

Social Life in an Online Neighborhood: Conversational Networks of Nation Of Neighbors

Second Year Paper
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A handwritten signature in blue ink that reads "Christina Prell". The signature is written in a cursive, flowing style.

Acknowledgment

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ABSTRACT

We explore online community life by analyzing one residential social networking site dedicated to reporting and discussing crime and crime related issues, called Nation of Neighbors (NoN). We use survey methods and content analysis of all the posted messages to understand NoN—what is being said (topic), why it is said (purpose), and how it is said (tone). We examine the characteristics of the initial posts that succeeded in eliciting many replies (high reciprocity), and discuss what can be done to increase participation in NoN. This ego network analysis of the conversations enables distinguishing larger networks and examining characteristics of those communication patterns. Finally, we discuss ways online communities might increase offline interactions in local communities.

Introduction

Facebook, Twitter, Myspace, Orkut, Webo, Renren.com are popular online social networking forms that have grown in membership and importance over the past few years. Facebook, which initially was oriented toward college students, has 141 million unique US visitors a month (QuantCast 2011a¹), and Twitter ranks fifth in overall web traffic, with 99.4 million unique US visitors each month (QuantCast 2011b²). Social networking sites are the latest online communication tool that allows users to create and view their own as well as other users' online social networks (Boyd & Ellison, 2007), and interact with people in their networks. A desire for easy communication attracts people to such sites (Ibid). These sites provide convenient ways of interacting people you know, as well as creating opportunities to meet and befriend strangers.

¹ QuantCast (2011a) "Profile for Facebook.com," Quantcast, <http://www.quantcast.com/facebook.com>, (accessed on Sep 9, 2011)

² QuantCast (2011b) "Profile for Facebook.com," Quantcast, <http://www.quantcast.com/twitter.com>, (accessed on Sep 9, 2011)

While social networking sites (SNS) are growing, questions remain about why people participate in online communities, what people do in these communities, and what kind of information they share.

Our study focuses on analyzing online interactions in a Internet-supported community organized around residential areas. Residential Internet-supported community networks occupy a small portion of the social network universe. Despite their relative lack of prominence, these communities can provide insight into unexplored social network dynamics. We used conversations on a residential web service dedicated to crime reporting, called Nation of Neighbors (NoN) to discover what people in NoN talk about, why they participate in conversations, and how they interact with one another. Also, we examine factors such as the topics, purpose, and/or tone of messages to understand the kinds of messages that prompt the further interaction. Previous research on residential Internet communities such as Netville (Hampton 2003) and Blacksburg Electronic Village (Kavanaugh and Patterson 2001) focused on the relationship between offline social relations and online interactions; we focus more on online interactions. We believe that studying online interactions can subsequently help to understand offline interaction and ultimately benefit the viability of the offline community.

Social network studies provide some guidance for studying online communities. Communication and information researchers have focused on reciprocated online communication. Using content analysis, researchers have identified what people talk about the most, why they initiate talking and in what circumstances people are more likely to reciprocate (Arguello 2006; Joyce and Kraut 2006). Similarly we used content analysis to analyze all the NoN messages: what is being said (topic), why it is said (purpose), and how it is said (tone) were identified. Fur-

ther, we examine the characteristics of the initial posts that succeeded in eliciting many replies (high reciprocity). Finally, we discuss what can be done to increase the reciprocity in NoN to benefit people in local communities.

In the following section, we explore the relevant works on online communities and people's interaction within. To provide the context of the study we describe the contents of NoN messages and visualize the relationships defined by the conversations. Based on this we examine the characteristics of the messages that elicited many replies. Finally, we discuss about what can be done to increase the reciprocity of NoN and suggest future research.

Online Behavior in Social Networks

Reciprocity

Reciprocity is inherent exchanges of services (Parsons 1951). If someone does something for us, we will do something for him or her (Gouldner 1960). Norms of reciprocity evoke obligations toward others on the basis of their past behavior. Particularly, in community and communication studies, the norms of reciprocity are essential in fostering community and social participation. When a community responds, participants benefit from the activity of others by receiving information and support (Arguello et al. 2006). In our study, we pay attention to the content of communication from which reciprocating interactions are more likely to occur.

Communication: Unilateral or Reciprocal?

In online communities, participation means generating messages, responding to messages, organizing discussion, and offering other online posts of interest to member. Previous community and communication studies found that online interactions tend to be unilateral rather than reciprocal. In a longitudinal study of 6,172 messages from 8 Usenet newsgroups, 27% of posts re-

ceived no response (Arguello 2006). In addition, most online conversations are smaller, focused with a relatively circumscribed topic, and with a small number of participants (Arguello 2006).

Characteristics of Initial Post

Characteristics of the initial post may influence whether it receives a reply (or number of replies) and the quality of the replies (Joyce and Kraut 2006). Particularly, topical relevance (Arguello 2006), its emotional tone, and whether it is a question or statement of initial messages may influence whether anyone replies and will likely influence the nature of the replies (Joyce and Kraut 2006). Ostensibly, online communities have a limited set of topics that are related to its goal or purpose and messages that relate to these topics are perceived as being consistent with the community mission. Messages that are off topic may be perceived negatively because they fail to appeal to members' interest as well as being distracting. So, topically relevant posts are more likely to generate replies than off-topic posts and people are more likely to respond to questions or explicit requests by offering information and advice (Sacks, Schegloff, & Jefferson, 1974). The emotional tone of initial posts may also influence the nature of the replies (Joyce and Kraut 2006). Repliers may mimic the tone, form, or style of the initial post (Hatfield, Cacioppo, & Rapson, 1993), such as carrying positive tone to positive posts.

Background

Nation of Neighbors

Nation of Neighbors [<http://www.nationofneighbors.com/>] is a web-based residential community tool that helps neighbors share local crime information, suspicious activity and other community concerns in real time using a messaging system. NoN was created by Art Hanson in 2005 in response to the robbery of his home. He discovered that his house was one of many

break-ins in his community by talking to neighbors. By collaborating with his neighbors the thief was eventually caught. Mr. Hanson focused on crime prevention and started the online communication tool in an effort to help other communities achieve the same success. Within a year NoN had over a hundred active communities and through May 2010, NoN has over 485 communities and 1,795 members.

Members voluntarily participate in NoN using the website to discuss community crime, share news, photos or documents, and manage upcoming events within the geographic boundaries of their neighborhoods. People, for example, report their personal experience and observations of crime-related activities. NoN has recruited local citizens interested in enhancing community safety by working together with law enforcement to fight and deter crime and build strong communities. While “community policing” during the 1980s were conducted by forming civilian patrols and posted signs indicating their new watchfulness with investment in guns, dogs, and locks for crime defense (Skogan 1988; Putnam 2000: 107), NoN is based on collaborative in-person relationship with neighbors.

