Political Behavior (2022) 44:1079–1103
https://doi.org/10.1007/s11109-020-09647-w

ORIGINAL PAPER

Polarized Networks? New Evidence on American Voters' Political Discussion Networks

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Accepted: 18 September 2020 / Published online: 29 September 2020

Abstract

An important mechanism of mass political polarization involves citizens' social networks: how politically homogeneous are they, how has this changed over recent years, and which individual and contextual variables predict the degree of homogeneity in social networks? Moreover, what are the consequences of network homophily on political preferences and in and out-group perceptions? In this paper, we address these questions by combining data from the 2000 American National Election Study and original data from the 2016 Cooperative Congressional Election Study. Both surveys ask respondents a battery of questions about the individuals with whom they most frequently discuss politics, including perceived vote choice and level of political knowledge. Using these data, we offer an updated empirical assessment of how polarization is influencing—and is influenced by—social network homophily.

Keywords Social networks · Disagreement · Polarization · Political perceptions · Political context

Introduction

Scholars have long recognized that citizens seldom go it alone when they engage in political activities. Instead, they rely on a close group of friends, family, and associates to acquire information, formulate opinions, and make choices about political matters (Huckfeldt et al. 2004; Sinclair 2012). The composition of these

Electronic supplementary material The online version of this article (doi:https://doi.org/10.1007/s11109-020-09647-w) contains supplementary material, which is available to authorized users.

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communication networks have far-reaching effects on individual political behavior, from partisanship and policy preferences to participation and tolerance (Berelson et al. 1954; Huckfeldt and Sprague 1987; McClurg 2006; Lupton and Thornton 2017). Heterogeneous or cross-cutting networks, in particular, can fulfill a key democratic purpose by facilitating meaningful deliberation between citizens across lines of political competition and promoting exposure to minority viewpoints, though perhaps at the cost of civic involvement (Mutz 2006; Klar and Shmargad 2017).

In an era of American politics defined by partisan-ideological polarization, it is little surprise that there has been a resurgence of interest in the makeup of voters' political information networks. One strain of research has examined trends in geographic polarization and found mixed support for the "big sort" hypothesis: that voters have become increasingly geographically clustered into politically like-minded communities (Bishop 2008; Tam Cho et al. 2013; Nall 2015). Other work has considered the specific mechanisms that promote political homophily in voters' discussion networks, including increases in associative mating (Huber and Malhotra 2017), inter-family political agreement (Iyengar et al. 2018), urban-rural political divides (Scala and Johnson 2017), and ideological alignment within occupational fields (Bonica 2014). Yet other scholars have focused on developments in traditional and social media and the degree to which they allow voters to occupy "echo chambers" dominated by reinforcing opinions and information (Prior 2007; Barberá et al. 2015; Settle 2018).

On the other hand, the literature on political communication networks makes clear that voters are limited in their ability to determine the makeup of their discussion networks. Contextual factors—particularly the partisan composition of an individual's county—constrain the types of discussion partners available to individuals (Huckfeldt et al. 1995). Indeed, while greater overlap between partisan-ideological and lifestyle preferences has facilitated geographic sorting, political considerations remain an peripheral factor in most Americans' migration decisions (Mummolo and Nall 2017).

This friction in the literature—alongside the fact that few public opinion surveys regularly include a discussion network battery which asks respondents to identify those with whom they most frequently discuss political matters—leaves us uncertain as to precisely how polarization has affected Americans' most immediate political discussion networks.[1] Moreover, surprisingly little work has empirically assessed how discussion network homophily influences political attitudes in non-experimental settings. The contact hypothesis (Allport 1954; Pettigrew 1998) predicts that intergroup contact reduces prejudice through several mechanisms, including by reducing negative stereotypes about the outgroup. As would be expected, this

[1] First developed by Laumann (1973), then applied in political science by Huckfeldt and Sprague (1995), these question batteries use a compound name generator which is meant to cover the nature of the interactions between respondents and their discussants. Included in political name generators are each respondent's relationship with the discussant and the discussant's perceived political partisanship. The political name generator used in this study was included in the ANES Time Series Study in 2000 and the 2016 CCES. Similar, but not exactly matching, batteries have been implemented in a variety of other studies.

effect is strongest when the contact is regular and personally intimate (Pettigrew 1997; Gaines and Garand 2010). Hence, the absence of regular cross-cutting contact in politically like-minded discussion networks should buttress negative attitudes towards those with rival political views and identities. If the composition of discussion networks indeed shapes political out-group perceptions, then network homophily likely serves as a key mechanism driving trends in affective polarization (Mason 2018; Enders and Armaly 2019). But we presently lack evidence that addresses whether individuals who regularly interact and discuss politics with opposing partisans hold, for instance, less extreme ideological perceptions of the other side than do citizens with politically homogeneous networks.

In this paper, we use novel survey data collected in 2016 to consider the determinants and consequences of homophily in Americans' political discussion networks. Though differences in survey methodologies make a direct comparison with similar data from the 2000 American National Election Study difficult, the results suggest that Democrats and Republicans increasingly avoid regular political discussion with members of the opposite party. In addition, our results reveal a strong relationship between network homophily and bias in respondents' ideological perceptions, such that voters in politically homogeneous discussion networks attribute more extreme positions to out-partisans and more moderate positions to their own party. This relationship remains significant while controlling for partisanship and partisan strength, ideological identification, and demographic factors. Taken together, these results have meaningful implications for our understanding of mass polarization and the role of discussion networks in shaping citizens' perceptions of the political world.

Polarization and Information Flows in Political Discussion Networks

Whatever its causes, the gap between "red" and "blue" America has become the defining characteristic of modern American politics. Academics, the media, and politicians all cite the divide as an important driving force behind a variety of trends in the American political system. Concerns over the implications of increased polarization are understandable, especially in the wake of several hotly contested presidential elections. At a time when Republicans and Democrats have become increasingly fortified in their respective geographic and psychological refuges, political tribalism is widely seen as a threat to the health of modern democracy (Mason 2018).

Though there remains considerable disagreement about the precise nature and degree of polarization among voters, more recent work has constructively moved from a focus on policy-based divisions to explore the social and psychological aspects of mass polarization. This burgeoning literature has drawn specifically from social identity theory (Tajfel and Turner 1979; Robinson et al. 1995) to demonstrate that partisan identities have grown more salient and fostered greater antipathy towards members of the out-group (i.e., the opposite party). Partisans not only report higher levels of dislike and distrust of members of the opposite party, but they are also more likely to discriminate on the basis of party in selecting dating partners, making economic choices, and even awarding scholarships (Iyengar et al. 2012; Iyengar and Westwood 2015; Huber and Malhotra 2017; McConnell et al.

2018; though see Klar et al. 2018). Partisan and ideological-based antipathy are most pronounced among strong partisans and politically sophisticated voters (Iyengar and Westwood 2015; Lelkes 2018). These voters are also more likely to seek out attitudinally congruent information and avoid or discount counterattitudinal messages (Taber and Lodge 2006; Arceneaux et al. 2013). While network homophily facilitates motivated reasoning and amplifies the effects of selective media exposure, heterogeneous networks also moderate media effects by regularly introducing cross-cutting messages into social interactions (Schmitt-Beck 2003; Song and Boomgaarden 2017).

