Dampening the Echo: Bridging Ideological Network Divides through Mutual Receptiveness to Opposing Views

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Abstract

Social worlds often splinter into echo chambers as the result of psychological and structural forces, including choice and induced homophily. This article examines how mutual receptiveness to opposing views can counteract these tendencies and thereby dampen the echo in some chambers. Using longitudinal data on dyadic interactions among 599 participants across three different field sites, we show that interaction partners who are more mutually receptive are less prone to forming ties on the basis of ideological homophily and triadic closure. We find that mutual receptiveness increases the propensity for members of the ideological majority to form ties with minority group members. Supplemental analyses reveal the emotional component of receptiveness—capacity to suspend negative emotions such as anger, frustration, annoyance, and disgust when listening to opposing viewpoints—is the primary explanation for the homogeneity-dampening effects we observe. We discuss implications for research on individual differences and networks, attitude polarization, and group composition.

Keywords: social networks, political ideology, homophily, group dynamics, receptiveness

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Democratic governance, sound judgment, and congenial relationships all require that individuals thoughtfully engage with ideas they disagree with, or even find offensive. Successfully navigating attitude conflict has myriad implications for domains ranging from parenting to international diplomacy (Judd, 1978). Indeed, in many cases, collaborations representing diverse points of view lead to better judgments and decisions (Minson, Liberman, & Ross, 2011; Soll & Larrick, 2009; Sunstein & Hastie, 2015; Surowiecki, 2005; Tost, Gino, & Larrick, 2012).

In spite of the well-documented benefits of attitude diversity, people nevertheless tend to splinter into groups of like-minded others who hold similar values, beliefs, and political preferences. Social networks have long been recognized to play a crucial role in sorting people into political "echo chambers" (Baldassarri & Bearman, 2007; DellaPosta, Shi, & Macy, 2015). Because initial network conditions constrain future connection opportunities, even slight preferences to connect with similar others can lead to social groups with compounding uniformity (Kossinets & Watts, 2009). And yet the factors—if any—that may counter these homogenizing structural forces remain largely unspecified. In this article, we examine the role of a recently identified individual difference construct—receptiveness to opposing views (Minson, Chen, & Tinsley, 2019)—in moderating people's tendency to select into social groups that lack political diversity.

Receptiveness—defined as the willingness to expose oneself to, process, and evaluate opposing views in an impartial manner—predicts a variety of individual behaviors in laboratory settings. In the current investigation, we test whether dyadic-level receptiveness (i.e., the extent to which two people are *mutually* receptive) affects the likelihood of a social network tie forming

between ideologically dissimilar individuals. Specifically, we examine whether prospective interaction partners who are more mutually receptive will be less subject to structural forces that typically dictate network formation and create segregated echo chambers: homophily and triadic closure. Furthermore, we extend prior literature (e.g., Ibarra, 1992) by examining the effect of receptiveness on tie formation between members of majority and minority groups. That is, we theorize the joint receptiveness of a dyadic pair will dampen the negative effects of ideological dissimilarity in majority members' choice to initiate a tie to minority members. We evaluate and find support for these ideas using longitudinal data on dyadic interactions among 599 participants across three different field sites. 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, 2001). Although networks can, in some cases, expose people to fresh perspectives (Burt, 2005), both psychological and structural forces often conspire to prevent individuals from forming networks that represent a breadth of viewpoints.

Psychological aversion to opposing ideological perspectives. Research in social psychology has repeatedly documented the phenomenon of selective exposure (Frey, 1986), also known as congeniality bias (Hart et al., 2009). When given access to a balanced set of information, individuals systematically avoid arguments that challenge their prior beliefs, instead preferring to engage with belief-confirming information. For instance, Boutyline and Willer (2017) found that individuals who hold extreme political views are more inclined to interact with others who reaffirm, rather than challenge, their perspectives. Using a large sample of politically engaged Twitter users, they explained this effect as a "preference for certainty" that orients

ideological extremists toward interactions that provide cognitive stability, clarity, and familiarity. Other research has shown that individuals report high levels of negative affect when exposed to contrary beliefs in laboratory settings (Dorison, Minson, & Rogers, 2019). Recent research has even demonstrated that individuals are willing to forego real money to avoid exposure to opposing views (Frimer, Skitka, & Motyl, 2017).

Structural reinforcement of homogeneous networks. Relatedly, research in social networks has identified two ubiquitous patterns of relationship formation that buffer people's exposure to new ideas and instead channel them into echo chambers of like-minded others: homophily and triadic closure. Homophily refers to the tendency of social ties to form between actors who are similar on one or more salient dimensions (McPherson, Smith-Lovin, & Cook, 2001). For example, friendships are more likely to form between people of the same race (Wimmer & Lewis, 2010), and co-workers are more likely to build ties to same-sex colleagues or those in the same formal subunit (Ibarra, 1992; Kleinbaum, Stuart, & Tushman, 2013; Srivastava, 2015a).

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* (Kossinets & Watts, 2009; McPherson & Smith-Lovin, 1987; McPherson et al., 2001). Such relationships are more likely to make people feel at ease (Meer & Tolsma, 2014) and help to avoid interpersonal disagreements (J. A. Davis, 1963).

Secondly, homophily also emerges from the opportunities for interaction that people face—a mechanism that is frequently labeled *induced homophily* (Kleinbaum et al., 2013; McPherson et al., 2001). 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 work organizations, men are more likely than women to form same-sex ties because men are simply more prevalent (Ibarra, 1992).

In the present investigation, we focus on *political homophily* (Huber & Malhotra, 2017), which is based on individuals' orientations toward liberal versus conservative values, ideological beliefs, and policy preferences (Colleoni, Rozza, & Arvidsson, 2014; McCarty, Poole, & Rosenthal, 2016; Tetlock, 1983). Political homophily has been documented across a diverse range of social contexts. For example, in the context of online dating, similarity in political orientation has been found to increase 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 & Malhotra, 2017). A study of politically engaged Twitter users found they were more likely to be exposed to and more quickly receive information from other like-minded users (Halberstam & Knight, 2016). In the context of climate policy debates, political elites sorted themselves into echo chambers, exchanging similar information with others who shared comparable policy views (Jasny, Waggle, & Fisher, 2015). In sum, across diverse settings, network formation is powerfully driven by the forces of political homophily (but see Lazer, Rubineau, Chetkovich, Katz, & Neblo, 2010 for a notable exception).

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 (Goodreau, Kitts, & Morris, 2009; Wimmer & Lewis, 2010). Referrals, exposure, and the need for balanced relationships all contribute to the closing of open triads. Referrals occur when a third party introduces two people who were previously unconnected to each other. Even in the absence of an explicit referral, however, two unconnected network contacts of a common third party are also likely to become connected because friends tend to co-

locate, participate in similar activities, and become members of the same groups (Feld, 1982). Finally, individuals have a psychological need for balanced social relations, which in turn motivates them to close open triangles (Heider, 1958; Krackhardt & Kilduff, 1999).

Triadic closure and homophily can be interrelated in that triadic closure often reflects unobserved forms of homophily. 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 will observe triadic closure when the underlying basis of relationship formation may actually be unobserved homophily. But, even in the absence of unobserved similarities, triadic closure limits the diversity of information and opinions received by the two newly connected individuals because they now share at least one interaction partner.

Social dominance of the ideological majority. In the present research we also investigate a third, relatively unexplored factor contributing to formation of homogenous network ties, one that encompasses both psychological and structural considerations: the degree to which potential interaction partners mutually align with the ideological majority. Since most groups consist of majority and minority ideological factions, we argue it is important to consider the psychological motivations and structural affordances that individuals in differing factions possess.

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, Jackson, & Pin, 2009; Kleinbaum et al., 2013). While majority group members inhabit a social context that is rich in the potential for homogeneous ties, minority group members risk losing access to valuable social resources if they segregate themselves. Thus, those in the minority are more motivated to connect to majority members than vice versa (Blau, 1977; Ibarra,

1992).

Psychologically, recognizing that one is in the majority reinforces the sense that one's worldview is correct (Nemeth, 1986) and contributes to the subjective experience of power and its associated biases (Fiske, 1993; Keltner, 2016). Furthermore, majority members are motivated to deride minority perspectives, not only out of substantive disagreement but also to maintain the majority's legitimacy (Johnson, Dowd, & Ridgeway, 2006; Ridgeway & Berger, 1986). Finally, there is 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 (Galinsky, Magee, Inesi, & Gruenfeld, 2006; Keltner, 2016; Russell & Fiske, 2010).

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 predict that members of the ideological majority will be less likely to form ties to members of the ideological minority than the other way around (i.e., as compared to the likelihood of minority members forming ties with majority members). Thus, we propose that the likelihood of tie formation decreases as a function of the (directional) ideological distance between majority and minority group members, or what we refer to as ideological majority-minority distance.

In sum, prior empirical research and our own theorizing suggest that both psychological and structural reasons jointly contribute to the formation of homogeneous networks. In the next section we turn toward examining an individual difference that we expect to attenuate these patterns.

Receptiveness to Opposing Views

Classic research in social and cognitive psychology, negotiations, and judgment and

decision-making has demonstrated that, by and large, individuals tend to give preferential treatment to ideas and people that support rather than oppose their prior beliefs (Hart et al., 2009; Lord, Ross, & Lepper, 1979; Nickerson, 1998; Ross & Ward, 1995). Recent work by Minson, Chen & Tinsley (2019), however shows that people vary in the extent to which they exhibit these tendencies. Specifically, these researchers find that the willingness to expose oneself to opposing ideological views, carefully consider those views, and evaluate them in an even-handed manner varies from person to person and can be predicted with a self-report scale of *receptiveness to opposing views*. The new scale possesses appropriate levels of convergent and discriminant validity across multiple large samples and predicts individual behavior across a time span of several weeks (See Appendix B for scale items).

