Network Research Experiments

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Abstract

This essay attempts to lay the foundation of modern social networks research with a jolt toward innovative ways to create data or finding ways to access newly available data to address meaningful political questions. We focus on outlining potential new resources for data, discuss the emergent theoretical arguments involving political networks, and present some current empirical estimates for the magnitude of the effects of political networks. With the rise of social media and new technology, ordinary citizens socialize online with old friends from elementary school, siblings across the country, and local neighbors. While these relationships have long been part of the social fabric of ordinary life, the ability to observe these exchanges directly and on a daily basis is new, for both researchers and citizens. Records of our social interactions have the potential to transform our academic understanding of the relationship between communication among family, friends, and coworkers and how we become informed about politics and act politically. Whether the relationship occurs on or offline, the social element of the relationship can be incredibly vital in understanding the way individuals react and interact with their political environments. Processing and understanding these interactions, however, can be difficult without knowing where to look for new information, what patterns to look for, and how to interpret data in the context of other findings on the effects of social and political networks. We conclude by considering the new and exciting directions this research may take in the future.

INTRODUCTION

With the rise of social media and new technology, ordinary citizens socialize online with old friends from elementary school, siblings across the country, and local neighbors. While these relationships have long been part of the social fabric of ordinary life, the ability to observe these exchanges directly and on a daily basis is new, for both researchers and citizens. Records of our social interactions have the potential to transform our academic understanding of the relationship between communication among family, friends, and coworkers and how we become informed about politics and act politically. Whether the relationship occurs through an "offline" meeting in a neighborhood or a Skype conversation across the world, the *social*

element of the relationship can be incredibly vital in understanding the way individuals react and interact with their political environments. Processing and understanding these interactions, however, can be difficult without knowing where to look for new information, what patterns to look for, and how to interpret data in the context of other findings on the effects of social and political networks. This brief essay attempts to lay the foundation of modern social networks research with a jolt toward innovative ways to create data or finding ways to access newly available data to address meaningful political questions. We focus on outlining potential new resources for data, discuss the emergent theoretical arguments involving political networks, and present some current empirical estimates for the magnitude of the effects of political networks. We conclude by considering the new and exciting directions this research may take in the future.

FOUNDATIONAL RESEARCH

With the growth and now ubiquitous nature of online social media, the quantity and depth of social ties between individuals is recorded. This data has enormous potential to yield insights into the relationships between an individual's social networks and political choices but is as of yet largely inaccessible to the academic community. Here we describe the potential of this data and some of the ways in which researchers can leverage these resources to focus on questions involving social networks and political behaviors and choices.

New Data Resources

Facebook, one of the most popular social networking sites, allows users the ability to create online profiles about themselves and share these profiles within a user-controlled network of other people called "friends." Facebook user data can provide researchers with a wealth of information germane to discussions of political networks and political information. First, one can find information on "friends" to see their relationship with a user in the online world and in the offline world. Traditionally, the dichotomy between on and offline social spheres suggested a barrier between the people and quality of interactions shared in these spaces. Facebook data provides insight on the type of relationship with the user (school friends, coworkers, family members, etc.) and its depth with respect to shared communication. It is possible to reasonably measure how often people interact with others online by counting the frequency a person shares stories, comments, or "likes" different types of communication. It is possible to perform a similar measure for offline interaction using instances where users are tagged in pictures

together. Where self-reporting of certain social networking questions left doubt about the veracity of responses, records of varying types of connections can help researchers map ties to each other and accurately predict the strength of those ties.

A second and related strength of online social networking sites is the insight into the type of political communications shared between users. Tracking Facebook posts (status updates and information shared on a user's wall) and responses to posts can reveal the political heterogeneity of friendship networks and sources of political information that are identified as credible. We can now figure out not only where people are getting their political information but what stories appeal to users from these sources and what subpopulations respond to different types of political information. Therefore, we can identify a liberal person who maintains a homogeneous liberal network and quantify differences between that user's friends who respond to security versus environmental politics. Beyond the complexity of Facebook, Twitter has emerged as an avenue that researches can utilize to track political information. Twitter defines itself as "a real-time information network that connects you to the latest stories, ideas, opinions and news about what you find interesting." Researchers can recreate networks between users to determine the salient political stories and establish their transmission through a network at low costs. Potentially, sites such as Twitter can be a preeminent source for disentangling political information consumption and constructing clustering patterns based on partisanship, issue salience, and node centrality within a network.

