

# “She said yes!” – Liminality and Engagement Announcements on Twitter

Munmun De Choudhury, Georgia Institute of Technology  
Michael Massimi, Microsoft Research, Cambridge, UK

## Abstract

Social media sites enable people to share milestones in their lives, but relatively little is understood about how and why they are used in the context of major life changes. We utilize social media as a lens to explore the behavior of individuals undergoing a major life transition – those who use Twitter to announce that they are engaged to be married. Inspired by the anthropological concept “liminality”, we identify behavior manifested in Twitter that characterize this transitional phase. A large-scale quantitative study of Twitter postings of engaged individuals spanning two years shows that this phase marks notable changes in behavior that can be gleaned from social media. A follow-up survey provides qualitative explanations for the statistical analysis. Our findings reveal how individuals may be utilizing social media in the context of a major milestone in life, and bear implications for social media design and applications.

**Keywords:** Engagement, liminality, Twitter, major life events, social media, emotion, language, transitions

**Citation:** De Choudhury, M., Massimi, M. (2015). "She said yes" -- Liminality and Engagement Announcements on Twitter. In iConference 2015 Proceedings.

**Contact:** munmund@gatech.edu, mmassimi@microsoft.com

## 1 Introduction

Social media websites have been widely adopted and in use for almost a decade, and their popularity suggests they are likely to be present for years to come. These sites have become something of a backdrop that acts as a collector and interlocutor in the unfolding set of events that occur throughout our lives. When a major life event such as a birth, wedding, or death occurs, these important events are often documented and talked about on social media sites alongside the more mundane goings-on of our lives.

Consequently, there has been growing interest to understand the role of these online technologies during major life milestones, such as new motherhood (Dimond, Shehan Poole, & Yardi, 2010; Gibson & Hanson, 2013), the loss of a job (Burke & Kraut, 2013), a residential move (Shklovski, Kraut, & Cummings, 2008), divorce (Yarosh, Abowd, et al., 2009), or the death of a loved one (Brubaker & Hayes, 2011; Massimi & Baecker, 2010). In recent years, however, researchers and designers have begun to note that not all events are alike, prompting efforts to distinguish among them on social media. Facebook’s transition to a timeline and support for including life events as special markers on this timeline (Williams, 2011) is a prominent example. This reflects an underexplored need to represent the distinction between major life events and more everyday content in social media and social networks.

In that spirit, we examine Twitter as a platform for sharing updates about major life events, and in particular, we focus on the major life event of engagement. Engagement is interesting because it is an event that marks the beginning of a transitory period from courtship to marriage, and its occurrence is often evinced in social media through a prominent announcement. This allows us to examine Twitter feeds of users to note changes in the periods before and after the engagement announcement, yielding insight into changes in human behavior and technology use.

Our examination consists of large-scale analysis of Twitter posts of individuals who publicly announce their engagement, and a follow-up web survey. The Twitter analysis allows us to examine behavioral patterns longitudinally across a large number of people over a period spanning nearly two years (900+ individuals who chose to announce their engagement on the platform). The follow-up survey asks those who announced their engagement on Twitter to explain the findings from the analysis, offering lay explanations for why the changes occurred and helping us to interpret our results. It also revealed their motivations behind using this social technology during an important phase of life. We base our research questions on the anthropological concept of liminality – a phase associated with a ritual where participants are in an ambiguous, transitory state shifting from one role in society to another (Turner, 1967; Gennep, 1960). Using Twitter, we are able to

---

<sup>1</sup>This research was performed while the author was employed at Microsoft Research, Redmond.

detect patterns of role transitioning, gender-specific behavior, emotionality, and relationship investment and progression.

Taken together, this paper makes the following contributions: (1) The first empirical study of engagement and its sequelae in social media; (2) A set of identifiable patterns of language use and emotional expression in Twitter that are brought about by engagement; and (3) A rationale for these patterns suggested by individuals who have experienced the life event and announced it on social media. Our findings reveal how individuals, following a major life event, might be adapting their behavior, carefully crafting their self-presentation, and appropriating a social technology like Twitter in ways beyond everyday use.

The implications of this research stand to impact the design of social media systems by illustrating how a major life event effects system use. Studying engagements and weddings is important not only because they are near-universal rites of passage, but also because weddings consume considerable amounts of time, money, and effort (supporting a multi-million dollar industry in the process). Finally, as much as Twitter can be seen as a means for monitoring large-scale societal changes, the findings of this study may contribute to a contemporary portrait of an ancient institution that is being continually reinvented.

## 2 Related Work

Technology Use and Life Events. In recent years there has been a growing interest in the use of technology during, and the design of technology for, major life events. These major life events occur throughout the passage of the entire human lifespan from birth to death, and resonate deeply in the personal sphere (Massimi & Baecker, 2010; Massimi, Odom, Banks, & Kirk, 2011). Prior research has focused on major life events including marriage (Massimi, Harper, & Sellen, 2014), new parenthood (Gibson & Hanson, 2013), divorce (Yarosh et al., 2009), the loss of a loved one (Massimi & Baecker, 2010), transition to college (Smith, Nguyen, Lai, Leshed, & Baumer, 2012), and residential move (Shklovski et al., 2008) among others. Understanding technology use during these events is important for many reasons, but among them is the fact that these are times when routines are broken and re-established (Dimond et al., 2010). Technology has a role to play in helping individuals establish a “new normal” in light of changing circumstances (Massimi, Dimond, & Le Dantec, 2012) and can be profitably used for purposes of social support and information seeking (Gibson & Hanson, 2013).

Well-established social media sites have been among the first technologies explored in relationship to these major life events. Research has examined how bereaved individuals use technologies such as Facebook (Getty et al., 2011) and MySpace (Brubaker & Hayes, 2011). Burke and Kraut (Burke & Kraut, 2013) explored the use of Facebook by those who have recently lost a job. De Choudhury et al. (De Choudhury, Counts, & Horvitz, 2013; De Choudhury, Counts, Horvitz, & Hoff, 2014) have examined Twitter and Facebook as sites for detecting postpartum behavioral changes and depression among new mothers. Our work contributes to this growing literature by examining engagement, a hitherto unexplored life event, and by building on the methods and findings in these studies. In addition to the large-scale analyses often undertaken in studies of life events and social media, we complement this with a user study that explores the actual opinions of individuals who have experienced the life event in question.

