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More of the Same? Homogenization in News Recommendations When Users Search on Google, YouTube, Facebook, and Twitter

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[Abstract] Amid concerns over algorithmic gatekeeping and the power of digital platforms to serve as engines for polarization and disinformation, we examined the performance of algorithmic recommendation systems as news intermediaries by crowdsourcing search results about newsworthy topics. This study offers a crowdsourced audit of the recommendations made by Google, Google News, Facebook, YouTube, and Twitter to ideologically, geographically, and demographically diverse U.S. participants (N = 1,598), examining the extent to which search algorithms on major platforms personalized results and drove traffic to particular kinds of websites. The findings of our cross-platform analysis show that rather than creating filter bubbles, the sorting mechanisms on platforms strongly homogenize exposure to information, at least among its top results. This effect was evident across search terms and platforms. At the same time, each platform prioritizes different types of content, with professionally produced news dominant on some platforms but not others, and politically conservative mainstays like Fox News being particularly recurrent.

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In recent decades—with the emergence of online news in the 1990s, the surging popularity of Google and YouTube in the 2000s, and the widespread diffusion of Facebook, Twitter, and other social media platforms in the 2010s—the evolving nature of the digital information landscape has raised a host of important questions about the distribution of news (Braun, 2019). Given the longstanding relationship between news use and political awareness and involvement, ongoing shifts in how news is found—and what news is prioritized in that process—matter in a fundamental, normative sense.

This is particularly true when several of the largest and most consequential platforms for news discovery are owned and operated by a handful of U.S. technology companies (Moore & Tambini, 2018); and when those firms use proprietary, closely guarded algorithms for determining how information is presented when users search those platforms for news-related topics (Pasquale, 2015). Algorithmically derived news recommendations on leading social media platforms and search engines have been shown to significantly influence how people find and consume news today (Fletcher & Nielsen, 2018; Fletcher et al., 2019; Newman et al., 2022). Increasingly, popular perceptions of how these algorithms work also play a part in shaping user trust in the news (cf. Shin, 2020; Thurman et al., 2019).

This study offers a comprehensive analysis of the recommendations offered by Google, Google News, Facebook, YouTube, and Twitter. Unlike multiple previous studies, the present study crowdsources search results from the "real world," drawing on an ideologically, geographically, and demographically diverse set of actual internet users in the United States (cf. Haim et al., 2018, Puschmann, 2019, Robertson et al., 2018, Steiner et al., 2022). Moreover, while previous studies have typically focused on a single platform, this study offers a rare cross-platform comparison of the sites that dominate search-based news discovery. Such comparisons

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are valuable because different platforms utilize different content filtering and discovery algorithms (Liu et al., 2021).

Our analysis builds on a long-running debate about what the introduction and proliferation of digital media platforms means for how people learn about and make sense of the world, particularly with regard to news and politics. Two decades ago, with the rise of partisan blogs and niche websites, it was believed that people would become less exposed to a broadly shared set of facts provided by legacy news media, opting for online echo chambers instead (Sunstein, 2002). Later, as algorithmic sorting and ranking of information became prominent on search and social platforms, new concerns arose about the possibility that people were becoming trapped in filter bubbles of user personalization (Pariser, 2011). In recent years, however, a growing body of empirical research has found that such concerns are mostly overblown—that online users may be exposed to a broader palette of news and information than previously assumed (see Bruns 2019 for a thorough review).

Meanwhile, questions have emerged about a different and increasingly salient problem: the effects of centralization and winner-take-all dynamics in digital spaces (Hindman, 2018). The concern is, first, that an increasingly concentrated and powerful set of technology platforms may produce increasingly homogenized results when users search for news—leading to less diversity and plurality in public discourse (Helberger et al., 2016; Loecherbach et al., 2020). Second, there is a corresponding concern that such homogenization may lead to the prioritization and entrenchment of a few national news providers, ultimately diminishing opportunities for smaller local news organizations to be discovered by users. Research, however, has yet to clarify how much centralization and homogenization occurs across platforms when similar search terms are queried by real users in real settings.

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As such, this study offers a comprehensive, crowdsourced audit of a broad set of important platforms for search-based news recommendations. Through data provided by 1,598 online users across all 50 U.S. states, we find that there is a high degree of homogenization in the top search results across all of the platforms studied (Google, Google News, Facebook, YouTube, and Twitter), even when accounting for differences in the user's political orientation and geographic location. Moreover, the type of information sources prioritized in search results are more likely to differ depending on the platform involved rather than the search term used, and we find that platforms often point to sources associated with viewpoints from across the political spectrum.

These findings challenge the conventional wisdom that online platforms are sorting users into filter bubbles through their search algorithms, and that conservative voices, as Republicans often claim, are being intentionally stifled by Big Tech. Instead, the results support concerns about a winner-takes-most paradigm, with a small number of predominantly national content producers—Fox News prominently among them—receiving the bulk of attention.

News plurality and algorithmic gatekeeping

Scholars have long paid considerable attention to the gatekeeping role of news producers, that is, their ability to determine what counts as news and gains priority and salience in public conversations (Carlson, 2007; Schudson, 1995; Shoemaker et al., 2008). In regard to this unique power, the importance of ensuring news plurality and news diversity has been a recurring concern (Napoli, 1999; Voakes, 1996). *Source diversity* (diversity in the types of news outlets that operate), *content diversity* (diversity in the types of formats produced and the demographics and viewpoints represented), and *exposure diversity* (consumers' access to a large number of news outlets) are "a fundamental principle underlying evaluations of the performance of mass

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media systems and the objectives of communication policymaking," given their necessity for creating a marketplace of ideas (Napoli, 1999, p. 7).

Discussions on plurality have evolved alongside developments in media technology and infrastructure, particularly as radio and broadcast technologies unified and nationalized media markets, and as sorting algorithms came to play a larger role in news distribution. Following the rise of new infrastructures for distribution of digital news, the state of consumer access to varied contents became a central, urgent theme in scholarly assessments of news landscapes. With the opening of the public sphere to user-generated content, many foresaw a participatory turn that would make it possible for a much greater number and variety of sources to gain a central place in conversations on public affairs. This, it was believed, would significantly increase the level of exposure diversity in news markets (Shirky, 2008).

By the late 2000s, however, these seemingly democratized digital information and news environments came to be governed by sorting algorithms, with the stated purpose of mechanically editing the plethora of available information to generate the most relevant personally tailored digest. Consequently, concerns over the effects of these curatorial decisions came to dominate the literature, with critics warning of the emergence of filter bubbles and echo chambers that structurally limit exposure to opposing viewpoints (Pariser, 2011; Sunstein, 2002). As search providers and social media platforms that filter content algorithmically, particularly Google and Facebook, equaled and surpassed news outlets as primary portals to news, these concerns became prevalent in academic and popular discourses (Helberger, 2019; Helberger et al., 2018; Lewis & Molyneux, 2018).

It is important to note that there is no single filtering algorithm that accounts for all aspects of personalization. Instead, there are many ways to operationalize a recommendation

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algorithm. For example, a platform may employ content-based recommendations that are keyed to features of a website and/or webpage; community-based recommendations that are keyed to the majority opinion of users; hybrid approaches that blend those approaches, and often further incorporate elements of homophily and implicit trust; or other strategies yet (Liu et al., 2021; Schmit & Riquelme, 2018). As such, different platforms may lend themselves to different levels and kinds of personalization effects.

In the past few years, a series of empirical studies have found little evidence of strong personalization and fragmentation effects in how platforms deliver news (e.g., Bruns, 2019; Flaxman et al., 2016; Krafft et al,. 2019). In effect, several studies found that, contrary to the assumption of filter bubbles, some platforms deliver remarkably homogeneous news diets, with major national news organizations amplified at the expense of small and local ones (Bruns, 2018; Fischer et al., 2020; Haim et al., 2018; Nechushtai & Lewis, 2019). One study showed that even when people used different search terms, Google provided them with common results (Trielli & Diakopoulos, 2022). Scholars are increasingly paying attention to concepts such as *automated serendipity*, which suggests that individuals' algorithmically curated news diets tend to be more (rather than less) diverse than the news diets they curate for themselves (Fletcher et al., 2019; Fletcher & Nielsen, 2018; see also Cardenal et al., 2019; Flaxman et al., 2016). There has also been growing emphasis on the concept of selective exposure, suggesting that differences in news consumption may be best explained through voluntary self-selection rather than algorithmic selection (Beam, 2013; Gentzkow & Shapiro, 2011; Humanes, 2019; Iyengar & Hahn, 2009; Stroud, 2011).

