

Dampening the Echo: Receptiveness to Opposing Views, Majority-Minority Distance, and Network Homogeneity *

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Abstract

Social worlds often splinter into echo chambers as people preferentially form ties to others who hold similar political views and avoid affiliating with those who disagree with them. Group composition often contributes to this dynamic, with those in the ideological majority being less likely than those in the minority to form relationships with ideological opponents. This article examines how an individual difference—receptiveness to opposing views—can counteract these tendencies and thereby dampen the echo in some chambers. We develop a theoretical account of how micro-level differences in receptiveness can give rise to macro-level patterns of network heterogeneity. In particular, we theorize that prospective interaction partners who are more mutually receptive will be less prone to forming ties on the basis of political homophily or triadic closure. In groups with majority and minority factions, we further propose that mutual receptiveness will increase the propensity of group members in the political majority to form ties with minority group members. We evaluate and find support for these ideas using field data from three sites that vary in political orientation, analyzing tens of thousands of dyads composed of 599 participants. We discuss implications for research on individual differences and networks, attitude polarization, and group composition.

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In politics, business, and social life, people tend to splinter into homogeneous groups. Although whether and how these groups become politically polarized remains a topic of interest and debate in sociology (e.g., DiMaggio et al., 1996; Baldassarri and Gelman, 2008; DiPrete et al., 2011), psychology (e.g., Myers and Lamm, 1976; Abrams et al., 1990; Willis, 2017), political science (e.g., Fiorina et al., 2005; Theriault, 2008; McCarty et al., 2016), and organizational studies (e.g., Farrell, 2016; Gupta et al., 2017; Gupta and Wowak, 2017), these divergent literatures are unified in acknowledging the role social networks can play in sorting people into echo chambers of like-minded others. In this article, we examine how people vary in their tendency to select into social groups that lack political diversity.

The twin network mechanisms of homophily—the tendency for people to come into contact with and prefer forming attachments to similar others—and triadic closure—the tendency for friends of friends to become friends—are known to drive people into homogeneous clusters (Goodreau et al., 2009; DellaPosta et al., 2015; Kossinets and Watts, 2006). These mechanisms are closely intertwined in that friends' friends also tend to be similar to the focal actor. Homophily, and its concomitant role in triadic closure, can exist on a variety of dimensions, including status characteristics such as race and gender, as well as underlying values, attitudes and beliefs (Lazarsfeld et al., 1954; McPherson et al., 2001). We focus on a particular form of values homophily—*political homophily*—which is based on individuals' orientations toward liberal versus conservative values, ideological beliefs, and policy preferences (Colleoni et al., 2014; McCarty et al., 2016).

Moreover, social structure—in the form of a social group's composition—can influence the nature and form of homophily that exists within a group (Lincoln and Miller, 1979; Blau, 1977; Blau and Schwartz, 1984; Marsden, 1988; McPherson et al., 2001). For example, group members in the numerical majority are more likely to select into homophilous relationships in part because similar contacts are simply more abundant (Ibarra, 1992; Curranini et al., 2009; Kleinbaum et al., 2013). Although minority group members may identify more strongly with and prefer to interact with others with whom they share characteristics that are relatively rare in a group (McGuire,

1984; Mehra et al., 1998), they often cannot afford to build homophilous ties because doing so would limit their access to social resources held by majority group members (Ibarra, 1992).

In social groups that include majority and minority political factions, we propose that, alongside these structural factors, one must also consider psychological dynamics between the factions. In particular, those in the ideological majority tend to be more prone than those in the minority to disregard, misperceive, and derogue opposing viewpoints (Nemeth, 1986; Ridgeway and Berger, 1986; Keltner, 2017). We posit that the greater the ideological distance between a majority and minority group member, the more the majority member will exhibit these psychological tendencies and the less likely she will be to initiate a tie. In particular, we introduce the construct of *majority-minority distance*, which reflects—at the dyadic level—the (directional) ideological distance between majority and minority group members. Whereas homophily and triadic closure promote the formation of ties, we propose that the likelihood of a group member establishing a relationship with a peer decreases with the majority-minority distance between them.

Although structural forces and group composition can powerfully shape patterns of relationship formation, an extensive literature has also uncovered the subtle ways in which personality traits and dispositions can influence the nature of ties an individual forms (Asendorpf and Wilpers, 1998; Mehra et al., 2001; Kleinbaum et al., 2015). Building on these insights, we argue that a newly documented individual difference—receptiveness to opposing views, defined as “a willingness to access, consider, and evaluate opposing views in an impartial manner” (Minson et al., 2018, p. 4)—will tend to counteract the effects of structure and group composition on the formation of politically homogeneous relationships.

We theorize that prospective interaction partners who are more mutually receptive will be less prone to forming ties on the basis of political homophily or triadic closure. In groups with majority and minority factions, we further argue that the receptiveness of a dyadic pair will dampen the negative effects of majority-minority distance on tie formation. We evaluate and find support for these ideas using longitudinal field data from three sites that vary in political orientation, analyzing

tens of thousands of dyads composed of 599 participants. We discuss implications for research on individual differences and networks, political polarization, and group composition.

NETWORK STRUCTURES AND ECHO CHAMBERS

Social networks are conduits to valuable resources such as information, influence, and social support (Lin, 2002). Although networks can, in some cases, expose people to fresh perspectives (Burt, 2005), two ubiquitous patterns of relationship formation limit people's exposure to new ideas and instead channel them into echo chambers of like-minded others: homophily and triadic closure.

Homophily

Homophily refers to the tendency of social ties to form between actors who are similar on one or more salient dimensions (McPherson et al., 2001). For example, friendships are more likely to form between people of the same race (Wimmer and Lewis, 2010), co-workers are more likely to build ties to same-sex colleagues or those in the same formal subunit (Ibarra, 1992; Kleinbaum et al., 2013; Srivastava, 2015a), and funding in an entrepreneurial crowdsourcing environment is more likely to occur when the entrepreneur and backer face similar perceived constraints arising from their shared gender identity (Greenberg and Mollick, 2017).

Homophily can, in turn, have consequences for attitudes and behaviors. For example, Golub and Jackson (2012) show, using agent-based models, that when agents' beliefs and behaviors are formed by averaging what they observe among their peers, homophily slows the rate at which the group as a whole converges to a consensus view. In a similar vein, Macy et al. (2003) use agent-based models to show that homophily and social influence can lead a group to self-organize into antagonistic factions even without the knowledge or intent of the agents. In other words, homophily contributes to the formation and persistence of subgroup echo chambers.

Homophily arises for two interrelated reasons. First, people may simply prefer to build and maintain ties to similar others—a mechanism referred to as *choice homophily* (McPherson and Smith-Lovin, 1987; McPherson et al., 2001; Kossinets and Watts, 2009). People tend to form ties

to similar others because such relationships are less likely to breed interpersonal conflict (Davis, 1963) and more likely to make people feel secure and at ease (Meer and Tolsma, 2014).

Independent of personal preferences, homophily also emerges from the opportunity structure for interaction that people face—a mechanism that is frequently labeled *induced homophily* (McPherson et al., 2001; Kleinbaum et al., 2013). Various facets of social structure lead people to sort into neighborhoods, schools, social classes, workplaces, and friendship circles that, in turn, define the social “foci” of potential social relations (Feld, 1981). Given the numerical representation of different social groups in a population, homophily can arise even if individuals within the group do not prefer to interact with similar others. For example, in many organizations, men are more likely than women to form same-sex ties in part because men are simply more prevalent (Ibarra, 1992).

Recognizing that homophily exists on a variety of dimensions, including status characteristics such as race and gender, and underlying values, attitudes and beliefs (Lazarsfeld et al., 1954; McPherson et al., 2001), we specifically focus on *political homophily* (Huber and Malhotra, 2017), which is based on individuals’ orientations toward liberal versus conservative values, ideological beliefs, and policy preferences (Tetlock, 1983). Political homophily has been documented across a diverse range of social contexts. For example, in a study based on potential dating partners on an online platform, similarity in political orientation increased the likelihood of one platform member reaching out to another. The magnitude of this effect was comparable to that of educational homophily and half as large as racial homophily (Huber and Malhotra, 2017). Similarly, recent work showed that politically engaged Twitter users are more likely to be exposed to, and more quickly receive, information from other like-minded users (Halberstam and Knight, 2016).

In the workplace, prospective employees are attracted to organizations whose members share their political views such that organizations can themselves develop political orientations. These organizational political ideologies can, in turn, shape firm-level investments in corporate social responsibility (Gupta et al., 2017). In sum, across diverse social contexts, network formation is powerfully driven by the forces of political homophily.

Triadic Closure

A network formation mechanism that is closely related to homophily is triadic closure—the tendency for network ties to form between individuals who are socially connected to a common third actor. In friendship networks, this tendency is known as the friends-of-friends-become-friends principle. Across a variety of social contexts, including Facebook connections (Wimmer and Lewis, 2010), school friendships (Goodreau et al., 2009), and even interorganizational collaborations (Gulati and Gargiulo, 1999; Ingram and Roberts, 2000), relationship formation hews to the principle of triadic closure.