Social identity theory, in particular, emphasizes the importance of negative outgroup stereotypes in promoting in-group cohesion (Robinson et al. 1995). Indeed, existing work has demonstrated that partisans believe there is a divide between the parties, and these partisans tend to attribute extreme views to members of the out-party (Brady and Sniderman 1985; Levendusky and Malhotra 2015). For example, self-reported Republicans believe that Democrats hold more liberal views than Democrats' own aggregated reports would suggest (Hare et al. 2015). These kinds of exaggerated ideological perceptions lead partisans to dislike and distrust the out-party more than *actual* levels of policy polarization among voters (Enders and Armaly 2019). Voters also exaggerate the representation of party-stereotypical groups (such as Evangelicals or racial minorities) in the parties—especially the out-party (Ahler and Sood 2018). This bias is most pronounced for politically interested partisans, and only after being provided information about the out-party's actual composition did partisans view its supporters as less extreme and feel socially closer to out-party members. Partisan stereotyping even extends to core values and beliefs, with voters also overestimating the extent to which Democrats and Republicans differ in their commitment to moral foundations (Graham et al. 2012).

Social identity and social networks are naturally intertwined, as social networks provide a steady flow of information that individuals use to develop their own preferences and their perceptions of group preferences (Berelson et al. 1954; Huckfeldt et al. 2004; Lazer et al. 2010). Consistent with the availability heuristic (Tversky and Kahneman 1974), voters tend to believe that the preferences of a group are similar to the preferences of group members with whom they are acquainted. For instance, one might conclude that the beliefs and motivations of all liberals are similar to those of liberal public figures (Mondak 1990) or liberals they know personally (Huckfeldt et al. 2004). Absent interaction with individuals who hold competing political views, citizens are left to rely on visible political elites, media reports, and group stereotypes to infer outgroup preferences. Indeed, the contact hypothesis also stresses the importance of regular personal contact between groups as a means of reducing negative or exaggerated outgroup stereotypes (Pettigrew 1998; Paluck et al. 2019).

Hence, when groups holding different viewpoints do not interact on a regular basis, we expect to find misperceptions about the political positions of rival groups. That is, one-sided exposure to politically agreeable information in discussion networks is not only likely to polarize attitudes (Mutz 2002; Klar 2014), but also to polarize *perceptions*. It is easier for political caricatures of the outgroup to flourish in the absence of regular political discourse. Moreover, the literature on political sophistication and specifically the determinants of ideological prejudice (Henry and

Napier 2017) indicates that the politically knowledgeable are best equipped to connect their affective reactions and ideological perceptions. Accordingly, we expect that composition of discussion networks will have the greatest influence on the ideological perceptions of politically sophisticated voters. Though cross-cutting personal contact is hardly assured to break through partisan and ideological filters (e.g., Dyck and Pearson-Merkowitz 2014), past work on the wide-ranging influence of social interactions on perceptions suggests that the political composition of discussion networks may nonetheless shape how voters—even voters with crystallized attitudes—see the political world (Crisp and Turner 2009; Levitan and Verhulst 2016).

Contextual Constraints on Information Flows

In considering how social interaction influences polarization, it is important to recognize that voters do not operate in a vacuum. Instead, individuals are frequently exposed to a variety of social scenarios in their environment which shape many aspects of their lives, including politics (Huckfeldt and Sprague 1995; Huckfeldt 2017). Some environmental contexts expose individuals to others who hold similar preferences and which provide fewer opportunities to acquire information about different viewpoints.[2] Other contexts allow individuals to experience discussion of contrary viewpoints more regularly, through increased supply of others with competing points of view. Existing in a heterogeneous environment means acquisition of information about the preferences of the other side is more likely. Put differently, the environmental context within which an individual resides impacts the types of communication available to that individual. This variation in supply is key to understanding how core social networks are related to polarization.

Though individuals attempt to build politically agreeable communication networks to avoid discomfort (Huckfeldt and Sprague 1987, 1995; Mutz 2006), deciding where to live is not primarily a political decision.[3] Where an individual lives has important consequences for social networks due to the constraints imposed on the supply of political information to which individuals are exposed (Huckfeldt 1983; Huckfeldt and Sprague 1995). By supplying potential discussion partners, and therefore information, differences in the partisan environment can impact individuals' attitudes and behaviors through their networks (Huckfeldt et al. 1995; Mutz 2006). Specifically, core social networks, developed from the larger environmental context, are where informal interactions and conversations with close associates, such as family, friends, and coworkers, occurs. These networks allow for more frequent interactions on a wider range of topics than would be possible with mere acquaintances (Hayes 1989), including those that provide intimate exposure to cross-cutting political viewpoints (Klofstad et al. 2013).

[2] Environmental context refers to the structurally imposed areas in which an individual resides. As we explain below, we focus on and individual's county as their environmental context in our analysis.

[3] Recent work on residential sorting has pointed out that economic factors, proximity to work, and neighborhood quality limit opportunities for individuals to engage in partisan residential sorting (Tam Cho et al. 2013; Mummolo and Nall 2017).

Regardless of how individuals come to live in an area, Republicans living in a Democratic area are exposed to a different set of political attitudes and communication opportunities than Republicans living in a Republican area. The local political milieu is consequential both in determining individuals' supply of discussion partners and the information that is disseminated through discussion networks (Granovetter 1985; Huckfeldt et al. 1995). Communication with others is the main way we understand the opinions and behaviors of those around us, yet as the network literature shows, social networks do not expose everyone to the same type of information. Those who live in San Francisco County, CA have a different supply of political discussion partners than do those living in nearby Amador County. Thus, during a period of intense partisan rancor, to understand the development of core social networks and the role they play in our lives, scholars must account for the context in which individuals reside.

Recent Trends in Americans' Political Discussion Networks

Political discussion networks shape opinion formation, and hence the composition of these networks have clear normative consequences. Voters who are regularly exposed to a heterogeneous set of political viewpoints hold more ambivalent and tolerant political preferences than voters occupying homogeneous networks (Mutz 2002; Visser and Mirabile 2004). Scholarly attention to the effects of such political "echo chambers" has tended to focus on trends in media consumption (e.g., Prior 2007; Lelkes et al. 2017) rather than voters' immediate political discussion networks. However, we expect that media fragmentation and the rise of social media are only part of the reason why voters now have less exposure to the other side. Indeed, research by Song and Boomgaarden (2017) demonstrates that selective media use, network homophily, and attitudinal polarization reinforce each other over repeated iterations in agent-based models. For instance, attitudinal polarization leads individuals to become more selective in preferring attitude-congruent media sources, while politically homogeneous networks facilitate efforts to prevent two-sided message flows (see also Schmitt-Beck 2003). In sum, it is likely that polarized media and polarized discussion networks have jointly contributed to more recent changes in voters' information environments.