Engagement as a Liminal Period. As many major life events are marked with a ritual, the ritual studies literature is relevant to our work. Anthropologist Arnold van Gennep (Gennep, 1960) identifies engagement as one of a set of rites of passage marking the transition from one social state to another. He uses the term liminal (from the Latin word “threshold”) to refer to this transitory process comprised of preliminal, liminal, and postliminal aspects, the purpose of which is to separate the individual from society, make the transformation, and then reincorporate them into society. While a fuller treatment of liminality and its relationship to ritual is not possible here (see also (Bell, 1992)), we see this as a useful way to approach our current study.

Using modern terminology, engagement stands on its own as a liminal period that is entered into, and exited from, through a series of rituals (Rapoport, 1965; Schweingruber, Anahita, & Berns, 2004). Prior research indicates that during this period the individual is expected to complete a transformation, and that transformation is accomplished through personal reflection, thought, and action (Kalmijn, 2004). Importantly, studies have observed that these cannot be simply inward processes, but must be projected outward – members

of the society must be able to see that the transformation is taking root through observable statements and actions (Humble, Zvonkovic, & Walker, 2007; Pearson, Child, & Carmon, 2010). It is these very kinds of aspects that accompany a role transition that we expect to find in Twitter after an individual becomes engaged and chooses to announce it to a social audience.

## 2.1 Research Questions

Engagement marks a major role transition in an individual's life – a shift from one social status to another. As one's social role changes, one's self-image or identity is affected, and the way in which others expect them to behave changes (Rapoport, 1965). Social and cognitive perceptions of relationship dynamics also evolve following engagement. It also involves an undertaking to form a new familial unit in society eventually in the longer-term.

Why investigate this phenomenon using Twitter? In a Western context, engagement announcements are traditionally matters of public record (e.g., announced in a newspaper); one might argue that Twitter bears a similar broadcast style to this form of announcement in comparison to, say, Facebook or Instagram. Beyond the convenience of access to data, Twitter also enables us to construct a control group for comparison in our analysis. Wedding forums might be another source of public data, but their limited topicality and use prohibits examination of more general patterns of behavior. Finally, as we will show, Twitter fulfills a unique need to broadcast the news of the engagement quickly and widely to people's social contacts, acquaintances, or simply familiar strangers.

Motivated by this literature, we investigate how postings on Twitter reflect this role transition. Along these lines, we frame our first research question (RQ):

**RQ 1:** *What kind of behavior manifested on Twitter characterizes the role transition observed during the liminal period succeeding an engagement announcement? For instance, how does Twitter illustrate (a) the evolution of marital identity, (b) shift in temporal focus of relationship dynamics, and (c) conformance to familial and social structure following the engagement ritual?*

During an engagement period, individuals invest in their relationship to strengthen their bond (Campbell & Ponzetti Jr, 2007; Campbell, Silva, & Wright, 2011). Couples develop shared meaning systems based on their interactions and investments in each other (Bell, 1992). These meaning systems are observable in the execution of shared activities e.g., daily or weekly rituals such as eating meals or participating in weekend activities (Campbell et al., 2011). This in turn impacts how their relationship progresses over time (Berger & Kellner, 1980): They integrate their individual conceptions of reality to form a common definition of the relationship. We suspect that evidence of this integration would appear on Twitter, and that it would increase in intensity over time, prompting RQ 2:

**RQ 2:** *What evidence do Twitter posts following an engagement announcement provide about relationship investment and progression?*

Finally, studies have shown that despite increasing egalitarian gender attitudes in other areas of life, women and men interpret, perceive, and invest in the relationship differently following engagement (Sassler & Miller, 2010). Further, research on wedding preparation experiences reveals that women do more wedding work than men (Humble et al., 2007). The rituals of engagement and wedding themselves pressurize women and men to act in gender-specific ways to live up to normative notions of femininity and masculinity (Ingraham, 2010). Based on postings made on Twitter, we intend to examine the similarities and differences in the way women and men behave in the period following engagement announcement, and how it compares to existing gender norms:

**RQ 3:** *Do women and men use Twitter differently following engagement announcement? That is, does Twitter activity reveal gender roles and norms among engaged users?*

### 3 Data and Methods

Our data collection proceeded using the following three steps: (1) scanning Twitter feeds for probable engagement announcements; (2) filtering the tentative announcements to discard noise using crowdsourcing techniques, and deriving the announcement date; and (3) collecting Twitter postings of the authors of (filtered) engagement announcements in two snapshots, one corresponding to several months before the engagement date, and the other corresponding to several months after the engagement date.

We began by first manually examining Twitter through its search feature to see how people announced their engagements. We found “#engaged” to be a commonly used hashtag that contained the least noise. We then used Twitter’s Firehose stream, made available to us via a contract with Twitter, to collect a 10% sample of public (English) posts mentioning the regular expression “#engaged” in an eight month period between May 1, 2011 and December 31, 2011. In this manner, we obtained a set of 2,394 posts that contained “#engaged”. In order to disregard posts in this tentative set that were not legitimate announcements, we adopted a crowdsourcing approach to have humans rate the likelihood of each post being an actual engagement announcement (e.g., a post to eliminate: “who is going to get #engaged tonight?! Share your stories with us!”). We uploaded the post text, along with a link to their Twitter profile on Amazon’s Mechanical Turk interface (<http://www.mturk.com/>). Note these were all public posts.

I cried & said YES to the man who finally proposed to me. I’m engaged!!!! #Engaged
So I asked <user> to marry me and she said yes. #engaged
Happiest girl in the whole world right now!! #engaged
Came back from <name’s> party with a ring on my finger #engaged.. man what a night..!!!!
Guess who is getting hitched :D #ring #engaged <url>

Table 1: Example engagement announcements.

