explain both the overarching strategic as well as the tactical communicative intentions of its sponsors (Nelson, 2019). Bringing underlying issues and contexts surrounding media interpretations into focus, it allows grasping the more complex and increasingly hybrid system of political communication in which "cross-media dynamics" redefine the traditional notions of credibility and authority (Pfeffer, Zorbach, & Carley, 2014, p. 123).

The Mechanisms of Algorithmic Curation on Social Media

The unprecedented volume of digital content has prompted the need to filter and rank it to prevent information overload. Such curation tasks are increasingly delegated to algorithmic systems that automatically retrieve content in the form of search results (Hannak et al., 2013) or social media feeds (Bakshy, Messing, & Adamic, 2015). The exact outputs are based on what the system assumes is the most relevant content for the user and are determined by factors ranging from prior interaction with the platform (Hannak et al., 2013) to user location (Kliman-Silver, Hannak, Lazer, Wilson, & Mislove, 2015) or the type of browser used (Urman, Makhortykh, & Ulloa, 2022).

Due to its importance in dealing with content abundance, algorithmic curation has become an integral component of both Western (e.g., Twitter and Facebook) and non-Western (e.g., VKontakte and Weibo) platforms. Facebook is a particularly relevant case: Not only is it among the early adopters of algorithmic curation as it started to use algorithms for managing user News Feed as early as 2009 (Cooper, 2021) but it also employs curation to manage multiple segments of its infrastructure, from the user News Feed to the internal platform Search.

However, the use of algorithmic curation raises multiple concerns that add to the already controversial role of platforms in contemporary societies (Tufekci, 2015). The frequent lack of transparency in curation systems (Pasquale, 2015) creates anxieties about their potential for polarizing and fragmenting the public sphere (Pariser, 2011). Algorithms may not only limit user access to information but also facilitate radicalization and enable distribution of false information, particularly because users are often unaware that the content they are exposed to is, in fact, algorithmically curated (Eslami et al., 2015). Under these conditions, studying potential abuses of algorithmic curation by government-sponsored outlets is of paramount importance.

Analyzing Information Curation and Strategic Framing

To explore the relationship between algorithmic curation mechanisms on Facebook and political interpretations promoted by RT, we employed an innovative mixed-methods approach that combines frame analysis and algorithmic auditing. Our methodology is structured around the "experience" of agents with the Facebook algorithm to understand their exposure to frames promoted by RT. Therefore, the focus of this study is not on the framing of the entirety of content promoted by RT during the selected timeframe but specifically on the content that the agents were exposed to as a result of Facebook's algorithmic curation.

Frame Analysis

Framing is best understood as a structured methodology, which involves quantitative or qualitative text analysis or a combination of both. Studies that point toward the methodological value of framing often label it as an approach (Pan & Kosicki, 1993) or a multiparadigmatic research program (D'Angelo, 2012). Originally defined as "schemata of interpretation," frames enable us to "locate, perceive, identify, and label" information (Goffman, 1986, p. 21). Frames can be used to promote radical new ideas, slightly adjust already accepted ones, or maintain and stabilize deep-seated understandings in the audiences. This phenomenon is closely linked to justifying behavior, a technique commonly employed by Russian propaganda. Using frame analysis together with algorithmic auditing for understanding activities of government-sponsored media on Facebook, we aim to add to the existing literature on computational propaganda by providing a more precise analysis of the political interpretations users might be exposed to.

To understand how the topics are represented we conceptually focus on frame setting. We understand it as a mechanism for shaping an interpretation of issues that may affect public opinion (Pan & Kosicki, 1993). Unlike scholars, who draw their frame identification from Jungian archetypes (Shaw, 2010), we see framing as a process that operates with a set of dynamic contexts and metaphors. Therefore, the analysis of frames within this methodology entails a more precise investigation of concrete contexts. To do it, we use issue-specific frames that are unique to certain contexts (Bantimaroudis, Ban, Reese, Gandy, & Grant, 2001; Hertog & McLeod, 2001) and, thus, have more potential for investigating how framing can generate meanings in the news context compared with more generic frames (De Vreese, Peter, & Semetko, 2001).

