2009

The Coevolution of Networks and Political Attitudes

David Lazer
Harvard University, davelazer@gmail.com

Brian Rubineau
Cornell University, brubineanu@cornell.edu

Carol Chetkovich
Mills College, cchetkov@mills.edu

Nancy Katz
Harvard University, nancy_katz@ksg.harvard.edu

Michael Neblo
Ohio State University - Main Campus, neblo.1@osu.edu

The coevolution of networks and political attitudes

David Lazer*
Harvard University

Brian Rubineau
Cornell University

Nancy Katz
Harvard University

Carol Chetkovich
Mills College

Michael A. Neblo
Ohio State University

Abstract

How do attitudes and social affiliations co-evolve? A long stream of research has focused on the relationship between attitudes and social affiliations. However, in most of this research the causal relationship between views and affiliations is difficult to discern definitively: Do people influence each other's views so that they converge over time or do they primarily affiliate (by choice or happenstance) with those of similar views? Here we use longitudinal attitudinal and whole network data collected at critical times (notably, at the inception of the system) to identify robustly the determinants of attitudes and affiliations. We find significant conformity tendencies: individuals shift their political views toward the political views of their associates. This conformity is driven by social ties rather than task ties. We also find that, while individuals tend to associate with similar others, political views are notably less a basis for associational choices than demographic and institutional factors.

*Corresponding author:

Harvard Kennedy School
Harvard University
Cambridge, MA 02138
Phone: 617-496-0102
e-mail: david_lazer@harvard.edu

David Lazer and Nancy Katz are Associate Professors at Harvard University.
Brian Rubineau is an Assistant Professor at Cornell University
Michael Neblo is an Assistant Professor at Ohio State University.
Carol Chetkovich is a Full Professor at Mills College

How people simultaneously construct and are molded by their social milieu is one of the foundational questions of social science. In the study of politics, this was the central question of Lazarsfeld and collaborators (Lazarsfeld et al. 1948, Berelson et al. 1954), and in more recent years Huckfeldt, Sprague, and colleagues (1987; Huckfeldt, Plutzer and Sprague 1993; Huckfeldt et. al. 1995; Huckfeldt, Johnson and Sprague 2002; 2004). The development of people's attitudes and their networks is a co-evolutionary, dynamic process. Views shape networks at the same time that networks shape views. This recursive evolution is a slippery subject for research, because in cross-sectional data it is difficult to disentangle the two processes of change. People who talk with each other may tend to become more similar in attitudes over time, but individuals also seek similar others to talk with.

This co-evolutionary dynamic, we would argue, following Mutz (2002), Mansbridge (1999), and Huckfeldt, Johnson and Sprague (2004), constitutes the very flesh and blood of the body politic: the multitude of little interactions and discussions that collectively represent popular deliberation about the issues of the day. Indeed, the mechanisms and quality of political opinion formation constitute the heart of democracy (Habermas 1996). Therefore, it is important that we understand, for a given set of opportunities to interact with others, to what extent do people associate with those holding views at odds with their own? Do such associations, in turn, have an impact on what people believe?

Our objective in this paper is to examine these processes in a microcosm, taking advantage of a natural experiment that occurs in educational settings, where individuals with few pre-existing ties to one another are placed together in a structured environment for an extended period of time. We collected whole network data, and examined at the micro level how political attitudes and interpersonal relationships develop over time. These data allow us to address the questions: Throwing a set of individuals together with few or no prior relationships, what predicts the structure of the emergent network? How does this network, in turn, push and pull the political views of its constitutive individuals?

Our approach represents a significant methodological advance. A standard critique of studies of network influence is that so-called "network effects" are really just epiphenomenal selection effects due to individuals' choosing each other on some sort of individual-level basis, and that there are almost surely omitted factors related to both attitudes and network ties. Our research design, by focusing on the whole network, with longitudinal data collected at the inception of the social system, greatly reduces the power of such a critique. With this design, we can assess and control for individual attitudes before they are plausibly subject to any social influences within the social system. Thus, we can observe and estimate both selection and influence processes distinctly.

SOCIAL SELECTION AND SOCIAL INFLUENCE

Our approach also represents a significant advance on the conceptual level. There have been several robust threads of research on network formation and social influence within political science, sociology, and social psychology. Two key themes run through these literatures: homophily (the tendency for similar individuals to share ties) and social influence (the tendency for individuals who have ties to become more similar). We pull together these ideas into a unified framework, in which an individual (ego) seeks an accommodation between his/her views and the views of his/her discussion partners (alters), and with a particular focus on political views. That accommodation may be achieved by choosing similar alters with whom to talk, by adjusting attitudes to be in alignment with those of alters, or by some combination of these processes (cf Balance Theory: Heider 1958; Newcomb 1961).

Network formation: Homophily

Following Verbrugge (1977), we conceive the emergence of social networks as a "meeting and mating" process. A variety of forces, both exogenous and endogenous, influence opportunities for people to meet and interact. These interactions create the opportunity for the formation of friendships or other forms of affiliation ("mating").

One such force is that of *homophily* – that social ties are more commonly shared by similar individuals than dissimilar individuals. Homophily is among the most robust findings in social science (for a thorough review, cf. McPherson, Smith-Lovin & Cook, 2001). For example, discussion partners are likely to be similar in

age, race, religion (Marsden 1987), and, most relevant to the present paper, political preferences (e.g., Huckfeldt and Sprague 1995, Ikeda and Huckfeldt 2001, Donatella et al. 2008). This similarity is partly the result of an opportunity structure where those with similar values are also more likely to meet one another (Feld 1982). For example, to the extent that residency is segregated by class, race, ethnicity, and the like (outside the choice of any single individual), and to the extent that these same factors are associated with political views, it is likely that individuals with similar political views will be grouped together.

Homophily is not just imposed by structure and opportunity, but is also the result of endogenous factors. Similar individuals tend to attract each other, and (contrary to many a romantic comedy) opposites tend to repel.[1] What Lazarsfeld and Merton observed anecdotally (1954: 31), later empirical findings confirmed: given a choice, people will systematically choose those similar to themselves for relationships (Byrne 1971).

There are a number of reasons for seeking out similar others. One is informational: similar others offer relevant information (Festinger 1954). For example, in seeking information about what movies to see, it is prudent to consult those with demonstrably similar taste. Another reason is preferential: the social identity (Tajfel and Turner 1986) literature has focused on the consequences of in-group preference. Similar others are more likely to engage in cooperation, allowing the formation of stronger relationships (Buchan, Croson and Dawes 2002). Dissimilarity entails greater competition, making the formation of strong relationships less likely (Nebus 2006; Reagans 2005).

A third motivator for affiliation with similar others is self-verification (Swann et. al. 2000), the notion that people would prefer to interact with others who are likely to understand them as they understand themselves. This encourages sorting that would reinforce such understanding. A fourth reason is cognitive balance (e.g., Heider 1958). Ties between individuals that hold dissimilar attitudes (including political views) are experienced as imbalanced. This imbalance causes discomfort. The imbalance may be resolved by dissolving the interpersonal relationship, or by one individual bringing his or her attitude into alignment with the other

[1]There is a continuum between the exogenous and endogenous drivers of the tendency for similars to form relationships, as Schelling's (1978) classic work on segregation illustrates. Schelling found that weak preferences to be grouped with similar others leads to an opportunity structure where most individuals can communicate only with similar others.

individual's.[2] Importantly, such processes can operate outside of conscious awareness (Greenwald and Banaji 1995:13). This tendency toward balanced relationships suggests that pairs of individuals who have consistent political orientations are relatively more likely to create and maintain relationships. These four processes provide the basis for our first hypothesis.

Hypothesis 1: Individuals tend to have relationships with other individuals with similar political orientations.

As noted above, the opportunity structure for creating particular types of relationships makes a difference. For example, a liberal Democrat has fewer similar potential alters in Texas than Massachusetts. One outcome in such a scenario is that ego has to "settle" for relatively dissimilar alters. An alternative outcome is that ego will be relatively disengaged from his/her immediate milieu. For example, Newcomb (1943) found that in a relatively liberal milieu like Bennington College, conservative students had fewer ties than liberal students. Similarly, Finifter (1974) found that conservative union members had fewer attachments than liberal union members. These similar findings could be explained at the individual level by positing some intrinsic difference in the tie formation practices of liberal versus conservative individuals. A network-based or relational explanation is that those in the political minority of a social system will be relatively disengaged when faced with such an opportunity structure for relationships. Thus:

Hypothesis 2: In a majority liberal setting, conservatives will tend to be relatively less engaged in the network than liberals.

