Who Cares About Your Big Day? 
Impact of Life Events on Dynamics of Social Networks

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ABSTRACT

With online social networking having revolutionized the way in which individuals communicate and interact with each other, there is heightened research interest in the dynamics of social networks. However, there is a gap in this stream of literature in addressing the key question of the impact of major life events, such as getting married or graduating, on network evolution. We seek to answer the fundamental question “Do major life events play a role in altering the structural properties of an individual’s activity network?” Consistent with prior studies on the evolution of individuals’ social networks, we specifically focus on two key attributes of an individual’s network – degree of ties and extent of relational embeddedness. We hypothesized that the dissemination of information on major life events changed network structure by: a) increasing the level of communication activity; b) reinforcing or strengthening of existing relationships. We tested our hypotheses by longitudinally analyzing the network activities of 15,276 users of a social network affiliated with a major US university. We found that the degree of ties or the level of activity that a user engaged in increased significantly following a major life event. Interestingly, we also found that the broadcast of major life events primarily served to revive dormant ties but not the formation of new ties.

Keywords: Life events, dynamics of social networks, online social networking

INTRODUCTION

Recent years have witnessed an increasing popularity and use of social networking sites such as MySpace, Facebook, LinkedIn, Orkut and many more. These sites have attracted millions of users, allowing them to interact, communicate and share content with their friends, family members, and other contacts. For instance, since its launch in 2004, Facebook currently has approximately 900M active users. As these sites have become more ubiquitous and deeply ingrained into our daily lives, they have revolutionized the way in which individuals communicate with one another.

The impact of online social networks is far-reaching and significant. The range of activities available through these sites allows users to engage in multiple types of interactions. These interactions are of utmost importance to users, with users benefitting from their connections and their own roles in their networks (Traud, Mucha, & Porter, 2012). From a business standpoint, the connections that form in these social networks and the interactions that follow have important implications for advertisers too. Advertising in social networks is related to the volume of page views in a network, which is a function of a users’ social activity on that site (Shriver, Nair, & Hofstetter, 2012). Thus, from the perspective of firms such as MySpace and Facebook, the primary objective is to develop a thriving community where users can interact in multiple ways.
Consequently, one of the goals of the extant research on online social networks is to understand the nature and structure of communication among participants. To that extent, questions such as “who is friends with whom” and “who interacts with whom” in the network are becoming increasingly relevant.

These questions related to online social network dynamics have recently received attention from a diverse set of scholars including social scientists, physicists and management researchers. However, most academic research in online social network dynamics has focused on the large-scale network structural properties of these networks, for example, (Kumar, Krishnan, & Krackhardt, 2008; Sahoo, Krishnan, & Callan, 2008; Wilson, Boe, Sala, Puttaswamy, & Zhao, 2009; Traud, Mucha, & Porter, 2012). Only few studies (Narayan & Yang, 2007; Welser, Gleave, Fisher, & Smith, 2007) have attempted to isolate the dynamics of network characteristics at a micro-level or at the level of an individual’s ego network. Moreover, the focus of extant research has been primarily on understanding how friendship links form and evolve in such networks with little attention being paid to the important aspect of user interactions over time.

Users’ online activities have been shown to be associated with at individual-, team-, and organizational-level performances in various contexts such as social networking sites (Shriver, Nair, & Hofstetter, 2012), virtual worlds (Mennecke, Tripllett, Hassall, Conde, & Heer, 2011; Montoya, Massey, & Lockwood, 2011), etc. The level and patterns of user activities reflect interactions with others and hence engagement with the social networking sites. Given the importance of the level of activity on these sites to firms, advertisers and users alike, we believe that activity and not friendship links ought to be the primary unit of analysis. Therefore, our study seeks to disentangle how a user’s interaction patterns vary over time, and what factors contribute to this variation.

In assessing factors that contribute to variations in a user’s interaction patterns, we explicitly recognize that social networking sites afford individuals the opportunity to manage a larger network of relationships and at the same time broadcast major life changes to their broad network. In this study, we specifically seek to tease out whether this enhanced ability to broadcast and rapidly propagate important life events plays a role in altering the structure of an actors’ communication network. In comparison to day-to-day events, we assert that major life events such as weddings, graduations, and birthdays have far reaching consequences and are more likely to shape an actor’s social network (Wrzus, Hänel, Wagner, & Neyer, 2013). Moreover, major life events, such as wedding, graduation, birthday, and so on, create new consumer needs. For example, newlyweds spend an approximate total of $70 billion on household products in their first year of marriage and are heavily sought after by marketers (KRT, 2000; Barnes & Clark, 2006). Despite the importance of major life events, only few studies have focused on their impact in shaping the usage of online social networks. For instance, Choudhury et al. (2013) analyze how level of usage activity on Twitter change for user post childbirth. However, to our knowledge no study has explicitly sought to analyze how an individual’s network characteristics are altered immediately post the occurrence of a major life event.
Our study, thus, contributes to existing research by 1) focusing on an individual’s ego network 2) analyzing the activity network for a user as opposed to the friendship network and 3) analyzing the role of major life events in altering a user’s activity network.

