

The Network in the Garden:
Designing Social Media for Rural Life

Eric Gilbert, Karrie Karahalios and Christian Sandvig
Depts. of Computer Science and Communication
University of Illinois at Urbana-Champaign
[egilber2, kkarahal, csandvig]@uiuc.edu

Abstract

History repeatedly demonstrates that rural communities have unique technological needs. Yet we know little about how rural communities use modern technologies and we therefore lack knowledge about how to design for rural life. To address this gap, our empirical paper investigates behavioral differences between more than 3,000 rural and urban social media users. Using a dataset collected from a broadly popular social network site, we analyze users' profiles, 340,000 online friendships and 200,000 interpersonal messages. Using social capital theory, we predict differences between rural and urban users and find strong evidence supporting our hypotheses. Namely, rural people articulate far fewer friends online, and those friends live much closer to home. Our results also indicate that the groups have substantially different gender distributions and use privacy features differently. We conclude by discussing design implications drawn from our findings; most importantly, designers should reconsider the binary friend-or-not model to allow for incremental trust-building.

Introduction

Rural communities are famous for using technology in novel ways. When the telephone first came to rural America in the early 20th century, communities adapted the rural custom of “visiting” to it. Although a system of rings signaled an individual home on a party line¹, other people would invariably join in or just eavesdrop. It was common enough that speakers would often adjust their conversations for large audiences. The practice so irritated Bell Telephone that the company instructed rural customers to behave more like its urban ones. In the end, however, Bell recognized a business opportunity and created a telephone specifically designed to support the rural custom (Atwood, 1984; Kline, 2000);

In the landmark 1964 study of pastoralism, *The Machine in the Garden*, Leo Marx wrote of the pervasive “urge” in American culture “to idealize a simple, rural environment,” and the struggle to understand how technology could fit within it (Marx, 1964). Designers of communication technologies have often thought that new communication systems would finally solve the problems of the hinterland, annihilating distance and making all places and users the same (Carey, 1989).

Yet history is full of examples documenting the unique technological needs of rural communities (Atwood, 1984; Kline, 2000; Umble, 1991). Despite this wealth of historical evidence, we lack basic data on how rural communities use modern technologies. Consequently, we lack knowledge on how to design for them. Rural people comprise roughly one-quarter of the U.S. population, a greater percentage than both senior citizens and people with disabilities (US Census Bureau, 1995). However, a search for “rural” in indices related to information technology and design turns up almost no academic work. The little that exists takes place outside the United States. A search for “urban,” on the other hand, turns up many pages of relevant results.

This paper attempts to fill the gap. Our empirical study analyzes the behavioral differences between over 3,000 rural and urban social media users, each from a different U.S. location. We use the theory of social capital to analyze users’ profiles, over 340,000 online friendships and over 200,000 interpersonal messages. We focus on rural life for several reasons. First, rural life is fundamentally a social setting: although certainly not a complete definition, rurality foremost implies low population density. Rural communities, for example, amass social capital in markedly different ways than urban communities (Falk, 2000). In particular, rural communities build bonding social capital more easily than urban communities. Furthermore, a rural location brings with it a number of other correlated social indi-

¹ Party lines are telephone lines shared by multiple households.

cators: income, education level, race, religious affiliation, socioeconomic class, etc. A focus on rurality is a focus on the distance between people. This suggests opportunities and scenarios for the use of communication technologies because they are often designed to bridge the distance between people. This lens further suggests new design implications in ways that studies organized around other multicollinear factors may not. While we know a great deal about the impact of work settings on technology use, we know relatively little about the impact of these other, less-constrained social variables. Finally, our study focuses on the U.S. in part because rurality is particularly relevant there. Previous scholarship has suggested that understanding the rural character of the U.S. may explain large differentials in Internet access and use—for example, the difference in broadband Internet adoption between the U.S. and European countries (LaRose, Gregg, Stover, Straubhaar & Carpenter, p. 361).

To investigate the impact of rural life on social media, we focus on MySpace.com, the most popular online social network site in the United States at the time of our data collection (Hitwise, 2008). Social network sites (SNSs) offer many of the features commonly found in social media: user profiles, publicly articulated friendships, blogs, comments and privacy settings based on network topology (boyd, 2004; Donath & boyd, 2004). SNSs also provide a place in which users amass weak ties and derive emotional strength from strong ones (Donath & boyd, 2004; Ellison, Heino & Gibbs, 2006; Granovetter, 1971; Wellman, Haase, Witte & Hampton, 2001; Wellman et al., 2003; Wellman et al., 1996). In contrast with previous work on SNSs and online communities (boyd, 2004; Ellison, Steinfield & Lampe, 2007; Golder, Wilkinson & Huberman, 2007; Hancock, Toma & Ellison, 2007; Lampe, Ellison & Steinfield, 2007; Whittaker, Terveen, Hill & Cherny, 1998) our study focuses on a broadly popular site that has always been open to everyone. Therefore, we can investigate a fairly broad, comparative research question: In what ways do rural and urban people use social media differently?

We first review the demographics of rural America, and then outline historical precedents for social technologies in rural communities. Next we use the theory of social capital to predict differences between rural and urban SNS users. Put in a rural context, social capital theory generally predicts that rural users will articulate far fewer friends, and keep their networks close to home. Our hypotheses address the following questions. Do rural and urban users articulate different numbers of friends? Do the groups use messaging differently? Do rural and urban users view privacy, and therefore visibility, differently? Whose friends live closer physically? Do the groups have different gender distributions? Do rural people show a preference for strong ties over weak ones in an online social network? We conclude by applying our findings to implications for designers of social media.

Literature Review

In this section we review descriptive and analytic work that informs this paper's research question: In what ways do rural and urban people use social media differently? We begin with a survey of the demographics of rural America, laying a foundation for understanding modern rural life. We then provide a brief history of social technologies in rural America, focusing on the telephone and the internet. Along with the theoretical motivations introduced in the next section, the work presented here informs our hypotheses about modern-day social media use.

