URBAN NETWORKS, URBAN CONTEXTS, AND

THE DIFFUSION OF POLITICAL INFORMATION

Brady Baybeck
Harvard University

Robert Huckfeldt
Indiana University

Paper prepared for presentation at New Methodologies for the Social Sciences: The Development and Application of Spatial Analysis for Political Methodology, Boulder, Colorado, March 10 – 12, 2000. Email contact: baybeck@latte.harvard.edu, huckfeld@indiana.edu.

Abstract

Our paper examines the spatial and temporal diffusion of political information within urban areas during an election campaign. The analysis is based on a two part argument. First, patterns of diffusion are subject to (1) the individual characteristics of urban residents, (2) the structure of their communication networks, and (3) the composition of the urban settings where they reside. Second, because patterns of diffusion are temporally specific, these three factors give rise to a dynamic process that unfolds over the course of the campaign. In order to evaluate this argument, we construct a multi-level analysis of information and communication, dependent on time, that is based on interviews with more than 3,500 residents of the Indianapolis and St. Louis metropolitan areas during the 1996 campaign. These interviews are spread over a period of nearly two years, and we are able to locate our respondents within the urban neighborhoods where they reside. Moreover, based on a social network name generator, nearly 1,500 of the interviews were conducted with discussants of the main respondents to the survey. Hence, individual respondents are located within time and space, and their discussants are similarly located. Levels of aggregation are both dynamic and spatial, based on individuals who are located within residential neighborhoods and networks of social and political communication.

We draw three main conclusions. First, not all networks are spatially dispersed, but some are, and the factors that give rise to spatial dispersion are directly related to an individual's position in social structure. Second, spatially dispersed networks produce a number of important consequences, but none is more important than decreasing the density of the respondents' communication networks. Finally, spatially dispersed networks are not necessarily political diverse, but they are more likely to connect individuals who reside in socially and politically divergent settings.

This paper examines the social diffusion of political information within urban areas during an election campaign. We are primarily concerned with patterns of spatial diffusion – the networks of communication that transmit political information among and between the citizens who reside in particular, spatially defined settings – but we also give attention to the dynamic implications of these spatially defined communication processes. The motivating question is relatively straightforward: How is political information transmitted through networks of social communication, and what are the implications for the spread of information in time and space? At the same time, simple questions lead to relatively complex analyses that depend on: the characteristics of individuals, the connecting ties that bring them together in communication networks, the spatial distances that are bridged by these ties, and the characteristics of the settings where these individuals reside.

The analysis is based on a two part argument. First, patterns of diffusion are subject to (1) the individual characteristics of urban residents, (2) the structure of their communication networks, and (3) the composition of the urban settings where they reside. Second, because patterns of diffusion are temporally specific, these factors give rise to a dynamic process that unfolds over the course of the campaign. In order to evaluate this argument, we construct a multi-level analysis of information and communication, dependent on time, that is based on interviews with more than 3,500 residents of the Indianapolis and St. Louis metropolitan areas during the 1996 campaign. These interviews are spread over a period of 10 months, and we are able to locate our respondents within the urban neighborhoods where they reside. Moreover, based on a social network name generator, nearly 1,500 of the interviews were conducted with the discussants of the main respondents to the survey. Hence, individual respondents are located within time and space, and their discussants are similarly located. Levels of aggregation are both dynamic and spatial, based on individuals who are located within residential neighborhoods and networks of social and political communication.

Several issues are crucial to the analysis. What are the individual and aggregate circumstances that give rise to spatially dispersed networks of social and political communication? What are the consequences of spatial dispersion for (1) the creation of bridges among and between diverse settings and networks? (2) the creation of heterogeneity and homogeneity within networks? (3) the temporal and spatial diffusion of political information across urban areas? Finally, to what extent does the temporal and spatial dependence of network based communication help to explain the aggregate distribution of preferences across urban areas?

Political Information, Spatial Diffusion, and Social Networks

The manner in which political information is diffused in time and space depends quite directly on the medium of transmission. When communication occurs through a newspaper or a news broadcast, information is obtained at the point when an individual reads the paper or is exposed to the broadcast. Hence, the diffusion process is wholly dependent on the habits and events of individual exposure. The communication process does not reach those who do not read or listen or watch – it does not reach individuals who do not come into direct contact with the information source.

Correspondingly, the spatial diffusion of information from the news media depends solely on the extent to which individual habits of exposure are distributed unevenly across geographic areas. That is, if all the residents in one neighborhood watch the news, but all the residents of the next neighborhood do not, the diffusion of information taken from the evening news broadcast will be spatially truncated. In contrast, the temporal diffusion of information is wholly due to the duration of information transmission and memory decay. If information is transmitted at only one time, there can be no temporal diffusion. Anyone who comes into contact with the source is informed, and the information slowly disappears as a function of memory attenuation. If information is broadcast and published on a regular basis for extended periods of time, the diffusion process will proceed at a decreasing rate until the entire attentive population is exposed, subject once again to memory attenuation.

The spatial and temporal diffusion of socially communicated information reflects a very different process. The news media introduces information to the public, but the information continues to be communicated (and recast), after the broadcast has concluded, as a consequence of countless social exchanges occurring among individuals imbedded within complex networks of social communication. While social communication itself occurs through various media (Huckfeldt and Sprague 1993), we restrict our attention in this paper to political discussion. Hence, in order for information to be conveyed, two individuals must be connected via patterns of political discussion, and the spatial locus of network ties is an open question.

Classic studies of social diffusion use the observed distribution of behaviors or information to infer the mechanisms of distribution (Coleman, Katz, and Menzel 1966; Burt 1987). In contrast, we use information regarding the mechanisms of transmission to make inferences regarding paths and patterns of diffusion. We do not know, with any certainty, which bit of information was obtained by whom with what effect (Lasswell 1948). But we do know: who talks with whom, whether an individual's discussants talk with each other, the size of communication networks, and the extent to which the networks are spatially diffuse. Our analysis is predicated on the utility of these data for understanding both (1) the manner in which political information is conveyed and (2) the attendant consequences for larger patterns of temporal and spatial distribution of political information.

Consider an individual who lives in an ethnic enclave on the south side of the city of St. Louis. He works at a local machine shop, and most of his coworkers live in the same area of the city. Most of his social relationships and political discussions are anchored in his immediate and extended family: his wife as well as his sister and her husband – both of whom live nearby. All three of these discussants know each other and interact frequently.

In contrast, consider this individual's second cousin, who lives in the suburban west county area of St. Louis and works in a downtown office building. This individual regularly goes to lunch with coworkers, but he seldom returns to the old South St. Louis neighborhood, and he does not get together with the members of his extended family as often as he would like. His most frequent discussants include his wife, a friend at work who lives in suburban south county, and a tennis partner he met at a local, west county recreational facility. His wife knows both of the other discussants, but seldom gets together with them socially. The tennis partner and the work place associate do not know each other.

These two individuals serve as exemplars for the issues that we intend to examine. The first individual's network is composed of spatially proximate associates, while the second individual's network is spatially dispersed, with discussants spread across the metropolitan area. The first individual's network is densely constructed, with connecting patterns of relationships among the discussants. The second individual's network is less densely constructed, populated by weak ties (Granovetter 1973), where the individual serves to bridge structural holes (Burt 1992) among the discussants. In the analysis that follows, we explore the source of spatially dispersed communication networks, as well as the consequences of spatial dispersion for network density and for the diffusion of political information. Before proceeding with this analysis, we turn to the design of the study.

The 1996 Indianapolis-St. Louis Study

Our analysis is based on a 1996 election study conducted by the Center for Survey Research at Indiana University. The study is primarily concerned with political communication over the course of the campaign, and thus we began interviews early in March of 1996 and stopped interviewing in early January of 1997. The study includes two samples: a sample of main respondents (N=2,174) drawn from the lists of registered voters, combined with a one-stage snowball sample of these main respondents' discussants (N=1,475). Main respondent samples are drawn from the voter registration lists of two study sites: (1) the Indianapolis metropolitan area defined as Marion County, Indiana; and (2) the St. Louis metropolitan area defined as the independent city of St. Louis combined with the surrounding (and mostly suburban) St. Louis County, Missouri. The pre-election main respondent sampling plan was to complete interviews with approximately 40 main respondents each week before the election, equally divided between the two study sites. After the election, an additional 830 respondents were interviewed, once again divided between the St. Louis and Indianapolis metropolitan areas. Discussant interviews were completed at a rate of approximately 30 interviews each week during the pre-election period, with an additional 639 interviews conducted after the election. In the pre-election period, the discussant interviews for a particular main respondent were completed within two subsequent interview weeks of the main respondent interview. (Response rates are included in the appendix.)