Structured websites such as Facebook and Twitter should not overshadow the development of more open-source information-based networking sites such as Reddit. Users collectively vote on discussions and stories, allowing people to control the popularity and salience of conversation on the site. Similar to other social networking sites, Reddit is not restricted to politics but user's collective political discourse can reveal several important findings for scholars. First, users on Reddit are not bonded by friendship; therefore, "popular" political topics emerge without the same filters worrisome in mediated relationships. An unmediated community is more susceptible to cross-partisan interaction and emerging topics may truly reflect the general population as compared to just friendship networks. Second and consistent with the theme throughout this section, researchers can identify the role of different types of media sources on public discourse. While users can generate topics independent of a traditional news source, many users begin conversations by linking to a traditional news source or popular blog. These open source sites allow scholars to access data on the types of information that resonate with broader audiences by utilizing the voting system for story popularity. Although not as popular as Facebook or Twitter, Reddit is

quickly emerging as a destination for sharing and conversing about political information.

Regardless of the platform, online social networks should be utilized to further construct and disaggregate the commotion innate in social network studies. Networking sites such as Facebook, Twitter, Reddit, and YouTube remove barriers to mapping and researching social networks by allowing access to quantifiable connections between users. These companies now possess the data necessary to answer a myriad of political questions. Establishing partnerships between these companies and academics would allow us to understand who is central to information diffusion by seeing how many people interact with a type of communication, for example, and other types of questions as well. Are there different levels of social pressure when viewing how users respond to interactions from family (immediate vs distant) and friends (close vs far)? What is the relationship between network structure and the transmission of political discussion? If fruitful research on social networks is to continue, scholars should try to access the increasingly available and detailed information gleaned through online social media sites. Some of this material can be accessed directly (Twitter, e.g., has established an API that can be scraped with computing software packages such as Python, but Facebook prohibits this kind of activity). Yet, these companies may be willing to open their data vaults to partnerships because while they have data on the accuracy in tie number, strength, and content of an individual's social network, they may not know the extent to which they can gain new insights by looking at the relationship between observable behavior and political choices. Academics offer much in the way of theoretical innovation to these partnerships.

EMERGENT THEORETICAL ARGUMENTS

Whether it is online or offline, an individual's placement within a social network can substantively impact one's political decision making. One of the most important developments in social network studies involves the role of social environments on political decisions: when an individual is confronted with a set of political choices, her decision is a consequence of her social environment. Within this theoretical framework, social environmental forces can take on different meanings. One such theory considers a networked individual relying on a social environment for learning about politics through deliberation and exposure to multiple perspectives, resulting in an individual being more informed to address the current political choice.

Sokhey and McClurg (2012) present a normative investigation of the impact of an individual's social network on the "quality of voting decisions." Quality control for voting decisions is operationalized by using the Lau and

Redlawsk (1997) article on "correct voting," the process of deciding who to vote for when given all available information on the candidates. In considering networked individuals making "correct votes," Sokhey and McClurg interrogate the work networks accomplish with respect to political discourse. The social environment can potentially change an individual's perspective when interpreting outside political information. Conceivably networked individuals will be exposed to more information but it is unclear if that information immobilizes them from the electoral politics or helps mature initial political preferences (Mutz, 2002). With these competing questions in mind, Sokhey and McClurg test two different hypotheses: (i) political disagreement within social networks will lead to more "incorrect" votes and (ii) increased political expertise in one's social network will result in more "correct" votes. Analyzing data from the 1992 Cross-National Study and the 2000 American National Election Study, they find political disagreement to be an overwhelmingly important predictor of "correct" voting with more disagreement resulting in a high chance of incorrect voting. More substantively, the impact of social networks appears to be as a resource for clear signals about candidates rather than a tool for enhancing political information. Unlike theories of networks providing information shortcuts espoused by Downs (1957), "correct" voting is not a consequence for learning more about the political issue; rather, it is receiving and responding to clear social cues from other members of the network. Ultimately, the social environment of the individuals studied provided political information cues that directly influenced varying political choices.

While political information represents one type of social environment consequence, social pressure emerges as a second theoretical explanation for a networked individual's behavior. Social pressure through conformity functions by establishing a given behavior as necessary for association with other members of a social network. For inclusion in the group in question, an individual must share the act or face ostracizing from the perceived audience which established the behavior as both normal and necessary. As compared to earlier voter mobilization field experiments where social pressure could work to shame people into participating, cueing tangible relationships between networked people can produce the social conformity to maintain membership within a self-selected community. Sinclair (2012) and Sinclair *et al*. (2013) investigate this argument through a quasi-experiment where subjects are randomly assigned to be contacted by local canvassers (people from the same neighborhood) versus canvassers from other communities. It is theorized that turnout represents the social norm that contacted people will need to conform to for network membership.