Demographics of Rural America

The U.S. is the 62nd most rural country in the world, with a population density similar to Madagascar. Although Internet use in the U.S. is often compared to European and Asian countries like the United Kingdom and Japan, these countries are 7–10 times more densely populated than the U.S. (The World Factbook, 2008) The U.S. Census defines a rural area as “a town with less than 2,500 people, or an open area” (read “open area” as “farm”) (US Census Bureau, 1995). Using this (rather conservative) definition, 24% of Americans live in rural areas. However, over 97% of the land area in the U.S. qualifies as rural (US Census Bureau, 2000). After a long period of migration to the cities, rural areas are growing again, faster even than urban ones (Isserman, 2001). Latinos immigrating directly to rural areas mostly account for this renewed growth.

Rural Americans tend to be older, less educated, less wealthy and less mobile than urban Americans (Bell, Reddy & Rainie, 2004). Senior citizens, for example, account for 22% of the rural population, but only 15% of the urban and suburban populations. Often working in professions like agriculture and manufacturing (Parker, Hudson, Dillman & Roscoe, 1989) rural Americans have not profited much from the new, information-centered economy (Castells, 2001).

Living in rural America means more than geographic or social isolation. As evidenced above, a number of other social indicators distinguish rural life as well. These indicators are also worth studying. However, it makes particular sense to look at social media through the lens of rural life because rural life is fundamentally a social setting. Rural communities have dramatically different social structures than urban communities. In the past, these structures have affected rural communities' use of technology. Given the role of information and communication technologies in reformulating space and distance, we would expect that the use of media technologies would be especially distinctive.

Social Technologies in Rural America

Rural people adopted America's first widespread social technology very enthusiastically (Fischer, 1994). As with the Internet at a later time (Toffler, 1981), telephone pioneers thought the device would reduce rural isolation and bridge social distance:

"The old time isolation and lonesomeness of farm life is a thing of the past. Modern communication has increased the activities and broadened the social life of the rural family." — *Making Farm Life Enjoyable, Bell Telephone Advertisement, 1907* (Fischer, 1994)

To some extent they were right. However, rural Americans did not use the telephone the same way as urban Americans: they appropriated it in ways unique to their settings (Umble, 1991). For example, instead of private phones in private homes, small towns would often own a single phone and summon individuals to it. It had little to do with price; the arrangement worked well in rural culture (Kline, 2000).

With any technology situated in a rural area, access is an issue. When farmers had difficulty convincing Bell to serve them in the early 20th century, they constructed phone networks out of barbed wire fences (Kline, 2000). In modern times, rural access to the internet has lagged behind urban and suburban areas, but the gap is closing. Today, 60% of rural people and 71% of urban people can access the internet (Horrigan & Murray, 2006). Yet there is still a significant rural lag in the adoption of broadband, with just 38% of rural users using broadband at home compared to 57% of urban users and 60% of suburban users (Horrigan, 2008). In fact, some rural leaders see the internet and online communities as tools for ensuring the viability of their communities (University of Maine, 2009).

In a recent study very relevant to ours, Larson (2008) interviewed 63 rural people to understand how they talk about the internet. The discursive approach allowed her to extract themes about rural users' conception of the internet. Two findings emerged from her research that bear directly on ours: women are the primary guardians of internet knowledge in rural communities; and, rural people generally distrust meeting new people over the Internet.

Social Capital in Rural Communities

We ground our work in the theory of social capital. Social capital refers to the resources accumulated over time in human relationships. People and communities can draw on social capital to affect change (Portes, 1998). While a detailed discussion of social capital is beyond the scope of this paper, it can distinguish communities and, more broadly, affect their overall health (Ellison, Steinfield & Lampe, 2007; Granovetter, 1971).

Rural communities possess a kind of social capital not readily found in urban settings. High population densities often create social capital rich in weak ties (Jacobs, 1961). Weak ties are important, and provide access to the non-redundant information found outside the network of strong ties. Rural communities, on the other hand, often prefer strong ties over weak ones (Falk & Kilpatrick, 2000). For example, in interviews with rural communities, Falk found participants attributing their community's vitality to "teamwork," "working together," "supporting each other," "pulling together," "cooperation between everyone," and "banding together." In other words, rural communities value bonding as opposed to bridging social capital.

It is important to note that the internet, like cities, easily supports the formation and maintenance of bridging social capital (Norris, 2002; Resnick, 2001). In this way, social media seems to align better with the values and needs of urban communities than with rural ones.

Hypotheses

The theory advanced above, along with prior work, leads us to introduce the following hypotheses concerning rural and urban SNS use:

H1: Rural users will have far fewer friends and comments than urban users.

H2: Females will account for a greater proportion of rural users than urban users.

H3: Rural users will set their profiles to private at higher rates than urban users.

H4: Rural users' friends will live much closer than urban users' friends.

H5: As compared to urban users, rural users' distribution of friends will preference strong ties over weak ties.

H2 primarily derives from Larson's findings on the social use of the internet in rural communities. Social capital theory primarily motivates the other four hypotheses; however, H3 also draws inspiration from Larson's work.

Method

To test our hypotheses, we sampled 2000 rural and 2000 urban MySpace users from 4000 different zip codes in the United States. Between May 11 and May 15, 2007, automated scripts searched MySpace for users in zip codes randomly selected from a zip code database (Hart, 2007). The database, created by the University of Washington's rural research center, classifies every zip code in the United States along a continuum from urban to rural. Its authors primarily considered two variables in determining a classification: population and relationship to a metropolitan area. For example, a small town in the Sierra Nevada mountains receives a rural classification; a small town whose resi-

dents commute to New York, on the other hand, receives a more urban classification. For our study, we selected zip codes classified at the ends of the spectrum. (The urban end of the spectrum typically includes a city's entire metropolitan area.) We sampled this way to examine the difference between urban and rural social media users at a high level. Yet, two weaknesses emerge from this approach. First, our design misses subtle changes along the continuum from urban to rural. Second, the database we used clearly has more resolution at the rural end than the urban end (e.g., Champaign-Urbana receives the same urban classification as Manhattan—they are both considered cities). We do not think these shortcomings critically impair our findings, but we would like to see future work address this sampling problem.

For every selected zip code, our scripts searched for users within ten miles of its center, randomly selecting one user from among the first 200 search results. After collecting 2000 rural and 2000 urban users, we removed accounts that had never been used, resulting in a sample of 1,661 rural users and 1,721 urban users, indicating that a substantial number of users never use their accounts once they sign up. We chose to remove orphaned accounts because our study focuses on usage patterns; the orphaned accounts could not provide that information.