The receptiveness scale consists of 18 self-report Likert scale items, which reliably load onto four subscales: (1) a diminished propensity to experience negative emotions when exposed to opposing ideological views; (2) curiosity about the nature of such views; (3) willingness to make more positive inferences regarding holders of opposing ideological views; and (4) a willingness to engage with seemingly "taboo" topics. In laboratory studies, more receptive individuals were 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 the speaker's conclusions.

Importantly, receptiveness to opposing views has been distinguished from other well-known and related constructs such as the Big Five personality inventory (John & Srivastava, 1999), as well as various measures of cognitive style, including Need for Cognition (Cacioppo, Petty, & Kao, 1984), need for Cognitive Closure (Roets & Van Hiel, 2011), and Perspective

Taking (M. H. Davis, 1980). These distinctions are both empirical and conceptual. Empirically, Minson et al. (2019) demonstrate that the receptiveness scale is a better predictor of various laboratory behaviors that signal engagement with opposing ideological views than a number of other measures. Conceptually, the distinction lies in the fact that receptiveness refers to one's tendency to engage with *opposing* views on hotly contested, self-relevant issues. By contrast, many other measures (e.g., the Openness and Extraversion subscales of the Big 5) tap individuals' reaction to information and experiences that are new or unusual but not particularly antithetical to one's own deeply held beliefs. Similarly, receptiveness is also distinct from cognitive tendencies such as Need for Cognition (Cacioppo et al., 1984) or Actively Open-Minded Thinking (Gürçay-Morris, 2016) in that the new scale does not capture individuals' *beliefs* about normatively appropriate approaches to contradictory evidence. Rather, it captures what people *actually* do in the face of political or ideological conflict. Thus, despite the proliferation of individual difference measures of related constructs, receptiveness emerges as potentially a stronger predictor of behaviors in the field that would constitute engagement with opposing views.

Receptiveness and Network Formation

Whereas early sociological accounts of network formation and change privileged the role of actors' structural positions (e.g., Mayhew, 1980; Wellman, 1983; White, Boorman, & Breiger, 1976), more recent work acknowledges the importance of human agency and individual differences in network dynamics (Emirbayer & Mische, 1998; Gulati & Srivastava, 2014; Ibarra, Kilduff, & Tsai, 2005). 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 (Asendorpf & Wilpers, 1998; Fang et al., 2015;

Ajay Mehra et al., 2001; Sasovova, Mehra, Borgatti, & Schippers, 2010). However, despite the fact that individual differences have been found to influence a variety of network characteristics—including degree, relationship quality, and structural position—there has been little research into the connection between individual differences and homophily.

Yet the potential impact on network formation of an individual difference such as receptiveness to opposing views has been anticipated in the literature. For example, in simulations, Mäs and Flache (2013) show that even small probabilities of individuals being positively influenced by others whose political opinions diverge considerably from theirs is sufficient to attenuate polarization. In the present research, we formulate and test theoretical arguments about how receptiveness can play just such a role in mitigating the tendency for people to sort into relationships on the basis of a similar political ideology.

In examining the relationship between receptiveness and network structure, we first extend the construct of receptiveness to opposing views—which was originally proposed and examined as an individual difference—to the dyadic level. Specifically, in the context of relationship formation, we propose that receptiveness should be conceptualized as a relational construct. Thus, the propensity for two people with opposing political views to form a tie will be a function of their *joint* receptiveness. We thus predict that higher mutual receptiveness between two individuals will counteract their tendency to form ties on the basis of political homophily and triadic closure. We similarly posit that higher mutual receptiveness will increase the likelihood that an individual in the social group's political majority will choose to form a tie with a counterpart in the political minority. Consistent with this theoretical focus, our main empirical analyses are conducted at the level of dyads (Mizruchi & Marquis, 2006).

The 18-item receptiveness scale consists of four distinct subscales each of which speak to

the psychological factors that enhance versus inhibit receptiveness to opposing views. These include attenuated negative emotional reactions to opposing views, intellectual curiosity, diminished derogation of opponents, and considering fewer issues as 'taboo.' Of these four, the items measuring negative emotional reactions to opposing views (including anger, frustration, disgust, and annoyance) have received the least attention in prior research on engagement with antithetical perspectives. Indeed, in our examination of the literature, we have found no other individual difference measure that captures individuals' emotional reactions to views they disagree with.

Yet it seems likely that affect, both at the individual and at the dyadic level, would be a strong driver of interpersonal behavior across the political divide. For example, prior research has demonstrated that individuals readily report negative affect in the context of disagreement (Matz & Wood, 2005) and show greater willingness to engage with opposing perspectives when they expect the affective cost to be smaller (Dorison et al., 2019). Furthermore, partisans in conflict expect their counterparts to also experience and express negative affect in the course of dialogue (Fincham, 2003; Jamieson, Valdesolo, & Peters, 2014; Van Kleef & Côté, 2018), further dampening their willingness to engage in dialogue.

Using the receptiveness scale thus affords a unique opportunity to examine the relative predictive power of the four subscales on network formation. In particular, we expect that dyad members' mutual tendency toward experiencing negative emotions in response to opposing views will play a crucial role in their likelihood of forming a tie across the ideological divide. We can further examine the extent to which emotional reactions to disagreement explain network structure to a greater or lesser extent than other factors based on "cooler" cognitive considerations, such as curiosity.

Although the receptiveness scale has been shown to be a robust predictor of engagement with opposing ideological views in laboratory settings, its effect on behavior in the field has not been examined. Individuals' self-proclaimed traits and abilities may not correspond to the ones that manifest in their behavior, and the effects of self-reports may be so small as to be undetectable in noisy, real-world conditions. Furthermore, although receptiveness has been shown to predict more even-handed cognitive processing of opposing views, prior research has not examined whether this construct affects interpersonal behavior. It may very well be the case that people who are willing to read or watch information from opposing party politicians are still not willing to be friends with those who embrace the opposing ideology. Identifying a self-reported difference that does indeed predict a set of important, normatively desirable interpersonal behaviors in a field setting affords researchers a new lens for studying political polarization and intolerance across a variety of contexts.

Research Overview and Hypotheses

We collected measures of self-reported receptiveness, extraversion, and self-monitoring from the incoming classes in three Master's degree programs. Our sample came from professionally, politically, and demographically diverse universities in the United States. The initial measures were collected before or as the students arrived on campus to start their respective programs, so they had not yet met their classmates. Several weeks into the semester we asked participants to report the membership of their social networks to examine the effect of the previously collected personality measures on network formation.

We tested three hypotheses. First, prior research demonstrates that 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 tendencies because they will be genuinely curious about each other's views and have more capacity to regulate negative emotions in the course of such interactions. 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.*

The arguments in support of Hypothesis 1 extend naturally to the case of triadic closure caused by 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 are more likely to form connections with others whose ideological perspectives differ from their own. This would make it less likely for them have closed, politically homogenous networks. Rather than automatically acting upon referrals and closing triads, they are more likely to look for diversity in attitudes, preferences, and beliefs. Thus, 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.*

Whereas the arguments supporting our first two hypotheses apply to social groups in general, our next set of arguments focus on 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.

Because of the structural and psychological affordances of belonging to the majority group, we propose that the likelihood of tie formation decreases as a function of the (directional) ideological distance between majority and minority group members, what we previously referred to as ideological majority-minority distance.

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. For example, majority-minority distance would be low if *i* and *j* embraced a similar ideological perspective on the political spectrum. Majority-minority distance would be high if *i*'s views tended toward the majority end of the political spectrum and *j*'s tended toward the minority end. Majority-minority distance would be negative if *i*'s views tended toward the minority end of the political spectrum and *j*'s tended toward the majority.

We argue mutual receptiveness will have a stronger effect on majority (as compared to minority) members' propensity to form ties that bridge the political spectrum (i.e., directed ties to ideologically distant alters). As explained above, minorities have more motivation and need to form relationships with members of a dominant majority than vice versa. Therefore, we predict that mutual receptiveness will have a stronger influence on the dyadic ties reported by individuals in the political majority than on those reported by individuals in the political minority. 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 participant sample included 599 graduate students from these three institutions. This sample was well-suited to our research aims for three 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. Thus, the boundaries of the network were clearly delineated (Marsden, 1990). Finally, as a relatively unstructured work environment, graduate school is a context in which relationships have more potential to arise from personal preferences and choices, allowing us to capture the (potentially subtle) effect of a psychological variable.

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 (i.e., sub-cohort of their graduating class) 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. For Hypotheses 1 and 2, we focus on confirmed ties (i.e., instances where both parties reported the existence of a tie). For Hypothesis 3, which focuses on the choices of the focal actor, we consider all instances of reported ties by the actor.

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. For Hypothesis 3, we transformed the homophily measure into a measure of majority-minority distance (described below).

Political orientation. We measured political orientation using a seven-point scale ranging from "Very Liberal" (1) to "Very Conservative" (7). On this scale, a response of four 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. (2019). These items assess respondents' willingness to engage with ideological 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). Because the receptiveness scale is comprised of four subscales, we repeated our analyses using a single measure constructed by averaging responses on all 18 items, as well as measures of each of the individual subscales constructed by averaging the items in each subscale separately. A full list of items and the subscales they are associated with appears in Appendix A. As noted above, Minson et al. (2019) 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

Given the sizable literature investigating the role of extraversion and self-monitoring orientation in social networks (e.g., Asendorpf & Wilpers, 1998; Fang et al., 2015; Feiler & Kleinbaum, 2015; Ajay Mehra et al., 2001; Sasovova et al., 2010), we included measures of

these constructs as control variables.[1] We measured extraversion using eight items from the Big Five Inventory (John & Srivastava, 1999) and self-monitoring orientation using thirteen items developed by Lennox and Wolfe (1984). We also controlled for gender, country of origin (whether from the United States or not), and whether individuals in a dyad belonged to the same section. We also included school-section fixed effects.