About Nation of Neighbors members

To learn more about user motivation in we asked registered NoN users to complete a short online survey about how people use the community. Surveys invitations were distributed by Mr. Hanson using messages on the NoN website, the NoN Facebook page, a mass email to all users (with follow-up emails). Responses were collected from December 11th 2010 to February 23rd 2011. The email was sent to 1,804 email addresses eliciting 157 responses (8.7% response rate).

Table 1. Demographics

Characteristics	Nation of Neighbors	U.S. Population
Age (mean)	49.5	37.2
Sex (female, %)	57.8%	50.8%
Race (non-Hispanic white, %)	89.8%	63.7%
Education (Bachelor degree or greater, %)	62.6%	27.9%
Household Income (median)	\$90,000-\$109,999	\$51,914

The mean age of NoN users was 49.5 years; 57.8% of users were female; 56.8% of users were employed full-time, and 26.3% were retired. Racially homogeneous, nearly 90% of members are white. Nation of Neighbors' users were similar to other middle-class North Americans with higher than average incomes and education. NoN users have a median income falling between \$90,000 and \$109,999 while the U.S. median was \$49,777 in 2009 (U.S. Census Bureau 2009). Approximately 89% of NoN users lived in detached single-family houses tend to live in suburban or rural areas. Approximately 62.6% of users held a 4-year college degree or greater, and all users report having a high school diploma (or equivalent) compared to only 27.9% college graduates and 87% for high school graduates of the general adult population (U.S. Census Bureau 2009). About 61% of the survey participants reported that they fully understood the Internet-related terms³ given in the survey. In sum, users of Nation of Neighbors are “the haves” in many aspects.

NoN members participate primarily for instrumental reasons. About 55 percent of respondents indicate their primary use NoN is to share information about crimes; 53 percent to be aware of crime; 50 percent to form a community, and 36 percent to contribute to justice and safety of

³ 59 out 150 skip questions.

the neighborhood.⁴ . People mostly use NoN for instrumental reasons, to acquire and share information rather than communal or moral motivation.

Table 2. Motivation to participate in Nation of Neighbors

Motivation	Percent
To share information about crime	55
To be aware of crime	53
To form a community	50
To contribute to justice & safety of the neighborhood	36

Approximately 97 percent respondents were interested in obtaining information about crime, rather than community events (156) and other kinds of postings (4%). This is consistent with the original motivation of NoN to prevent and/or catch crimes by distributing alerts of crimes and suspicious activities among neighbors.

Table 3. Use of Nation of Neighbors

Use of Nation of Neighbors	Percent
To find and share information about crime	97
To find and share information about community events	16
To find and share other information	4

Respondents' perceptions of the crime rate in their neighborhoods were generally low; about 28 percent report the crime rate was very low, and 43 percent low. Less than 5 percent believe that the crime rate in their neighborhood is high.

⁴ Multiple responses were allowed.

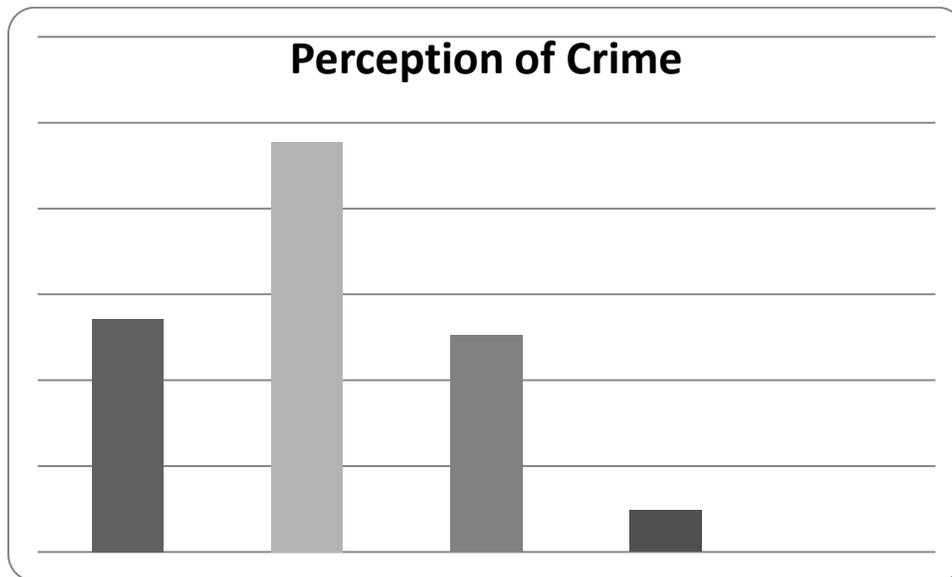


Figure 1. Survey Respondents' Perception of Crime

Importantly, respondents reported they generally found the information they received from NoN very useful (62.2 percent) or somewhat useful (33.3 percent). Just 4.4 percent felt that the information they received was not at all useful. NoN appears to be meeting most members' informational needs.

Hypotheses

Based on this background information about NoN we can predict the communication behaviors of NoN participants. Arguello found approximately 30% of messages in news groups had no response, thus we expect to see

H1) Communication patterns in NoN will be mostly unilateral, receiving no reply.

Similar to the Usenet newsgroups in which people interested in certain topics had a limited set of topics that are related to its goal, NoN will be focused with a relatively circumscribed subject matter. Thus, our second hypothesis is:

H2) Given the goal of enhancing community safety through crime prevention, conversations in NoN will be focused on crime and community related issues.

As certain types of messages are more likely to evoke obligations to respond (Sacks, Schegloff, & Jefferson 1978; Joyce and Kraut 2006), we expect to see:

H3) Initial posts about crime will likely elicit replies more so than off-topic posts.

H4) Initial posts that ask questions and or requests will likely elicit replies than those of simple statements.

In extension of Joyce and Kraut's findings that the emotional tone will influence the nature of the replies, we expect:

H5) Initial posts with an emotional tone will likely elicit more replies than those with a neutral tone.

Data and Methods

Data

There are five types of user activities in NoN; crime reports, posting on discussion forum, reply to the notes, inviting neighbors to NoN, and accepting the invitation. The present paper focuses on the conversations, crime reports, and replies since they are fundamental activities of online community (Schuler 1996). Reports, and post and replies are separated on the website representing two different types of content; reports are linked to a specific location, require moderation, have no associated user, and trigger 'alerts.' On the other hand, posts are just like a post on any forum. The forum is divided into several topics. Users can choose to follow specific topics and receive an email when a new discussion is added to a topic that they are following. They can

also follow individual conversations, and if one contributes to a discussion, s/he automatically follows the discussion. In sum, in discussion forum users post new discussions in one or more topics and choose a topic or discussion to follow and can comment on ongoing discussions. Another difference between posts and reports is that posts can only ever be in one community group, but reports can be included in several groups if they geographically overlap.