By focusing on an individual’s activity network, this paper specifically seeks to address the following research questions: a) how does the structure of an individual’s activity network in a social networking site evolve over time? b) Are structures stable with respect to the level of communications, whom users communicate with and how communication links are established? c) Do major life events play a role in altering the structural properties of an individual’s activity network? These questions are particularly important because active interactions among members are critical for the sustainability of these social networking sites.

To address these questions, we adopt a social network perspective and examine a unique set of users of the MySpace network. We longitudinally analyze the network activities of 15,276 MySpace users at a major U.S. university. We specifically investigate the patterns of “comments” activity between users. Our goal is to understand how relationships between pairs of individuals evolve over time, based on the frequency and the content of comments exchanged between them. Our longitudinal analysis recognizes that social networks are inherently evolving systems: over time, individuals join and leave the networks, and social relationships are created and discontinued (Banks & Carley, 1996; Burt, 1997; Snijders, 2005; Panzarasa, Opsahl, & Carley, 2009).

To longitudinally analyze the evolution of these networks, we focus primarily on how the extent of activities and whom the users communicate with evolve over time. Prior research on the structure of online social networks have found that the evolution of the structure of a user’s activity network typically stabilizes over time with respect to both the extent of communications and whom they communicate with. However, such studies have not specifically sought to discern circumstances under which we are likely to observe changes in the overall structure of these networks. We, therefore, seek to address this gap and look to identify specific factors such as the occurrence of major life events that may drive changes to the network structure. We argue that the ability to rapidly broadcast major life events changes network structure by: a) increasing the level of communication activity and b) reinforcing or strengthening of existing relationships. We, further, contend and attempt to test the competing argument that while the ability to broadcast major life increases the extent of activity with strong ties it also results in the revival of dormant ties.

The rest of the paper is organized as follows: The following section introduces our theory and hypotheses. Next we present data and variables, followed by estimation methods and results. Finally, we conclude with managerial implications and directions for future research.

**THEORY AND HYPOTHESES**

Network theory has received a great deal of attention from social scientists over the past few decades. Social network analysis focuses on relationships between individuals, groups of people, and organizations (Wasserman & Faust, 1994). It looks beyond the specific attributes of individuals to understand the relationships and exchanges between social actors. In its broadest
conceptualization, a network consists of a set of nodes and relationships that link two nodes together (Barabási, Jeong, Néda, Ravasz, Schubert, & Vicsek, 2002). The nodes are actors which can be individuals, groups of people or organizations depending upon the context of the study. A tie, also known as a link, connects two actors together and multiple ties combine to form the network (Wasserman & Faust, 1994). Ties can be of different types such as friendship ties, alliances, trade ties between countries, etc. An actor with a more diverse set of ties is likely to have access to a greater variety of resources (Granovetter, 1973).

Researchers adopting the social network perspective have sought to understand how ties are formed and how the characteristics of ties affect the actions and performance of the connected actors. The formation and evolution of networks has been a fertile research area in many fields of inquiry to understand how different patterns of preferential attachment shape network evolution (Watts & Strogatz, 1998; Newman, 2001; Barabási, Jeong, Néda, Ravasz, Schubert, & Vicsek, 2002). Such inquiries have focused on the dynamics of link accumulation over time among different actors and the consequent impact on the overall network topology. In a similar vein, studies have also focused on how prior network structures drive formation of new ties. For instance, Gulati (1995) found that new tie formation is heavily embedded in an actor’s previous network and actors are more likely to form ties with prior partners. A related stream of research has in turn focused on the role of “weak ties” on network partner choice. For instance, Burt (1997) found that weak ties serve as bridges, and provide access to new resources and knowledge. Recent research on network change has combined this rationale of tie formation to understand how network change occurs as a function of repeat tie and new tie formation (Owen-Smith, Powell, & White, 2005; Koka, Madhavan, & Prescott, 2006; Rosenkopf & Padula, 2008). In addition to understanding the patterns of tie formation and network evolution, researchers have also focused on how network structure and an actor’s network position drive performance outcomes (Burt, 1992; Podolny & Baron, 1997; Podolny, 2001).

