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ORIGINAL ARTICLE

Attention Centrality and Audience Fragmentation: An Approach for Bridging the Gap Between Selective Exposure and Audience Overlap

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Scholarship on audience fragmentation typically takes one of two approaches: The micro-level analysis of individuals' selective exposure to partisan news, or the macro-level analysis of audience overlap. To bridge the gap between these levels of analysis, we introduce the concept of attention centrality as a set of macro-to-micro measures that characterize how individual news media selection is situated within networks of public attention. Relying on an online panel survey conducted in the United States ($N = 1{,}493$), we examine the relationship between three indicators of respondents' attention centrality (closeness, betweenness, and reach) and the partisan valence of their news selections. The study finds different patterns of results for the three indicators of attention centrality, indicating that partisan news media are not uniformly isolated to the periphery of public attention. Results are discussed in light of conversations about selective exposure and audience overlap in the United States and around the world.

Keywords: Audience Fragmentation, Audience Overlap, Selective Exposure, Partisan News Media, Attention Centrality

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The problem of news audience fragmentation has been a topic of scholarly interest for more than a decade (Stroud, 2008; Webster & Ksiazek, 2012), and not without good reason: It has been linked to political polarization and the spread of propaganda (Benkler, Faris, & Roberts, 2018), and its influence on politicians and

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parties hinders negotiation in a way that could lead to the breakdown of democratic processes (Mancini, 2013). Prior literature has taken two approaches to the problem: micro-level analysis of individuals' selective exposure to partisan news (e.g., Garrett, 2009a; Knobloch-Westerwick, Johnson, & Westerwick, 2015) and macro-level analysis of audience overlap (Ksiazek, 2011; Mukerjee, Majó-Vázquez, & González-Bailón, 2018). Findings indicate a contrast between these two lines of research: Micro-level studies find evidence for pro-attitudinal news selection, and macro-level studies find evidence of substantial audience overlap (Webster & Taneja, 2018). On the surface, these findings appear to be contradictory, raising the question of why pro-attitudinal partisan news use is so prevalent despite the fact that news audiences are not altogether fragmented.

We argue that the field has applied the language of selective exposure and fragmentation to similar but ultimately different approaches to thinking about partisan news consumption. For example, research on selective exposure to partisan news media has sought to uncover individual-level mechanisms of news selection while largely ignoring macro-level features of the media environment. In contrast, overlap (or duplication) studies seek to uncover the audience-level structures of news media consumption, which reveal the power of elite news organizations in commanding audience attention, but often overlook the partisan nature of news organizations and their audiences. Despite these differences, these studies draw on similar concepts and assumptions, sometimes agreeing and other times offering conflicting findings.

The goal of this study is to engage both of these modes of inquiry and offer an explanation for why audience overlap occurs despite a micro-level preference for partisan sources. To this end, we introduce the concept of *attention centrality*, or the extent to which individuals' news selections are central to the overall attention network. Relying on an online panel survey of adult internet users in the United States ($N = 1{,}493$), we operationalize attention centrality as a set of multi-level characteristics of news selection that characterize how individual news media preferences are situated within broader networks of public attention, and we build on previous work on news audience networks by examining the relationship between individuals' attention centrality and the partisanship of their news selections. Results are discussed in light of ongoing, scholarly conversations about selective exposure and audience fragmentation.

Selective exposure to political news

The predilection to choose sources of information compatible with individuals' beliefs is known as *selective exposure* (Stroud, 2008). In the context of politics, selective exposure has been characterized as news media selection that supports preexisting political preferences or dispositions (Garrett, 2009a; Garrett & Stroud, 2014; Stroud, 2008). However, this process is more complicated than its definition suggests, because news consumers are more likely to select pro-attitudinal media than

they are to avoid counter-attitudinal media (Garrett, 2009b). Thus, the current state of selective exposure research is characterized by two emergent findings: *confirmation bias*, on the one hand, and *nonavoidance*, on the other. The tendency to select attitude-consistent news is thought to arise from the confirmation bias (Knobloch-Westerwick et al., 2015), which is the willingness to devote more energy and time to information that affirms existing beliefs (Stroud, 2008). Confirmation bias explains how different people interpret the same news story in different ways, as they are more likely to assimilate affirmative information than contradictory information. To the extent that citizens understand their political environment through the lens of this bias, it may have broad effects on sociopolitical cohesion as individuals give more attention to sources that affirm their existing ideology (Knobloch-Westerwick et al., 2015).

Despite this tendency toward confirmation bias, individuals do not necessarily avoid attitude-inconsistent sources, a parallel tendency called nonavoidance (Garrett, Carnahan, & Lynch, 2013). People who use news more often are less likely to avoid incongruent messages compared to people who use news less often (Knobloch-Westerwick & Kleinman, 2012). Some people even seek out counter-attitudinal information (Garrett et al., 2013), and work on the disconfirmation bias suggests these people become motivated by skepticism, spending more time with attitude-discrepant news to develop counter-arguments against opposing views (Strickland, Taber, & Lodge, 2011).

Networks of audience overlap

While selective exposure research seeks to uncover the individual-level mechanisms of partisan media preferences, a parallel line of literature suggests that network analysis can shed light on the extent to which news audiences are split along ideological lines. These studies follow a social network analysis approach, treating news organizations as nodes in a network and connections between news organizations as edges (for an overview, see Ksiazek, 2011). This approach allows researchers to identify how audiences are dispersed across the media landscape. The study of *audience overlap*, which is the tendency for an audience of one program to be represented in another, dates to at least the 1960s. In an era of media scarcity, audiences were constrained to narrow programming options. As media choice accelerated with cable television and the internet, scholars examined the role of choice in creating isolated, fragmented audience clusters.

Studies addressing these phenomena from a network perspective consider audience duplication between news organizations as evidence against fragmentation (Ksiazek, 2011; Webster & Ksiazek, 2012; Weeks, Ksiazek, & Holbert, 2016). Employing both surveys and large datasets of linking patterns, these studies find that despite concerns about political clustering, audience "silos" are less common than expected. Instead, audiences tend to overlap: Connections are duplicated among news outlets, pointing to a pattern of heterogenous news selection.