Referrals, exposure, and the need for balanced relationships all contribute to the closing of open triads, or triangles. Referrals occur when a third party introduces two people who were previously unconnected to each other. If successful, the referral will lead all three people to be interconnected, thereby closing the triangle. Yet triadic closure can occur even in the absence of an explicit referral. Because friends tend to co-locate, participate in similar activities, and become members of the same groups, two unconnected network contacts of a common third party are likely to become connected because shared activities and geographic proximity increase their likelihood of being exposed to one another (Feld, 1982). Finally, individuals have a psychological need for balanced social relations, which in turn motivates them to close open triangles (Heider, 1958; Krackhardt and Kilduff, 1999; Kilduff and Tsai, 2003).

Like homophily, triadic closure tends to limit the diversity of information and opinions to which people are exposed. The two mechanisms are closely related and can both contribute to the formation of echo chambers because triadic closure often reflects unobserved forms of homophily. Indeed, if people in a group form ties on the basis of characteristics that are difficult to observe—for example, deeply held values or a wry sense of humor—then researchers studying network formation in the group will observe triadic closure when the underlying basis of relationship formation may simply be unobserved homophily. But even in the absence of unobserved similarities, triadic closure

should limit the diversity of information and opinions received by the two newly connected individuals because they now share at least one interaction partner. Whether triadic closure results from latent homophily or from referrals, exposure, or the need for balanced relationships, people who are socially proximate in the network will tend to have access to similar information and opinions. Thus, consistent with the extensive literature on social networks, our baseline expectation is that relationship formation in a social group will adhere to the principles of political homophily and triadic closure.

Although there are predictable patterns of network formation, we also know that there is considerable heterogeneity in how individuals build social relations. Yet it remains unclear whether there are individual-level characteristics that render someone less susceptible to the forces of network homogeneity. We turn next to considering just such an individual difference.

INDIVIDUAL DIFFERENCES AND NETWORKS

Whereas early sociological accounts of network formation and change privileged the role of actors' structural positions (e.g., White et al., 1976; Mayhew, 1980; Wellman, 1983), more recent work acknowledges the importance of human agency and individual differences in network dynamics (Emirbayer and Mische, 1998; Ibarra et al., 2005; Gulati and Srivastava, 2014).

Indeed, recent years have seen a proliferation of studies that uncover how various personality traits and dispositions can influence the pattern of ties a person forms and thereby affect the larger structure of a network. For example, a study of network formation among university undergraduates found that extraversion positively influenced the number and quality of relationships formed (Asendorpf and Wilpers, 1998). Extraverts not only tend to accumulate more friendships but are also more likely to form friendships to other extraverts, resulting in “network extraversion bias”—the tendency for extraverts to be over-represented in people's social networks, while introverts are under-represented (Feiler and Kleinbaum, 2015). Further evidence from a recent meta-analysis showed that more extraverted individuals are more likely to occupy positions of brokerage in in-

strumental networks (Fang et al., 2015).

Beyond extraversion, a study of social networks and performance in a high-technology firm, Mehra et al. (2001) examined the role of self-monitoring orientation—the tendency for people to act like “social chameleons” who adjust their self-presentations to match others’ expectations—and found that high self-monitors were substantially more likely than low self-monitors to become central actors in the network. In a similar vein, Sasovova et al. (2010) studied friendship relations in a radiology department and showed that high self-monitors were more likely to attract new friends and bridge structural holes than were low self-monitors. Moreover, the new friendships that high self-monitors built were less likely to be with friends of a friend. In more recent work, Kleinbaum et al. (2015) demonstrated that the network benefits of self-monitoring are amplified for those who are perceived by their peers as empathetic.

Although extraversion and self-monitoring orientation have garnered considerable attention in the literature, many other individual differences, including need for cognition (Anderson, 2008), need for affiliation (Casciaro, 1998), *tertius iungens* orientation (Obstfeld, 2005), implicit collaborative self-concept (Srivastava and Banaji, 2011), and propensity to connect to others (Totterdell et al., 2008), have also been linked to social network patterns. Building on this burgeoning literature, we propose that another individual difference—receptiveness to opposing views (Minson et al., 2018)—will importantly shape network dynamics as they relate to political ideologies.

The conceptual arguments that follow operate across levels of analysis. We first introduce an individual-level construct—receptiveness—and then extend it to the dyadic level. Next we argue that the joint receptiveness of two individuals will counteract their tendency to form ties on the basis of political homophily and triadic closure. We similarly posit that mutual receptiveness will increase the likelihood that an individual in the social group’s political majority will build ties to a counterpart in the political minority. Consistent with this theoretical focus, our main empirical analyses are conducted at the level of dyads (Mizruchi and Marquis, 2006). Yet the theory we develop at the dyadic level also has implications for the social group as a whole: it suggests that

groups with a greater proportion of receptive individuals will be less likely to splinter into echo chambers of like-minded individuals.

RECEPTIVENESS TO OPPOSING VIEWS

Although balanced exposure to a variety of beliefs and positions is a hallmark of democratic discourse and sound decision-making, extensive research demonstrates that individuals generally avoid contact with holders of opposing views. Research on the phenomenon of selective exposure (Frey, 1986), also known as congeniality bias (Hart et al., 2009), postulates that people systematically avoid contrarian information because it leads to cognitive dissonance—an unpleasant state of psychological arousal resulting from cognitive conflict (Festinger, 1962). Indeed, when individuals are exposed to contrary beliefs in laboratory paradigms, they report high levels of negative affect (Dorison et al., 2018). In a similar vein, Boutyline and Willer (2017) report that politically extreme individuals orient toward cognitive stability, clarity, and familiarity. Using a large sample of politically engaged Twitter users, they demonstrate that a “preference for certainty” makes these individuals more inclined to interact with others who reaffirm, rather than challenge, their views.

Recent research by Minson et al. (2018), however, also documents that people vary in their willingness to be exposed to, engage with, and impartially evaluate opposing political views. They introduce and validate an individual difference construct: *receptiveness to opposing views*. The new scale has been shown to have appropriate levels of convergent and discriminant validity across multiple large samples. Importantly, it is distinct from other well-known and related constructs such as the Big Five personality inventory (John and Srivastava, 1999), as well as various measures of cognitive style such as need for cognition (Cacioppo et al., 1984), need for closure (Roets and Van Hiel, 2011), and perspective taking (Davis, 1980).

The receptiveness scale consists of 18 self-report Likert scale items, which reliably load onto four factors: (1) a curiosity about the nature of antithetical views; (2) a diminished propensity to experience negative emotions when exposed to attitude-incongruent views; (3) the tendency to

make more positive assessments of holders of opposing views; and (4) a willingness to engage with seemingly “taboo” topics. In laboratory studies, highly receptive individuals were shown to be more willing to consume information from political leaders in the opposing party, reported less mind wandering when watching a speech they disagreed with, and more impartially evaluated policy arguments regardless of whether they agreed or disagreed with their conclusions. Importantly, responses to the receptiveness self-report still predicted behavior after a time lag of several months (Minson et al., 2018), suggesting that the tendency toward receptiveness may be a stable individual difference.

The receptiveness scale has reliably measured individuals preferences and behavior in controlled laboratory environments, but it remains to be established whether a preference for engaging with opposing views on a self-reported questionnaire predicts more complex social behavior such as network formation. In the context of relationship formation, we propose that receptiveness should be conceptualized as a relational construct. In particular, we argue that the propensity for two people with opposing political views to form a tie will be a function of their *joint* receptiveness. Given the powerful roles of homophily, triadic closure, and majority status in shaping tie formation, identifying a self-reported relational characteristic that predicts the formation of more politically diverse networks would have important implications for our understanding of the interplay between individual agency and social structure.

Receptiveness and Political Homophily

Political homophily arises from both opportunity structures and the choices people make within those contexts. The arguments that follow pertain to the latter. People often experience negative psychological effects when exposed to others who hold opposing views and thus seek to avoid such interactions. We posit that prospective interaction partners who are both highly receptive will be apt to overcome these dissimilarity-avoidance tendencies because they will be genuinely curious about each other’s views. With greater mutual receptiveness, they will each have more capacity to

regulate negative emotions and resist devaluing the other's perspective. They will also tend to be more willing and able than less receptive dyads to move beyond surface-level topics to explore deeper and potentially more controversial areas of disagreement. In other words, prospective interaction partners who share a high degree of receptiveness will hold weaker preferences for interacting with politically similar others and may even prefer interacting with others who expose them to divergent or contradictory viewpoints. We therefore propose that:

HYPOTHESIS 1 (H1): Mutual receptiveness will diminish the tendency for prospective interaction partners to form ties on the basis of political homophily.

Receptiveness and Triadic Closure

Recall that triadic closure can arise from unobserved homophily, as well as from referrals, common exposure, and the need for psychological balance. The arguments in support of Hypothesis 1 extend naturally to the case of unobserved homophily. All else equal, we do not expect more receptive individuals to differ from less receptive ones in exposure to similar others or the need for psychological balance. We do, however, anticipate that receptive individuals will be more discerning in their choices to form connections to others whose attitudes and opinions might be redundant. Rather than automatically acting upon referrals and closing triads, they are more likely to look for diversity in attitudes, preferences, and beliefs (Harrison et al., 1998) when deciding whether to form a new social connection. For these reasons, we propose that:

HYPOTHESIS 2 (H2): Mutual receptiveness will diminish the tendency for prospective interaction partners to form ties on the basis of triadic closure.