Within the literature on online and virtual communities, researchers have increasingly begun to adopt a network perspective. Network theory has been used to address questions related to how links are formed and sustained in virtual communities (Gu, Huang, Duan, & Whinston, 2009; Lu, Zhao, & Wang, 2010); how prior ties impact formation of new ties (Hahn, Moon, & Zhang, 2008; Kumar, Krishnan, & Krackhardt, 2008); and how network positions and type of ties influence performance outcomes (Grewal, Lilien, & Mallapragada, 2006; Bampo, Ewing, Mather, Stewart, & Wallace, 2008).

More recently, scholars have also begun studying informal social networks such as Facebook, MySpace, LinkedIn and Twitter. These studies have been conducted in the context of marketing, social sciences, information systems design and communication. The overarching theme of these studies has been to examine how ties are formed in these settings and how they help an individual achieve a personal goal. For instance, Kumar, Novak, & Tomkins (2010) investigate the preferential attachment modes of the growth of social networking sites. Other researchers have examined the extent to which friendship links in online social networking sites mirror offline communities (Sahoo & Krishnan, 2008; Sahoo, Krishnan, & Callan, 2008). Researchers have also examined how the activity network, or the pattern of interactions between users, compares with the social network. In particular, Wilson et al. (2009) studied the activity network of samples of the Facebook network and found that, in contrast to the social network, the activity
network is much more sparse and has a significantly lower degree. Similarly, at Facebook, Burke et al. (2011) analyzed the friendship links reported in each user’s profile, asking to what extent each link was actually used for social interaction, beyond simply being reported in the profile.

Our study is in the spirit of such studies – we focus on the temporal evolution of an individual actors’ activity network as opposed to their friendship networks. Moreover, a key distinction of our research is that it recognizes that each individual engages in a set of distinctive activities and has a set of distinctive characteristics that can shape the formation of links in a network (Easley & Kleinberg, 2010). These considerations underscore the need to study the impact of exogenous factors that exist outside of nodes or ties in a network but which nevertheless affect how the network structure evolves. We, thus, evaluate the impact of major life events such as getting married or graduating from college on network evolution. Consistent with prior studies on the evolution of individuals’ social networks, we specifically focus on two key attributes of an individual’s network – degree of ties and extent of relational embeddedness. We use these two attributes to capture the key elements of a user’s activity network and present a theory of how these attributes evolve or change with major life events.

Evolution of Degree of Ties

Degree is regarded as one of the most important and commonly used concepts for exploring actor roles in social networks. A node’s degree centrality is defined as the number of nodes that are connected to that node (Wasserman & Faust, 1994). It refers to the extent to which an actor has links to other members in a social network (Marsden, 1981; Cho, Gay, Davidson, & Ingraffea, 2007). The degree of a tie can have a number of interpretations depending upon the context. It can be interpreted as a measure of social integration (Marsden, 1981); prominence (Knoke & Burt, 1983) and activity (Wasserman & Faust, 1994).

Actors with high degree centrality are assumed to be the most active, prestigious and powerful actors in a network due to the many connections that they have with other actors (Freeman, 1979). A large number of studies have focused on the performance benefits of high degree centrality. Such studies have found that actors with a large number of ties have a number of benefits including access to resources (Ahuja, 2000) and greater power and influence (Ahuja, Galletta, & Carley, 2003). More recently, researchers have become interested in understanding the dynamics of network evolution and have focused on how degree of ties evolve over time (Barabási, Jeong, Néda, Ravasz, Schubert, & Vicsek, 2002; Powell, White, Koput, & Owen-Smith, 2005).

In the context of our study, degree refers to the level of activity engaged in by a participant in a social networking site. Prior research has shown that the degree of ties for an actor in social networking sites remains fairly stable over time (Viswanath, Mislove, Cha, & Gummadi, 2009). Similarly, Panzarasa et al. (2009) in their study of an online community find that the community evolves according to a two-fold regime, whereby an initial phase of rapid network growth is followed by a phase of structural stability. Consistent with these findings, it is possible that the degree of ties or the level of activity for a participant in an online social networking site is likely to stabilize over time. Contrary to this position, we posit that we are likely to observe a spike in activity for a user following a major life event. Our thesis is supported by prior research that has
found that life cycle changes, such as getting married, childbearing, and so on, add a different dimension and result in different types of ties to the network (Stueve & Gerson, 1977). Thus, we argue that major life events are likely to attract greater attention among network partners and hence elicit responses or comments from a larger number of connections. Consequently, we hypothesize that:

**H1:** The average degree of ties for a network participant is likely to increase immediately following a major life event.