Independent Variable

We considered one variable as independent in our study: location, a categorical variable which takes on the values of rural and urban. We excluded many other possible variables by focusing solely on location: gender, education level, income, etc. In fact, some of these, as described earlier, have specific and well-known correlations with the categories of rural and urban. However, as we are the first to investigate the impact of rural life on social media, we feel it is important to first study it at a coarse level (e.g., rural vs. urban), as do other studies (Horrigan & Murray, 2001).

Dependent Variables

To assess rural and urban SNS differences, we collected 16 dependent variables from users' MySpace profiles, broadly falling into four categories: basic SNS usage, gender, privacy and physical distance. Basic SNS usage includes variables that form the building blocks of all social network sites (e.g., friends, comments, relationships, etc.). We take a closer look at gender and privacy settings, since our theoretical motivations indicate they will differ between groups. The physical distance variables, average distance to friends and friendship strength, address our distance hypothesis. The Results section below describes each variable in detail².

² In this paper the designation of these variables as "independent" vs. "dependent" is conceptual. In non-experimental research designs these labels are interchangeable as neither set of variables has been manipulated (that is, controlled in order to demonstrate causation). In this study we aim to demonstrate that a simple dichotomy of urban/rural can be used to classify users: rural-ity is then "independent" in the sense used in statistics that it is the explanatory factor in this design.

In contrast with other SNS studies (Ellison, Steinfield & Lampe, 2007; Lampe, Ellison & Steinfield, 2007) we chose not to include most profile elements in our measures. The reason for this is that most profile elements typically reported on MySpace (e.g., education level, ethnicity, religious views) could be deduced from Census data (given rural or urban status). Instead, our study addresses the usage aspects of SNSs.

Finally, there is no way to verify the self-reported information on users' profiles. Information we collected most likely contains errors, oversights and deception (Donath, 1998). For example, one of our participants probably does not live "on the moon, in New York." At this time, it is not clearly understood how much deception and reporting error occurs in communities like MySpace. In our study, we view errors and deception as noise, and employ random sampling to distribute it uniformly across rural and urban groups.

Results

Overall, rural users demonstrate very different SNS behavior than urban users. On nearly every measure, rural and urban groups differ significantly (most at the $p < 0.001$ level). The variables do not tend toward normality: most are power-law or exponentially distributed. Therefore, in the following subsections, we perform non-parametric statistical tests to compare the groups and report medians as measures of central tendency. As is true in any statistical analysis, it is crucial in this study to analyze findings that are both substantively and statistically significant. While most results are statistically significant here, this is sometimes an artifact of our large sample size.

We begin by presenting an analysis of basic SNS usage by rural and urban users. Next we discuss differences in privacy settings and proportions of users by gender. We conclude this section by analyzing the relationship between physical distance and the strength of a friendship.

Basic SNS Usage

Table 1 shows differences in basic MySpace usage between rural and urban users: number of friends, age, time since last login, use of images and video, comments and commenting relationships. MySpace assigns every user a unique, sequential ID. Consequently, MySpace IDs tell us about the order in which users create accounts. The median rural ID is more than an order of magnitude greater the median urban ID: rural users clearly signed up much later than urban users. While a one-to-one mapping from ID to account creation time is problematic (surges in MySpace adoption would lead to nonlinear growth, for example), the vastly different IDs indicate a substantial time difference. Rural users are also significantly younger than their urban counterparts, perhaps an artifact of rural users' late adoption (Rogers, 1995). In other words, urban users may have grown up with the site.

Table 1. Rural and urban users' basic SNS usage.

Measure	Rural	Urban	z	p-value
N	1661	1721		
MySpace ID	54M	2.7M	-40.1	< .001
Age	22	24	-7.9	< .001
Friends	45	104	-14.6	< .001
Comments	40	118	-14.9	< .001
Images	17	21	-3.5	< .001
Embedded videos	0	0	-5.5	< .001
Days since last login	4	10	-12.1	< .001
Unique commenters	11	29	-14.9	< .001
Reciprocal relationships	2	5	-10.1	< .001

Note. We report medians as measures of central tendency in Rural and Urban. z refers to the Mann-Whitney test.

Rural users publicly articulate far fewer friends than urban users (in roughly a 1:3 ratio). The relative imbalance of comments is about the same. A comment here refers to the act of a user leaving a text note on someone's profile page, similar to comments on a blog or Facebook's Wall. Paradoxically, perhaps, rural users log into MySpace more often. At the time of our sample, rural users had not logged into MySpace in 4 days (median), while urban users had spent 10 days away, indicating that rural users log into the site about twice as often as urban users.

We see the 1:3 ratio again between rural and urban profiles in the number of unique commenters and the number of reciprocal relationships. We calculated unique commenters by counting the unique individuals (known by their IDs) who left comments on a user's profile page. A reciprocal relationship refers to a pair of users, each of whom has left at least one comment on the other's profile.

Gender

The relative proportions of males and females differ significantly between rural and urban groups, $\chi^2(1, N = 3379) = 40.436, p < .001$. Figure 1 shows that rural women outnumber rural men by 3%; however, urban men outnumber urban women by a much wider margin, 18.8%. Because we sampled users with the MySpace search interface, we had no way to include private profiles in our sample. If urban women set their profiles to private at significantly higher rates, it might explain their relatively low representation in our sample. We investigate this possibility when we discuss privacy shortly.

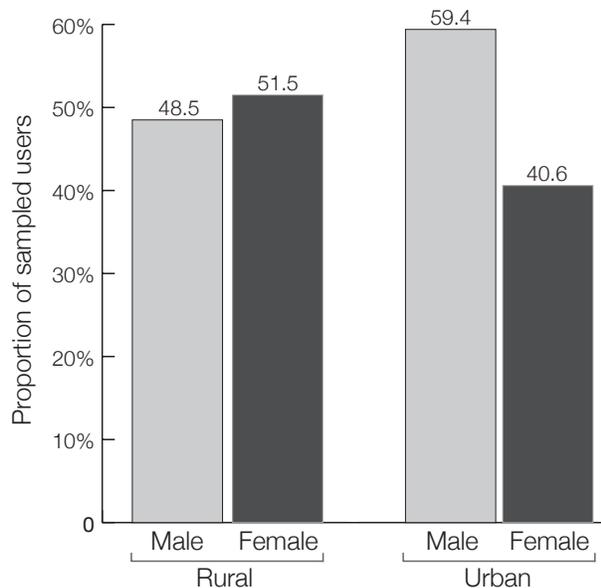


Figure 1. Proportions of sampled rural and urban MySpace users by gender. While rural women outnumber rural men, the trend is reversed and magnified in urban users.