Every respondent to the survey was asked to provide the first names of not more than 5 discussion partners. A random half of the sample was asked to name people with whom they discuss “important matters”; the other half was asked to name people with whom they discuss “government, elections, and politics” (Burt 1986; Huckfeldt et al. 1998). The experimental condition that is imbedded within the design of this name generator allows us to examine the extent to which political information networks are separate from social communication networks more broadly considered. For the purposes of the present analysis, we do not differentiate between the two name generators.

After compiling a list of first names for not more than five discussants, the interviewers asked a battery of questions about each discussant. At the end of the interview, the interviewer asked the main respondents for identifying information to use in contacting and interviewing their discussants. Based on their responses we interviewed 1,475 discussants, employing a survey instrument that was very similar to the instrument used in the main respondent interview. Most analyses of this paper draw on information taken from both the main respondents and their discussants, where each observation in the resulting data set is a dyadic relationship between a main respondent and a discussant.

Finally, based on main respondent and discussant street addresses, main respondent and discussant residential locations were placed on a map (termed geocoding) using geographic information systems software (GIS). These geocoded locations provide census geography for each main respondent and discussant at the levels of census tracts and block groups, thereby providing the means for both visual and statistical analyses. Figure 1 is a map of the geocoded main respondents to the survey, while Figure 2 locates the discussants who reside within the boundaries of St. Louis City and County, as well as Indianapolis and Marion County.

[Figures 1 and 2 about here]

GIS software can be used to calculate distance measures for each dyadic relationship. Figures 3 and 4 plot the within jurisdiction networks, defined as a line between each discussant and their respondents. We were able to plot and obtain distance measures for a total of 924 dyads, 429 of which were in St. Louis City/County and 425 in Indianapolis. Hence, we have measures for the proximate social worlds of the main respondents and the discussants, as well as a measure of the spatial dispersion for each dyadic relationship.

[Figures 3 and 4 about here]

Sources of Spatially Dispersed Networks

What are the factors that give rise to spatially dispersed networks of political communication? One set of factors is directly related to the personal characteristics of the individuals in the networks. We might, for example, expect that people who are employed will be more likely to come into contact with others who are farther removed from their own residential neighborhood. In his classic studies of the political behavior of American Jews, Fuchs (1955) argued that the divergence in political preferences between the men and women who lived in a Jewish New York City neighborhood during the 1950s was due to the fact that men were more likely to be employed. When they went off to work, he reasoned, they came into contact with people who resided beyond the boundaries of the neighborhood, and hence they also came into contact with divergent preferences.

The important thing to note regarding the Fuchs argument is that these individual characteristics take on importance as factors affecting the construction of social networks. It is not the characteristic per se that is important, but rather the characteristic as it affects the structure of social interaction. There is nothing particularly unique about employed men that makes them construct spatially dispersed networks of communication and association. Rather, being employed often entails coming into coming into contact with coworkers who do not live nearby, thereby changing the odds of constructing a dispersed network within the context of a stochastic process of social interaction.

In Part A of Table 1, we consider a range of individually defined factors that might affect the spatial dispersion of social networks. The dependent variable is a measure of spatial dispersion within dyads, such that a value of "0" indexes people who live at the same address, and increasingly higher values are related to greater distances between the main respondent and the discussant. (The measure is based on an arbitrary linear scale.)

[Table 1 about here]

Some respondents name discussants who do not live within the study area, and we only calculate the distance measure for discussants who live in Marion County (Indianapolis) and St. Louis City and County. Hence, the model in Table 1A is restricted to dyads within the main respondent's larger community of residence. The distribution of the distance measure is shown in Figure 5, where we see that 217 out of 993 dyads involve individuals who live at the same address.

[Figure 5 about here]

The model in Table1A suggests that dyads are likely to be spatially dispersed when the discussant is neither a spouse nor a relative. None of the other factors produce statistically discernible effects when family status is taken into account, but we will see in later analyses that the likelihood of non-kinship networks is enhanced by many of the factors considered in this model. Moreover, many of the explanatory factors included in this model produce coefficients with plausible signs and t-values that are not insubstantial. For example, there is at least some evidence to suggest that people who are employed and people with larger networks are more likely to have spatially dispersed networks.

In Table 1B we consider whether main respondents have discussants who lie beyond their own larger communities of residence. For the St. Louis sample, this is defined as individuals who live beyond the boundaries of St. Louis City or St. Louis County. For the Indianapolis sample, this is defined as discussants who live beyond the boundaries of Marion County, which is coincidential with the city of Indianapolis. These are, to some extent, arbitrary definitions because both metropolitan areas reach out to adjacent counties. Hence in later analyses we will separate discussants who live within and beyond the relevant metropolitan areas.

The results of Table 1B once again show discernible effects for spousal and non-relative discussants, but notice that the direction of the effect for non-relative status has changed. Non-relative discussants are more likely to live farther away from the main respondent within the larger community of residence. At the same time, non-relative contacts are substantially less likely to be maintained beyond the larger community of residence. The model predicts that, with spouse held constant at zero and all other variables held constant at their mean values, the probability of a discussant living out of the area decreases from .46 for non-spouse relatives to .20 for non-relatives. The model also produces a discernible (but somewhat curious) relationship in which women are less likely to have discussants who are located beyond the larger community.

Reaching Beyond the Boundaries of Kinship

The larger message of Table 1 is quite clear. Non-relative discussants provide the key to the spatial dispersal of social networks. Non-relative discussants are <u>more</u> likely to be dispersed <u>within</u> the local community, but they are <u>less</u> likely to dispersed <u>beyond</u> the local community. Thus the question naturally arises, what are the factors that give rise to networks which extend beyond the boundaries of kinship?

In contrast to the earlier analysis which focused on dyads, the unit of analysis in Table 2 is the main respondent, and our concern is with summary characteristics of the respondent's entire network based on the main respondent's own report. In Table 2A the number of non-relative discussants is regressed on many of the same factors considered as predictors of spatial dispersion in Table 1. First and most important, people with larger networks are more likely to reach beyond the boundaries of kinship in their patterns of association. As the size of networks increases, the likelihood of non-relative ties increases as well. In other words, it is quite unlikely for larger networks to be limited to the ties of kinship.

[Table 2 about here]

A number of other factors are also quite influential in affecting the likelihood of non-relative ties. Married people and women are less likely to have non-relative discussants. Employed people, older people,[1] and perhaps people engaged in church and organizational activities are more likely to have non-relative ties. Hence, we see that the effects of employment status on the creation of spatially dispersed networks is mediated by its effect on the number of non-relative network ties. The most important effect on the creation of non-relative ties, and hence on spatially dispersed networks, is network size. People with larger networks are more likely to have non-relative ties, and these non-relative ties are more likely to be spatially dispersed within the larger community of residence.

What are the factors that give rise to larger networks? Table 2B regresses the size of the respondent's network on the remaining explanatory variables from Table 2A. The basic story to be

---

[1] The effect of age warrants more attention than we are giving it here. For a more complete examination see Burt (1990).

obtained from this table is that younger, more highly educated respondents who are employed and active in organizations are more likely to have larger communication networks.

In summary, the spatial dispersion of social contacts within the larger community of residence is, most importantly, a function of social networks that reach beyond the ties of kinship. Larger networks are more likely to include these non-relative discussants. And larger networks are created through contact with institutions within the larger community – organizations and workplaces. These results have obvious relevance to the literature and arguments regarding the creation of social capital. That is, the creation of social capital (Coleman 1988, Putnam 1993) is furthered by employment and organizational involvement, but the same factors that create social capital also lead to the spatial dispersion of these underlying networks of association across the larger community. What are the consequences of spatial dispersion for the functioning of social networks and political communication?

Network Density and Spatial Dispersion

In this section we evaluate the consequences of spatial dispersion for the density of social networks. A network is dense to the extent that all the members of the network are associated with each other. Thus, if a respondent reports three discussants, all of whom know each other, the network – defined by discussion with the main respondent – scores high on a density index. Alternatively, if none of the three discussants know each other, the network scores low on a density index. What are the consequences of density?

Granovetter (1973) introduced the concept of "weak ties" to characterize a situation in which one of an individual's social contacts is unrelated to the individual's other social contacts.

Thus, your friend is a weak tie if he or she is not a friend to your other friends.[2] The "strength of weak ties," in Granovetter's argument, is that they are more likely to provide an individual with non-redundant information – information that would not be obtained from the other social contacts. In the context of political information, the weak ties that are created by low density networks are more likely to expose individuals to new political information and alternative political viewpoints – indeed to divergent viewpoints and information.