Analytical Strategy

Although all three hypotheses require analysis at the dyad level, the hypotheses differ in the suggested direction of the dyad. In particular, our outcome of interest in Hypotheses 1 and 2 is a *mutually recognized relationship,* and we do not distinguish between the individuals in the dyad. Thus, analyses based on undirected dyads are appropriate for the first two hypotheses. In contrast, Hypothesis 3 considers potential asymmetry in majority and minority members' willingness to connect and thus focuses on the *nomination* of one actor by a another. Here the distinction between members of the dyad is important, and thus analyses based on directed dyads are appropriate. Second, two of our hypotheses involve divergence effects—for Hypothesis 1, divergence in political orientation; for Hypothesis 3, distance in majority-minority orientation—and how these effects are moderated by mutually held receptiveness.

Both of these factors—whether or not analyses are based on directed or undirected dyads and the need to estimate the effects of divergence—have important implications for our modeling choice. Fafchamps and Gubert (2007) provide a framework for modeling dyadic network data that addresses both undirected and directed dyads, including the appropriate

[1] In robustness checks, we directly examined whether these individual differences attenuated homophily and triadic closure effects in a similar manner as receptiveness. As reported below, we find receptiveness contours network formation in a manner that is independent and distinct from that of these constructs.

specification of regressors given dyad directionality. This approach is appealing because it is rooted in social network research, yields results that are easy to interpret, and provides a common structure to all of our models. In particular, Fafchamps and Gubert's (2007) approach estimates divergence effects by using difference scores as regressors: absolute differences when dyads are undirected and algebraic differences when dyads are directed.

Edwards (1994) notes that the use of difference variables makes assumptions about the nature of congruence (divergence) effects and advocates the use of polynomial regression and response surface plots as alternatives. We discuss and test these assumptions below and demonstrate in Appendix B that polynomial regressions yield results that are largely consistent with those obtained using difference scores. Given that the polynomial regression results are more complicated to present and interpret and that the framework of polynomial regression is ill-suited to testing Hypothesis 2, we report difference score results as our main results and the polynomial regression results in Appendix B.

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.[2] To test Hypotheses 1 and 2, we introduce interaction terms between absolute value in political orientation distance and mutual receptiveness, as well as between the number of shared ties and mutual receptiveness. Our saturated model takes the following form:

$$
\begin{aligned}
NetworkTie_{ij} = \alpha &+ \beta_1\left|(Political_i - Political_j)\right| + \beta_2\left(Political_i + Political_j\right) \\
&+ \beta_3\left|(Recept_i - Recept_j)\right| + \beta_4\left(Recept_i + Recept_j\right) + \beta_5 SharedTies_{ij} \\
&+ \beta_6\left|(Political_i - Political_j)\right| \times \left(Recept_i + Recept_j\right) \\
&+ \beta_7 SharedTies_{ij} \times \left(Recept_i + Recept_j\right) + \text{DifferenceControls}_{ij}\mathbf{\Gamma_1} \\
&+ \text{SumControls}_{\text{ij}}\mathbf{\Gamma}_2 + \text{DyadAttributeControls}_{ij}\mathbf{\Gamma}_3 + u_{ij}
\end{aligned}
\tag{2}
$$

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*. $\text{DifferenceControls}_{\text{ij}}$ 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 $\text{DyadAttributeControls}_{ij}$ includes indicators that dyad members are both female, both male, both

[2] As Fafchamps and Gubert (2007) observe, effects of sums (e.g., β_2) are identified only when individuals vary in degree (i.e., have different numbers of connections). Because we did not set an upper or lower bound on the number of fellow students that 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).

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-tie definition: while self-reports of outdegree are especially susceptible to bias (Feld & 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.[3]

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

[3] For 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 between political orientation difference and receptiveness sum.

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 the focal individual compares to his or her potential interaction partners in alignment with the majority and minority factions. This requires a rescaling of the political orientation scale and a move to algebraic rather than absolute difference.

To measure majority-minority distance, we first rescale political orientation (in our two majority-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 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:

$$\begin{aligned} Nomination_{ij} = \alpha + \ & \beta_1\left(MajorityMinorityDistance_{ij}\right) + \ \beta_2\left(Political_i + Political_j\right) \\ & + \beta_3\left(Recept_i - Recept_j\right) + \beta_4\left(Recept_i + Recept_j\right) + \beta_5 SharedTies_{ij} \\ & + \beta_6\left(MajorityMinorityDistance_{ij}\right) \times \left(Recept_i + Recept_j\right) \\ & + \beta_7 SharedTies_{ij} \times \left(Recept_i + Recept_j\right) + \mathrm{DifferenceControls_{ij}}\boldsymbol{\Gamma_1} \\ & + \mathrm{SumControls_{ij}}\boldsymbol{\Gamma_2} + \mathrm{DyadAttributeControls_{ij}}\ \boldsymbol{\Gamma_3} + u_{ij} \end{aligned} \tag{4}$$

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 $\mathrm{DifferencesControls}_{ij}$ matrix, the difference variables use simple rather than absolute

differences, and the $\text{DyadAttributeControls}_{ij}$ 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, Wang, & Ai, 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 our models, we account for the non-independence of dyadic interactions using two-way-cluster-robust standard errors (Cameron, Gelbach, & Miller, 2011), following common practice in prior studies (Biancani, McFarland, & Dahlander, 2014; Kleinbaum et al., 2013; Srivastava, 2015a). In robustness checks, we alternatively use the Multiple Regression Quadratic Assignment Procedure (MRQAP; see Hubert & Schultz, 1976; Krackhardt & Kilduff, 1999) to account for the non-independence of observations and obtain results that are substantively similar.

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, while extraversion and self-monitoring are each positively and significantly correlated with number of network ties, receptiveness is not ($r = 0.025$, $p = 0.549$). We find a modest and significant positive correlation between political orientation (scaled from 1: "Very Liberal", to 7:

"Very Conservative") and individual-level receptiveness ($r = 0.193$, $p < 0.001$). That is, in our sample, more conservative individuals tended to be more receptive.[4]

[Insert Table 1 about here]

These correlations suggest that highly receptive individuals do not necessarily cultivate larger networks than others. Yet it leaves open the question of whether they build more politically diverse networks. The stacked percent plot in Figure 1 provides initial descriptive evidence that they indeed do. The figure was prepared using all dyads that had a realized relationship (i.e., both parties nominated the other as one with whom they had formed a relationship). It summarizes the distribution of political orientation difference dyads in a given 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 1 shows, the overwhelming majority (79 percent) of dyads in the lowest quintile of receptiveness sum differ by zero or one on the political orientation scale. As mutual receptiveness increases, the share of highly homogeneous dyads decreases, with 45 percent of dyads in the highest receptiveness quintile exhibiting a political orientation (absolute) difference of two or greater. In sum, Figure 1 shows how differences in receptiveness at the dyadic level

[4] In analyses not reported, we examined the distributions of receptiveness for each level of political orientation. We found that while "Very Liberal" respondents had the lowest median value of receptiveness, moderate respondents—those with a response of four on the seven-point political orientation scale—had the highest median receptiveness. 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 test our hypotheses using non-moderates only. We find results that are consistent with our main analyses.

translate into aggregate patterns of network homogeneity.

[Insert Figure 1 about here]

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* suggests a baseline probability of tie formation of 3.4 percent, which serves as a benchmark for interpreting the effect sizes reported below.

[Insert Table 2 about here]

Receptiveness and Homophily Analyses

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, as well as school-section fixed effects. In this model, we find a negative, statistically significant main effect for political orientation difference (-0.079, $p = 0.002$). This provides support for the baseline expectation that individuals with different political beliefs are less likely to form a relationship.[5]

[Insert Table 3 about here]

[5] In 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.

Model 2 of Table 3 includes an interaction between political orientation difference and receptiveness sum. The estimated coefficient for this interaction is positive and statistically significant (0.059, $p = 0.005$). Figure 2 presents a partial effects plot corresponding to Model 2.[6] The figure illustrates how the average partial effect of political orientation difference (change in predicted probability of a relationship tie) 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. Interestingly, 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 −1.2 percent at the lowest level of receptiveness to about 0.7 percent at the highest. In view of a baseline probability of tie formation of 3.4 percent from Table 2 above, this range in predicted probability change is substantive.

[Insert Figure 2 about here]

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 of these bins for the continuous (absolute) difference measure. We designated a

[6] Figures 2 through 4 were prepared using the margins package in R (Leeper, 2019). 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.

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 (64.5 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, increased differences in political perspective decreases the likelihood of tie formation, with a more pronounced effect for high-difference dyads (-3.274, $p < 0.001$) than for medium-difference dyads (-1.092, $p = 0.038$). The interactions with receptiveness are proportionately different in magnitude (0.102, $p = 0.064$ for medium-difference dyads; 0.315, $p = 0.002$ for high-difference dyads).

These results also help dismiss an alternate explanation for our finding from Model 2 and Figure 2: namely, that receptiveness is simply an instrument for political moderateness. 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 and Model 3 respectively by including the additional controls described above. The interaction effect size in Model 3 is somewhat attenuated but remains robust to these additional controls. In Model 5, we retain the same pattern of results as in Model 3 for high political orientation difference and its interaction with receptiveness, although 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, complementary receptiveness variables, and school-section fixed effects. 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 (0.318, $p < 0.001$).

[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 (−0.038, $p < 0.001$). Figure 3 presents the accompanying partial effects plot for this interaction. As in Figure 2, 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 3 about here]

The other models in Table 4 introduce additional controls and interactions for robustness.

In Model 3, we include additional controls, and Model 4 includes the political orientation and receptiveness sum interaction of interest to Hypothesis 1. In Model 5, we again employ discrete bins of political orientation difference, as we used in Models 3 and 5 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 2). But these results do not identify whether majority group members or minority group members are more likely to elect to bridge ideological divides, nor whether receptiveness dampens any such asymmetry in choosing to engage with the 'other side'.

As noted above, the models in Table 5 use directed rather than undirected dyads. Changing the dependent measure to directed ties affects both sample sizes and the interpretation of results. Inspecting the number of observations for these models, we see in Table 5 that this shift naturally results in a doubling of the sample size from 63,775 to 127,550 because we have an observation for each side of the dyad. Because the dependent variable is an indicator of nomination (i.e., one-sided reporting of a relationship) 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 mutually confirmed 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, receptiveness difference, and school-section fixed effects. Counter to our expectations, there was no statistically significant main effect of majority-minority distance on nomination (0.005, $p = 0.275$). 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 (−0.262, $p = 0.057$) and a positive, marginally significant interaction with receptiveness (−0.028, $p = 0.056$). This pattern of results is generally consistent with Hypothesis 3, though we again prepared a partial effects plot to aid interpretation.