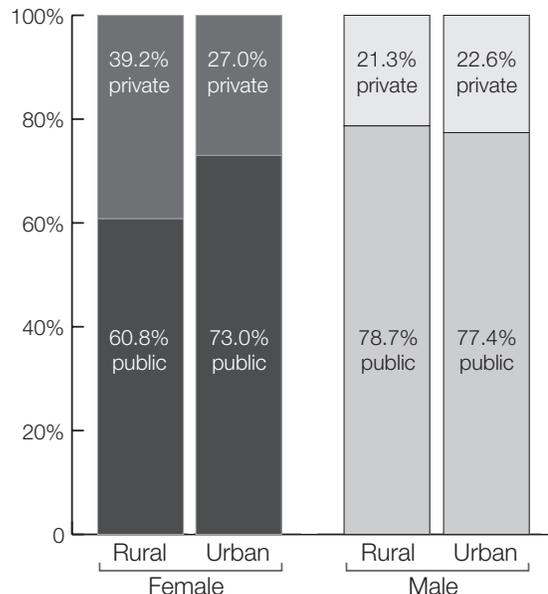


Figure 2. Breakdown of profile privacy by gender. Rural women drive the privacy difference between rural and users seen in Table 3.

Because we found such a stark contrast between the gender distributions of rural and urban groups, we also investigated the impact of gender on friendships. Table 2 shows the relative distributions of male-male, male-female, female-male and female-female friendships in the two groups. (*male-female*, for example, refers to a male in our sample with a female friend.) While rural and urban groups differ in this respect, the difference is not very substantial: rural men befriend women at a slightly higher rate than urban men, $\chi^2(1, N = 2101) = 6.509, p = .011$. Table 2 also indicates that men and women, regardless of the rural/urban division, prefer women as friends.

Privacy

Due to our social capital theoretical motivations, we wanted to investigate differences in privacy settings between rural and urban SNS users. However, as noted above, our sampling method precluded us from collecting private profiles. To address this problem, we derived a snowball sample from our original random sample in the following way: using a randomly selected subset from our original sample, we coded each user's friends into rural and urban categories. However, snowball sampling can introduce unwanted biases, such as oversampling users from large social networks. We defended against this bias by randomly selecting the same number of friends from every user's network.

Table 2. The effect of gender on friendships.

Friendship Type	Rural	Urban
Male-Male	35.5%	38.6%
Male-Female	64.5%	61.4%
Female-Male	42.5%	43.7%
Female-Female	57.5%	56.3%

Note. Rural men befriend women at slightly higher rates than urban men. Regardless of location, participants prefer women as friends.

Table 3. Comparison of public and private profiles by location using a derived, snowball sample.

Privacy Setting	Rural	Urban
Public	68.5%	74.9%
Private	31.5%	25.1%
Total	998	2069

Note. Rural users set their profiles to private more often than urban users.

Table 3 shows that rural users set their profiles to private more often than urban users, $\chi^2(1, N = 3067) = 13.626, p < .001$. In two equally-sized samples of rural and urban MySpace users, we would expect 25.5% more private rural profiles than private urban profiles ($31.5/25.1 = 1.255$).

As previously noted, our sample included far more urban men than urban women. We speculated that profile privacy might explain the large discrepancy. However, Figure 2 demonstrates that rural women set their profiles to private at much higher rates than urban women, $\chi^2(1, N = 1777) = 26.602, p < .001$. Furthermore, it shows that urban women set their profiles to private only slightly more often than urban men, $\chi^2(1, N = 2069) = 5.257, p = .022$. Men set their profiles to private at the same rates across rural and urban, $\chi^2(1, N = 1290) = .255, p = .613$. Rural women seem to drive the privacy difference between urban and rural users.

Distance and the Strength of Friendships

We conclude this section by analyzing the relationship between physical distance and friendship strength, as measured by the number of comments between two friends. For each user in our sample, we examined the pairwise comments between the user and each friend, building a corpus of over 200,000 messages. We did not examine or store the content of the messages. For each friendship for which it was possible, we also computed the physical distance between users' reported locations using the distance of the shortest path on the globe.

Rural users live, on average, 88.8 miles from their friends, while urban users live 201.7 miles from their friends, Mann-Whitney $z = -7.791, N_1 = 1051, N_2 = 1266, p < .001$. (88.8 and 201.7 are medians.) When friendships do include comments, both rural and urban friendships tend to have the same number of messages, with the pair writing 2 comments, Mann-Whitney $z = -.253, N_1 = 1104, N_2 = 1355, p = .801$. However, a very large portion of friends never comment on each other's profiles: 43.5% of friendships go comment-less.

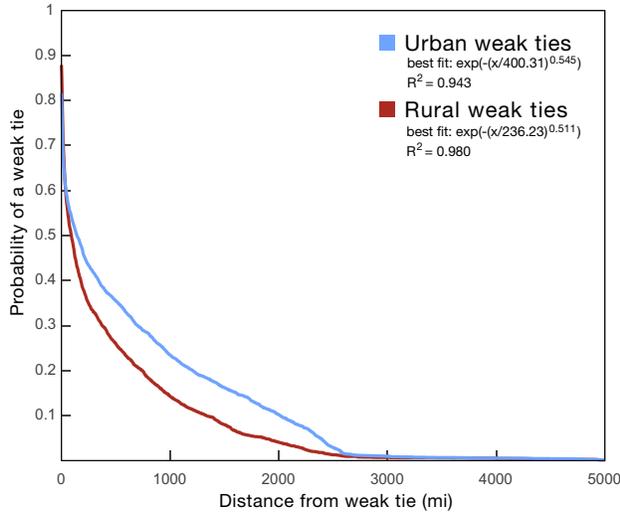


Figure 3. Probability density of weak ties as a function of physical distance. Urban users' weak ties are physically farther than rural users' weak ties.