However, the difference seems to cause some confusion with users. For instance, meeting announcements were often sent as reports and crime reports via posts. Even the NoN founder, Hanson admits it may make sense to combine the two functionalities. Thus, we merged these two in the data set, although reports, and post and replies are separated on the website.

Methods

Content Analysis

Conversation is the fundamental activity in a community network. People communicate by offering their opinions, reading those of others, and providing information in their postings (Schuler 1996; 43). Analyzing conversations is therefore important in understanding Nation of Neighbors. As a systematic, objective, quantitative analysis of message characteristics (Neurendorf 2002), content analysis has been used widely ranging from the analysis of naturally occurring language to the study of newspaper.

We perform quantitative content analysis of all community posts during the period 2005 to 2010 (1,932 posts and replies), treating each post and its replies as one conversational ego network. Quantitative content analysis reduces large amounts of text into numerical data that can be analyzed statistically (Holsti, 1969; Krippendorff, 1980). In the Netville study Hampton (2003) attempted to analyze email messages exchanged among the residents, identifying the topics and

purposes of those messages. But he did not provide the quantitative results of his observation, nor the additional reliability of a second observer/coder. Neuendorf notes that “reliability is paramount, given that a goal of content analysis is to identify and record relatively objective characteristics of messages” (2002: 141).

Two researchers conducted content analysis with the same data in our study. Notes and conversation messages were first coded by a main coder, and the other coder evaluated the validity of the codes that the first researcher made. After revised, the newly confirmed codes were used for classifying messages. We quantified the results of content analysis, and a second observer examined a 10% random sample of conversations. The results of these two coders was used to calculate Krippendorff’s inter-coder alpha reliability which was 0.70.⁵

We employ computer-aided text analysis, using a contents analysis program, ATLAS/ti (Archive for Technology, the Life world, and Everyday Language) because of the large amount of text. Using the text interpretation program we built and refined our codes based on impressions that we gained as we explored the conversations (Popping 1988:214).

Content Analysis Coding

We coded conversations by *topic*, *purpose*, and *tone*. Each online community has a limited set of topics that are related to its goal or purpose, and these conversational topics help establish and maintain the unique identity of the community (Arguello et al. 2006). Also, the emotional

⁵ Inter-coder reliability is the term for the extent to which independent coders evaluate a characteristic of a message or artifact and reach the same conclusion. Krippendorff’s alpha (α) is a reliability coefficient developed to measure the agreement between observers, coders, judges, raters, or measuring instruments. It is widely applicable wherever two or more methods of processing data are applied to the same set of objects, units of analysis, or items and the question is how much they agree (2007).

tones of messages are an indicator of the general communicative behavior of the community (Joyce and Kraut 2006). We coded each posting and reply in the following way:

- 1) Topic of posting: crime-related, community-related, NoN, other
- 2) Purpose of posting: instrumental (informative, asking, educational), expressive (expressive, social), other (testing, commercial, don't know)
- 3) Tone toward subject: positive, neutral, negative
- 4) Tone toward audience: positive, neutral, negative

Topic of Posts

Posts in NoN are basically about crime and community related issues. People talk about and discuss both crimes and community issues mostly because they want to prevent crimes. Sometimes it is hard to distinguish which is crime-related or which is community-related because a crime occurrence in a community is concerned both. For example, the following note is concerning about crime prevention for Halloween:

*...October is Crime Prevention Month and also the month in which Halloween is celebrated. Learn how to celebrate both together ... following a few safety tips can ensure safe fun for kids and candy-givers alike.... Keep your house well lighted, both inside and out...**Report any suspicious or criminal activity to your police or sheriff's department**... Older kids should trick-or-treat in groups... Younger kids should be accompanied by a parent or trusted neighbor.*

We delineate crime-related posts as those reporting suspicious activities and crimes such as felony or the offence of conspiracy to defraud, or misdemeanor. The above post ensuring crime or suspicious activity report is categorized as crime-related post. The following example is clearer:

“Two men were walking through BRA today, asking to rake leaves. The older man had a full grey beard, baseball cap and longer hair in a ponytail. Also a younger man, probably late teens. Anyone know more about these guys?”

On the other hand, community-related posts contain activities or comments concerning about such as preparing for emergencies, financial, property issues, and/or community events such as block party/meetings. For instance:

“Please try to attend the Civic Association meeting at 1:00pm on Saturday at the Firehall.”

“In this day and age of “Post 9-11” and the recent Katrina Relief Failures by FEMA ... I'd like to see some discussion about How Prepared is ___ County?”

Some posts neither about crimes nor community. In those “other” conversations, people ask personal requests or questions—e.g. *“These dogs were trying to get into our fence today. Anyone know who they belong to?”* Also, when the content was too short or unclear to figure out the topic, we put those notes in this category.

NoN notes can only be posted within the online forum. The following note is a typical posting:

“I have been able to locate a Guest Writer, a member of the career LE community, who is willing to advance our efforts to thwart crime by sharing his knowledge and experience on a wide variety of topics related to safety and security.”

Purpose of posts

People initiate and participate in conversations for various reasons. They can be for exchanging information, advice, resource; expressing feelings, interpersonal friendliness; or opinion and discussing issues. We categorized all posts in NoN into:

- 1) informing,
- 2) asking
- 3) educational
- 4) discussing
- 5) expressive
- 6) social, and
- 7) testing/others

Understanding why people participate in conversation, which is a more active form of participation than reading, will indicate the member's actual use of NoN.

Informing posts include notes to disseminate, update, correct information; For example, they begin with *"I'd like to give you a quick update on the Civic Association."*

Some posts are written to ask question or request information like: *"Anyone on the asphalt roads notice any snow / ice on the road?"*

Some are to give other people knowledgeable advice, or persuade to make change in behavior or attitude, for instance: *"Please abstain from ANY burning activity until the continuing drought is mitigated by very significant rainfall"*

A few posts are to discuss issues, opine, or suggest ideas, in which the posters often encourage other people to participate in discussing the subject matter: *"Anyone have ideas on what to do about stop sign runners. What can we do as citizens to make our community safe from these."*

Expressive posts are to thank and/or simply express feelings; for instance, *"Thanks for the notification,"* and *"It's scary out there and I think most of these break-ins are low-lives looking to sell stuff for drug money."*

Posts to invite and socialize with people, as seen the following note look like: *“Many of you mentioned you'd be interested in having a 4th of July block party this year. Could you post a reply letting us know if you will come or not? Thanks.”*

Others include posts to test: *“This is just a test,”* and to advertise own business, products, and service, for instance: *“Best prices and quality work: Fencing,”* Too short or unclear contents to figure out the purpose are included in this category.

Tone of Posts: Subject

In exchanging information, resources, and conversations, people either convey positive, neutral, or negative emotions. This is defined as tone, and first we focus on the writers' attitude toward the subject.