In effect, social conformity as a type of social pressure is particularly persuasive among networked individuals and works in a two-tiered process.

First, networked individuals need to be engaged by other members in the network to identify the social norm being applied, with that norm emerging as the new standard for group inclusion. Voter mobilization campaigns using local volunteers signal the importance of turnout in terms of representation for a specific set of people within a given geographic or social space. The second tier of the process necessary for social persuasion through conformity involves the credible threat of accountability from that community. As Sinclair *et al*. outline, compliance is hypothesized to increase because contacted individuals more than likely will interact with each other in the future. Local canvassers turned neighbors can potentially raise the issue of turnout in future interactions creating a need to conform; this conformity pressure is unfounded if the canvasser is not embedded in one's network as the individual does not share the same "in-group" norms as he and the canvasser come from different groups.

  Sinclair *et al*. conducted a field experiment with the Strategic Concepts in Organizing and Policy Education, a Los Angeles–based grassroots political group working on turnout and civic engagement in low-income neighborhoods. Local canvassing was defined as a volunteer contacting a resident in the same zip code as the volunteer. Individuals contacted by volunteers from a different zip code represented nonlocal canvassers, although both groups used the same scripts when contacting individuals. Consistent with previous literature, those contacted by any canvasser reported higher turnout rates than individuals in the control group who received no contact (Green & Gerber, 2008). Furthermore, results confirm the hypothesis that local canvassers are more effective in turning out the vote than nonlocal canvassers, suggesting networked persuasion to be a viable campaign strategy and meaningful implication for social pressure on political decision making. The nature of the experiment isolated the difference between local and nonlocal canvassers by utilizing the same messaging cue for social inclusion. This experiment articulates the power of social networks as vehicles to create conformity for maintained membership rather than shaming. The networked individual reacts by consequence of the network exerting pressure in making a decision to participate, not mere mobilization as detailed in prior behavior literature.

  Sinclair *et al*.'s emphasis on social environments as influential through social pressure and McClurg and Sokhey's highlighting networks as spaces for political information represent two of the largest theories in networked research. Both theories place emphasis on the individual connected to the social network but the range of the theories provides scholars different areas of research on the strength of either theory on a particular political decision. Sinclair *et al*. highlight that people do not necessarily need to be influenced through their closest social networks as much as strategically located networks with differentiated communication patterns. McClurg and

Sokhey, through using observational data, rely on close social ties to define information transfers and specific political decisions, whereas Sinclair *et al.* concern themselves with the decision to participate at all. Both theories address different approaches to the impact of social networks but the two theories converge with respect to individuals making political decisions influenced by their social environment.

CUTTING-EDGE RESEARCH

Social networking relationships can have substantive impact on political decision making, but measuring these effects is difficult using observational data. Too many external confounders can confuse the relationship between network diffusion and alternative explanations for altered behavior in response to one's social environment. Eluding these concerns requires methodological tools, allowing researchers to stabilize all other explanatory differences while isolating the impact of networked behavior. Experimental studies provide the best tool to accomplish this across online and offline political networks.

  One useful experiment attempting to quantifiably measure the impact of social pressure on political behavior was conducted by Gerber, Green and Larimer (2008) before the 2006 Michigan primary election. Operationalizing social pressure involves four different treatments testing different degrees of social pressure on voter mobilization: appeals to civic duty, appeals that their voting behavior will be monitored by researchers, appeals featuring an individual's voting record will be shared with others in their household, and appeals that their voting record will be shared with their neighbors. Gerber *et al.* propose that social norms become causally influential through three processes: (i) recognition of the norm, (ii) acceptance of the norm in question, and (iii) enforcement of norms through fear of exclusion from the norm-making association. Each treatment group interacts with different levels of social norm influence with civic duty appeals cueing awareness of a norm with no accountability while exposure to neighbors cues norms, their internalization, and accountability. Results show an 8% increase in turnout among individuals exposed to the neighbors' treatment; this finding is not only the highest of any treatment in their experiment, it exceeds exposure to phone calls and is comparable to in-person mobilization efforts. The innovation in their approach focused on social pressure and message content rather than simple contact disconnected from an individual's interpersonal engagement within a network. This type of large field experiment offers a departure point for future research on political behavior by incorporating an individual's placement within a social sphere governed by specific norms into a given decision-making calculus.