Algorithmic Auditing

Defined as "a process of investigating the functionality and impact of decision-making algorithms" (Mittelstadt, 2016, p. 4994), algorithmic auditing is a research technique used to understand the logic behind algorithmic systems (functionality auditing) and evaluate the potential effect of their outputs (impact

auditing). It is applied for studying the performance of different forms of algorithmic curation systems, ranging from Web search engines (Hannak et al., 2013; Urman, Makhortykh, Ulloa, & Kulshrestha, 2022) to social media feeds (Bakshy et al., 2015; Kramer, Guillory, & Hancock, 2014) and news personalization systems (Bandy & Diakopoulous, 2020).

In the case of Facebook, the platform's curation mechanisms are often audited by Facebook's own employees (Bakshy et al., 2015; Kramer et al., 2014). Despite substantial limitations in access to Facebook data, there are several studies that conduct external audits of the platform's algorithmic mechanisms. For instance, Thorson, Cotter, Medeiros, and Pak (2021) crowd-sourced Facebook's archived data from individual users and identified that user actions (e.g., liking of political pages) affect the composition of the News Feed, which can lead to the unequal degrees of exposure to political information. While a crowd-sourcing approach is promising for studying Facebook curation, the costs of data acquisition and the limited ability to control for the effect of specific variables are two major limitations of its use for the auditing tasks.

One alternative is the use of agent-based approaches, which has demonstrated its applicability for auditing other curation systems such as search engines (Makhortykh, Urman, & Ulloa, 2020; Unkel & Haim, 2021; Urman, Makhortykh, & Ulloa, 2022). Such approaches rely on simulating user activity to generate signals for the curation system (e.g., by entering certain inputs) to identify what kind of outputs they generate. The use of agent-based approaches allows more control over the procedure of auditing, in particular, personalization and randomization factors (Hannak et al., 2013). This is important for reliably identifying how curation mechanisms interact with content posted by foreign government-sponsored media and what factors can influence the users' exposure to it.

Methods

Data Collection

To conduct our study, we manually created 22 Facebook agents (i.e., researcher-controlled accounts) without prior history of interaction with the platform. However, many of these agents were closed down by the platform at different stages of the study due to the platform's bot account detection mechanisms (Facebook, 2019). It left us with eight "clean" accounts, which we used to generate data for our analysis. Although we acknowledge that the creation of research accounts on Facebook may not be in line with the platform's Terms of Service (TOS), we argue that it falls under the range of actions protected by the First Amendment and the human right to free research (Mancosu & Vegetti, 2020; United Nations General Assembly, 1976), in particular, considering the importance of research on propaganda and disinformation for public interest. Although Facebook does offer some access to researchers via CrowdTangle, such tools have limitations that do not allow for performing research on algorithmic information curation. Given that numerous calls from the academic community to facilitate access to Facebook data for research have largely remained unanswered (Association of Internet Researchers [AoIR], 2018), we had to perform our analysis in the way noted above. That said, we did not use agents for any social interactions (e.g., adding friends, leaving comments) to avoid misleading other Facebook users. For the same reason, we did not fill up the agent's profile with additional information (e.g., user photos) besides assigning them generic names commonly used in the United States and specifying their location.

Following the assumption that geographic location—also referred to as a form of curation contextualization (Baeza-Yates, Broder, & Maarek, 2011)—is an important component of algorithmic curation, we assigned our agents to different geographic locations in the United States. Four of our agents were assigned to swing states, Minnesota and Georgia.[1] The remaining four agents were assigned to a pro-Democratic state (Massachusetts: two agents) and two pro-Republican states (Kansas and Texas: one agent each). The location was modeled by specifying it in the agent's Facebook profile and then accessing it using Virtual Private Network (VPN).