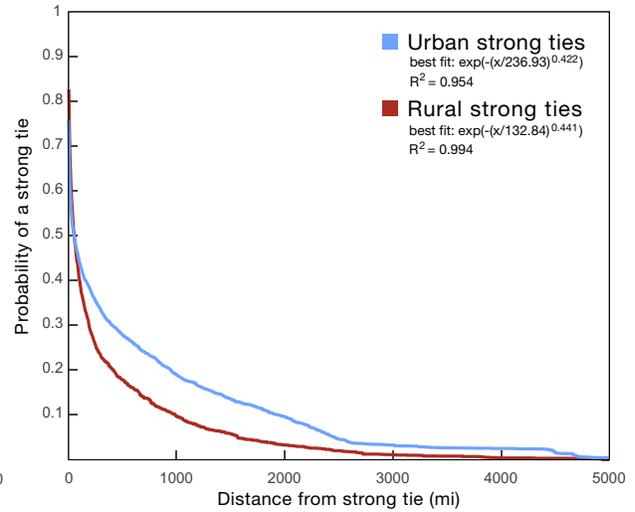


Figure 4. Probability density of strong ties as a function of physical distance. The gap between rural and urban users widens when we examine strong ties.

To understand the relationship between distance and friendship strength more deeply, we separated friendships into two categories, strong ties and weak ties, and examined them as a function of distance. To define a strong tie, we used the criterion of 10 comments between friends; this represented approximately 4% of the friendships in both groups. We chose 10 because it was the first integral value of comments to reach the mean plus two standard deviations mark. However, strong tie is notoriously difficult to quantify; we use 10 largely to contrast with weak tie. To define a weak tie, we include friendships with either no comments or just one comment (non-reciprocal relationships). As noted previously, this represented a large proportion of the friendships in our sample. Figures 3 and 4 show the results of the analysis.

At all levels, rural social networks do not reach as far as urban social networks. The gap is most pronounced when we look at strong ties. To take some example numbers from the probability density functions (PDFs), only 20% of rural users' strong ties live more than 414 miles away. The farthest 20% of urban users' friends, on the other hand, live more than 948 miles away. Interestingly, all the PDFs fit a stretched exceptionally well (Laherrere & Sornette, 1998). The PDF for rural strong ties, for example, fits a stretched exponential with $a = 132.84$, $b = .441$, $R^2 = .994$. Among the four PDFs, the lowest R^2 is .943.

Figure 5 visualizes the findings of Figures 3 and 4 on the U.S. map. To create the visualization, we randomly selected 50 rural participants and 50 urban participants from our sample and plotted their physical locations. For every rural participant, we also plotted a translucent red circle with a radius of 414 miles, centered at their location. (80% of rural participants' strong ties fall within this boundary.) Where the circles overlap, they form more saturated red

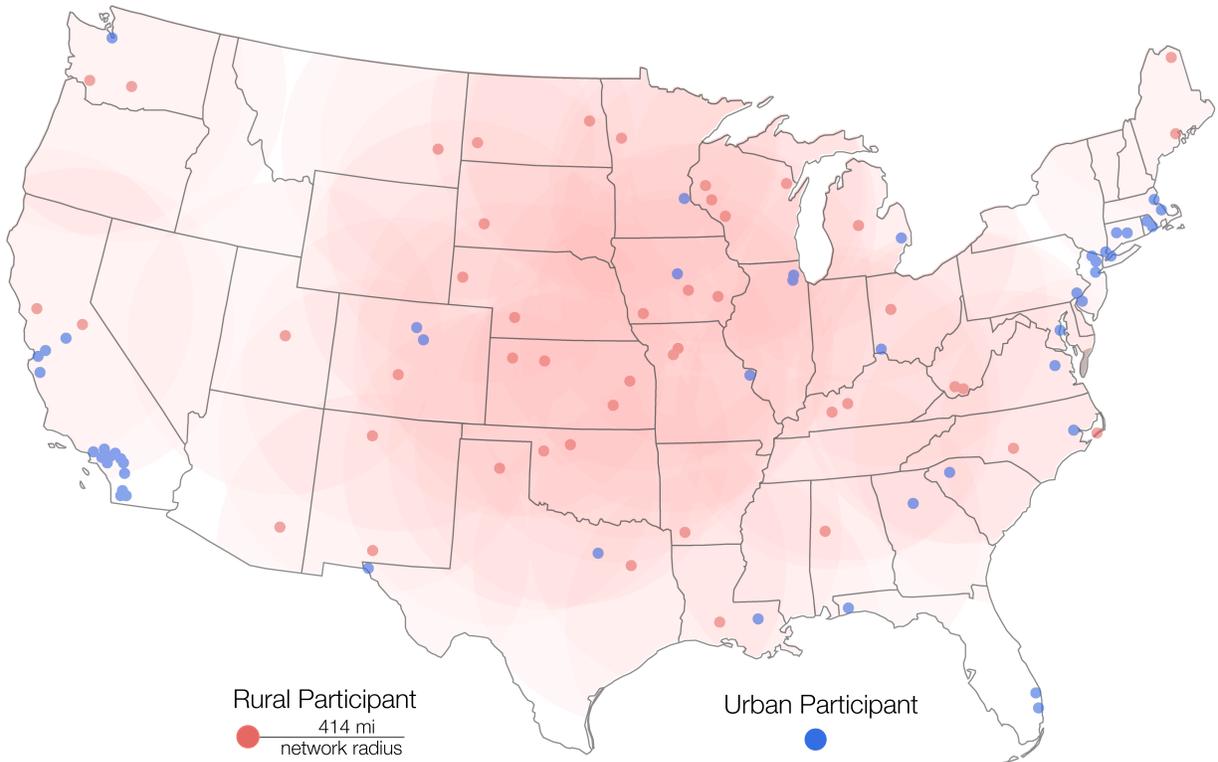


Figure 5. A visualization of the reach of rural social networks. 50 random rural participants and 50 random urban participants are plotted. A translucent red circle accompanies each rural participant. Stacking them creates likelihoods of rural friends in different parts of the country. Most urban people live in low-likelihood areas.

areas, corresponding to higher likelihoods of finding rural friends at those locations. The method is similar to Venn diagrams. Since we produced the visualization by randomly selecting participants, it is not biased; at the same time, since the number of participants is small, it does not overwhelm the viewer either. Figure 5 demonstrates that most urban participants fall outside the reach of rural social networks. (Some cities fall in high probability regions, but most do not.) The rural networks cannot overcome the distance imposed by rural locations.