Yet, concerns over exposure diversity in relation to political orientation remain prominent. Even if studies repeatedly find little empirical evidence that news delivery algorithms

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reduce such diversity, concerns about this issue continue to be fueled by growing evidence that Americans of different political persuasions have rather different media diets (e.g., Pew Research Center, 2020). The centrality of these concerns led us to define political orientation as a key variable informing our research design. By having participants with different political preferences search for politically charged terms, we can examine if the algorithms point their attention primarily to ideologically homogeneous sources or offer a varied news diet.

While worries over filter bubbles have been mitigated, scholars have grown increasingly wary of a different kind of threat to news plurality online: the previously unimaginable levels of concentrated domination over public conversation and news distribution that a small number of mega-platforms have acquired. The unevenness and lack of transparency in a field dominated by a small number of platforms—ones not currently recognized as news publishers and, consequently, not subject to the editorial protocols, ethical standards, and regulation that characterize older media organizations—is of growing concern. Some research finds that the information landscapes constructed on these platforms are characterized by winner-take-all dynamics and diminished exposure diversity (Carlson, 2017; Hindman, 2008, 2018; Moore & Tambini, 2018; Smyrnaios, 2018).

News producers are also themselves increasingly dependent on Big Tech. Research in this vein has shown how concentration of publishing power and uneven amplification of content by a very small number of big players can impact both news production and distribution in problematic ways (Bell, 2019; Napoli, 2019; Nechushtai, 2017; Nielsen & Ganter, 2018; Schiffrin, 2021; Smyrnaios & Rebillard, 2019). Journalists consider digital platforms as proxy representations of society and rely on them for news gathering and news judgment, potentially affecting content diversity (Donovan & Friedberg, 2019; McGregor & Molyneux, 2020; Phillips,

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2018; Poell & van Dijck, 2015). Additionally, journalists are ever-cognizant of the preferences of the algorithms that determine who will be exposed to news stories (Giomelakis & Veglis, 2016; Tandoc & Maitra, 2018). Together, this literature points to evolving threats to plurality in contemporary news environments.

In particular, the speed and scale at which news markets are centralizing highlights the negative effects for local news organizations and their economic viability. Local news organizations historically have been considered indispensable providers of geographically relevant information, including forms of public affairs and accountability journalism that may be unique to a given region or community (Nielsen, 2015). In the digital economy, the capacities of local news organizations have drastically diminished and the sustainability of many is in peril, leading to a rapid expansion of news deserts (Abernathy, 2018; Napoli et al., 2018; Nielsen 2015; Sullivan, 2020). In response to these concerns, Google and Facebook announced in recent years that they would make financial support available to small and medium-size local news organizations through programs such as the Google News Initiative and Journalism Emergency Relief Fund and the Facebook Journalism Project. Both companies also said, at different points, that their services would highlight local news sources. Still, scholars continue to find that large national outlets dominate news recommendations on these platforms.

The centrality of concerns over the salience of local news led us to define geographic location as a key variable informing our sampling, search terms, and analysis. By having participants in different locations search for terms that can easily be localized, we can examine if the algorithms point their attention to sources that are local or national.

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Research Questions and Hypotheses

Seeing that algorithmic sorting has a significant impact on news discovery and news use, this study examined search-based news recommendations on multiple digital platforms. While search and recommendation algorithms are conceptually distinct—the former aims to address a user-initiated query and the latter to anticipate a user's future interests—contemporary platforms have the capacity to blend the two, by surfacing the results they expect would best address the user's information need. The logic for how to do that may differ across platforms, though. We performed comparative cross-platform analyses of five prominent platforms that are driven by algorithmic recommendations: Facebook, Google News, Google (Search), Twitter, and YouTube. By crowdsourcing the searches, we obtained our data from an ideologically, geographically, and demographically diverse set of real users. The Institutional Review Board of Columbia University determined the study to be exempt from IRB review in February 2019 (protocol number: IRB-AAAS2559).

First, we examined the individual news diets offered to participants: Is a filter bubble effect evident in the news recommendations collected, and what could explain it? Based on previous research (e.g., Bruns, 2019; Krafft et al., 2019; Nechushtai & Lewis, 2019; Pew Research Center, 2020), we evaluated the following hypotheses regarding the source homogeneity of search results:

H1*:* Regardless of their political orientation, participants will be shown a homogeneous set of top search results across all platforms.

H2*:* Regardless of their geographic location, participants will be shown a homogeneous set of top search results across all platforms.

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If the recommended sources are indeed homogenous, it is important to examine which organizations tend to receive the most exposure in these environments—that is, the "winners" within a competitive digital ecosystem (Carlson, 2017; Hindman, 2008, 2018; Moore & Tambini, 2018; Smyrnaios, 2018). This involves a more qualitative assessment that focuses on the characteristics of the sources that are linked to most often within the search results. As such, we posed the following research questions:

RQ1: Does the level of homogeneity in search results differ between platforms?

RQ2: Do different platforms yield different types of sources in news searches?

RQ3: Does the level of homogeneity in search results differ depending on the search term?

RQ4: Do different search terms yield different types of sources in news searches?

Method

To examine these research questions, we conducted a crowdsourced audit of several search-based recommendation systems on major digital platforms, wherein real users completed real-world searches of topics on the news (for a similar approach, see Nechushtai & Lewis, 2019). Algorithmic aggregators are the main gateway to news for 28% of users worldwide (Newman et al., 2022, p. 23). In the United States, 42% of users say social media is their main source of news—up from 27% in 2013 (Newman et al., 2022, p. 113). Participants were recruited through Amazon Mechanical Turk (MTurk), a crowdsourcing platform on which researchers can assign tasks to users. Recruitment on MTurk has been consistently found to produce samples that are more similar to the general population than other methods (Coppock, 2018; Mason & Suri, 2012), and many studies within journalism and communication studies have used it for recruitment with success (see Bandy & Diakopoulos, 2020; Wu, 2020; Yang & Tian, 2021).

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First, participants were asked about their geographic location, political leanings, and demographics. Then, they were asked to perform searches on five different online news platforms using a specific search term given to them. To increase validity, we asked users to conduct the searches while being signed into their account on that platform; since our goal was to examine if platforms personalize results based on user characteristics, signing in could enable the platforms to identify what may serve as the basis for such personalization. Third, participants were asked to paste the links for the top three results they encountered, based on specific guidance for each platform, into an online form. We focused on the top results, as is customary in studies in this area, since users are most likely to interact with them (see Steiner et al., 2022; Urman & Makhortykh, 2022). While reliance on human participants to complete tasks and manually enter information may introduce potential for data entry error (discussed later in this section) and confounding variables (discussed later in this paper), the lack of artificiality offers a realistic accounting of users' experiences, complementary to the highly controlled experiments more common in this stream of work (e.g., Haim et al., 2018; Fischer et al., 2020; Steiner et al., 2022).

The audit covered five of the largest platforms (in terms of U.S. users): Facebook, Google, YouTube, Twitter, and Google News. While some of the platforms studied offer multiple ways of accessing news content, this study focused on results obtained through their search functions. Within Google Search, participants were asked to record information for both the suggested news stories (which precede search results) and the search results.

Each participant was asked to perform searches using just one keyword. All searches were conducted in May 2019. On May 15, participants used the term "immigration." On May 16, they searched for "state Republicans." On May 20, they used the term "Trump." On May 21,

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they searched for "crime." These keywords represent a combination of national and local stories, as well as a combination of electoral politics and general news topics. While we recognize that users may prefer using different search terms in practice (e.g., "shooting on Main Street" rather than "crime") or may utilize distinct search strategies according to the platform at hand or their ideological preferences (see van Hoof et al., 2022), these terms nevertheless encompass general interest topics and serve as a constant to enable multi-context comparison regarding the subject of interest: the diversity of search results. Replicating the audit across four different search terms increases the robustness of our findings.

All audits were conducted at 2 p.m. Eastern Time. Participants were asked to sign into their social media accounts and were paid $4 per search term. Although participants were given two hours to conduct the searches, the vast majority of responses were obtained within the first hour of the task becoming available. All participants who signed up for the task completed it.