GROUP COMPOSITION AND NETWORK FORMATION

Whereas the arguments supporting our first two hypotheses apply to social groups in general, our next set of arguments pertains to groups that have majority and minority political factions. We also make another key analytical shift: while the first two hypotheses consider tie formation

without regard for who initiates the tie, we now specifically address directionality. We begin with the premise that, for both structural and psychological reasons, majority group members will be less inclined to initiate a tie to peers in the minority group.

From a structural standpoint, members of the majority will have greater opportunity for contact with other majority group members relative to those in the minority (Blau, 1977; Currarini et al., 2009; Kleinbaum et al., 2013). While majority group members inhabit a social context that is rich in the potential for homophilous ties, minority group members risk losing access to valuable social resources if they segregate themselves in homogeneous clusters. Thus, those in the minority are more motivated to connect to majority members than the latter are to affiliate with the former (Blau, 1977; Ibarra, 1992).

Furthermore, there are additional psychological reasons to expect that majority members will be particularly prone to homophilous tie formation. As Nemeth (1986) argues in her classic work on majority and minority influence, recognizing that one is in the majority reinforces the sense that one's worldview is correct. Moreover, viewpoints that deviate from those of the majority represent a threat to the majority's status. As a result, majority members are motivated to deride minority perspectives, not only out of substantive disagreement but also to maintain the majority's legitimacy (Ridgeway and Berger, 1986; Johnson et al., 2006).

In addition, majority status contributes to the psychological experience of power and its associated biases (Fiske, 1993; Keltner, 2017). In partisan conflicts, majority members are more likely to exaggerate and thus misperceive the extremism between opposing perspectives (Keltner and Robinson, 1996; Ebenbach and Keltner, 1998). Beyond motivations to deride opponents as irrational or ideologically motivated to protect the perceived rationality of their own views (Robinson et al., 1995), majority members are also likely to be less informed about minority perspectives than minorities are about majority beliefs and opinions. In social contexts with a dominant political majority, majority viewpoints are likely to be widespread, whereas minority perspectives are apt to be marginalized or even suppressed. Finally, there is also a psychological tendency for attention

to flow upward in social hierarchies such that the powerful attend primarily to the powerful, while the less powerful also attend to the powerful out of necessity, dependence, or the desire for influence (Russell and Fiske, 2010; Keltner, 2017). While it is common for minorities to attend to the perspectives of the majority, majority members are much less likely to make efforts to understand minority perspectives (Galinsky et al., 2006).

Because of the structural opportunities that majority members face and the psychological factors that make them less inclined to understand and engage with minority perspectives, we begin with a baseline expectation that majority group members will be less likely to form ties to minority group members than the other way around. We further propose that the likelihood of tie formation decreases as a function of the ideological distance between majority and minority group members. In making this argument, we introduce the construct of *majority-minority distance*, which indicates the (directional) ideological distance between majority and minority group members. The majority-minority distance of actor i relative to actor j increases as i 's political ideology becomes more closely aligned with the majority group's ideology in comparison to j 's ideology. (Majority-minority distance therefore takes on negative values for members of the political minority relative to those in the political majority.) We turn next to considering how receptiveness can be expected to moderate the effects of majority-minority distance on tie formation.

Receptiveness and Majority-Minority Distance

We argue that, relative to less receptive majority members, highly receptive majority members will be more motivated to overcome the structural and psychological barriers to forming ties to ideologically distant minority group members because they will be more curious to learn about their views. Moreover, their motivation and interpersonal capacity to do so will increase when minority group targets are themselves highly receptive and signal their own openness to and curiosity about opposing viewpoints. We therefore propose:

HYPOTHESIS 3 (H3): In groups with political majorities and minorities, mutual receptiveness

will mitigate the negative effects of majority-minority distance on tie formation.

METHOD

Empirical Setting and Sample

We collected data from the entering cohorts of three professional schools that varied in political orientation—two were majority-liberal environments, while one was a majority-conservative setting. Our sample included the dyads composed of 599 graduate students from these three institutions. This sample was well-suited to our theoretical aims for three main reasons. First, the individuals we studied were mostly encountering one another for the first time. Thus, we could study the formation of *de novo* ties. Second, newcomers to these programs were fully immersed in their new environments and focused on building ties to others in their cohort rather than to outsiders. Thus, the boundaries of the network were clearly delineated (Marsden, 1990). Finally, compared to typical organizational settings in which tie formation tends to follow the contours of formal structure (Lazega and Van Duijn, 1997), relationships among graduate students are more likely to arise from personal preferences and choices than from opportunity structures. Yet the fact that our data come from professional school settings also raises questions about generalizability, which we return to in the discussion section below.

We collected data from all participants through surveys that were implemented at two points in time. The first survey was administered at the beginning of students' first semester in their program. In this survey, individuals answered questions about their own receptiveness, political orientation, and other personality attributes. Several weeks later, we administered a second survey, in which students identified the peers with whom they had formed a relationship. To mitigate recall bias, we used the roster method to elicit these contacts (Marsden, 2011). We also collected in this survey additional measures (described below), which served as control variables in our analyses.

Measures: Dependent Variable

Our dependent variable was constructed from contacts identified in the second survey. At the beginning of the survey, respondents viewed a screen with a roster of all students in their section and read the following prompt: “Please click on a name if you have formed a close or very close relationship with any of these classmates (e.g., you discuss with them matters that are personally important to you).” Respondents then viewed rosters for each additional section—with sections ordered at random—until they had considered every classmate in their cohort. We used responses to this question to construct undirected (Hypotheses 1 and 2) and directed (Hypothesis 3) indicators of tie formation.

Measures: Independent Variables

For Hypothesis 1, we included a measure of homophily based on political orientation, receptiveness, and the interaction of the two variables. For Hypothesis 2, we substituted a measure of triadic closure (i.e., shared ties) for homophily based on political orientation. And for Hypothesis 3, we transformed the homophily measure into majority-minority distance (described below).

Political orientation. We measured political orientation using a seven-point scale ranging from “Very Liberal” to “Very Conservative.” On this scale, a “4” denotes someone who self-identifies as a political moderate who is neither conservative nor liberal.

Receptiveness. We measured receptiveness using the 18-item, self-report measure validated by Minson et al. (2018). These items assess respondents’ willingness to engage with viewpoints different from their own, their emotional reactions to opposing views, the degree to which they derogate others who think differently, and the breadth of topics they deem suitable to debate. Respondents were shown items in the form of a statement and were asked to indicate the extent of their agreement using a seven-point scale ranging from “Strongly Disagree” to “Strongly Agree.” For example, respondents viewed such statements as, “I am willing to have conversations with individuals who hold strong views opposite to my own,” “Listening to people with views that

strongly oppose mine tends to make me angry” (reverse coded), and “Some issues are just not up for debate” (reverse coded). A full list of items appears in the Appendix. Minson et al. (2018) found evidence of this measure’s internal, convergent, discriminant, and predictive validity.

Shared Ties. The baseline expectation for Hypothesis 2 is that dyads will exhibit triadic closure. Evidence consistent with triadic closure is finding that the probability of two individuals forming a tie increases with the number of ties they have in common. We measure shared ties as the number of individuals who nominated, or were nominated by, both individuals in a dyad. Formally:

1. For individuals i, j , find the sets of individuals K_i and K_j that nominated or were nominated by i, j respectively, where $k \notin \{i, j\}$ for all $k \in K_l$.
2. Number of shared ties = $|K_i \cap K_j|$

Measures: Control Variables

To account for other individual differences that could be correlated with receptiveness and influence the likelihood of tie formation, we estimated models that included extraversion and self-monitoring orientation as control variables. We measured extraversion using eight items from the Big Five Inventory (John and Srivastava, 1999) and self-monitoring orientation using thirteen items developed by Lennox and Wolfe (1984). We also controlled for gender, country of origin (United States or not), and whether individuals in a dyad belonged to the same section.

Analytical Strategy

While all of our hypotheses require analysis at the dyad level, the hypotheses differ in directionality. In Hypotheses 1 and 2, we are interested in how the effects of homophily and triadic closure are moderated by receptiveness. In particular, we consider how an aggregate attribute of a dyad (i.e., combined level of receptiveness) moderates the effect of a dyad-level contrast (i.e., political orientation difference) on a dyad-level outcome (i.e., existence of a mutually recognized relationship). In other words, with Hypotheses 1 and 2, we do not distinguish between the individuals in the dyad.

Accordingly, to test these hypotheses, we analyze undirected dyads.

In contrast, Hypothesis 3 considers potential asymmetry in majority and minority members' willingness to connect with one another and the moderating role of receptiveness. Although we continue to examine the moderating effect of combined levels of receptiveness, we shift the analytical focus to directed dyads to account for this asymmetry.