Viewed from an alternative vantage point, Burt (1992) characterizes the disjuncture between two networks as a structural hole – as the lack of a connecting tie between two networks of communication or association. An individual provides a bridging function between the two networks – she spans the structural hole – when she forms an association with each of the networks. Hence, the concept of a bridge across a structural hole is quite closely related to the concept of a weak tie, and both are related to the density of networks. Less dense networks are more likely to involve weak ties, and an individual with a weak tie will, by definition, bridge a structural hole. From the standpoint of political opinion and information, an individual who serves as a bridge is more likely to bring together divergent political perspectives and points of view.

We address these problems from the standpoint of network density with questions that asked main respondents whether their discussants regularly came into contact with each other. If the discussants did not regularly come into contact, the respondent was asked whether the discussants knew each other.[3] Based on these questions, we construct two dummy variables. The first measures whether all the discussants regularly come into contact with one another, and the

[2] Note that the concept of a weak tie is not directly related to the intensity or intimacy of a relationship.

[3] The knowledge question was not asked during the early stages of the survey, and hence it produces a lower n-size in analyses.

second measures whether all the discussants know each other. Thus, we conceive of network density along two different dimensions: (1) acquaintanceship and (2) frequency of interaction.

A logit model is employed in Table 3A to regress the density measure based on frequent interaction on the familiar list of explanatory variables. The coefficient signs and t-values suggest that larger networks are less likely to be dense. In this context, people with larger networks are unlikely to have associates who are all in regular contact with one another. Moreover, network density is further suppressed by spatial dispersion. People with spatially dispersed networks are also less likely to have associates who regularly come into contact with one another.

[Table 3 about here]

As Figure 6 shows, the effects of network size are particularly pronounced, but the effects of spatial dispersion are not inconsequential. Controlling for the explanatory variables by holding them at particular values, we can predict the probability that the discussants interact with each other on a frequent basis.[4] Regardless of spatial distance between respondent and discussant, we see a negative relationship between the number of discussants and the probability of interaction – as the number of discussants in the network increases, the probability of high network density decreases. But there is also an effect for the spatial dispersion. All else equal, and with the number of discussants set at 2, the probability of a high density network for a single household respondent-discussant dyad is .55, while the probability of a high density network for a respondent-discussant dyad set is .21 at the maximum distance.

[Figure 6 about here]

A different pattern of effects is produced in Table 3B when the acquaintanceship measure of network density is regressed on the same set of explanatory variables. In particular, the spatial dispersion measure does not produce a discernible effect on network density defined in terms of acquaintanceship. This pattern of effects seems eminently reasonable. Spatially dispersed networks are more likely to limit the possibilities of regular interaction than they are to limit the possibilities of acquaintanceship.

In summary, these results demonstrate that spatial dispersion has important consequences for the structure of information networks. When network density is defined in terms of regular interaction, spatially dispersed networks are likely to be low density networks. That is, if an individual has a spatially dispersed network, members of the network are not likely to be in regular contact with one another. In this way, the individual occupies a pivotal role in the transmission of political information. In Granovetter's vocabulary, the individual benefits from the advantages of non-redundant information – independent sources of information that do not socially duplicate one another. In Burt's vocabulary, the individual serves as a bridge across a structural hole, thereby occupying a crucial role in the transmission of information between separate and independent networks.

At the same time, the individuals who occupy these pivotal roles may suffer from role-related stresses. In an earlier vocabulary, these individuals are more likely to be subjected to social cross pressures. They are more likely to receive politically conflicting messages through channels of social communication (Lazarsfeld, et al. 1944). In their prescient analysis of social communication in electoral politics, Berelson et al. (1954) draw attention to the two sides of cross pressures. At the same time that cross pressured citizens help to provide the political system with dynamic flexibility, they are also likely to suffer from indecisiveness and ambivalence as a

---

[4] We asked respondents whether a particular discussant talks with each of the other discussants they have identified at least once a month. For most of the study, respondents who answered "no" were then asked whether the same discussant knows the other discussants.

consequence of the conflict that arises due to independent streams of incoming information regarding politics.

Spatial Dispersion and Network Heterogeneity

We have seen that spatially dispersed networks produce lower levels of network density and correspondingly higher frequencies of weak ties and bridges across structural holes (Granovetter 1973; Burt 1992). In this section we begin an analysis of the consequences for network heterogeneity. That is, are spatially dispersed ties more likely to connect individuals with different educational levels, candidate evaluations, or partisan loyalties? Are they more likely to connect individuals who live in socially disparate settings? Are they more likely to connect individuals who are each imbedded within politically disparate networks?

This analysis begins in Table 4 by focusing on a comparison between the objective circumstances of the discussant's and main respondent's respective neighborhoods. Return for a moment to our west St. Louis County resident who works downtown and has a workplace friend who lives in south St. Louis County. While their places of residence are far removed from each other, their neighborhoods may be social and political facsimiles. That is, the distance between the two may be spatial but not social or political. Even though their networks may be spatially diverse, the network tie may not produce a connection between politically and socially distinct environments.

[Table 4 about here]

This analysis employs a simple strategy for considering the spatially contingent relationship between the neighborhoods of the discussant and main respondent. Each member of the dyad is located within a census tract and a census block group, and characteristics of the respondent's location are regressed on the same characteristics of the discussant's location. Hence we are using tracts and block groups as proxies for neighborhoods, and the slope in the regression becomes a simple descriptive measure of the correspondence between the respective neighborhoods for the members of the dyads. In addition, the models of Table 4 include a control for the distance between the residences of the main respondent and the discussant, as well as an interaction between this distance measure and the relevant characteristic of the discussant's block group or tract. Hence, the coefficient on this interaction allows an evaluation of whether the relationships between the neighborhoods are contingent on spatial dispersion.

Several different neighborhood characteristics are considered in Table 4, both at the level of tracts and block groups. We consider the percent of neighborhood residents who are high school educated, the percent who are college educated, the median household income, and the percent of the neighborhood population that is African-American. In each instance, for both block groups and tracts, the interaction produces a strong coefficient on the interaction term with a substantial t-value. The magnitude of the effect is illustrated in Figure 7, where we compare the relationship between neighborhoods for spatially proximate and spatially dispersed dyads.

[Figure 7 about here]

In Figure 7, the trellis plot shows the changing relationship between the environments (defined in this case as median household income of the tract) of the respondents and discussants as spatial distance increases. The correct way to read the panels is as a graph, not as a table – read in the order of lower-left, lower-right, upper-left, upper-right, where the order is determined by spatial dispersion. The lower left-hand corner is where spatial distance is equal to zero or very close to zero; not surprisingly, there is a nearly perfect linear relationship. What is somewhat surprising, however, is how the relationship (described by the loess smoother) changes as distance increases –

at the very least it flattens out, meaning that respondents with far-flung networks are exposed to discussants living in environments different from their own. We constructed these graphs for all of our measures in Table 4, and each had the same result – as spatial distance increases, so does the likelihood that the environments do not match.

These results suggest that spatial dispersion creates important consequences for the integration of socially disparate social worlds. Networks that are spatially dispersed are more likely to bring together people who reside in socially (and by inference politically) disparate locations. Does this create corresponding consequences with respect to the individual characteristics of the main respondent and the discussant? Are spatially dispersed dyads more likely to involve individuals who demonstrate socially and politically disparate individual level characteristics?

We use a similar technology to address this question in Table 5, where we examine the individual level correspondence between respondents and discussants, contingent on spatial dispersion. Several individual characteristics are considered: partisan identifications, evaluations of Bill Clinton, and individual education levels. As before, the main respondent measure is regressed on the discussant measure, the measure of spatial dispersion, and the interaction between spatial dispersion and the discussant measure. In contrast to Table 4, none of these interactions produce statistically discernible coefficients even though the signs of the coefficients lie in the expected direction. Hence, we have only marginal support for an expectation that spatially dispersed network ties necessarily bring together people who demonstrate dramatically different opinions, attitudes, and characteristics.

[Table 5 about here]

Before concluding, we examine one more source of network heterogeneity that might be encouraged by spatially dispersed network ties. Thus far we have focused on the self-reported characteristics of the main respondent's network, but the discussants are also imbedded within networks that are identifiably distinct from the main respondent's network. Hence, we used the same network name generator in the discussant interview to identify the discussant's self identified network. The question naturally arises, how closely do these networks correspond? And are they less likely to correspond when the discussant and the main respondent are separated in space?