There are also reasons to suspect that network homophily has increased over the last two decades, necessitating a reexamination of the role of discussion networks on political behavior. Since Berelson et al.'s (1954) pioneering Columbia studies, scholars have recognized that most voters operate in generally homogeneous political discussion networks. That is, voters are more likely to regularly discuss politics with individuals who share their broad political orientations. Nonetheless, during the period between the Columbia studies and the 2000 election, a substantial fraction of voters (somewhere between one-third and nearly one-half) had at least some heterogeneity in their immediate discussion networks (Huckfeldt et al. 2004).

Several factors lead us to believe that American voters' discussion networks have become less likely to include politically conflicting viewpoints. First, trends in geographic sorting have dramatically (and mostly recently) increased the number

of politically homogeneous counties, cities, and neighborhoods in the United States (Sussell 2013; Lang and Pearson-Merkowitz 2015). As discussed above, politically sorted communities make it more likely that voters will regularly encounter and discuss politics with only those of the majority political persuasion. Second, even if individuals are not explicitly self-selecting into politically like-minded areas, the overlap of cultural, lifestyle, religious, and professional factors with partisan-ideological divisions means that relocation or other social choices (such as mating or employment) often reflect political preferences, thus producing greater sorting (Tam Cho et al. 2013). Finally, social sorting produces a feedback effect that amplifies affective polarization among sorted voters by making them more responsive to polarizing cues and information. For instance, experimental evidence has demonstrated that both policy and partisan-based threats and reassurances most reliably provokes feelings of partisan anger and enthusiasm among socially sorted voters (Mason 2016).

Recent trends in polarization and sorting in the American electorate may alter our understanding of political discussion networks and their influence on political behavior. But, lacking updated information about the composition of voters' immediate political discussion networks, we can only speculate about the polarizing consequences of network homophily during a time of intense partisan division among American voters. Renewed focus on group-oriented approaches to social influence (e.g., Klar 2014; Druckman et al. 2018) calls for an updated empirical analysis on the relationship between contexts, core social networks, and attitudes.

Analysis

Hypotheses

Existing work on the role of social networks in mass political behavior leaves us with three broad questions. First, how has the degree of political homogeneity in voters' discussion networks tracked broad trends in polarization and/or partisan-ideological sorting? Second, how influential are contextual factors—in particular, the partisan makeup of voters' social environments—in shaping political discussion networks? Finally, what are the effects of network homogeneity on voters' ideological perceptions?

We address these questions by testing the following hypotheses:

Hypothesis 1 *Most voters do not regularly discuss politics with members of the opposite party or supporters of the opposite party's presidential candidate. The proportion of discussion networks meeting this definition of homogeneity has grown between 2000 and 2016 for both Democrats and Republicans.*

Hypothesis 2 *Voters living in more heavily Democratic (Republican) areas have a higher proportion of Democrats (Republicans) in their political discussion networks, controlling for individual-level factors.*

Hypothesis 3 *Voters with politically homogeneous discussion networks exhibit greater bias in their political perceptions (viewing the opposite party as more ideologically extreme), controlling for individual and contextual-level factors. This relationship will be most pronounced for those with higher levels of political knowledge.*

Discussion Network Data from the 2000 ANES and 2016 CCES

To test our hypotheses, we leverage the social network battery of questions in the 2000 American National Election Survey (ANES) and the 2016 Cooperative Congressional Election Study (CCES). These datasets include some of the best available observational data for exploring the relationship between social networks and political behavior.[4] Both datasets included a social network battery that identifies the partisanship of respondents' political communication networks using a compound name generator (Laumann 1973; Huckfeldt and Sprague 1995).[5] The use of name generators helps social scientists to understand who individuals talk to and what they talk about with their discussion partners (i.e., name generators capture egocentric social networks). In a variety of recent studies, name generators have been shown to capture political communication networks "quite well" (Sokhey and Djupe 2014). Thus, we are confident that the analysis in subsequent sections describes political communication networks from the point of view of individual respondents.[6]

The social network battery used in both the 2000 ANES and the 2016 CCES are based entirely on the perceptions of survey respondents regarding the characteristics of their identified discussants. Respondents in each survey's post-election wave were asked to provide the first name of other people with whom they "discuss government, elections, and politics" (2000 ANES and 2016 CCES Codebooks).[7]

[4] Though the network questions in the 2016 CCES were designed to be identical to the those in the 2000 battery, the surveys themselves differ in some important ways. The 2000 ANES is a nationally representative survey administered face-to-face and over telephone, while the 2016 CCES is an opt-in survey administered over the internet. Samples from opt-in surveys tend to overrepresent politically interested and engaged voters (see Malhotra and Krosnick 2007; though we show in an appendix that the increase in network homophily from 2000 to 2016 persists when we compare low and high political sophistication groups separately.

[5] A "compound" name generator approach uses only one name generator for the same respondents. These standard political name generators gather information on interactions, a particular topic, and attributes of discussion partners. A "multiplex" name generator approach uses more than one name generator for the same respondents. See Sokhey and Djupe (2014) for a more detailed discussion.

[6] Studies examining the implications of online versus face-to-face data collection of name generator data have been inconsistent. Online surveys avoid issues related to interviewer effects present in face-to-face interviews, including social pressure which may artificially inflate the number of discussants reported. At the same time, online surveys could limit the number of discussants reported through survey design. However, both modes of data collection generally yield name generator data of comparable quality (see Brashears 2011 and Eveland et al. 2018 for additional discussion).

[7] Invalid responses to the name generator, including "NA" and "none of your business" were excluded from the analysis. Respondents who did not support a candidate are coded as not voting in the election. Discussants who the respondent did not think had voted or voted for a minor candidate are coded as disagreeing with the respondent. Discussants who the respondents could not report preference for were not included in the analysis.

Respondents to the 2000 ANES could name up to four discussants and respondents to the 2016 CCES could name up to three discussants. Hence, for comparability purposes, we drop the fourth discussant from the number of discussants for respondents to the 2000 ANES data in all analyses.[8] In the 2000 ANES, 26 percent of the post-election respondents failed to provide any names, 19 percent provided one, 20 percent provided two, and 35 percent provided three or more. In the 2016 CCES, 19 percent of post-election respondents failed to provide any names, 18 percent provided one, 13 percent provided two, and 50 percent provided three.[9]

After obtaining the names, interviewers asked the respondents a short series of questions about each discussant.[10] The questions were meant to cover the nature of the interactions between respondents and their discussants, including each respondent's relationship with the discussant and the discussant's perceived political partisanship. The discussants themselves were not identified or interviewed. Both surveys also include extensive measures of individual-level political and demographic variables. Given the available data and the research questions of interest, the unit of analysis is the individual respondent.