Positive notes tend to emphasize what is good or laudable. This kind of notes looks like: *“Thanks to a generous donation from the SSP, we now have a new and improved location entering tool.”* Neutral notes have no distinctive emotional quality, characteristics, or type. Most common notes in this category look like the following: *“My two pets got out of their fence last night around 4pm. One Black lab Sheppard cross and a husky. Pictures and contact via the link. Thanks.”*

Negative notes display opposition or resistance toward the subject. For instance: *“We all know that ATVs are causing a public nuisance in our communities - especially on the mountain.”*

Tone of Posts: Audience

Similarly, we divide the tone toward audience into positive, neutral, and negative.

Positive notes are characterized by affirmative qualities, such as enthusiasm, interest, or optimism and friendliness. For example, *“Awesome! Thanks very much,”* and *“That's fantastic! Thanks for all the hard work you put in to help us get to this point.”*

Neutral posts toward audience are of no distinctive quality, characteristics, or type of attitude. For example: *“You can go online to the Martinsburg Journal for an article as well as NBC 25 TV station for a short video.”*

Negative notes are characterized by disapproval, revulsion, and/or harangue the audience. For instance: *“Good for you, then go do it at a location where it is legal before you end up with a fine and a record.”*

Regression Analysis

Using the content analysis, we examine the conversational factors that explain the high level of reciprocity in NoN. Specifically, we examine which topics, purposes, and/or tones were associated with high number of replies of the initial posts. This required some recoding of the data. While reading the messages we found some replies are actually responding to the post above or below of them. This required fixing the relations according to the date in which the post/reply were written and the context of the conversation.

Our dependent variable, level of reciprocity, is measured as the number of replies to each post. Explanatory variables are characteristics of messages, topic, purpose, and tone, derived from the content analysis results. All explanatory values are categorical, and each value of a code is mutually exclusive.

Messages were coded to have only one topic among the following options: crime-related (CRIME), community-related (COMMUNITY), NoN-related (NON), others (OTHERS), and don't know (DK).

Messages were also coded to have one purpose, among the following options: to inform (INFORM), ask (ASK), express (EXPRESS), discuss (DISCUSS), educate (EDUCATE), socialize (SOCIAL), and test or other (TEST/DK).

Finally, messages were coded to have one tone toward their posted subject: positive (POSITIVE), neutral (NEUTRAL), and negative (NEGATIVE); and one tone toward audience: positive (POSITIVE), neutral (NEUTRAL), and negative (NEGATIVE)

Statistical Analysis

All analyses were performed using STATA (Version.11, Statacorp., 2009). First, we examine the association between the number of replies and the independent variables in the categories topic, purpose, and tone. Next, we examine the effects of the topic, purpose, and tone of the post to the mean number of replies.

All of the explanatory variables are coded as dummy or indicator variable. Thus our model is:

$$\hat{Y} = \hat{\beta}_0 + \sum_{i=1}^4 (\hat{\beta}_i TP_i) + \sum_{i=5}^{10} (\hat{\beta}_i P_i) + \sum_{i=11}^{14} (\hat{\beta}_i TN_i)$$

where TP_i indicates topic, P_i purpose, and TN_i tone.

We will focus on the messages whose mean number of replies is above average. Messages in NoN are generally expected to be unilateral, if a message received more replies than the others, then we interpreted that message as being somehow different in the sense that something about the message elicited replies. Because our interest is in knowing the characteristics of the messages that increase reciprocity in NoN, we will examine those messages that elicit a large number of replies. Among the initial messages that succeeded in eliciting more than one reply, those eliciting above average numbers of replies should be considered having “many” replies.

Network Visualization

We describe networks of relations between posts and replies. Network visualization will help us to understand how people communicate in NoN with the goal of seeing what type of conversations prospers the most in NoN and what the reciprocating communications look like. Typically, analysts approach social networks in two ways (Laumann, Marsden & Prensky, 1983; Wellman & Wortley, 1990; Wellman 1982). One approach considers the relations reported by a focal individual. In ego-centered (or “personal”) networks members of the network are defined by their specific relations with ego. The second approach analyzes the structure of social networks as a whole (including the structure of each ego-centered network). We treat the initial post beginning a conversation as ego and replies to the ego as alters then map out the most active conversations. Because we are more interested in defining the characteristics of the egos that succeeded in eliciting many replies, ego-centered network analysis is used in this paper. To give an idea of what these networks look like, the following figure shows three conversations, each one beginning with the ego post. These postings resulted in seven, four, and three replies:

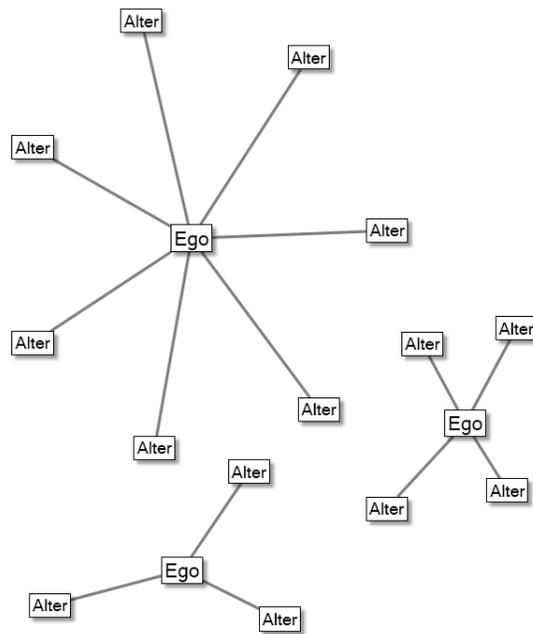


Figure 2. Example of Ego Networks Derived from NoN Conversations

Results

Results of Content Analysis

The following graphic shows the mean number of posts and replies by content domain based on the 1,932 messages.