Figure 4 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 effectively zero (i.e., values on the y-axis are centered around zero); however, this effect is intriguingly contoured by levels of receptiveness. When mutual receptiveness is low, majority-minority distance has a negative effect on the probability of nomination. When mutual receptiveness is instead high, this disparity in opinions actually has a positive effect on nomination. Whereas Hypothesis 3 referred to the *dampening* effect of receptiveness on the negative majority-minority distance effect, these results suggest that majority-minority difference may have positive appeal in the context of mutual receptiveness.

[Insert Figure 4 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 heterogeneous dyad. As we see 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 (-3.191, $p < 0.001$), and this negative effect is positively moderated by receptiveness sum (0.327, $p < 0.001$). Minority-group members in heterogeneous dyads are no more or less likely to nominate a majority member than are individuals to nominate someone in a relatively homogeneous dyad (-0.200, $p = 0.869$), and there is no significant interaction with receptiveness sum (-0.014, $p = 0.915$).

Model 4 of Table 5 introduces additional controls. We obtain the same pattern of results as reported in Model 2. In Model 5, 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 our previous tests of Hypothesis 2, we again obtain a positive effect for number of shared ties (0.469, $p < 0.001$) and a negative interaction effect with receptiveness (-0.026, $p = 0.007$), and the findings for majority-minority distance are the same. Model 6 extends Model 5 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 4) is intriguing. This finding provides stronger evidence for our general assertion that receptiveness to opposing views contributes to more diverse networks. However, it also suggests that minority-group members are less likely to nominate majority-group members, even in the context of mutual receptiveness. We consider implications of these results below.

Supplemental Analysis: Decomposing Results by the Subscales of Receptiveness

To further understand the role of receptiveness in mitigating the tendency for people to form politically homogeneous ties, we repeated our analyses using each of the four receptiveness subscales in the place of the aggregate receptiveness scale. These subscales include decreased negative emotions associated with exposure to opposing views, intellectual curiosity about opposing views, a diminished tendency to derogate opponents, and greater willingness to engage in consideration of taboo issues. For three of these subscales (negative emotions, derogation of opponents, and taboo issues), the items in the scale were phrased such that greater agreement indicated lower receptiveness. Thus, we reverse coded the participant responses on these items. Although we did not derive formal hypotheses about these subscales, we conjectured—as noted in the introduction—that the emotions subscale might prove to be especially important in

explaining when two people might successfully counteract the tendency to form politically homogenous network ties.

Table 6 presents tests of Hypothesis 1 using these subscales. As in our prior tests of Hypothesis 1 (see Table 3), the dependent variable is an indicator that the given undirected dyad has a mutually recognized network tie, and we estimated coefficients using logistic regression. Models 1 through 4 are minimal models that include complementary sum and difference variables for political orientation and one of the four receptiveness subscales, interactions, and school-section fixed effects. Models 5 through 8 extend these minimal models to include additional controls and all receptiveness subscales. Model 9 is a saturated model that includes all subscale interactions simultaneously. In Models 1 through 4, we see initial evidence that each receptiveness subscale positively moderates the negative effect of political orientation difference on tie formation: each interaction coefficient is positive and three are statistically significant, while one (subscale 4: taboo issues—reversed) is marginally significant.

As we add controls in Models 5 through 8, we see marginally significant support for Hypothesis 1 persist with subscale 1 (negative emotions – reversed) and subscale 2 (intellectual curiosity); however, in Model 9, we find that none of the subscale interactions is statistically significant. In all, we find suggestive evidence that the ability to suspend negative emotional reactions to opposing views and intellectual curiosity are particularly important in dampening political orientation homophily effects, though these results also indicate that the evidence based on the complete receptiveness scale (e.g., Table 3) remains the most compelling.

We similarly retested Hypothesis 2 using the subscales. In Table 7, Models 1 through 4 are minimal models containing number of shared ties, receptiveness subscale variables, interactions, and school-section fixed effects; Models 5 through 8 introduce additional controls;

and Model 9 is a saturated model containing all shared ties and subscale interactions simultaneously. Here, we find support for Hypothesis 2 using three of the four subscales: subscale 1 (negative emotions – reversed), subscale 3 (derogation of opponents - reversed), and subscale 4 (taboo issues – reversed). This support is robust to additional controls. However, in the saturated model (Model 9 of Table 7), only the interaction between subscale 1 (negative emotions – reversed) and shared ties is statistically significant, suggesting that the dampening effect of receptiveness on dyads' tendency towards triadic closure is especially driven by the affective component of receptiveness.

Lastly, we retested Hypothesis 3 using receptiveness subscales. In Table 8, we see evidence that subscale 1 (negative emotions – reversed) and subscale 4 (taboo issues - reversed) both positively moderate negative effects of majority-minority distance (Models 1 and 4), and that these effects are robust to additional controls (Models 5 and 8) and the inclusion of all subscale interactions (Model 9). These findings suggest that individuals more aligned with the consensus than a focal counterpart are more likely to overcome this structural distance when (a) both parties suspend negative emotional reactions to opposing views, or (b) when both parties are willing to discuss taboo issues.

In sum, we draw two main conclusions from the subscale analyses. First, in evaluating how the mutual receptiveness of a dyadic pair counteracts their tendency to form politically homogeneous ties, the full receptiveness scale is more predictive than any one of its four components. Second, of the four subscales, the negative emotions subscale appears to be the most consistently predictive—though the other subscales do seem to matter for some network formation mechanisms.

Robustness Check: Polynomial Regression

While the Fafchamps and Gubert (2007) modeling approach is consistent with the empirical approach used in prior network studies and provides a unifying framework for testing our three disparate hypotheses, it relies on difference scores, which make potentially problematic assumptions. In particular, Edwards (1994) argues that the assumptions underlying the use of difference scores are sometimes violated and, in those cases, advocates for the use of polynomial regression as an alternative analytical approach.

Because two of our three hypotheses (H1 and H3) involve divergence effects and the role of mutual receptiveness in moderating these effects, we examined whether the assumptions underpinning the difference-score approach were justified and, to evaluate the robustness of our findings, also implemented Edward's (1994) proposed polynomial regression approach. A summary of this analytical approach and its associated results are presented in Appendix B.

Overall, the polynomial regression results largely corroborate our main findings. At the same time, the three-dimensional surface plots that can be generated from the polynomial regressions also provide additional nuance. Specifically, we find that the tendency to connect with like-minded others is most pronounced for individuals with 'very liberal' political orientations and for majority-group members. Also, we find that, while receptiveness appears to dampen majority-group homophily effects, minority-group homophily effects persist even in the presence of receptiveness and may even become more pronounced in such dyads. This may help explain the receptiveness moderation effects reported in Table 5 and Figure 4: while receptiveness attenuates homophily effects for majority-group members, this dampening effect is at least partially offset by persistent or amplified homophily effects for minority-group members. A more extensive discussion of our polynomial regression findings appears in Appendix B.

Additional Robustness Checks

In additional robustness checks, we also evaluated the role of receptiveness in tie formation relative to other established constructs such as extraversion and self-monitoring orientation. For example, an alternative explanation for the results in support of Hypothesis 1 is that receptiveness partially reflects one's propensity to be more outgoing (extraversion) or to exercise chameleon-like adaptability in engaging with diverse interaction partners (self-monitoring). To assess these and other alternative explanations for our results, we replicated our analyses reported in Tables 3 through 5 substituting mutual levels of extraversion and self-monitoring for mutual receptiveness in the interaction terms of interest. We also estimated saturated models that included both our original interaction terms and new interaction terms involving either extraversion or self-monitoring.

We find that mutual extraversion moderates neither the negative effect of political orientation difference nor the negative effect of majority-minority distance. That is, we have no evidence to suggest that politically diverse dyads high in extraversion are any better than others at deflecting the negative effect of belief differences on tie formation. While we find that extraversion performs a similar dampening role on the positive effect of number of shared ties as receptiveness, in saturated models, we retain evidence of an independent moderating effect of receptiveness on triadic closure (though the significance level of Wald tests is attenuated from the $p < 0.001$ level of significance (as reported in Table 4) to the $p < 0.05$ level).

We find some support for mutual self-monitoring performing a similar moderating role as receptiveness in dampening the effects of homophily and—consistent with the findings Sasovova and colleagues (2010)—triadic closure, but the evidence is not as consistent as that for receptiveness, and there is no evidence of self-monitoring moderating the negative effect of

majority-minority distance. All of our original hypotheses are robust to including interactions involving self-monitoring.

In sum, we find that mutual receptiveness has an effect on relationship formation that is distinct and independent from the effects of other individual differences, and we find that our original findings are generally robust to additional interactions.

Discussion and Conclusion

We examined 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' 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 extended work on (directional) ideological distance between majority and minority group members, theorizing 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 dyad members are highly receptive. Supplemental analyses suggest that the emotional component of receptiveness—that is, the ability to regulate affective reactions such as anger, frustration, disgust, and annoyance when confronted with antithetical perspectives —plays an especially important role in counteracting people's tendencies to form politically homogeneous ties.

Contributions

We contribute to the prior literature in several notable ways. First, we affirm a micro-to-macro link between individual differences and social structure (Coleman, 1990; Hedström & Swedberg, 1998). Our findings inform interdisciplinary research on how stable individual differences—for example, extraversion (Feiler & Kleinbaum, 2015; Gosling, Augustine, Vazire, Holtzman, & Gaddis, 2011), 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, Kilduff, & Tasselli, 2013). We extend this literature by looking beyond individual effects to examine whether pair-level compatibility of traits (viz., receptiveness) helps to overcome robust effects of homophily on relationship formation.