The most satisfying way to undertake such a comparison is to remove the members of the dyads when examining correspondence between the two networks. That is, we would like to compare the residual network of the main respondent to the residual network of the discussant after removing the interviewed discussant from the main respondent's network and the main respondent from the discussant's network. The problem is that we have no direct measure of whether the main respondent is named by the discussant, and hence we employ a proxy measure of reciprocity to use in arriving at a measure for the discussant's residual network.[5]

We employ this procedure in Table 6 to regress Clinton support in the main respondent's residual network on: Clinton support in the discussant's residual network, the spatial distance measure, and the interaction between the two. Not only does this regression fail to produce a statistically discernible coefficient for the interaction term, but the coefficient for the interaction lies in an unexpected direction. Hence, there is no support in these results for the argument that

[5] Removing the interviewed discussant from the main respondent's network is a straightforward task. Removing the main respondent from the interviewed discussant's network is not straightforward because we do not have a direct measure of reciprocity – we do not know whether the discussant names the main respondent as one of her discussants. We adopt the procedure of assuming that the main respondent is included in the discussant's network if the main respondent reports a candidate preference that is perceived by the discussant to be present in the network.

spatially dispersed network ties bring together individuals who reside in separate and politically diverse networks.

[Table 6 about here]

How are we to make sense of these results? At one level of analysis – the spatial level – spatially dispersed networks bring together individuals who are more likely to reside in politically and socially disparate spatial surroundings. At two other levels of analysis – the individual and network levels – there is no relationship between spatial dispersion and the presence of social and political diversity. Individuals with spatially dispersed network ties are no more or less likely to associate with individuals who are socially or politically diverse, and neither are they more or less likely to associate with individuals whose own network differs dramatically from their own.[6]

Hence, it would not appear that spatially dispersed patterns of network ties necessarily produce either social or political heterogeneity within networks. Rather, it would appear that spatially dispersed networks create spatially dispersed communities of quite similar individuals. We are not suggesting that these political communication networks protect individuals from the experience of political disagreement. Indeed, the experience of political disagreement somewhere within the network is the modal condition among these main respondents (Huckfeldt and Sprague 1999). Rather our argument is that the experience of political disagreement or social diversity within these networks is not necessarily a function of spatial dispersion.

What are the likely mechanisms for creating these spatially dispersed networks of socially and politically compatible individuals? First, recall that these networks originate in the workplaces

[6] It is perhaps worth mentioning that the residual networks of main respondents and discussants do not always correspond. Indeed, for main respondents and discussants who do not share political preferences, we see divergent patterns of preferences within residual networks as well (Huckfeldt and Sprague 1999). This underlines the point that it is not spatial dispersion that explains the political divergence of residual networks, but rather the particular distribution of preferences within dyads.

and organizations where individuals become socially engaged, but these workplaces and organizations are likely to bring together people with shared interests and concerns. Second, at the same time that people are being sorted and matched through organizational and institutional means, social influence processes are also taking place that accelerate the tendency toward shared opinions and attitudes. This is not the place to explore the relative importance of these alternative mechanisms for creating networks of shared viewpoints and characteristics. The important point for present purposes is that, even when spatially dispersed networks are not responsible for introducing diversity within networks, they are responsible for creating networks of common viewpoints that span spatially based structural holes within the social networks of urban residents.

Dynamic Implications of Spatial Dispersed Networks

Thus far in the analysis, we have been treating the respondents and discussants as though they were all interviewed at the same point in time. In fact, as was discussed above, the interviews were spread over a ten month period, even though the interviews for a particular dyad occurred within close temporal proximity of each other. For present purposes, we divide the sample into three temporal periods. The first wave, the period of primary elections and nominating contests, took place from March through June. The second wave, the period of the general election campaign, took place from July through the election. The third wave, or the post-decision period, took place after the election, mostly during November and December.

The argument of Berelson et al. (1954) is that the political campaign creates political homogeneity within small, informal social groups. In terms of our analysis, the stimulus of the campaign should encourage citizens to discuss politics, thereby creating socially visible preferences, and resulting pressures toward conformity should generate political homogeneity within social networks. The problem is that the applicability of such an argument depends on network density. In highly dense networks, it is entirely conceivable that such conformity pressures might drive out divergent preferences. But in a situation where networks are characterized by spatial dispersion and lower density levels, people may be forced to accommodate disagreement (Huckfeldt and Sprague 1999), and this should become particularly apparent in the later stages of the campaign.

Hence, in Table 7, we reconsider levels of agreement within dyads regarding the candidates. We expand the analysis of Table 5B to include individual evaluations of both Clinton and Dole. As before, we consider levels of individual correspondence in the evaluations as they are contingent on spatial dispersion. But in this analysis, we re-estimate the models for each wave of the survey. The results for the first two waves reinforce earlier results – the interaction between the discussant's candidate evaluation and the distance measure fails to produce statistically discernible coefficients. The results for the third, post-election wave are quite different. Not only does the coefficient for the interaction lie in the expected negative direction, but the t-value suggests a discernible effect.

These are only preliminary results, and more work remains to be done, but it appears quite useful to provide a temporal overlay on the spatial results. Spatial dispersion produces temporal consequences, and both time and space become important to the analysis of social diffusion and political information.

[Table 7 about here]

Conclusion

The spatial and temporal diffusion of political information within urban areas is contingent on the complex networks of communication that exist among urban residents. In this paper we have pursued a strategy of analysis that exploits information regarding these network micro-environments to draw inferences regarding the aggregate formation and communication of public opinion. What have we learned?

First, not all networks are spatially dispersed, but some are, and the factors that give rise to spatial dispersion are directly related to an individual's position in social structure. Most importantly, those individuals with larger networks are more likely to have more non-relative discussants, and non-relative discussants are more likely to be spatially dispersed within the local community. (They are less likely to lie beyond the local community.) Hence, network size is crucial, and the size of networks is directly related to the employment status and organizational involvement of the respondents. People who are engaged by extra-familial institutions are more likely to develop networks of association that do not depend on kinship, and these ties are more likely to be spatially dispersed within the larger community.

Second, spatially dispersed networks produce a number of important consequences, but none is more important than decreasing the density of the respondents' communication networks. When discussants are spatially dispersed, frequent association among discussants becomes more difficult. Recall that convenience is central to the creation and maintenance of social ties. One of the primary factors creating spatially dispersed ties is the convenience of a joint place of employment. But this convenience is not available to others in the main respondent's network, and hence patterns of association across spatially dispersed networks are likely to be attenuated.

What are the consequences of the low network density that is induced by spatial dispersion? People imbedded in lower density networks are more likely to possess "weak ties," and hence they are more likely to obtain non-redundant political information. These people are also more likely to serve as bridges across the "structural holes" that would otherwise truncate the social flow of information. In summary, the lower density networks created through spatially dispersed ties of association give rise to higher levels of political integration within the local community. Rather than being self contained social cells, the lower density networks produce higher levels of connectivity between and among the closely held micro-environments of urban residents.

Finally, spatially dispersed networks are not necessarily political diverse, but they are more likely to connect individuals who reside in socially and politically divergent settings. Indeed, in many instances it would appear that spatially dispersed networks create a politically homogeneous overlay on a politically diverse urban area. In other instances, however, spatial dispersion does seem to introduce politically divergent viewpoints within networks of communication, and this phenomenon only becomes clear when we introduce a temporal dimension within the analysis. At the end of the presidential election campaign, after citizens have resolved their uncertainty and cast their votes, the opinions of spatially distant associates are more likely to be at variance with their own views. In other words, the temporally structured process of communication that is induced by the campaign, serves to reveal the spatial boundaries on the flow of political information within urban areas.

Appendix: Sampling Information

The main respondent sample was drawn from lists of registered voters at both study sites. The response rate, calculated as the ratio of completions to the sum of completions, refusals, partials, and persistently unavailable respondents was 58 percent. If we include those respondents in the base who never answered the phone after repeated call backs, the response rate is 53 percent. The cooperation rate – the ratio of completions to the sum of completions, refusals, and partials—is 64 percent. Comparable rates for the discussant interviews were 59 percent, 56 percent, and 72 percent.

The weekly target for the main respondent sample in the period before the election was 20 respondents each week from each study site. The target for the discussant sample was 15 respondents each week from each study site. In order to couple the main respondent-discussant interviews in time, the discussant interviews were completed within 3 weeks after the main respondent interview was completed. In the period after the election, no weekly targets were set, and the time spacing of main respondent and discussant interviews was not explicitly controlled. The 830 main respondent interviews and 639 discussant interviews were completed as rapidly as possible after the end of the election, with all interviewing completed early in January.