Participants were asked to self-report demographic and sociopolitical information, and two variables merit particular attention here. First, their political orientation was calculated by taking the mean of the responses to the two following questions, which were measured on a seven-point Likert scale ranging from *very liberal* (1) to *very conservative* (7): "Thinking about your political preferences on {social / economic} issues, where would you place yourself on a range from very liberal to very conservative?" Respondents were then grouped into the Liberal group if that mean was less than 3, Moderate if it was between 3 and 5, and Conservative if it was between more than 5. Second, respondents were asked to provide their ZIP code, which we then linked to one of four U.S. Census Bureau Regions (Northeast, South, West and Midwest). That serves as the basis for the geographic location variable.

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A total of 1,598 respondents participated in the survey, with similar participation totals across the four keywords (n_{crime} = 412; $n_{immigration}$ = 425; $n_{statereps}$ = 386; n_{trump} = 375). The sample skewed left of center, with Liberals receiving the highest representation (44.6%), followed by Moderates (40.8%) and Conservatives (14.5%). The geographical distribution of respondents was in line with the 2018 U.S. American Community Survey estimates ($n_{midwest}$ = 330; $n_{northeast}$ = 327; n_{south} = 577; n_{west} = 357). The median respondent's age was 35, and 51.1% of respondents self-identified as "Male" and 76% as White (only) and non-Latinx. The median income level was $50,000 to $59,999. Finally, 48.3% of the respondents self-reported having a bachelor's degree or higher.

To measure the level of source homogeneity in news searches, we examined the identity of the sources that users were referred to. Participants submitted the links they were referred to by the platforms' search functions, and the submitted link data was then subjected to rigorous data cleaning to ensure they were correctly matched across respondents (see Appendix B in Online Supplemental Materials). This was necessary because the links were sometimes submitted in the form of URL shorteners or redirects, included additional parameters such as unique tracking identifiers, or involved specialized versions of a story (e.g., mobile-friendly). The authors thus developed a computer script to sanitize the links based on a series of rules and then manually reviewed the entirety of the cleaned dataset. A total of 28,475 valid links were submitted by the participants, yielding a link validity rate of 99.0%. We therefore do not believe data entry error exerted a major impact on the findings.

There is no natural or obvious process or threshold for assessing the source homogeneity of search results. As such, the authors measured the amount of exposure to a particular organization—that is, how many participants were shown a link from that organization's

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website—and determined that if three of the top four sources were shared across all subgroups for a given variable, then there was a high degree of homogeneity. If two of the top four sources were shared across all subgroups, then there was a moderate degree of homogeneity. If fewer than two of the top four sources appeared across all subgroups, then there was a low degree of homogeneity. It bears noting that a single source (e.g., nytimes.com) could appear twice in the three search results recorded by a participant, but it would effectively be counted as a single exposure, since this approach was attenuated to the proportion of participants who came across a particular source and not the frequency of exposure to that source.

Upon the completion of the quantitative analysis of source diversity, the top five sources for each platform and search term were qualitatively analyzed by one of the authors. This portion of the analysis was intended to identify what kinds of sources were highlighted in each of the searches in order to see if any patterns emerged. The author was particularly sensitive to characteristics that are typically used as key variables in the journalism studies literature, like the type of organization (e.g., news source or government agency), its size (e.g., large newsroom or small local news outfit), its original medium (e.g., print-based or television), and, when applicable, the evident political slant of the organization (e.g., strongly conservative-leaning or strongly liberal-leaning). The qualitative analysis was completed using inductive open coding.

Findings

Source Homogeneity and Political Orientation

The first hypothesis posited that regardless of their political orientation, respondents would be shown a homogeneous set of top search results across all platforms. As shown in Table 1, all five platforms exhibited a high degree of source homogeneity across all four keywords. Thus, the first hypothesis was supported.

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There was some variation across platforms in the range of exposure to particular sources, though. For example, Google News tended to have a higher range in the proportions reported (e.g., 93.8% of participants who identified as Liberal were exposed to *The New York Times* when searching for the keyword "immigration" while just 85.2% of participants who identified as Conservative were exposed to the *Times*). Nevertheless, there was remarkably high consistency across groups in terms of which sources came up the most for a given keyword, and often steep drop-offs between the third- and fourth-ranked sources. For example, the third most frequent source for the keyword "crime" on Twitter, across all political orientations, was *NowThis News*, and it ranged between 49.2% and 51.7%. In contrast, the fourth most frequent source under that condition was U.S. President Donald Trump's personal Twitter account, which ranged between 18.0% and 21.5%.

— Table 1 here —

This study cannot determine the exact reasons for the differences in the percentages, though they may reflect a combination of factors from other forms of personalization, small gaps between the time when participants accepted the MTurk task and the time when they conducted the search that still fell within the allotted time limit, and/or possible data entry error when participants recorded their results (i.e., pasting a valid link in the wrong entry field). However, there were no discernible patterns in these differences and, most importantly, the results appear to show that political orientation is not a significant point of differentiation, in line with the findings of previous studies (Robertson et al., 2018).

Source Homogeneity and Geographic Location

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The second hypothesis posited that regardless of their geographic location, respondents would be shown a homogeneous set of top search results across all platforms. Four of the five platforms exhibited a high degree of source homogeneity across all four keywords. Google Search (search results) was the only moderately homogeneous platform.[1] Thus, the second hypothesis was mostly supported. (A detailed table covering these results is available in the Online Supplemental Materials for this article.)

Again, there was some variation across platforms in the range of exposure to particular sources. The average range in the exposure to a source in a particular ranking across all geographical subgroups was higher than their political orientation counterparts for nearly all platforms. This suggests that there is a slightly stronger localization effect for all platforms (even those that were considered highly homogeneous). Nevertheless, there was once again remarkably high consistency across groups in terms of which sources came up the most for a given keyword, and often steep drop-offs between the third- and fourth-ranked sources. The search results for Google Search were the only ones that varied considerably across regions, and even then, only for the "state republicans" keyword as participants were pointed to their states' GOP website (and, sometimes, a Wikipedia page for their own representatives). In contrast, the suggested news stories accompanying the Google Search results were consistent—except for the Northeast region being more likely to be shown a *New Yorker* story at the expense of a *New York Times* one.

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[1] YouTube technically falls into the moderate degree of source homogeneity classification under the schema used, as only two of the sources were consistently among the top four for the keyword "immigration". However, we have opted to classify it as highly homogeneous because of the steep drop-off in the exposure proportions from the second- to third-ranked sources for that keyword. This is because the majority of participants were shown two results from Fox Business and one from Fox News Channel. Thus, the third highest-ranked source rarely came up, and was more influenced by long-tail variation. All other keywords demonstrated a high degree of homogeneity.

As with the first hypothesis, this study cannot determine the exact reasons for the differences in the percentages. However, there do not appear to be any discernible patterns in the differences and, most importantly, the results appear to show that geographical location is not a significant point of differentiation—though it does appear to exert marginally higher effects than political orientation, in line with the findings of previous studies (Kliman-Silver et al., 2015).

Types of Sources

Having found that search results were highly homogenous for users across the board, we examined which types of sources dominated these recommendations (see Table 2) and conducted an inductive qualitative analysis of the top links.

— Table 2 here —

While other searches may yield referrals to other sources, we were able to identify consistent patterns within our data.

First, all the platforms we studied strongly favored news organizations with national reach in search results. They rarely amplified local or even regional news outlets prominently. We found that Google News and Google Search's Top Stories—two recommendation services that specifically focus on professional news—tended to recommend legacy news organizations, with major print-based publications gaining the highest levels of exposure in search results. These characteristics are in line with previous findings on Google News (Nechushtai & Lewis, 2019).

At the same time, we noticed a substantial change in the performance of news sources identified as politically conservative, most notably Fox News. In a previous study conducted in

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2016 that followed similar methods (Nechushtai & Lewis, 2019), Fox News was hardly represented in Google News recommendations. In the current study, however, Fox News repeatedly appeared among the top results on Google News and Google Search's Top Stories, and it was especially salient on YouTube. Across all platforms, Fox News came up nearly as often as *The New York Times* and *The Washington Post*—with those being the three most salient news organizations.

YouTube, also owned by Google, is typically framed as a disruptive platform that offers non-professional producers of video content an opportunity to compete on equal terms in the marketplace of ideas. Yet, the top performers in our searches consistently were national television networks, both cable news and traditional national broadcasters. However, some digitally native outlets did break through, such as BlazeTV, True Crime Daily, and Vox.

While Google News, Google Search's Top Stories, and YouTube mostly amplified professional national news outlets, a different picture emerged on Facebook, Twitter, and regular Google Search results, where most top search results referred to non-news organizations. Each of these services prioritized a completely different type of source and constructed a different kind of information diet when people searched for news-related topics.