Discussion

Our results strongly confirm hypotheses H1 through H4. When compared to urban users, rural users have roughly one-third as many friends and profile comments (H1). Three years ago, Donath and boyd argued that SNSs could cheaply support the creation and maintenance of large numbers of friends (Donath & boyd, 2004). Yet despite the technical possibility, urban users have 104 friends on average; rural users have much fewer. This is particularly compelling in the case of rural users. Despite their relative geographic and social isolation, rural users do not use SNSs to find and articulate lots of friends. This might stem from the tendency for users to form friendships offline and then move them online, or could be an artifact of access to broadband internet (Lampe, Ellison & Steinfield,

2007). (might also be broadband access issue) Upon further analysis, a curious similarity appears between the groups. While rural and urban users have vastly different numbers of friends, they tend to keep contact with nearly the same percentage of them. In each group, any given commenter is responsible for about 4 comments, and only about 4% of friendships are reciprocal. An interesting corollary of this 4% result is that when friendships are reciprocal, they almost certainly consist of at least 10 messages.

Even after correcting for privacy settings, women represent a much larger proportion of rural SNS users than urban SNS users (H2). This result supports Larson's finding that rural women are the guardians of internet knowledge in rural communities. Larson found that rural men see the internet as a communication medium most appropriate for women.

We also find that rural users, particularly women, set their profiles to private at higher rates than urban users (H3). At first glance, this appears counterintuitive. As Jane Jacobs (1961) wrote, "privacy is precious in cities". Why should urban SNS users set their profiles to private at lower rates? We draw support from Larson's finding that rural people do not view the internet as a place to meet new people; they view it as a place to communicate with people with whom they already share a strong connection. Our rural social capital theory also indicates that rural communities keep their networks nearby, something that appears to have replicated itself online. Urban people may view visibility differently because of their location. In cities, people are on display all the time, a fact that keeps cities vibrant and safe. In rural communities, most people possess deep knowledge about each other already. In fact, rural people view this detailed interpersonal knowledge as an important prerequisite for friendship (Larson, 2007). Our empirical results indicate that rural users, particularly women, view privacy as more important than urban users. This is especially surprising since the geographic isolation of rural communities affords much more privacy from outsiders (but not from insiders) than urban locations. In other words, a stranger viewing your profile is much more likely to live close by if you live in a city.

Along similar lines, we find that rural users' friends live significantly closer than urban users' friends (H4). Again, this result may seem counterintuitive. With so many people to choose from, why would an urban person need to go far to find friends? With so few people to choose from, why wouldn't a rural person search far and wide? Combined with H1, this result is particularly compelling: rural people have far fewer friends, and those friends live much closer physically. As Figure 5 demonstrates, the result has even more force when aggregated over many rural users. Most rural people only befriend other rural people. The strong red center in the Plains and Midwest visualizes this result.

We offer two interpretations of this behavior. The first hinges on the geographic mobility of urban people. With cities offering refuge for young, transient populations, it is entirely possible that urban friends move quite often, making the distance to their friends substantially greater than rural people. In this way, MySpace differs markedly from studies possible on Facebook. Since Facebook only recently extended its audience beyond college campuses, most of its users are bound by college networks for many years. However, cities are more dynamic than college campuses. An alternative explanation is that rural people need deep interpersonal knowledge before friendship. At an average distance of 88.8 miles, most rural online friends could only come from a handful of surrounding towns: most of the areas around any given rural location are sparsely inhabited. The small distances covered by rural networks represent an area that can be easily covered in person.

We found disconfirming evidence for H5, that rural users prefer strong ties over weak ones in online networks. When we examined the distributions of friendship strength for both rural and urban users, we found nearly parallel curves. In other words, at every level of measurement of friendship strength (e.g., five messages between the pair), the same percentage fit the description in both groups. This finding implies that rural and urban people use SNSs to communicate with roughly the same percentages of strong and weak ties. Yet, given the confirmation of hypotheses 1 through 4, rural people have far fewer connections overall and those connections are closer to home.

Design Implications

Although it is clearly technologically possible to do so, rural users do not use social networks to find many friends far from home. They do just the opposite. Our findings indicate that rural social networks span other nearby rural areas, creating limited access to social capital.

In interviews, Larson found that rural people would like access to a wider range of people online, but trusting a distant person hinders the process. Similar results have been found in work settings (Bradner & Mark, 2002). Our results support this. If most friendships start offline and move online, rural users ultimately have very few people with whom they can start an online friendship. Perhaps the binary friend-or-not model is to blame. Moving to a system of incremental trust would more easily support trust-building in distant, online relationships. Consider the following analogy: before committing to a serious relationship, couples usually date for a long time. As the relationship grows, each person gradually introduces the other to their friends and provides increasingly detailed and accurate personal information. The binary friend-or-not model found in almost all SNSs is something like never meeting versus going steady: either you know almost nothing about the other person, or you each know everything. We feel that our work

argues for incremental trust from a novel perspective. Moreover, moving to a more sophisticated and subtle incremental trust model may allow more online friendships to actually originate online.

Moving to an incremental trust model benefits more than just rural people. Many have documented this shortcoming in social media, as the current model does not support varying degrees of friendship (Gilbert & Karahalios, 2009). Implementing this feature will benefit not only rural users building social capital, but every person who does not want to disclose everything with every social media friend. We would argue that this covers just about everyone.

Limitations

This study looks only at one SNS, MySpace, over a short time span. While the findings here most pertain to MySpace and similar SNSs, we feel that the behavioral findings for rural users represent a general contribution to the study and design of social media.

Our quantitative approach did not allow us to fully explain the behavior of SNS users. While theory and prior work often offer compelling possibilities, interviews would complete the picture.