The configuration of an individual's friendships reflects some mix of the choices that individual makes (e.g., to talk with similar others), and factors exogenous to that individual (e.g., the types of individuals who happen to be near him/her). It is also possible, as discussed above, for the opportunity structure and endogenous choices to reinforce each other. Homophily notwithstanding, however, we know that our networks of political discussants are only imperfectly like us (Huckfeldt et. al. 2002; Mutz 2002), which, in turn,

[2] Note that this literature is cognitive in nature (i.e., about ego's beliefs), and thus does not necessarily imply that if ego is liberal and alter conservative they will not be friends. It suggests that ego might (incorrectly) believe that alter is liberal, allowing the friendship to endure; or that ego might believe alter is conservative, making an enduring friendship less likely; or that ego might classify alter as an exceptional type of conservative more simpatico with liberal beliefs than other conservatives (Heider 1958: 208).

creates the possibility of social influence.[3] In reality, the opportunity structure for forming relationships is often sharply constrained, e.g., as Mutz and Mondak (2006) explored empirically in the context of political interactions in the workplace.

Network effects: Social Influence

Our networks, while dynamically evolving, are also simultaneously affecting us. A well-known stream of social psychology and sociology research from the 1940s and 1950s (Newcomb 1943; Lazarsfeld et. al. 1948; Festinger et al. 1950; Festinger 1954) explored how our networks affect our attitudes and behaviors. These findings were followed up by research in political science on contextual effects (Berelson 1954; Putnam 1966), as well as a series of studies using egocentric network data (Huckfeldt, Johnson and Sprague 2002 and 2004; Huckfeldt and Sprague 1987 and 1991; Mutz 2006). There is also a parallel, whole-network oriented, research vein in current sociological research, generally focusing on non-political attitudes, e.g., Erickson (1988), Friedkin (1998; 2004), Friedkin and Johnsen (1997), and Marsden and Friedkin (1993).

All of these research streams suggest that there is a tendency for individuals to become more like their discussion partners over time. The theoretical underpinnings of attitudinal change include cognitive balance (e.g., Frank and Fahrbach 1999), group-persuasion (Mackie and Queller 2000), and elite driven models involving the dynamics of political attention (Zaller 1992). The statement by an individual you know that he/she likes a movie sends you a signal that it is, indeed, a good movie, affecting your own belief about the movie. From a cognitive perspective, the statement by someone whom you like that he/she prefers a presidential candidate that you do not creates a tension that may be resolved by changing your own belief about that candidate. Not only is the friendship between two people endogenous, but so is the attachment between those individuals and their political views. Should a liberal talk to a conservative, they might choose not to become friends (or to sever an existing relationship), or one or both individuals might change their ideological orientation. This dynamic probably unfolds in an uneven, stochastic, fashion. The equilibrium may evolve below the level of conscious adjustment (McConnell et. al. 2008). Friendship begets familiarity, and familiarity

[3] While virtually all research on the topic indicates that there is homophily in our discussion networks, there is disagreement as to whether near-perfect homogeneity is typical; e.g., compare Huckfeldt, Johnson, and Sprague (2004: 19) and Huckfeldt, Mendez, and Osborn (2004: 72) to Mutz (2006: 38).

(may) beget friendship, but what friends find out about each other is driven largely by the vagaries of conversations and events, and politics may not even come up. Presumably, in the absence of talk about politics, social influence on political views is limited or non-existent.

Following from the work on cognitive balance, we hypothesize that valenced relationships — relationships that are emotionally and personally important, such as friendship — are likely to be a stronger source of social influence (Kenny 1994) than task-based relationships. Exposure to a particular viewpoint from someone whom you like will have a greater impact on your own opinion as compared to exposure to the same viewpoint from someone you work with. Thus:

Hypothesis 3: The political attitudes of people who have ties to each other will tend to become more similar over time.

Hypothesis 4: Social influence on political attitudes will be especially powerful among people who are friends, versus among people who work together.

RESEARCH DESIGN

Analytical Challenge

Because social similarity may generate both social ties and similar outcomes, including political attitudes, social similarity may be a source of a spurious causal association between social ties and attitudes.[4] A critical challenge in studying the impact of social networks on political attitudes is dealing with this possible alternative explanation of a positive association between political behavior/attitudes and network configuration.

The problem of measuring social influence (associates affecting individuals) in the presence of selection effects (individuals choosing their associates) has been well-documented in both the sociological (Mouw 2006; Winship and Mare 1992) and the economic (Manski 1993) literatures. A recent review (Soetevent 2006) of efforts in economics to address this problem suggested three categories of strategies: (1) application of

[4] As an example, one empirical investigation into the role of contacts in finding jobs that explicitly explored this potential spurious found that ties among individuals can capture social similarity, which drives similar employment outcomes (Mouw, 2003).

certain data collection procedures (e.g., manipulation via natural or laboratory experiments); (2) use of inferential procedures that eliminate selection concerns (e.g., use of instrumental variables); and (3) direct evaluation of the functional form of the selection process (e.g., through a two-stage analysis).

Within political science, Nickerson (2008) offers a rare example of the first type of strategy for studying social contagion. Nickerson conducted an experimental study of the transmission of "get out the vote" messages within two-voter households, by randomly manipulating the message that households received. Half of the households received a get out the vote message, and the other half a placebo message. The key finding was that, for households that received the get out the vote message, the individual in the household who did not answer the door was more likely to turn out (suggesting social transmission of the behavior). Huckfeldt, Sprague, and colleagues (1987; Huckfeldt, Plutzer and Sprague 1993; Huckfeldt et. al. 1995; Huckfeldt, Johnson and Sprague 2002; 2004), follow a quasi-experimental path. They dealt with the co-evolution of attitudes and networks in two ways: (1) by using extensive individual-level control variables; and (2) by treating elections as an exogenous factor raising, for short periods, the salience of political views, thus activating political discussions and social influence processes.

This vein of research finds substantial evidence that people's political preferences become increasingly aligned with those of their contexts as an election nears. Yet, while these findings are compelling, they do not eliminate the possibility that the results are driven by divergent histories (e.g., campaign messages may differ depending on where you sit in the network), or a selection bias from omitted or difficult-to-measure factors such as associational choices (e.g., in Huckfeldt, Sprague and colleagues' work, the reasons why an individual has a particular set of associates).

We seek to advance this research through a longitudinal and more microscopic examination of social influence over time. Our research setting enables us to observe individuals' political views before and after exposure to one another. Thanks to the setting, we know that initial political views are not the result of interactions with the other participants in the study. We then examine whether subsequent interactions among participants contribute to changes in their political views.

Design and Data

This study builds upon social network methods of assessing interpersonal social influence (Friedkin & Johnsen 2002; Leenders 2002; Robins Pattison & Elliott 2001). Our data come from two originally distinct studies of the same cohort of 164 students entering a 2-year masters program in public policy. One study was longitudinal, surveying this cohort every semester of their program. This study provides our outcome variable: political attitude, measured at Time 1 (in the first couple of weeks of their first semester at school) and Time 3 (during the second semester of their first program year). A separate study surveyed the network structure of 161 members of this cohort[5] at the beginning of the spring of their first year. This study provides the Time 2 data, collected in between the T1 and T3 surveys, at the beginning of the second semester.

We integrate student responses from the three surveys. The T1 political attitudes survey provided 126 valid responses from 164 surveys (a response rate of 77%). The T2 network survey provided 131 valid responses from 161 full-roster network surveys, a response rate of 81%. The T3 political attitudes survey provided 104 valid responses from the 126 surveys, a response rate of 82.5%. (In the longitudinal study, only students who completed the T1 survey were included in later surveys.)