On Google Search, maximal visibility was given to information repositories, such as Wikipedia and Neighborhood Scout, as well as the official websites of organizations relevant to the search topic. On Twitter, many of the sources most referred to were individual journalists with large followings (as well as a mix of legacy, digital-born, and TV news organizations).

Facebook's search results included an even mix of Facebook Groups, news sources, entertainment programs, and official sites of relevant government agencies. This heterogeneity is perhaps not surprising, given Facebook's announcements in recent years that its platform would

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prioritize strengthening interpersonal relationships over delivering professional news. At the same time, digital-born conservative outlets, notably the Washington Examiner and the Daily Caller, were more salient on Facebook searches than on the other platforms studied—which is consistent with journalistic accounts showing that right-wing news performs particularly well on Facebook (Roose, 2020).

In all the platforms studied, the level of source diversity in the search results was very low, and the level of homogeneity was very high. The information diets offered by all of them promoted a centralized winner-take-all structure, rather than the multiple, discrete echo chambers often associated with them. At the same time, each platform appeared to employ a different kind of editorial logic in shaping the information landscape it offered in response to searches. These editorial distinctions seem to be the most significant factors shaping what is prioritized. While some level of internal variation was evident with respect to search terms (for example, Google Search offered practical informative results in response to queries on "immigration" but more news stories in response to queries on "crime"), platform-specific logics prevailed: the major distinctions in patterns of amplification were between platforms, not between topics.

In sum, we offer the following succinct answer to our research questions*:* The level of homogeneity and the types of the sources that are linked to the most differ depending on the platform being used, more than they differ depending on the nature of the search term.

Discussion

Our findings offer several contributions to our understanding of exposure to news via searches on major platforms and point to several directions that future research could develop.

First, the findings show that more than creating personalized filter bubbles based on political orientation or geographic location, the search and sorting mechanisms used on

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prominent digital platforms homogenize exposure to information, at least among the top search results. We cannot definitively say that the platforms studied here are producing different information diets today than they have in the past (though it is plausible that this is the case considering the criticisms they have long received), or that the patterns identified in search results necessarily apply in every other curation and recommendation service offered by the platforms we studied. However, it is evident that the information diets that platforms deliver are more homogenized than they are often assumed to be. While the prospect of public conversations on news and public affairs being fragmented into discrete echo chambers received considerable attention in the past decade, our findings, together with other recent evidence, suggests that fears of algorithmically driven fragmentation have not yet materialized, and that news diets may actually be less polarized than previously thought (e.g., Sunstein, 2002; Pariser, 2011). A post-hoc analysis also indicated that the lack of personalization was not limited to our variables of interest. A similar pattern of homogenization was also evident for the demographic variables of age and gender.

Second, the findings show that a small number of content producers typically dominate the gateways to news and information about key local and national issues. The identities and characteristics of these "winners" are different on each platform: while some platforms referred users primarily to professional news, others highlighted other types of sources, demonstrating the dissolving boundaries between journalism and other forms of digital media (see Steensen & Westlund, 2020). Yet overall, the pattern remains the same across platforms: Algorithmic news distribution seemingly benefits a small set of mostly national winners at the expense of local (and regional) sources. While more research is needed to understand how algorithms serve news users and shape information flows, these findings advance our understanding of how to theorize

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the current media landscape and the impact that these emergent spaces for news have on news consumption and public debates.

While polarization has been much discussed in recent years, there has been less consideration of what very high levels of homogenization and centralization in public conversations, identified here and in prior work (e.g., Flaxman et al., 2016; Krafft et al., 2019; Nechushtai & Lewis, 2019), might mean for normative (and practical) ideas about information diversity. Some may conclude that, overall, this architecture is preferable to the prospect of filter bubbles, and that it might blunt the prospect of increased fragmentation and disinformation. Yet, such concentration in news markets may come with its own steep costs. Some have suggested that a nationally oriented news environment exacerbates polarization as a result of growing information gaps (especially regarding state politics) and the tendency of national news to focus on the most contentious aspects of national politics (Darr et al., 2018).

Furthermore, this increased homogenization is occurring at a time of increasing market concentration—at least in the United States—which (re)introduces concerns about the political economy of journalism (MacLeod, 2019). This, coupled with an algorithmic prioritization of national media, further limits the pathways to viability for local news media by diminishing the opportunities for visibility that local news organizations so desperately seek, which in turn contributes to the crisis in local news (Napoli et al., 2018; Sullivan, 2020). Thus, there appears to be an important disconnect between the algorithms employed by these platforms and the platforms' rhetoric and philanthropic efforts. These findings suggest the continued need to strengthen and support the types of news organizations that have consistently underperformed in searches.

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The findings also show each platform having its own distinct editorial preferences, which results in the adoption of algorithms that prioritize certain types of content over others. Notably, professional news organizations appeared to be heavily favored on some platforms (e.g., Google News and YouTube) but not others (e.g., Facebook). We can only speculate about why that might be the case. It may reflect both a philosophical and commercial stance. For example, Facebook has long been guided by a desire to build community, and it may thus opt to leverage its algorithms to guide users toward groups and pages where members play a larger role in determining what news to orient the community around—which, in turn, may result in more time being spent within the Facebook ecosystem. Moreover, Facebook in recent years has announced changes to its algorithms to deprioritize news and instead play up "friends and family" (Thompson & Vogelstein, 2018). In the case of Google News, it may seek to convey its journalistic legitimacy by platforming mainstream (and less-controversial) news sources. This should give pause to the treatment of these platforms as a monolith of sorts. The evidence provided here and elsewhere (e.g., Carlson, 2017; Napoli, 2019) illustrates that they operate differently in important ways. This may suggest the need to encourage the adoption of diverse media diets, not only in terms of the news sources that users click on, but also when it comes to the very platforms and recommendation services they select as gateways to news.

Finally, these findings add to an important conversation about the relationship between conservative media and platform gatekeeping. In recent years, Republican politicians, led by former President Donald Trump, and conservative media personalities have railed against Google, Facebook, and Twitter for what they see as lacking representation of right-leaning sources in search results or the news feeds of those platforms. The representation of slanted news sources on digital platforms is a complex issue, and clear principles are hard to form and

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operationalize. Yet, our findings appear to corroborate recent popular accounts that, rather than being squelched by the platform providers, conservative sources may actually have received something of a bump in prominence—at least relative to what was found in similar previous research (e.g., Nechushtai & Lewis, 2019). As *The New York Times* has noted, this may be "a classic example of a politician 'working the refs'—that is, complaining vocally about a referee's decision in the hopes of getting a better call next time. It's a tactic the Trump movement has revived and deftly employed against the powerful, befuddled new referees of public debate, Google, Facebook and Twitter" (Smith, 2020, para. 4). Media analysts have already found that Facebook, for example, relaxed its rules against misinformation in ways that favored right-wing sources in response to charges from its politically conservative users (Roose, 2020; Solon, 2020; Seetharaman & Glazer, 2020). While our methodological approach precludes us from linking the search results to the criticisms the platforms have received—indeed, a perfectly plausible alternative explanation is that the demographics of the platforms' users may be changing and that particular news organizations have become more adept at picking up on algorithmic preferences—it is nevertheless noteworthy that conservative sources fared better in this study than they did in prior research.

This study has limitations that could be addressed in future work. First, we focus on news generated via searches, which are a primary gateway to news online (Newman et al., 2022). At the same time, concerns about the polarizing effects of social media platforms are often related to other forms of interaction with the platforms—most notably, the homepage news feed functions of Facebook, Twitter, and other services. Thus, other forms of news discovery warrant attention, and comparative research of those forms is sorely needed.

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Second, compared to prior studies that examined similar questions through computational simulations in controlled environments, the messiness of a crowd-sourced audit likely introduces some potential confounders that make it hard to isolate the impacts of specific variables (e.g., geographical location or political orientation). However, upon reflection, the high levels of homogeneity suggest that even in an uncontrolled environment, the results were strikingly similar—that is, this potential limitation for isolating effects also proves to be a strength, in highlighting that the likely impact of potential (non-studied) factors is also highly limited in a real-world setting. Ultimately, even as we acknowledge a certain artificiality in the use of four general keywords for the purposes of empirical comparison, our approach offers a significant benefit: a more realistic examination of how a diverse set of actual human users was served by the search functions that are among the main gateways to news and information today. Adding to a growing body of research with similar findings, our study was able to demonstrate the pattern across multiple platforms within a single research design. At the same time, the snapshot design of the study means that our findings reflect a particular moment in time. Although four different keywords were used, the crowdsourced audit occurred over a one-week time span. Future research could further examine whether (and how) the distribution of search results for the same words changes over time.