Second, 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 relationship formation. Additionally, whereas previous work has thought about receptiveness to opposing views as an individual-level construct (Minson et al., 2019), 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 the scope of the construct opens the door to theorizing about and measuring the construct at the level of social groups, organizations, and even nations. Our supplemental analyses suggest further that different components of the receptiveness scale—in our case, the emotion subscale—may play specific roles in shaping group outcomes.

Furthermore, in connecting receptiveness to formation of social networks, we pave the

way to understanding how the two constructs can be mutually constitutive. For example, just as positions in network structure can shape individual cognition (Burt, 2017; Walker, 1985), so we conjecture that occupying positions that bridge political factions may, over time, shift a person's level of receptiveness and associated behaviors.

In addition, this work contributes to our understanding of the factors that shape attitude polarization in social groups (Friedkin, 1999; Macy, Kitts, Flache, & Benard, 2003; Mäs, Flache, Takács, & Jehn, 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 (Flache et al., 2017; Kitts, 2006; Mäs & Flache, 2013). 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, 2018). Insofar as these results apply to real, rather than simulated, social groups, it seems likely that such renegades 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.

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 homogeneous tie formation (Currarini et al., 2009; Ibarra, 1992; Kleinbaum et al., 2013; A. Mehra, Kilduff, & Brass, 1998). 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 homogeneous tie formation without regard for who initiates the tie, we highlight the importance of understanding directionality and examine the conditions under which majority group members are more or less likely to form ties to minority group members with whom they disagree 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 & Hastie, 2014).

Limitations and Future Directions

The study is not without limitations, and these 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. Moreover, it seems likely that the conservative students who choose to enroll in a liberal university and the liberal students who opt to join a conservative university differ in important respects from the general populations of conservatives and liberals. We therefore urge caution in overgeneralizing these results to other social groups. Replications of this design across a wide range of social groups would assess robustness and identify potential scope conditions of these effects.

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 & 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 (Goldberg, Srivastava, Manian, Monroe, & Potts, 2016; Kossinets & Watts, 2009; Quintane & Kleinbaum, 2011).

Conclusion

In sum, 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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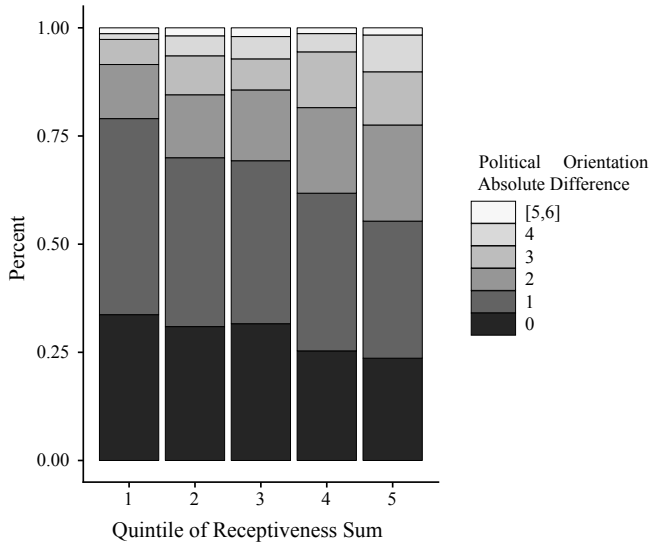

Figure 1. Distribution of Political Orientation Difference by Quintiles of Receptiveness

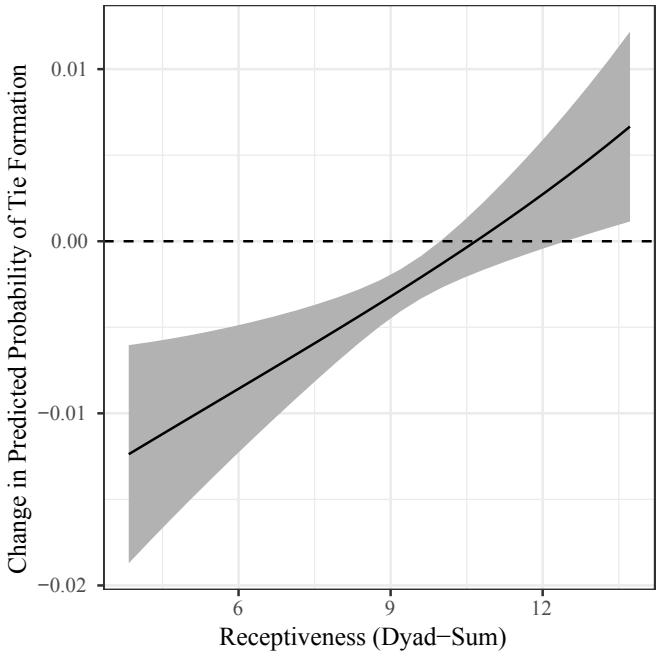

Figure 2. Average Partial Effects of Political Orientation Difference on Probability of Tie Formation by Receptiveness Sum (Hypothesis 1)

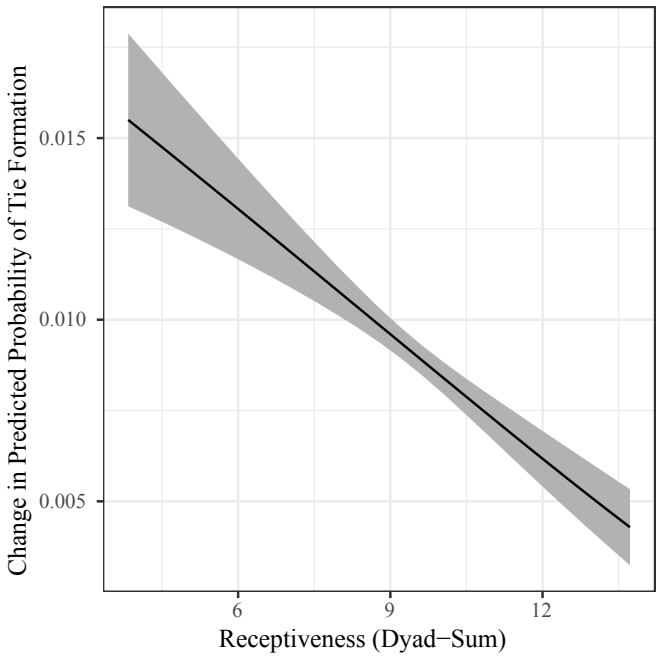

Figure 3. Average Partial Effects of Nb. Shared Ties on Probability of Tie Formation by Receptiveness Sum (Hypothesis 2)

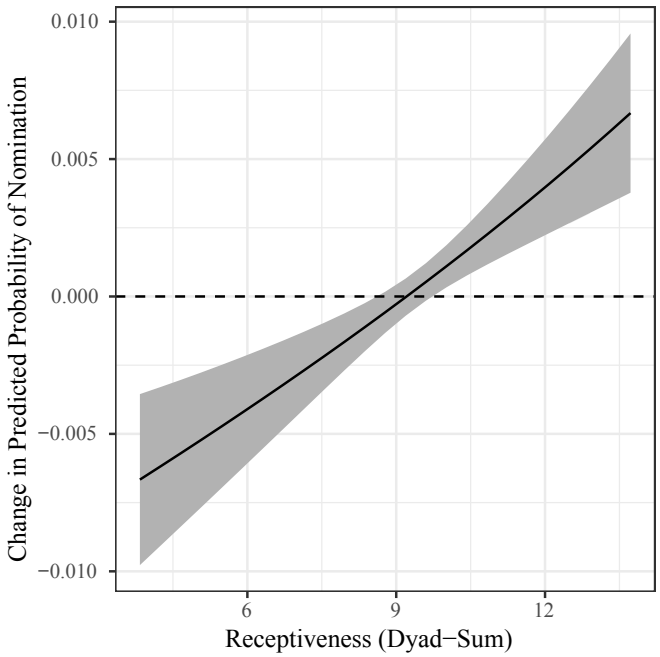

Figure 4. Average Partial Effects of Majority-Minority Distance on Probability of Nominationby Receptiveness Sum (Hypothesis 3)

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 2	7.346	5.063	6.000	0.000	33.000						
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: Tie Formation in Undirected Dyads (Hypothesis 1)

	Model 1	Model 2	Model 3	Model 4	Model 5
Political Orientation Sum	-0.055^{**}	-0.051^{**}	-0.052^{**}	-0.026	-0.026
	(0.020)	(0.019)	(0.019)	(0.016)	(0.016)
Political Orientation Diff.	-0.079^{**}	-0.634^{**}		-0.430^{*}	
	(0.025)	(0.199)		(0.183)	
Receptiveness Sum	0.021	-0.053	-0.024	-0.121^{***}	-0.102^{***}
	(0.033)	(0.040)	(0.035)	(0.035)	(0.030)
Receptiveness Diff.	-0.014	-0.010	-0.012	-0.061	-0.062
	(0.050)	(0.050)	(0.050)	(0.039)	(0.039)
Political Orientation Diff. × Receptiveness Sum		0.059^{**}		0.042^{*}	
		(0.021)		(0.019)	
Medium Political Orient. Diff. [2,3]			-1.092^{*}		-0.680
			(0.529)		(0.538)
High Political Orient. Diff. [4,6]			-3.274^{***}		-2.662^{***}
			(0.960)		(0.795)
Med. Pol. Orient. Diff. × Receptiveness Sum			$0.102^{\dagger}$		0.067
			(0.055)		(0.056)
High Pol. Orient. Diff. × Receptiveness Sum			0.315^{**}		0.267^{**}
			(0.100)		(0.082)
Additional Controls	No	No	No	Yes	Yes
AIC	18096.100	18084.362	18086.555	15053.197	15054.225
BIC	18367.993	18365.319	18385.638	15415.722	15434.876
Log Likelihood	−9018.050	−9011.181	−9010.278	−7486.599	−7485.112
Deviance	18036.100	18022.362	18020.555	14973.197	14970.225
Num. obs.	63775	63775	63775	63775	63775