Eighty percent of the main respondents responded to the name generator by providing social network information. Of those who provided social network information, 60.8 percent agreed to provide identifying information on the individuals in the network, 25.7 percent refused, and the remainder agreed to a call back to collect the information. Ultimately, at least one discussant was interviewed for 872 main respondents, or 40 percent of the entire main respondent sample.

References

Berelson, Bernard R., Paul F. Lazarsfeld, and William N. McPhee. 1954. Voting. Chicago: University of Chicago Press.

Burt, Ronald S. 1986. "A Note on Sociometric Order in the General Social Survey Network Data," Social Networks 8: 149-174.

Burt, Ronald S. 1987. "Social Contagion and Innovation: Cohesion versus Structural Equivalence," American Journal of Sociology 92: 1287-1335.

Burt, Ronald S. 1990. “Kinds of Relations in American Discussion Networks,” in C. Calhoun et al. (eds.), Structures of Power and Constraint: Papers in honor of Peter M. Blau. Cambridge University Press.

Burt, Ronald S. 1992. Structural Holes. Cambridge, MA: Harvard University Press.

James S. Coleman, Elihu Katz, and Herbert Menzel. 1966. "Medical Innovation: A Diffusion Study. Indianapolis: Bobbs-Merrill.

Coleman, James S. 1988. "Social Capital in the Creation of Human Capital," American Journal of Sociology 94: S95-S120.

.

Fuchs, Lawrence H. 1955. “American Jews and the Presidential Vote," American Political Science Review 49: 385-401.

Granovetter, Mark. 1973. "The Strength of Weak Ties," American Journal of Sociology 78: 1360-1380.

Huckfeldt, Robert, Jeffrey Levine, William Morgan, and John Sprague. 1998. “Election Campaigns, Social Communication, and the Accessibility of Discussant Preference,” Political Behavior 20: 263-294.

Huckfeldt, Robert and John Sprague. 1993. "Citizens, Contexts, and Politics," in A.W. Finifter (ed.), Political Science: The State of the Discipline II. Washington, D.C.: American Political Science Association. Pages 281-303.

Huckfeldt, Robert and John Sprague 1999. "Political Environments, Micro-Environments, and the Dynamics of Political Preference,” Prepared for delivery at the annual meeting American Political Science Association, Atlanta, September, 1999.

Lasswell, Harold. 1948. "The Structure and Function of Communication in Society." In Lyman Bryson, ed., The Communication of Ideas, pp. 37-51. New York: Harper and Row.

Lazarsfeld, Paul F. Bernard R. Berelson, and Hazel Gaudet. 1944. The People's Choice. New York: Columbia University Press.

Putnam, Robert D. 1993. Making Democracy Work. Princeton, NJ: Princeton University Press.

Table 1.

A. Distance between main respondent and discussant. Dyad data, OLS Model. The response variable in this case is a measure of spatial distance. The measure is a linear transformation of miles that has no substantive meaning, but is best judged in relative terms.

	Coefficient (Standard Error)	t score
Size of Network	287.15	1.74
	(165.02)	
Discussant is Non-Relative	1817.87	3.444
	(527.87)	
Married	458.92	0.903
	(508.36)	
Female	-423.50	-0.939
	(450.89)	
Church Attendance	-187.51	-1.261
	(148.75)	
Employed	852.34	1.548
	(550.78)	
Organizational Memberships	-91.75	-0.713
	(128.69)	
Age of Respondent	-20.79	-1.162
	(17.88)	
Discussant is Spouse	-6276.20	-8.773
	(715.39)	
Constant	7016.39	4.792
	(1464.17)	
N	993	
R^2	.17	

B. Probability that discussant lies outside county. Dyad data. Logit estimates. The response measure is coded 0 if the discussant lives within the county of the respondent, 1 if not.

	Coefficient (Standard Error)	t score
Number of Discussants Named	.08	1.52
	(.05)	
Discussant is Non-Relative	-1.24	-9.31
	(.13)	
Married	.20	1.42
	(.14)	
Female	-.40	-3.01
	(.13)	
Church Attendance	-.01	-.33
	(.04)	
Employed	-.007	-.04
	(.16)	
Organizational Memberships	.06	1.65
	(.04)	
Age of Respondent	-.004	-.74
	(.005)	
Discussant is Spouse	-3.52	-7.52
	(.47)	
Constant	-.32	-.76
	(.42)	
N	1451	
Log Likelihood	-738.62	

Table 2. Characteristics of the respondent's network, based upon individual-level predictors.

A. Number of non-relatives in network. Main respondent self-report. OLS model. The response measure is the number of non-relatives contained within the respondent's network.

	Coefficient (Standard Error)	t score
Size of Network	.62 (.01)	50.17
Married	-.29 (.05)	-6.27
Female	-.38 (.04)	-8.52
Church Attendance	.02 (.01)	1.52
Employed	.18 (.06)	3.29
Organizational Memberships	.01 (.01)	1.05
Age of Respondent	.003 (.002)	1.98
Education Level of Respondent	.0007 (.009)	.07
Constant	-.08 (.19)	-.43
N	2101	
R^2	.59	

B. Size of network. Main respondent self-report. OLS model. In this case, the response measure is the absolute size of the respondent's network.

	Coefficient (Standard Error)	t score
Married or Not	-.04 (.08)	-.45
Female	.14 (.08)	1.72
Church Attendance	-.01 (.02)	-.41
Employed	.19 (.10)	1.92
Organizational Memberships	.17 (.02)	7.51
Age of Respondent	-.01 (.003)	-3.22
Education Level of Respondent	.11 (.02)	7.00
Constant	.85 (.33)	2.55
N	2101	
R^2	.11	

Table 3. Network density for networks with at least two discussants. Dyad data.

A. Do all discussants interact frequently? (yes=1, no=0) Logit estimates.

	Coefficient (Standard Error)	t score
Size of Network	-.61	-7.15
	(.09)	
Discussant is Nonrelative	-.17	-.78
	(.21)	
Married	.03	.14
	(.22)	
Female	-.15	-.76
	(.20)	
Church Attendance	.004	.07
	(.07)	
Professional or Managerial Occupation	.18	.73
	(.25)	
Employed	.09	.29
	(.30)	
Organizational Memberships	-.03	-.46
	(.06)	
Age of Respondent	-.003	-.42
	(.008)	
Respodnent-Discussant Distance	-.00004	-2.64
	(.00001)	
Constant	1.06	.158
	(.67)	
N	877	
Log Likelihood	-342.03	

B. Do all discussants know each other? (yes=1, no=0) Logit estimates.

	Coefficient (Standard Error)	t score
Size of Network	-.30	-3.80
	(.08)	
Discussant is Nonrelative	-.55	-2.92
	(.19)	
Married	.15	.79
	(.19)	
Female	-.25	-1.37
	(.18)	
Church Attendance	-.05	-.79
	(.06)	
Professional or Managerial Occupation	-.01	-.06
	(.22)	
Employed	-.09	-.35
	(.26)	
Organizational Memberships	.04	.85
	(.05)	
Age of Respondent	-.0003	-.04
	(.007)	
Respondent-Discussant Distance	-.0000009	-.08
	(.00001)	
Constant	2.17	3.46
	(.63)	
N	604	
Log Likelihood	-386.94	

Table 4. Correspondence between neighborhoods of main respondents and discussants, contingent on spatial dispersion. Dyad data.