In view of our use of both attribute and difference variables, we utilize the dyadic modeling framework forwarded by Fafchamps and Gubert (2007). This framework describes the conditions necessary for properly identifying both dyad-level effects and dyad-difference effects—termed “sum” and “difference” effects, respectively. This framework also provides a unifying structure to our undirected and directed models. The main difference lies in the specification of the “difference” variables (i.e., whether to use simple difference or absolute difference). Although other approaches exist for modeling dyadic data—particularly directed dyads (e.g., Apicella et al. (2012))—our chosen approach is preferred because it is parsimonious, yields results that are easy to interpret, and can be applied across both undirected and directed models.

Undirected Dyad Models: Hypotheses 1 and 2

Following Fafchamps and Gubert (2007), we use models that include combinations of individual-level attributes—sums ($z_i + z_j$) and differences ($z_i - z_j$)—and dyad attributes w_{ij} . In the case of undirected dyads, these models take the following general form:

$$Y_{ij} = \alpha + \beta_1|(z_i - z_j)| + \beta_2(z_i + z_j) + \beta_3|w_{ij}| + u_{ij} \quad (1)$$

Since there is no focal actor in undirected models, we take the absolute value of the difference in individual attributes. For example, our models include the absolute difference in political orientation to estimate the homophily effect: a negative coefficient for this variable would be consistent with our baseline expectation that relationships are more likely to form between politically similar,

rather than dissimilar, peers.¹ To test Hypotheses 1 and 2, we introduce interaction terms for distance in political orientation and mutual receptiveness and for the number of shared ties and mutual receptiveness. Our saturated model takes the following form:

$$\begin{aligned}
NetworkTie_{ij} = & \alpha + \beta_1 |(Political_i - Political_j)| + \beta_2 (Political_i + Political_j) \\
& + \beta_3 |(Recept_i - Recept_j)| + \beta_4 (Recept_i + Recept_j) \\
& + \beta_5 SharedTies_{ij} \\
& + \beta_6 |(Political_i - Political_j)| \times (Recept_i + Recept_j) \\
& + \beta_7 SharedTies_{ij} \times (Recept_i + Recept_j) \\
& + \text{DifferenceControls}_{ij} \boldsymbol{\Gamma}_1 + \text{SumControls}_{ij} \boldsymbol{\Gamma}_2 \\
& + \text{DyadAttributeControls}_{ij} \boldsymbol{\Gamma}_3 + u_{ij}
\end{aligned} \tag{2}$$

where $NetworkTie_{ij}$ is an indicator that a (confirmed) relationship exists between actors i and j ; $Political_i$, $Political_j$, $Recept_i$, and $Recept_j$ are the political orientation and receptiveness reported for i and j , and $SharedTies_{ij}$ is the number of individuals who mutually nominated or were nominated by i and j . $DifferenceControls_{ij}$ and $SumControls_{ij}$ are matrices of additional complementary sum and difference variables computed from individual responses of i and j , including sums of and differences in extraversion and self monitoring. The matrix $DyadAttributeControls_{ij}$ includes indicators that dyad members are both female, both male, both from the United States, neither from the United States, both from the same section, and school-section fixed effects.

Models with undirected dyads present us with two choices for the construction of the dependent variable. We can indicate a tie: (a) if both individuals nominate the other only (i.e., reciprocated ties), or (b) if either individual nominated the other. Here, we use the more stringent, reciprocated-

¹As Fafchamps and Gubert (2007) observe, effects of sums (e.g., β_2) are identified when individuals have varying degrees only. Because we did not set an upper or lower bound on the number of fellow students respondents could nominate, we can appropriately identify these effects. Including complementary sum and difference variables in the model allows us to estimate the effect of each conditional on the other. For instance, as we include both political orientation (absolute) difference and political orientation sum, we can estimate the homophily effect conditional on the combined level of political orientation (i.e., the extent to which the dyad is liberal or conservative).

tie definition: while self-reports of outdegree are especially susceptible to bias (Feld and Carter, 2002), ties that are mutually nominated are less likely to reflect measurement error. Accordingly, the analyses for Hypotheses 1-2 presented below use reciprocated ties as the dependent variable.²

Directed Dyad Models: Hypothesis 3

We follow a similar modeling approach for directed dyads, though with some modifications. In our undirected dyad models, we do not distinguish between actors i and j , and we enter absolute differences in individual attributes as the difference variables. In our directed dyad models, we enter the attributes of i relative to j as the difference variables. The general form of these models is thus:

$$Y_{ij} = \alpha + \beta_1(z_i - z_j) + \beta_2(z_i + z_j) + \beta_3|w_{ij}| + u_{ij} \quad (3)$$

One of the main difference variables in these models is majority-minority distance. For Hypothesis 1, we estimate the homophily effect using the absolute difference in political orientation—i.e., without distinguishing between individuals in the dyad. For Hypothesis 3, we need to understand how a focal individual compares to a given potential interaction partner in terms of alignment with the majority and minority factions. This requires a rescaling of the political orientation scale and a move to simple rather than absolute difference.

To measure majority-minority distance, we first rescale political orientation (in our minority-liberal sites) to ensure that the maximum value indicates the individual is in the extreme position of the majority political orientation for that person's school. We then consider the simple difference between the rescaled political orientation of focal actor i and that of potential interaction partner j . A high value of this variable (maximum value of 6) suggests that the focal actor is in the social

²For robustness, we also estimated models using the less-precise version of the dependent variable (i.e., assume a tie exists if either individual in the dyad nominated the other). We obtain comparable results. The only notable difference is that in the saturated models, there is some attenuation in the significance of the interaction effect among political orientation difference and receptiveness sum.

group's far majority, while her prospective interaction partner is in the far minority. A low value of this variable (minimum value of -6) denotes the opposite.

Our saturated model testing Hypothesis 3 takes the following form:

$$\begin{aligned}
Nomination_{ij} = & \alpha + \beta_1(MajorityMinorityDistance_{ij}) + \beta_2(Political_i + Political_j) \\
& + \beta_3(Recept_i - Recept_j) + \beta_4(Recept_i + Recept_j) \\
& + \beta_5 SharedTies_{ij} \\
& + \beta_6(MajorityMinorityDistance_{ij}) \times (Recept_i + Recept_j) \\
& + \beta_7 SharedTies_{ij} \times (Recept_i + Recept_j) \\
& + DifferenceControls_{ij} \boldsymbol{\Gamma}_1 + SumControls_{ij} \boldsymbol{\Gamma}_2 \\
& + DyadAttributeControls_{ij} \boldsymbol{\Gamma}_3 + u_{ij}
\end{aligned} \tag{4}$$

where $Nomination_{ij}$ is an indicator of whether i nominated j , and $MajorityMinorityDistance_{ij}$ is the difference in the (rescaled) political orientation of i and j . The other variables are as defined in equation (1) above, except that in the $DifferenceControls_{ij}$ matrix, the difference variables use simple rather than absolute differences, and the $DyadAttributeControls_{ij}$ include an indicator for whether the potential partner j nominated focal actor i .

Estimation

Because the dependent variable in all models is dichotomous, we estimate logistic regression models. Recognizing the potential difficulties in interpreting interactions in nonlinear models (Norton et al., 2004), we present average partial effects plots for interactions to ensure our interpretation of coefficients is correct. These plots also allow us to interpret effects in terms of changes in probabilities. In all models, we account for the non-independence of dyadic interactions using two-way-cluster-robust standard errors (Cameron et al., 2011), following common practice in prior studies (Kleinbaum et al., 2013; Biancani et al., 2014; Srivastava, 2015a).

RESULTS

Descriptive Statistics

Table 1 presents descriptive statistics and correlations for the individual-level variables. While receptiveness is positively and significantly correlated with extraversion ($r = 0.140, p < 0.001$) and self-monitoring ($r = 0.121, p = 0.003$), these correlations are not large in magnitude. Also of note is the absence of a significant correlation between receptiveness and number of network ties ($r = 0.020, p = 0.549$). This suggests that individuals who self-report being highly receptive to opposing views do not necessarily cultivate larger networks.

[Insert Table 1 about here]

We find a modest (yet significant) positive correlation between political orientation (with the maximum value seven indicating “Very conservative”) and individual-level receptiveness ($r = 0.193, p < 0.001$). Figure 1, which uses notched boxplots to compare the distribution of receptiveness for each level of the political orientation scale, helps explain the relationship between these variables. Jittered dotplots of individual receptiveness are superimposed on the boxplots. The lower and upper horizontal edges of each boxplot indicate the 1st and 3rd quartiles, respectively, with the range between hinges corresponding to the interquartile range. The vertical “whiskers” indicate the maximum and minimum values for each distribution. The notch on each box (i.e., where the box narrows to a sharp point) centers at the median of each distribution, and the vertical span of the notch represents roughly a 95 percent confidence interval for the median, such that notches that do not overlap suggest significant differences in medians.

[Insert Figure 1 about here]

As can be seen in the figure, the moderate political subsample (four) has the highest median level of receptiveness, and this median is significantly higher than that of all other political orientations,

with the exception of “Slightly conservative” (five). To ensure that our results are driven by receptiveness and not merely the tendency of moderates to be slightly more receptive than non-moderates, we report robustness checks below that estimate the receptiveness effect based on non-moderates only. We also note that, for this sample, those reporting a “Very liberal” political orientation have a significantly lower median value of receptiveness than that of all other political orientations groups. Moreover, those with more liberal political orientations exhibit greater variance in receptiveness.