### Evolution of Relational Embeddedness – Competing Perspectives

In this section, we describe the construct of relational embeddedness and present two competing perspectives to understand the impact of life events on relational embeddedness. Degree of ties (discussed earlier) measures the extent of activity or the number of links that an actor has, but largely ignores the source of these links. Researchers have increasingly become interested in understanding the patterns of tie formation in a network and how actors choose their network partners. One such dimension of partner choice has been explained by the notion of relational embeddedness. Embeddedness refers to “the fact that exchanges and discussions within a group typically have a history, and that this history results in the routinization and stabilization of linkages among members” (Marsden, 1981). Relational embeddedness highlights the impact of strong/cohesive ties between actors. Cohesive ties amplify trust and create more certainty regarding future partnerships (Podolny, 1993; Gulati, 1995). They also prompt actors to become less willing to engage in partnerships outside of these close relationships (Uzzi, 1996; Uzzi, 1997; Venkatraman & Lee, 2004).

Prior research on partner selection and tie formation in networks has demonstrated that actors who share specific personal attributes, such as education, age, but also geographic proximity and shared values are more likely to have repeated opportunities to interact with each other. They are, therefore, able to maintain their ties over time (McPherson, Smith-Lovin, & Cook, 2001).

Within online communities, prior research on interaction patterns has found that to a large extent users continue to send messages to the same set of acquaintances, thereby reinforcing existing relationships (Guimera, Uzzi, Spiro, & Amaral, 2005; Onnela, Saramäki, Hyvönen, Szabó, De Menezes, Kaski, Barabási, & Kertész, 2007). Indeed, a number of studies comparing actual friendship links to activity links in online communities have found that even users who maintain large, explicit lists of friends often communicate with only a small subset of those friends. For instance, prior research of the Facebook network has shown that users tend to interact mostly with a subset of their friends, often having no interactions with up to 50% of their friends (Wilson, Boe, Sala, Puttaswamy, & Zhao, 2009).

These studies emphasize the fact that social networking sites are used to maintain contact with close ties (Hampton, Lee, & Her, 2011). Therefore, we argue that interactions in social networks are likely to be characterized by high degrees of embeddedness where we define embeddedness as the extent to which a user communicates with only a subset of partners. Communication about major life events such as graduation or wedding provide an opportunity to reinforce connections.
with close ties and are thus likely to increase the extent of relational embeddedness. We, therefore, hypothesize:

**H2a:** The average embeddedness of an actor is likely to increase immediately following a major life event.

Conversely, a competing perspective is that major life events have the propensity to decrease the extent of embeddedness in an actor’s network. Social networking sites allow users to manage a larger network of “weak” ties and at the same time provide a mechanism for the very rapid dissemination of information pertaining to important life events such as engagements, weddings or childbirths. Thus, such events are more likely to revive dormant ties and also elicit responses or communication from a user’s “passive” or “weak” ties, thereby reducing the extent of embeddedness. We, thus, hypothesize that:

**H2b:** The average embeddedness of an actor is likely to decrease immediately following a major life event.

DATA

Users and Their Comment Activities

In this study, we collect data from one of the largest social networking sites – MySpace. Our research sample is a large-scale organizational social network on MySpace. The sample organization is one of the largest research universities in the U.S. with a total enrollment of more than 50,000 students. We gathered data for all members on MySpace who were current students at this university. Among the 27,608 MySpace users affiliated with this university, there were 12,101 private users and 15,507 public users. Since the webpages of the private users were not available, this study analyzes only the public users. After removing 231 public users with invalid user IDs, the number of users in our sample is 15,276 as of March 2008. In order to capture the social interactions among users, we collected user comment activity data when a user commented on another user’s profile. During the time period from September 2003 to March 2008, users in our sample posted 85,269 comments on other users’ profiles. Figure 1 provides the distribution of these user comments over time.

![Distribution of User Comment Activities over Time](image)
Life Events

Users announce their life events through posting blogs on MySpace. In order to determine relevant life events, we randomly selected 1,000 blogs and manually went through them to identify all the life events contained in these blogs. We then chose the most recurring life events – wedding, birthday, and graduation. For these three life events, two judges independently read through each blog with its comments and tagged the blogs as having events or not having events. The two independent codings were then compared and integrated. If the two judges disagreed, then a third judge was consulted and the tagging result with two votes was used. The overall disagreement level was very low – 1.3% of the blogs. The distribution of the resulting three life events over time is presented in Figure 2.