Recent scholarship has developed additional methodological steps in the treatment of audience overlap. These studies employ filtering techniques to extract the "backbone" or "core" network (Majó-Vázquez et al., 2019; Mukerjee et al., 2018). The resulting network is less densely populated, revealing a core of audience attention to the most popular news outlets. After applying the filters, audience overlap follows a power-law distribution, where the majority of audience attention flows through the most popular news outlets. Legacy media organizations often represent the most powerful organizations in these core networks, suggesting that the structure of media systems has an influence on the centrality of particular outlets (Majó-Vázquez et al., 2019). Indeed, some researchers in this area have argued that country-level context may be more important than political slant in shaping audience attention (Fletcher & Nielsen, 2017).

Building on the audience network approach

There are several approaches to the study of news audiences in the literature. The "media-centric approach" looks at the relative popularity of news organizations and treats audience share as evidence of public or macro-level attention. In contrast, the "user-centric approach" captures micro-level patterns of news use (as is common in selective exposure research) and conceptualizes attention to news as a cognitive process that may or may not follow from news exposure (Althaus & Tewksbury, 2000). A third, "audience-centric approach," is based on both levels of analysis (Webster & Ksiazek, 2012, p. 45). Here, the audience is conceptualized as groups of people within a media ecosystem who pay attention to the same sources, creating various levels of audience overlap (Webster, 2014).

This study builds on that multi-level approach by introducing the concept of attention centrality. Audience-centric scholars have often used the terms *attention* and *use* interchangeably (e.g., Mukerjee et al., 2018; Webster, 2014), and thus we intentionally chose our terminology to be consistent with this literature while also recognizing that exposure and attention may be considered as discrete concepts (Eveland, Hutchens, & Shen, 2009). It is also important to note that while this literature often refers to the entire media audience, our focus in this study is specifically on the news audience. With those considerations in mind, we define attention centrality as a person's news selections relative to the center of the news attention network. A person's position in the network reflects how isolated their habits are: Individuals positioned farther from the center of the network share news experiences with a narrower portion of the audience, whereas individuals positioned more centrally in the network share experiences with a wider portion of the audience. Thus, attention centrality accounts for the sources to which individuals pay attention, as well as the size of the shared audience of those sources. Attention centrality is operationalized by applying network-level centrality scores to individuals. That is, self-reported measures of news selection are used to create a projection of the audience-wide attention network (Fletcher & Nielsen, 2017), and centrality scores

are then extracted from the network and assigned to individuals based on their selections, indicating their position within the network.

Revisiting the fragmentation hypothesis

The fragmentation hypothesis predicts that as media choice increases, people will either opt-out of political news or gravitate toward sources that confirm pre-existing views. Scholars have examined these phenomena as filter bubbles, echo chambers, or media balkanization (Benkler et al., 2018; Flaxman et al., 2016). In particular, the increasing reliance on digital and social media for news is thought to accelerate the fragmentation of the news audience.

An especially prominent and detailed example of the fragmentation claim comes from recent work by Benkler et al. (2018) on the prevalence of propaganda and misinformation in the American media system during the 2016 U.S. Presidential Election. Examining (a) links between news organizations and (b) the sharing behavior of people who are active on social media, they provide evidence that the American media system is characterized by asymmetrical polarization, wherein the right-wing of the media system is structurally distinct from the center-left core. These two segments of the system have developed distinct norms and values, with the center-left operating according to a logic of factual verification and opinion disconfirmation, and the right-wing operating according to a logic of propaganda and opinion confirmation. The bifurcation of the system has dangerous consequences, they argue, resulting in widespread attention to political propaganda during the election cycle. In particular, Fox News—the most centrally situated right-wing news organization—acted in the aftermath of the election as something of a conduit for right-wing hyperpartisan ideas that spread to core of the system, where they were treated critically but, nonetheless, covered by center-left news outlets.

With its emphasis on intermedia linkage and active social media users, Benkler and colleagues provide a powerful complement to studies of audience overlap. Yet, empirical support for the role of political news in driving fragmentation remains mixed: Network analyses of audience structures reveal a considerable degree of overlap (e.g., Mukerjee et al., 2018), and selective exposure research provides evidence of nonavoidance (Garrett, 2009a, 2009b). Therefore, while the interrelationships among media themselves point toward a fragmented system, user- and audience-centric studies augment claims of fragmentation with evidence of ideological overlap and nonavoidance. Thus, people pay attention to ideologically diverse news even while media systems themselves may be fragmented, leaving scholars with a pressing problem: Despite findings of heterogeneity in audience attention, the current media landscape in the United States is characterized by an ever-increasing supply and demand for partisan (and hyperpartisan) news across the system, particularly on the polarized right-wing. Despite broad scholarly interest in the fragmentation hypothesis, fundamental questions remain about why partisan news exposure persists despite evidence for audience overlap and nonavoidance.

We argue that one solution to this problem is to merge research agendas between the audience-as-networks method and selective exposure research. While network analyses find evidence for diverse news consumption habits, they often ignore the political valence of news outlets. The underlying assumption in these studies is that fragmentation should emerge as a structural, network-level feature. If the fragmentation hypothesis predicts the audience will sort into isolated clusters, then observed audience overlap is interpreted as evidence against this hypothesis. However, the most popular nodes in the network may be either explicitly partisan or implicitly partisan by linking, sharing, or distributing ideologically valanced content (Benkler et al., 2018). Thus, partisan news exposure and audience overlap are not incompatible ideas.

Particularly in a media system such as that of the United States, in which partisan news outlets are well connected to the core of the system and right-wing media are polarized, attention centrality and partisan news exposure may not only coexist, but be "part and parcel" to the system itself. Depending on the configuration of a media system, partisan content may not be "peripheral" to the attention network, but rather at its center. Thus, by paying attention to "central" news media, people may be exposed to a substantial amount of partisan content while also not completely avoiding counter-attitudinal content, a circumstance that fits with the emerging consensus in selective exposure research around the nonavoidance phenomenon (Garrett, 2009a, 2009b; Garrett et al., 2013; Knobloch-Westerwick et al., 2015).

News organizations central to the network play a major role in setting the public agenda, framing issues of the day, and driving conversations around the news (Golan, 2006). In the United States, the *New York Times* has traditionally been cast in this role, but the growth in the influence of Fox News provides another example of this phenomenon (Benkler et al., 2018; Hyun & Moon, 2016). Because of central news media such as these, people may consume the same news as the majority of other people, motivated not by their partisan preferences but rather by a variety of other motivations, such as information utility (Knobloch-Westerwick & Kleinman, 2012), a desire for shared experience with others (Althaus & Tewksbury, 2000), or even by happenstance (Sears & Freedman, 1967). In the process, they may be exposed to partisan news even while the overall balance of their news exposure is not necessarily one-sided.