Over the period from October 28 to November 4, 2020, around the U.S. presidential election, we used our agents to conduct a sequence of actions ranging from searching for certain queries to liking or sharing specific posts. After each action, we manually saved the resulting html pages and checked the action's effect on the agent's News Feed. Given that users typically engage with the top results when interacting with outputs of algorithmic information curation systems (e.g., in the case of Web search; Urman & Makhortykh, 2021), we have limited the scrolls to seven per page. The full list of 32 actions is provided in the Appendix.[2]

In the findings below, we present a selection of the data obtained via actions 21 to 32. This choice is based on our observations of the News Feed composition. Before action 21 (i.e., following FoxNews on Facebook), it was mostly empty or constituted by the same few links to RT materials. However, following action 21, we observed an increase in the volume and variety of politically relevant content in agents' News Feeds.

For the sake of comparability, the majority of actions were the same across all the agents with the exception of a last few actions for which two agents from a pro-Democratic state and two agents from swing states conducted Biden-focused actions, whereas two agents from pro-Republican states and two agents from swing states conducted Trump-focused actions. To limit the effect of the time factor, actions were conducted around the same time of the day over the entire period. To examine to what content published by RT Facebook exposed (or did not expose) our agents, we retrieved all links published by two Facebook pages affiliated with RT (RTnews and RTAmerica) between October 28 and November 4, 2020, using CrowdTangle.[3]

Data Analysis

To conduct the analysis, we extracted unique URLs from our agents' News Feeds and Search pages (specifically, for the "US voting" query). For each instance of the Feed capture per agent, we filtered out duplicate URLs as well as links to Facebook internal pages (e.g., Watch). The remaining URLs were manually labeled by the two coders. For consistency reasons, each coder labeled all the URLs, and the resulting

[1] The selection was based on Crowdtangle's 2020 U.S. Election Live Display Hub (Sessego, 2020).

[2] The supplementary file can be accessed via the following link: https://docs.google.com/file/d/12ILzvO-e0g5FkUDipmbKP4fssIsGPPx8/edit?usp=docslist_api&filetype=msword

[3] CrowdTangle is a social monitoring platform that provides researchers access to Facebook data with some limitations (e.g., no access to user comments). However, it is useful for retrieving content published by public pages and groups, including news channels such as RT.

disagreements were consensus coded. We have used right- and left-leaning political sources, such as Breitbart, Occupy Democrats, and Fox News, as baselines with which we compared RT (Owen, 2019). The choice of these sources was based on the assumption that RT targets audiences on both ends of the political spectrum (Yablokov, 2015).

To answer the first research question, we performed a frame analysis of each textual or audiovisual piece of RT content appearing in our agents' News Feeds. The analysis consisted of three stages: First, we used predefined coding instruments to classify all content based on its topical relevance: "election-relevant" or "election-irrelevant." Second, we open-coded all the "election-relevant" content for keywords (Reese, 2010) and, subsequently, for unique frames (Van Gorp, 2010). Third, we revisited the uniquely coded frames for control and refinement (Pan & Kosicki, 1993). The intercoder reliability (based on the percentage of agreements; for Brennan-Prediger Kappa, see Appendix) ranged between 83% and 88% for issue-specific frames and was 100% for the first-level coding. Disagreements, which were attributed to the different degrees of coder awareness about the RT framing of U.S. politics, were subsequently consensus coded.

Overall, we coded 43 unique URLs from RTAmerica and 75 from RTnews (N = 118). Due to RT's reporting style, which uses humor and sarcasm as elements of persuasion (Crilley & Chatterje-Doody, 2020), our analysis included inductive evaluation. This meant that we coded some stories as "anti-Biden" or "pro-Trump" despite the lack of an explicit political frame. Although we had taken steps such as adopting a multistep analysis design to avoid bias, it needs to be noted that some degree of subjectivity might have affected our research outcomes.

For tackling the second research question, we extracted all URLs to RT-associated accounts from our agents' News Feeds. We then calculated the Jaccard index for each pair of agents to measure how similar or different the sets of URLs are. The Jaccard index is a statistical value used to measure similarity between the sample sets (Jaccard, 1901) that measures the share of the identical results among all the unique results. Its value varies between 0 and 1, where 1 indicates that the compared sets are 100% identical and 0 that they are completely different. This makes it useful for comparing variations in algorithmic systems' outputs, such as Web search results (Hannak et al., 2013; Urman, Makhortykh, & Ulloa, 2022). In our case, it allowed us to investigate whether the Facebook Feed algorithm exposed our agents to the same set of RT stories or there was variation in their selection.