FIGURE 2. Distribution of Life Events over Time

Social Network Characteristics

In this subsection, we formally define the metrics we use to describe the communication activity patterns among users. We define $G = \{V, E\}$ as the activity network, where $V$ denotes the set of all users and $E$ denotes the set of all communication activities among the users. For a specified time window $T = [t_1, t_2]$, where $t_1$ represents the starting date and $t_2$ represents the ending date, we propose two specific metrics – indegree and embeddedness to describe users’ communication patterns.

We use indegree to capture the degree of ties for an individual. Formally, indegree for user $i \in V$ within time window $T = [t_1, t_2]$ is defined as follows:

$$\text{Indegree}(i, T) = \sum_{t=t_1}^{t_2} \sum_{i \neq i} e_{ijt},$$

where $e_{ijt} = 1$ represents user $j$ commented on user $i$’s profile or blog at time $t$; $0$ represents user $j$ did not comment on user $i$’s profile or blog at time $t$. Indegree for user $i$ within time window $T$ is measured by the total number of comments received by user $i$ between dates $t_1$ and $t_2$. 

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Embeddedness for user $i \in V$ within time window $T = [t_1, t_2]$ is defined as follows:

$$\text{Embeddedness}(i, T) = \sum_{j \in E, j \neq i} \left( \sum_{t=t_1}^{t_2} e_{jit} \right)^2 \left( \sum_{t=t_1}^{t_2} \sum_{l \in E \cup \{i\}} e_{lit} \right)^2$$  \hspace{1cm} (2)

Embeddedness measures the degree of concentration for the ego network of a focal user. Embeddedness for user $i$ within time window $T$ is 1 if all comments received by user $i$ within time window $T$ are from the same friend. In contrast, embeddedness for user $i$ within time window $T$ is close to 0 if user $i$ receive many comments within time window $T$ but the comments are all from different friends.

**Variables**

To capture the changes in the two key attributes of an individual’s activity network before and after a life event, we defined two difference variables based on the two structural metrics proposed in Section 3.3. We use $T_{\text{pre}}$ to represent the pre-event time window and $T_{\text{post}}$ to represent post-event time window. Formally, for a given pair of $(T_{\text{pre}}, T_{\text{post}})$, change in indegree is defined as: $\Delta\text{Indegree}(i) = \text{Indegree}(i, T_{\text{post}}) - \text{Indegree}(i, T_{\text{pre}})$; and change in embeddedness is defined as: $\Delta\text{Embeddedness}(i) = \text{Embeddedness}(i, T_{\text{post}}) - \text{Embeddedness}(i, T_{\text{pre}})$.

These two difference variables, $\Delta\text{Indegree}$ and $\Delta\text{Embeddedness}$, will serve as dependent variables in our model. Since our focus in this study is the directionality of change in network attributes, these dependent variables are further coded as discrete values with 0 (no change), 1 (increase), and 2 (decrease).

We define our main independent variable $\text{Life\_Event}$ as a dichotomous variable. After analyzing the blogs for each user, we identified the occurrence of the three major life events described previously. Every time a life event was identified it was coded as 1. For each user with a life event, we randomly selected another user without a life event and computed his/her corresponding indegree and embeddedness measures during the same time windows. For these set of users without a life event, the $\text{Life\_Event}$ variable took on a value of 0. This allowed us to analyze how network structure changed for a user with a life event compared to that of other users without a life event during the same time period.

Users’ individual characteristics may have impacts on their online communication patterns. We control for individual demographic characteristics by introducing age, gender, status, here for friends, and ethnicity as control variables. Table 1 provides a summary of these demographic control variables. In our analysis, gender, status, here for friends, and ethnicity are all coded as dichotomous variables.
TABLE 1. Summary of Demographic Control Variables