Results

Homophily in Voters' Discussion Networks

To test Hypothesis 1—that the proportion of voters occupying homogeneous discussion networks has grown in recent years—we examine respondents' political communication networks in the 2000 and 2016 presidential elections.[11] Specifically, we operationalize the level of disagreement in these networks as the proportion of discussants who the main respondent reported as voting for the opposite party's presidential candidate. Figures 1 and 2 show the proportion of respondents' political communication network that the respondent perceived as voting for a particular candidate.

Figure 1 shows the level of political homogeneity in respondent discussion networks across years. Here we mean homogeneity as the proportion of discussants that voted for the same candidate as the respondent.[12] Among those respondents who name at least one discussant, only 16.4 percent of the Gore supporters and 13.0

[8] As a robustness check, we also estimated network homophily after switching the third and fourth discussants in the 2000 ANES for the 327 respondents who named a fourth discussant. The results, provided in the appendix, are virtually identical to those presented below.

[9] The mean number of discussants in 2000 was 1.60 while the mean in 2016 was 1.95. Individuals who do not provide discussant names are assumed to have no discussants. In our analyses, we include only respondents who responded to the name generator.

[10] See the appendix for question wording. In the case of the 2016 CCES, interviewers were not used. Instead, respondents were prompted online to answer a short series of questions about each discussant.

[11] Replication materials for this manuscript are available at https://doi.org/10.7910/DVN/3VQXIM.

[12] There are a variety of alternatives to measuring political disagreement and homogeneity. See Klofstad et al. (2013) and Lupton and Thornton (2017) for reviews.

percent of Bush supporters fail to name a discussant who shares the same candidate preference. In 2016, only 12.3 percent of the Clinton supporters and 12.4 percent of Trump supporters fail to name a discussant who shares the same candidate preference. Put differently, more than 80 percent of Republican and Democratic voters in the 2000 presidential election could name at least one other person who supported the same candidate in their political communication network.[13] This number increases to nearly 90 percent among both groups in 2016. Figure 1 makes clear that voters have little trouble naming other supporters of their preferred candidate in their political communication network. In support of Hypothesis 1, this figure also suggests that individuals were exposed to more like-minded individuals in 2016 than in 2000.

Figure 2 provides additional evidence in support of Hypothesis 1, that the proportion of voters who do not regularly discuss politics with supporters of the opposite party's presidential candidate has grown between 2000 and 2016. Among respondents who named at least one discussant, 64.5 percent of Bush voters could not name a Gore discussant. Similarly, 63.3 percent of Gore voters failed to name a Bush supporter. Thus, a substantial amount of supporters on both sides of the 2000 presidential election, more than 35%, were exposed to disagreement. When examining the 2016 election, however, we see that the level of heterogeneity was considerably lower than in 2000. Among respondents who name at least one discussant, 79% of both Trump and Clinton voters fail to name someone who voted for the opposing party's presidential candidate. Thus approximately 15% more respondents could not name a discussant from across the aisle, providing limited evidence that the proportion of homogeneous discussion networks was higher in 2016 than in 2000. Taken together, the basic statistics shown in Figs. 1 and 2, demonstrate that most voters do not regularly discuss politics with supporters of the opposite party's presidential candidate in their core social networks. This divide was present in 2000, and had not diminished (in fact, likely increased) by 2016.[14]

Contextual Influences on Network Homogeneity

Which factors influence the homogeneity in political discussion networks noted above? Past research indicates that one important factor is the environmental context within which an individual resides (Huckfeldt and Sprague 1995). The environmental context, including the partisan makeup of voters' counties, plays a substantial role in shaping voters' discussion networks. Opportunities for everyday political discussion are structured by supply of discussion partners, regardless of partisanship. That is, voters living in more heavily Democratic (Republican) areas should have a higher proportion of Democrats (Republicans) in their political discussion networks.

[13] Huckfeldt et al. (2004) provide additional details about disagreement in American voters' political communication networks in 2000.

[14] It is important to note that some research, including Eveland et al. (2013), shows that people experience higher levels of disagreement in their larger (and more peripheral) networks. This disagreement does not get picked up by name generators, which capture core discussion networks.

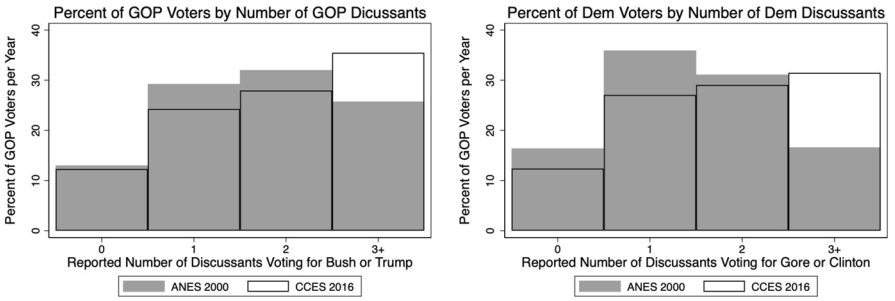

Fig. 1 Level of homogeneity within Democrat and Republican voter communication networks, 2000 ANES and 2016 CCES

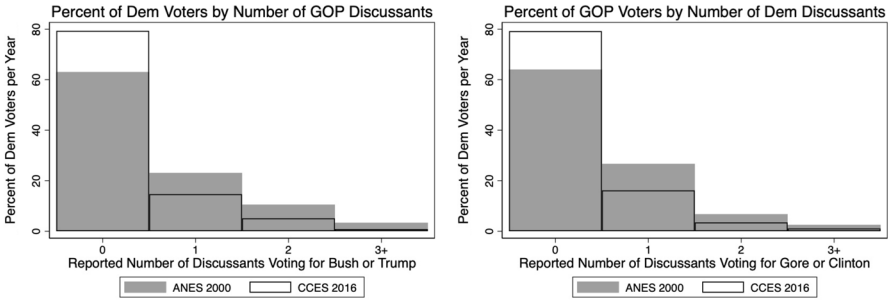

Fig. 2 Level of heterogeneity within Democrat and Republican voter communication networks, 2000 ANES and 2016 CCES

There are a number of reasons to use an individual's county as a measure of environmental context as opposed to, for example, an individual's state. First, the use of counties to measure political environments has a long history in political science (Key 1949; Huckfeldt et al. 1995; Miller 1956). Part of the reason that counties are such an important unit of study is that they are the smallest contextual unit for which political data (e.g. presidential election returns) exists and is readily available.

Beyond the convenience of data availability, counties are small enough to capture more proximate levels of information about an individual's environment context than the individual's state. For example, California seems like a safely blue state, but this masks a great deal of internal variation. Once one examines election returns outside of the coastal areas, many of California's inland counties are quite red. In addition, the variation in county-level support for candidates at all levels of government helps account for "swing states." The aggregation of county-level information in these states means they are neither red nor blue, but some shade of purple.

Counties are also large enough to capture most, if not all, of the daily professional, social, and political activities of individual citizens. If we were to try to

capture neighborhood contextual effects, we may miss out on nuanced exposure to people who do not live in an individual's neighborhood. Taken together, counties constitute the most important electoral unit below the level of the state. The way counties are tied into the American electoral process makes them one of the most significant units of political and electoral organization in American politics. One purpose of this paper is to investigate the significance of spatially defined political units for polarization in politics, and for these purposes counties are particularly appropriate units.