Following the analysis of variation, we used logistic regression to identify factors that might affect the probability that a specific RT post would appear in an agent's News Feed. Logistic regression analysis is a research technique that is used to model the probability of a binary outcome (dependent variable) given a set of independent variables (Menard, 2002). We used 10 data entries provided in CrowdTangle metadata as independent variables: likes, comments, shares, "love" emotes, "wow" emotes, "haha" emotes, "sad" emotes, "angry" emotes, "care" emotes, and views (see Tables A2 and A3 in the Appendix). The appearance of the RT content served here as a binary dependent variable (0 = the content did not appear; 1 = the content did appear). Additionally, we generated variables determining whether the post included the word "Trump" or "Biden" to test whether their presence could predict appearance in the News Feed. To test the performance of logistic regression models, we used

the Hosmer-Lemeshow test. The results of the test were better in the case of the RTnews model (*p* value .37 with "Trump" and "Biden" variables; *p* value .77 without "Trump" and "Biden" variables), whereas the model for RTAmerica performed worse (*p* value .57 with "Trump" and "Biden" variables; *p* value .37 without "Trump" and "Biden" variables).

Findings

Strategic Framing on RTAmerica and RTnews

Using frame analysis, we identified three main RT narratives that our agents were exposed to. Given that our focus was on the interaction of the agents with the Facebook algorithms, it was important to understand what stories got into their feeds. This allowed us to be better positioned to observe whether or not RT was able to deliver its strategic framing to the users through the Facebook algorithm.

The frames that our agents were exposed to were consistent throughout the channel's subpages (RTnews and RTAmerica). First, RT ran stories that emphasized the potential unrest in Washington after the election, which we identified as the "violence" frame. This focus on the divide in American society was particularly present on RTAmerica (33% of all posts in News Feeds). The stories contained long discussions on the problems in U.S. society, particularly racial issues. Looting and violence were justified by RT presenters, like Rick Sanchez, by the growing unhappiness of citizens concerning the imbalance and volatility of the political situation in the United States.

Second, RT tried to maintain a facade of balanced reporting, which can be attributed to its explicit branding as an alternative but reputable source of information (Kuznetsova, 2021). For example, talk shows discussing the presidential race, such as the one titled "Who's Winning the Endorsement Game, Trump or Biden?" aimed at presenting a sober analysis of the campaigns without explicit attempts to sway opinions. However, overall, the agents were exposed to primarily anti-Biden leaning content: 17% of RTAmerica posts that appeared in our agents' News Feeds were explicitly anti-Biden, whereas only 8% of the posts were anti-Trump. Stories that were anti-Trump mentioned, among other things, the lack of any substantial change for the workers in the automobile industry, despite Trump's initial promises.

Thirdly, RT promoted antiestablishment frames (29% on RTAmerica and 14% on RTnews) emphasizing the elitism of mainstream media and their hostility toward Trump. Notably, some stories pandered to African American voters, while others were explicitly pro-Bernie Sanders, which supports the argument that RT targets audiences across the political spectrum (Yablokov, 2015).

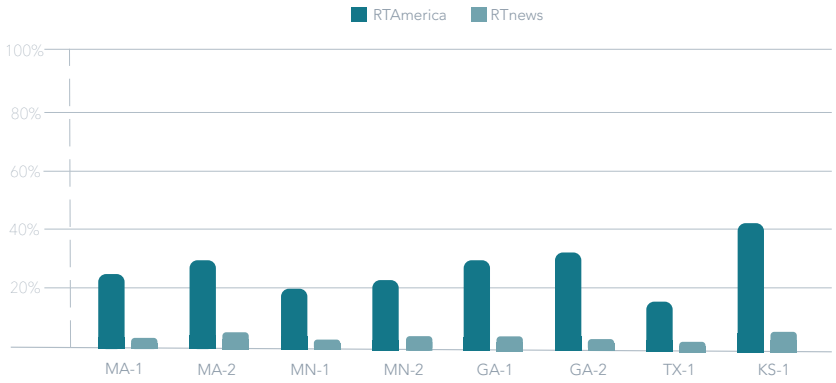

Figure 1. Percentage of RT posts published during the period of observation appeared in agents' News Feeds (by agent).