Each HIT contained 20 such posts, and there were 5 assignments of each HIT, i.e., we obtained 5 separate judgments on each post. Crowdworkers were restricted to the US, with at least 80% approval ratings in previous AMT tasks and with familiarity of Twitter, and were paid \$1 per assignment. Fleiss’ Kappa of interrater agreement was 0.68 over the entire set of posts; however we decided to consider only those set of posts on which we had 100% agreement. Thereafter we extracted the authors associated with those posts, and the timestamps of the posts which would be a proxy for the engagement announcement date. We provide example announcements in Table 1.

**Compiling Twitter histories of engaged users.** For this filtered set of users who announced being engaged, we went back to the Firehose stream of Twitter data, and collected all of their postings in two periods before and after their announced engagement date. The pre-engagement period data we collected per user spanned approximately nine months (270 days), whereas for the post-engagement period, we collected the postings over 12 months following the date of engagement (365 days). After eliminating users whose accounts were deleted, or had fewer than 100 posts over each of the time periods, we obtained a final set of 923 users.

	Pre-engagement	Post-engagement
active days/user	78.28	170.43
posts/user	615.51	1661.97
total posts	568,115	1,534,000
mean #followers	193	228

Table 2: Statistics of engagement data over 923 users. Pre-engagement: 270 days; post-engagement: 365 days.

Table 2 gives some statistics of the data we collected over the pre- and post-engagement periods of Twitter activity from these users. Additionally we also inferred the gender of these users, wherever possible by matching the self-reported first names on Twitter profiles with US Census and public Facebook data (for

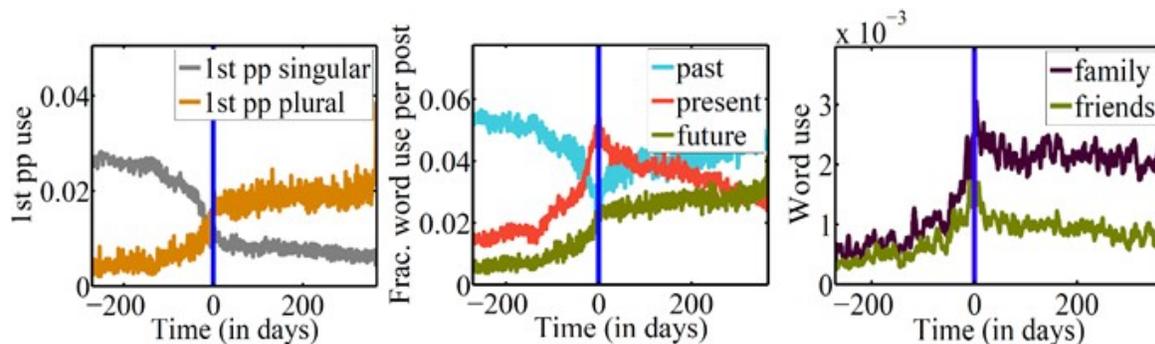


Figure 1: Characterizing role transition of users around engagement (RQ 1). Plot (left) indicates the evolution of marital identity through interpersonal pronoun use; (middle) shows a shift in temporal focus through use of verb tenses; and (right) indicates gradual conformance to familial structure manifested in the Twitter postings of users after announcement of engagement. The blue vertical line in the middle indicates the date of engagement.

details see (De Choudhury et al., 2013)). Using this method we were able to infer the gender of 778 users, with 68% female.

**Constructing a control group.** Finally, we constructed a control group dataset in order to compare the behavioral patterns of the engaged users above to a Twitter “baseline”. For this purpose, we randomly sampled 50 users per day in the same time period as the engagement users (excluding the 923 users who announced their engagement). A total of 11,684 users were identified. For the set of users sampled per day, we collected their Twitter posts over a 270 day period prior to the day of sampling, and a 365 day period after using the Twitter Firehose – similar to our focus group. This gave us a total of 5,239,394 posts in the period before sampling, and 6,931,272 during the period following sampling date.

## 4 RQ 1 Results: Role Transition

### 4.1 Evolution of Marital Identity

We examine the evolution of marital identity among engaged users through the lens of interpersonal pronoun use: function words that provide a non-reactive way to explore social and personality processes in individuals (Chung & Pennebaker, 2007). Particularly, we focus on the patterns of usage of 1st person singular and 1st person plural pronouns in postings during the pre- and post-engagement periods (Figure 1(left)). Each line in Figure 1(left) gives the mean daily use of the two pronoun types (i.e., fraction of words in a post that are 1st person singular/plural pronouns) over the 923 users. For reference purposes, the blue vertical line in the middle indicates the date of engagement, and all users’ Twitter histories were aligned per their engagement dates – engagement date is denoted as time  $t_0$ .

Compared to the pre-engagement period, the use of 1st person singular pronouns decreases during the post-engagement period (-69%), while 1st person plural pronouns increase (+51%). The control group shows minimal change: a 3% increase in the use of 1st person singular pronouns, and 7% decrease for that of 1st person plural pronouns. For example, we observe more postings of the type “*our weekends: we are working out, calling the chapel, calling about a cake, etc. phew. wedding stuff is tough on both of us :)*” or “*we can’t wait for racing today. we are topping off a gr8 week with the family, lucky us #lovinglife*” in this liminal phase. Wilcoxon tests comparing the mean use of each of 1st person singular and plural pronoun during the post-engagement period with those in the pre-engagement period reveal the differences to be statistically significant (1st person singular:  $z = -6.09$ ,  $p < .001$ ; 1st person plural:  $z = 4.46$ ,  $p < .001$ ). An interpretation of these results supported by the literature (Braithwaite & Baxter, 1995) suggests that increased interpersonal word use accompanies engagement.