Despite the fact that partisan news media are increasingly central to networks of attention, particularly in the United States, the partisan character of audience structures is often overlooked, and therefore findings from macro-level overlap studies do not offer a convincing answer to questions about selective exposure (e.g., Webster & Taneja, 2018). In practice, research has to this point produced very little knowledge about how macro-level network structures relate to patterns of media selection at the micro-level. We argue that attention centrality provides a conceptual bridge that can help fill this research gap.

Research questions

Current conversations suggest that partisan selective exposure and audience overlap are inversely related manifestations of the same social phenomenon. As we have shown, in practice these terms derive from different levels of analysis: User-centric selective exposure studies have sought to uncover underlying cognitive and intrapersonal processes of media selection and effects, while media- and audience-centric studies reflect aggregate representations of shared audiences among news outlets. Despite these differences in approach, key terms and assumptions are often traded between research contexts as equivalent. For example, Webster and Taneja (2018) offer an overview of the general consensus "that the power of selective exposure is overrated," and that big, legacy news websites "act as gravity centers of public attention" (p. 22).

We argue that these concepts are not evenly applied in the literature. Absence of audience duplication is not necessarily evidence for selective exposure, particularly politically motivated selective exposure, and audience-centric studies rarely account for partisan valence. Thus, it is difficult to derive hypotheses based on previous work. Prior research finds that individuals with strong political preferences are more likely to select pro-attitudinal news media (Garrett & Stroud, 2014). If selective exposure is an inverted, micro-level indicator of audience overlap, we could also predict that people with strong preferences would exhibit low centrality—that is, their news selections would be more peripheral to the overall attention network.

On the other hand, if we consider the partisan valence and the role of organizations within the attention network, we may find that people who consume partisan news are just as likely to get their news from the same places as others in the general audience. Where central news outlets are partisan, attention centrality should be positively related to partisan news exposure, but not necessarily to ideological extremity. Based on this logic, we might expect to find no relationship between political preferences and centrality, because the center of the network reflects the preferences of the entire audience. To our knowledge, no prior research has examined these relationships, and therefore we pose the following research questions:

RQ1: How is ideological extremity related to attention centrality?
RQ2: How is strength of partisanship related to attention centrality?

Most prior research on audience overlap does not account for the partisan leanings of news media outlets. Thus, it is not clear from prior research whether liberal or conservative news media are more central in the American context. We therefore ask:

RQ3: How is attention centrality related to liberal news exposure?
RQ4: How is attention centrality related to conservative news exposure?

We have argued that audience overlap and selective exposure are not necessarily inverse manifestations of the same phenomenon, and therefore it is not safe to

assume that attention centrality will be negatively related to selective exposure, conceptualized as one-sidedness in overall news exposure. Therefore, we propose the following research question:

RQ5: How is attention centrality related to selective exposure?

Methods

Sample and data

This study relies on a cross-sectional online panel survey fielded between 19 and 29 September 2018, 6 weeks before the 2018 U.S. Midterm Elections. The survey was administered by Survey Sampling International (SSI)/Research Now (now called Dynata), which randomly selected subjects from an online panel using quotas for age, gender, race, and census region based on population parameters from the U.S. Census Bureau's 2016 American Community Survey (ACS). The survey has a sample size of $N = 1{,}493$ and a cooperation rate of 70% (American Association of Public Opinion Research [AAPOR], 2016; CR3), which is an appropriate metric to report for online panel surveys (Callegaro et al., 2014). The sample is reflective of the population of interest (see Table S1 in the online supplemental appendices). The median age is 49 (as compared to 48 in the ACS), and the majority of respondents are women (51%, approximately the same as in the ACS) and white (~77% vs. 76% in the ACS). The average respondent attended some college or has a 2-year degree ($M = 4.4$, $SD = 1.7$, where 1 = Some high school and 7 = Post-graduate degree) and has an annual household income between $45,001 and $75,000 per year ($M = 4.8$, $SD = 2.1$, where 1 = Less than $15,000 and 8 = More than $150,000). The sample overrepresents people with college and graduate degrees, and it underrepresents people with a high school diploma or less. The sample also underrepresents people living in households making less than $15,000 per year. Therefore, the data were weighted by income and education. Demographic comparisons between the present data and the ACS, along with values used to create the survey weights, are available in the online supplemental appendices (Appendix A). Missing data were deleted listwise.

Data filtration

We filtered the data to reflect *broad* and *core* attention networks, which are based on open-ended measures of news use. Respondents were asked to name up to three news outlets they "watched, read, or listened to in the past week." These measures rely on free recall, which is more cognitively demanding than cued recall (Kruikemeier, Lecheler, & Boyer, 2018). Thus, it is reasonable to assume that the named outlets reflect real experiences rather than random answers. The responses were cleaned and categorized to indicate discrete news outlets (80 outlets in total; a full list of outlets is available in Appendix B of the online supplement) and then used to create a network projection of audience attention based on an adjacency

matrix. News outlets are represented as nodes in the networks, and co-mentions—that is, the count of co-occurrences of discrete news outlets mentioned by all respondents—are represented as edges. Edges were weighted by strength of connections between outlets based on shared audience. The raw network comprises 3,382 mentions, 394 edges, and has a density of 0.11.

It is common practice to filter survey data used to project news audience networks, and several probability-based or significance-testing methods have been developed to do so (Mangold & Scharkow, 2020). While these methods differ in their specific approaches, all of them aim to reduce *nonsystematic measurement error* (i.e., random noise) in closed-ended survey measures. The current data present a different problem, that of *systematic measurement error*, which arises from systematic tendencies to over- or underestimate phenomena of interest (King et al., 1994). Free-recall responses are unlikely to be random, as haphazard answers are most likely to take the form of gibberish or missingness (both of which were removed from the data). However, the data may contain responses that, while based on real behavior, do not reflect underlying tendencies in audience behavior but rather infrequent or one-time visits to peripheral news outlets. Including links between these outlets and others could bias estimates of centrality and its relationship with partisan news exposure (King et al., 1994). Therefore, rather than rely on previous methods designed to reduce random noise, we employed a method to filter out infrequent links based on edge weight to address the problem of systematic error.