Of all the content published by RT, only a relatively small share appeared in agents' News Feeds (Figure 1). On average, agents were exposed to approximately 20% of RTAmerica's posts published during the period of observation, apart from Kansas where the number was 41.6%. In the case of RTnews, the ratio was lower, which can be attributed to it producing substantially more content.

Figure 2 shows that exposure to RT content was highly inconsistent among individual agents. The highest overlap between agents' News Feeds (i.e., Jaccard index) was 37%, whereas for most agents it was close to 20%, thus indicating that 80% of the RT content they were exposed to varied among agents. We did not manage to identify a consistent exposure pattern (e.g., agents from the same state having more overlap). This leads us to assume that such variation can be attributed to the randomization of News Feed composition similar to Web Search Results (Makhortykh et al., 2020). Such randomization can be used by Facebook to refine its curation mechanisms by testing different options for selecting and ranking content.

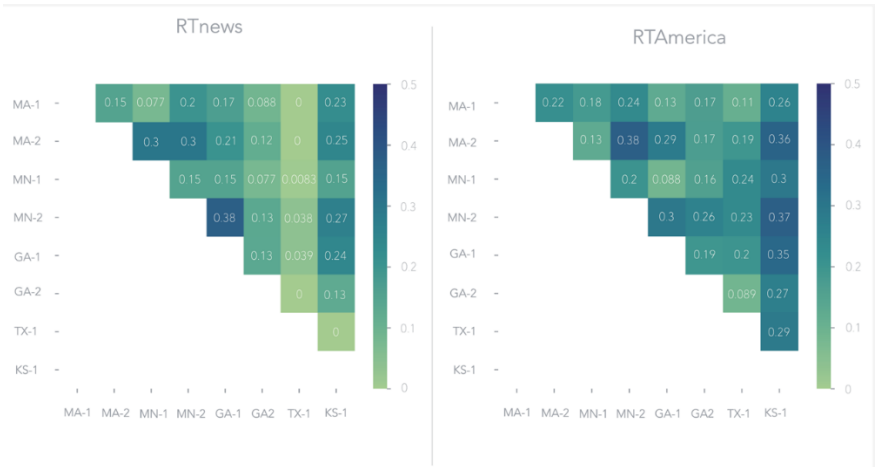

Figure 2. Jaccard indexes of agent exposure to RTnews and RTAmerica content via News Feeds.

There was no RT story that appeared in all the agents' feeds. Of the six RTnews stories that had the highest inter-agent visibility, only two stories were "election-relevant" and contained neutral frames (i.e., not "pro-Biden" or "pro-Trump"). The remaining three stories were classified as "clickbait" stories—primarily funny videos, involving cars, or cute videos with animals. A similar pattern was observed for RTAmerica content, where of the six most visible stories only two were election-relevant.

News Feeds, Search Results, and the Distribution of RT Content in Different Locations

The first factor of RT content curation on Facebook that we looked at is the agents' location. Using the location modeling strategy described in the Methods section we identified that the exposure of agents to RT content differed by agent location as well as the type of the algorithmic curation system (e.g., News Feeds and Search Results).