We utilize a set of fractional response models (FRMs) to assess Hypothesis 2, which states that voters living in more heavily partisan areas will have correspondingly higher proportions of partisans in their political discussion networks. We use these models to evaluate the determinants of the proportion of named discussants who voted for the Democratic and Republican candidates in the 2000 and 2016 presidential elections. The dependent variables in the following analyses are the proportion of named discussants who voted for the Democratic or Republican candidates in each election (Gore/Bush in 2000 and Clinton/Trump in 2016). Since these values are proportions that range between 0 and 1, but do not *only* take on values of 0 and 1, we use FRMs rather than logit or tobit analyses (Papke and Wooldridge 1996).

The political composition of an individual's core network is regressed on several explanatory variables. In each regression, we control for contextual and individual-level variables that could plausible impact the proportion of discussants each respondent reports. The contextual variables are the political composition of an individual county's electorate. Democratic (Republican) County indicates the percentage of an individual's county that voted for the Democratic (Republican) candidate in each year.

Respondents are located in partisan environments, and the partisan makeup of an individual's county is used as a proxy for the partisanship of their context. Though an individual's county is not the ideal proxy for the universe of political activity, counties do serve as an appropriate measure of an individual's political encounters outside their stated discussion networks. For example, individuals may experience politics through yard signs and bumper stickers that they encounter on their daily drive to work. These political experiences are represented by the partisanship of their neighborhood, or in this case, their county. We use county-level measures of partisanship, rather than congressional districts, because they better represent an individual's neighborhood, whereas a congressional district may miss partisan geographical nuance.[15]

As with past social network analyses, our analysis relies on the assumption that individuals choose their neighborhoods, friends, and discussants for reasons other than partisan preferences (McPherson et al. 2001; Sinclair 2012; Mummolo and Nall 2017). To the extent that individuals are able to choose their networks, it is unlikely

[15] As noted by Huckfeldt and Sprague (1995, p. 1030), "Citizens do not reside in a single environment of public opinion, but rather in a series of nested, cascading, overlapping environments that are both larger and smaller than the county unit. A real challenge of political analysis is to understand individual citizens within this variety of settings, and hence our analysis of counties is not intended to preclude analyses at other levels." This analysis is meant to be interpreted in the same manner.

that individuals base their decision on partisanship alone. Instead, their decision is likely to be based on their age, education, marital status, ideology, race, and gender. We control for these variables since they are also likely to affect an individual's selection into their social network. If individuals select their discussion networks based on these control variables, and we find an additional impact from our network variables, then the evidence we provide suggests that a individual's environmental context impacts individual's social network.[16]

Individual partisanship is included as a control variable in the regression models to account for citizens' preferences to reside in politically homogeneous networks. Formal education and political interest have been shown to produce more extensive communication networks—the highly educated and the politically engaged are more likely to have more discussion partners, independent of partisanship. As expected, Table 1 indicates that these patterns are largely present in both the 2000 and 2016 data.[17] Most importantly, these results echo past findings that context constrains individuals' choice of discussion partners (e.g., Huckfeldt et al. 1995; Brundidge 2010). While the popular emphasis on individual control over political information has increased with the spread of the internet and the 24-hour cable news cycle, control is incomplete. The relationship between county partisan composition and proportion of discussants is non-trivial and present across party lines as well as electoral settings. Thus, even during a period of intense partisan rancor, environmental supply continues to meaningfully shape the choices individuals can make regarding their core political discussion partners.[18]

Given that we implement fractional response models in this section, the effect of an individual coefficient depends on the values of all other variables in the model. Thus, in Fig. 3, we evaluate the magnitude of contextual effects by setting the values of all other explanatory variables at their mean/median value and adjusting county partisan composition. Overall, Fig. 3 shows the partisan composition of the county vote demonstrates corresponding effects on the partisan composition of networks. That is, in support of Hypothesis 2, individuals who live in counties with proportionally more Democratic (Republican) voters are more likely to name more Democratic (Republican) supporters within their political communication networks.

Figure 3 also shows the change in magnitude of partisan county composition's effect on the respective discussant proportions, contingent on individual partisanship. This Figure demonstrates that similar preferences result in different core discussion networks due to variation in supply from which an individual must choose partners. In counties that vary in support for Gore from 30 percent to 70 percent (black dots), the proportion of Gore discussants increases by 0.26 among strong Democrats, 0.26 among independents, and 0.18 among strong Republicans. The

[16] See the appendix for full model specification and complete list of controls. Party identification and ideological self-placement are coded so that higher values indicate higher levels of Republican/conservative identification.

[17] The results in Tables 1 and 2 are unweighted. Weighted versions of the results are provided in the appendix, and are substantively similar to those obtained without the use of survey weights.

[18] Other research suggests the same is true of online discussion networks (Brundidge 2010).

change in magnitude of the county effect was much smaller among Clinton voters in 2016. In counties that vary in support for Clinton from 30 percent to 70 percent (gray diamonds), the proportion of Clinton discussants increases by 0.12 among strong Democrats, 0.11 among independents, and 0.04 among strong Republicans.

While Table 1 indicates a positive relationship between the supply and proportion of discussants, this result masks interesting nuance. Evidence from Figure 3 suggest that the processes described by Finifter (1974) might still be at play in the 2000 and 2016 presidential elections. That is, core discussion networks may insulate minorities in a given context from the overall opinion climate of that context. Put differently, the relationship between discussant supply and core network composition is different for members in the partisan minority and majority. As expected, the proportion of Gore and Clinton supporters increases less for strong Republicans (the out-party in a Democratic county) than strong Democrats (the in-party in a Democratic county). Also, regardless of partisanship or election, the number of discussants increases based on supply.

Table 1 and Fig. 3 demonstrate that the partisan makeup of voters' social environment influences the composition of political discussion networks. Voters living in more heavily Democratic (Republican) areas have a higher proportion of Democrats (Republicans) in their political discussion networks, controlling for individual-level factors. In other words, Table 1 and Figure 3 show that while the effects of individual partisanship are larger, the effects of county partisan composition are non-trivial and present across different electoral settings. Individuals do not have complete control over who they can choose for their discussion networks, and since individuals are embedded in a variety of contexts at once (e.g., work, sports league, church, etc.), they may be exposed to a considerable amount of political disagreement, potentially undercutting some of Bishop's (2008) normative concerns about political bubbles. These results suggest that part of the key to understanding the composition of political discussion networks lies in the distributions of preferences within environments that are, at least in part, geographically based.[19]

Network Effects on Ideological Perceptions

To assess the influence of discussion networks on voters' ideological perceptions and test Hypothesis 3, we next analyze respondents' placements of various political stimuli along the standard seven-point liberal-conservative scale using data from the 2000 ANES and 2016 CCES.[20] We model the systematic bias (also referred to as

[19] The results in this section replicate using data from the 2008-09 ANES Panel Study. Using these data, we see overall patterns which more closely resemble those seen in during the 2000 presidential election. See the appendix for important notes about how data from that Panel Study differs from the surveys used analysis presented here.