Third, while we asked participants to sign into their accounts on each platform—which should increase the likelihood of personalization based on prior browsing and listed preferences—we had no way of validating that they did indeed sign in. Yet there is no reason to suspect a significant number of participants ignored this instruction. Finally, we left out other platforms (e.g., Instagram and Tik Tok) that continue to grow in importance as sources for news exposure and merit attention in future studies.

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While we examined searches that were conducted in the United States and revolved around American politics, our findings are aligned with those of studies from Spain (Cardenal et al., 2019), Greece (Giomelakis & Veglis, 2016), Germany (Haim et al., 2018; Puschmann, 2019; Steiner et al., 2022), Australia (Bruns 2018), and the United Kingdom (Fletcher & Nielsen, 2018). There is a clear need for more research in non-Western contexts, though. Our sample overrepresented White males and skewed left of center, though the findings appeared consistent enough to warrant confidence in them. Additionally, this study involves data taken from a snapshot in 2019, and thus reflects algorithmic performance at a specific point in time.

Even so, this study offers a comparison of the outcomes of search-led news discovery among a diverse set of real users, who searched information while logged into their accounts on some of the biggest digital platforms today—which serve, for many, as primary portals to information and news, including as some people attempt to fact-check the news for themselves through Google searches and the like (Nelson & Lewis, 2021). This design enables us to offer valuable insights on how people are served by the search algorithms that direct a large share of the audience for news today. Our findings, consistent with other recent work, downplay the threat of filter bubbles or high degrees of personalization. However, they also highlight another type of concern: the prospect of news and information markets in which a small handful of large organizations are positioned to amass nearly all the attention, relevance, and revenue, while the vast majority of other news organizations, particularly local ones, struggle for sunlight.

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References

Abernathy, P. M. (2018). *The expanding news desert*. University of North Carolina Press. https://www.usnewsdeserts.com/

Bandy, J., & Diakopoulos, N. (2020). Auditing news curation systems: A case study examining algorithmic and editorial logic in Apple News. *Proceedings of the International AAAI Conference on Web and Social Media*, 14, 36-47. https://doi.org/10.1609/icwsm.v14i1.7277

Beam, M. A. (2014). Automating the news: How personalized news recommender system design choices impact news reception. *Communication Research* 41(8), 1019-1041. https://doi.org/10.1177/0093650213497979

Bell, E. (2019). The dependent press: How Silicon Valley threatens independent journalism. In M. Moore & D. Tambini (Eds.), *Digital dominance: The power of Google, Amazon, Facebook, and Apple* (pp. 241-261). Oxford University Press.

Braun, J. A. (2019). News distribution. In *Oxford Research Encyclopedia of Communication*. Oxford University Press. https://doi.org/10.1093/acrefore/9780190228613.013.846

Bruns, A. (2019). *Are filter bubbles real?* Polity.

Bruns, A. (2018, May 23). Following, mentioning, sharing: A search for filter bubbles in the Australia Twittersphere. *69th International Communication Association Conference*, Prague.

Cardenal, A. S., Aguilar-Paredes, C., Galais, C., & Pérez-Montoro, M. (2019). Digital technologies and selective exposure: How choice and filter nubbles shape news media exposure. *The International Journal of Press/Politics*, 24(4), 465-486. https://doi.org/10.1177/1940161219862988

ACCEPTED MANUSCRIPT

Carlson, M. (2018). Facebook in the news: Social media, journalism, and public responsibility following the 2016 Trending Topics controversy. *Digital Journalism* 6(1), 4-20. https://doi.org/10.1080/21670811.2017.1298044

Carlson, M. (2007). Order versus access: News search engines and the challenge to traditional journalistic roles. *Media, Culture & Society*, 29(6): 1014-1030. https://doi.org/10.1177/0163443707084346

Coppock, A. (2019). Generalizing from survey experiments conducted on Mechanical Turk: A replication approach. *Political Science Research and Methods*, 7(3), 613-628.

Darr, J. P., Hitt, M. P., & Dunaway, J. L. (2018). Newspaper closures Polarize voting behavior. *Journal of Communication*, 68(6), 1007-1028. https://doi.org/10.1093/joc/jqy051

Donovan, J., & Friedberg, B. (2019). *Source hacking: Media manipulation in practice.* Data & Society Research Institute. https://datasociety.net/library/source-hacking-media-manipulation-in-practice/

Fischer, S., Jaidka, K., & Lelkes, Y. (2020). Auditing local news presence on Google News. *Nature Human Behaviour*. https://doi.org/10.1038/s41562-020-00954-0

Flaxman, S., Goel, S., & Rao, J. M. (2016). Filter bubbles, echo chambers, and online news consumption. *Public Opinion Quarterly*, 80, 298-320. https://doi.org/10.1093/poq/nfw006

Fletcher, R., Kalogeropoulos, A., & Nielsen, R. K. (2019, August 30). How search engines and social media shape news use: Evidence from tracking data. *115th American Political Science Association's Annual Meeting*, Washington.

Fletcher, R., & Nielsen, R. K. (2018). Automated serendipity: The effect of using search engines on news diet balance and diversity. *Digital Journalism*, 6(8), 976-989. https://doi.org/10.1080/21670811.2018.1502045

ACCEPTED MANUSCRIPT

Gentzkow, M., & Shapiro, J. M. (2011). Ideological segregation online and offline. *Quarterly Journal of Economics*, 126 (4), 1799-1839. https://doi.org/10.1093/qje/qjr044

Giomelakis, D., & Veglis, A. (2016). Investigating search engine optimization factors in media websites: The case of Greece. *Digital Journalism*, 4(3): 379-400. https://doi.org/10.1080/21670811.2015.1046992

Haim, M., Graefe, A., & Brosius, H. B. (2018). Burst of the filter bubble? Effects of personalization on the diversity of Google News. *Digital Journalism*, 6(3), 330-343. https://doi.org/10.1080/21670811.2017.1338145

Helberger, N. (2019). On the democratic role of news recommenders. *Digital Journalism*, 7(8), 993-1012. https://doi.org/10.1080/21670811.2019.1623700

Helberger, N., Karppinen, K., & D'Acunto, L. (2018). Exposure diversity as a design principle for recommender systems. *Information, Communication & Society*, 21(2), 191-207. https://doi.org/10.1080/1369118x.2016.1271900

Hindman, M. (2008). *The myth of digital democracy*. Princeton University Press.

Hindman, M. (2018). *The internet trap: How the digital economy builds monopolies and undermines democracy*. Princeton University Press.

Humanes, M. L. (2019). Selective exposure in a changing political and media environment. *Media and Communication*, 7(3), 1-3. https://doi.org/10.17645/mac.v7i3.2351

Iyengar, S., & Hahn, K. S. (2009). Red media, blue media: Evidence of ideological selectivity in media use. *Journal of Communication*, 59(1), 19-39. https://doi.org/10.1111/j.1460-2466.2008.01402.x

ACCEPTED MANUSCRIPT

Krafft, T. D., Gamer, M., & Zweig, K. A. (2019). What did you see? A study to measure personalization in Google's search engine. *EPJ Data Science*, 8(38). https://doi.org/10.1140/epjds/s13688-019-0217-5

Loecherbach, F., Moeller, J., Trilling, D., & van Atteveldt, W. (2020). The unified framework of media diversity: A systematic literature review. *Digital Journalism*, 8(5), 605-642. https://doi.org/10.1080/21670811.2020.1764374

Lewis, S. C., & Molyneux, L. (2018). A decade of research on social media and journalism: Assumptions, blind spots, and a way forward. *Media and Communication*, 6(4), 11-23. https://doi.org/10.17645/mac.v6i4.1562

Liu, P., Shivaram, K., Culotta, A., Shapiro, M. A., & Bilgic, M. (2021, April 19). The interaction between political typology and filter bubbles in news recommendation algorithms. *Proceedings of the Web Conference 2021* (WWW '21), Ljubljana. https://doi.org/10.1145/3442381.3450113

MacLeod, A. (Ed.) (2019). *Propaganda in the information age: Still manufacturing consent*. Routledge.

Mason, W., & Suri, S. (2012). Conducting behavioral research on Amazon's Mechanical Turk. *Behavior Research Methods*, 44(1), 1-23.