To create the broad attention network, we filtered out news outlets that shared only one respondent (edge weight < 2). Approximately 42% of the outlets ($\sim$52% of edges) in the raw network fit this description, and therefore this minimal approach to filtration yields a network composed of 46 outlets (3,345 mentions) connected by 203 edges, which has a network density of 0.20 (Appendix B). Additionally, we created a core network containing only those news outlets that receive the bulk of audience attention. Based on the logic of the Pareto principle (i.e., the "80/20 rule"), we filtered out nodes sharing fewer than seven respondents (edge weight < 7), as this method filtered out all but $\sim$22% of the edges. This maximal approach to filtration yields a network that comprises 23 outlets and 88 edges (3,285 mentions), which has a density of 0.35.

Measures

Attention centrality

Centrality metrics were calculated in the igraph package in R (Csardi & Nepusz, 2006) for the broad and core networks. Three standard centrality metrics were assigned to each news outlet. ***Closeness*** represents the inverse distance of a news outlet to all other news outlets. Meanwhile, ***betweenness*** is the relative power of a news outlet in brokering messages to other news outlets and represents a bridging function. Finally, ***reach*** represents the strength of ties among news outlets based on shared audience. For each respondent, we took the average of the network-level centrality scores of each news outlet they named, resulting in three metrics where

higher values indicate individual-level attention to central news media and lower values to peripheral news media. We rescaled each metric so that the possible values range from 0.00 to 1.00. In the broad network, closeness has a mean of 0.63 ($SD = 0.13$), betweenness has a mean of 0.52 ($SD = 0.24$), and reach has a mean of 0.53 ($SD = 0.22$). In the core network, closeness has a mean of 0.74 ($SD = 0.09$), betweenness has a mean of 0.32 ($SD = 0.19$), and reach has a mean of 0.61 ($SD = 0.23$). Correlations and distributions are provided in the online supplement (Appendix C).

Partisan news exposure

The open-ended data were coded for news outlet partisanship by four trained coders. Coders first coded the same 10% of the sample to obtain intercoder reliability (Krippendorf's $\alpha = 0.90$). The code guide was adapted from prior literature (Barnidge et al., 2020; Stroud, 2008) to identify the news outlet's political ideology ($-1 = Liberal$, $0 = Neutral$, $1 = Conservative$). If prior literature identified an outlet's ideology, the outlet was categorized based on this identification (Budak et al., 2016; Niculae, Suen Zhang Danescu-Niculescu-Mizil, & Leskovec, 2015; Otero, 2018). If prior literature did not identify an outlet's ideology, coders used the following criteria in order of availability: (a) the outlet's stated ideology, (b) candidate endorsements dating back to 2012 (a simple count was conducted; if the outlet endorsed candidates from both sides, the average was taken), and (c) editorials about gun control, abortion, immigration, and same-sex marriage. If coders could find no information based on these criteria, the outlet was assumed to be neutral. In particular, social media outlets were coded as neutral because the data do not allow us to determine the ideological leanings of a respondent's news feed, and empirical work has found that people are exposed to both ideologically congruent and incongruent news on these platforms (Flaxman et al., 2016). Gibberish and missing responses were coded as "NA."

The partisan codes for the three open-ended items were used to create three variables. ***Liberal news exposure*** was calculated by tallying the liberal media responses (1 if liberal news named, 0 if not) ($M = 0.62$, $SD = 0.75$, $Min. = 0.00$, $Max. = 3.00$). Conservative news responses were likewise tallied to create the ***conservative news exposure*** variable ($M = 0.22$, $SD = 0.47$, $Min. = 0.00$, $Max. = 3.00$). A ***selective exposure*** variable was created based on prior literature (Barnidge et al., 2020) by taking the absolute difference between liberal and conservative news exposure as a proportion of total news exposure, including liberal, conservative, and neutral news ($M = 0.33$, $SD = 0.36$, $Min. = 0.00$, $Max. = 1.00$).

Political preferences

The ideology measures were based on three survey items asking respondents to place themselves on an 11-point, L-R scale ($1 = Liberal$, $6 = Neutral$, $11 = Conservative$) for social issues, economic issues, and general ideology. These three items were averaged for each respondent to create the ***ideology*** variable

(Cronbach's $\alpha = 0.95$, $M = 6.2$, $SD = 2.7$). To create the ***ideological extremity*** variable, the scale was folded so that extreme ideologies receive high scores and moderate ideologies receive low scores ($M = 2.1$, $SD = 1.7$).

Three survey items, which were borrowed from the 2017 Annenberg National Election Study, were used to create the ***party identity*** variable. The first asked respondents, "Generally speaking, do you usually think of yourself as a Democrat, a Republican, an independent, or what?" Those who identified as *Democrat* or *Republican* were then directed to a second question asking them how strong their identity is (*Strong* or *Not that strong*). Respondents who strongly identified with a party were assigned a score of 3 (Republican) or −3 (Democrat), while respondents who did not strongly identify with a party were assigned a score of 2 or −2. Those who identified as *independents* or *other* were directed to a different follow-up question, which asked "Even though you don't identify with either major party, do you typically think or yourself as closer to the Democratic Party or to the Republican Party?" Those who identified as party-leaners were assigned scores of 1 (Republican) or −1 (Democrat), while those who responded *neither* were assigned a score or 0 (Nonpartisan). This method resulted in a 7-point scale (−3 = *Strong Democrat*, 0 = *Nonpartisan*, 3 = *Strong Republican*), and the variable has a mean of −0.2 ($SD = 2.2$). To create a ***strength of party identity*** variable, the party identity variable was folded so that 0 = *Nonpartisan* and 3 = *Strong partisan* ($M = 2.0$, $SD = 1.1$).

Control variables

In addition to demographics, the analyses also control for news use and political interest. Both have been linked to partisan news consumption (Hyun & Moon, 2016; Knobloch-Westerwick et al., 2019), and therefore they may also be related to attention centrality. The ***news use*** variable was constructed using thirteen items, asking respondents how often (1 = *Never*, 7 = *Several times a day*) they use national newspapers, local or regional newspapers, and national news magazines, talk radio, public radio, national news broadcasts, local news broadcasts, cable news, online-only news sites or blogs, online sites for news organizations, podcasts, online message boards, blogging websites, social networking websites or apps, microblogging websites or apps, photo sharing websites or apps, video sharing websites or apps, and mobile messaging websites or apps. These thirteen items were averaged for each respondent (Cronbach's $\alpha = 0.97$, $M = 2.9$, $SD = 1.1$). ***Political interest*** was measured with three items that asked respondents to rate their interest in local or regional politics, national politics, and international politics (1 = *Not at all*, 7 = *Very*). These items were averaged (Cronbach's $\alpha = 0.89$, $M = 4.5$, $SD = 1.7$).