Table 2 presents descriptive statistics for the dyad-level variables used to test the first two hypotheses. As described above, the level variables are sums of dyad members’ values of a given variable. The mean value of *Network Tie* is 3.4 percent, which provides a benchmark for the effect sizes reported below.

[Insert Table 2 about here]

Receptiveness and Homophily Analyses

The stacked percent plot in Figure 2 provides initial descriptive evidence of the correspondence between receptiveness and political orientation difference. This figure summarizes the distribution of political orientation difference for dyads in each quintile of dyad-level receptiveness. Political orientation difference ranges from zero to six, where zero indicates that the individuals reported the same political orientation, while six suggests that the individuals are on the opposite ends of the spectrum. As Figure 2 depicts, the share of dyads with greater absolute difference in political viewpoints increases as their mutual receptiveness level increases.

[Insert Figure 2 about here]

Table 3 reports coefficients obtained from logistic regression models. Model 1 is a minimal model in which the indicator of tie formation is regressed on the complementary sum and difference variables for political orientation and receptiveness. In this model, we find a negative, statistically

significant main effect for political orientation difference (-0.108 , $p < 0.001$). This provides support for the baseline homophily expectation that differences in beliefs are less likely to result in relationship formation.³

[Insert Table 3 about here]

Model 2 of Table 3 includes an interaction between political orientation difference and self-reported receptiveness sum. The estimated coefficient for this interaction is positive and statistically significant (0.068 , $p = 0.006$). Figure 3 presents a partial effects plot corresponding to Model 2.⁴ The y-axis shows changes in the predicted probability of a tie forming.

[Insert Figure 3 about here]

The figure illustrates how the average partial effect of political orientation difference varies over the range of dyad-level receptiveness: for dyads with low or moderate levels of receptiveness, political orientation difference is negatively associated with relationship formation, but this negative effect is attenuated as receptiveness increases. Surprisingly, for the highest levels of receptiveness, the effect of political orientation difference becomes positive. In all, the partial effect of political orientation difference varies from about -0.017 at the lowest level of receptiveness to about 0.007 at the highest. Given the 0.034 baseline probability of tie formation inferred from Table 1, these partial effects and variations in partial effects are substantive.

To further explore the nature of the relationship between political orientation difference, receptiveness, and tie formation, we split political orientation into discrete bins and substituted indicators

³In models not reported (but available upon request), we confirmed that our results are not the mere artifact of including complementary variables. For example, when we estimate models that exclude political orientation sum, we obtain a similar pattern of results for political orientation difference. Similarly, excluding receptiveness difference does not materially change the results related to receptiveness sum.

⁴This plot and those presented in Figures 4 and 5 were prepared using the `margins` package in R (Leeper, 2018). Partial effects plots generally show how the response variable (Y) changes as an independent variable (X) changes, conditional on values of covariates. Here, we extend partial effects plots by considering how the partial effects (i.e., the effects of X on Y) change across the range of another variable, Z (in our case, receptiveness). The effects reported in each figure are “average” partial effects in that we have computed the partial effect at every observation in our data, altering the value of receptiveness to a 25-quantile of receptiveness. Thus, a partial effect is computed for each of our 63,775 (undirected) or 127,550 (directed) observations, twenty-five times. Variances were computed using the delta method.

of these bins for the continuous (absolute) difference measure. We designated a difference of four to six as “high difference” (7.6 percent of dyads) and a difference of two to three as “medium difference” (27.9 percent). The omitted category was an absolute difference of one or no difference (35.5 percent of dyads). In Model 3 of Table 3, we retain negative and statistically significant main effects of political orientation difference for both the medium and high bins, as well as positive interactions between each bin and receptiveness. Consistent with Hypothesis 1, the homophily effect is most pronounced for high-difference dyads: the effect for medium-difference dyads ($-1.317, p = 0.010$) is half that for high-difference dyads ($-3.763, p < 0.001$), and the interactions with receptiveness are proportionately different in magnitude ($0.118, p = 0.027$; $0.358, p = 0.002$).

These results also help dismiss an alternative explanation for our finding from Model 2 and Figure 2: namely, that receptiveness is simply an instrument for political moderateness. In Figure 1, we saw that individuals with moderate views (i.e., a political orientation score of four) have the highest levels of receptiveness. Because of how we constructed the bins described above, moderates cannot appear in the high-difference bin [4, 6]. They can at most be an absolute distance of 3 from an individual at either extreme of the seven-point spectrum. If our results were a mere artifact of the tendency of political moderates to be more receptive, then we would expect the main effect and interaction terms to be more pronounced for the medium-difference bin than for the high-difference bin.

Models 4 and 5 of Table 3 extend Model 2, including the additional controls described above and school-section fixed effects. Compared to Model 2, the interaction effect size is somewhat attenuated but remains robust to these additional controls. Model 6 similarly extends Model 3 by including the additional controls and school-section fixed effects. While we retain the same pattern of results as in Model 3 for high political orientation difference and its interaction with receptiveness, the main effects and interactions involving medium political orientation difference are no longer statistically significant. This suggests that receptiveness intervenes most potently when there is a large disparity in potential interaction partners’ views. In all, we find support for

Hypothesis 1.

Receptiveness and Triadic Closure Analyses

Table 4 presents tests of Hypothesis 2. Model 1 of Table 4 is a minimal model in which an indicator of relationship formation is regressed on the number of shared ties and complementary receptiveness variables. We find support for the baseline expectation of triadic closure: as members of a dyad have more shared ties, they are more likely to identify one another as interaction partners (0.331, $p < 0.001$).

[Insert Table 4 about here]

In Model 2 of Table 4, we introduce an interaction between number of shared ties and self-reported receptiveness sum. Consistent with Hypothesis 2, the coefficient for this interaction is negative and statistically significant (-0.042 , $p < 0.001$). Figure 4 presents the accompanying partial effects plot for this interaction. As in Figure 3, the y-axis displays changes in predicted probabilities of tie formation. This plot affirms that the effect of number of shared ties on tie formation is positive for all values of receptiveness, but that this positive effect is significantly attenuated as receptiveness sum increases. Again, in view of the baseline probability of tie formation of 3.4 percent, these effects and variations in effects are substantive.

[Insert Figure 4 about here]

The other models in Table 2 introduce additional controls and interactions for robustness. In Model 3, we include additional controls, Model 4 adds school-section fixed effects, and Model 5 includes the political orientation and receptiveness sum interaction of interest from Table 3. In Model 5, we again employ discrete bins of political orientation difference, as we used in Models 3 and 6 of Table 3. Across these models, the interaction effect between shared ties and receptiveness sum remains negative and statistically significant, and we replicate the political orientation difference and receptiveness interactions we reported in Table 3. Hypothesis 2 is therefore supported.

Receptiveness and Majority-Minority Distance Analyses

The analyses reported for Hypothesis 1 provide evidence that the likelihood of tie formation decreases with political orientation difference and that this negative effect is attenuated, or even reversed, in the presence of receptiveness (recall Figure 3). But these results do not identify which, if any, of the parties in a heterophilous dyad might be reluctant to connect and which might instead be eager to form a tie.

As noted above, the models in Table 5 use directed rather than undirected dyads. This shift affects both sample sizes and the interpretation of results. Inspecting the number of observations for these models, we see that this shift naturally results in a doubling of the sample size, from 63,775 to 127,550. In other words, we have an observation for each side of the dyad. Because the dependent variable is an indicator of nomination rather than an indicator of a mutually recognized tie, effects indicate expected changes in the logged odds of nomination (or, in the corresponding figure, changes in the predicted probability of nomination) rather than tie formation.

[Insert Table 5 about here]

As with the previous tables, Model 1 of Table 5 is a minimal model. Subsequent models introduce interactions and controls. Model 1 estimates the main effect of majority-minority distance, conditional on political orientation sum, mutual receptiveness, and receptiveness difference. Counter to our expectations, the main effect of majority-minority distance is positive, though not statistically significantly different from zero ($0.005, p = 0.357$). With the introduction of a receptiveness sum interaction in Model 2, we find evidence of a negative, marginally significant main effect for majority-minority distance ($-0.253, p = 0.065$) and a positive, marginally significant interaction with receptiveness ($-0.028, p = 0.062$). This pattern of results is generally consistent with Hypothesis 3, though we again prepared a partial effects plot to aid interpretation.

Figure 5 corresponds to Model 2 of Table 5. This figure describes a different interaction pattern than that previously observed. Consistent with Model 1 of Table 5, we see that the average effect

of majority-minority distance is zero (i.e., values on the y-axis are centered around zero); however, this effect is intriguingly contoured by levels of receptiveness. When receptiveness is low, majority-minority distance has a negative effect on the probability of nomination. When receptiveness is instead high, this disparity in opinions actually has a positive effect on tie formation.

