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Dominic Thomas
Emory University, dominic_thomas@bus.emory.edu

Elliot Bendoly
Emory University, elliot_bendoly@bus.emory.edu

Monica Capra
Emory University, mcapra@emory.edu

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Dominic Thomas
Goizueta Business School, Emory University
dominic_thomas@bus.emory.edu

Elliot Bendoly
Goizueta Business School, Emory University
elliot_bendoly@bus.emory.edu

Monica Capra
Economics Department, Emory University
mcapra@emory.edu

ABSTRACT

How do social networks motivate people to connect not only to their previously existing friends but also to novel or blind new contacts? We report the results of an experiment to identify the value that participants give to alternative network characteristics when deciding to connect to a social network. We focus on network tie characteristics because they represent information that potentially can be automated and provided without compromising privacy policies. Our experiment employed q-methodology to capture participants' subjective values as they evaluated potential connections described by their tie strength, variety, and quantity, three important tie characteristics. We identify four distinct groups of individuals in terms of value. Our findings suggest social networks should include network characteristics to encourage joining and blind ties. They also suggest that current social network interfaces and research need to be augmented to address network tie characteristics.

Keywords

Social Media, Social Networks, Q-method, Interface design

INTRODUCTION

"it is now widely accepted that both digital and social networks play a crucial role in the structure and conduct of economic activity"(Agarwal et al. 2005)

While we know that social network research has made great strides in the past decade and that digital social networks have become pervasive in online communities, we have yet to sufficiently research many key tenets about how they work, what they mean to their participants, and how to best design systems to encourage and support them online (Agarwal et al. 2008). For participants, social networking systems present several levels of potential involvement. These range from simply joining and lurking or observing activities of others to contributing novel information (Burke et al. 2009) or providing valuable editorial services that invigorate these communities (Majchrzak 2009). The beginning of any social network is the decision to join. While contributing and editing are important research topics, this study focuses on the joining decision, particularly how potential participants in a social network will value making their first tie to an unknown network.

From the emergence of the Internet in public life, scholars have hypothesized that it would enable flatter, more democratic processes by connecting people around their interests across vast distances and without regard to biasing characteristics typically experienced through face-to-face contact (Hiltz et al. 1993). Today social network technologies are providing new opportunities for individuals to meet and connect over the Internet. Common conceptions continue to portray Internet-enabled social connection as an opportunity to meet and interact without typical limitations of face-to-face situations (Trunk 2007), yet there remains uncertainty about whether all groups would find value in these connections and how they would best be motivated to join with individuals they do not already know (Gumpert 2007; Hollyfield 2007; Jackson 2009).

Social networks have inherent, permanent characteristics, such as ties and nodes, which may be represented to individuals making a joining decision (Monge et al. 2000). These characteristics will exist regardless of pre-existing personal contact and may be represented to any individual making a choice to connect to another person. Researchers have examined why people connect to others due to node characteristics, such as the personality, desirability, or other individual characteristics of the potential contact (Monge et al. 2000). Tie characteristics have not been studied in relation to the joining decision and may be important.

We conducted an experiment to explore how tie characteristics relate to a joining decision in Fall 2008. Of particular interest was whether we would find significant differences among the participants (groupings) in how they value the potential to connect to another person and what those differences would be. The experiment involved careful controls to ensure participants could not personally identify potential contacts, and the context was designed to involved a real connection decision, potential recruiters for undergraduate students. The next section provides some background on literature related to the study. The following section details our exploratory experimental method and use of Q-Methodology to answer our research question. The fourth section discusses the implications of our findings, followed by a brief conclusion.

BACKGROUND

Social networks refer to interconnected sets of people in which ties may be explicit or implicit and generally refer to communications channels (Monge et al. 2000; Rice 1994). Social network research has received increasing attention from researchers as advances in information systems in the past few years have led to flourishing use of advanced and integrated social networking technologies. These technologies include complete environments such as Facebook, Linkedin, MySpace, Plaxo, Ning, Habbo, Friendster, hi5, Orkut, Flixster, and many others. They integrate shared repositories of information, multiple communications means, identity management, as well as group permissions controls.