Further, these changes would also suggest engaged users becoming habituated with the new role in life they are embarking on (or have embarked on), including new traditions and customs of referring to themselves as a couple. This process also helps couples in the enactment of a marital identity, and enhances

the intimacy in their relationship (Braithwaite & Baxter, 1995).

## 4.2 Shift in Temporal Focus

Do engaged users post more about the past, present, or future compared to the period before their engagement? We study the daily patterns of use of past, present, and future tense verbs (mean fraction of each tense word in the postings across all users) during the pre- and post-engagement periods (Figure 1(middle)). The tense words were obtained from the psycholinguistic lexicon LIWC (Linguistic Inquiry and Word Count: <http://www.liwc.net/>). In general, users show a decreased tendency to use past tense verbs in their posts following engagement (-41%), and an increased tendency to use future-oriented verb tenses (+62%), and an increased tendency to use present tense (+52%). Peak use of the present tense occurs around the engagement announcement date. Wilcoxon signed rank tests reveal that the differences of the usage of the three tenses during this liminal phase are statistically significant, in comparison to that during the period preceding engagement (past tense:  $z = -5.29$ ,  $p < .001$ ; present tense:  $z = 4.73$ ,  $p < .001$ ; future tense:  $z = 3.82$ ,  $p < .001$ ). The control group exhibits little change post-sampling date compared to that before: past tense use decreases by 8.7% while future and present tenses increase by 6% and 10% respectively.

By way of illustration, there was an uptick in posts that contain conceptions of the future (e.g., “going to b a wife to the greatest guy on earth...:”) or current happenings (e.g., “registering to vote with my husband to be! <url>”; “@<user> until fiancée becomes husband, my mortgage only comes in my name #ijs”). Interpreting this result alongside the literature (e.g., (Campbell et al., 2011)), this suggests that during engagement there is a detectable increase in posts related to present and future content.

## 4.3 Conformance to Familial and Social Structure

Next, we investigate the phenomenon of conformance to familial and social norms and structure in Twitter posts of engaged users through the usage of two types of content words – family and friends-centric words. These word lists were obtained once again from LIWC. This is shown in Figure 1(right). The figure shows the mean fraction of family/friends-oriented words in all of the users – postings over time (in days), with respect to the engagement event ( $t_0$ ). Compared to the pre-engagement period, use of family words following engagement increased by 219%, while use of friends words increased 68% (the same are -8% and +12% for the control group). Wilcoxon signed ranked tests indicate that both the increases we observe during the post-engagement period are statistically significant compared to the pre-engagement phase (family-centric words:  $z = 14.49$ ,  $p < .0001$ ; friends-centric words:  $z = 7.31$ ,  $p < .001$ ). Through posts like “last part of christmas festivities will be spent with my wife to-be and her parents :) <url>”, we conjecture the growing tendency of engaged couples to embrace a form of social and familial embeddedness as a long-term change in their lives.

Summarily, the results of RQ 1 showed that following engagement, there were observable increase in interpersonal word use, friends and family word use, and present and future-oriented words. These suggest increasing richness of relationships post-engagement (Chung & Pennebaker, 2007), and orientation towards forthcoming events.

## 5 RQ 2 Results: Relationship Investment, Progression

In order to address RQ 2, we focus on the topical content of the Twitter posts of the engaged users during the liminal period following the engagement announcement.

**Identifying topics.** To understand a couple’s investment and progression in a relationship, two researchers familiar with Twitter independently coded a sample of the data (1,000 posts), beginning with a set of topics identified in the literature (Campbell & Ponzetti Jr, 2007) and adding new topics when the data did not fit into the preexisting coding scheme. In this way, our final set comprised five categories. Example posts belonging to each category are given in Table 3. Thereafter we uploaded 10,000 randomly selected Twitter posts (from the post-engagement period) to Amazon’s Mechanical Turk, and asked crowdworkers to select the most appropriate category for each item (each post could be associated with only one dominant category). Each post was coded with five independent judgments, and the majority vote was taken as a post’s final category

(Fleiss' Kappa=0.64).

Following the labeling task, we developed a language model (a maximum entropy classifier (Duda, Hart, & Stork, 1999)) that would utilize the 10,000 labeled posts as training data to infer the topic label in a test set. The classifier used unigrams and bigrams in the posts in the training set as features of classification. We provide summary performance statistics (details not included for brevity): mean accuracy: 81.5%; mean precision: .73; mean recall: 0.57. Having demonstrated good performance of the classifier, we applied it to all of the remaining 1,524,000 posts shared during the post-engagement period.

**Findings.** Figure 2 shows the volume of posts over time (in days) belonging to each topic category during the post-engagement period. “Togetherness rituals” and “wedding planning” were the two most frequent categories identified in posts: a Friedman test yields statistically significant difference across the volume of different topics ( $\chi^2(3174, N = 635) = 18.82, p < 10^{-7}$ ). The figure also shows that, over time, topical categories manifest themselves differentially in the case of the engaged users. The most prominent topic “wedding planning” shows a monotonically increasing pattern, which escalates beyond 3-4 months after engagement ( $\mu = 904.6$  between days 100-365, vs.  $\mu = 128.3$  between days 0-99) (see Table 3 for examples). Following a brief period post-engagement, posts correspond to an increased focus on wedding planning: couples perhaps also increasingly devote their time and efforts into this planning process.

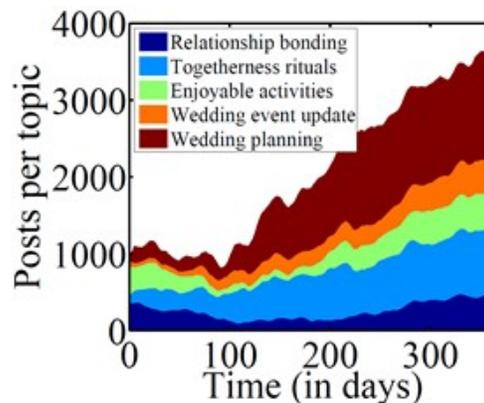


Figure 2: Frequency of posts mentioning different topics that characterize investment in and progression of relationships of engaged individuals (RQ 2).