Future Work

Researchers may find that a rural perspective has traction with other modern technologies. For example, we question why so much research has focused on securing wireless networks, while so little has focused on neighbors sharing wireless connections easily, safely and efficiently. We hypothesize that social norms in rural and urban settings play a substantial role. Of course, many technological systems are probably unintentionally optimized for urban life because most technology design occurs in cities.

Our foremost design implication is to extend the binary friend model. We have recently taken up this thread by focusing on tie strength in social media (Gilbert & Karahalios, 2009). We see this as a profitable, practical and technically feasible way to implement the suggestions we propose here. Although the technique we present in this work applies more generally, we think designers could find in rural populations a very good use case.

Conclusion

Rural and urban people use social media very differently: four of our five hypotheses were confirmed. Rural people articulate far fewer friends, and those friends are located much closer to home. Women occupy a much greater segment of the rural user base than the urban user base. Rural users, particularly rural women, also set their profiles to private at higher rates than urban users. However, both rural and urban users seem to communicate with roughly the

same proportions of strong and weak ties. Our work further emphasizes how a priori social patterns manifest themselves in social media even when the technology could be used to change the patterns.

Designers of social media may be able to apply our findings toward building richer experiences for rural users. Rural people would like to reach beyond their geographic isolation using social media, but have trouble establishing trust with distant people. Building systems that enable incremental trust may overcome this problem and provide rural users with access to a greater diversity of people online.

In the 1970s, human-computer interaction pioneer Douglas Engelbart produced a slideshow to describe his NLS (oNLine System)—the first computer system to use a mouse, along with many other innovations. To explain this ARPANET-connected collaboration system, Engelbart's team made a slide that juxtaposed two cartoons, each containing two people. In the first, the people are seated at computer monitors while in the second these same users are shown flying on airplanes to see each other in person. The message was that travel and computing were substitutes, and that computing could collapse distance. The idea that computer networks were distributed communication tools and not just distributed computation tools was then novel enough that Engelbart apparently had to explain it to his audiences in great detail.

Thirty years later as we write this article, communication (between humans) now drives most time spent with computing applications. Computers are widely recognized as communication tools, and rurality should have a special relevance for designers as they work on systems are often explicitly designed to address problems related to distance.

Yet designing applications to take rurality into account is more complex than it first appears. Rurality (a.k.a. rural “isolation”) is often thought of as a disease that communication can cure. In this view rural users must want more communication. The word “rural” is often used in an unnecessarily pejorative way. Leo Marx (1964) has also cautioned us that “rural” is also sometimes unnecessarily admiring. American culture privileges decentralization and often views an ideal geography to be a pastoral idyll. In this view rural users must want less communication—perhaps their goal is a more contemplative life.

Defining the category “rural” by population density includes artificial islands created in Florida to house a mansion for the the ultra-rich. It also includes Indian Reservations near the Mexican border where the roads are not paved, there are no stores, and there is no electrical power or telephone service. Accounting for rural Internet users must then include people who seek out a particular lifestyle by choice. These people may have an individual disposition

that leads them to communicate less and have friends who are closer to home. Rurality is not a disease that they want cured. Accounting for rural Internet users must also include people who are trapped by poverty or circumstance in places that afford them structurally limited opportunities to communicate and few chances for travel or meeting new people.

These competing examples of rurality are particularly relevant today. As large-scale efforts such as the Tennessee Valley Authority and the Rural Electrification Service transformed rural life in the 20th century, policymakers are now contemplating a similar agenda for rural broadband Internet service. To combat large-scale migration of young people away from small towns in the U.S., one policy vision calls for Internet technology to provide a means of communication that would make rural places functionally equivalent to urban ones and promote decentralized economic production to sustain them. Computing tools like social networking systems are one way this vision might be achieved—the present take on “the machine in the garden.”

Of course, social networking systems are unlikely to serve or create either a MySpace Arcadia (the Greek province now synonymous with rural utopia) or a MySpace Cahulawassee (the fictional location in Georgia where the movie *Deliverance* is set). But any careful consideration of the design implications for rural users will show that the design choices depend crucially on the system designer’s attitudes toward these spaces. To design for rurality means considering differences between people in new ways, but also what our ideals for these spaces and lifestyles might be, and how technology might transform them.

Acknowledgments

We would like to thank Nancy Baym, Scott Golder, Jonathan Grudin, Kiley Larson, Marc Smith and the Social Spaces group at UIUC for their comments on early versions of this work. This material is based on work supported by the National Science Foundation under Grant No. IIS-0546409.

Citations

Adamic, L. A., & Glance, N. (2005). *The Political Blogosphere and the 2004 U.S. Election: Divided They Blog*. Paper presented at LinkKDD, Chicago, IL.

Atwood, R. A. (1984). *Telephony and Its Cultural Meanings in Southeastern Iowa*: University of Iowa Press.

Baym, N. K. (2006). *Interpersonal Life Online*. In L. A. L. S. Livingstone (Ed.), *The Handbook of New Media*. London: Sage.

- Bell, P., Reddy, P., & Rainie, L. (2004). Rural Areas and the Internet. Pew Internet and American Life Project.
http://www.pewinternet.org/PPF/r/112/report_display.asp
- boyd, d. m. (2004). Friendster and publicly articulated social networking. Paper presented in CHI '04 extended abstracts on Human factors in computing systems.
- Bradner, E., & Mark, G. (2002). Why distance matters: effects on cooperation, persuasion and deception. Paper presented at the 2002 ACM conference on Computer supported cooperative work.
- Carey, J. (1989). *Communication as Culture: Essays on Media and Society*. New York: Routledge
- Castells, M. (2001). *The Internet Galaxy: Reflections on the Internet, Business, and Society*. New York: Oxford University Press.
- Donath, J., & boyd, d. m. (2004). Public displays of connection. *BT Technology Journal*, 22(4), 71.
- Donath, J.S. (1998). Identity and Deception in the Virtual Community. In Kollock, P. and Smith, M. eds. *Communities in Cyberspace*. London: Routledge.
- Ellison, N., Heino, R., & Gibbs, J. (2006). Managing impressions online: Self-presentation processes in the online dating environment. *Journal of Computer Mediated Communication*, 11(2).
- Ellison, N. B., Steinfield, C., & Lampe, C. (2007). The benefits of Facebook "friends:" Social capital and college students' use of online social network sites. *Journal of Computer-Mediated Communication*, 12(4).
- Falk, I., & Kilpatrick, S. (2000). What is Social Capital? A Study of Interaction in a Rural Community. *Sociologia Ruralis*, 40(1), 87-110.
- Falk, I., & Kilpatrick, S. (2000). What is Social Capital? A Study of Interaction in a Rural Community. *Sociologia Ruralis*, 40(1), 87-110.
- Fischer, C. S. (1994). *America Calling: A Social History of the Telephone to 1940*: University of California Press.
- Gilbert, E. and Karahalios, K. (2009). Predicting Tie Strength With Social Media. Paper presented at the SIGCHI conference on Human factors in computing systems.
- Golder, S., Wilkinson, D., & Huberman, B. A. (2007). Rhythms of Social Interaction: Messaging within a Massive Online Network. Paper presented at the Conference on Communities and Technologies (CT2007), East Lansing, MI.
- Granovetter, M. (1973). The Strength of Weak Ties. *American Journal of Sociology*, 78(6), 1360-1380.
- Hamilton, L. (2006). *Rural Voting in the 2004 Election*: Carsey Institute: University of New Hampshire.