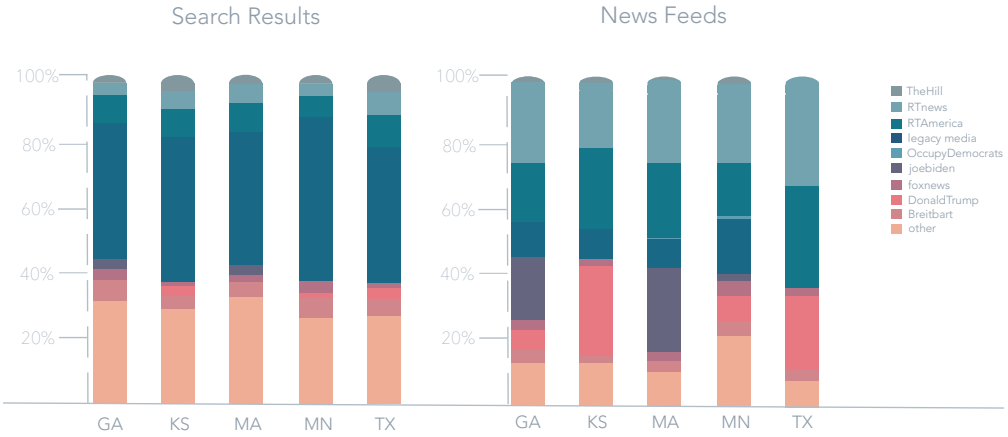

Figure 3. Distribution of sources by agent location.

Figure 3 shows that for Search Results (based on the "US voting" query), the effect of location was rather limited. Legacy media pages were most commonly prioritized, followed by sources from the "other" category (e.g., FiveThirtyEight). In comparison with other sources, the visibility of RTnews and RTAmerica remained low despite agents' intensive engagement with these pages. Such discrepancy suggests that the algorithmic curation of Search Results emphasizes authoritative U.S. media, which is consistent with Facebook's official statements (Facebook, 2020). This tendency is further amplified by Search Results' ranking, where legacy media content is positioned at the top, while personalized content suggestions driven by agent activities (e.g., RT stories) are located at the bottom.

In contrast to Search Results, Facebook News Feeds were more responsive to what agents followed, containing posts primarily by RT, presidential candidates, and hyper-partisan media, whereas legacy media and other suggested sources constituted a relatively small share of links. That said, we could see location-based variation in the distribution of both sources that agents followed and sources suggested by Facebook, such as Minnesota getting a higher share of legacy media and hyper-partisan right-leaning content.

Even though all our agents were following RTnews and RTAmerica, we could see discrepancies in their visibility depending on the state. The presence of RTAmerica content in Search Results was particularly prominent in Texas (8.96%) and comparatively low in Minnesota (6.52%). A similarly high proportion of RTnews content appeared in Texas (5.97%), while Georgia received the lowest number of RTnews posts (3.45%). Such a difference leads to unequal exposure to RT content among agents located in different states and hence limits the strategic framing potential of the channel. Drawing on the research dealing with other algorithmic personalization systems (e.g., Web search; Kliman-Silver et al., 2015; Urman, Makhortykh, Ulloa, & Kulshrestha, 2022) we had assumed that user location could play an important factor. We believe that our findings might indicate that Facebook's algorithms also take the location of the user (either declared in the profile or Internet Protocol [IP]-based) into consideration and personalize content accordingly.

News Feeds, Search Results, and Agents' Actions

The second factor of RT content curation on Facebook that we looked at is agent actions. We found that the News Feed was substantially more responsive to our agents' actions compared with the Search Results albeit the effect of specific actions varied. Follow and unfollow actions had the largest effect on News Feed and Search Results composition (Figure 4). We observed some location-based discrepancies: The proportion of RT content following action 23 (following RTnews) was higher in Massachusetts and Texas, whereas in other states the presence of legacy media and other sources remained high. Similarly, News Feeds in Georgia and Massachusetts received a higher proportion of Biden-related links compared with Trump-related links in other agents' Feeds after following a specific candidate (action 26).

The effect of following and unfollowing actions was lower in the case of Search Results, supporting our earlier suggestion that it might be more resilient to user actions and prioritizes legacy media sources. After agents followed new sources (e.g., RTnews), their presence in Search Results increased albeit to a relatively small degree. Interestingly, despite unfollowing hyper-partisan sources (i.e., Breitbart), they resurged later (e.g., action 32 of Search Results and News Feeds) in some of the states).