[Insert Figure 5 about here]

In subsequent models of Table 5, we explore this relationship further by decomposing majority-minority distance into discrete bins. “Minority→Majority” is an indicator set to one when this variable has a value within the range [-6, -4]—i.e., when the focal actor is in the political minority and the alter is in the majority. “Majority→Minority” is an indicator set to one when this variable has a value within the range [4, 6]—i.e., when the focal actor is in the political majority and the alter is in the minority. The reference group in these models includes majority-majority dyads, minority-minority dyads, and any dyad that includes a political moderate—i.e., self-reported political ideology of four on our seven-point scale.

In Model 3, we substitute the majority-minority scale with these indicators, and we interact these indicators with receptiveness sum. This modeling approach allows us to examine the receptiveness-sum interaction from both sides of a heterophilous dyad. As can be seen in Table 5, the effects appear to be driven by majority-group members in relation to minority group members: compared to dyads that are relatively close in political orientation, majority group members in such dyads are less likely to nominate a minority-group partner, and this negative effect is positively moderated by receptiveness sum. Minority-group members in heterophilous dyads are no more or less likely to nominate a majority member than are individuals to nominate someone in a relatively homophilous dyad, and there is no significant interaction with receptiveness sum.

As in the previous tables, Models 4 and 5 of Table 5 introduce additional controls and school-section fixed effects. We obtain the same pattern of results as reported in Models 1 and 2. In Model 6, to replicate the findings for triadic closure—albeit with directed ties and a different dependent

variable (nomination)—we include an interaction between number of shared ties and receptiveness. As in Table 4, we again obtain a positive effect for number of shared ties and a negative interaction effect with receptiveness, and the findings for majority-minority distance are robust (and slightly stronger). Model 7 extends Model 6 by including the discrete bins of majority-minority distance (as in Model 3). Our results are robust in this saturated model. Overall, this pattern of results is consistent with Hypothesis 3, although the reversal of the negative majority-minority distance effect for dyads with high levels of mutual receptiveness (as reflected in Figure 5) is unexpected.

DISCUSSION AND CONCLUSION

The goal of this article has been to examine how individual differences in self-reported receptiveness to opposing views can influence the propensity to build politically homogeneous networks. Bringing the construct of receptiveness to the social group context, we theorized that mutual receptiveness counteracts individuals' well-documented tendencies to form ties on the basis of political homophily and triadic closure. Integrating social psychological theories of majority-minority group dynamics with network-structural perspectives, we also introduced a dyad-level construct—majority-minority distance, or the (directional) ideological distance between majority and minority group members. We further theorized that mutual receptiveness decreases the negative effect of majority-minority distance on tie formation. Drawing on longitudinal field data from 599 participants in three research sites that varied in political orientation, we found general support for our theory. At the same time, contrary to expectations, we found that majority-minority distance can—for dyads especially high in mutual receptiveness—have a *positive* effect on tie formation, suggesting that majority members actively seek to build ties to minority members with whom they sharply disagree when both parties are highly receptive.

Individual Differences and Networks

Findings from this investigation contribute to interdisciplinary research on how stable individual differences—for example, extraversion (Gosling et al., 2011; Feiler and Kleinbaum, 2015), self-

monitoring orientation (Sasovova et al., 2010), locus of control (Srivastava, 2015b), and network-relevant personality (Burt, 2012)—influence the emergence of social structure (for a review, see Burt et al., 2013). First, whereas prior research on receptiveness has been conducted under closely controlled laboratory conditions, we show that this construct can also predict complex social behavior in a field setting. Our diverse set of participants not only reported varying preferences for engaging with opposing views, but they also acted on these preferences over the course of several weeks of tie formation. Second, whereas previous work has thought about receptiveness to opposing views as an individual-level construct (Minson et al., 2018), we broaden this conceptualization to the level of dyads. In other words, receptiveness inheres not only within individuals but also between pairs of prospective interaction partners. This broadening of receptiveness’ scope opens the door to theorizing about and measuring the construct at the level of social groups, organizations, industries, and even nations.

Next, we establish a micro-to-macro link between individual differences and social structure (Coleman, 1990; Hedström and Swedberg, 1998) by demonstrating how the mutual receptiveness of prospective interaction partners can influence the degree of network homogeneity in a social group. Finally, in connecting receptiveness to social networks, we pave the way to understanding how the two can be mutually constitutive. For example, just as positions in network structure can shape individual cognition (Walker, 1985; Burt, 2017), so we conjecture that occupying positions that bridge political factions may, over time, shift a person’s level of receptiveness.

Attitude Polarization in Groups

This work also contributes to our understanding of the factors that shape attitude polarization in social groups (Friedkin, 1999; Macy et al., 2003; Mäs et al., 2013). Studies in this vein have theorized and found empirical support for *negative influence*—the proposition that contact between in-group and out-group members of a social group can, under certain conditions, amplify, rather than ameliorate, their differences (Kitts, 2006; Mäs and Flache, 2013; Flache et al., 2017). For

example, Liu and Srivastava (2015) report that greater interpersonal contact between U.S. senators with opposing political identities led to further divergence, rather than convergence, in their voting behavior.

Recent simulation-based experiments have shown, however, that a “renegade minority” of individuals who value out-group members and their opinions can mitigate negative intergroup relations and, in some cases, even produce attitude reversal—a state in which a majority of individuals hold positive views of the out-group (Flache, 2017). Insofar as these results apply to real, rather than just simulated, social groups, it seems likely that such individuals would be high in receptiveness. This suggests that, in settings where leaders have the ability to shape group composition and set policy, the infusion of highly receptive people or introduction of interventions designed to increase receptiveness could mitigate the tendency toward attitude polarization. Conversely, incorporating the four conceptual elements of receptiveness—curiosity, emotional regulation, suppression of derogatory views, and a willingness to discuss “taboo” topics—into agent-based models of attitude polarization may inject greater theoretical precision into these models and help to disentangle the mechanisms that give rise to attitude reversals.

Group Composition and Networks

Finally, our theory and empirical results have implications for research on group composition and networks. Prior work has examined how opportunity structures and preferences interact to shape homophilous tie formation (Ibarra, 1992; Mehra et al., 1998; Kleinbaum et al., 2013; Currarini et al., 2009). We add to this understanding by accounting for the complex psychological dynamics between members of the majority and those in the minority. Whereas most prior work on group composition and networks has considered homophilous tie formation without regard for who initiates the tie, we highlight the importance of understanding directionality. We also introduce the construct of majority-minority distance, which helps explain the conditions under which majority group members are more or less likely to form ties to minority group members with whom they dis-

agree sharply. For dyads low in mutual receptiveness, majority-minority distance had the expected negative effect on tie formation. Yet, surprisingly, we found that mutual receptiveness can even reverse the negative effects of majority-minority distance on tie formation. In dyads with high mutual receptiveness, majority members appeared to seek, rather than avoid, ties to minority members with whom they sharply disagreed. Moreover, this pattern was asymmetric: in high-receptiveness dyads, it was majority, but not minority, members who sought such contact.

These results thus reinforce the importance of majority outreach for breaking down echo chambers. Whereas many of the canonical studies focused on the actions minority group members can take to have influence (e.g., Nemeth, 1986; Ridgeway, 1978, 1982), our work emphasizes not only the propensity of the minority to engage with the majority but also the importance of the majority's readiness (i.e., receptiveness) to engage with minority viewpoints. This finding also fits with and reinforces the literature on inclusive leadership, which highlights the importance of actively soliciting minority viewpoints to improve decision-making quality in groups (Hackman, 2011; Sunstein and Hastie, 2014).

Limitations and Future Directions

The study is not without limitations, and these shortcomings also point to avenues for future research. First, although we drew upon data from three different settings that varied in political orientation, the sample included only graduate students in universities. Future research should explore how the patterns we observed would generalize to other settings. For example, in organizations, formal and semiformal structure typically serve as bases for homophilous tie formation (Biancani et al., 2014; Kleinbaum et al., 2015; Srivastava, 2015a) and may interact in complex ways with the forces of political homophily, triadic closure, and majority-minority distance. Moreover, organizations themselves can develop political ideologies (Gupta et al., 2017; Gupta and Wowak, 2017), which introduces additional variation in the social context of tie formation. Replications of this study design in formal organizations would help clarify these potential contingencies.

Next, although we collected survey data on receptiveness before network ties began to form, our study design cannot establish causality. Further work—perhaps using experimental designs in which receptiveness is manipulated—is needed to pin down the causal link between receptiveness and networks. Finally, our research design relied on survey-based measures of network formation, which are known to suffer from various forms of self-report bias (Feld and Carter, 2002; Marsden, 2011). Future work could address this limitation by pairing a network survey with network measures derived from electronic communications among group members (Quintane and Kleinbaum, 2011; Kossinets and Watts, 2009; Goldberg et al., 2016).

Conclusion

Social worlds are prone to fragmenting into echo chambers of homogeneous viewpoints, and social networks frequently act as catalysts for this splintering. Yet this process is not inexorable: the receptiveness of individuals in a social group can interrupt the regularities of network formation and thereby alter the extent to which the social group as a whole becomes an echo chamber.