The next most common topic “togetherness rituals” also shows a consistent increase. Over time as a relationship progresses, there is likely to be increase in mundane and routine-chore activities, or “patterned interactions” which couples often find to be necessary for relational functioning and maintenance (Duck, 1994; Crespo, Davide, Costa, & Fletcher, 2008). Together, the two topics provide evidence of progression in the romantic relationships of the engaged individuals. Next we observe that the topics “relationship bonding” and “enjoyable activities” show fairly consistent patterns, with discernable peaks early on in the phase following engagement, and towards the end of our analysis period, i.e., several months after engagement. Together these two topics indicate relationship investment. From Table 3 we find that posts on these topics include escape episodes, intimacy expressions, or creating shared memories together. Finally, we observe the topic of “wedding event update” that surfaces as a relatively less prominent topic; however, it shows an increasing trend over time – as we go forward from the time of engagement, people likely get married and turn to Twitter to share updates on it.

## 6 RQ 3 Results: Gender Roles and Expectations

This final section presents results on our third RQ: how women and men compare in their behavior as manifested on Twitter during the liminal phase following engagement.

**Relationship terms.** We present gender-wise similarities and differences in usage of different relationship terms (boyfriend, girlfriend, fiancé, fiancée, husband, wife), and how they evolve in the time periods before and after engagement (Figure 3). The figure shows the daily mean proportion of posts that contain a particular relationship term, aggregated across all users. As one would expect, for both women and men use of the words boyfriend and girlfriend decreases post-engagement, compared to that before (*boyfriend*:  $z = -10.4, p < .001$ ; *girlfriend*:  $z = -7.7, p < .001$  per Wilcoxon tests); whereas that of *fiancé*, *fiancée*, *husband*, and *wife* increases (*fiancé*:  $z = 6.2, p < .001$ ; *fiancée*:  $z = 4.2, p < .01$ ; *husband*:  $z = 18.3, p < 10^{-5}$ ; *wife*:  $z = 13.4, p < 10^{-5}$  per Wilcoxon tests). This marks how the ritual of engagement acts as a significant life milestone

**Relationship bonding: continuance, roles**

My fiancée made red wine risotto with crimini mushrooms and shrimp for dinner. jealous? You should be.

I love my fiance!! He's already planned theme weeknights when we merge into a family.

#thingsthatmakemesmile cards from him. He writes the sweetest things and leaves them in the most random places

**Togetherness rituals: occurrence, repetitiveness, attendance**

There's only 1 thing better than a morning run; a morning run w/<user>

Watching tv with my beautiful pregnant fiancée! (at home sweet home) <url>

Out to dinner with my lovely girl.. <url>

**Enjoyable activities (couple-centric)**

We just got back from a camping trip. Definitely had nothing to be afraid of at night.. my fiance is the scariest thing in the woods.

Exhausted. And my alarm is set for 4am (less than three hours!) so I can make sure my fiance is up for a fishing trip. #TooEarly

Some video footage of when me and my girlfriend went around Chester and visited the museum etc.... <url>

**Wedding event update**

Wedding picture. union station. 12/3/11 ;) ;) <url>

We were just given the most incredibly gorgeous chinese meditation bell as a nye/wedding gift. wow. #dharma #hsil <url>

Headed to the wedding with my bro @<user> <url>

**Wedding planning**

Almost just died florist had the wrong flowers written down for my #wedding

Picking out wedding ring bands today #yayyy

My wedding dress came in! :)))))))). can't wait!!!! to see it, try it on! hope it's not too small...

Table 3: Topic categories in Twitter posts characterizing users' relationship investment and progression during the phase succeeding engagement.

impacting how one refers to their romantic partner; and this aspect is consistently true for both gender.

**Context of use of relationship terms.** In what context do women and men use these relationship terms? To answer that, we extracted all the bigrams in Twitter posts of engaged users in our dataset that contain one of the relationship terms (stopwords, urls eliminated). In Table 4, we list the top six bigrams containing each of the relationship terms (although analysis used the top 500 bigrams). We observe: bigrams that exhibit high usage by women tend to have emotional attributes associated (e.g., "love boyfriend", "miss boyfriend", "fiancé yay", "fiancé blessed", "wonderful husband") or are used in the context of family-oriented updates ("fiance's family", "parents fiancé", "husband kids"). However the family-oriented terms appear more in the fiancé and husband bigrams than in boyfriend, indicating the evolution of a form of marital identity among the

female users, and conformance to familial structure after they are engaged and/or married. The bigrams that are used more heavily by men tend to attribute to a large extent to the physical attributes of their partners (e.g., "girlfriend cute", "gorgeous fiancée", "sexy fiancée", "beautiful wife"); there are also affectionate references (e.g., "girlfriend kiss", "my fiancée", "lovely wife"). We do observe a propensity to conform to

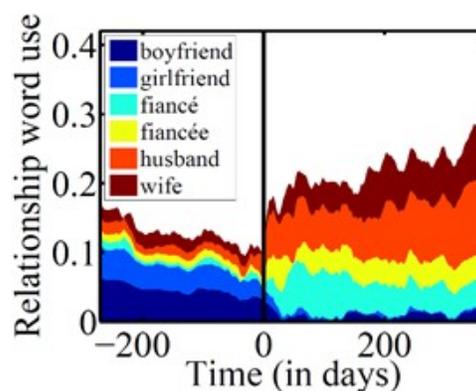


Figure 3: Daily proportion of posts mentioning relationship terms (RQ 3). The vertical line represents engagement date.