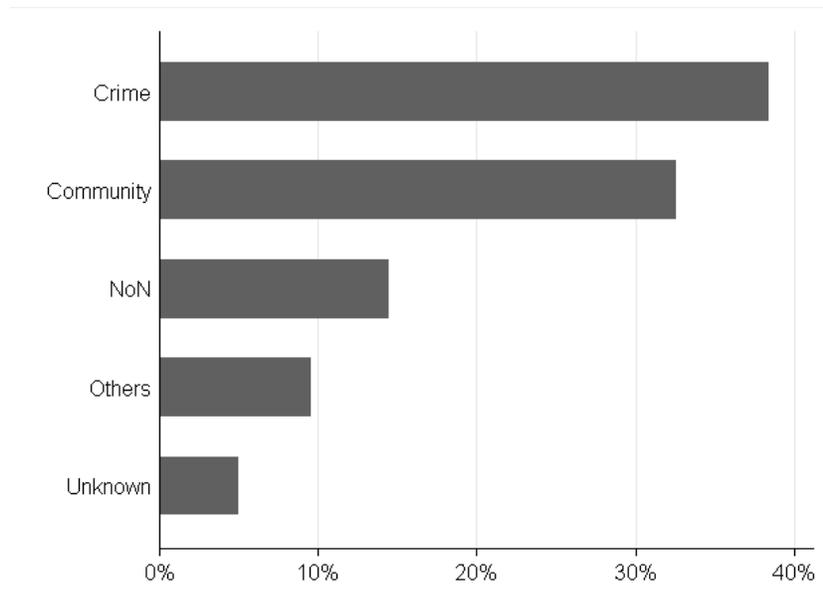


Figure 3. Content Analysis by topic

NoN members are mostly sharing crime-related information consistent with the NoN founder's initial purpose to provide neighboring people with reporting and communicating tool for watching their own community. However, there is little difference from the number of community related notes such as informing community events/meetings. In sum, NoN is not only used for reporting crimes or discussing crime-related issues but also for updating community events.

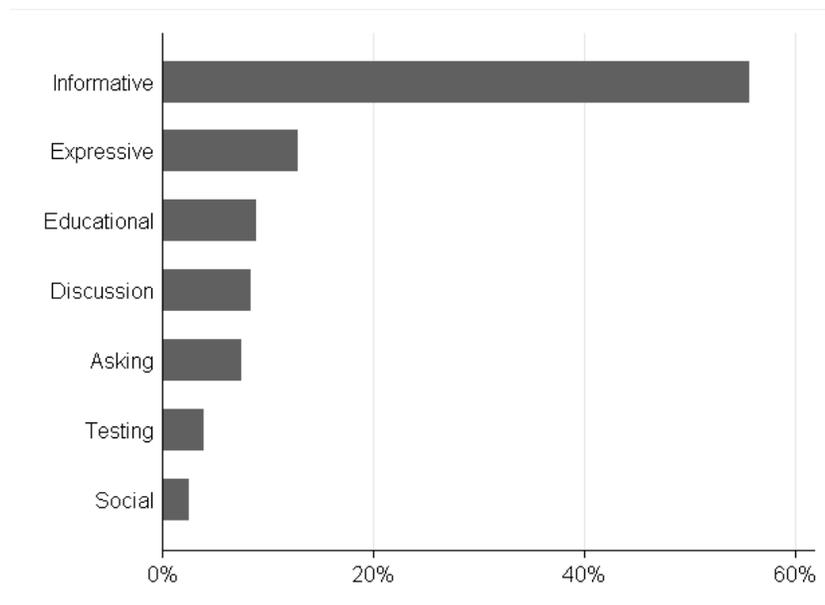


Figure 4. Content Analysis by purpose

The purpose data reveals that members primarily used NoN for information sharing. This was followed distantly by postings thanking others or simply expressing feelings. About ten percent of posts were to educate others, or to discuss a topic, respectively. Discussions prevalent as we expected, given the data source includes the discussion forum.

NoN members' general speaking tones toward both subject and audience are predominantly neutral. About 77 percent of messages do not contain distinctive emotional qualities. Positive messages are ranked second, but are proportionately fewer, comprising less than 20 percent of the messages. Showing opposition or resistance about the topic is rare (less than 10 percent of the messages). Similarly, about 79 percent of messages talk toward other members in a neutral way. We consider this is probably because most conversations are factual exchanges. Some extent of friendliness is still found (21%), and hostility to other members is very rare. NoN people generally communicate with civility.

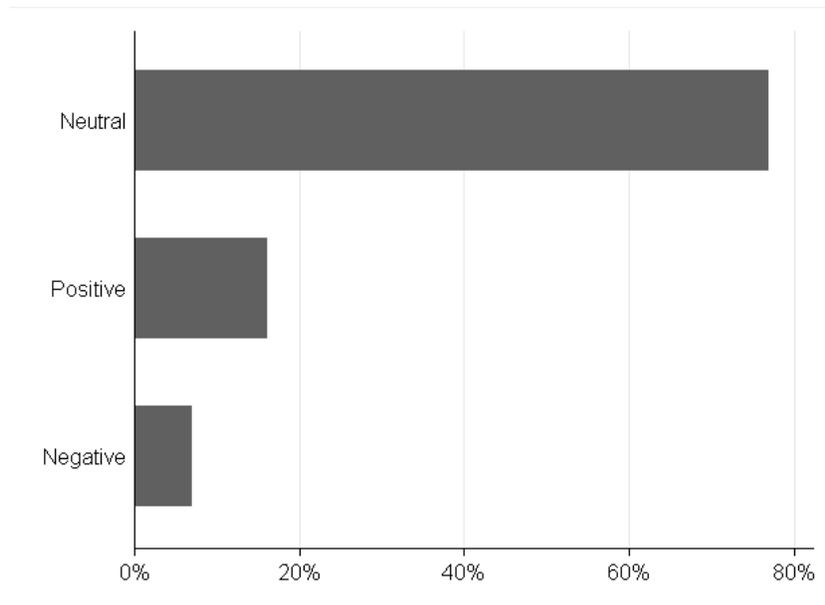


Figure 5. Content Analysis by tone toward subject

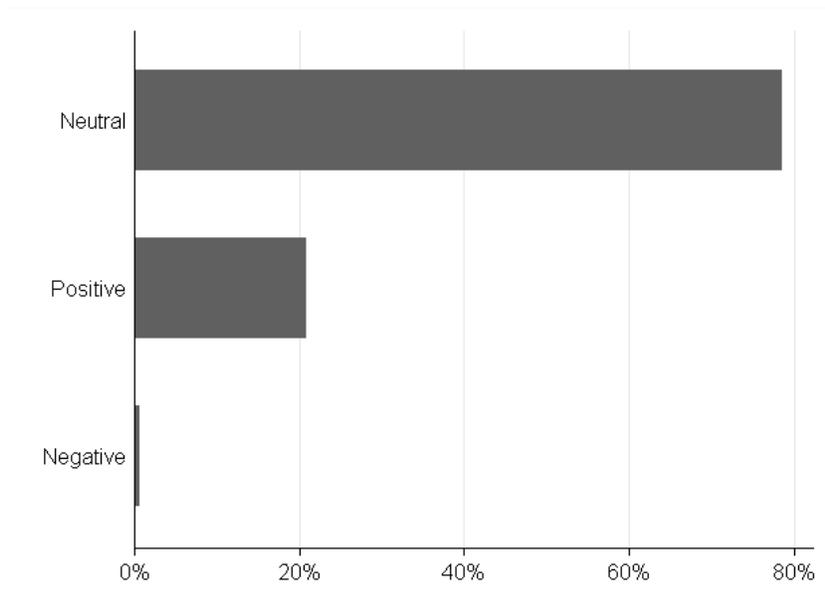


Figure 6. Content Analysis by tone toward audience

In sum, people in NoN talk about crime and community related issues to inform others and mostly they use neutral tone—factual exchanges focused on crimes are the mode of communication in NoN.