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Table 1: Descriptive Statistics and Pairwise Pearson Correlations—Individual Level (N = 599)

	Mean	S.D.	Median	Min.	Max.	1	2	3	4	5	6
1 Number of Network Ties	7.346	5.063	6.000	0.000	33.000						
2 Receptiveness	4.616	0.820	4.611	1.889	7.000	0.025					
3 Political Orientation	3.002	1.730	2.000	1.000	7.000	0.016	0.193				
4 Female	0.404	0.491	0.000	0.000	1.000	-0.072	-0.145	-0.269			
5 From U.S.	0.715	0.452	1.000	0.000	1.000	0.124	-0.159	0.050	-0.014		
6 Extraversion	3.429	0.837	3.500	1.250	5.000	0.273	0.140	-0.026	0.013	-0.031	
7 Self-monitoring	3.606	0.586	3.615	1.154	5.231	0.200	0.121	-0.114	-0.002	-0.027	0.220

Note: Correlations greater than 0.1 in absolute magnitude are statistically significant at $p < 0.01$. Political orientation ranges from “Very Liberal” (1) to “Very Conservative” (7).

Table 2: Descriptive Statistics—Undirected Dyads (N = 63,775)

	Mean	Std. Dev.	Median	Min.	Max.
Network Tie	0.034	0.183	0.000	0.000	1.000
Receptiveness Sum	9.227	1.180	9.222	3.833	13.722
Receptiveness Difference	0.930	0.711	0.778	0.000	4.944
Political Orientation Sum	5.574	2.576	5.000	2.000	14.000
Political Orientation Difference	1.361	1.246	1.000	0.000	6.000
Number of Shared Ties	1.179	2.233	0.000	0.000	55.000
Both Male	0.342	0.474	0.000	0.000	1.000
Both Female	0.183	0.386	0.000	0.000	1.000
Both from U.S.	0.490	0.500	0.000	0.000	1.000
Neither from U.S.	0.094	0.291	0.000	0.000	1.000
Extraversion Sum	6.849	1.183	6.875	2.500	10.000
Extraversion Difference	0.961	0.692	0.875	0.000	3.750
Self-monitoring Sum	7.305	0.932	7.308	3.077	10.385
Self-monitoring Difference	0.579	0.454	0.462	0.000	3.462
Same Section	0.258	0.437	0.000	0.000	1.000

Note: “Difference” variables are the absolute difference of individual responses.

Table 3: Logistic Regressions—Relationship Formation in Undirected Dyads (Hypothesis 1)

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Political Orientation Sum	0.080*** (0.016)	0.082*** (0.016)	0.081*** (0.016)	0.008 (0.012)	-0.027 (0.017)	-0.027 (0.018)
Political Orientation Difference	-0.108*** (0.032)	-0.737** (0.225)		-0.439* (0.179)	-0.402* (0.173)	
Receptiveness Sum	-0.006 (0.038)	-0.090* (0.044)	-0.057 (0.039)	-0.132*** (0.038)	-0.116** (0.036)	-0.097** (0.031)
Receptiveness Difference	-0.015 (0.053)	-0.010 (0.053)	-0.010 (0.053)	-0.072† (0.040)	-0.063 (0.039)	-0.064 (0.039)
Political Orientation Diff. × Receptiveness Sum		0.067** (0.024)		0.042* (0.019)	0.039* (0.019)	
Medium Political Orient. Difference [2,3]			-1.317* (0.512)			-0.616 (0.500)
High Political Orient. Difference [4,6]				-3.763*** (1.119)		-2.523** (0.768)
Med. Pol. Orient. Diff. × Receptiveness Sum			0.118* (0.054)			0.060 (0.053)
High Pol. Orient. Diff. × Receptiveness Sum				0.358** (0.118)		0.253** (0.081)
Additional Controls	No	No	No	Yes	Yes	Yes
School-Section Fixed Effects	No	No	No	No	Yes	Yes
AIC	19040.628	19024.369	19025.831	15072.488	15060.824	15062.081
BIC	19085.943	19078.748	19098.335	15217.498	15296.465	15315.848
Log Likelihood	-9515.314	-9506.185	-9504.915	-7520.244	-7504.412	-7503.040
Deviance	19030.628	19012.369	19009.831	15040.488	15008.824	15006.081
Num. obs.	63775	63775	63775	63775	63775	63775

*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$, † $p < 0.10$. Two-way-cluster-robust standard errors appear in parentheses. Additional controls include gender (indicators both male, both female), country of origin (both U.S., neither U.S.), extroversion (dyad sum and difference), self-monitoring (dyad sum and difference), same section, number of shared ties.

Table 4: Logistic Regressions—Relationship Formation in Undirected Dyads (Hypothesis 2)

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Nb. Shared Ties	0.331*** (0.021)	0.733*** (0.115)	0.682*** (0.103)	0.681*** (0.099)	0.681*** (0.100)	0.680*** (0.099)
Receptiveness Sum	-0.089** (0.032)	0.061 [†] (0.036)	0.057 (0.035)	0.069* (0.034)	0.018 (0.041)	0.035 (0.037)
Receptiveness Diff.	-0.121** (0.043)	-0.106* (0.041)	-0.062 (0.039)	-0.055 (0.038)	-0.053 (0.039)	-0.053 (0.039)
Nb. Shared Ties × Receptiveness Sum	-0.042*** (0.011)	-0.038*** (0.010)	-0.038*** (0.010)	-0.038*** (0.010)	-0.038*** (0.010)	-0.038*** (0.010)
Political Orientation Sum			0.002 (0.012)	-0.029 [†] (0.018)	-0.028 (0.017)	-0.028 (0.018)
Political Orientation Diff.			-0.039 (0.024)	-0.033 (0.022)	-0.418* (0.180)	
Political Orientation Diff. × Receptiveness Sum					0.041* (0.019)	
Medium Political Orient. Diff. [2,3]						-0.795 (0.485)
High Political Orient. Diff. [4,6]						-2.304** (0.779)
Med. Pol. Orient. Diff. × Receptiveness Sum						0.079 (0.050)
High Pol. Orient. Diff. × Receptiveness Sum						0.230** (0.082)
Additional Controls	No	No	Yes	Yes	Yes	Yes
School-Section Fixed Effects	No	No	No	Yes	Yes	Yes
AIC	15904.053	15819.784	15011.639	14998.276	14994.763	14996.722
BIC	15940.305	15865.100	15156.649	15233.917	15239.467	15259.552
Log Likelihood	-7948.026	-7904.892	-7489.819	-7473.138	-7470.381	-7469.361
Deviance	15896.053	15809.784	14979.639	14946.276	14940.763	14938.722
Num. obs.	63775	63775	63775	63775	63775	63775

*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$, [†] $p < 0.10$ Two-way-cluster-robust standard errors appear in parentheses. Additional controls include gender (indicators both male, both female), country of origin (both U.S., neither U.S.), extraversion (dyad sum and difference), and indicator individuals are in the same section.

Table 5: Logistic Regressions—Relationship Nomination in Directed Dyads (Hypothesis 3)

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Political Orientation Sum	-0.003 (0.021)	-0.003 (0.021)	-0.012 (0.021)	0.003 (0.019)	0.010 (0.019)	0.010 (0.018)	0.003 (0.019)
Majority-Minority Distance	0.005 (0.020)	-0.253 [†] (0.137)		-0.246 [†] (0.130)	-0.253* (0.128)	-0.259* (0.126)	
Receptiveness Sum	0.036 (0.039)	0.036 (0.039)	0.023 (0.040)	-0.018 (0.034)	-0.026 (0.034)	0.046 (0.035)	0.034 (0.035)
Receptiveness Diff.	0.075 [†] (0.039)	0.074 [†] (0.040)	0.075 [†] (0.039)	0.061 [†] (0.035)	0.058 [†] (0.034)	0.058 [†] (0.034)	0.062 [†] (0.034)
Majority-Minority Dist. × Receptiveness Sum		0.028 [†] (0.015)		0.026 [†] (0.014)	0.027 [†] (0.014)	0.027* (0.014)	
Minority→Majority			-0.132 (1.100)				0.145 (0.893)
Majority→Minority				-3.061** (0.933)			-2.670* (1.041)
Minority→Majority × Receptiveness Sum			-0.015 (0.118)				-0.040 (0.096)
Majority→Minority × Receptiveness Sum				0.318** (0.099)			0.276* (0.111)
Nb. Shared Ties					0.227*** (0.016)	0.222*** (0.016)	0.483*** (0.095)
Nb. Shared Ties × Receptiveness Sum						-0.027** (0.010)	-0.027** (0.010)
Additional Controls	No	No	No	Yes	Yes	Yes	Yes
School-Section Fixed Effects	No	No	No	No	Yes	Yes	Yes
AIC	48223.925	48205.490	48190.319	43745.179	43701.255	43631.073	43626.335
BIC	48282.462	48273.783	48278.126	43911.036	43964.674	43904.249	43919.022
Log Likelihood	-24105.962	-24095.745	-24086.160	-21855.590	-21823.627	-21787.537	-21783.167
Deviance	48211.925	48191.490	48172.319	43711.179	43647.255	43575.073	43566.335
Num. obs.	127550	127550	127550	127550	127550	127550	127550

*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$, [†] $p < 0.10$ Two-way-cluster-robust standard errors appear in parentheses. ‘Minority→Majority’ indicates the focal actor is in the minority, considering someone in the majority; similarly, ‘Majority→Minority’ is an indicator that the focal actor is in the majority, considering someone in the minority.