The T1 and T3 political views of students were assessed via a 7-point Likert-type scale. Students were asked to place themselves on the political spectrum ranging from "Extremely Liberal" (anchored at 1) to "Extremely Conservative" (anchored at 7).[6] Using the T2 network survey data, we measured two types of network ties: dyads mutually identifying each other as getting together socially, and dyads mutually identifying each other as getting together for academic work. (A dyad is a pair of individuals in the system, who may or may not have a tie.) Questions covering basic demographic and individual background data (sex, race and religious affiliation) were included in the T1 survey. We also drew on institutional data regarding "section" assignment. The entire cohort of students was divided into three sections. Students in the same section took their "core" (required) classes together. Students were assigned to sections using a stratified random assignment procedure which sought to achieve similar racial and gender compositions across the three sections. (See Appendix for tables and statistics showing that the sex, minority status and religious group distributions were similar across the three sections.)

[5] The network survey was administered to only 161 of the initial 164 students because three students from the initial cohort did not take the required core spring semester class.
[6] There were no extreme conservatives (7) observed in the sample.

The T2 instrument was a network roster survey, listing all students in that cohort by name, and asking subjects to check the name "if you discussed academics (outside of the classroom) with him/her this year" (task ties) and "if you got together with him/her for non-academic reasons this year" (social ties).

Ninety students completed all three surveys and could be matched by individual student. The effective response rate over all three data collection periods yields a sample comprising 55% of the cohort surveyed. Although 55% is the effective response rate for students whose responses could be matched across all three data collection periods, it is important to note that the response rate for the network survey alone exceeded the 80% response rate threshold commonly cited as necessary for generating useful insights into network structure from full-network surveys (e.g., Sparrowe et. al. 2001: 319). There were no significant differences among any of the sub-samples along any social category dimensions (see Appendix). The overall distribution of political attitudes did not change significantly between the two time periods.

Our study design presents an unusual opportunity to disentangle the influence effects of social similarity from those of social network ties. The T1 measure of political attitudes occurs at the inception of the system. The T1 measure provides a pre-exposure baseline score that is not likely to be meaningfully influenced by interactions within the social system. This is important, because it is probable that social systems are far more dynamic at their inception, and that in the long run people reach some type of accommodation between their network and attitudes somewhere short of perfect consonance between the two. That is, it is plausible that network effects may be significant, but observable only for a short period. The T2 social network data reveal relationships emerging after that baseline. The T3 measure captures any changes in the outcome of interest. Evidence for social influence on political views is found in the significance of the association between a measure of the T1 political views of students' alters and their T3 political views, controlling for each individual student's baseline political view as well as other individual and contextual effects. Any such significant association would represent the best and most unambiguous evidence thus far for direct social influence on political attitudes.

We also conducted interviews with 26 of the students shortly after T3. While in this paper we focus on the quantitative analysis of the survey data, we present data from the qualitative analysis of the interviews

when they help illuminate the processes underlying the quantitative results. The interview transcripts were analyzed in two stages, using the software program NVivo. First, all passages relating in any way to social interaction were identified and collected into a single file. Second, this text was coded line by line for references to the processes and content of social interactions, so that important themes and patterns could be identified across all interviews and among subgroups of respondents.

ANALYSIS

Figure 1 provides a graphic image of our data. The nodes represent individuals, and the lines connecting nodes represent relationships (reciprocated social ties) among individuals. The shape of the node indicates which section the individual was assigned to (triangle = section 1, square = section 2, and circle = section 3). The shade of the node indicates the individual's initial political attitudes. Lighter nodes are more conservative and darker nodes are more liberal, with white and black nodes having the most extreme views. The size of the node reflects the direction of attitude change. Large shapes became more conservative, small shapes more liberal, and medium-sized nodes demonstrated no attitude change from T1 to T3.

[Figure 1 about here]

Our central questions, expressed in terms of the imagery in Figure 1, can be restated as follows: 1) Is there segregation within the network based on political views? That is, are there more dark and more pale neighborhoods than one would expect by chance? 2) Is there unambiguous evidence of social influence on political views? That is, did individuals in the darker (more liberal) neighborhoods of the network become even more liberal (depicted as smaller in size), and individuals in the paler neighborhoods even more conservative (depicted as larger in size)? 3) Were these effects more pronounced for social networks than for task networks?[7]

[7] This question references hypothesis 4. We note that our empirical setting presents a conservative test for this hypothesis. We expect in general that friendship ties are more likely to be the conduits for social influence of political attitudes than task-based ties. As we noted, this influence is contingent on political topics coming up in interactions within the friendship. Among these public policy students, a dyad sharing a task-based tie assuredly has discussed political topics, and we have no such assurance for friendships.

Social Influence

We first test for evidence that students influence one anothers' political views. The theory of network influence advanced by Huckfeldt and Sprague (1987) and their subsequent work with Johnson (2002; 2004) suggest that the views of one's alters in the aggregate are a potentially important source of network influence. Using the Time 2 network survey combined with the Time 1 survey of political views, we determined the Time 1 political views of all of ego's alters from both his/her social and task networks. Using these combined data, we constructed a set of two individual-level variables: (1) the mean Time 1 political view of ego's task-tied alters; and (2) the mean Time 1 political view of ego's socially-tied alters. The means, standard deviations, and correlations between these two variables along with ego's Time 1 and Time 3 political views are provided in the appendix.

Our initial tests for social influence on political views estimates whether ego's self-selected social environment is significantly associated with his/her Time 3 political views, controlling for his/her Time 1 political views (considered a pre-exposure measure of political view) and a set of demographic and institutional controls. Because our dependent variable in this analysis, student's Time 3 political attitudes, comes from responses to a 7-point Likert-type survey question, we use ordered logit regression models[8] to estimate our regression coefficients and their standard errors (Agresti 2002). The results of these tests are presented in Table 1. In Table 1, Models 1 through 4 examine the determinants of Time 3 political views. We include Time 1 political views, which should capture any individual-level drivers of Time 3 political views. In these models, significant effects of the demographic variables indicate that particular demographic groups show changes in political views between Time 1 and Time 3. Model 1 indicates significant associations for the sex variable, "men," and for the race/ethnicity category "Asian," suggesting that women and students identifying as Asian are more likely to become more conservative as compared to men and whites, respectively.[9]

[Table 1 about here]

[8] Ordered regression models produce "cut-point" estimates for the transition between levels of the dependent variable. Because these cut-points are distinct for each model estimation, the magnitude of the estimated coefficients themselves are not meaningful when compared across models. Only the sign of the coefficients and their level of significance may be meaningfully compared across models.

[9] As an additional test of the robustness of our findings, we replicated our analyses with Asians removed from the sample. There were no substantive changes to our social influence estimates. We also looked for significant differences in social influence between men and women, and found none. Analyses available upon request.

In Models 2 through 4 in Table 1, we add in the social influence indicators. The mean Time 1 political views of both task and social alters have positive significant effects on students' changing political views. The more conservative an ego's alters' Time 1 views are, the more conservative ego will be at Time 3. Similarly, the more liberal an ego's alters' Time 1 views are, the more liberal ego will be at Time 3. Although this relationship is true for alters in both task and social networks, Model 4 shows that it is the social network alters that are more influential. When terms for task network alters and social network alters are included in the same model (as in Model 4 in Table 3), only the mean T1 view of socially-tied alters remains a significant predictor of Time 3 views.[10]

These findings provide support for hypotheses 3 and 4. That is, we find strong and consistent evidence of social influence with respect to ideological self ratings. These effects are substantively quite large. Table 2 offers a summary of the size of these effects at around the mean of the various control variables. We find that the typical marginal effect of a single point change in average T1 attitude of T2 alters is associated with approximately a .6 to .8 point shift in ego's view by T3.

[Table 2 about here]

As an additional test that social ties are the key mechanism for attitude change, we divide the potential relational pathways of influence on an individual into three categories of dyads: dyad type 1: individuals to whom ego has a social tie; dyad type 2: individuals to whom ego has a task tie; and dyad type 3: individuals to whom ego has both social and task ties. Does having a task tie to someone in addition to a social tie increase his/her influence on ego? Table 3 duplicates the four models in Table 1, adding, as an independent variable, the mean views of individuals to whom ego has both task and social ties.

[Table 3 about here]

The negative coefficient for dual ties in Model 4 in Table 3 indicates that the marginal effect of having a task tie in addition to a social tie with an individual is unlikely to be significantly positive. This suggests that, consistent with and providing additional support for hypothesis 4, the pathway of influence on political attitudes is through social (rather than task) ties.