[20] Respondents to the 2000 ANES were asked to place themselves and the Democratic and Republican parties, President Clinton, Al Gore, and George Bush on the liberal-conservative and other issue scales. Respondents to the 2016 CCES were asked to place themselves alongside the Democratic and Republican parties, Hillary Clinton, Donald Trump, President Obama, Merrick Garland, and the Supreme Court on the liberal-conservative scale. CCES respondents were also asked about their governor, Senators/Senate candidates, and Representative/Representative candidates, but we exclude these from the analysis since they are not common across respondents.

Table 1 Factors predicting the proportion of discussants who support Democratic and Republican presidential candidates in networks, 2000 and 2016

Number of Discussants: Predictors	Gore	Clinton	Bush	Trump
Democratic county	0.03 (5.26)	0.02 (4.50)		
Republican county			0.01 (2.65)	0.02 (4.66)
Party identification	−0.29 (−8.65)	−0.41 (−11.72)	0.29 (8.58)	0.35 (10.38)
Partisan strength	0.03 (0.51)	0.02 (0.47)	0.05 (0.86)	0.06 (1.26)
Formal education	0.10 (2.51)	0.18 (4.63)	−0.06 (−1.40)	−0.12 (−3.12)
Political Interest	0.01 (0.08)	0.16 (2.52)	0.18 (2.46)	0.20 (3.17)
Constant	−2.71 (−6.86)	−3.17 (−9.29)	−1.45 (−3.31)	−1.75 (−5.12)
N	1,016	1,619	1,016	1,619
Deviance	740.31	1,080.33	726.60	1,083.89

Full fractional response model in Appendix. z statistics in parentheses

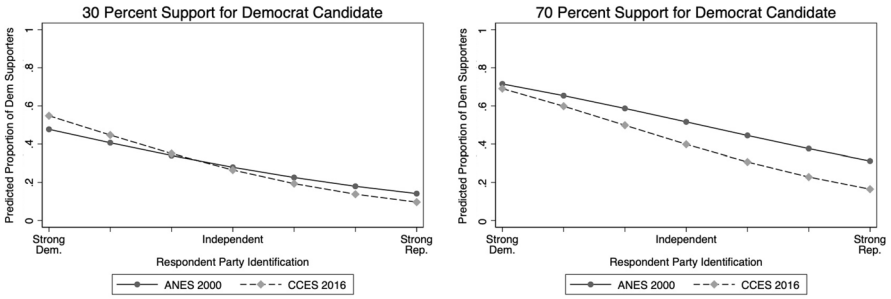

Fig. 3 Predicted proportion of Democratic supporters in discussion network by respondent party identification, year, and county partisan composition

differential item-functioning; see King et al. 2004) in respondent placements using Bayesian Aldrich-McKelvey (BAM) scaling (Aldrich and McKelvey 1977; Hare et al. 2015).

The BAM procedure treats reported placements of common stimuli as linear distortions of the "true" stimuli positions on a latent dimension. The two individual-specific distortion parameters capture how respondents systemativcally shift their placements left and right (the shift term) and stretch or flip their placements along the scale (the stretch term). The shift term is of special interest to us, since it measures the extent to which respondents view political parties and figures as too far to the left or too far to the right. For instance, a center-left Democrat may be viewed as extremely liberal by a Republican respondent, while a moderate Republican may be perceived as extremely conservative by a Democratic respondent.[21] Hare et al.

[21] The scaling procedure uses respondents' placements of all stimuli to estimate the distortion parameters. Partisans who place out-party stimuli at extreme ideological positions also tend to overstate how mainstream their own views are (i.e., the "false consensus" effect), placing themselves and in-party stimuli at more centrist positions on the liberal-conservative scale (Ross et al. 1977; Westfall et al. 2015;

(2015) present evidence that these kinds of distortions are widespread in the American electorate.

Hence, the distortion parameters (particularly the shift term) provide measures of bias in respondents' ideological perceptions, and can also be used to back out bias-corrected estimates of respondents' liberal-conservative positions from their raw self-placements. More technically, let z_{ij} represent the placement of stimulus j ($j = 1, \ldots, q$) by respondent i ($i = 1, \ldots, n$):

$$z_{ij} = \alpha_i + \beta_i \zeta_j + u_{ij} \tag{1}$$

where ζ_j is the true position of stimuli j, α_i is the shift term, β_i is the stretch term, and u_{ij} is the error term.[22] We estimate this model using noninformative priors, running two chains for 10, 000 iterations, and discarding the first 5, 000 iterations while thinning the remaining iterations by 5.[23]

Though interest is usually on the estimated "true" locations of the stimuli, our focus here is on α_i—the shift term. α_i captures how respondents skew their ideological placements of parties and candidates, with negative (positive) values of α_i indicating that the respondent places stimuli too far to the left (right). We use the posterior mean as our point estimate of α_i.

Hypothesis 3 states that network homogeneity should distort respondents' perceptions of the ideological space in a way that exaggerates the extremity of rival political stimuli. Specifically, respondents in homogeneous Democratic networks should be more likely to shift their placements rightward (producing positive values of α_i), and respondents in homogeneous Republican networks should be more likely to shift their placements leftward (producing negative values of α_i).

Figure 4 provides an initial look at the relationship between network composition and ideological perceptions in both years: 2000 and 2016. Network types are divided into five categories depending on the mix of discussants in the respondent's network. We also subset respondents by level of political sophistication using a summated index of three knowledge items common to both surveys: (1) identification of the majority party in the US House of Representatives; (2) identification of the majority party in the US Senate; and (3) placement of the Democratic Party to the left of the Republican Party on the liberal-conservative scale.[24] The distribution of respondents' α_i values (i.e., their shift terms) is shown along the y-axis.

Footnote 21 (continued)
Hare et al. 2015, p. 765-766). Both sources of bias contribute to the magnitude of the α_i (or "shift") parameter.

[22] BAM allows for heteroskedastic error by estimating both individual and stimuli-specific error terms, hence the indexing on u_{ij}.

[23] Visual inspection of the chains and use of the Geweke and Gelman-Rubin diagnostics indicate successful convergence on the posterior target distributions.

[24] In both surveys, the median score is 0.67 (i.e., correctly answering two of the three knowledge items) and the modal score is 1 (i.e., correctly answering all three items). Hence, we code respondents with scores between 0 and 0.67 as low sophistication and scores of 1 as high sophistication to create groups that are as equally sized as possible.

Network homophily is a weak predictor of ideological distortion for both low and high political sophisticates in 2000. In the 2016 data, however, the differences in ideological distortion by network composition are larger and in the expected direction (i.e., more homogeneous Democratic [Republican] networks are more strongly associated with positive [negative] α_i values), and this relationship appears to be somewhat more pronounced among politically knowledgeable voters. There also appear to be at most minor differences in ideological bias between respondents in purely homogeneous networks (only Gore/Bush or Clinton/Trump voters) and networks that also include discussants with unclear voting intentions. Consistent with our expectations, voters who occupy politically heterogeneous networks exhibit the least systematic bias in their ideological perceptions.