As research in this area has matured, researchers have isolated important levels of interaction in which social network participants may engage. These include contributing novel information (Burke et al. 2009) as well as providing editing services applied to existing information within a network repository (Majchrzak 2009). The decision to join into a social network and make the first tie to another person has also been studied, particularly within literature on the emergence of communications networks (Monge et al. 2000).

At the individual level, two motivations have primarily been found to drive social network joining, utility, an extrinsic motivation, and homophily, an intrinsic motivation. Utility has often been framed in terms of specific task needs that a network may meet, such as knowledge sharing to create new knowledge (Lievrouw et al. 1991) or career networking for obtaining employment (Kadushin et al. 1990). Intrinsically, the decision to tie has largely been understood as motivated by homophily, "love of one's self", social comparison and identification with another individual leading to valuing similar individuals (Monge et al. 2000). Many of these studies focus on similarity dimensions such as race, gender, age, ethnicity, religion, or other personal characteristics. Interestingly, in computerized social networks, it is quite possible that few or none of these personally identifying characteristics of another individual may be known at the time of deciding to connect (Hiltz et al. 1993). Individuals often hide their profiles. They have the option not to disclose any personally identifying information to unknown people attempting to connect to them.

In our casual analysis of several social networks, personally identifying details are often protected by individuals choosing not to share their profiles or by system rules that limit disclosure at the time of network joining decisions. Thus, potential participants in a network will have to make their decision to create a tie based on some other data and criteria. What would those criteria be? Granovetter's Theory of the Strength of Weak Ties provided the basis for homophily explanations of connection emergence in social network analysis (1973). Interestingly, it also provides an abstract explanation we can apply to valuation of social network tie characteristics.

Per this theory, if, as an illustration, we begin with three individuals with only two connections, then we have a scenario in which two individuals are not directly connected (do not have strong ties) and one individual is connected to both of the others (strong ties with each). The two people who are not directly connected are said to have a weak tie through the doubly connected individual. The theory postulates that, even if the two who are not directly connected are unaware of each other initially, the bridging or weak tie through the doubly connected individual will increase the likelihood that they will all be connected eventually.

Studies examining predictions of tie emergence using the Theory of the Strength of Weak Ties have found mixed results (Williams 2004). One consistent finding has been that availability of electronic social media has led to increases in the total number, overall strength, and variety of ties among individuals (DiMaggio et al. 2001; Williams 2004). Could it be that individuals considering a connection make their decision in part due to intrinsic motivations related to value-influencing perceptions of abstract tie strength, number of ties, and variety of ties? The theory of the Strength of Weak Ties suggests this would be so. If one person does have a personal value on these tie dimensions and the information is available in some form, the theory of the Strength of Weak Ties would suggest that they would be more attracted to connect to the other person. In effect, they would be tied together through the information made digitally available that indicates the tie dimension. If this tie does bind two individuals otherwise blind to their personal characteristics, does each dimension equally contribute to creating strong, direct ties? Since values on the tie dimensions could reasonably be expected to vary along interpersonal

dimensions, such as introverts valuing tie strength but not tie quantity (Dougherty et al. 2008), we sought to understand the different groupings of individuals. This led to our research questions:

1) What are the differing groups of potential social network entrants based on value of tie dimensions of nodes?

2) How do the groups compare on their subjective values on tie dimensions at the time of deciding to create a tie?

We designed our study to explore these questions.

METHODS

We designed an experiment to explore our questions. An experiment particularly suited our needs, because we wanted to control all variance in initial information provided to participants facing the initial decision to connect. Giving them only information on abstract dimensions of social network nodes ensured the information would not otherwise be drowned out by personally identifying information about nodes, information known to influence connection decisions due to social comparison and identification.