McGregor, S. C., & Molyneux, L. (2020). Twitter's influence on news judgment: An experiment among journalists. *Journalism* 21(5), 597-613. https://doi.org/10.1177/1464884918802975

Moore, M., & Tambini, D. (Eds.) (2018). *Digital dominance: The power of Google, Amazon, Facebook, and Apple*. Oxford University Press.

Napoli, P. M. (1999). Deconstructing the diversity principle. *Journal of Communication* , 49(4), 7-34. https://doi.org/10.1111/j.1460-2466.1999.tb02815.x

ACCEPTED MANUSCRIPT

Napoli, P. M., Weber, M., McCollough, K., & Wang, Q. (2018). *Assessing local journalism: News deserts, journalism divides, and the determinants of the robustness of local news*. DeWitt Wallace Center for Media & Democracy, Duke University. https://dewitt.sanford.duke.edu/wp-content/uploads/2018/08/Assessing-Local-Journalism_100-Communities.pdf

Napoli, P. M. (2019). *Social media and the public interest: Media regulation in the disinformation age*. Columbia University Press.

Nechushtai, E., and Lewis, S. C. (2019). What kind of news gatekeepers do we want machines to be? Filter bubbles, fragmentation, and the normative dimensions of algorithmic recommendations. *Computers in Human Behavior*, 90, 298-307. https://doi.org/10.1016/j.chb.2018.07.043

Nechushtai, E. (2018). Could digital platforms capture news through infrastructure? *Journalism*, 19(8), 1043-1058. https://doi.org/10.1177/1464884917725163

Nelson, J. L., & Lewis, S. C. (2021). Only "sheep" trust journalists? How citizens' self-perceptions shape their approach to news. *New Media & Society*, https://doi.org/10.1177/14614448211018160

Newman, N., Fletcher, R., Robertson, C. T., Eddy, K., & Nielsen, R. K. (2022). Reuters Institute Digital News Report 2022. Reuters Institute for the Study of Journalism, Oxford University. https://reutersinstitute.politics.ox.ac.uk/digital-news-report/2022

Nielsen, R. K. (2015). *Local journalism: The decline of newspapers and the rise of digital media*. Bloomsbury.

ACCEPTED MANUSCRIPT

Nielsen, R. K., & Ganter, S. A. (2018). Dealing with digital intermediaries: A case study of the relations between publishers and platforms. *New Media & Society*, 20(4), 1600-1617. https://doi.org/10.1177/1461444817701318

Kliman-Silver, C., Hannak, A., Lazer, D., Wilson, C., & Mislove, A. (2015, October 28). Location, location, location: The impact of geolocation on web search personalization. *Proceedings of the Internet Measurement Conference* (IMC 2015), Tokyo. https://doi.org/10.1145/2815675.2815714

Pariser, E. (2011). *The filter bubble: What the internet is hiding from you*. Penguin.

Pasquale, F. (2015). *The black box society*. Harvard University Press.

Pew Research Center. (2020). *U.S. media polarization and the 2020 election: A nation divided*. https://www.journalism.org/2020/01/24/u-s-media-polarization-and-the-2020-election-a-nation-divided/

Phillips, W. (2018). *The oxygen of amplification: Better practices for reporting on extremists, antagonists, and manipulators*. Data & Society. https://datasociety.net/library/oxygen-of-amplification/

Poell, T., & van Dijck, J. (2015). Social media and journalistic independence. In Bennett, J. & Strange, N. (Eds.), *Media independence: Working with freedom or working for free?* (pp. 182-201). Routledge.

Puschmann, C. (2019). Beyond the bubble: Assessing the diversity of political search results. *Digital Journalism*, 7(6), 824-843. https://doi.org/10.1080/21670811.2018.1539626

Robertson, R. E., Jiang, S., Joseph, K., Friedland, L., Lazer, D., & Wilson, C. (2018). Auditing partisan audience bias within Google Search. *Proceedings of the ACM on Human-Computer Interaction*, Vol. 2, CSCW, Article 148. https://doi.org/10.1145/3274417

ACCEPTED MANUSCRIPT

Roose, K. (2020, August 27). What if Facebook is the real "silent majority"? *The New York Times*. https://www.nytimes.com/2020/08/27/technology/what-if-facebook-is-the-real-silent-majority.html

Schiffrin, A. (Ed.) (2021). *Media capture: How money, digital platforms, and governments control the news*. Columbia University Press.

Schmit, S., & Riquelme, C. (2018, April 9). Human interaction with recommendation systems. *Proceedings of the 21st International Conference on Artificial Intelligence and Statistics* (AISTATS 2018), Lanzarote.

Schudson, M. (1995). *The power of news*. Harvard University Press.

Seetharaman, D, & Glazer, E. (2020, October 16). How Mark Zuckerberg learned politics. *The Wall Street Journal*. *The Wall Street Journal*. https://www.wsj.com/articles/how-mark-zuckerberg-learned-politics-11602853200

Shin, D. (2020). User perceptions of algorithmic decisions in the personalized AI system: Perceptual evaluation of fairness, accountability, transparency, and explainability. *Journal of Broadcasting & Electronic Media*, 64(4), 541-565.

Shirky, C. (2008). *Here comes everybody: The power of organizing without organizations*. Allen Lane.

Shoemaker, P. J., Vos, T. P., & Reese, S. D. (2008). Journalists as gatekeepers. In Wahl- Jorgensen, K., & Hanitzsch, T. (Eds.), *The handbook of journalism studies* (pp. 73-87). Routledge.

Smith, B. (2020, August 10). How pro-Trump forces work the refs in Silicon Valley. *The New York Times*. https://www.nytimes.com/2020/08/09/business/media/trump-facebook-google-twitter-misinformation.html

ACCEPTED MANUSCRIPT

Smyrnaios, N. (2018). *Internet oligopoly: The corporate takeover of our digital world*. Emerald.

Smyrnaios, N, & Rebillard, F. 2019. How infomediation platforms took over the news: A longitudinal perspective. *The Political Economy of Communication*, 7(1), 30-50.

Solon, O. (2020, August 7). Sensitive to claims of bias, Facebook relaxed misinformation rules for conservative pages." *NBC News*. https://www.nbcnews.com/tech/tech-news/sensitive-claims-bias-facebook-relaxed-misinformation-rules-conservative-pages-n1236182

Steensen, S., & Westlund, O. (2021). *What is digital journalism studies?* Taylor & Francis.

Steiner, M., Magin, M., Stark, B., & Geiß, S. (2022). Seek and you shall find? A content analysis on the diversity of five search engines' results on political queries." *Information, Communication & Society*, 25(2): 217-241. https://doi.org/10.1080/1369118x.2020.1776367

Stroud, N. J. (2011). *Niche news: The politics of news choice.* Oxford University Press.

Sullivan, M. (2020). *Ghosting the news: Local journalism and the crisis of American democracy*. Columbia Global Reports.

Sunstein, C. R. (2002). *Republic.com*. Princeton University Press.

Tandoc, E. C., & Maitra, J. (2018). News organizations' use of native videos on Facebook: Tweaking the journalistic field one algorithm change at a time. *New Media & Society*, 20(5), 1679-1696. https://doi.org/10.1177/1461444817702398

Thompson, N., & Vogelstein, F. (2018, February 12). Inside the two years that shook Facebook–and the world. *Wired*. https://www.wired.com/story/inside-facebook-mark-zuckerberg-2-years-of-hell/

Thurman, N, Moeller, J., Helberger, N., & Trilling, D. (2019). My friends, editors, algorithms, and I: Examining audience attitudes to news selection." *Digital Journalism* 7(4), 447-469. https://doi.org/10.1080/21670811.2018.1493936

ACCEPTED MANUSCRIPT

Trielli, D., & Diakopoulos, N. (2022). Partisan search behavior and Google results in the 2018 U.S. midterm elections. *Information, Communication & Society*, 25(1), 145-161. https://doi.org/10.1080/1369118x.2020.1764605

Urman, A., Makhortykh, M., & Ulloa, R. (2022). The matter of chance: Auditing web search results related to the 2020 US presidential primary elections across six search engines. *Social Science Computer Review*, 40(5), 1323-1339. https://doi.org/10.1177/08944393211006863

van Hoof, M., Meppelink, C. S., Moeller, J., & Trilling, D. (2022). Searching differently? How political attitudes impact search queries about political issues. *New Media & Society*. https://doi.org/10.1177/14614448221104405

Voakes, P. S., Kapfer, J., Kurpius, D., & Chern, D. S. (1996). Diversity in the news: A conceptual and methodological framework. *Journalism & Mass Communication Quarterly* 73(3), 582-593. https://doi.org/10.1177/107769909607300306

Wu, Y. (2020). Is automated journalistic writing less biased? An experimental test of auto-written and human-written news stories. *Journalism Practice* 14(8), 1008-1028. https://doi.org/10.1080/17512786.2019.1682940

Yang, J., & Tian, Y. (2021). "Others are more vulnerable to fake news than I am': Third-person effect of COVID-19 fake news on social media users. *Computers in Human Behavior*, 125, 106950.