To check that network composition is not simply serving as a proxy for other individual and/or contextual-level political factors, we next specify a series of linear regression models of the ideological bias (α_i) estimates from Bayesian Aldrich-McKelvey scaling. We attempt to control for other factors influencing respondents' ideological perceptions; namely, party identification, ideological self-placement, demographic factors, and county partisanship. We subset and present results separately for respondents by level of political sophistication. Network composition type is broken down into a series of indicator variables, with **D + R** (mixed) network serving as the reference category.

The results, presented in Table 2, suggest that network composition is a stronger predictor of ideological bias in 2016 compared to 2000. Given differences between the two surveys, we should be cautious about reading too much into these findings. However, we think that it is reasonable to suspect that voters—especially politically attentive voters—more naturally connect their political conversations and ideological perceptions of the parties in a more polarized atmosphere, and our results are consistent with that expectation. At a minimum, we can say that by 2016, discussion network composition emerges as a more consistent predictor of voters' ideological perceptions while controlling for standard political and demographic variables.

Table 2 provides limited support for our third hypothesis—that political sophistication should strengthen the relationship between network composition and ideological bias. In both surveys, our model better predicts ideological distortion among highly politically knowledgeable respondents than respondents with lower levels of political knowledge (with R^2 of 0.31 and 0.57 for high knowledge respondents in 2000 and 2016, respectively, relative to values of 0.16 and 0.15 for low knowledge respondents). However, only in the 2016 data do we find that political knowledge conditions the effects of network composition in a consistent manner and in the expected direction. Moreover, a standard equality of coefficients test reveals that only the difference in the cumulative effect of network composition (i.e., moving from an **Only D** network to an **Only R network**) differs between low and high knowledge respondents in the 2016 CCES ($p = 0.08$, two-tailed test).[25] Given that this difference is estimated somewhat imprecisely, we interpret the results as a

[25] Additional details provided in the appendix.

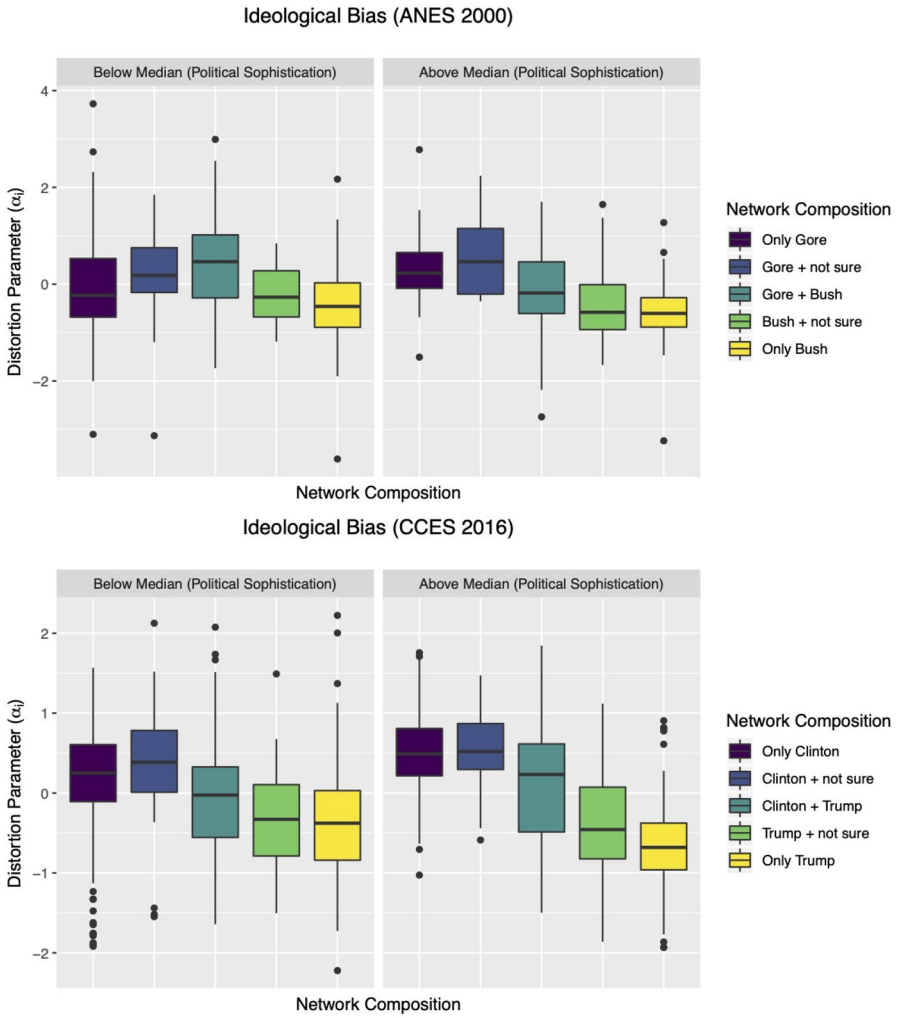

Fig. 4 Estimates of ideological bias by discussion network composition. Larger positive (negative) values of the distortion parameter indicates a stronger leftward (rightward) skew in respondents' ideological perceptions

promising but qualified indication that political sophistication serve to amplify the relationship between discussion networks on voters' ideological perceptions.

Finally, while we found that the county partisanship influences network composition, Table 2 provides virtually no evidence of such a contextual influence on individual biases in ideological perceptions. That is, once we account for network composition, the partisan leaning of a voter's surrounding region has little influence on her ideological perceptions. The one exception occurs among relative political sophisticates in 2000.

Table 2 Network effects on respondents' ideological perceptions. Response variables are estimates of ideological bias (α_i) from Bayesian Aldrich-McKelvey scaling