Analysis

The analysis unfolds in two stages. First, we provide a descriptive comparison of the broad and core networks. Second, we performed regression analyses using ordinary least squares (OLS). The first set of models assesses the antecedent relationships

between political predispositions and the centrality metrics in broad and core networks. The second set tests relationship between predispositions and partisan news exposure without including the centrality metrics. Finally, the third set of models adds the centrality metrics, examining the relationship between these metrics and partisan news exposure in both broad and core networks. All regression models employ residual bootstrapping methods, which is an appropriate safeguard against biased estimation for relationships in which the shape of the regression function is known (linear, in this case), but the distribution of error is unknown (Berkowitz & Kilian, 2000).

Results

Figure 1 depicts the broad and core networks of audience attention to news, along with the political valence and relative audience share for each outlet. National television (valence = neutral; 37% of respondents mentioned as a main source for news in the last week), Fox News (conservative; 30%), social media (neutral; 24%), and CNN (liberal; 24%) occupy the center of both networks, as they draw the largest audiences and share the largest proportion of audience overlap. The rest of the center is composed of local television (neutral; 19%), local newspapers (neutral; 15%), news aggregators (neutral; 15%), and the *New York Times* (liberal; 11%). Taken together, these outlets make up a left/neutral center of the attention network, with the primary exceptions being Fox News and, to a lesser extent, the *Wall Street Journal*. Fox News also links to hyper-partisan right-wing fringe outlets such as Breitbart News, Drudge Report, and OAN, which are part of the core network, along with

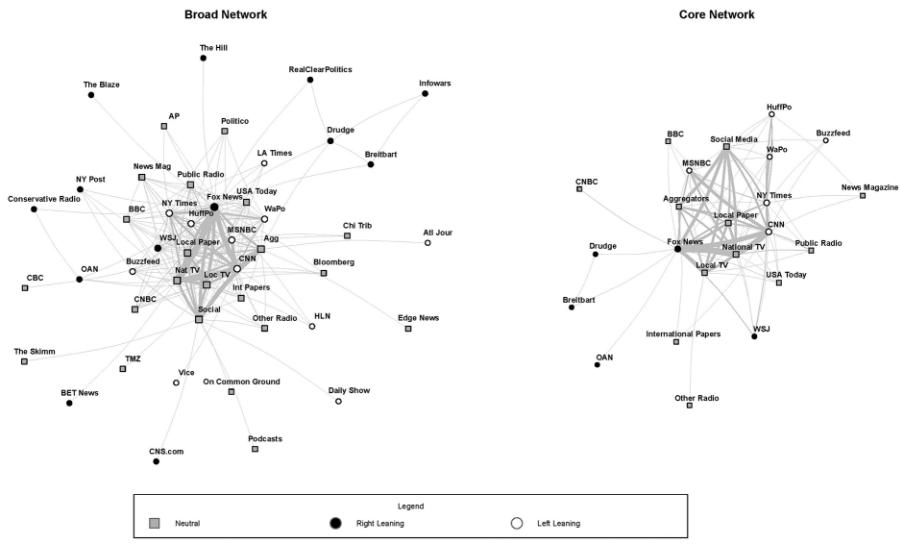

Figure 1 Graphs of broad and core networks.

InfoWars, conservative radio, and the *New York Post*, which are outside of the core network but are part of the broad network.

The centrality measures (Figure 2) offer details about the different positions and roles news organizations play in the overall attention network. Closeness measures display a good amount of face validity in both networks, as larger, mainstream outlets score higher on these measures while smaller, alternative outlets tend to score lower, although this is not a hard-and-fast rule (e.g., Politico scores higher on closeness than CNN in the broad network). Fox News scores high on betweenness in both the broad and core networks, which means that it acts as an audience bridge to other (primarily right-wing) outlets. In the core network, the betweenness score for Fox News is more than twice the next score (*USA Today*). In the broad network, aggregators and social media also score high on betweenness, along with the *Wall Street Journal*. Finally, reach scores are consistent across the two networks, with a top four of (a) national television (i.e., ABC, CBS, and NBC), (b) Fox News, (c) CNN, and (d) social media.

The second phase of the analysis tested the relationship between indicators of political preference and attention centrality (RQ1-2) using OLS regression, and these results are reported in Table 1. In the broad network, ideological extremity is positively related to closeness ($\beta = 0.12$, $p = .015$), but it is not significantly related to betweenness or reach. A different pattern is observed in the core network, where ideological extremity is positively related to betweenness ($\beta = 0.22$, $p < .001$) but not closeness or reach. Strength of party identity is not significantly related to the centrality metrics in either network. Taken together, these results show that the relationship between predispositions and attention centrality is weak and/or inconsistent.

Next, we tested models that assess the relationships predicted by selective exposure theory (predispositions and partisan news exposure), which provide a baseline for comparison. Full results are available in the online supplement (Appendix D). Political ideology (+ conservative,—liberal) and party identity (+ Republican,—Democrat) are related to liberal news exposure in expected directions ($\beta = -0.19$, $p < .001$ for the former and $\beta = -0.09$, $p = .046$ for the latter). Results for conservative news exposure are less consistent: Party identity is related in the expected direction ($\beta = 0.14$, $p = .016$), but political ideology is not. Finally, and contrary to expectations, neither ideological extremity nor strength of party identity is related to selective exposure. Taken together, some of these results conform to expectations, but others do not.

The final set of models (Table 2) adds the centrality metrics for both the broad and core networks, and they address RQ3 (liberal news exposure), RQ4 (conservative news exposure), and RQ5 (selective exposure). In general, these metrics are stronger and more consistent predictors of partisan news exposure than political predispositions, and some interesting patterns emerge that help to explain the dynamics of attention and ideology in the network.