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Table 1. Proportion of participants who were exposed to a source, by political ideology

Keyword: "crime"

Facebook						Google News					
Liberal		Moderate		Conservative		Liberal		Moderate		Conservative	
Source	**%**	**Source**	**%**	**Source**	**%**	**Source**	**%**	**Source**	**%**	**Source**	**%**
True Crime Daily	90.1	True Crime Daily	90.6	True Crime Daily	85.2	Fox News	93.7	Fox News	96.5	Fox News	98.4
Unspeakable Crimes	36.0	CrimeFeed	31.6	CrimeFeed	27.9	AZFamily	73.0	AZFamily	76.9	AZFamily	80.3
CrimeFeed	27.9	Unspeakable Crimes	31.6	Unspeakable Crimes	24.6	NPR	69.5	NPR	67.6	NPR	75.4
The Daily Caller	20.9	Crime Videos	18.7	The Daily Caller	21.3	CNN	16.7	CNN	13.9	CNN	9.8
Tales of True Crime	12.8	The Daily Caller	17.0	Crime Videos	14.8	Just Security	12.1	Just Security	10.4	Just Security	8.2

Keyword: "immigration"

Facebook						Google News					
Liberal		Moderate		Conservative		Liberal		Moderate		Conservative	
Source	**%**	**Source**	**%**	**Source**	**%**	**Source**	**%**	**Source**	**%**	**Source**	**%**
U.S. Citizenship & Immigration Serv.	76.2	U.S. Citizenship & Immigration Serv.	71.8	I-130 filers Immig. Visa Group	67.3	New York Times	93.8	New York Times	86.0	New York Times	85.2
I-130 filers Immig. Visa Group	70.4	I-130 filers Immig. Visa Group	67.8	U.S. Citizenship & Immigration Serv.	63.5	Vanity Fair	76.0	Vanity Fair	73.6	Vanity Fair	74.1
New York Times	36.0	New York Times	35.1	New York Times	28.8	CNN	24.0	CNN	25.3	CNN	22.2
Immigration USA	18.5	Washington Exam.	23.6	Washington Exam.	19.2	Fox News	16.1	Dallas Morn. News	14.0	Washington Exam.	16.7
Washington Exam.	18.0	Fox News	19.0	Fox News	17.3	Dallas Morn. News	9.9	Fox News	13.5	Fox News	14.8

Keyword: "state republicans"

Facebook						Google News					
Liberal		Moderate		Conservative		Liberal		Moderate		Conservative	
Source	**%**	**Source**	**%**	**Source**	**%**	**Source**	**%**	**Source**	**%**	**Source**	**%**
Business Insider	82.6	Business Insider	71.9	Business Insider	70.9	New York Times	93.7	Washington Post	92.8	New York Times	87.7
FourStates	70.9	FourStates	64.4	FourStates	60.0	Washington Post	93.7	New York Times	88.8	Washington Post	80.7
Yahoo!	56.4	Yahoo!	45.9	Yahoo!	56.4	FiveThirtyEight	21.7	FiveThirtyEight	17.1	FiveThirtyEight	15.8
Pittsburgh Post-Gaz.	10.5	Pittsburgh Post-Gaz.	11.0	Pittsburgh Post-Gaz.	10.9	New Yorker	8.0	Vox	7.9	CNN	5.3
Washingt. St. Reps.	8.1	Washingt. St. Reps.	9.6	News Radio KKOB	5.5	Vox	5.7	CNN	7.2	New Yorker	5.3

Keyword: "Trump"

Facebook						Google News					
Liberal		Moderate		Conservative		Liberal		Moderate		Conservative	
Source	**%**	**Source**	**%**	**Source**	**%**	**Source**	**%**	**Source**	**%**	**Source**	**%**
Donald J. Trump (Personal)	84.1	Donald J. Trump (Personal)	79.0	President Donald J. Trump (Govmt.)	78.9	Politico	79.0	Vox	80.3	Politico	72.9
President Donald J. Trump (Govmt.)	82.3	President Donald J. Trump (Govmt.)	77.6	Donald J. Trump (Personal)	77.2	Vox	76.0	Politico	74.8	Vox	71.2
Business Insider	65.9	Business Insider	63.6	Business Insider	52.6	CNN	69.5	CNN	66.0	CNN	57.6
Washington Exam.	9.8	Washington Exam.	13.3	Ivanka Trump	8.8	New York Times	24.6	New York Times	23.8	New York Times	22.0
The Hill	4.9	The Hill	5.6	Washington Exam.	8.8	Fox News	1.8	USA Today	3.4	CBS News	8.5

Note: Source refers to the individual or organization linked to in the search result. % refers to the proportion of participants who encountered that domain as one of their top three search results. A single source may have appeared more than once in the search results but would only be counted once here because the table reports the proportion of participants exposed, not the frequency of exposure.

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Table 1 (continued). Proportion of participants who were exposed to a source, by political ideology

Keyword: "crime"

Google Search Stories						Google Search Results					
Liberal		Moderate		Conservative		Liberal		Moderate		Conservative	
Source	**%**	**Source**	**%**	**Source**	**%**	**Source**	**%**	**Source**	**%**	**Source**	**%**
Fox News	97.7	Fox News	95.3	Fox News	95.1	People Magazine	53.4	People Magazine	60.9	Fox News	75.4
Washington Post	80.0	Washington Post	83.1	Washington Post	80.3	Neighbor. Scout	51.7	Fox News	58.6	People Magazine	67.2
WSPA Channel 7	39.4	WSPA Channel 7	51.2	WSPA Channel 7	49.2	Fox News	47.2	Neighbor. Scout	47.1	Neighbor. Scout	34.4
Deutsche Welle	19.4	Washington Exam.	18.6	Washington Exam.	18.0	Wikipedia	21.6	Wikipedia	19.0	Wikipedia	18.0
Mother Jones	16.6	Deutsche Welle	14.5	Deutsche Welle	14.8	AreaVibes	18.8	AreaVibes	13.1	AreaVibes	13.1

Keyword: "immigration"

Google Search Stories						Google Search Results					
Liberal		Moderate		Conservative		Liberal		Moderate		Conservative	
Source	**%**	**Source**	**%**	**Source**	**%**	**Source**	**%**	**Source**	**%**	**Source**	**%**
Dallas Morn. News	87.4	Dallas Morn. News	86.5	Dallas Morn. News	90.7	U.S. Citizenship & Immigration Serv.	85.9	U.S. Citizenship & Immigration Serv.	87.6	U.S. Citizenship & Immigration Serv.	79.6
Fox News	80.6	Fox News	75.8	Fox News	75.9	USA.gov	83.9	USA.gov	86.5	USA.gov	75.9
Washington Post	68.6	Washington Post	74.7	Washington Post	72.2	White House	78.1	White House	78.1	White House	72.2
AOL	28.8	AOL	25.8	AOL	22.2	Wikipedia	7.8	Wikipedia	8.4	Wikipedia	14.8
McClatchy DC	7.3	McClatchy DC	7.9	CNN	3.7	U.S. State Dept.	6.8	U.S. State Dept.	5.1	U.S. State Dept.	11.1

Keyword: "state republicans"

Google Search Stories						Google Search Results					
Liberal		Moderate		Conservative		Liberal		Moderate		Conservative	
Source	**%**	**Source**	**%**	**Source**	**%**	**Source**	**%**	**Source**	**%**	**Source**	**%**
FiveThirtyEight	94.9	FiveThirtyEight	98.0	FiveThirtyEight	93.0	Wikipedia	91.4	Wikipedia	92.1	Wikipedia	91.2
Washington Post	89.1	Washington Post	87.4	Washington Post	87.7	GOP.com	9.7	GOP.com	9.2	GOP.com	8.8
New York Times	53.7	New York Times	57.0	New York Times	57.9	Pennsylvania GOP	4.0	Pennsylvania GOP	5.3	California GOP	5.3
New Yorker	52.6	New Yorker	47.7	New Yorker	47.4	Amer. for Tax Ref.	2.9	Texas GOP	4.6	North Carolina GOP	5.3
The Guardian	2.9	Newsweek	2.6	The Guardian	5.3	New York GOP	2.9	The Guardian	4.6	Pennsylvania GOP	5.3