Because we wanted to understand how people value tie strength, tie quantity, and tie variety relative to each other in deciding to connect, we choose to use q-methodology, a methodology particularly suited to capturing and understanding subjective decision-making values (Thomas et al. 2001). A q-study presents participants with a number of statements, which exemplify the universe of possibilities within a given topic of interest. In our case, our experimental design required eight statements. Each statement had information on of each of the three tie dimensions, which indicated either a high or low level of each. Thus, one statement was high on all three dimensions, one was low on all three, and each of the other combinations was also represented. To set the context of the statements, we had to find a topic of interest to study participants and that would evoke an decision environment that they could reasonably imagine (Brown 1980).

Since we had access to a sample of undergraduate business students at a university in the southeastern United States, we decided to set the decision context as a common context underlying social networking sites, such as Linkedin, that is, the potential to connect to someone who may help students find a job (Swearington 2009). To represent the levels of two of the social network tie dimensions, one author took an average of the numbers of ties among his contacts (for tie quantity), the variety of firms in personal profiles and connections (for tie variety). While we had no indication that these numbers would specifically matter for the relative weighting against each during participant sorting in the q-study, we wanted the q-statements to accurately represent high and low levels based on current social networks. We could not think of a clear numerical indicator of tie strength in profiles on current networks, so this dimension was directly varied in the statements (Table 1).

No.	Statement	Tie Strength	Tie Variety	Tie Quantity
1	This person has 5-20 close direct contacts in 1-5 fields/firms, and the typical individual in this professional's pool of direct contacts has a strong relationship with him/her.	HIGH	LOW	LOW
2	This person has 5-20 close direct contacts in 10-20 fields/firms, and the typical individual in this professional's pool of direct contacts has a strong relationship with him/her.	HIGH	HIGH	LOW
3	This person has 5-20 close direct contacts in 1-5 fields/firms, and the typical individual in this professional's pool of direct contacts has an acquaintance-level relationship with him/her.	LOW	LOW	LOW
4	This person has 50-200 close direct contacts in 10-50 fields/firms, and the typical individual in this professional's pool of direct contacts has an acquaintance-level relationship with him/her.	LOW	HIGH	HIGH
5	This person has 50-200 close direct contacts in 1-5 fields/firms, and the typical individual in this professional's pool of direct contacts has a strong relationship with him/her.	HIGH	LOW	HIGH
6	This person has 5-20 close direct contacts in 10-20 fields/firms, and the typical individual in this professional's pool of direct contacts has an acquaintance-level relationship with him/her.	LOW	HIGH	LOW

7	This person has 50-200 close direct contacts in 1-5 fields/firms, and the typical individual in this professional's pool of direct contacts has an acquaintance-level relationship with him/her.	LOW	LOW	HIGH
8	This person has 50-200 close direct contacts in 10-20 fields/firms, and the typical individual in this professional's pool of direct contacts has a strong relationship with him/her.	HIGH	HIGH	HIGH

Table 1. Q-Statements

Our sample drew from an undergraduate business course. All students performed the q-sorting procedure, designed following the guidelines suggested by Thomas and Watson (2001), on the same day using online software called WebQ that enables participants to conduct the procedure through a Web browser. Thus, students sorted the eight statements according to how much they valued each one (each representing a node of a social network) within the context of potentially connecting to a person who may provide them with access to professional networks and job opportunities. They had to sort the statements into a forced distribution including five piles, which ranged from one statement at -2 to one statement at +2 with two statements each allowed at -1, 0, and 1.

Our analysis followed established procedures for this data, using PQMethod software (Thomas et al. 2001). 118 students completed the sorting procedure, and six sorts had to be removed due to invalid or incomplete data for a composite sample N of 112. The following section presents the results of our study.