<i>boyfriend</i> (numbers show % female users; total women = 162)			
love boyfriend	83.69	boyfriend material	25.59
boyfriend ever	76.17	miss boyfriend	27.54
amazing boyfriend	75.84	boyfriend's birthday	17.36
<i>girlfriend</i> (numbers show % male users; total men = 121)			
beautiful girlfriend	27.54	girlfriend cute	24.51
girlfriend lol	17.36	awesome girlfriend	23.93
amazing girlfriend	26.34	girlfriend kiss	15.9
<i>fiancé</i> (numbers show % female users; total women = 223)			
love fiancé	86.91	fiancé yay	85.57
amazing fiancé	85.3	wonderful fiancé	71.59
parents fiancé	75.39	proud fiancé	74.84
<i>fiancée</i> (numbers show % male users; total men = 198)			
beautiful fiancée	12.5	gorgeous fiancée	23.68
sexy fiancée	28.5	fabulous fiancée	19.83
fiancée married	25.06	lovely fiancée	27.85
<i>husband</i> (numbers show % female users; total women = 204)			
future husband	86.9	husband tonight	84.99
miss husband	72.88	husband father	89.51
husband home	81.21	wonderful husband	77.13
<i>wife</i> (numbers show % male users; total men = 174)			
future wife	19.1	wife tonight	15.67
beautiful wife	16.53	lovely wife	19.84
wife kids	16.74	pregnant wife	21.93

Table 4: Bigrams mentioning relationship terms.

familial structure for men too, however to a lesser extent and mostly limited to bigrams mentioning wife (e.g., “wife family”, “pregnant wife”).

Finally, both women and men demonstrate evidence of a temporal progression in their relationships in the context of use of the relationship terms husband/wife: e.g., “future husband”, “husband tomorrow”, “future wife”, “new wife”. Through their postings, women thus provide more evidence of relationship closeness and greater family investment. They also tend to express higher positive perceptions of the marital relationship through references to their partner in emotional contexts. These findings are consistent with the prior research (Crespo et al., 2008) that found stronger results for women than for men in the association between social manifestation of couple-centric rituals and satisfaction in a relationship.

## 7 Followup Survey

The quantitative analyses described above reveal behavioral, and linguistic attributes of content shared on Twitter following announcement of engagement. However, the lived experience of an individual who uses Twitter to announce their engagement might be different from the trends observed in the large-scale analysis. In order to help us interpret our findings, we conducted a follow-up web survey.

While we would have liked to recruit users whose Twitter posts had been analyzed as part of the original dataset, we were unable to determine a privacy-preserving way of contacting these users based on their Twitter userids alone. Alternatively, we conducted a cross-sectional survey in which we recruited participants through Amazon Mechanical Turk. To be eligible, participants had to have used Twitter to announce either their engagement, or their wedding. They were compensated with \$2.50 for participation in the survey that typically took 20 minutes to complete. The survey collected 95 valid responses, of which 61% were male and 39% were female. Participants ranged in age from 19 to 61, with a mode of 25. Geographically, 51% of respondents were from the USA, 42% were from India, with the remainder from other countries. Of these, 88% tweeted about their engagement and 76% did so for their wedding. In the analysis below we focus

on the 88% who announced an engagement.

Announcing an Engagement on Twitter. Respondents agreed on a narrow but focused set of reasons behind using Twitter to announce their engagement. Generally, they were excited and wanted to share the news with as many people as possible and as quickly as possible: *“you can reach a lot of contacts very quickly”*; *“getting the news out first”*; *“so I can reach a lot of people”*; *“to share my excitement”*; *“let my friends and acquaintances know of my happiness”*. Some participants thought that Twitter was useful for its speed, but realized that it would not reach all of the people who needed to be informed: *“Twitter and Facebook made it faster, and in a way was like a ‘timed exclusive’ where we quickly passed word to our closest friends and family. But at the same time we have close family who don’t use Twitter, such as grandparents, so we sent cards and also called.”* Further, participants described the response from their audiences as positive, including replies and retweets that expressed congratulations and excitement. Some responses involved using additional modes of communication: *“I got phone calls!”*; *“people checked my Facebook page”*; *“people wanted to see images of my ring”*. Overall the survey responses suggest that Twitter filled a perceived need for engaged users who wish to disseminate the news of the event quickly and to a wide audience; its utility stems from its ability to save time in that it eliminates the need to tell people individually, especially distant friends and acquaintances.

Responses to Findings from Twitter Log Data. The second half of the survey provided participants with illustrations of our empirical findings (the graphs) from the previous section, along with a simplified sentence that summarized the observation. For each of these, participants were asked what their reaction to the finding was, how they would explain the finding, and if it was representative of their own behavior. We report on two prime findings:

**Use of pronouns (marital identity).** Most of our participants (72%) felt that they themselves increased their first person plural pronouns use post-engagement (ref. Figure 1). Users provided explanations for this trend: *“It shows how cooperative they are.”*; *“They are started to believe that they are made for each other”*; *“More people think of themselves as a whole after engagement.”*; *“Marriage is a partnership, it’s only logical to start thinking of life as a ‘team’, people want others to perceive the couple as a single entity, so they start using we instead of I.”*

**Use of future tense (shift in temporal focus).** 67% of our participants agreed that the use of future tense in their postings increased following engagement (ref. Figure 1). *“it is because you are looking forward to spending your life together.”*; *“getting engaged makes you think about the future, both in the short term (planning a wedding, moving in together) and the long-term (sharing the rest of your life)”*; *“I think I was seeking reassurance from friends by talking about the future a lot.”*

**Use of relationship words.** 79% agreed that they changed their relationship word use after engagement (Figure 3), and offered several reasons one might do this: *“because people are more connected to their significant other”*; *“because you are trying to show she is much more than that [a girlfriend] now, they want to exhibit their relationship”*; *“they want to show that they’re something more than just boyfriend and girlfriend.”*

Overall these findings align with the concepts of liminality discussed earlier where there is a need for separation from the past (e.g., terms like *boyfriend/ girlfriend*) and a need to publicly manifest this change into “something more.” One participant noted that “I started using these words to make it official,” while another said “if you get through all the hurdles of relationships and make it to get engaged/married then you’re proud and that deserves a label.” Participants who disagreed stated that they thought these words were cliché, or that they had their own labels for referring to their partner that remained unchanged (e.g., “my love”). Without making claims about the generalizability of this sample, the follow-up survey suggests that the findings from the large-scale analysis ring true with the subjective experiences of users who announced their engagement on Twitter. Users’ ability to provide explanations for the trends suggests that the statistical analyses are congruent with their own expectations and usage.