Incorporating new data resources from social media spaces can also illuminate the role of an individual's environment on political behavior. Bond *et al*. (2012) present a credible system for identifying and inferring social ties between individuals through observable online behavior on Facebook. Available data enabled researchers to confidently predict an individual's best friends (strong ties) through compiling public interactions on Facebook with 82% accuracy. Surprisingly, traditional relationships between individuals such as shared history and attributes did not strongly impact the model's predictive power. This assumes that the social behavior of networked individuals will be received by others and can potentially alter future observed behavior.

Bond *et al*. empirically investigated this by conducting a mobilization experiment with 61 million Facebook users during the 2012 Congressional campaign. Users were divided into three groups: a control group exposed to no message prompts; an information message group exposed to a prompt to vote, information on polling centers, and a button to click to declare that individual voted; the final group represented the "social message" group featuring the same prompts as the information group *except* the voting button also displayed six randomly selected Facebook friends who clicked the button indicating their decision to vote. The design allows for users to report to friends their behavior interpreted as political expression and inclusion within a group doing a social norm—voting. Although their estimated indirect effects are small (approximately 0.01% points), their results show exposure to social messages positively increased turnout directly by approximately 60,000 voters and diffused throughout the network for an indirect increase of nearly 280,000 voters (Bond *et al*., 2012). The design allowed for self-reporting to be confirmed with publically available voting records effectively combining observational data with experimental methods. Where Traud *et al*. (2011) find no effect of online mobilization, new data sources allow researchers the ability to go beyond traditional sample sizes to detect real effects of social-based mobilization. New evidence from online quasi-experiments provides credible results supporting claims of online networks tangibly and substantively impacting political behavior.

Observational evidence fails to serve our purposes for understanding offline network construction and diffusion, too. Empirical claims founded upon observational data cannot effectively parse out differences between (i) the universal social environment an individual and her network is exposed to, (ii) self-selection biases as people with shared preferences tend to connect with each other, and (iii) unconsidered externalities distorting the effect of the network on individual behavior. David Nickerson (2008) compares these problems with prior literature's insistence to dismiss the power of "interpersonal influence," an assumption of an atomistic voter—an

individual who makes political decisions without a connection to his social network. If, however, political behavior can be influenced or caused by relationships within a social network, research should be focused on measuring individuals not directly exposed to treatments for behavior (i.e., voter mobilization campaigns).

Nickerson proposed a series of field experiments to measure these effects by considering the contagious nature of get out the vote campaigns among residents of two person households, focusing on the behavior of the person who lives with but does *not* receive the mobilization treatment. Uniquely, these experiments avoid the worrisome assumptions of an atomistic voter and external influencing factors by simultaneously conducting a placebo experiment with some households exposed to a pitch to recycle instead of a get out the vote message. In addition, experiments were conducted in two different cities (Denver and Minneapolis) to acquire a high number of treated and placebo cases. Turnout of people who did not answer the door in two-person households can then be measured as the research design accounts for peer effects, similar interests, and self-selection with the placebo experiment. The placebo protocol (recycling pitch) establishes the necessary baseline for individual and secondary networked behavior; the only difference between treatment and control is the exposure to a voter mobilization prompt. Subsequent conclusions from the experiment do not require assumptions on baseline voter rates for each individual in a household; a simple calculation of differences in average turnout for secondary household members between voter-mobilized treatments and recycling treatments reveals the depth of contagious political behavior through social networks.

Nickerson's results show that the get out the vote campaign produced significantly higher turnout and pooled results from both experiments show a statistically significant effect on nontreated individual's voting behavior. The methodological approach to answering questions of social network behavior is as important as substantive findings on altered behavior. Use of placebo experimental controls allows for researchers to confidently isolate the diffusion of political behavior through networks without costly assumptions and risk of externalities embedded in observational study. Imposing limits on the size of the network, in this case a two-person network, allows for more manageable analysis without concerns of unaccounted for influences within a network.

Experiments similar to Nickerson (2008) become problematic when attempting to generalize findings to different cases. As he points out, there remain questions on the extent that voting contagion can occur without an exogenous shock similar to a mobilization campaign. Taking place amid lower salience elections, there is uncertainty if more salient elections change the contagious nature of voting. Furthermore, it is unclear whether similar

effects of voting behavior can be found in larger social networks with multiple types of interpersonal connections. As referenced in the theoretical argument debate earlier, Nickerson acknowledges difficulties in specifying the process that transfers behavior (either lower costs through greater information or social pressure by a housemate).