A. Percent high school in main respondent tract. OLS model.

	Coefficient (Standard Error)	t score
Discussant Tract Percent High School Graduate	.78 (.05)	16.73
Respondent – Discussant Distance	.004 (.0004)	9.84
Interaction Term	-.00005 (.000005)	-9.89
Constant	17.31 (3.86)	4.49
N	790	
R^2	.28	

B. Percent high school in main respondent block group. OLS model.

	Coefficient (Standard Error)	t score
Discussant Block Group Percent High School Graduate	.68 (.04)	15.54
Respondent – Discussant Distance	.003 (.0003)	8.82
Interaction Term	-.00003 (.000004)	-8.96
Constant	26.20 (3.63)	7.22
N	790	
R^2	.24	

C. Percent college in main respondent tract. OLS model.

	Coefficient (Standard Error)	t score
Discussant Tract Percent College Graduate	.88 (.04)	20.71
Respondent – Discussant Distance	.001 (.0001)	9.30
Interaction Term	-.00005 (.000004)	-11.50
Constant	4.01 (1.44)	2.79
N	790	
R^2	.37	

D. Percent college in main respondent block group. OLS model.

	Coefficient (Standard Error)	t score
Discussant Block Group Percent College Graduate	.80 (.04)	18.73
Respondent – Discussant Distance	.001 (.0001)	6.94
Interaction Term	-.00004 (.000004)	-9.44
Constant	6.42 (1.55)	4.15
N	790	
R^2	.34	

E. Median household income in main respondent tract. OLS model.

	Coefficient (Standard Error)	t score
Discussant Tract Median Household Income	.75	18.67
	(.04)	
Respondent – Discussant Distance	1.74	11.34
	(.15)	
Interaction Term	-.00004	-12.12
	(.000003)	
Constant	8087.20	4.93
	(1642.16)	
N	790	
R^2	.32	

F. Median household income in main respondent block group. OLS model.

	Coefficient (Standard Error)	t score
Discussant Block Group Median Household Income	.63	15.31
	(.04)	
Respondent – Discussant Distance	1.63	9.15
	(.18)	
Interaction Term	-.00004	-10.10
	(.000004)	
Constant	13157.37	7.19
	(1831.26)	
N	790	
R^2	.23	

G. Percent black in main respondent tract. OLS model.

	Coefficient (Standard Error)	t score
Discussant Tract Percent Black	.85	18.86
	(.05)	
Respondent – Discussant Distance	.00004	3.59
	(.0001)	
Interaction Term	-.00005	-11.70
	(.000005)	
Constant	4.78	3.91
	(1.22)	
N	790	
R^2	.32	

H. Percent black in main respondent block group. OLS model.

	Coefficient (Standard Error)	t score
Discussant Block Group Percent Black	.88	20.25
	(.04)	
Respondent – Discussant Distance	.0003	2.57
	(.0001)	
Interaction Term	-.00005	-11.44
	(.000005)	
Constant	4.65	3.92
	(1.19)	
N	790	
R^2	.37	

Table 5. Individual level correspondence between main respondents and discussants, contingent on spatial dispersion. Dyad data.

A. Individual partisan identification. OLS model.

	Coefficient (Standard Error)	t score
Discussant Party Identification	.52 (.04)	13.49
Respondent – Discussant Distance	.000007 (.00002)	.43
Interaction Term	-.000003 (.000004)	-.75
Constant	1.44 (.15)	9.36
N	962	
R^2	.24	

B. Individual evaluation of Clinton. OLS model.

	Coefficient (Standard Error)	t score
Discussant Clinton Evaluation	.46 (.04)	12.03
Respondent – Discussant Distance	.00002 (.00001)	1.44
Interaction Term	-.000005 (.000004)	-1.27
Constant	1.59 (.12)	13.51
N	1002	
R^2	.18	

C. Individual education.

	Coefficient (Standard Error)	t score
Discussant Education	.49 (.04)	13.84
Respondent – Discussant Distance	.00005 (.00006)	.77
Interaction Term	-.000003 (.000004)	-.85
Constant	7.77 (.53)	14.68
N	1000	
R^2	.23	

Table 6. Clinton support in residual network of main respondent as a function of Clinton support in residual network of discussant, contingent on spatial dispersion. OLS model.

	Coefficient (Standard Error)	t score
Clinton Support in Discussant's Residual Network	.22 (.05)	4.19
Respondent – Discussant Distance	.000001 (.000002)	.54
Interaction Term	.000003 (.000005)	.53
Constant	.30 (.03)	11.26
N	667	
R^2	.06	

Table 7. Correspondence within dyads regarding evaluations of Clinton and Dole, contingent on time and space. OLS model. The response measure is the main respondent's evaluation of a presidential candidate.

A. FIRST WAVE OF SURVEY

Response Measure: Main Respondent Clinton Evaluation

	Coefficient (Standard Error)	t score
Discussant Clinton Evaluation	.41 (.07)	5.99
Respondent – Discussant Distance	-.000009 (.000007)	-.46
Interaction Term	.000002 (.000007)	.29
Constant	1.81 (.20)	8.83
N	302	
R^2	.18	

Response Measure: Main Respondent Dole Evaluation

	Coefficient (Standard Error)	t score
Discussant Dole Evaluation	.28 (.07)	3.87
Respondent – Discussant Distance	.000009 (.00003)	.32
Interaction Term	.0000007 (.000009)	.08
Constant	1.96 (.23)	8.63
N	303	
R^2	.09	

B. SECOND WAVE OF SURVEY

Response Measure: Main Respondent Clinton Evaluation

	Coefficient (Standard Error)	t score
Discussant Clinton Evaluation	.34 (.08)	4.11
Respondent – Discussant Distance	-.000007 (.00002)	-.32
Interaction Term	.000004 (.000007)	.58
Constant	1.95 (.25)	7.76
N	269	
R^2	.14	

Response Measure: Main Respondent Dole Evaluation

	Coefficient (Standard Error)	t score
Discussant Dole Evaluation	.37 (.08)	4.57
Respondent – Discussant Distance	.000006 (.00003)	.22
Interaction Term	.000002 (.000008)	.21
Constant	1.74 (.27)	6.52
N	270	
R^2	.15	

C. THIRD WAVE OF SURVEY

Response Measure: Main Respondent Clinton Evaluation

	Coefficient (Standard Error)	t score
Discussant Clinton Evaluation	.57 (.06)	10.40
Respondent – Discussant Distance	.00005 (.00002)	3.02
Interaction Term	-.00002 (.000006)	-2.91
Constant	1.18 (.17)	6.84
N	431	
R^2	.24	

Response Measure: Main Respondent Dole Evaluation

	Coefficient (Standard Error)	t score
Discussant Dole Evaluation	.37 (.06)	6.03
Respondent – Discussant Distance	.00004 (.00002)	1.56
Interaction Term	-.00001 (.000007)	-1.97
Constant	1.88 (.19)	9.71
N	430	
R^2	.09	

Figure 1. Map of respondents, St. Louis City/County and Indianapolis/Marion County. The number of respondents that have geocoded adresses is 2,170 – 1,102 in St. Louis City/County and 1068 in Indianapolis.