[10] Although the mean T1 views of social and task alters are significantly correlated, the Variance Inflated Factors associated with Model 4 for these two terms are 2.03 and 1.93, respectively. Both factors are well below the common threshold of 10 as an indicator of multicollinearity issues (e.g., Myers 1990: 369).

The qualitative data suggest that students did regularly engage in policy-related discussion in which political differences emerged, but that these differences were often within a fairly narrow ideological band. As one student (self reported ascjust left of center, a 3 on the 7-point scale) explained, "[I]n general there are both viewpoints, in terms of conservative and liberal at the school, but by and large they're very liberal. And the same in this group. I definitely ended up being the more conservative side but by and large we were all very liberal."

The interview data also suggest that the process of social influence on political views was subtle. No students reported that they underwent a major change in political attitudes. Several students made the point that, while their basic attitudes hadn't changed, their general knowledge around policy had expanded (as one would hope). When asked whether she thought differently about political issues at the end of her first year, one student responded, "Probably not a lot differently, except that I know a lot more about them so I just have more opinions on them."

Network formation

To test for political view homophily, we look for evidence that the ties measured at Time 2 are significantly associated with dyadic similarities in Time 1 political views. Figure 1 offers some hints as to the key drivers of the emergent network. There are clearly more ties within cohort (i.e., shape of node), while it is not so clear whether ties cluster by political preference (i.e., lightness or darkness). There is only a weakly significant correlation between ego's T1 political views and the mean T1 political views of ego's socially-tied alters (see Appendix). Figure 2 plots the latter as a function of the former, showing no visibly strong association. If there were perfect ideological homophily (i.e., students talk only to students with the same political views), Figure 2 would be a line with a slope of 1. More generally, if there were significant attitude homophily, we would expect an obvious positive slope. Given the near-zero slope apparent in Figure 2, it is clear that if there is any political view homophily, it is weak at best.

[Figure 2 about here]

A second way to assess political view homophily is using network density measures. A density measure is simply the ratio of actual ties to potential ties. For example, if there are five actual ties out of a set

of ten possible ties, the density would be 0.5. Tie density is a first-order estimate of tie probability. Here, we look at the odds ratio of the densities (probabilities) of within-group ties and between-group ties, where "group" refers to those similar on some dimension—demographic or attitudinal. In the absence of homophily, the odds ratio would be 1 (i.e., just as likely to form a tie within-group as between-group). If there is homophily, the ratio would be greater than 1, and if there is heterophily, the ratio would be less than 1. Table 4 presents these calculated densities and associated odds ratios for political views, as well as for other known sources of homophily: sex, race, and religion (Marsden 1988) as well as section membership. As Table 4 shows, the odds of forming a tie with a person of the same political view are 1.2 times the odds of forming a tie with a person of a different political view, suggesting that there is a mild tendency toward political homophily. As with the correlation statistic, this finding is consistent with the presence of political view homophily. These findings are only suggestive, however, because there are multiple inter-related factors (e.g., political views and religion) that are correlated with the presence/absence of a tie.

[Table 4 about here]

A complication in a multivariate analysis of dyadic data is that the observations are typically interdependent, thus violating a fundamental assumption of many statistical methods. For example, it is a well-established finding in the study of social networks (Wasserman and Faust 1994) that triads tend to be closed. In a social system of three people A, B, and C, if A is tied to B and B is tied to C, A and C are more likely to have a tie (to "close" the triangle) than in the system where B is absent. In addition, whenever such a "triangle" forms, the ties among A, B, and C are more likely to survive over time than ties in dyads without a third shared partner. (For a detailed discussion of both phenomena, see Krackhardt & Handcock [2007], and for interactions with homophily, see Louch [2000].)

In testing for associations between network properties and tie formation likelihoods, there are two classes of statistical approaches: the Multiple Regression Quadratic Assignment Procedure (MRQAP), and Exponential Random Graph Models (ERGM, also called "p*"). MRQAP is designed for testing the significance of the relationship between different dyad-level variables —e.g., comparing different networks, or whether (in the extant case) dyadic similarity along various dimensions predicts the presence of a relationship.

ERGM allows testing for the presence of dyad-level associations, but also the presence of particular structural tendencies in the network (such as the tendency for triad closure). Here our primary objective is to examine the relationship between dyad-level variables (whether the similarity in Time 1 political views between two individuals is associated with the likelihood those two individuals share a tie at Time 2), so either method of estimation is appropriate. We therefore report our findings using both approaches.[11]

Table 5 reports our findings from our QAP and ERGM analyses.

[Table 5 about here]

In these analyses, the key term of interest is the absolute value of the difference in Time 1 political views. This variable is a distance measure. The larger the value, the more dissimilar the individuals are in terms of political views. A negative coefficient for this variable would suggest that homophily in political views contributes to tie formation; the smaller the difference in political views between two people, the more likely they are to form a tie. A positive coefficient on this variable would suggest heterophily: dissimilar individuals are more likely to form ties. Among the models shown in Table 7 where significance levels could be estimated, all revealed the identical pattern of significance for the homophily-related terms: Similarities in section assignment, race, and religion are strongly associated with increases in the likelihood of having a tie at Time 2. Neither differences in Time 1 political views nor sex similarities were associated with tie probabilities. The sum of Time 1 political views had a significant negative association with tie probabilities. This means that the larger the dyadic sum of Time 1 political views (i.e., the more conservative the dyad), the less likely the dyad has a tie at Time 2. The smaller the dyadic sum of Time 1 political views (i.e., the more liberal the dyad), the more likely the dyad has a tie at Time 2. Figure 3 shows that even for the two ERG models for which significance levels could not be estimated, the pattern of estimated homophily-related coefficients are quite similar to the model where significance levels could be estimated.[12] Table 6 provides a substantive interpretation of our homophily findings by demonstrating how various differences affect relative tie probabilities.

---

[11] In the Appendix, we discuss these two statistical approaches in greater detail.

[12] If triad closure and survival amplify apparent homophily, we would expect the ERGM without triad terms to overestimate homophily effects. Thus, the triad terms should reduce the significance of homophily terms, making it highly unlikely that political attitude homophily would plausibly emerge as significant in these two models. Again, the QAP model estimates hold constant the structural properties of the network.

[Figure 3 about here]

Our analysis generated several surprising findings. First, we find no evidence of political view homophily in social tie formation (hypothesis 1). We can see that even for a dyad with a difference in political views of 2 full points on a 7-point scale, the relative tie probability is comparable to that for an opposite sex dyad. (Our data show no significant homophily by sex.) We do not infer from this finding that political view homophily does not exist. Rather, political view similarity was not an important determinant of tie formation in this setting. (It may be that the relatively low degree of variation in political views diminished the importance of this dimension in tie formation relative to what would occur in a more politically heterogeneous setting.) Another surprise is the sheer magnitude of racial and religious homophily in this university, cosmopolitan setting. Two individuals who are the same race and religion are about eight times more likely to form a friendship than two individuals who are different on those two dimensions.

We do find support for hypothesis 2, with the significant negative association between the dyadic sum of Time 1 political views and tie probability. That is, liberals are more likely to form ties (and conservatives are less likely to form ties) in this setting. We examine this last finding in more detail below.

[Table 6 about here]

The interview data are consistent with the statistical finding of a powerful effect of section (and core course) assignment on social networks, and little tendency toward affiliations based on political viewpoint homophily. On the matter of racial and, to a lesser extent, religious homophily, the interview data offer a more nuanced understanding of the process of tie formation.

In describing the development of their social networks, students repeatedly referred to the impact of section membership. One described his network as "entirely" section-based. Another said of the section system, "I didn't realize how much I would appreciate that." A third noted that it was common practice in the beginning of the year for any student who was organizing a party to invite his/her entire section. One woman lamented not knowing students from other sections, but then joked, "I think it's a myth that there are other people outside the beta [section][13]!" The process of meeting in core classes was reinforced through the many

[13] Comments in brackets are not the speaker's words but are inserted to make sense of a passage.

group assignments that students were given. As one person said of his group project, "I'm definitely much, much better friends with the four people I worked with because we had an exhilarating experience learning about this." Another student alluded to the role of early study groups associated with the quantitative core classes, saying "I think some of us became friends by working together like in statistics or economics or that kind of thing, first semester. . . . through some of those groups is how I've got the friends that I'm closest to."[14]

Students also referred to participation in various clubs that cut across sections and degree programs. (The students in this study were all in the masters in public policy program, but there are many other students at the school earning other degrees, such as a masters in public affairs or a Ph.D. in policy). Activities that invited students from across the school to participate gave students ample opportunity to meet others with similar interests or social identities. As one woman stated, "You name it, I did it… Women's caucus, Jewish caucus, Democratic caucus, Campaigns and Elections [interest group]…." Although it is true that students might connect with politically similar classmates through some of these venues, it was extremely rare for students to describe making social connections on the basis of political affiliation. Only one student said her closest ties were to people "whose politics I respect."