<table>
<thead>
<tr>
<th>Control Variables</th>
<th>Values</th>
<th>Count</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>16-19</td>
<td>125</td>
<td>16.0%</td>
</tr>
<tr>
<td></td>
<td>20-25</td>
<td>528</td>
<td>67.7%</td>
</tr>
<tr>
<td></td>
<td>26-29</td>
<td>83</td>
<td>10.6%</td>
</tr>
<tr>
<td></td>
<td>30+</td>
<td>44</td>
<td>5.6%</td>
</tr>
<tr>
<td>Gender</td>
<td>Female</td>
<td>342</td>
<td>56.2%</td>
</tr>
<tr>
<td></td>
<td>Male</td>
<td>438</td>
<td>43.8%</td>
</tr>
<tr>
<td>Status</td>
<td>Divorced</td>
<td>5</td>
<td>0.6%</td>
</tr>
<tr>
<td></td>
<td>Engaged</td>
<td>10</td>
<td>1.3%</td>
</tr>
<tr>
<td></td>
<td>In a relationship</td>
<td>279</td>
<td>35.8%</td>
</tr>
<tr>
<td></td>
<td>Married</td>
<td>50</td>
<td>6.4%</td>
</tr>
<tr>
<td></td>
<td>Single</td>
<td>414</td>
<td>53.1%</td>
</tr>
<tr>
<td></td>
<td>Other</td>
<td>22</td>
<td>2.8%</td>
</tr>
<tr>
<td>Here for friends</td>
<td>Yes</td>
<td>530</td>
<td>67.9%</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>250</td>
<td>32.1%</td>
</tr>
<tr>
<td>Ethnicity</td>
<td>Asian</td>
<td>25</td>
<td>3.2%</td>
</tr>
<tr>
<td></td>
<td>Black African descent</td>
<td>57</td>
<td>7.3%</td>
</tr>
<tr>
<td></td>
<td>Latino Hispanic</td>
<td>79</td>
<td>10.1%</td>
</tr>
<tr>
<td></td>
<td>White Caucasian</td>
<td>355</td>
<td>45.5%</td>
</tr>
<tr>
<td></td>
<td>Other</td>
<td>264</td>
<td>33.8%</td>
</tr>
</tbody>
</table>

Notes: Matching 390 users with life events with 390 matching users without life events gives us a sample size of 780.

Figures 1 and 2 indicate that users’ behavior of announcing life events on social networking sites may be affected by the overall usage of social networking sites or other trends over time. In order to control for potential time trends, we also include Date_Diff as another control variable.

ESTIMATION METHODS

Ordered Logit Regression

The goal of our study is to explain the role major life events played in altering the structure of an individual’s activity network. In our analysis, we individually analyzed the changes in two key attributes of a user’s activity network – the average degree of ties and the average embeddedness – following a major life event. Our focus in this study is to understand the directionality of change in network attributes as opposed to the extent of change in attributes following a life event. As a result, we specifically analyzed whether there is an increase, a decrease, or no change in the network attributes after the broadcast of an important life event by a user. We coded the change in network attributes as follows: no change in network attributes is coded as 0, an increase in the network attribute following a major life event is coded as 1 and a decrease in network attributes following a major life event is coded as 2. Since our dependent variable is now measured on an ordinal scale as opposed to a continuous scale, the model could not be consistently estimated using the OLS regression technique. As a result, we needed to estimate our model using a maximum likelihood regression technique. Since our dependent variable, had...
more than two categories, the appropriate model to use was the Ordered Logit regression (Winship & Mare, 1984; Robson & Bennett, 2000). Our models were estimated using the `ologit` command in Stata 12. We built our model in two stages – Model 1 includes all the control variables and in Model 2 we introduced the main independent variable – the occurrence of a major life event.

**Results**

In this section, we conduct our analyses and report results for each of the two network attributes for the following parameters: $T_{pre} = 60$ days and $T_{post} = 30$ days as the pre-event and post-event time windows respectively. Table 2 includes the results for the impact of life events on changes in degree of ties. Table 3 presents the results of the impact of life events on changes in relational embeddedness.

Hypothesis 1 predicts an increase in the extent of degree of ties for a user immediately following a major life event. As found in Model 2 of Table 2, the coefficient of the life event variable is positive and significant (0.18, $p < 0.05$). This indicates support for our hypothesis that we are likely to observe a spike in activity for a user following a major life event, since these events are likely to attract the attention and elicit responses of a large number of network partners.