ANALYSIS AND DISCUSSION

To analyze the sort data, we performed a principle components factor analysis with a varimax rotation in PQMethod extracting four factors (representing groupings of individuals based on the variance in their sort patterns) from the data. It is possible that we would have found only one group had there been either uniform or random valuation of the different sort statements (Brown 1980). This was not the case. We decided to extract four factors, because three factors achieved eigenvalues above 1 and we wanted to ensure we caught all significant variance (Thomas et al. 2001). Thus, the first three factors are significantly different from each other and represented in the population at high enough levels that they appear non-random. The forth factor is uncertain in this regard. Perhaps we would see its representation increase and become significant in a larger sample.

These four factors had the following characteristics and summary statistics (Table 2).

	Average Statement Score on Each of Four Factors			
Stmt.	1	2	3	4
1	0.06	1.76	-0.86	0.53
2	0.68	0.78	0.99	0.16
3	-1.51	0.20	-1.66	-0.53
4	0.04	-1.62	-0.42	0.37
5	0.75	0.09	0.06	1.43
6	-0.83	-0.16	1.47	-1.43
7	-0.75	-0.66	0.42	0.74
8	1.56	-0.39	0.00	-1.27
	Tie Dimension Scores			
Strength	3.05	2.24	0.19	0.85
Variety	1.45	-1.39	2.04	-2.17
Quantity	1.60	-2.58	0.06	1.27
	Counts			
People	75	8	7	2
% of N	66.96%	7.14%	6.25%	1.79%

Table 2. Factor Characteristics and Summary Statistics

For each factor, we created scores on each tie dimension by valuing the high level of each dimension as a 2 and the low level as a 1 then multiplying the average statement score for each statement by the level of each dimension in the statement and summing the eight products. Thus, the range on each tie dimension score is -4 to +4.

The majority of individuals (67%) compose the first group we found, a group characterized by high interest in tie strength, variety, and quantity (Table 1). This group made a lot of sense to us. If someone is considering linking to another individual within the context of a professional career network, we could understand why they might value all of the tie dimensions as indicators of a strong social network and therefore put a premium on connecting with such individuals. Information about number of links and variety of ties is available within the backend systems of social networking sites. Their invitation messages for the majority of their members may be arriving to individuals within this first group, people who value connecting people with higher numbers and variety of contacts. Many current invitations provide for personal messages, typically not used in the authors' experiences, with no further automated information about tie characteristics (Figure 1). This should be augmented. We discuss this implication of our study in more detail in a section that follows this one.

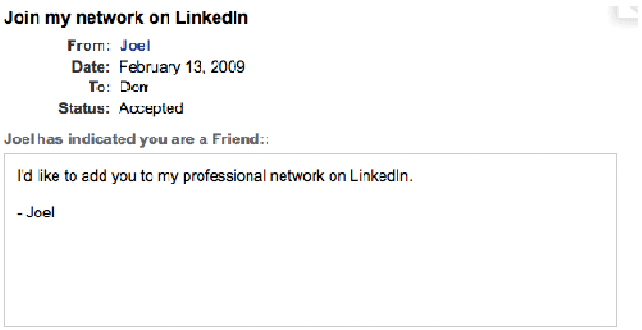

Figure 1. LinkedIn Invite

Our second group displayed a strong dislike for larger numbers of ties (-2.58) and a dislike of larger variety of ties (-1.39), while highly valuing tie strength (2.24). This is an interesting group to consider, given the techniques some social networking sites currently use to encourage people to connect. For the people in this second group, seeing a large number of ties may actually dissuade them from getting involved. Such information could be made available during joining decisions. For example, in a contact list in LinkedIn, one can see the number of contacts each person has prominently displayed to the right of their name and current work affiliation (Figure 2). This information may be working at counter purposes to some individuals getting linked with each other, yet, in a way it is information that this second group values. If LinkedIn were aware of the individuals for whom this information is counter-indicative of linking, they could remove the information and place information about tie strength- we discuss what this might be in subsequent paragraphs- to encourage them to try linking prior to making a summary negative assessment on tie quantity and variety.