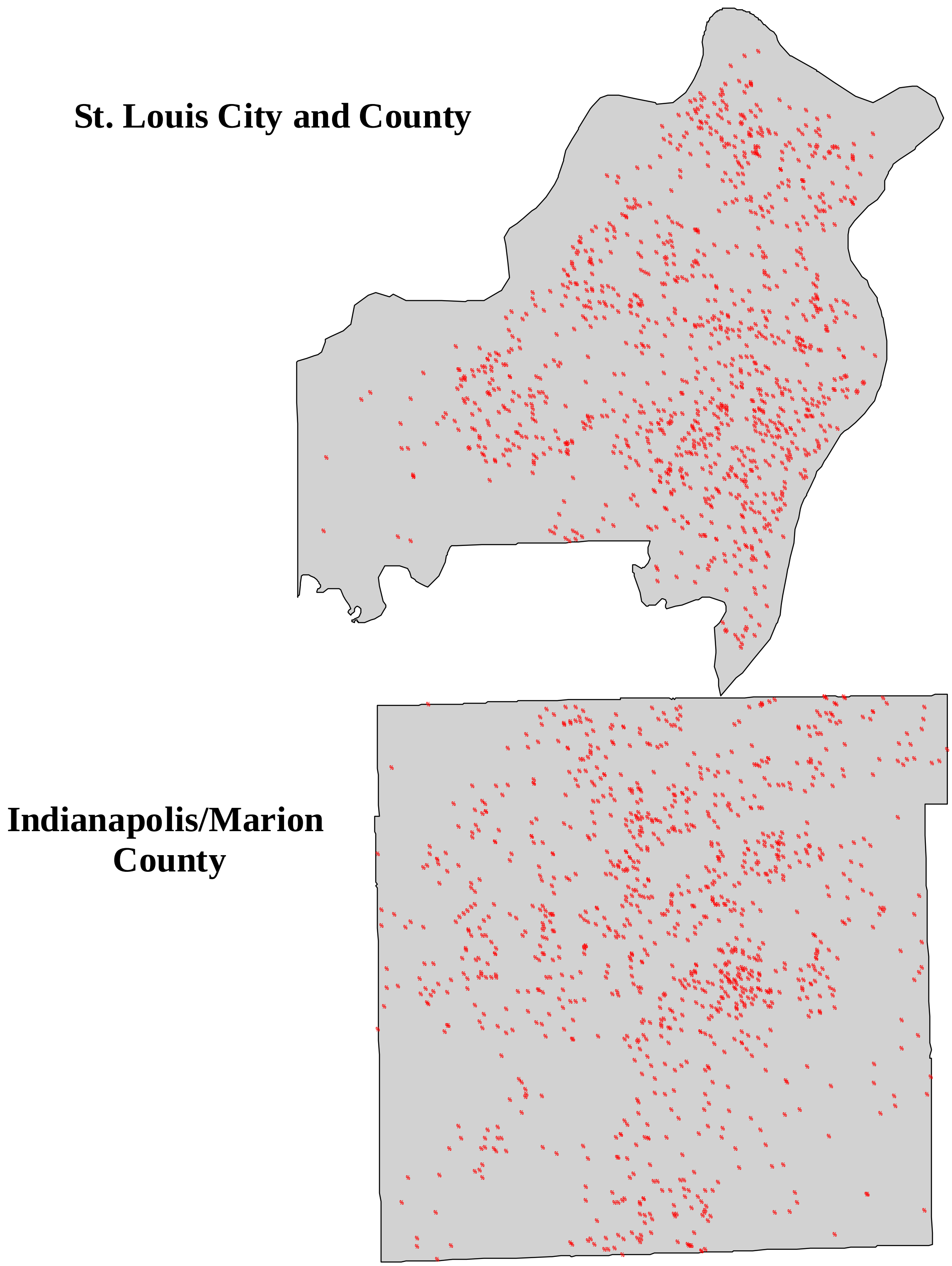

Figure 2. Map of discussants, St. Louis City/County and Indianapolis/Marion County. There are 1,087 geocoded discussants in the survey – 574 in St. Louis City/County, 513 in Indianapolis.

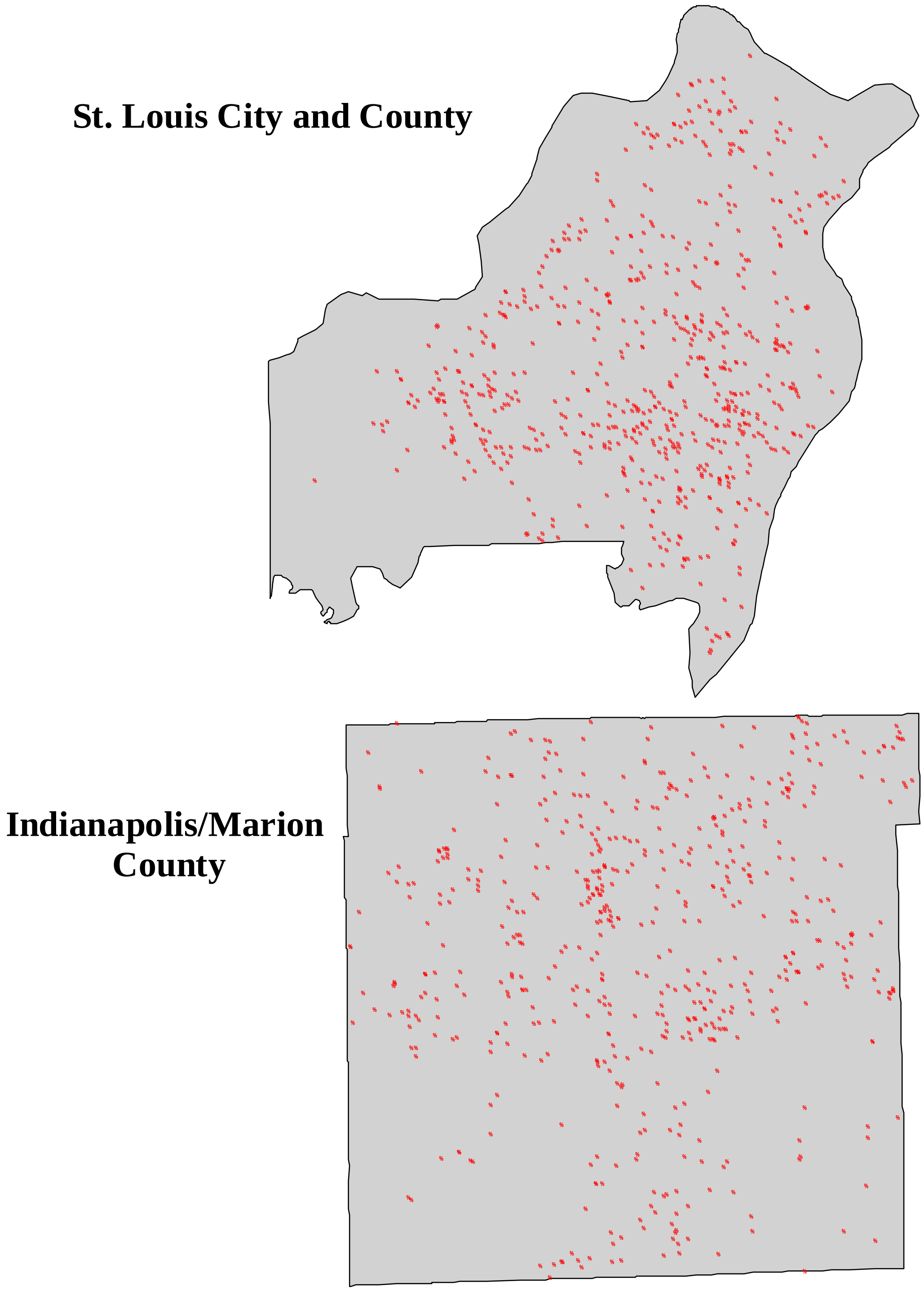

Figure 3. Map of networks, St. Louis City/County. Each line represents the link between a respondent and a discussant in the survey. There are 425 dyads in St. Louis City and County for which we were able to obtain distance measures.

Figure 4. Map of networks, Indianapolis. Each line represents the link between a respondent and a discussant in the survey. There are 361 dyads in Indianapolis for which we were able to obtain distance measures.

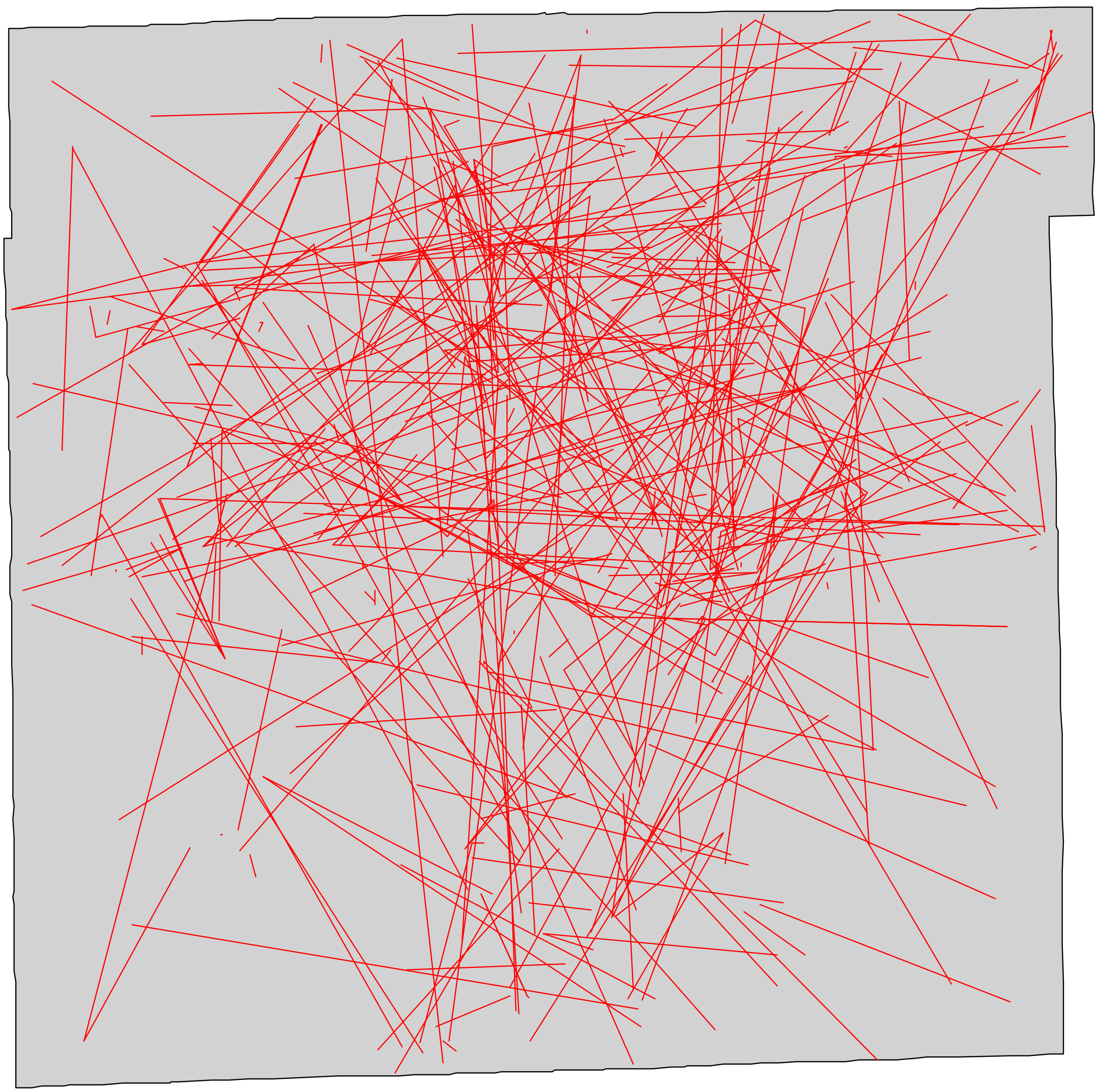

Figure 5. Distribution of spatial distance between respondents and discussants. The largest category of distance in the data is zero (217 out of 1007), meaning that many respondents named discussion partners who lived at the same address. The unit of measure is a linear transformation of miles, and has no substantive interpretation. The total number of dyads with distance measures is 1007. This differs from the N in Table 1 (where N=993) due to missing values on the explanatory variables.