- Hancock, J. T., Toma, C., & Ellison, N. (2007). The truth about lying in online dating profiles. Paper presented at the SIGCHI conference on Human factors in computing systems.
- Hart, G. (2007). Rural-Urban Commuting Area Codes (version 2.0) (Publication from Rural Health Research Center, University of Washington).
- Hitwise. (2007). MySpace Receives 79.7 Percent of Social Networking Visits.
<http://www.hitwise.com/press-center/hitwiseHS2004/socialnets.php>
- Horrigan, J. (October 2001). Online Communities: Networks that nurture long-distance relationships and local ties. Pew Internet and American Life Project.
http://www.pewinternet.org/report_display.asp?r=47
- Horrigan, J., & Murray, K. (2006). Rural Broadband Internet use. Pew Internet and American Life Project.
- Horrigan, J. (2008). Home Broadband 2008. Pew Internet and American Life Project.
<http://www.pewinternet.org/Reports/2008/Home-Broadband-2008.aspx>
- Isserman, A. M. (2001). Competitive Advantages of Rural America in the Next Century. *International Regional Science Review*, 24(1), 38-58.
- Jacobs, J. (1961). *The Life and Death of Great American Cities*. New York: Random House.
- Kline, R. R. (2000). *Consumers in the Country: Technology and Social Change in Rural America*. The Johns Hopkins University Press.
- Laherrere, J. and Sornette, D. (1989). Stretched Exponential Distributions in Nature and Economy: 'Fat Tails' with Characteristic Scales. *European Physics Journals*, B2, 525-539.
- LaRose, R., Gregg, J. L., Strover, S., Straubhaar, J., and Carpenter, S. Closing the rural broadband gap: Promoting adoption of the Internet in rural America. *Telecommunications Policy* 31(6/7).
- Lampe, C. A. C., Ellison, N., & Steinfield, C. (2007). A familiar face(book): profile elements as signals in an online social network. Paper presented at the SIGCHI conference on Human factors in computing systems.
- Larson, K. A. (2007). *The Social Construction of the Internet: A Rural Perspective* Unpublished Masters, University of Kansas, Lawrence, Kansas.
- Lenhart, A., & Madden, M. (2007). Teens, Privacy & Online Social Networks: How teens manage their online identities and personal information in the age of MySpace. Pew Internet and American Life Project.

- Lenhart, A., & Madden, M. (2007). *Social Networking Websites and Teens: An Overview*. Pew Internet and American Life Project.
- Marx, L. (1964). *The Machine in the Garden: Technology and the Pastoral Ideal in America*. New York: Oxford University Press.
- Norris, P. (2002). The Bridging and Bonding Role of Online Communities. *The Harvard International Journal of Press/Politics*, 7(3), 3-13.
- Parker, E. B., Hudson, H. E., Dillman, D. A., & Roscoe, A. D. (1989). *Rural America in the Information Age: Telecommunications Policy for Rural Development*. Lanham, MD: University Press of America.
- Portes, A. (1998). Social Capital: Its Origins and Applications in Modern Sociology. *Annual Review of Sociology*, 24(1), 1-24.
- Resnick, P. (2001). Beyond Bowling Together: Sociotechnical Capital. In J. Carroll (Ed.), *HCI in the New Millennium*. Boston, MA: Addison-Wesley.
- Rogers, E. M. (1995). *Diffusion of Innovations*: Free Press.
- Toffler, A. (1981). *The Third Wave*. New York: William Morrow.
- Umble, D. Z. (1991). *The coming of the telephone to plain country: A study of Amish and Mennonite resistance in Lancaster County, Pennsylvania at the turn of the century*. University of Pennsylvania.
- University of Maine (2007). *Maine Rural Partners*. <http://www.mainerural.org>. Retrieved Jun 3, 2009.
- U.S. Census Bureau (1995). *Urban and Rural Definitions*.
- U.S. Census Bureau (2000). *Summary File 1 (SF 1) and Summary File 3 (SF 3)*.
- Wellman, B., Haase, A. Q., Witte, J., & Hampton, K. (2001). Does the Internet increase, decrease, or supplement social capital? Social networks, participation, and community commitment. *American Behavioral Scientist*, 45(3), 436.
- Wellman, B., Quan-Haase, A., Boase, J., Chen, W., Hampton, K., Isla, I. D. d., et al. (2003). The Social Affordances of the Internet for Networked Individualism. *Journal of Computer Mediated Communication*, 8(3).
- Wellman, B., Salaff, J., Dimitrova, D., Garton, L., Gulia, M., & Haythornthwaite, C. (1996). Computer networks as social networks: Collaborative work, telework, and virtual community. *Annual Review of Sociology*, 22, 213-238.

The World Factbook. (2008). Retrieved May 29, 2009, from U.S. Central Intelligence Agency:

<https://www.cia.gov/library/publications/the-world-factbook>

Whittaker, S., Terveen, L., Hill, W., & Cherny, L. (1998). The dynamics of mass interaction. Paper presented at the 1998 ACM conference on Computer supported cooperative work.