$^{***}p < 0.001$, $^{**}p < 0.01$, $^{*}p < 0.05$, $^{\dagger}p < 0.10$. Two-way-cluster-robust standard errors appear in parentheses. All models include school-section fixed effects. 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: Tie Formation in Undirected Dyads (Hypothesis 2)

	Model 1	Model 2	Model 3	Model 4	Model 5
Nb. Shared Ties	0.318^{***}	0.680^{***}	0.674^{***}	0.675^{***}	0.674^{***}
	(0.017)	(0.090)	(0.086)	(0.086)	(0.085)
Receptiveness Sum	-0.074^{**}	$0.062^{\dagger}$	0.065^{*}	0.011	0.029
	(0.029)	(0.032)	(0.032)	(0.042)	(0.037)
Receptiveness Diff.	-0.095^{*}	-0.085^{*}	-0.053	-0.051	-0.052
	(0.039)	(0.039)	(0.039)	(0.039)	(0.039)
Nb. Shared Ties × Receptiveness Sum		-0.038^{***}	-0.038^{***}	-0.038^{***}	-0.038^{***}
		(0.009)	(0.008)	(0.008)	(0.008)
Political Orientation Sum			$-0.028^{\dagger}$	-0.026	-0.026
			(0.016)	(0.016)	(0.016)
Political Orientation Diff.			$-0.037^{\dagger}$	-0.450^{*}	
			(0.022)	(0.185)	
Political Orientation Diff. × Receptiveness Sum				0.044^{*}	
				(0.019)	
Medium Political Orient. Diff. [2,3]					$-0.866^{\dagger}$
					(0.515)
High Political Orient. Diff. [4,6]					-2.450^{**}
					(0.801)
Med. Pol. Orient. Diff. × Receptiveness Sum					0.086
					(0.053)
High Pol. Orient. Diff. × Receptiveness Sum					0.244^{**}
					(0.082)
Additional Controls	No	No	Yes	Yes	Yes
AIC	15350.179	15285.241	14993.079	14988.737	14990.533
BIC	15613.010	15557.134	15355.604	15360.324	15380.247
Log Likelihood	−7646.090	−7612.620	−7456.540	−7453.368	−7452.267
Deviance	15292.179	15225.241	14913.079	14906.737	14904.533
Num. obs.	63775	63775	63775	63775	63775

$^{***}p < 0.001$, $^{**}p < 0.01$, $^{*}p < 0.05$, $^{\dagger}p < 0.10$ Two-way-cluster-robust standard errors appear in parentheses. All models include school-section fixed effects. Additional controls include gender (indicators both male, both female), country of origin (both U.S., neither U.S.), extraversion (dyad level 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
Political Orientation Sum	0.021	0.021	0.010	0.011	0.011	0.004
	(0.019)	(0.019)	(0.020)	(0.019)	(0.019)	(0.019)
Majority-Minority Distance	0.005	$-0.262^{\dagger}$		$-0.246^{\dagger}$	-0.250^{*}	
	(0.019)	(0.138)		(0.129)	(0.127)	
Receptiveness Sum	0.031	0.031	0.017	-0.022	0.047	0.035
	(0.039)	(0.039)	(0.040)	(0.034)	(0.035)	(0.035)
Receptiveness Diff.	$0.076^{\dagger}$	$0.074^{\dagger}$	$0.076^{\dagger}$	$0.061^{\dagger}$	$0.061^{\dagger}$	$0.065^{\dagger}$
	(0.040)	(0.040)	(0.040)	(0.035)	(0.035)	(0.034)
Majority-Minority Dist. × Receptiveness Sum		$0.028^{\dagger}$		$0.026^{\dagger}$	$0.026^{\dagger}$	
		(0.015)		(0.014)	(0.014)	
Minority → Majority			-0.200			0.141
			(1.210)			(0.908)
Majority → Minority			-3.191^{***}			-2.606^{*}
			(0.834)			(1.057)
Minority → Majority × Receptiveness Sum			-0.014			-0.041
			(0.131)			(0.097)
Majority → Minority × Receptiveness Sum			0.327^{***}			0.269^{*}
			(0.088)			(0.113)
Nb. Shared Ties				0.219^{***}	0.469^{***}	0.464^{***}
				(0.016)	(0.094)	(0.093)
Nb. Shared Ties × Receptiveness Sum					-0.026^{**}	-0.026^{**}
					(0.010)	(0.010)
Additional Controls	No	No	No	Yes	Yes	Yes
AIC	46892.369	46873.122	46851.894	43642.506	43578.190	43572.206
BIC	47194.813	47185.322	47183.607	44042.513	43987.954	44001.482
Log Likelihood	−23415.184	−23404.561	−23391.947	−21780.253	−21747.095	−21742.103
Deviance	46830.369	46809.122	46783.894	43560.506	43494.190	43484.206
Num. obs.	127550	127550	127550	127550	127550	127550

$^{***}p < 0.001$, $^{**}p < 0.01$, $^{*}p < 0.05$, $^{\dagger}p < 0.10$ Two-way-cluster-robust standard errors appear in parentheses. All models include school-section fixed effects'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. Additional controls include gender (indicators both male, both female), country of origin (both U.S., neither U.S.), extraversion (dyad level and difference), and an indicator individuals are in the same section.

Table 6

Logistic Regressions: Relationship Formation in Undirected Dyads—Receptiveness Subscales (Hyp. 1)

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
Political Orientation Sum	−0.053**	−0.050**	−0.051**	−0.052**	−0.017	−0.019	−0.020	−0.021	−0.017
	(0.020)	(0.019)	(0.019)	(0.019)	(0.017)	(0.016)	(0.016)	(0.016)	(0.017)
Political Orientation Diff.	−0.265**	−0.719**	−0.326**	−0.254*	−0.185*	−0.479*	−0.201	−0.153	−0.523*
	(0.092)	(0.240)	(0.121)	(0.104)	(0.086)	(0.240)	(0.123)	(0.097)	(0.255)
Receptiveness Sum (Subscale 1: Negative Affect - Reversed)	−0.019				−0.087***	−0.064**	−0.062**	−0.063**	−0.076**
	(0.023)				(0.025)	(0.021)	(0.021)	(0.021)	(0.028)
Receptiveness Diff. (Subscale 1)	−0.074**				−0.056*	−0.059*	−0.059*	−0.059*	−0.057*
	(0.027)				(0.027)	(0.027)	(0.027)	(0.027)	(0.028)
Receptiveness Sum (Subscale 2: Intellectual Curiosity)		−0.004			0.028	−0.016	0.029	0.029	−0.005
		(0.041)			(0.031)	(0.039)	(0.031)	(0.031)	(0.038)
Receptiveness Diff. (Subscale 2)		0.010			−0.002	−0.000	−0.002	−0.002	−0.001
		(0.043)			(0.040)	(0.040)	(0.040)	(0.040)	(0.040)
Receptiveness Sum (Subscale 3: Opponent Derogation - Reversed)			−0.036		−0.003	−0.004	−0.029	−0.005	−0.009
			(0.027)		(0.023)	(0.023)	(0.030)	(0.023)	(0.032)
Receptiveness Diff. (Subscale 3)			−0.019		−0.008	−0.007	−0.006	−0.008	−0.008
			(0.032)		(0.029)	(0.029)	(0.029)	(0.029)	(0.029)
Receptiveness Sum (Subscale 4: Taboo Issues - Reversed)				−0.022	0.003	0.003	0.003	−0.014	−0.004
				(0.023)	(0.017)	(0.017)	(0.017)	(0.024)	(0.024)
Receptiveness Diff. (Subscale 4)				0.014	0.015	0.015	0.015	0.016	0.015
				(0.028)	(0.025)	(0.025)	(0.025)	(0.025)	(0.025)
Political Orientation Diff. × Receptiveness Sum (Subscale 1)	0.024*				0.018†				0.010
	(0.011)				(0.010)				(0.012)
Political Orientation Diff. × Receptiveness Sum (Subscale 2)		0.053**				0.037†			0.027
		(0.020)				(0.020)			(0.020)
Political Orientation Diff. × Receptiveness Sum (Subscale 3)			0.028*				0.019		0.004
			(0.014)				(0.014)		(0.016)
Political Orientation Diff. × Receptiveness Sum (Subscale 4)				0.021†				0.014	0.005
				(0.013)				(0.012)	(0.012)
Additional Controls	No	No	No	No	Yes	Yes	Yes	Yes	Yes
AIC	18076.813	18078.889	18092.739	18094.657	15048.872	15047.884	15050.037	15050.569	15052.078
BIC	18357.770	18359.846	18373.695	18375.614	15465.776	15464.788	15466.940	15467.472	15496.171
Log Likelihood	−9007.407	−9008.445	−9015.369	−9016.329	−7478.436	−7477.942	−7479.018	−7479.284	−7477.039
Deviance	18014.813	18016.889	18030.739	18032.657	14956.872	14955.884	14958.037	14958.569	14954.078
Num. obs.	63775	63775	63775	63775	63775	63775	63775	63775	63775

$^{***}p < 0.001$, $^{**}p < 0.01$, $^{*}p < 0.05$, $^{\dagger}p < 0.10$. Two-way-cluster-robust standard errors appear in parentheses. All models include school-section fixed effects. Additional controls include other receptiveness factors (dyad sum and difference), 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, and number of shared ties.