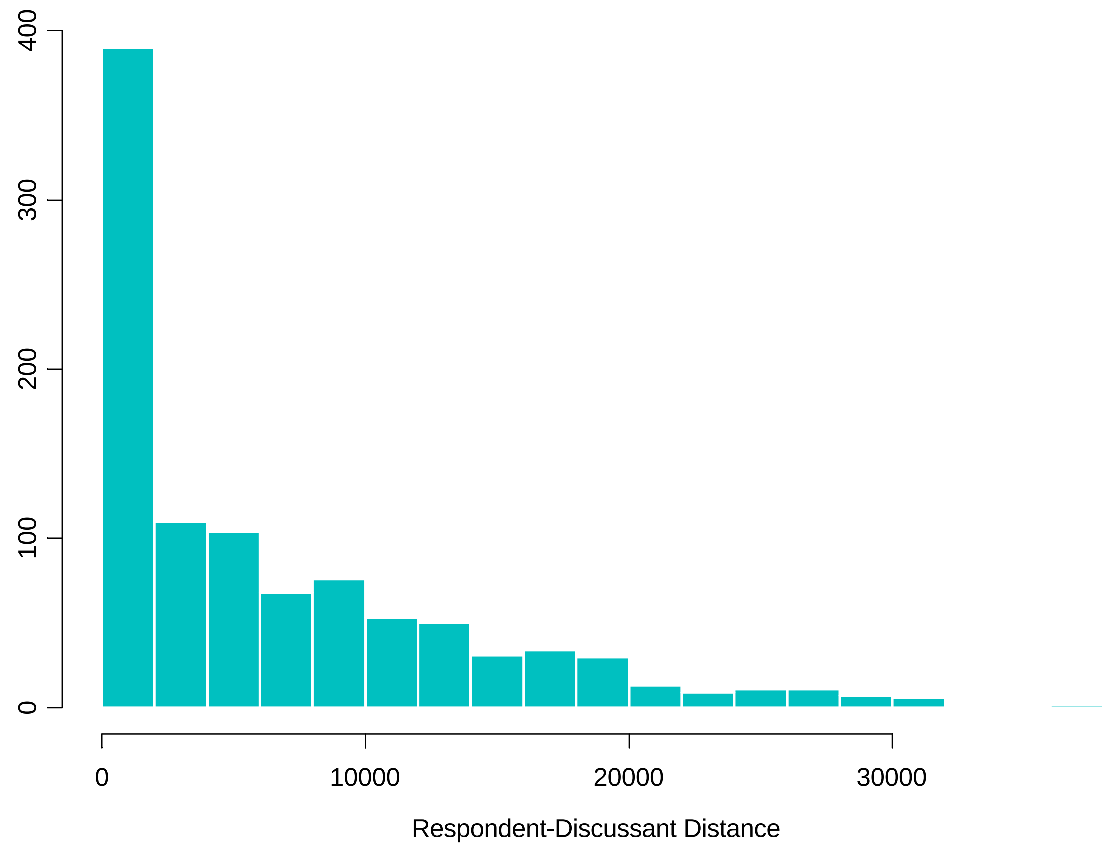

Figure 6. Logit curve, effects of increasing the number of discussants on network density, by spatial distance between respondent and discussant. As the number of discussants increases, the probability that all discussion partners talk with each other frequently decreases. Increasing spatial distance further depresses the likelihood that all discussants talk with each other frequently. N = 877.

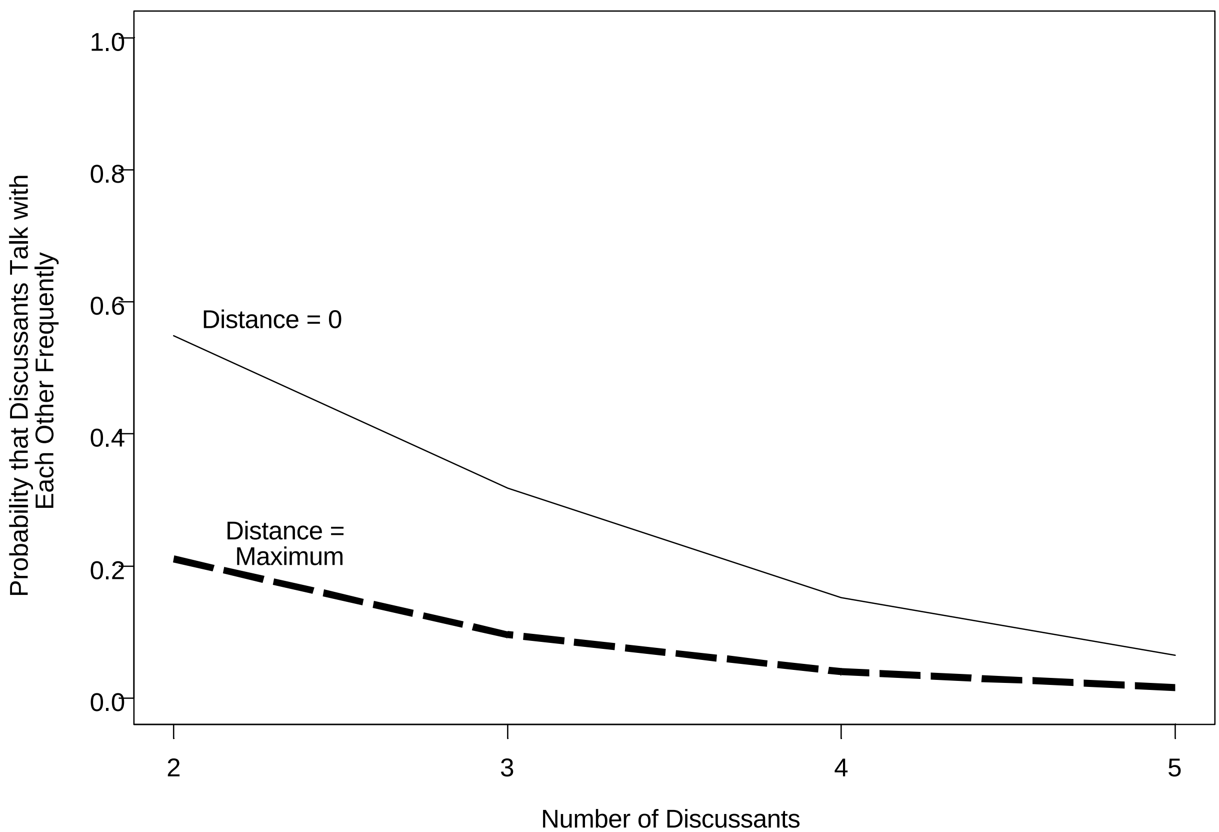

Figure 7. Comparing the relationship between neighborhoods for spatially proximate and spatially dispersed dyads. This trellis plot shows the changing relationship between the environments of the respondents and discussants as spatial distance increases. In this case the environment is median household income of the tract for the respondent and discussant. Each panel represents 25% of the data with no overlap, sorted by spatial distance. The correct way to read the panels is lower-left, lower-right, upper-left, upper-right. The lower left-hand corner is where spatial distance is equal to zero; not surprisingly, there is a perfect linear relationship. What is somewhat surprising, however, is how the relationship changes as distance increases – at the very least it flattens out, meaning that respondents with far-flung networks are exposed to discussants living in environments different from theirs. A loess smoother with a span of 2/3 describes the relationship. The number of data points is 1,007.