## 8 Discussion

Our results suggest that at a large scale, patterns can be detected in the posts of Twitter users who have announced their recent engagement, and survey respondents recognized these patterns as sensible byproducts of expected behaviors and goals. At the same time, a substantial minority of survey participants (between 21% and 38%) did not report evidencing the patterns detected by the large-scale study. One reason for this could be that individuals do not want to appear naive or overly whimsical in their conceptions of romance, engagement, and marriage (Massimi et al., 2014). They also understood that on the whole there is sense of what is expected and appropriate. From this we draw out implications that are both theoretical and design-oriented.

### 8.1 Implications for Theory and Design

Our findings, on one hand, validate known observations in the engagement and wedding ritual literature. They tell us that social media tools like Twitter are emergent technologies in the study of major milestones in people's lives. On the other hand, our findings reveal how individuals might be adapting their behavior and carefully crafting their self-presentation on a public social platform like Twitter during this important marker in their lives. For instance, the observed Twitter use suggests an attempt to enact an impression of being in a "perfect relationship" through references about themselves as a couple, mentions of activities they participate in and enjoy doing together, and so on. Keeping Twitter audiences informed about the various routine chores that the new role has brought in affirms liminality – that the transition is not solely an internal feeling, but one that manifests change in the day-to-day, and can be made visible to the community at large.

The high volume of postings around wedding planning also indicates that engagement announcing users may use Twitter for coping with the decision-making involved with planning. While family, friends, culture, and tradition have always guided the decisions surrounding a wedding, what we note is that the availability of social technologies is adding another source of advice and inspiration to the mix. Characterizing the unique interplay among these various sources remains a question worth exploration by social Q&A and decision-support research. Finally, we observed women socializing and sharing information about this life marker on Twitter more than men. Our findings illustrate how a major life event foregrounds gender-sensitive motivations and usage of social media (Massimi et al., 2014).

Our findings contribute design guidelines for tailoring social technologies (or applications within their ecosystems) to better support the needs of people experiencing the liminal period of life following the announcement of engagement. First, as the large-scale analysis and survey suggest, the engagement sets off an increased number of relationship-centric posts that need to reach an audience as quickly as possible. In other words, there is a "rush" of excitement for the future and Twitter is enlisted to demonstrate these. Designers might productively consider how this kind of "rush" could be better represented via visual cues (e.g., a rush of tweets about an engagement might be collapsed for easy perusal, or highlighted as significant for later review). We also expect this rush to occur for other life events besides engagement, such as starting a new job or having a child (De Choudhury et al., 2014).

We also note that, while platforms like Twitter and Facebook were primarily geared towards facilitating everyday interactions, their increasing use around major life events (Gibson & Hanson, 2013; Massimi et al., 2014) shows promise in how they may be leveraged in the design of lifelogging systems. Such technologies may help create digital diaries of the memorable and personal moments that engaged individuals experience during this transitory phase. The multimodal nature of these personal moment updates (e.g., a number of tools allow sharing photos and videos through Twitter posts) brings visualization challenges to these lifelogging systems as well. Finally, given that Twitter was also extensively used to seek and share wedding planning related information, better mechanisms to provide credible and quality community support on social media are also useful design directions.

### 8.2 Limitations and Future Directions

Despite promising findings, the approach used in this study has limitations. Our study leverages public Twitter announcements about the engagement event via the #engaged hashtag. While our examination suggested this is among the most common markers of an engagement announcement, this dataset omits

those who chose to announce the life event through other means on Twitter, or those who do not make an announcement at all. Moreover, we focused on those who used Twitter to a substantial extent; as such, our findings do not extend to those who do not announce on Twitter, or those who use alternative platforms such as Facebook. We note that our contribution lies in understanding the behavior of those who choose to announce a major life marker like engagement on a public platform online, and their motivations behind it. Further, because of our focus on English language Twitter posts, our study was restricted to engagement announcements in Western urban contexts. In the future it would be interesting to see how they generalize to other cultures, since the rituals of engagement and wedding are unique in their own way in different regions.

## 9 Conclusion

In this paper, we utilized liminality as a concept for understanding social media use by individuals following the announcement of their engagement. We adopted a mixed-methods approach to examine a number of behavioral and emotional aspects characterizing this liminal period that are manifested in Twitter postings of more than 900 individuals who chose to publicly announce their engagement. We also supplemented this log study with a follow-up survey. Together the studies showed that this phase marks notable changes in behavior, language use, emotionality, and relationship investment which can be gleaned from Twitter. Survey respondents believed these changes resonated with their own behavior and provided a range of plausible explanations for their occurrence. A next step would be to examine how this liminal phase relates to interpersonal characteristics such as attachment style, satisfaction, and commitment, and if ritual functioning in engaged couples is predictive of relational outcomes once a couple marries.