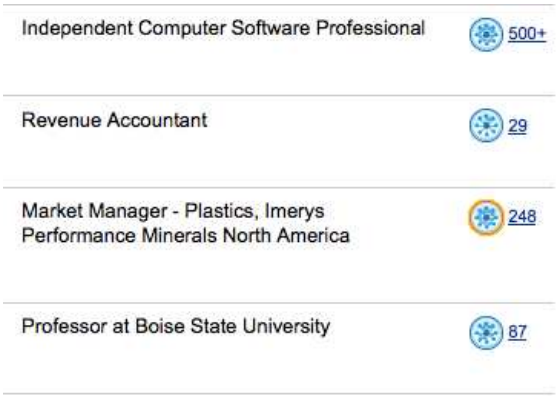

Figure 2. LinkedIn Contact Details

The third group is indifferent to tie strength (0.19) and quantity (0.06) but values variety of connections (2.04), while the fourth, small group (n=2) considers variety of connections a negative factor in deciding to link (-2.17) and favors quantity (1.27) and strength (0.85).

Where is Tie Strength?

All of the groups value tie strength. Interestingly, when we examined the invitation interfaces of popular social network sites including LinkedIn (eg. Figure 1 and 2), Plaxo (eg. Figure 3), Facebook (eg. Figure 4), MySpace, Ning, and Hi5, we found little evidence of any of the tie dimensions represented, particularly tie strength. For the most part, the processes seem to assume that one already knows the person offline and will decide to connect based primarily on the individual's picture (which is often missing), location information (missing in some interfaces), name (always present), and personal message (missing approximately 90% of the time in our non-scientific survey of 30 invitations received).

Some systems allow the prospective connector to view portions of the profile of the individual with whom they may connect (eg. Plaxo's public profile in Figure 5). To the right, hidden for anonymity reasons, in the Plaxo public profile, one may view the employment/affiliations of an individual and get information that may indicate tie variety. Remember that tie strength was operationalized as the difference between having a "strong" versus "acquaintance-level" relationship with existing contacts. We see no indication of this type of information within the current digital interfaces though it appears important based on our study for individuals engaging in a blind tie in which they are not simply converting an existing physical connection into a digital connection. Perhaps this partially explains why it may currently be necessary to have face-to-face interactions to build requisite social capital for later online linkages and interactions (Robert et al. 2008). That is, our digital social network technologies do not yet handle the needs of creating blind ties very well.