The interview data remind us that people do develop ties on the basis of shared elements of identity (such as race and religion), but that all of us possess multiple dimensions of social identity and their relative salience varies according to a number of factors, including social context. Thus, although several students commented on the racial homogeneity of their networks, others noted the fluidity of social identification. Speaking to the salience of race, one African American man commented that he found himself hanging out less with whites than he had in other settings, and observed, "I've been more uncomfortable in some places [social settings here] than I have been in the past. A couple of other people, two other people, two of my closest friends here said the same thing." He suspected this was a result of being in a less racially balanced environment than what he had experienced elsewhere. One white student made a similar observation about his network, but offered a different possible explanation. Speaking of his close associates, he said,

> But of that group, it's a very white group. I mean that's the first thing that comes to mind and I've commented to other people. I've had more homogenous friends here than I've had ever before. . . . I

[14] Ellipses indicate omitted text.

> think partly it's similar interests. I think the people that I'm closest with are similar in their interests -- education policy and other domestic issues. And the people of color here are, at least some of my, I think most of my friends [of color] are more interested in international issues

At the same time, however, students also pointed out the influence of cross-cutting identities on affiliation, noting that racial or ethnic similarities did not always trump other dimensions of identity or interests. For example, an Asian American man explained that a Latino/Chicano friend

> . . . was talking about his experiences with another person in his cohort who is from Mexico. And it seems like on paper they would have a lot in common…. this idea of a common ethnicity, a lot of shared cultural values. But the person from Mexico, (his) family is part of the ruling party. And my friend said he just can't have more than a surface conversation with this other person because they just have very little in common. Growing up in a very working class background in LA versus having all your needs catered to in Mexico City… besides school, the commonalities ended.[15]

A Latino American man described the same division from the other side:

> I was just speaking about the Latino community . . . Miguel, one of my best friends here in our cohort, is an interesting sort of bridge because he comes to the *Latino* Caucus meetings but, on this campus, he's *Latin*. And they're two very separate communities with no interaction. And the Latino Caucus is concerned about bilingual ed, immigration reform, welfare policy, healthcare, housing issues. . . . And so, through me . . . he has, from the beginning, has come to these meetings and -- sort of like me, we sort of sit in back and we're more quiet, not the really involved people -- but they are definitely involved. He's also, of course, involved with the Latin community which has their own organization and they . . . can talk about different things . . . this group who -- so many went to British schools -- somewhere in South America, very wealthy families . . . . And they're here studying international trade and finance and they will go back to be a member of Congress and then an Ambassador, or do big business back home. They could care less about Proposition 187 in California or immigration reform at the border. These two groups do not interact at all.

A third student observed that on the small group level there was considerable "self-segregation," but the basis for these affiliations wasn't always the same dimension of identity:

> I think it breaks down on a lot of different ones [dimensions] and it's like people choose their one and then it's kind of fixed…. It could be that you're Hispanic or it could be that you're gay or that it could be that you're a woman or that you're a black woman. You know, it could be any number of things. It could be you're interested in a policy area…. And I think some people get around an issue and then around an ethnic or some other kind of social network.

Our data suggest that, while identity is in the eyes of the ego, social context can make some identities more salient than others. For example, a number of students spoke of the salience of race in their identities and their friendships, but no one referred to left- or right-handedness as a salient dimension of identity and their networks. In this university setting (in contrast to, for example, a baseball team), handedness was not

[15] Words and spaces in parentheses are inaudible portions or tentative transcriptions.

experienced as salient. The quantitative data capture the collective salience of particular dimensions of social identity, but at the individual level it is clear that an individual has many cross-cutting dimensions of identity.

Politics and Networking

Are there different levels of social network engagement across the political spectrum? The ERGM above suggested that conservatives are more peripheral than liberals in this population. Here we further examine this relationship. Table 7 summarizes the relationship between political orientation and two measures of centrality: degree (the number of ties an individual has) and betweeness (the number of times an individual lies on the shortest path between all other pairs of individuals; see Freeman 1979).

[Table 7 about here]

Individuals on the left of the political spectrum are significantly more central ($p < .05$) by both measures of centrality. For example, they have 50% more ties than those on the right. There is no tendency for conservatives (5 or 6 on the Likert scale) to talk to each other. For example, the tie-density (the ratio of observed ties to all possible ties – a first-order estimate of tie probability) of conservative-conservative social ties is 6.8%, and task ties 5.7%, smaller than the tie-density of conservative-liberal ties, 7.1% (social) and 9.0% (task). As a point of comparison, the tie-density of liberal-liberal ties was 12.1% (social) and 12.8% (task). The conservative minority, rather than banding together, connected less with each other and less with the network in general. This is a notable contrast to demographic minorities within the school, such as African Americans, Jews, and Hispanics, who generally did not have fewer ties, and had a tendency to form in-group ties.

This conservative disengagement could be a reaction to being a particular kind of minority in this setting (e.g., being a conservative at a liberal policy school),[16] or could reflect some intrinsic difference about the social networking priorities and/or proclivities of liberals and conservatives. We have data to address the last explanation from our Time 1 survey. Students were asked to identify their top 2 reasons from a list of 11 possible reasons for enrolling in that particular graduate school of public policy. One option was the "value of social connections for my career." This variable was coded as either a 1 (among the student's top 2 reasons) or 0. The mean was 0.18 and the standard deviation was 0.38 (n=119). Students were also asked to rank the top

[16] As a point of contrast, other types of minority status (e.g., with respect to race, religion, gender) were not associated with peripherality.

3 ways from a list of 5 possible ways they expected the policy school to contribute to their professional lives. One option was "contacts – the people I meet at and through the school will be helpful to me in my future career." This variable was coded as follows: 3 = most important way, 2 = 2nd most important way, 1 = 3rd most important way, 0 = either 4th or 5th in importance. The mean was 1.02, and the standard deviation was .90 (n=122). Correlations between these two variables and students' Time 1 political views are -0.03 and 0.04, respectively. Neither correlation is significant. This ex post analysis does not support the conjecture that political view is associated with social networking attitudes or intentions.

The interview sample contained only four conservative students. Therefore, the qualitative data on conservative students' experiences can merely hint at possibilities. One such possibility is based on the fact that two conservative students indicated that the people they were closest to were outside of the school. This suggests that conservative students might have worked harder than liberal students to maintain ideologically compatible ties outside of school. Unlike the aforementioned racial or ethnic minorities, conservatives are a *disproportionate* minority at the school. The proportion of conservatives outside of the school is much larger than within the school. As a result, conservative students may be "fishing" for ties in external networks, because these offer a more favorable ideological balance. A statement by another student hints at a related possibility:

> [Q: If you want to raise a contrary position to what's being argued in class, how do you find that to be received?] "The teachers are usually ok with it, and the other people in the class, it seems that they're looking at you like you're a little bit strange. It's not like anybody's forcing you not to say something. It just seems like a lot of times people think, well this is opinion and everybody else would have that opinion and it would be wrong if you had a different opinion. Or… not just that your opinion would be wrong, but you would be wrong or you would be a bad person… if you thought that way."

This quote suggests that, when a student who is in an attitudinal minority experiences the normative environment as hegemonic or coercive, a coping mechanism might be to withdraw from social attachments that are perceived as optional.

DISCUSSION

This paper provides the cleanest evidence in the political science literature for social influence affecting political attitudes. The research design accounts for the co-evolutionary complexities in assessing social influence. As a result, our findings are robust to concerns of selection and endogeneity. Alternative

explanations for our finding of peer social influence on political views would require processes that (we think implausibly) satisfy two criteria: (1) the process must be associated with changes in political views; (2) the process must push individuals toward the selection of alters that lean in the same direction that their political views *will* change.