## References

- Bell, C. (1992). *Ritual theory, ritual practice*. Oxford University Press.
- Berger, P. L., & Kellner, H. (1980). Marriage and the construction of reality. *JM Henslin, Marriage and family in a changing society*, 163–181.
- Braithwaite, D. O., & Baxter, L. A. (1995). I do'again: The relational dialectics of renewing marriage vows. *Journal of Social and Personal Relationships*, 12(2), 177–198.
- Brubaker, J. R., & Hayes, G. R. (2011). We will never forget you [online]: An empirical investigation of post-mortem myspace comments. In *Proceedings of the acm 2011 conference on computer supported cooperative work* (pp. 123–132).
- Burke, M., & Kraut, R. (2013). Using facebook after losing a job: Differential benefits of strong and weak ties. In *Proceedings of the 2013 conference on computer supported cooperative work* (pp. 1419–1430).
- Campbell, K., & Ponzetti Jr, J. J. (2007). The moderating effects of rituals on commitment in premarital involvements. *Sexual and Relationship Therapy*, 22(4), 415–428.
- Campbell, K., Silva, L. C., & Wright, D. W. (2011). Rituals in unmarried couple relationships: An exploratory study. *Family and Consumer Sciences Research Journal*, 40(1), 45–57.
- Chung, C., & Pennebaker, J. W. (2007). The psychological functions of function words. *Social communication*, 343–359.
- Crespo, C., Davide, I. N., Costa, M. E., & Fletcher, G. J. (2008). Family rituals in married couples: Links with attachment, relationship quality, and closeness. *Personal Relationships*, 15(2), 191–203.
- De Choudhury, M., Counts, S., & Horvitz, E. (2013). Major life changes and behavioral markers in social media: case of childbirth. In *Proceedings of the 2013 conference on computer supported cooperative work* (pp. 1431–1442).
- De Choudhury, M., Counts, S., Horvitz, E. J., & Hoff, A. (2014). Characterizing and predicting postpartum depression from shared facebook data. In *Proceedings of the 17th acm conference on computer supported cooperative work & social computing* (pp. 626–638).
- Dimond, J. P., Shehan Poole, E., & Yardi, S. (2010). The effects of life disruptions on home technology routines. In *Proceedings of the 16th acm international conference on supporting group work* (pp. 85–88).
- Duck, S. (1994). Steady as (s) he goes: Relational maintenance as a shared meaning system.
- Duda, R. O., Hart, P. E., & Stork, D. G. (1999). *Pattern classification*. John Wiley & Sons,.
- Gennep, A. v. (1960). *The rites of passage*. Chicago: University of Chicago Press.
- Getty, E., Cobb, J., Gabeler, M., Nelson, C., Weng, E., & Hancock, J. (2011). I said your name in an empty room: grieving and continuing bonds on facebook. In *Proceedings of the sigchi conference on human factors in computing systems* (pp. 997–1000).
- Gibson, L., & Hanson, V. L. (2013). Digital motherhood: how does technology help new mothers? In *Proceedings of the sigchi conference on human factors in computing systems* (pp. 313–322).

- Humble, Á. M., Zvonkovic, A. M., & Walker, A. J. (2007). "the royal we": Gender ideology, display, and assessment in wedding work. *Journal of Family Issues*.
- Ingraham, C. (2010). *White weddings: Romancing heterosexuality in popular culture*. Routledge.
- Kalmijn, M. (2004). Marriage rituals as reinforcers of role transitions: An analysis of weddings in the netherlands. *Journal of Marriage and Family*, 66(3), 582–594.
- Massimi, M., & Baecker, R. M. (2010). A death in the family: opportunities for designing technologies for the bereaved. In *Proceedings of the sigchi conference on human factors in computing systems* (pp. 1821–1830).
- Massimi, M., Dimond, J. P., & Le Dantec, C. A. (2012). Finding a new normal: the role of technology in life disruptions. In *Proceedings of the acm 2012 conference on computer supported cooperative work* (pp. 719–728).
- Massimi, M., Harper, R., & Sellen, A. J. (2014). Real, but glossy: technology and the practical pursuit of magic in modern weddings. In *Proceedings of the 17th acm conference on computer supported cooperative work & social computing* (pp. 854–865).
- Massimi, M., Odom, W., Banks, R., & Kirk, D. (2011). Matters of life and death: locating the end of life in lifespan-oriented hci research. In *Proceedings of the sigchi conference on human factors in computing systems* (pp. 987–996).
- Pearson, J. C., Child, J. T., & Carmon, A. F. (2010). Rituals in committed romantic relationships: The creation and validation of an instrument. *Communication Studies*, 61(4), 464–483.
- Rapoport, R. (1965). The transition from engagement to marriage. *Acta Sociologica*, 8(1-2), 36–55.
- Sassler, S., & Miller, A. J. (2010). Waiting to be asked: Gender, power, and relationship progression among cohabiting couples. *Journal of Family Issues*, 0192513X10391045.
- Schweingruber, D., Anahita, S., & Berns, N. (2004). "popping the question" when the answer is known: The engagement proposal as performance. *Sociological Focus*, 37(2), 143–161.
- Shklovski, I., Kraut, R., & Cummings, J. (2008). Keeping in touch by technology: maintaining friendships after a residential move. In *Proceedings of the sigchi conference on human factors in computing systems* (pp. 807–816).
- Smith, M. E., Nguyen, D. T., Lai, C., Leshed, G., & Baumer, E. P. (2012). Going to college and staying connected: Communication between college freshmen and their parents. In *Proceedings of the acm 2012 conference on computer supported cooperative work* (pp. 789–798).
- Turner, V. W. (1967). *The forest of symbols: Aspects of ndembu ritual* (Vol. 101). Cornell University Press.
- Williams, O. (2011). *Facebook timeline: Tell us about your life events*.
- Yarosh, S., Abowd, G. D., et al. (2009). Supporting parent–child communication in divorced families. *International Journal of Human-Computer Studies*, 67(2), 192–203.

## Table of Figures

Figure 1	Characterizing role transition of users around engagement (RQ 1). Plot (left) indicates the evolution of marital identity through interpersonal pronoun use; (middle) shows a shift in temporal focus through use of verb tenses; and (right) indicates gradual conformance to familial structure manifested in the Twitter postings of users after announcement of engagement. . . . .	5
Figure 2	Frequency of posts mentioning different topics that characterize investment in and progression of relationships of engaged individuals (RQ 2). . . . .	7
Figure 3	Daily proportion of posts mentioning relationship terms (RQ 3). The vertical line represents engagement date. . . . .	8

## Table of Tables

Table 1	Example engagement announcements. . . . .	4
Table 2	Statistics of engagement data over 923 users. Pre-engagement: 270 days; post-engagement: 365 days. . . . .	4
Table 3	Topic categories in Twitter posts characterizing users' relationship investment and progression during the phase succeeding engagement. . . . .	8
Table 4	Bigrams mentioning relationship terms. . . . .	9