Keyword: "Trump"

Google Search Stories						Google Search Results					
Liberal		Moderate		Conservative		Liberal		Moderate		Conservative	
Source	**%**	**Source**	**%**	**Source**	**%**	**Source**	**%**	**Source**	**%**	**Source**	**%**
New York Times	80.2	New York Times	85.0	New York Times	78.0	Donald J. Trump	91.6	Donald J. Trump	94.6	Donald J. Trump	89.8
USA Today	61.1	USA Today	51.7	USA Today	62.7	Trump Organizat.	88.6	Trump Organizat.	89.1	Trump Organizat.	86.4
Washington Post	22.2	CBS News	30.6	CBS News	23.7	Politico	53.3	Politico	46.9	Politico	49.2
CBS News	21.6	Washington Post	28.6	Fox News	18.6	CNN	26.3	Vox	26.5	CNN	25.4
Politico	21.6	Fox News	19.0	New York Post	18.6	Vox	16.8	CNN	24.5	Vox	20.3

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Table 1 (continued). Proportion of participants who were exposed to a source, by political ideology

Keyword: "crime"

Twitter						YouTube					
Liberal		**Moderate**		**Conservative**		**Liberal**		**Moderate**		**Conservative**	
Source	**%**	**Source**	**%**	**Source**	**%**	**Source**	**%**	**Source**	**%**	**Source**	**%**
Los Angeles Times	70.1	Los Angeles Times	76.2	Los Angeles Times	73.8	Fox News Channel	82.8	Fox News Channel	83.8	Fox News Channel	88.5
Ruptly	63.8	Ruptly	66.3	Ruptly	57.4	True Crime Daily	82.8	True Crime Daily	78.6	True Crime Daily	85.2
NowThis News	50.0	NowThis News	51.7	NowThis News	49.2	CNN	68.4	CNN	73.4	CNN	72.1
Donald J. Trump	19.5	Donald J. Trump	21.5	Donald J. Trump	18.0	AZFamily	0.6	SET India	2.3	Qualtrics	1.6
Aditya Raj Kaul	11.5	Aditya Raj Kaul	19.2	Aditya Raj Kaul	13.1	Soft ASMR	0.6	YouTube	1.7	YouTube	1.6

Keyword: "immigration"

Twitter						YouTube					
Liberal		**Moderate**		**Conservative**		**Liberal**		**Moderate**		**Conservative**	
Source	**%**	**Source**	**%**	**Source**	**%**	**Source**	**%**	**Source**	**%**	**Source**	**%**
United We Dream	61.3	United We Dream	62.1	United We Dream	56.6	Fox Business	98.4	Fox Business	96.6	Fox Business	96.3
Maggie Haberman	52.4	Maggie Haberman	47.7	CNN	45.3	Fox News Channel	93.2	Fox News Channel	93.3	Fox News Channel	96.3
CNN	38.2	CNN	41.4	Maggie Haberman	41.5	ABS-CBN Entert.	4.2	ABS-CBN Entert.	3.9	Google	9.3
Washington Post	33.0	Washington Post	33.3	Washington Post	39.6	Google	3.6	Brian D. Lerner	3.9	Brian D. Lerner	5.6
NBC News	21.5	NBC News	18.4	Breitbart	18.9	PBS NewsHour	3.1	CivicsQuestions	3.4	MyImmigrationAt t.	5.6

Keyword: "state republicans"

Twitter						YouTube					
Liberal		**Moderate**		**Conservative**		**Liberal**		**Moderate**		**Conservative**	
Source	**%**	**Source**	**%**	**Source**	**%**	**Source**	**%**	**Source**	**%**	**Source**	**%**
Nathan H. Rubin	61.3	Nathan H. Rubin	61.8	Nathan H. Rubin	70.9	Guardian News	98.9	Guardian News	99.3	Guardian News	100.0
Kara [deleted]	55.5	Kara [deleted]	56.6	Kara [deleted]	54.5	Vox	98.3	Vox	98.7	ABC News	94.6
The Epoch Times	36.4	The Epoch Times	30.9	The Epoch Times	38.2	ABC News	97.1	ABC News	98.0	Vox	94.6
Javier Soriano	23.7	Javier Soriano	23.7	Shane Kavanaugh	27.3	NowThis News	1.1	Business Insider	0.7	MSNBC	1.8
Shane Kavanaugh	20.8	Jeremy Schulman	20.4	Javier Soriano	21.8	RealLifeLore	1.1	FourStates	0.7	NowThis News	1.8

Keyword: "Trump"

Twitter						YouTube					
Liberal		**Moderate**		**Conservative**		**Liberal**		**Moderate**		**Conservative**	
Source	**%**	**Source**	**%**	**Source**	**%**	**Source**	**%**	**Source**	**%**	**Source**	**%**
Donald J. Trump	78.3	Donald J. Trump	72.8	Donald J. Trump	67.2	Fox News Channel	93.4	Fox News Channel	91.2	Fox News Channel	87.7
CNN	40.4	CNN	49.0	CNN	41.4	CBS News	88.6	CBS News	85.0	CBS News	82.5
Washington Post	35.5	Washington Post	25.9	Washington Post	37.9	MSNBC	37.7	MSNBC	37.4	MSNBC	36.8
New York Times	12.0	New York Times	11.6	New York Times	8.6	BlazeTV	28.7	BlazeTV	21.8	BlazeTV	21.1
The Hill	4.8	The Hill	7.5	The Hill	8.6	CBC News	6.6	CBC News	10.9	CBC News	15.8

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Table 2. Most salient sources by platform

Keyword: "crime"

Facebook	Google News	Google Search Stories	Google Search Results	Twitter	YouTube
True Crime Daily	Fox News	Fox News	People Magazine	Los Angeles Times	Fox News Channel
Unspeakable Crimes	AZFamily	Washington Post	Fox News	Ruptly	True Crime Daily
CrimeFeed	NPR	WSPA Channel 7	Neighbor. Scout	NowThis News	CNN
The Daily Caller	CNN	Washington Exam.	Wikipedia	Donald J. Trump	SET India
Crime Videos	Just Security	Deutsche Welle	AreaVibes	Aditya Raj Kaul	YouTube

Keyword: "immigration"

Facebook	Google News	Google Search Stories	Google Search Results	Twitter	YouTube
U.S. Citizenship & Immigration Serv.	New York Times	Dallas Morn. News	U.S. Citizenship & Immigration Serv.	United We Dream	Fox Business
I-130 filers Immig. Visa Group	Vanity Fair	Fox News	USA.gov	Maggie Haberman	Fox News Channel
New York Times	CNN	Washington Post	White House	CNN	Google
Washington Exam.	Fox News	AOL	Wikipedia	Washington Post	ABS-CBN Entert.
Immigration USA	Dallas Morn. News	McClatchy DC	U.S. State Department	NBC News	Brian D. Lerner

Keyword: "state republicans"

Facebook	Google News	Google Search Stories	Google Search Results	Twitter	YouTube
Business Insider	Washington Post	FiveThirtyEight	Wikipedia	Nathan H. Rubin	Guardian News
FourStates	New York Times	Washington Post	GOP.com	Kara [deleted]	Vox
Yahoo!	FiveThirtyEight	New York Times	Pennsylvania GOP	The Epoch Times	ABC News
Pittsburgh Post-Gaz.	Vox	New Yorker	The Guardian	Javier Soriano	RealLifeLore
Washington State Republican	New Yorker	The Guardian	North Carolina GOP	Shane Kavanaugh	NowThis News

Keyword: "Trump"

Facebook	Google News	Google Search Stories	Google Search Results	Twitter	YouTube
Donald J. Trump (Personal)	Vox	New York Times	Donald J. Trump	Donald J. Trump	Fox News Channel
President Donald J. Trump (Govmt.)	Politico	USA Today	Trump Organizat.	CNN	CBS News
Business Insider	CNN	CBS News	Politico	Washington Post	MSNBC
Washington Exam.	New York Times	Washington Post	CNN	New York Times	BlazeTV
The Hill	USA Today	Fox News	Vox	The Hill	CBC News

Note: Source refers to the individual or organization linked to in the search result. A single source may have appeared more than once in a participant's search results, as with two Fox News Channel videos appearing on the results page of a search on YouTube.

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