In the broad network, closeness is positively related to liberal news exposure ($\beta = 0.13$, $p = .007$) and negatively related to conservative news exposure

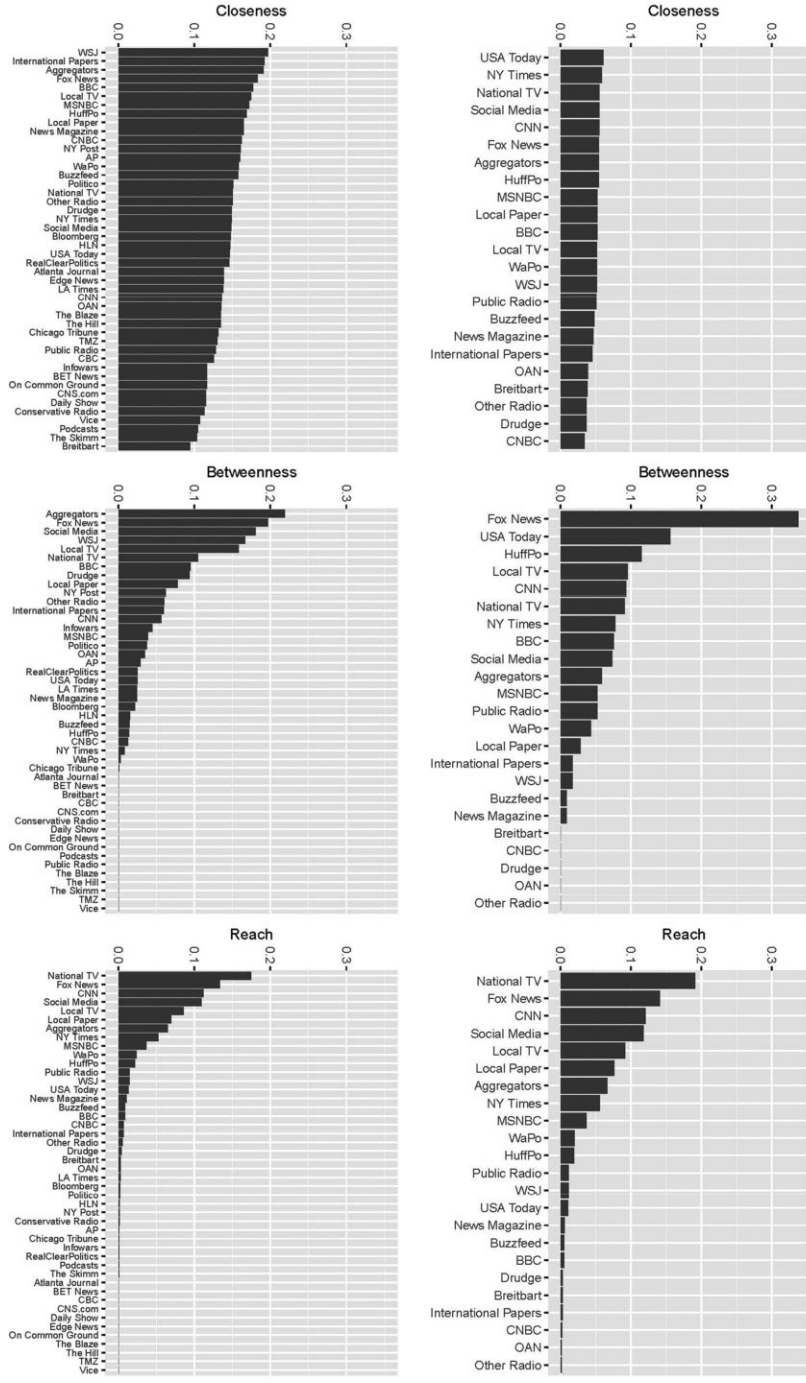

Figure 2 Power law distributions for attention centrality.
Note: Centrality metrics for the broad (left) and core network (right).

Table 1 Predictors of Attention Centrality

Variable	Broad Network			Core Network		
	Closeness	Betweenness	Reach	Closeness	Betweenness	Reach
Age	0.14*	−0.08	0.06	−0.20*	0.01	0.05
Gender (1 = Woman)	0.08	0.03	0.05	−0.02	−0.07	−0.01
Education	−0.06	−0.14*	−0.13*	0.01	−0.16*	−0.15*
Income	0.02	−0.07	−0.05	0.02	0.03	0.00
Political interest	−0.10*	−0.16*	−0.02	−0.02	0.00	0.00
News use	−0.06	−0.05	0.05	0.10*	0.06	0.08
Ideological extremity	**0.12***	**0.08**	**0.00**	**0.05**	**0.22***	**0.07**
Strength of party identity	**−0.02**	**−0.02**	**0.09**	**0.02**	**0.01**	**0.05**
R^2	0.04	0.11	0.04	0.06	0.07	0.04
N	1,378	1,378	1,378	1,376	1,376	1,376

Note: Cell entries are standardized coefficients from ordinary least squares (OLS) regression models estimated via residual bootstrapping (1,000 iterations). Bold text indicates key variables of interest.
*$p < .05$.

($\beta = -0.16$, $p = .013$), indicating that people who pay attention to news media closer to the center of the attention network are more likely to be exposed to liberal news. On the other hand, betweenness is negatively related to liberal news exposure ($\beta = -0.55$, $p < .001$) and positively related to conservative news exposure ($\beta = 0.14$, $p = .044$), suggesting that people who pay attention to "bridging" news outlets are more likely to encounter conservative news. Meanwhile, reach is negatively related to conservative news ($\beta = -0.17$, $p = .009$), suggesting that people who pay attention to news media named by other respondents are more likely to be exposed to liberal news. Finally, betweenness ($\beta = -0.49$, $p < .001$) and reach ($\beta = -0.15$, $p = .003$) are negatively related to selective exposure, indicating that bridging and far-reaching news media tend to reduce partisan imbalance.

These findings reflect two dynamics in the broad network. First, the network is dominated by a liberal/neutral center, which features solid-blue cable news outlets (CNN and MSNBC) and left-leaning prestige newspapers (*Washington Post* and *New York Times*) in addition to neutral national and local television channels. Second, Fox News (which is the primary right-wing exception in the center of the attention network), acts as a bridge to more peripheral right-wing media outlets including, for example, the Drudge Report, Breitbart News, the Blaze, InfoWars, OAN, and conservative talk radio. These outlets tend to be less well connected to one another, as Fox News is their primary link to the rest of the network.