Results of Regression Analysis

Of total 1,932 messages, 1,235 messages are initial posts that generated 697 replies. Of 1,235 initial posts, 299 elicited one or more replies, forming conversation networks. The number of replies ranges from one to fourteen with a mean number of replies of 0.55, indicating that as expected, NoN communications are generally unilateral (rather than reciprocal). The mean number of replies to the 299 conversations that receive one or more replies is 2.33 showing a relatively vibrant, but smaller, set of conversations.

The association between the number of reply and the topic, purpose, and tone measures of the initial posts are all statistically significant ($R^2=0.1409$, $p<0.001$). Particularly, the purpose of post is the most greatest at predicting reciprocity ($R^2=0.1218$, $p<0.001$); the topic of posts is significantly associated with number of replies but it only explains 1.49% of variation in the number of replies ($p<0.001$). Finally, 0.74% of variation was associated with tone toward the subject ($p<0.01$), and 0.44% by the tone toward audience ($p<0.05$).

Tables 4 through 7 shows the mean number of reply for topics, purposes, and tones based on the regression model. We compare the mean for each characteristic of initial messages with the mean number of replies for 1,235 initial messages (0.55) and the mean of the 299 initial messages that elicit one or more replies (2.33). We focus on those with above average number of replies.

Table4. Expected Mean of Number of Replies for Topics

Number of Replies	Mean	P>z
Crime	0.48	0.000
Community	0.52	0.000
NoN	1.07	0.000
Other	0.41	0.000
Don't Know	0.32	0.089

None of topic areas explain the likelihood of eliciting over 2.33 numbers of replies indicating that topic does not play a particularly important role in eliciting many replies. Only NoN related messages has an average number of replies great than 0.55. The mean of NoN related messages is even higher than crime related messages different from our hypothesis that crime-related posts would elicit many replies because of the great interest in sharing information about crimes. Careful reading of messages indicates us that most NoN related posts are written by community managers and owners, and the same people responded to one another. We were able to identify the community managers and/or owners because they use their names and positions in their messages. These people are highly committed to NoN and voluntarily managing the communities. Thus, their commitment to enhancement of NoN service results in the high reciprocity of NoN-related conversations.

Table 5. Expected Mean of Number of Replies for Purposes

Number of Replies	Mean	P>z
Inform	0.45	0.000
Ask	1.24	0.000
Educational	0.16	0.177
Social	0.83	0.000
Express	0.20	0.098
Discuss	2.91	0.000
Test/Other	0.58	0.008

Messages discussing issues have the highest mean, exceeding 2.33 numbers of replies. This implies that discussion posts play a significant role in many replies, thus increasing reciprocity in NoN. Discussing messages usually raise questions in an open-ended format, encouraging others to participate in the conversation. The second highest mean of ASK messages is higher than the grand mean of 0.55 but less than 2.33. Asking messages are more explicitly seeking information and are less likely to be simple statements. But answering a question is less likely to extend conversations once the information needs are satisfied—questions are typically and answered without much discussion, indicating the efficacy of this communication medium. However, there are cases where questions are ignored. This could happen for a large number of reasons. Some questions may be ill-formed and difficult to answer; others may have been answered numerous times before and long-time community members are tired of repeating themselves; of course, maybe no one has an answer or are too busy to reply.

Table 6. Expected Mean of Number of Replies for Tones toward Subject

Number of Replies	Mean	P>z
Positive	0.56	0.000
Neutral	0.53	0.000
Negative	0.76	0.000

Unlike neutral messages, emotional messages have higher mean number of replies than 0.55, but, none of positive or negative messages' exceeds 2.33. This indicates that emotionality is comparatively more effective in eliciting replies than neutrality. However, only emotional messages are not sufficient to lead to conversations.

Table 7. Expected Mean of Number of Replies for Tones toward Audience

Number of Replies	Mean	P>z
Positive	0.73	0.000
Neutral	0.52	0.000

Note: Shaded boxed indicates the expected mean is higher than the mean value of number of replies 0.55.

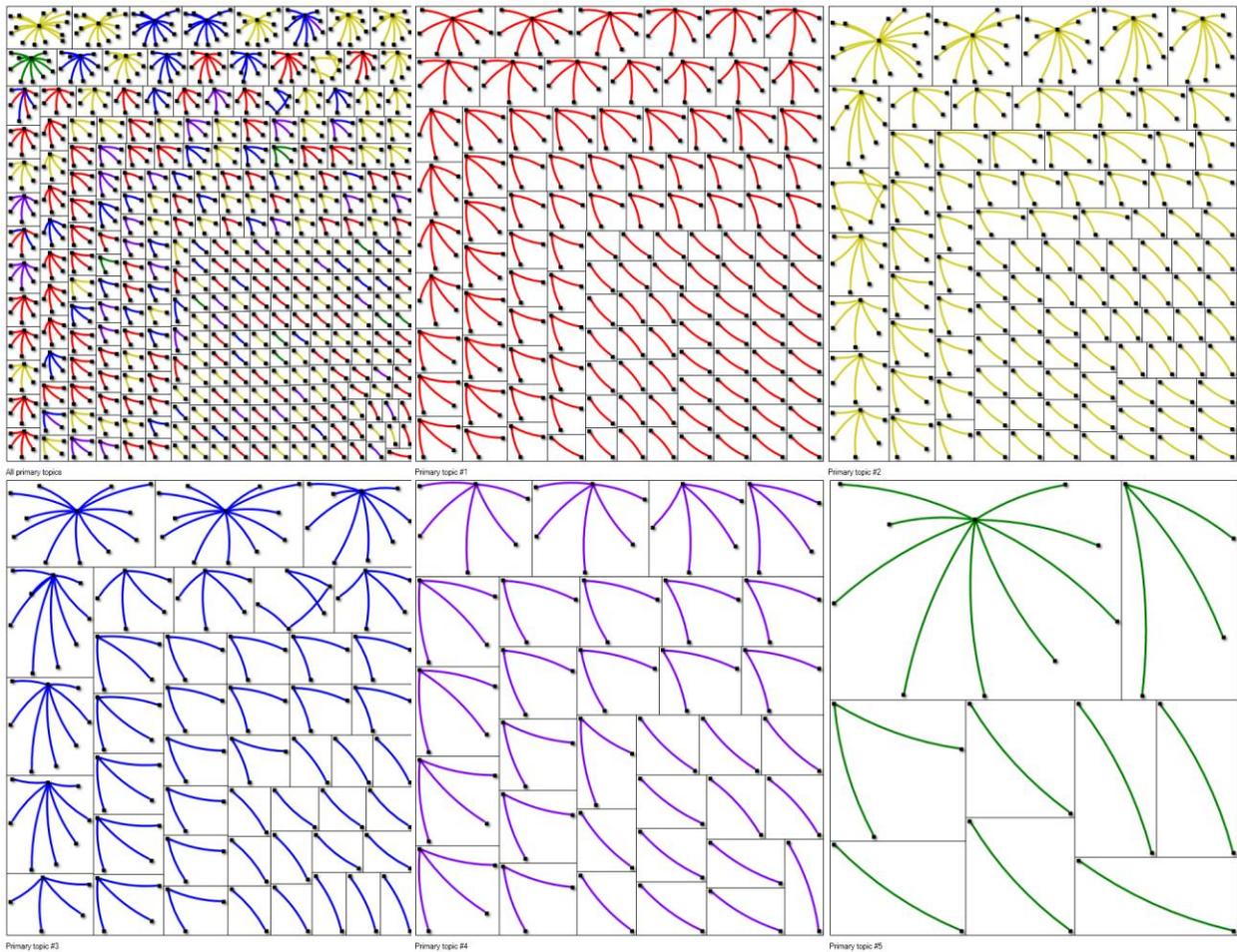
Likewise, positive messages toward the audience average 0.73 number of replies, compared to neutral messages which have less than 0.55 replies ($p < 0.001$). Positive messages on average do not receive over 2.33 replies. None of negative initial messages toward the audience receives a reply.