Table 7
Logistic Regressions: Network Tie in Undirected Dyads—Receptiveness Subscales (Hyp. 2)

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
Nb. Shared Ties	0.566***	0.485***	0.541***	0.426***	0.560***	0.462***	0.525***	0.435***	0.460***
	(0.046)	(0.124)	(0.066)	(0.061)	(0.046)	(0.117)	(0.065)	(0.056)	(0.102)
Receptiveness Sum (Subscale 1: Negative Affect - Reversed)	0.044*				0.029	−0.061**	−0.063**	−0.064**	0.031
	(0.017)				(0.022)	(0.021)	(0.021)	(0.021)	(0.024)
Receptiveness Diff. (Subscale 1)	−0.084***				−0.060*	−0.059*	−0.058*	−0.060*	−0.060*
	(0.025)				(0.027)	(0.027)	(0.027)	(0.027)	(0.027)
Receptiveness Sum (Subscale 2: Intellectual Curiosity)		0.021			0.035	0.069†	0.033	0.031	−0.002
		(0.035)			(0.031)	(0.039)	(0.031)	(0.031)	(0.037)
Receptiveness Diff. (Subscale 2)		−0.048			0.020	0.000	0.009	0.004	0.021
		(0.039)			(0.040)	(0.040)	(0.040)	(0.040)	(0.040)
Receptiveness Sum (Subscale 3: Opponent Derogation - Reversed)			0.051*		0.003	−0.004	0.075**	−0.001	0.008
			(0.023)		(0.023)	(0.022)	(0.028)	(0.023)	(0.027)
Receptiveness Diff. (Subscale 3)			−0.034		−0.003	−0.005	−0.005	−0.005	−0.004
			(0.027)		(0.029)	(0.029)	(0.029)	(0.029)	(0.029)
Receptiveness Sum (Subscale 4: Taboo Issues - Reversed)				0.023	0.005	0.004	0.007	0.053*	0.011
				(0.022)	(0.017)	(0.017)	(0.017)	(0.023)	(0.021)
Receptiveness Diff. (Subscale 4)				−0.009	0.009	0.013	0.013	0.011	0.010
				(0.025)	(0.026)	(0.025)	(0.025)	(0.025)	(0.026)
Nb. Shared Ties × Receptiveness Sum (Subscale 1)	−0.029***				−0.029***				−0.030***
	(0.004)				(0.004)				(0.006)
Nb. Shared Ties × Receptiveness Sum (Subscale 2)		−0.014				−0.012			0.011
		(0.010)				(0.010)			(0.008)
Nb. Shared Ties × Receptiveness Sum (Subscale 3)			−0.025***				−0.023***		−0.002
			(0.007)				(0.007)		(0.008)
Nb. Shared Ties × Receptiveness Sum (Subscale 4)				−0.013†				−0.014*	−0.002
				(0.007)				(0.006)	(0.006)
Additional Controls	No	No	No	No	Yes	Yes	Yes	Yes	Yes
AIC	15218.362	15363.232	15318.000	15352.069	14945.213	15046.584	15011.845	15030.880	14947.351
BIC	15490.256	15635.126	15589.893	15623.962	15362.117	15463.488	15428.749	15447.783	15391.444
Log Likelihood	−7579.181	−7651.616	−7629.000	−7646.034	−7426.607	−7477.292	−7459.923	−7469.440	−7424.676
Deviance	15158.362	15303.232	15258.000	15292.069	14853.213	14954.584	14919.845	14938.880	14849.351
Num. obs.	63775	63775	63775	63775	63775	63775	63775	63775	63775

$^{***}p < 0.001$, $^{**}p < 0.01$, $^{*}p < 0.05$, $^{\dagger}p < 0.10$ Two-way-cluster-robust standard errors appear in parentheses. All models include school-section fixed effects. Additional controls include political orientation, gender (indicators both male, both female), country of origin (both U.S., neither U.S.), extraversion and self-monitoring (dyad level and difference), and indicator individuals are in the same section.

Table 8

Logistic Regressions: Relationship Nomination in Directed Dyads—Receptiveness Subscales (Hypothesis 3)

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
Political Orientation Sum	0.019	0.019	0.018	0.018	0.009	0.008	0.008	0.008	0.009
	(0.019)	(0.019)	(0.019)	(0.019)	(0.019)	(0.019)	(0.019)	(0.019)	(0.019)
Majority-Minority Distance	$-0.132^{\dagger}$	−0.037	−0.092	$-0.136^{\dagger}$	-0.134^{*}	−0.015	−0.043	-0.137^{*}	−0.069
	(0.069)	(0.149)	(0.082)	(0.071)	(0.066)	(0.141)	(0.081)	(0.065)	(0.148)
Receptiveness Sum (Subscale 1: Negative Affect - Reversed)	0.009				−0.032	−0.032	−0.032	−0.032	−0.032
	(0.022)				(0.025)	(0.025)	(0.025)	(0.025)	(0.025)
Receptiveness Diff. (Subscale 1)	0.069^{**}				0.083^{***}	0.085^{***}	0.084^{***}	0.086^{***}	0.084^{***}
	(0.023)				(0.023)	(0.023)	(0.023)	(0.023)	(0.023)
Receptiveness Sum (Subscale 2: Intellectual Curiosity)		0.053			0.012	0.011	0.011	0.011	0.011
		(0.033)			(0.029)	(0.029)	(0.029)	(0.029)	(0.029)
Receptiveness Diff. (Subscale 2)		0.069^{*}			0.021	0.021	0.021	0.020	0.023
		(0.033)			(0.030)	(0.031)	(0.030)	(0.030)	(0.030)
Receptiveness Sum (Subscale 3: Opponent Derogation - Reversed)			0.010		0.002	0.002	0.002	0.002	0.002
			(0.025)		(0.026)	(0.026)	(0.026)	(0.026)	(0.026)
Receptiveness Diff. (Subscale 3)			0.029		−0.022	−0.020	−0.020	−0.019	−0.021
			(0.027)		(0.026)	(0.025)	(0.025)	(0.025)	(0.025)
Receptiveness Sum (Subscale 4: Taboo Issues - Reversed)				0.008	0.006	0.006	0.006	0.006	0.006
				(0.022)	(0.020)	(0.020)	(0.020)	(0.020)	(0.020)
Receptiveness Diff. (Subscale 4)				−0.010	$-0.036^{\dagger}$	$-0.037^{\dagger}$	$-0.037^{\dagger}$	$-0.038^{\dagger}$	$-0.038^{\dagger}$
				(0.022)	(0.020)	(0.020)	(0.020)	(0.020)	(0.020)
Majority-Minority Dist. × Receptiveness Sum (Subscale 1)	0.018^{*}				0.017^{*}				0.017^{*}
	(0.009)				(0.008)				(0.009)
Majority-Minority Dist. × Receptiveness Sum (Subscale 2)		0.003				0.001			−0.010
		(0.013)				(0.012)			(0.013)
Majority-Minority Dist. × Receptiveness Sum (Subscale 3)			0.010				0.005		−0.008
			(0.009)				(0.009)		(0.010)
Majority-Minority Dist. × Receptiveness Sum (Subscale 4)				$0.016^{\dagger}$				0.017^{*}	$0.015^{\dagger}$
				(0.009)				(0.008)	(0.008)
Additional Controls	No	No	No	No	Yes	Yes	Yes	Yes	Yes
AIC	46805.445	46885.378	46925.319	46925.850	43552.441	43571.988	43570.868	43554.893	43545.381
BIC	47117.645	47197.579	47237.519	47238.050	44010.986	44030.532	44029.413	44013.438	44033.194
Log Likelihood	−23370.722	−23410.689	−23430.659	−23430.925	−21729.221	−21738.994	−21738.434	−21730.447	−21722.691
Deviance	46741.445	46821.378	46861.319	46861.850	43458.441	43477.988	43476.868	43460.893	43445.381
Num. obs.	127550	127550	127550	127550	127550	127550	127550	127550	127550

$^{***}p < 0.001$, $^{**}p < 0.01$, $^{*}p < 0.05$, $^{\dagger}p < 0.10$ Two-way-cluster-robust standard errors appear in parentheses. All models include school-section fixed effects. '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. Additional controls include number of shared ties, gender (indicators both male, both female), country of origin (both U.S., neither U.S.), extraversion (dyad level and difference), and indicator individuals are in the same section.

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Appendix A

Receptiveness to Opposing Views 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.

Scale

Please click the radio button below each statement to indicate the extent to which **you agree or disagree with that statement.**

Strongly Disagree	Somewhat Disagree	Slightly Disagree	Neither Agree nor Disagree	Slightly Agree	Somewhat Agree	Strongly Agree

Item	Factor
1. I am willing to have conversations with individuals who hold strong views opposite to my own.	2
2. I like reading well thought-out information and arguments supporting viewpoints opposite to mine.	2
3. I find listening to opposing views informative.	2
4. I value interactions with people who hold strong views opposite to mine.	2
5. I am generally curious to find out why other people have different opinions than I do.	2
6. People who have opinions that are opposite to mine often have views which are too extreme to be taken seriously. (R)	3
7. People who have views that oppose mine rarely present compelling arguments. (R)	3

8. Information from people who have strong opinions that oppose mine is often designed to mislead less-informed listeners. (R)	3
9. Some points of view are too offensive to be equally represented in the media. (R)	4
10. Some issues are just not up for debate. (R)	4
11. Some ideas are simply too dangerous to be part of public discourse. (R)	4
12. I consider my views on some issues to be sacred. (R)	4
13. People who have views that oppose mine are often biased by what would be best for them and their group. (R)	3
14. People who have views that oppose mine often base their arguments on emotion rather than logic. (R)	3
15. Listening to people with views that strongly oppose mine tends to make me angry. (R)	1
16. I feel disgusted by some of the things that people with views that oppose mine say. (R)	1
17. I often feel frustrated when I listen to people with social and political views that oppose mine. (R)	1
18. I often get annoyed during discussions with people with views that are very different from mine. (R)	1

Scoring

Items 6-18 are reverse coded (R); responses on the 18 items are then averaged to create a total receptiveness index. Factor 1 (Negative Emotions) is comprised of items 15-18. Factor 2 (Intellectual Curiosity) is comprised of items 1-5. Factor 3 (Derogation of Opponents) is comprised of items 6, 7, 8, 13, and 14. Factor 4 (Taboo Issues) is comprised of items 9-12.

Appendix B: Polynomial Regression

Edwards (1994) identifies the following potential problems of difference scores in estimating divergence effects:

1. A difference score is constructed using two or more component measures. The component measures of a difference score do not necessarily contribute equally to the effect of the aggregate variable. They do so only when the two components have the same variance.
2. Difference scores confound the separate effects of each component measure on the outcome: we cannot see these separate effects, and what we do see may be driven by one effect only.
3. Difference scores may fail to account for possible heterogeneity (e.g., nonlinearity) in divergence effects.