Table 2 Relationship Between Attention Centrality and Partisan News Exposure

Variable	Broad Network			Core Network		
	Liberal News Exposure	Conservative News Exposure	Selective Exposure	Liberal News Exposure	Conservative News Exposure	Selective Exposure
Age	−0.08	0.14*	−0.05	0.01	0.00	0.00
Gender (1 = Woman)	−0.04	0.01	−0.03	−0.06	−0.02	−0.04
Education	0.01	−0.02	−0.04	0.04	0.03	0.04
Income	0.05	−0.09*	−0.01	0.10*	−0.07	0.03
Political interest	0.07*	0.05	0.05	0.15*	0.03	0.12*
News use	0.07*	0.03	0.02	0.09*	0.03	0.04
Ideological extremity	−0.06	0.09	0.03	−0.15*	−0.04	−0.01
Strength of party identity	−0.08	0.14*	−0.01	−0.07	0.03	0.01
Closeness	**0.13***	**−0.16***	**0.10**	**0.08**	**−0.50***	**−0.12***
Betweenness	**−0.55***	**0.14***	**−0.49***	**−0.09**	**0.34***	**0.19***
Reach	**0.01**	**−0.17***	**−0.15***	**−0.05**	**0.03**	**−0.20***
R^2	0.40	0.06	0.31	0.17	0.26	0.10
N	1,378	1,378	1,288	1,376	1,376	1,278

Note: Cell entries are standardized coefficients from ordinary least squares (OLS) regression models estimated via residual bootstrapping (1,000 iterations). Bold text indicates key variables of interest.
*$p < .05$.

Results in the core network are relatively consistent with those observed in the broad network. For example, while betweenness is not related to liberal news exposure ($\beta = -0.09$, $p = .091$) and positively related to conservative news exposure ($\beta = 0.34$, $p < .001$), showing that Fox News acts as an attention bridge even in the core network, primarily because while the most peripheral right-wing outlets are filtered out of the network (as shown in Figure 1), several remain, including the Drudge Report, Breitbart News, and OAN. Also similar to the broad network, closeness is negatively related to conservative news exposure ($\beta = -0.50$, $p < .001$); however, unlike in the broad network, closeness is unrelated to liberal news exposure, reflecting the fact that neutral rather than liberal news media score highest in closeness in the core network.

Another difference between the broad and core networks pertains to selective exposure. Whereas negative relationships were observed in the broad network, both negative and positive relationships are observed in the core network. In particular, closeness ($\beta = -0.12$, $p = .028$) and reach ($\beta = -0.20$, $p < .001$) are negatively related, but betweenness ($\beta = 0.19$, $p < .001$) is positively related. This difference likely manifests from the influence of Fox News, which is the predominant bridging news outlet in the

network, and it is magnified when the analytic focus is narrowed to the core network, where it is the only link between the center and right-wing periphery.

Discussion

We employed a macro-to-micro analysis that offers some illuminating results and helps to explain why prior research has observed both a micro-level tendency toward partisan news exposure, as suggested by selective exposure theory (e.g., Stroud, 2008), as well as a substantial degree of audience overlap, as suggested by audience duplication research (e.g., Mukerjee et al., 2018). The evidence suggests that nonavoidance occurs (Garrett et al., 2013) in part because of the structure of the media system and links between news organizations, which implies that confirmation bias in perception (Knobloch-Westerwick et al., 2015) may happen despite these politically heterogeneous information flows within a broad, shared audience.

Specifically, we find that a majority of Americans pay attention to small core of news media, regardless of their own political predispositions or the partisanship of the news outlets that occupy the center of attention. Thus, in line with recent research that questions the extent of fragmentation in news audiences (Webster & Taneja, 2018), our results suggest the core outlets in the U.S. news media system still enjoy a shared audience that cuts across political divides. Our primary pieces of evidence for this claim come from (a) network and power-law analyses of the core outlets that occupy the center of Americans' attention, and (b) the fact that political predispositions are relatively weak and inconsistent predictors of centrality.

Americans also receive a healthy dose of partisan news exposure—not despite their attention to the shared core, but because of it. In fact, the center of the attention network comprises a mix of both partisan and nonpartisan news outlets. For the most part, the center can be described as predominantly neutral, thanks to the continued centrality of national television news (i.e., ABC, CBS, and NBC nightly broadcasts) and local news. But liberal-leaning news is also quite prominent at the central of the attention network, including left-wing cable news outlets (CNN, MSNBC) and the coastal prestige press (*New York Times*, *Washington Post*) (Figure 1). Finally, the center of the network contains conservative exceptions to its liberal/neutral character, including Fox News and, to a lesser extent, the *Wall Street Journal* (see also Benkler et al., 2018). Thus, our findings demonstrate that news organizations can be both partisan and central, and, furthermore, that the centrality of partisan outlets creates a dynamic in which the majority of people who consume news are exposed to at least some partisan news, not because of their predispositions but rather because of the structure of the system and the shared audiences between particular news outlets. In support of this claim, our evidence shows that the centrality metrics are stronger and more consistent predictors of selective exposure than political predispositions, even after accounting for the influence of those predispositions.

In particular, our findings are shaped to substantial degree by the centrality of Fox News. To illustrate this influence, we conducted analyses with a core network dataset that did not contain mentions of Fox News (Appendix E of the online supplement). The most notable difference is that the sizable positive relationship between betweenness and conservative news exposure observed in the "with Fox" analysis ($\beta = 0.34$, $p < .001$) disappears in the "without Fox" analysis ($\beta = -0.05$, $p = .540$). The relationship between betweenness and liberal news exposure is also substantially different (with Fox, $\beta = -0.09$, $p = .085$, and without Fox, $\beta = 0.27$, $p < .001$). These discrepancies highlight the bridging influence of Fox News, which, as Figure 2 illustrates, is most pronounced in the core network where Fox News has a score that is more than twice as high as the next highest outlet. We can conclude, therefore, that this influence is strong enough to shape the magnitude and valence of the relationship between the betweenness variable and partisan news exposure. Thus, we might draw very different conclusions about the role of conservative news outlets in the attention network if it were not for Fox News. This conclusion has wider implications for our understanding of journalistic positioning and its effects. Fox News positions itself as an alternative to mainstream news media, but it also normalizes voices that traditional journalists would otherwise find "deviant" (Nygaard, 2021). Thus, journalistic positioning can be used to mainstream counter-normative and even anti-democratic content.

These results speak to the central position that Fox News occupies in Americans' news diets—it is the most-watched cable news channel, with viewership higher than CNN or MSNBC, and it is well-connected to both the peripheral, conservative media eco-system and the liberal/neutral core. As previously noted, Benkler and colleagues highlight the central role played by Fox News in (a) channeling propaganda from peripheral alt-right news outlets such as Breitbart News and InfoWars into mainstream news coverage, and (b) influencing coverage of left-leaning news media, as these outlets devoted attention to criticizing core ideas and debunking misinformation contained in those stories. Thus, Fox News acts as a conduit through which alt-right news media can "hack" the core of the American attention network, resulting in asymmetrical polarization. Therefore, Fox News encapsulates the argument that selective exposure to partisan news cannot be understood as an inverted, micro-level indicator of audience overlap, as partisan news media can also occupy the center of audience attention.