This finding is all the more striking given the population under study, which were elites that one would anticipate had crystallized opinions. There is an implicit assumption in much of the literature on public opinion that elites are likely immune from social influence. While caution needs to be exercised in extrapolating from this particular group, these results also suggest that this assumption needs to be re-examined with a critical eye.

We also found that the pathway to social influence seems to be through social rather than task-based ties. This finding is particularly notable for our population because political views were certainly conveyed through task relationships. Our finding suggest that persuasion might be more a function of affect than information transfer, and persuasion is unlikely to be a function merely of interaction frequency. This finding is of especial importance, given research that suggests that a disproportionate share of discordant political communication occurs in the workplace (Mutz and Mondak 2006). These results suggest that these workplace ties may result in relatively little persuasion.

We found only weak, and in the end, insignificant tendencies toward political homophily. By comparison, the effects of race/ethnicity and religion on network formation were orders of magnitude larger. One might expect that politics would be a powerful social divide because of the high salience of politics in a policy school. Instead, what we found was that the political minority, rather than sticking together, essentially withdrew from the community. That is, rather than a "red-blue" divide within this population, there is a blue (majority) core and a red (minority) periphery. The relative peripherality of conservatives is consistent with previous studies where conservatives were in the minority (Finifter 1974; Newcomb 1943), although we do not find, as Finifter did, that the political conservatives tend to band together.

The magnitude of homophily with respect to race, ethnicity, and religion was a surprise. Our expectation was that in the immersive experience of professional school, with an ideology that emphasizes the

value of diversity, and powerful institutional forces (such as assigned sections and assigned core courses) pushing dissimilar people together, race/ethnicity and religion would not be quite such strong predictors of who created ties with whom. Instead, we found patterns endemic in the broader society (e.g., Marsden 1987) replicated themselves in this microcosm.

Methodologically, this paper builds a bridge among three different traditions in the study of social influence: the controlled, laboratory experimental approach of social psychology; the whole-network tradition of sociology; and the ego-centric network orientation of political science. Our findings are thus complementary to those of Huckfeldt, Sprague, and colleagues (1987; Huckfeldt, Plutzer and Sprague 1993; Huckfeldt et. al. 1995; Huckfeldt, Johnson and Sprague 2002; 2004; see also Donatella et al. 2008) regarding the power of social relationships in shaping politics, providing some of the micro-underpinnings of the processes that Huckfeldt et al. examine. From this union of traditions, literatures, and methodological approaches, we have crafted a demonstration of the importance of social influence in determining political attitudes. Furthermore, we introduced to the political science literature two powerful methods for the statistical analysis of social network data: MRQAP and ERGM.

Our study took place in a very particular setting, and one could argue that the particularities of the setting limit the generalizability of our findings. In response to such criticism, we first acknowledge that we have sacrificed breadth for depth. While we have offered strong evidence of social influence on political attitudes, this confidence applies solely to our empirical setting. Still, we argue that there exists no ideally generalizable setting for the study of social influence. Instead, we assert that society is made up of many diverse micro settings, which vary along dimensions that affect social influence processes. Indeed, much of the study of social capital focuses on the emergent outcomes from different micro-level processes of network evolution. For example, Bourdieu (1986) found that small ethnic minorities have a great in-group capacity to regulate behavior because of the difficulty of exiting that network. Similarly, we argue, social influence is an emergent property of micro-level processes governing the co-evolution of individuals and their attitudes. The conceptual challenges around connecting micro-level processes and macro-level outcomes have long been identified as a fundamental one in political science (cf. Eulau 1969; Schelling 1978). We offer here a new

approach to traversing the chasm between micro-level social processes (i.e., selection and influence) underlying the attitudes of individuals and the macro-level patterns (the distribution of the attitudes and patterns of communication in a population) that result.

We acknowledge the limitations to the generalizability of this particular setting. We chose the setting because we were seeking a robust test of social influence with respect to political attitudes. To this end, we wanted a setting where (1) we could capture political attitudes prior to exposure to others in the system, (2) individuals would be exposed to novel perspectives, and (3) political views were likely to be both expressed and socially salient. The first year of a masters in public policy program fit those criteria perfectly. Of course, there are other seetings where politics are rarely discussed, and social influence thus likely to be minimal. We do not claim that social influence of political views typically operates with the strength we identified in this study. Rather, we present these findings first as an existential proof of social influence, and second as a sharper examination of the pathways (social rather than task) through which that influence flows.

REFERENCES

Agresti, A. 2002. Categorical Data. Second edition. Wiley.

Allen, Thomas J. 1977. Managing the flow of technology: Technology transfer and the dissemination of technological information within the R&D organization. Cambridge, MA: MIT Press.

Anderson, C. J., S. Wasserman, and B. Crouch. 1999. A p* primer: logit models for social networks. Social Networks 21 (1):37-66.

Aron, Arthur; Aron, Elaine N.; Smollan, Danny. 1992. Inclusion of Other in the Self Scale and the structure of interpersonal closeness. Journal of Personality and Social Psychology. Vol 63(4): 596-612.

Berelson, Bernard. 1954. Voting; a study of opinion formation in a presidential campaign. Chicago: University of Chicago Press.

Borgatti, S.P., Everett, M.G. and Freeman, L.C. 2002. Ucinet for Windows: Software for Social Network Analysis. Harvard, MA: Analytic Technologies.

Bourdieu, P.: The forms of capital, in: J.G. Richardson (ed.): Handbook for Theory and Research for the Sociology of Education, 1986, pp.. 241 – 258

Buchan, Nancy R, Rachel T A Croson, and Robyn M Dawes. 2002. Swift neighbors and persistent strangers: A cross-cultural investigation of trust and reciprocity in social exchange. American Journal of Sociology 108 (1):168-206.

Byrne, Donn. 1971. The Attraction Paradigm, New York, NY: Academic Press.

Campus, Donatella, Gianfranco Pasquino, Cristian Vaccari. 2008.
"Social Networks, Political Discussion, and Voting in Italy: A Study of the 2006 Election," Political Communication 25: 423-444.

Dekker, D., Krackhardt, D. and Snijders, T.A.B. 2007. Sensitivity of MRQAP Tests to Collinearity and Autocorrelation Conditions. Psychometrika 72(4): 563–581.

Eulau, Heinz. 1969. Micro-Macro Political Analysis: Accents of Inquiry. Aldine Publishing Company.

Erickson, B. H. 1988. The relational basis of attitudes. In Social structures: A network approach, edited by B. Wellman and S. D. Berkowitz. Cambridge: Cambridge University Press.