Figure 1: Distribution of Individual Receptiveness by Political Orientation

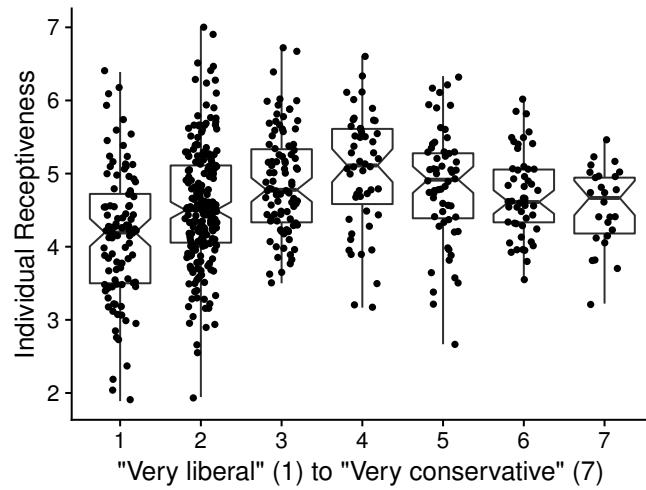


Figure 2: Distribution of Dyad Political Orientation Difference by Receptiveness Sum

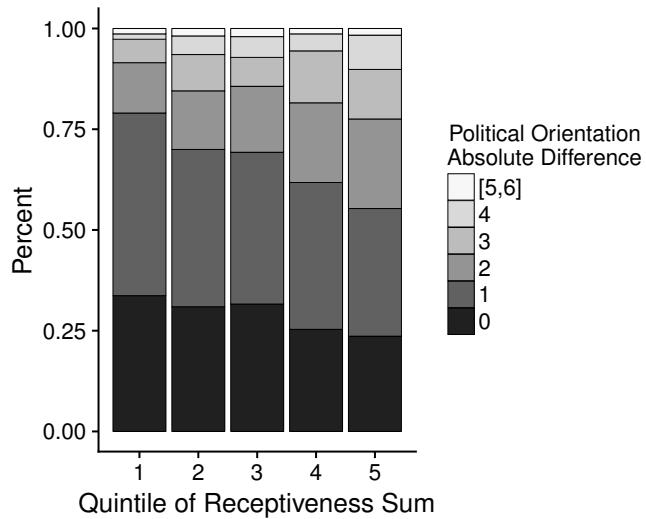


Figure 3: Average Partial Effects of Political Orientation Difference
on Probability of Tie Formation
by Receptiveness Sum (Hypothesis 1)

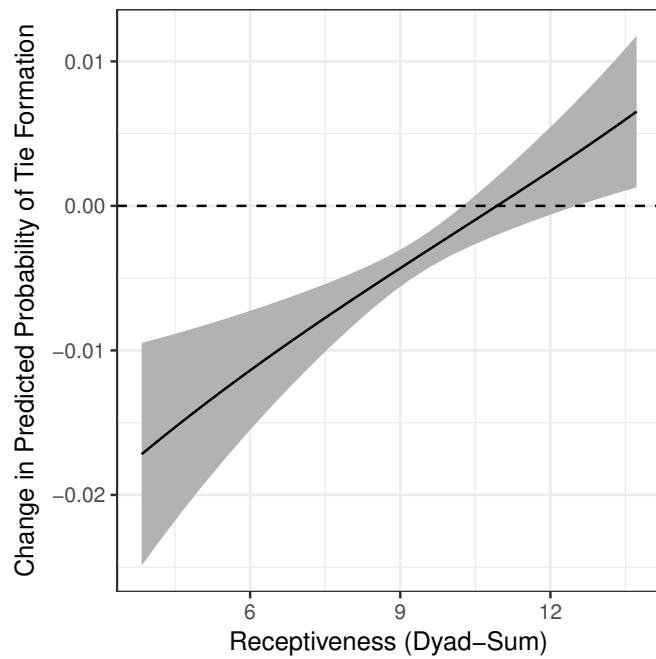


Figure 4: Average Partial Effects of Nb. Shared Ties
on Probability of Tie Formation
by Receptiveness Sum (Hypothesis 2)

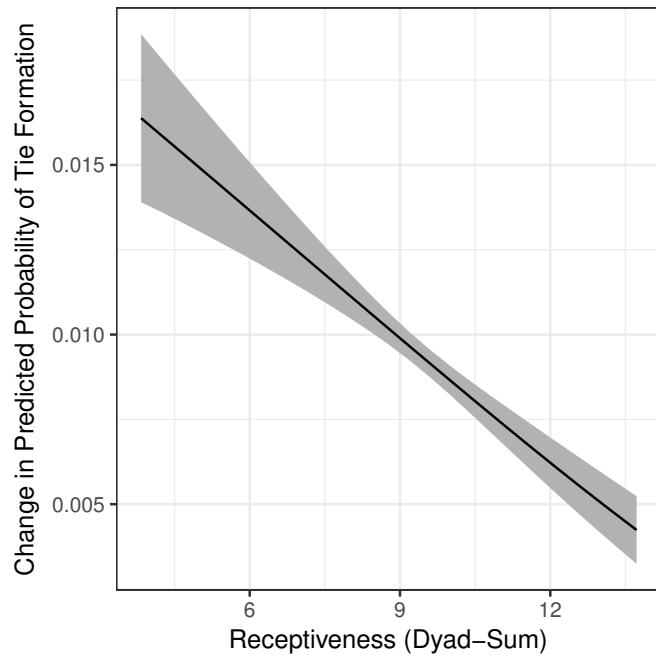
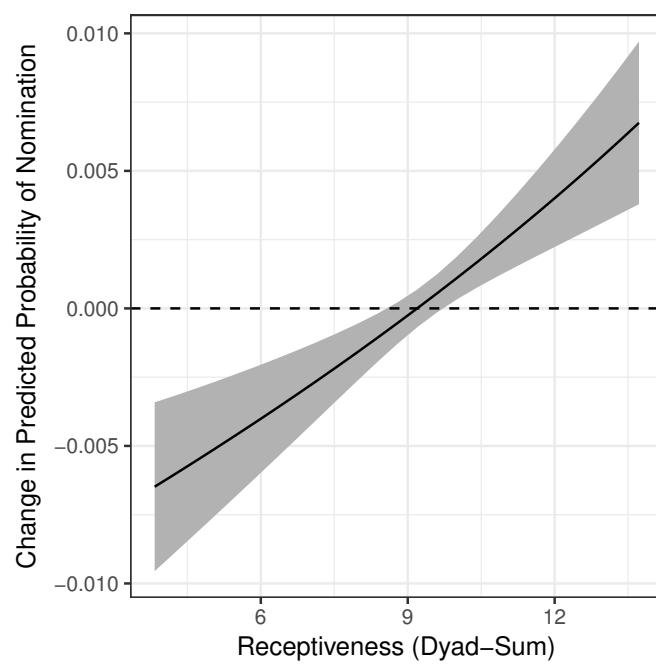


Figure 5: Average Partial Effects of Majority-Minority Distance
on Probability of Nomination
by Receptiveness Sum (Hypothesis 3)



Appendix: Receptiveness Scale

The questions below address the manner in which you deal with contrary views and opinions on social and political issues that are important to you. When answering these questions think about the hotly contested issues in current social and political discourse (for example: universal healthcare, abortion, immigration reform, gay rights, gun control, environmental regulation, etc.). Consider especially the issues that you care about the most.

Please indicate the extent to which you agree or disagree with each statement. There are no right or wrong answers. Please rate each statement as honestly and thoughtfully as possible.

Strongly Disagree	Somewhat Disagree	Slightly Disagree	Neither Agree nor Disagree	Slightly Agree	Somewhat Agree	Strongly Agree
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1. I am willing to have conversations with individuals who hold strong views opposite to my own.
2. I like reading well thought-out information and arguments supporting viewpoints opposite to mine.
3. I find listening to opposing views informative.
4. I value interactions with people who hold strong views opposite to mine.
5. I am generally curious to find out why other people have different opinions than I do.
6. People who have opinions that are opposite to mine often have views which are too extreme to be taken seriously.
7. People who have views that oppose mine rarely present compelling arguments.
8. Information from people who have strong opinions that oppose mine is often designed to mislead less-informed listeners.
9. Some points of view are too offensive to be equally represented in the media.
10. Some issues are just not up for debate.
11. Some ideas are simply too dangerous to be part of public discourse.
12. I consider my views on some issues to be sacred.
13. People who have views that oppose mine are often biased by what would be best for them and their group.
14. People who have views that oppose mine often base their arguments on emotion rather than logic.
15. Listening to people with views that strongly oppose mine tends to make me angry.

16. I feel disgusted by some of the things that people with views that oppose mine say.
17. I often feel frustrated when I listen to people with social and political views that oppose mine.
18. I often get annoyed during discussions with people with views that are very different from mine.

Scoring

Items 6-18 are reverse coded; responses on the 18 items are then averaged to create a total receptiveness index.