While the results of this study are highly specific to the American context—indeed we have argued that they are shaped by the centrality of specific news outlets and are therefore quite limited in their applicability to other media systems—we believe our method is generalizable to other national contexts. The methodological approach takes as its central question the relationships between attention centrality and the partisanship of news media channels, which are characteristics that cut across media systems. Thus, in other contexts, different news media channels—for example, the BBC in the United Kingdom or *Der Spiegel* in Germany, may exert the same kind of influence on audience attention as Fox News in the American system.

However, given the key differences in the partisan nature of these outlets, we might expect to observe a different relationship between attention centrality and partisan news exposure in the United Kingdom and Germany than we do in the United States. Doing so would reveal something valuable about news audiences in those countries. Rather than insisting that the individual-level behaviors translate directly from one national context to another, our approach seeks to understand how individuals navigate the specific media and political systems in which they are immersed in light of their individual preference and the structure of attention in that country.

To that end, future research could adopt a comparative approach, examining the role of structural variables in shaping attention centrality. For example, these variables might include the range of news media choice, the effective number of parties, political parallelism, and the type of and extent to which pluralism is reflected in the news media (Hallin & Mancini, 2004). It is also worth considering the ways in which this systemic approach could challenge normative assumptions about individual-level behavior. While it is a popular plea that people should strive to diversify their news and social information exposure (Stroud, 2008), conversations about audience fragmentation have not necessarily considered the ways in which media systems shape attention centrality and, thus, exposure to partisan news. Individuals are responsible for their own media choices; however, those choices are more or less constrained by systemic factors.

Finally, this study adds to ongoing conversations about filtration methods for audience network data in two ways. First, methods should be appropriately tailored to solve particular issues regarding measurement error in the underlying data, and second, varying filtration levels can be used to create comparative leverage that reveals additional information relevant to the research problem. Recent work has established that filtration techniques can alter the structure of network projections (Mangold & Scharkow, 2020). Given that filtration is designed to reduce measurement error in the underlying data, it is important to employ a method that is appropriately tailored for either systematic or nonsystematic error (King et al., 1994), so that it produces relatively stable structures across networks of varying size. While prior research employed methods designed to reduce nonsystematic error, we employed a method designed to reduce systematic measurement error, which is the bigger issue for network projections based on open-ended news use questions. The approach produced networks of varying size that have relatively stable structures. For example, while minor differences in the rank order of mid-tier outlets are observed, the skew and dispersion of centrality scores, as well as the overall rank of the top news outlets, are stable across the broad and core networks (see Figures 1 and 2). Additionally, both networks have produced similar individual-level estimates in most instances. Given this overall consistency, the differences in individual-level estimates can be leveraged for comparison, which reveals additional information about particular aspects of the overall network. The primary example in the current study is the difference in estimates for betweenness, which highlights the bridging

role of Fox News. In sum, we believe these two insights (appropriateness and comparison) can inform future research on news audience networks.

The conclusions of this study are limited in other important ways related to design, measurement, and analysis. First, the design is cross-sectional, and therefore these data cannot be used to make causal inferences. The variables are ordered by theoretical expectations rather than by time, and the possibility of spuriousness cannot be eliminated. Additionally, the survey sample is not a true probability sample. While the sample does reflect the target population along the quota criteria, it also overrepresents individuals who are highly educated, and it underrepresents individuals with less education and individuals living in low-income households. The data have been weighted to account for these discrepancies between the survey sample and the target population. There are differences between the weighted and unweighted data, but these differences affect the interpretation of the results only minimally. Out of 30 key coefficients, only two are statistically significant in the weighted data that were not also significant in the unweighted data. The average difference between weighted and unweighted coefficients is 0.04, with a higher average in the core network (0.05) than in the broad network (0.04).

In terms of measurement, the study relies on self-reports of news use, and concerns about survey length and response fatigue limited the number of open-ended news items to three. But while our measures do not capture the full extent of respondents' news use, they do provide a snapshot of what respondents remember the most. Free recall measures, such as the open-ended news measures, are more cognitively demanding than cued recall measures, such as those typically used in close-ended news use scales. Thus, responses to the open items are more likely to capture vivid memories than close-ended scales. And while these measures are also limited in that they do not capture the overall frequency of news use, we also measured news use frequency with close-ended measures, and we included that variable as a control in the regression analyses. Another limitation is related to the coding of social media platforms. We grouped all social media platforms together due to the relatively low number of these responses. We lose some precision by doing this, and we are not able to assess how specific platforms are situated in the attention network. Future research could explore these platform differences, perhaps by drawing on existing theory about the distinct technological affordances and norms of communication to test predictions how each is more or less connected to the center of the news audience attention network, as well as how their centrality (or peripherality) is related to partisan news use.

The study's analysis is also limited. Centrality scores have only been explored in a small number of audience studies, and the extent to which conceptual and empirical definitions based on traditional social networks apply to media uses and practices is a potential path for future work. Additionally, the data potentially lend themselves to two-mode network analysis, as our data contain respondents (mode one) who are connected to news outlets (mode two) (see Appendix F). Two-mode network analyses are most useful when nodes are connected within modes and

between modes. Our data only contains the latter type of connection, as respondents are not connected to one another, nor are news outlets connected to one another except through shared mentions. Future research could explore two-mode approaches to attention networks.

This study employed an approach to news audience research that bridges the gap between selective exposure and audience overlap to understand the ways in which individuals' media choices are situated in networks of public attention, and, to this end, it has introduced attention centrality as a conceptual connection between the macro and micro levels of analysis. The evidence generated by this approach shows that selective exposure to partisan news and audience overlap are not simply inverted manifestations of the same phenomenon, but rather two moving parts in a complex interplay between individual choice and public attention.

Supporting information

The following supporting information is available for this article: Appendices A–F. Additional Supporting Information may be found in the online version of this article.

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Declaration of interests

The authors declare no conflict of interests related to this study.

Data availability

Datasets and treatment files supporting the analyses for this paper are available at https://doi.org/10.17632/r4t28k38fw.1.

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