Feld, S. L. 1982. Social Structural Determinants of Similarity among Associates. American Sociological Review, 47(6): 797-801.
Festinger, Leon. 1954. A Theory of Social Comparison Processes, Human Relations 7: 117-40.
Festinger, Leon, Stanley Schachter, Kurt W. Back, Catherine Bauer, Robert Woods Kennedy, and M.I.T. Albert Farwell Bemis Foundation. 1950. Social pressures in informal groups; a study of human factors in housing. [1st ed. New York,: Harper.
Finifter, Ada W. 1974. The Friendship Group as a Protective Environment for Political Deviants. American Political Science Review 68(2): 607-625.
Frank, K.A., and K. Fahrbach. 1999. Organizational Culture as a Complex System: Balance and Information in Models of Influence and Selection. Organization Science 10 (3, Special issue on Chaos and Complexity in Organization):253-277.
Freeman, Linton C. 1979. Centrality in Social Networks I: Conceptual Clarification. Social Networks 1: 215-239.
Friedkin, Noah E. 1998. A structural theory of social influence. Structural analysis in the social sciences: [13]. Cambridge: Cambridge University Press.
_____. 2004. Social Cohesion. Annual Review of Sociology 2004.
Friedkin, Noah E. and Eugene C. Johnsen. 1997. Social positions in influence networks. Social Networks 19 (3):209-222.
_____. 2002. Control loss and Fayol's gangplanks. Social Networks 24 (4): 395–406.
Gibbons, D., and P. M. Olk. 2003. Individual and structural origins of friendship and social position among professionals. Journal of Personality and Social Psychology 84 (2):340-351.
Goodreau, S., Handcock, M., Hunter, D., Butts, C., and Morris, M. 2008. A statnet Tutorial. Journal of Statistical Software 24(9): 1-26.
Greenwald, Anthony M., and Mahzarin R. Banaji. 1995. Implicit Social Cognition: Attitudes, Self-Esteem, and Stereotypes. Psychological Review 102(1):4-27.
Handcock, Mark S., Hunter, David R., Butts, Carter T., Goodreau, Steven M., and Morris, Martina. 2003. statnet: Software tools for the Statistical Modeling of Network Data. URL http://statnetproject.org
Heider, Fritz. 1958. Social Perception and Phenomenal Causality," Psychological Review, 51.
Hintze, Jerry L., and Nelson, Ray D. 1998. Violin Plots: A Box Plot-Density Trace Synergism. American Statistician 52(2):181-84.
Holland, P.W., and Leinhardt, S. 1981. An exponential family of probability-distributions for directed-graphs. Journal of the American Statistical Association 76(373): 33–50.
Huckfeldt, R., P. E. Johnson, and J. Sprague. 2002. Political environments, political dynamics, and the survival of disagreement. Journal of Politics 64 (1):1-21.
_____. 2004. Political disagreement : the survival of diverse opinions within communication networks, Cambridge studies in political psychology and public opinion. Cambridge, UK: Cambridge University Press
Huckfeldt, Robert, Jeanette Morehouse Mendez, and Tracy Osborn. 2004. Disagreement, Ambivalence, and Engagement: The Political Consequences of Heterogeneous Networks. Political Psychology.
Huckfeldt, R., E. Plutzer, and J. Sprague. 1993. "Alternative Contexts of Political Behavior: Churches, Neighborhoods, and Individuals," Journal of Politics (May): 365-381.
Huckfeldt, R., and J. Sprague. 1987. Networks in Context - the Social Flow of Political Information. American Political Science Review 81 (4):1197-1216.
_____. 1991. Discussant Effects on Vote Choice - Intimacy, Structure, and Interdependence. Journal of Politics 53 (1):122-158.
_____.1995. Citizens, Politics, and Social Communication. New York: Cambridge University Press.
Hunter, D. R. 2007. Curved Exponential Family Models for Social Networks. Social Networks 29(2): 216–230.
Ikeda, K. and R. Huckfeldt. 2001. "Political Communication and Disagreement Among Citizens in Japan and the United States," Political Behavior 23: 23-52.
Kenny, C. B. 1994. The Microenvironment of Attitude-Change. Journal of Politics 56 (3):715-728.
_____. 1998. The behavioral consequences of political discussion: Another look at discussant effects on vote choice. Journal of Politics 60 (1):231-244.
Krackhardt, D. 1988. Predicting with networks—Nonparametric multiple-regression analysis of dyadic data. Social Networks 10(4): 359–381.
Krackhardt, D. and Handcock, M. S. 2007. Heider vs Simmel: Emergent Features in Dynamic Structures. Lecture Notes in Computer Science 4503:14-27.
Lazarsfeld, Paul, Robert Merton. 1954. "Friendship as Social Process: A substantive and Methodological Analysis," in P. L. Kendall, The Varied Sociology of Paul Lazarsfeld, New York, NY: Columbia University Press: 298-348.
Lazarsfeld, Paul, Bernard Berelson, and Hazel Gaudet. 1948. The people's choice; how the voter makes up his mind in a presidential campaign. 2nd ed. New York: Columbia University Press.

Leenders, R. 2002. Modeling social influence through network autocorrelation: constructing the weight matrix. Social Networks 24 (1):21-47.
Lincoln, J. R., and J. Miller. 1979. Work and Friendship Ties in Organizations - Comparative Analysis of Relational Networks. Administrative Science Quarterly 24 (2):181-199.
Louch, H. 2000. Personal network integration: Transitivity and homophily in strong-tie relations. Social Networks 22 (1): 45-64.
Luttmer, E. F. P. 2001. Group loyalty and the taste for redistribution. Journal of Political Economy 109(3): 500-528.
Mackie, Diane M., and Sarah Queller. 2000. "The Impact of Group Membership on Persuasion: Revisiting "Who Says what to Whom with what Effect?"." In Attitudes, Behavior, and Social Context: The Role of Norms and Group Membership., ed. Deborah A. Terry and Michael A. Hogg. Mahwah, N.J.: Lawrence Erlbaum Associates.
Manski Charles F. 1993. Identification of Endogenous Social Effects: The Reflection Problem The Review of Economic Studies, 60: pp. 531-542.
Marsden, Peter V. 1987. Core Discussion Networks of Americans. American Sociological Review 52 (1): 122-131.
_____. 1988. Homogeneity in confiding relations. Social Networks 10 (1988) (1): 57–76.
Marsden, Peter V., and Noah E. Friedkin. 1993. Network Studies of Social-Influence. Sociological Methods & Research 22 (1):127-151.
McConnell, Allen R.; Rydell, Robert J.; Strain, Laura M.; Mackie, Diane M. 2008. Forming implicit and explicit attitudes toward individuals: Social group association cues. Journal of Personality and Social Psychology. Vol 94(5): 792-807.
McPherson, M., L. Smith-Lovin and J. M. Cook. 2001. Birds of a feather: Homophily in social networks. Annual Review of Sociology 415-444.
Mollica, K. A., B. Gray, and L. K. Trevino. 2003. Racial homophily and its persistence in newcomers' social networks. Organization Science 14 (2):123-136.
Morris, M., Handcock, M., and Hunter, D. 2008. Specication of Exponential-Family Random Graph Models: Terms and Computational Aspects. Journal of Statistical Software 24(4): 1-24.
Mouw, Ted. 2003. "Social Capital and Finding a Job: Do Contacts Matter?" American Sociological Review. 68(December):868-898.
Mouw, Ted. 2006. "Estimating the Causal Effect of Social Capital: A Review of Recent Research." Annual Review of Sociology. 32:79-102
Mutz, D. C. 2002. Cross-cutting social networks: Testing democratic theory in practice. American Political Science Review 96 (1):111-126.
Mutz, D. C. 2006. Hearing the Other Side: Deliberative versus Participatory Democracy. Cambridge, UK: Cambridge University Press.
Mutz, D. C., and J. J. Mondak. 2006. The workplace as a context for cross-cutting political discourse. Journal of Politics 68 (1):140-155.
Myers, R. 1990. Classical and modern regression with applications (2nd ed.). Boston: Duxbury Press.
Nebus, James. 2006. Building Collegial Information Networks: A Theory of Advice Network Generation. Academy of Management Review 31 (3):615-637.
Newcomb, T. M. 1943. Personality & social change; attitude formation in a student community. New York,: Dryden Press.
Newcomb, T. M. 1961. The Acquaintance Process. New York, NY: Holt, Rinehart, and Winston.
Nickerson, D. 2008. "Is Voting Contagious? Evidence from Two Field Experiments," American Political Science Review (February).
Pattison, P. and S. Wasserman. 1999. Logit models and logistic regressions for social networks, II. Multivariate relations. British Journal of Mathematical & Statistical Psychology 52 (2):169-193.
Postmes, T., S. A. Haslam, and R. I. Swaab. 2005. Social Influence in Small Groups: An Interactive Model of Social Identity Fomration. European Review of Social Psychology. 16:1-42.
Putnam, Robert. 1966. Political Attitudes and the Local Community. American Political Science Review 60: 640-54.
Reagans, R. 2005. Preferences, identity, and competition: Predicting tie strength from demographic data. Management Science 51 (9):1374-1383.
Robins, G., P. Pattison, and P. Elliott. 2001. Network models for social influence processes. Psychometrika 66 (2):161-189.
Sacerdote, B. 2001. Peer Effects with Random Assignment: Results for Dartmouth Roommates. Quarterly Journal of Economics, 116, 681-704.
Snijders, T., Pattison, P., Robins, G., and Handcock, M. 2006. New specifications for exponential random graph models. Sociological Methodology 36: 99–153.
Soetevent, A. R. 2006. "Empirics of the Identification of Social Interactions; an Evaluation of the Approaches and Their Results," Journal of Economic Surveys, 20(2), 193-228.