<table>
<thead>
<tr>
<th>TABLE 2. Estimation Results for Degree of Ties</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model 1</td>
</tr>
<tr>
<td>--------</td>
</tr>
<tr>
<td>Life Event</td>
</tr>
<tr>
<td>Age</td>
</tr>
<tr>
<td>Female</td>
</tr>
<tr>
<td>Divorced</td>
</tr>
<tr>
<td>Engaged</td>
</tr>
<tr>
<td>In a Relationship</td>
</tr>
<tr>
<td>Married</td>
</tr>
<tr>
<td>Single</td>
</tr>
<tr>
<td>Here for Friends</td>
</tr>
<tr>
<td>Asian</td>
</tr>
<tr>
<td>Black African Descent</td>
</tr>
<tr>
<td>Latino Hispanic</td>
</tr>
<tr>
<td>White Caucasian</td>
</tr>
<tr>
<td>Date Diff</td>
</tr>
<tr>
<td>Log-Likelihood</td>
</tr>
<tr>
<td>Δ(-2LL)</td>
</tr>
</tbody>
</table>

Hypothesis 2 predicts the impact of life events on the change in the average embeddedness of a user’s ties. We proposed two competing hypotheses to explain changes in embeddedness and argued that communication about major life events such as graduation or wedding provide an opportunity to reinforce connections with close ties and are thus likely to increase the extent of relational embeddedness. Conversely, we also posited that such events are more likely to revive dormant ties and also elicit responses or communication from a user’s “passive” or “weak” ties,
thereby reducing the extent of embeddedness. As seen in Model 2 of Table 3, the coefficient of life event is negative and significant (-0.62, p < 0.01) implying that the average embeddedness of a user decreases following a major life event. Therefore, our assertion that online social networks increase the ability to propagate major life events to a user’s network, thereby resulting in revitalizing their latent ties is supported.

**TABLE 3.** Estimation Results for Relational Embeddedness

<table>
<thead>
<tr>
<th></th>
<th>Model 1</th>
<th>Model 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Life Event</td>
<td>-0.62** (0.23)</td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>0.008 (0.012)</td>
<td>0.006 (0.013)</td>
</tr>
<tr>
<td>Female</td>
<td>-0.20 (0.20)</td>
<td>-0.14 (0.20)</td>
</tr>
<tr>
<td>Engaged</td>
<td>0.69 (0.88)</td>
<td>0.84 (0.88)</td>
</tr>
<tr>
<td>In a Relationship</td>
<td>0.33 (0.53)</td>
<td>0.34 (0.53)</td>
</tr>
<tr>
<td>Married</td>
<td>-0.99 (0.81)</td>
<td>-1.00 (0.83)</td>
</tr>
<tr>
<td>Single</td>
<td>0.41 (0.52)</td>
<td>0.44 (0.52)</td>
</tr>
<tr>
<td>Here for Friends</td>
<td>-0.03 (0.22)</td>
<td>-0.0008 (0.22)</td>
</tr>
<tr>
<td>Asian</td>
<td>-0.53 (0.41)</td>
<td>-0.52 (0.41)</td>
</tr>
<tr>
<td>Black African Descent</td>
<td>-0.37 (0.40)</td>
<td>-0.32 (0.40)</td>
</tr>
<tr>
<td>Latino Hispanic</td>
<td>-0.29 (0.34)</td>
<td>-0.23 (0.35)</td>
</tr>
<tr>
<td>White Caucasian</td>
<td>-0.05 (0.23)</td>
<td>0.07 (0.24)</td>
</tr>
<tr>
<td>Date Diff</td>
<td>0.0003 (0.0003)</td>
<td>-0.0002 (0.0003)</td>
</tr>
<tr>
<td>Log-Likelihood</td>
<td>-159.82</td>
<td>-156.16</td>
</tr>
<tr>
<td>Δ(-2LL)</td>
<td></td>
<td>7.30**</td>
</tr>
</tbody>
</table>

***p<0.001, **p<0.01, *p<0.05, †p<0.1

**Validation**

In order to test the robustness of our results, we conducted a series of additional analyses. To test whether our results remained consistent across time, we conducted the analyses using additional pre-event and post-event time windows. Specifically, we reran our analysis using the following additional parameters – \( T_{pre} = 90 \) days and \( T_{post} = 60 \) days; \( T_{pre} = 180 \) days and \( T_{post} = 30 \) days. Our findings across these time windows were consistent with the results discussed above.

To further analyze whether there was a change in network attributes following a life event we also tested the extent of change using the continuous dependent variables and the OLS regression. We performed the OLS regression analysis using Stata 12 for each of the three time windows discussed above. Again our results were consistent with the results obtained from the Ordered Logit regression model.

**CONCLUDING REMARKS**

Our research is one of the first studies, to our knowledge, to examine the impact of major life events on the evolution of the network characteristics of users of online social networks. Understanding the structure and nature of communication patterns of users in social networks is critically important for users, online social networking firms and advertisers alike. To better understand the dynamics of communication and activity in these networks, we focused primarily
on major life events, as we believe that events such as weddings, graduations and birthdays have further reaching consequences and are more likely to shape an actor’s social network than day-to-day events.