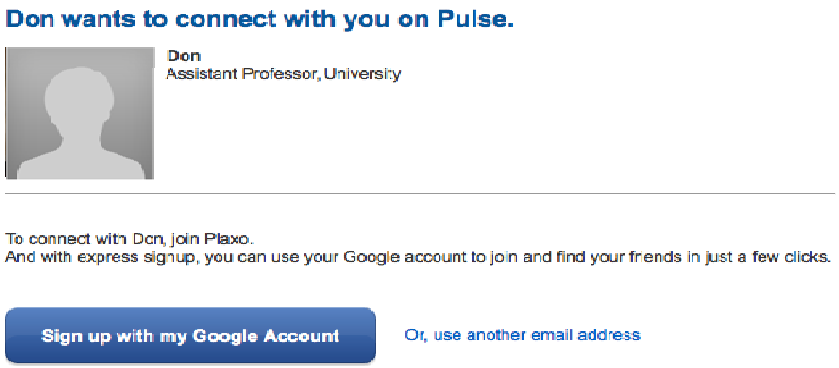

Figure 3. Plaxo Invite

Figure 4. Facebook Add Friend Dialog

Figure 5. Plaxo Public Profile

What would a digital representation of tie strength be? Is tie strength information available in digital social networking systems? We believe the answer to this latter question is yes. We need research to focus on this area. The digital representation of tie strength may include a measure of reciprocity. For example, one could measure the reciprocity between nodes (i.e. the likelihood that a person will respond promptly when someone sends them a message). We know that this aspect of tie expectation does have a paradoxical effect on likelihood of pro-bono contribution within social network group settings (Wasko et al. 2005) and is associated with high performance work systems (Evans et al. 2005). Perhaps it is a type of tie strength indicator one could mathematically derive and represent during connection processes. One might also measure group/connection overlap or concentration (Mutton 2004; Sedaitis 1998). Perhaps this could be indicated as ties formed as a result of invitations through connections in a person's network to develop a metric for the strength (likelihood of causing a connection) of a person's ties. While we are uncertain whether either of these would be an adequate measure, we suggest them to spur thought toward research in this area, because we see that the current designs of digital social networking do not necessarily reflect the capabilities and needs people have in physical social networking. This lack of coherence may be inhibiting further expansion and usage, particularly when it comes to pure digital interaction in which new ties are formed absent any prior physical tie (Robey et al. 2003).

Toward Better Social Network Joining Systems

To get to a state of improved digital tie capacity, there will need to be further research on the joining decision individuals face when confronting an option to connect to a new node (person or group or whatever represents a node in a social network). Our study indicates that information provided by the social network operator at the time of a tie decision should be designed to include information on social network tie dimensions, because these tie dimensions can serve as a digital representation of shared value that enables the Theory of the Strength of Weak Ties to operate and lead to increased joining (first ties between nodes). As such, this additional information during tie decisions would make the digital systems increasingly complimentary to the physical systems and more likely to be useful for common tasks individuals desire to accomplish (Robey et al. 2003). The fact that different social network characteristics impact potential for effective groups/interactions may be innately understood by some individuals in networks. We do know, for example, that social network characteristics of nodes, such as centrality – a measure of how central a person is within a given set of people-, do relate to improved performance among leaders in a work group (Ajay et al. 2006). It is not surprising then that we find tie characteristics also appear to be important.

In that our Q-study identified four groups with differing values on tie characteristic information in deciding to tie, we can say with confidence that these groups exist in larger populations of individuals facing similar decisions in digital social networks (Brown 1980). At the same time, our findings should be interpreted with caution regarding our sample.

Our sample drew from a set of undergraduate students at a private university in the southeastern United States. On personality tests, the students in the sample showed a the complete range in variety but a disproportionately large quantity of extroverts relative to what we might expect in the general population. While we did test whether these personality characteristics or gender related to any one of the groups, none of our tests were statistically significant. The proportions of individuals with the preferences we found may be different in other populations social networks may serve. If so, other populations would probably value tie variety and number less than our sample. It would be even more important for digital social network operators to be able to know the individual needs of their social network participants in order to provide them with the information they value to have when making decisions to connect with others.

Such information may even be built into the digital social network tie recommender engines. Some research on such engines for digital shopping does indicate that we need to learn the key information to represent during the recommendation process to build requisite trust for increased sales (Wang et al. 2007). This finding suggests that key information for tie decisions in digital social network settings also requires study. in order to increase the accuracy and satisfaction with blind tie suggestions generated by social network system recommendation engines. We expect that implications of innovations in social networking joining decisions would eventually trickle into knowledge management in business too, where proactive connection recommendation may be even more valuable and likely to succeed if customized (Liang et al. 2007).

CONCLUSION

Our experiment identified four groups of individuals who differ on how they value information about tie characteristics when deciding to connect to other people. Our data clearly suggest that a more comprehensive description of the ties in social networks may encourage joining. In addition, tie strength seemed to be a characteristic uniformly relevant across the four groups. Interestingly, an inspection of current popular social network sites shows that these sites do not stress the characteristics that we found are valuable to participants. We contribute knowledge of what information about tie characteristics potential entrants value. This is very important as it provides researchers and practitioners information on how online social networks behave and how to design them for success.

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