An alternative approach, polynomial regression, avoids these potential problems by including components of a difference score as separate regressors, as well as interaction and higher-order terms. This allows consideration of the separate and combined effects of component measures on the outcome, as well as more flexible estimation of the response surface.

We discuss these three critiques of difference scores in turn. The first and second critiques—unbalanced contributions of separate components and confounded effects of separate components—are less applicable in our setting. While prior work has tended to focus on divergence as it relates to conceptually distinct constructs (e.g., the divergence between individual and organizational values in studies of person-organization fit), we examine divergence on the same conceptual spectrum (i.e., political orientation and majority-minority orientation). Furthermore, in the case of undirected dyads, we do not distinguish between dyad

members—that is, there are no meaningful separate components of the political orientation difference score. Indeed, if we arbitrarily designate one member of an undirected dyad as the *i* actor and the other as the *j* actor, the political orientation variables for *i* and *j* have nearly identical variance (2.514 and 2.507, respectively). Thus, analyses involving undirected dyads should not be subject to the first two critiques.

In the case of directed dyads, ego political orientation and alter political orientation have identical variance (2.510) because each individual appears an equivalent number of times as *i* and *j*. Hence, the first critique does not apply to directed dyads; however, the second critique may be relevant because we do distinguish between the members of the dyad and use a directed outcome variable—i.e., whether or not *i* nominates *j*—instead of mutual nomination. For instance, it is possible that an individual's own political orientation may be more influential on her likelihood of nominating someone than her counterpart's political orientation.

The third critique of difference scores—that they may fail to reflect nonlinearities in divergence effects—is the most generally applicable and perhaps the most potent for our paper. Our previous models show evidence of divergence effects, but they do not indicate *where* in the joint distribution of political orientation these effects occur or how these effects *vary* across different configurations. For instance, an implicit assumption in our difference score models is that the tendency to connect with like-minded others is as pronounced for liberal-liberal dyads as for conservative-conservative dyads (relative to mixed-political-orientation dyads). Difference score models cannot discern potential asymmetries in effects across dyads that vary in political orientation.

Even though our difference score models are less susceptible to the concerns about imbalanced and confounded component effects, we nevertheless estimated polynomial

regressions and prepared accompanying surface plots to assess the robustness of our findings and to develop a more nuanced understanding of the results related to Hypotheses 1 and 3. We did not apply polynomial regressions to test Hypothesis 2 because it is simply not possible to decompose the key variable of interest—number of shared ties between *i* and *j*—into separate components. The number of shared ties is, by definition, a dyad-level measure that cannot be decomposed.

Polynomial regressions take the following general form:

$$Z = \alpha + \beta_1 X + \beta_2 Y + \beta_3 X^2 + \beta_4 XY + \beta_5 Y^2 + u \qquad \text{(B1)}$$

where Z is the outcome of interest, and X and Y are the bases of congruence effects (Edwards, 1994). For our analyses involving directed dyads (tests of Hypothesis 3), these bases are naturally majority-minority orientation of the evaluator, *i*, and target, *j*. For our analyses involving undirected dyads (tests of Hypothesis 1), these bases are less obvious, since we do not conceptually distinguish between members of the dyad. To implement polynomial regressions for Hypothesis 1, we simply designated one member of each undirected dyad as the *i* and the other as the *j*. As in our previous models, we account for stable, between-section differences using school-section fixed effects.

For Hypotheses 1 and 3, we first estimated a polynomial regression using the full sample. This allowed us to assess baseline divergence effects. Strong evidence of political homophily effects (the inverse of divergence) would be a surface plot with a high ridgeline along the X = Y line, with predicted probabilities plummeting rapidly as X and Y values diverge. Because our hypotheses focus on the moderation of such homophily effects, we estimate models using

subsamples of dyads, including low-receptiveness dyads (those in the lower 25% of the distribution of mutual receptiveness—values of 8.44 or less) and high-receptiveness dyads (those in the upper 25%—values of 10.0 or more). To the extent that homophily effects become more pronounced as mutual receptiveness decreases and attenuated as mutual receptiveness increases, we find support for our hypotheses.

Table B1 reports results of polynomial regression using undirected dyads (Models 1-3; Hypothesis 1) and directed dyads (Models 4-6; Hypothesis 3). Models 1 and 4 were estimated using the full sample; Models 2 and 5 using low-receptiveness dyads; and Models 3 and 6 using high-receptiveness dyads. As with our previous models, these results are best interpreted visually, though we note that the coefficients themselves suggest that there is more heterogeneity in effects than would be captured by difference scores of political orientation or majority-minority orientation. Edwards (1994) suggests that difference scores may sufficiently describe the response surface when base-term coefficients in polynomial regressions have opposite signs and when higher-order terms are not statistically significant. In Model 1, we see that while the bases of political orientation or majority-minority orientation have opposite signs, these coefficients are not statistically significant, and one of the squared-term coefficients is statistically significant. In Model 4, we also see that one of the higher-order terms is statistically significant. Together, these models suggest difference scores may not fully capture the nuance of divergence effects.

Another pattern we see in Table B1 is that the relationships between independent variables of interest and the outcome variable become more curvilinear in the absence of receptiveness. Both Models 2 and 5 have higher-order terms and interaction terms that are greater in magnitude than their respective, full-sample counterparts (Models 1 and 3). Lastly,

none of the coefficients in either high-receptiveness model (3 or 6) is statistically significant, suggesting that tie formation and nomination among these dyads attend less to relative positions in political orientation and majority-minority orientation.

Figure B1 depicts the three-dimensional relationship between political orientation of *i,* political orientation of *j*, and the formation of network ties suggested by the models of Table B1. The x- and y-axes are the political orientations of dyad members, and the z-axis is the predicted probability of a mutually recognized network tie. Pairs of subfigures display the same plots from two different angles to ease interpretation. In Figure B1a, we see a pattern consistent with homophily: dyads with opposite political orientations have the lowest predicted probability, and dyads with the same political orientations (i.e., dyads along the $Political\ Orientation_i = Political\ Orientation_j$ line) have relatively higher predicted probabilities. We note there is a slight asymmetry in homophily effects: individuals who identify as 'Very Liberal' (a political orientation value of '1') are more likely to connect with others who are also 'Very Liberal' than are those who are 'Very Conservative' to connect with others who are also 'Very Conservative'. This nuance was not visible under our models using difference scores.

Figures B1b and B1c correspond to Models 2 and 3 of Table B1 and illustrate how receptiveness moderates homophily effects. At lower levels of receptiveness, we see much more pronounced homophily effects: homogenous political orientation dyads (i.e., dyads along the $Political\ Orientation_i = Political\ Orientation_j$ line) have a higher predicted probability of a network tie than corresponding dyad profiles in Figure B1b, and this predicted probability plummets steeply as political orientations diverge. Again, there is an asymmetry in the tendency for 'liberal' individuals to connect with similar others compared to this tendency for 'conservatives'. Figure B1c, in contrast, presents a relatively flat response surface, suggesting

dyads high in receptiveness are less attentive to political orientation in network tie formation. Overall, these results are consistent with and support Hypothesis 1.[1]

Figure B2 reports the figures corresponding to Models 4 through 6 of Table B1. The dependent variable in these analyses is the indicator that evaluator, *i,* nominated target, *j*. In the figures, the x-axis is the majority-minority orientation for ego, the y-axis is the majority-minority orientation for alter, and the z-axis is the predicted probability that ego nominated alter. In Figure B2a, we see a similar pattern as appears in Figure B1a, although more pronounced: dyad pairs most likely to exhibit nomination are homogenous (e.g., majority-group members viewing other majority-group members), and dyad pairs least likely to show nomination are heterogenous (majority-group members viewing minority group members, and vice versa).

In the remaining subfigures, we again see evidence of receptiveness moderating homophily effects. In Figure B2b, we see that in the presence of low receptiveness, individuals are most likely to nominate individuals whose majority-minority orientation is similar to theirs (e.g., along the 'Majority-Minority Orientation$_i$' = Majority-Minority Orientation$_j$' line), and that the probability of nomination drops steeply as the majority-minority orientation of ego and alter diverge. This is consistent with amplified homophily effects. As in Figures B1a and B1b, we again see heterogeneous effects in Figure B2b: majority-group members are more likely to nominate other majority-group members than are minority-group members to nominate other minority-group members. Figure B2c shows that, when mutual receptiveness is high, evaluators

[1] We hesitate to make too much of the saddle-like nature of Figure B1c. In analyses not reported, we test Hypothesis 1 using directed dyads and nominations as the dependent variable, even though we conceptualized Hypothesis 1 using undirected dyads and mutually recognized ties. We obtain similar results as reported in Figure B1a and B1b and obtain a virtually flat response surface for the high-receptiveness dyads. If anything, liberal individuals prefer to nominate conservative individuals in the presence of high receptiveness.

are much more likely to nominate divergent alters than otherwise. Surprisingly, we also see that, even when mutual receptiveness is high, minority-group members persist in nominating other minority-group members, and if anything, are more likely to do so (compare with B2a). We also see that, in these conditions, evaluators generally tend to nominate minority-group members, regardless of their own majority-minority orientation.

Taken together, the plots in Figure B2 are consistent with the previous findings for Hypothesis 3, though they suggest a more elaborate account than before. We still see that the predicted probability of nomination within heterogenous dyads increases as mutual receptiveness increases. Yet unexpectedly, we find that homophilous minority-minority effects persist with a rise in receptiveness. This helps explain why the moderated relationship between receptiveness and the majority-minority difference score reported in Table 5 and Figure 4 are less pronounced than otherwise: mutual receptiveness is simultaneously attenuating homophily effects for majority-group members, while amplifying homophily effects for minority-group members.[2]

[2] In other analyses not reported, we extended polynomial regression models to include the full suite of controls used in our other analyses. Although the corresponding surface response plots are less pronounced, we again find support for the pattern of moderation described above.