One concern raised by Nickerson requires special attention and involves the stable unit treatment value assumption (SUTVA), a core tenant stated when claiming causal relationships between variables in experimental studies. By focusing on individuals, Nickerson argues previous experiments designed to measure mobilization (Gerber & Green, 2000a, 2000b; Michelson, 2003; Nickerson, 2007) did not accurately account for spillover effects of treatments to unassigned subjects. Given the contagious nature of voting with a single individual assigned to treatment impacting behavior of nonassigned subjects, experimenters may worry that treatment is "spilling over" to other individuals. Sinclair *et al*. (2012) investigate the value of multilevel experiment designs applied to a large-scale mobilization experiment testing the impact of social pressure on local voters. Multilevel experiments randomly assign subjects to treatment and control plus randomly assign the treatment to other subjects within an individual's social network. In this context, implementing a multilevel experiment on social pressure expand beyond Nickerson (2008) by considering the spillover effects in a given household and among an individual's neighborhood. Despite ignoring the mechanism of indirect influence on other parts of a social network, Sinclair *et al*. argue that individuals can be influenced differently by neighbors than compared with housemates.

Sinclair *et al*. apply the Gerber, Green, and Larimer's social pressure mailings to a 2009 Illinois special election and find mixed results of spillover within populations. Within households, spillover effects are found although not at the levels reported by Nickerson (2008); differences in turnout levels are attributable to in-person conversations being more likely to prompt dialog than postcards. Interestingly, no evidence of spillover effects between individuals within zip-code-defined neighborhoods. Multilevel experimentation allowed for the identification of a null finding of significance given the difficulty in mapping possible pathways of social influence within complex social networks. Sinclair *et al*.'s use of precise multilevel experiments identifies areas of research to be focused on (household transmission of mobilization stimuli) and areas where limited resources do not need to be spent in bulk (neighborhood diffusion of mobilization treatments).

Regardless of the online or offline nature of social network influence on political behavior, credible empirical evidence suggests these relationships do matter for determining how individuals will express themselves politically. Investigations of social network influence using observational data consistently make questionable assumptions based on correlations between

seemingly connected people and their shared behavior. Observational data falls short, however, in accounting for other factors that could explain correlated behavior limiting causal claims. Social network research has increasingly relied on experimental studies to create an environment to control for unobserved correlates and measure exogenous shock diffusion through social networks. In particular, experimental strategies allow researchers three different types of manipulations for measurement: (i) creating an exogenous shock and monitor its diffusion, (ii) alter/control information flows through the network, or (iii) randomize individual placements within the network (Nickerson, 2011). Researchers will need to carefully consider the question they hope to answer when determining which experimental method to use, but experimental studies provide the more comprehensive tools available to confidently identify causal relationships between networked individual's political behaviors.

FUTURE RESEARCH WITH EXPERIMENTAL PROCESSES

Experimental research is frequently concerned with questions of external validity, which means there is great potential for new directions for research on questions previously unstudied using a methodological approach built for causal claims. One such area involves questions of interest-based voting as alluded to by Sokhey and McClurg. Most experimental studies focus on turnout or political communication through social networks, but few begin to identify the mechanisms surrounding interest building and mobilization in electoral politics. Growths in multilevel experiments now allow researchers to explore theoretically stable and well-defined social networks to understand how different types of political information are communicated and when political behavior appeals will be effective. Online data from social media sites greatly reduce the cost of conducting experiments and allow researchers new resources to extend beyond geographic boundaries (zip codes or neighborhood lines) when defining unique networks and their strength.

  Another important area for scholarly growth involves understanding young people's involvement and engagement in politics. Literature on political engagement begins with youth apathy and transitions toward the importance of socioeconomic status for understanding differences in adult consumption and participation in electoral contexts. Without traditional predictors of participation meaningfully available in younger populations, access to new media can provide insights in how young people form their political identities. Advanced observational and experimental research on social networks can reveal the influences of environment on developing political ideologies, reveal changes in issue salience as individuals mature,

and capture the different ways young people communicate about politics. New data and direct experimentation can enhance our understanding of how a single individual decides to be political before obtaining more conventional political resources. There are many questions left to be investigated with respect to social networks, political participation, and how we are at once influencing others while also being influenced by those near and far. Access to new data allows researchers to test hypotheses to improve our understandings of being interconnected, political people.

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