Sparrowe, Raymond T, Robert C Liden, Sandy J Wayne, and Maria L Kraimer. 2001. Social networks and the performance of individuals and groups. Academy of Management Journal 44 (2):316-325.

Sunstein, Cass. 2003. Why Societies Need Dissent. Cambridge, MA: Harvard University Press.

Swann, W. B., Jr., Milton, L. P., & Polzer, J.T. (2000). Should we create a niche or fall in line? Identity negotiation and small group effectiveness. Journal of Personality and Social Psychology.79, 238-250

Tajfel, Henri, and John Turner. 1986. The social identity theory of intergroup behavior. In Psychology of intergroup relations, edited by W. G. Austin and S. Worchel. Chicago: Nelson-Hall Publishers.

Verbrugge, Lois. 1977. The Structure of Adult Friendship Choices. Social Forces: 576-97.

Wasserman, S. and K. Faust. 1994. Social Network Analysis: Methods and Applications. Cambridge: Cambridge University Press.

Wasserman, S. and P. E. Pattison. 1996. Logit models and logistic regressions for social networks: I. An introduction to Markov graphs and p*. Psychometrika 61 (3): 401–452.

Winship, Christopher and Robert Mare.1992. Models for Sample Selection Bias," Annual Review of Sociology, 18: pp. 327-50.Zaller, John R. 1992. The Nature and Origin of Mass Opinion. Cambridge: Cambridge University Press.

Table 1: Ordered logit models predicting Time 3 political views based on demographic characteristics, section assignment, and Time 1 views of alters (standard errors in parentheses).

	Model 1	Model 2	Model 3	Model 4
Male	-1.27**	-1.29*	-1.37*	-1.37*
	(0.47)	(0.52)	(0.54)	(0.55)
Religious Affiliation (Protestant is referent)				
Catholic	-1.21	-1.65*	-1.48†	-1.49†
	(0.77)	(0.84)	(0.88)	(0.88)
Jewish	-0.51	-0.58	-0.51	-0.51
	(0.71)	(0.79)	(0.81)	(0.81)
Other	-0.71	-1.08	-0.41	-0.44
	(0.93)	(0.96)	(0.93)	(0.95)
None	-0.89	-1.28†	-1.18†	-1.19†
	(0.59)	(0.66)	(0.67)	(0.67)
Race/Ethnicity (White is referent)				
Black	0.06	0.89	1.31	1.31
	(0.85)	(0.98)	(1.05)	(1.05)
Latino/a	0.51	1.08	1.90	1.86
	(1.06)	(1.32)	(1.41)	(1.43)
Native American	-1.24	-1.33	-1.11	-1.10
	(1.85)	(1.95)	(2.02)	(2.02)
Asian	1.87*	1.82*	2.04*	2.04*
	(0.73)	(0.87)	(0.84)	(0.85)
Other/Missing	-0.50	-0.55	-1.18	-1.17
	(0.83)	(0.92)	(0.96)	(0.96)
Section (Section 3 is referent)				
Section 1	0.73	0.86	0.51	0.53
	(0.52)	(0.58)	(0.58)	(0.59)
Section 2	-0.33	-0.36	-0.35	-0.34
	(0.59)	(0.62)	(0.65)	(0.66)
Time 1 Political View	2.40***	2.59***	2.93***	2.92***
	(0.34)	(0.39)	(0.44)	(0.44)
Mean of Academic Alters' T1 View		1.74**		0.12
		(0.67)		(0.89)
Mean of Social Alters' T1 View			3.16***	3.08**
			(0.76)	(0.98)
Cutpoints				
1 to 2	1.63	6.40	10.62	10.72
2 to 3	4.59	9.60	14.18	14.28
3 to 4	7.31	12.63	17.41	17.51
4 to 5	9.88	15.42	20.85	20.94
5 to 6	13.57	19.79	26.44	26.50
Log Likelihood	-89.0	-75.4	-68.6	-68.6
Pseudo-R^2	0.355	0.398	0.448	0.448

Table 2: Illustrative interpretation of social influence findings with actual data ranges indicated.

Ego's Time 1 Political View	Mean Time 1 View of Socially-Tied Alters						Data Range	
	1	2	3	4	5	6	Min	Max
1	1.01	1.14	1.73	2.54	3.38	4.24	2	3.29
2	1.14	1.73	2.54	3.38	4.23	4.96	1.5	3.29
3	1.73	2.53	3.38	4.23	4.96	5.59	2	3.5
4	2.53	3.38	4.23	4.96	5.58	5.95	2.36	3.31
5	3.38	4.23	4.96	5.58	5.95	6.00	2.38	3.83
6	4.23	4.95	5.58	5.95	6.00	6.00	2.45	2.78

NOTE: Table results are based on predicted estimates from the ordered logit regression model of the form: T3 view = f (T1 view, Mean of social alters' T1 view, Section dummies), i.e., Model 2 from Table 3 but ignoring demographic distinctiveness. The table also assumes the referent section, section 3.

Table 3: Testing social influence effects from alters with both social and task ties versus all task-tied and all socially-tied alters.

	Model 1	Model 2	Model 3	Model 4
Male	-1.25*	-1.25*	-1.44**	-1.42*
	(0.53)	(0.53)	(0.55)	(0.56)
Religious Affiliation (Protestant is referent)				
Catholic	-1.56†	-1.57†	-1.43	-1.44
	(0.85)	(0.85)	(0.89)	(0.89)
Jewish	-0.78	-0.77	-0.38	-0.30
	(0.80)	(0.80)	(0.82)	(0.83)
Other	-0.68	-0.73	-0.33	-0.47
	(0.93)	(0.95)	(0.93)	(0.95)
None	-1.11†	-1.12†	-1.19†	-1.24†
	(0.67)	(0.67)	(0.66)	(0.67)
Race/Ethnicity (White is referent)				
Black	1.13	1.14	1.27	1.28
	(1.02)	(1.02)	(1.06)	(1.06)
Latino/a	1.43	1.37	2.06	1.92
	(1.36)	(1.37)	(1.44)	(1.44)
Native American	-1.50	-1.47	-0.95	-0.78
	(1.96)	(1.97)	(2.03)	(2.04)
Asian	1.52†	1.55†	2.25*	2.43**
	(0.85)	(0.86)	(0.88)	(0.92)
Other/Missing	-0.91	-0.88	-1.21	-1.14
	(0.93)	(0.94)	(0.96)	(0.96)
Section (Section 3 is referent)				
Section 1	0.57	0.60	0.52	0.65
	(0.58)	(0.60)	(0.58)	(0.60)
Section 2	-0.56	-0.52	-0.21	-0.05
	(0.65)	(0.67)	(0.68)	(0.70)
Time 1 Political View	2.72***	2.72***	2.97***	2.98***
	(0.42)	(0.42)	(0.45)	(0.45)
Mean T1 View of Type 3 Dyad Alters	1.92**	1.74†	-0.97	-1.81
	(0.57)	(0.90)	(1.18)	(1.55)
Mean T1 View of Task Alters		0.27		0.99
		(1.10)		(0.89)
Mean T1 View of Social Alters			4.30**	4.61**
			(1.59)	(1.65)
Cutpoints				
1 to 2	6.95	7.23	11.22	12.53
2 to 3	10.25	10.53	14.81	16.19
3 to 4	13.31	13.61	18.05	19.45
4 to 5	16.49	16.77	21.52	22.87
5 to 6	21.44	21.66	27.25	28.42
Log Likelihood	-72.1	-72.0	-68.3	-67.9

Table 4: Densities and Odds Ratios of ties within and between categories.

Grouping Category	Social Tie Density	Odds Ratio
Political Views		
Same View	11.7%	1.20
Different View (all)	9.9%	
Differ by 1	11.3%	
Differ by 2	9.4%	
Differ by 3	6.4%	
Differ by 4	10.2%	
Differ by 5	3.7%	
Sex		
Within-Group	10.7%	1.06
Between-Group	10.1%	
Race		
Within-Group	14.8%	2.28
Between-Group	7.1%	
Religion		
Within-Group	13.4%	1.48
Between-Group	9.4%	
Section		
Within-Group	21.3%	5.17
Between-Group	5.0%	

(Based on ties among 105 individuals, or 5460 dyads.)

Figure 2: Political view of ego plotted against average views of alters