The results of this analysis suggest that topic, purpose, and tone of a message play roles in explaining the level of reciprocity. Interestingly, it is not the crime-related topic but NoN that had the greatest average reciprocity because highly committed community leaders are the main conversation participants. When writers question, request, and/or initiate discussion, they are likely to receive a reply, and especially when discussing they are responded by many replies. When the tone was emotional conversations grew larger than when the tone was neutral.

Network Visualization

We construct the networks by counting the number of replies to initial posts, regardless whether the same writer returns to his own post, or the same single replier made multiple responses to a post. We focus on the relations of post and reply and to identify certain networks in which responses bring other responses. The purpose of this visualization is not only for reinforcing the above results but also for recognizing any interesting phenomena that might not be captured by the content regression analyses.

Figure 7. Conversational Networks in Nation of Neighbors



The top left box in Figure 7 shows the 299 conversational networks in NoN. The center vertex in each ego network is the initial post and the edges show links to replying vertices. The edges are colored by the topic of the message; red for crime, yellow for community topic, blue for NoN, purple for other, and green for unknown topics, which are generally test messages.

We break down the 299 conversational networks by topic. Table 8 shows the distribution of the number of edges for each topic as well as the minimum, maximum, and mean number of replies for the initial posts of the topic-related conversations. We define the conversations whose numbers of replies are under the mean are smaller networks and whose above the mean are larger networks.

Table 8. Distribution of Number of Replies by Topics

Crime		Value
Min	1	52
Max	7	2
Mean	2	26
Total (replies \geq 1)		111
Community		
Min	1	53
Max	14	1
Mean	2	19
Total (replies \geq 1)		99
NoN		
Min	1	16
Max	11	2
Mean	3	5
Total (replies \geq 1)		48
Others		
Min	1	13
Max	5	2
Mean	2	12
Total (replies \geq 1)		33
Don't Know		
Min	1	6
Max	9	1
Mean	2	1
Total (replies \geq 1)		9

Crime-related messages produce the largest number of networks but the general sizes are smaller than those of community and/or NoN related networks. Community and NoN related messages generally form larger size of conversational networks than crime, others, and unknown topics. Other-topic conversations tend to end short, mostly with one or two replies. Unknown (DK) messages also receive replies, one of which has nine replies. But they are typically chains of testing messages among community managers.

We examine initial messages to see whether there are qualitative differences between larger networks and smaller networks in topical subject such as burglaries, drug dealings, and/or writing style. Then, we investigate whether specific posters elicit more number of replies than others.

Crime-related messages are mostly about the same topics: missing kids, home invasions, home vandals, burglaries, drug problems, ATV/dirt bike problems, car vandals, drivers passing the neighborhood, and reports of suspicious activities are commonly found for both larger and smaller conversational networks. We suspect the communities in which the messages are posted determine the size of network. Particularly, reports of cars being vandalized form larger networks in one community, while it has none or small networks in other communities. We suspect there is a *community effect* that influences the size of interactions. Due to variance in crime rates, history of establishment, and population distribution, each local community has distinctive problems. Thus, depending on the community in which a message is posted, the size of conversations of the same message can vary.

For community-related messages message content is not much different and often the same among the large and small networks. Timing, however, makes a difference. The earlier the same message, the its subsequent network. One of the three largest conversations is about a fire on a mountain. This content is discussed in small networks, too, but that largest one was posted first. Another significant conversation was about a a police officer injured during on duty. The first post had 10 replies including updates by his colleagues and emotional supports by other users. Months later, a similar post about an officer's death on duty had two replies. The same writer writes about the injured and killed officer, and he was shocked to find the indifference, saying:

“I find it hard to believe that myself and one other person from this site have any interest in my idea.”

For NoN-related, other-topics, and unknown messages, the content of messages is nearly the same among the large and small networks. NoN-related messages are exchanges of technical problems of managing the NoN web service. Regardless of size, other-topic messages include messages about animals, pets. Unknown messages are mostly meaningless.

Individual Contributors

Do specific writers influence the number of replies?. It is possible that people post regularly are more likely to receive responses because others feel obliged to return the favor and trust them (Arguello 2006; Gouldner 1960). The average number of posts and replies by any community member who posted at least once is 9. Of the 1,932 NoN messages 43 active members contributed at least nine posts and replies. We matched those active writers' user ID with the larger networks' ID.

Except for writers of crime-related messages, the egos of larger networks are nearly the same those who thread more than nine posts and replies. Seven out of eight writers of community-related larger conversations, all three writers of NoN-related, five out of six writers of other-topic, and all two writers of topic-unknown larger networks are identical with the active writers who contribute to NoN postings.

For crime-related messages, 29 different writers received three or more replies for their initial messages and 16 of them are identified as active writers. It is not clear if there is a *writer effect* where contribution history and trust influence others to respond. Previously, we suggested

community effects determine the size of conversations. We think writers' contribution history and the characteristics of the communities in which they post all determine the reciprocity of interactions and growth of conversations.