Actions involving interaction with the RT pages, such as share, trigger a sharp increase in suggestions of these pages and thus serves as a strong signal for the curation mechanism. This is particularly visible for actions 22 and 23, when agents unfollowed all non-RT sources and followed RTnews. As a result, the number of RT posts increased. Our agents' interaction with the RTnews page by reposting its video triggered a sharp rise in RT appearances in the News Feeds in most states.

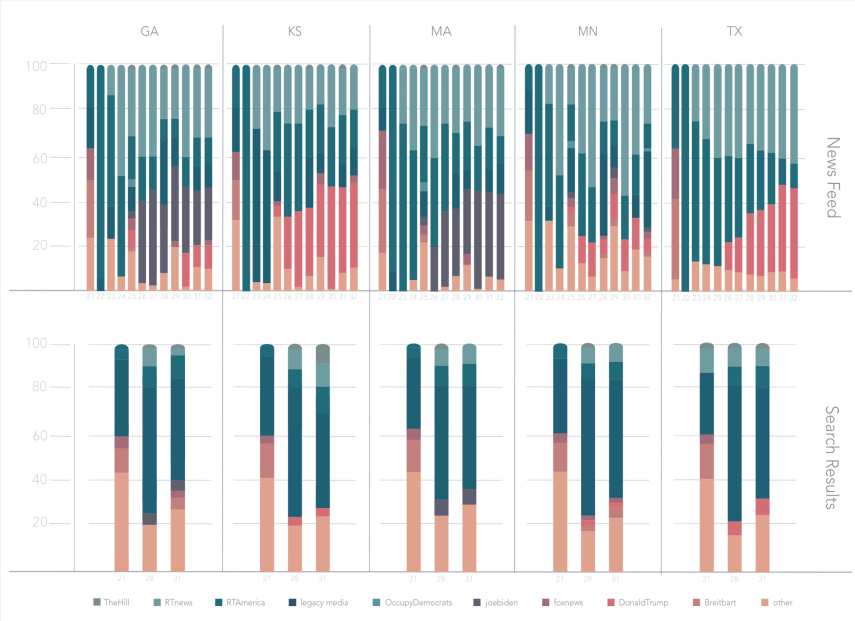

Figure 4. Distribution of sources by agent action and agent location.

Other types of agent actions, such as searches and likes, had lesser effect on agent exposure to specific types of information. Searching for "Biden" or "Trump" (action 25) led to the appearance of a few URLs in the News Feed related to the respective candidate (except Texas). Liking joebiden or DonaldTrump (action 26) resulted in a larger increase in the number of candidate-related links in the News Feed, thus suggesting that liking is a more potent signal for the algorithmic curation system compared with searching. At the same time, searching had more indirect side effects on the Feed as shown by the increase of the legacy media content in the Feed in most of the states following action 25. A similar effect was observed following the subsequent search queries (e.g., "US voting"; actions 28 and 32), where we saw an increase in legacy media content in most agents' Feeds. This increase was higher on the election day for most states (action 28) than on the day after (action 32).

To understand what factors make it more likely for a post to appear in agents' News Feeds, we used two logistic regression models (for RTAmerica and RTnews; see model descriptions in the Appendix). We found that in both cases the number of likes was the strongest predictor for a post to appear in a News Feed. In the case of RTnews, the number of "angry" emotes and the number of post views were also significant variables that negatively correlated with the probability of the post appearing in the Feed, which adds to the recent debate on the impact of "angry" emoticons on Facebook algorithms (Merrill & Oremus, 2021). Other variables such as the number of comments, shares, and other emotes did not appear as significant. This finding may hint at Facebook's curation logic that determines content distribution in News Feeds, including the concerning prevalence of popularity-based predictors, which can be abused by government-sponsored outlets such as RT to increase its visibility through the distribution of attractive but often politically irrelevant content.