	2000 ANES		**2016 CCES**	
	Low Knowledge	High Knowledge	Low Knowledge	High Knowledge
Network: Only D	−0.13	−0.11	0.04	0.14**
	(0.21)	(0.14)	(0.10)	(0.06)
Network: D + Not Sure	−0.09	−0.07	0.17	0.18**
	(0.26)	(0.20)	(0.15)	(0.08)
Network: R + Not Sure	0.06	−0.33	−0.14	−0.24**
	(0.26)	(0.23)	(0.18)	(0.09)
Network: Only R	−0.23	−0.37***	−0.18*	−0.38***
	(0.20)	(0.13)	(0.10)	(0.06)
Party identification	−0.58**	−0.33*	−0.26*	−0.15
	(0.29)	(0.19)	(0.14)	(0.09)
Partisan strength	−0.16	−0.12	−0.06	0.12**
	(0.24)	(0.15)	(0.10)	(0.06)
Ideological self−placement	−0.62	−0.88***	−0.31**	−0.90***
	(0.48)	(0.33)	(0.15)	(0.11)
Household income	−0.29	−0.17	0.04	0.00
	(0.24)	(0.17)	(0.09)	(0.05)
Age	−0.74	0.14	−0.25**	−0.07
	(0.50)	(0.32)	(0.11)	(0.06)
Education	0.16	0.01	0.02	−0.12**
	(0.31)	(0.21)	(0.10)	(0.06)
Female	−0.16	0.05	0.04	0.00
	(0.16)	(0.10)	(0.07)	(0.04)
Black	0.40	0.24	0.09	−0.07
	(0.31)	(0.24)	(0.13)	(0.09)
Latino	−0.16	−0.64**	−0.02	0.01
	(0.31)	(0.30)	(0.12)	(0.09)
Union member	0.12	−0.18	0.11	−0.01
	(0.19)	(0.15)	(0.08)	(0.04)
Religiosity	−0.23	−0.17	−0.23*	−0.19**
	(0.26)	(0.17)	(0.12)	(0.07)
GOP county %	0.65	−1.00**	0.21	−0.08
	(0.64)	(0.43)	(0.23)	(0.12)
Intercept	0.92*	1.32***	0.37*	0.74***
	(0.51)	(0.38)	(0.21)	(0.11)
N	189	215	426	659
R^2	0.16	0.31	0.15	0.58
adj. R^2	0.08	0.25	0.12	0.57
Resid. sd	0.96	0.69	0.71	0.49

Entries are OLS coefficients, standard errors in parentheses.

Significance levels: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$ (two-tailed tests).

Predictor variables are scaled to range between 0 and 1, response variables are standardized.

Table 2 (continued)

D refers to Gore (Clinton) voters in 2000 (2016); **R** refers to Bush (Trump) voters in 2000 (2016).
Network: D + R serves as the baseline category

Hence, we have presented preliminary, though compelling, findings that suggest homogeneous political discussion networks serve to exaggerate the ideological distance between the parties in the minds of voters. We speculate that this relationship has strengthened over the last two decades, though we lack comparable survey data to definitively establish such a trend. Regardless, the results from 2016 more firmly establish two points with important implications for mass polarization in contemporary American politics. Our data show that most voters' immediate political discussion networks are indeed highly sorted. The people with whom American voters most frequently discuss political events, figures, and controversies tend to share their basic political dispositions and identities. It is not especially surprising, then, that these voters also hold more ideologically caricatured views of the political world, perceiving their side as centrist or mainstream and the other side as extremist and perhaps even dangerous.

Discussion

American politics is now often described as "tribal." Party competition routinely antagonizes ideological, cultural, and religious cleavages between citizens, whose suspicion and dislike of each other is exacerbated by ignorance about the other side and its motives (Graham et al. 2012). Accordingly, much of the discussion surrounding polarization concerns the degree to which Americans have become sorted into "red" and "blue" states, counties, and communities. As has long been understood, political discussion networks lie at the center of voters' political universes, and their makeup reflects local political geography and personal political characteristics (Huckfeldt and Sprague 1995). Moreover, regular interpersonal interactions with members of outside groups—the kind provided by heterogeneous discussion networks—have been shown to promote tolerance and moderate attitude strength in both political and nonpolitical situations (Pettigrew 1998; Mutz 2006).

If regular interaction serves to inhibit stereotypes and prejudice towards groups different from our own, then trends in political sorting—geographic and otherwise—bode poorly for goals of deliberation and tolerance. Unfortunately, few analyses of political sorting employ direct measures of the political composition of Americans' most immediate networks. Without such data, we are left to tenuously connect trends in geographic sorting and political polarization without testing the underlying social mechanisms. Moreover, most evidence concerning the consequences of political network homophily is experimental and faces questions about external validity. Though outgroup perceptions and prejudice are thoroughly intertwined, the effect of political discussion network homophily on group ideological perceptions has been widely ignored in the literature (though see Buttice et al. 2009).

In this paper, we address these concerns and gaps in the literature with the use of original survey data. Although differences in sampling methodology and survey mode make a direct comparison difficult, the results are consistent with our expectation that citizens' political discussion networks are widely homogeneous and have likely grown more so over recent decades. Trends in geographic and social sorting are natural candidates to help explain such a change. Indeed, consistent with past work, we find that geography influences network composition in the expected direction (i.e., more Republican [Democratic] counties produce more Republican [Democratic] networks, ceteris paribus). Voters may also have become more vigilant in screening out discussants with competing political views, a task also facilitated by trends in social sorting and affective polarization.

In either scenario, the dearth of cross-cutting discussion networks has removed one potential impediment to the momentum of polarization in American politics (cf. Settle 2018). Specifically, our analysis also provides some preliminary evidence that networks influence voters' ideological perceptions. Drawing from the social-psychological literature—particularly work concerning the contact hypothesis—we expected to find that the absence of cross-cutting contact in political discussion networks leads voters to view the out-party as more ideologically extreme and their own party as more ideologically mainstream. While additional work will be needed to validate the causal ordering, we nonetheless show that network homophily—independent of voters' own partisan, ideological, and demographic identities—is associated with greater perceptual bias in voters' ideological placements of the parties and candidates. Given that polarized perceptions have also be found to drive negative affect and distrust of out-partisans (Enders and Armaly 2019), our findings have sobering implications for those concerned about trends in affective polarization and the health of democratic deliberation in American politics.

With these results in mind, however, we think it is appropriate to emphasize the limitations of our present study and provide suggestions for future research. First, in limiting our attention to the relationship between network composition and ideological perceptions, we have not considered some of the normatively desirable effects of network homophily uncovered by other scholars (for instance, increased levels of political interest, voter turnout, and correct voting). Second, in this paper we have considered only one dimension of voters' political perceptions—those concerning the ideological positions of the parties and their candidates. Future work could probe alternative ways that discussion networks shape political perceptions and biases; for instance, how voters attribute motives to members of the outparty and their policy goals (cf. Popan et al. 2010). Finally, we note that our measure of discussant political preferences is based on respondents' own reports, and hence subject to projection or false consensus effects. Even though these effects are likely present in both 2000 and 2016 (e.g., Huckfeldt et al. 2000), it is possible that they are responsible for some of the apparent increase in network homophily.[26]

[26] Of course, even an increase in *reported* network homophily is consequential, as it suggests partisans have become more likely to (1) view regular political conversations and perhaps general relationships with outparty members as socially undesirable and/or (2) ignore cross-cutting political messages from outparty discussants, eliminating their influence.

Discussion networks provide the kind of ongoing, intimate personal contact that work in political science and social psychology has shown can shape perceptions of and reduce animus towards outgroups. However, owing largely to a scarcity of data, political discussion networks have gone underappreciated in studies of mass polarization. This is unfortunate, as our findings reiterate the importance of networks in voters' political universes—particularly as they relate to polarizing phenomena such as geographic sorting and perceptual biases. Social media only captures a fraction of voters' political conversations and interactions, and can only tell part of the story about how voters' use networks to acquire information, exchange ideas, and form perceptions and attitudes.

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