The writer's diversity of knowledge plays a more important role in increasing reciprocity than the writer's amount of contribution. The following series of interactions demonstrate how the introduction of new perspective, knowledge and/or expertise can lead people to join the conversation:

"I have been able to locate a Guest Writer, a member of the career LE community, who is willing to advance our efforts to thwart crime by sharing his knowledge and experience on a wide variety of topics related to safety and security..." (An initial poster)

"...how we can better detect and report on drug dealings that occur on the mountain at such locations as the point, the Gate 3 mailboxes, etc. We know that drug trafficking here is a huge driver of other crimes such as break-ins, thefts, etc...."(An asker)

"Drug dealing...to known customers [i]s tough to catch them with sting operations and break it up...But...numerous reports. If you see a car or a person acting suspiciously, get the car's make, model, color and license plate and a description of the people involved—height, age, sex, skin color, clothing description, age, facial hair, etc. And the date/time is very important too, so don't overlook that..."(The guest writer)

"Thanks (the name of guest writer). You're giving a lot to Our Mountain Community. The input is greatly appreciated."(Another passerby)

As such, the introduction of a guest writer and his diversity of knowledge contributed to increasing participation with repliers asking further questions, answering questions and give kudos to one another. Those people join the conversation because they are interested in the guests' expertise. That is, communications in NoN are instrumental networks driven by information needs. Thus, the enlargement of member pool diversity should motivate the members to participate, increasing reciprocity in NoN.

The network visualization helps to identify the communication patterns across topics. It also helps distinguish larger networks and focus on examining characteristics of those. The timing of message posted, the writer's diversity of knowledge and history of contribution, the community in which the messages are posted are suggested to play more important role in increasing reciprocity than content of the message. Also, the introduction of new knowledge has positive impact to increasing reciprocity.

Discussion

Despite its widespread use and insertion in daily life of online social networks, what people talk about, why people initiate talking, how they talk to one another, and when they will likely to reciprocate online are not well studied. Residential Internet-supported community networks occupy a small portion of social network service but can reveal details about the larger state of online interactions.

We analyzed conversations in NoN using content, statistical, and network analyses. We found about 70% of messages in NoN had no response, confirming our first hypothesis that communication pattern in NoN will be mostly unilateral. We perceived that the low reciprocity was due to the fact that the majority messages were factually based simple statements without significant emotion.

Another perception about small crime reports conversations is that people might not feel safe discussing crimes online. As one NoN member revealed, "*Unwanted members—it is possible some of these non-members are folks looking to see if crimes they committed have been posted.*" In-depth interview of members would help understand this issue better.

Second, we found that crime information posts had the greatest frequency followed by community concerns and events. However, the messages about crime were not overwhelmingly major topics (38.4 percent) compared to community-related topics (32.6 percent) unlike the survey results where nearly 70 percent of the respondents reported their main interest was crime related information. We suspect the low real crime rates in the residential communities account for this relatively small proportion of crime-related posts. The further examination of this question will be discussed in the following section.

Third, we found some unexpected results regarding the relationship between characteristics of initial posts and the number of replies. We expected that crime or community-related posts elicit more replies than any other topics, but posting about NoN operating issues was. Writers of NoN-related posts were mostly community managers and owners who were very committed to Nation of Neighbors, explaining the large size of these conversations.

Fourth, as we expected people are more likely to reply when the first writer initiated discussion or asked a question. Discussing and asking messages increased the size of network, compared to expressing, educating, and informing messages. The results support why crime-related posts had low reciprocity. Most were informing, which is simple statement, so people would find less necessity to respond than they would do to questions and or explicit requests.

Fifth, we found that initial posts with emotional tone had higher mean of number of replies than those with neutral tone did. Although the difference between the means was not significant, our finding proposes that emotionality of message online is related not only to the nature of reply but also the likelihood of receiving more reply.

We did not find a difference in content between larger networks and smaller networks. Rather, the community in which a message is posted makes the biggest contribution to the number of replies even for the same message. The writer's diversity of knowledge rather than his/her amount of contribution plays a more important role in increasing reciprocity. Similarly, people generally respond more to newer information that never appear before.

Based on our findings, we suggest that in addition to helping with the technical management of NoN, leaders instigate substantive discussions to effectively engage people in their community. Posting questions in addition to announcement also helps. Given the users are driven by instrumental needs for information, diversifying information by introducing of guest writers of new perspective, knowledge and/or expertise should increase participation. At the same time, lessening fear and mistrust for online space is needed. Since members' high commitment is critical for thriving communities recruiting diverse members and ensuring security of NoN are utmost important.

Limitations and Directions for Future Research

Due to the relatively small sample size and limited number of NoN participants, our ability to generalize the results is limited. Of the 1,795 members, about fourteen percent of them, 260 people have written at least one post throughout the period we investigated. We found that one single user member posted 475 messages, while nearly a hundred other users stopped posting after one message. The distribution of 1,932 messages is skewed with only 43 members posting above the average. Further, the community where Mr. Hanson, the NoN founder and designer participates accounts for 44.5 percent of all messages. This unequal participation is a limit of the study as well as of NoN if it is to continue to thrive. However, unequal participation is not

unique to NoN but commonly observed in many other online social networks (Arguello et al. 2006). Rather, it may be more productive to understand why most people lurk as well as how a few active members are playing roles in sustaining the networks.

There has been an effort to investigate ‘why lurkers lurk.’ Nonnecke and Preece conducted in-depth interviews of online group members and found that lurking capably satisfies meeting members’ personal and information needs (2001). Although we were not able to conduct an interview of NoN members, our survey results indicated that 55.68 percent, and 62.37 percent of respondents report they found NoN updates and information very helpful, respectively. In addition, 83.6 percent survey respondents report satisfied with NoN. Thus, we might be able to say why people lurk is the members’ personal and information needs are met by just reading posts in NoN. In other words, people might be satisfied enough to get to know about their communities and neighbors as well as to watch their neighborhood through NoN. To confirm our conjecture future research needs to conduct interviews of NoN members to investigate why people in NoN lurk.

Another limitation of this study is related to the data selection processes. In the present paper, we treated the data globally even though conversations in each community are distinct. As a result, the unique traits of each community might not be ably represented. But our findings suggest there might be community effects to increasing reciprocity. Thus, further research may need to distinguish conversations by community, focus on one the specific community conversations and compare the results to see how different communities work differently.

Conclusion

This paper explored the content of conversations and examined the relationship between characteristics of initial message and the size of network formed within Nation of Neighbors. A case study like this does not allow us to generalize the findings, but it is useful to pose further research questions. We suggest that network analysts and communication researchers should adopt multi-dimensional methods to enrich understanding of online interactions.

We believe that our study about online interactions can subsequently help to understand offline interaction. In particular, our findings about the factors that are associated with the high level of reciprocity within online space might associate with those toward offline interactions. Since we did not collect data about offline communications in the local communities, we are not in a position to argue increasing reciprocity within online communities can ultimately increase that of offline community. However, people are using NoN to hear about and follow local crime events and signs of reciprocity were observed, so their increased awareness of collective identity as members of same community should help increase chance of offline interactions. Future research needs to collect data about both the local communities and members that participate in NoN. We hope our findings and research elements from NoN study may be considered in the design of empirical research in this area.

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