Discussion and Conclusion

Studying the activities of pro-government media on social media is a growing field of academic inquiry. In this article, we looked at a small subset of this phenomenon, in particular, the relationship between Facebook algorithmic curation mechanisms and persuasive content of the Russian international broadcaster, RT. Using a mixed-methods approach, we presented a snapshot of the "experience" that our virtual agents had with the platform's algorithms and identified the following aspects of this relationship:

1. RT's election-relevant strategic framing on Facebook included promotion of content with anti-Biden leaning and emphasizing antiestablishment narratives.
2. However, due to algorithmic factors, such as randomization and localization of content curation, individual agents were exposed to eclectic RT content without an overarching framing.
3. Despite extensive engagement with RT pages, agents were also exposed to the content of other information sources (e.g., legacy media) as part of Facebook's algorithmic curation, which at the time prioritized reputable news sources. However, this exposure differed substantially among agents located in different states.

Although the logic behind Facebook's algorithmic curation aims to increase the exposure of users to reputable information (Facebook, 2020), regardless of what information sources they follow, our analysis shows that its implementation still allows some opportunities for Russian government-sponsored media to disseminate its frames. These are primarily related to the discrepancies between the curation models used by specific components of the platform, namely News Feed and Search. The former seems to provide more possibilities for manipulating content distribution, for instance, by manipulating the number of likes, which are curation signals that can be artificially generated, contributing to the enhancement of communication flows (Entman & Usher, 2018).

At the same time, the potential for manipulation can be limited by randomization of content curation on Facebook. Similar to the Web search outputs (Makhortykh et al., 2020), randomization of News Feed composition makes it difficult to predict what content gets there and why. Due to this feature of Facebook curation, it is harder for news outlets to use strategic framing of topics such as elections. While it makes it harder for authoritative media to inform the public in a systematic manner, it also means that it is harder for foreign government-sponsored media to disseminate anti-establishment frames. In this respect, platforms in a way weaken the flow of frames "from traditional journalists to elites and publics" (Entman & Usher, 2018, p. 304) and contribute to the communication ecosystem that can nevertheless amplify confusion—a phenomenon often attributed to Russian actors online (Stelzenmüller, 2017)—due to the lack of consistency in curation models.

Since Facebook algorithmic curation mechanisms give preference to authoritative U.S. mainstream media, independently of user location, RT could reach our agents primarily via News Feeds if they followed its page or liked a post from it. When the agents followed or searched RT, they usually received fewer legacy media sources. While it does limit agent exposure to potentially biased and inaccurate political information, it at the same time prevents them from seeing other reputable sources, potentially locking RT followers into a filter bubble. This is in sharp contrast to hyper-partisan sources (e.g., Breitbart and OccupyDemocrats), that at the

time of the study were favorably treated by Facebook algorithm, making them prominent in the Search Results together with legacy media. Notably, Facebook controls the effects of its curation and adjusts the algorithm only post factum (after the 2016 election in the case of RT, and after November 2020 in the case of OccupyDemocrats and Breitbart) (Roose et al., 2020). Tactical changes in Facebook algorithms, such as the ones aimed at managing the spread of misinformation, are often the result of normative pressure exerted by journalists or policy makers. Our findings also have implications for the changes to the two-step flow of communication brought about by algorithmic personalization systems (Soffer, 2021), highlighting that the gatekeeping—a function that is currently shared between news organizations and algorithms—can produce diffuse and often unpredictable effects. We suggest that targeted algorithmic adjustments currently undertaken by Facebook are less effective than rethinking the entire model of curation that would allow a more sustainable information ecosystem on Facebook.

There are several limitations of our study connected to the difficulties associated with Facebook curation auditing that must be taken into consideration. Our findings could be affected, for example, by the inconsistency in the type of device and operating system used to access agents as well as the number of scrolls down per page. Our results are based on a snapshot of Facebook algorithmic curation during the limited period of our study, which is important to acknowledge due to the constantly changing nature of the Facebook algorithms. Bearing this limitation in mind and the small sample of agents, our findings cannot be generalized. Nevertheless, considering the profound influence of Facebook curation mechanisms on information exposure (Barrett & Kreiss, 2019) and the limited number of studies analyzing the relationship between algorithmic curation and computational propaganda, our study provides insights for the future research on the impact of information curation models on frame dissemination and the effects of location on Facebook personalization. It also stresses the importance of providing more opportunities for conducting external and independent algorithmic audits to ensure a more sustainable and transparent information ecosystem.

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