We specifically sought to understand whether the occurrence of major life events and their subsequent broadcast by users in an online social networking site altered their communication network. Our study focused on two aspects of the social network structure – degree of ties and extent of relational embeddedness and presented a theory of how these attributes evolve or change with major life events. We argued that the ability to rapidly broadcast major life events altered network structure by: a) increasing the level of communication activity; b) reinforcing or strengthening of existing relationships. We, further, contended and attempted to test the competing argument that while the ability to broadcast major life changes adds a different dimension and are more likely to attract greater attention among network partners and hence elicit more responses than regular day-to-day communications.

Using a unique dataset of all current students at a large research university and monitoring the communication dynamics among all members in the sample social network we found that overall, immediately following the broadcast of major life events there were changes in the communication network of users. We, specifically, found that the degree of ties or the level of activity that a user engaged in increased significantly following a major life event. While prior research on online social networking sites had found that the degree of ties of users typically stabilized over time (Panzarasa, Opsahl, & Carley, 2009; Viswanath, Mislove, Cha, & Gummadi, 2009), these studies did not specifically seek to disentangle how major life events altered networked structure. We, specifically, argued and found support that major life changes added a different dimension and were more likely to attract greater attention among network partners and hence elicit more responses than regular day-to-day communications.

In addition to understanding how the level of activity or the number of ties changed with major life events, we also attempted to discern whether major life events had an impact on whom users communicated with. We acknowledged that life changes could increase the reinforcement of existing ties or embeddedness and simultaneously result in the revival of dormant or passive ties, thereby decreasing the extent of embeddedness with a subset of partners. Our analysis, however, found that the broadcast of major life events primarily served to revive dormant ties and increased the level of activity between users that did not typically communicate on a day-to-day basis.

Our study makes important contributions to extant research. We attempted to isolate the network characteristics at the micro or individual user level to better understand how user networks evolved in online social networking sites. Moreover, as opposed to focusing on friendship ties as the unit of analysis, we developed a more nuanced conceptualization of ties as emerging from individual user interactions. Finally, we explicitly recognized the role of exogenous events in shaping the pattern of interactions in a users’ activity network. Our findings reinforced the importance of focusing on an individual user’s activity or communication network and provided important insights into how life events have an impact on altering important aspects of network structure.
The findings of our study have important managerial implications as well. The connections that form in online social networks and the interactions that follow have important consequences for firms such as MySpace and Facebook that manage these online networks and advertisers that help monetize these sites. Advertising in social networks is a function of users’ social activities on that site (Shriver, Nair, & Hofstetter, 2012). Thus, from the perspective of firms such as MySpace and Facebook, the primary objective is to develop a thriving community where users can interact in multiple ways. Consequently, from a business perspective, it is important to understand the nature and structure of communication among participants. Our findings that major life events play an important role in the evolution of a user’s communication network reinforce the importance of examining the circumstances or factors that result in changes in communication patterns for a user. They further provide important insights to firms as they seek to design their social networking sites to facilitate better and greater interaction among their users. Finally, our findings also assist in the targeting marketing efforts of advertisers in social networking sites.

Our study makes important contributions to extant research on the evolution of online social networks. Our results, however, need to be seen against the backdrop of some limitations that point directions for further refinement and extensions. One, our study focused only on the MySpace network of a subset of users in a university setting that potentially limits the generalizability of our findings. Future research could focus on conducting similar analyses across different types of populations and different types of virtual networks. Two, we focus only one aspect of the user’s activity network – “comment” network. An extension to this could be to study different types of communications or interactions in a user’s social network. Three, we study the evolution of two key characteristics of a user’s network structure. While these results provide important insight into how a user’s network evolves over time, additional analysis could include focusing on other network characteristics and how they evolve. For instance, an interesting extension would be to analyze whether major life events impacted users with different network positions differently. This analysis could also help shed light into the impact of major life events on the extent of triadic closure. A potential extension could be to study whether we were likely to observe an increase in the level of triad closures immediately following a life event based on the rationale that two participants in a social networking site are more likely to locate each other and become friends, when they have a common friend, simply based on the opportunity for the two participants to meet. While our data limitations prevented us from testing this assertion, future research could benefit from discerning the dynamics of triad closure in online social networks.

REFERENCES


Srinivasan et al. Impact of Life Events on Dynamics of Social Networks


