

“I regretted the minute I pressed share”: A Qualitative Study of Regrets on Facebook

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ABSTRACT

We investigate regrets associated with users’ posts on a popular social networking site. Our findings are based on a series of interviews, user diaries, and online surveys involving 569 American Facebook users. Their regrets revolved around sensitive topics, content with strong sentiment, lies, and secrets. Our research reveals several possible causes of why users make posts that they later regret: (1) they want to be perceived in favorable ways, (2) they do not think about their reason for posting or the consequences of their posts, (3) they misjudge the culture and norms within their social circles, (4) they are in a “hot” state of high emotion when posting, or under the influence of drugs or alcohol, (5) their postings are seen by an unintended audience, (6) they do not foresee how their posts could be perceived by people within their intended audience, and (7) they misunderstand or misuse the Facebook platform. Some reported incidents had serious repercussions, such as breaking up relationships or job losses. We discuss methodological considerations in studying negative experiences associated with social networking posts, as well as ways of helping users of social networking sites avoid such regrets.

Keywords

Social media, Facebook, regret, privacy

Categories and Subject Descriptors

H.5.m [Information Interfaces and Presentation]: Miscellaneous

1. INTRODUCTION

As social networking sites (SNSs) gain in popularity, stories of regret continue to be reported by news media. In June 2010, a porgie mascot for the Pittsburgh Pirates was fired because he posted disparaging comments about the team on his Facebook page [13]. More recently, a high school teacher was forced to resign because she posted a picture on Facebook in which she was holding a glass

of wine and a mug of beer [14]. These incidents demonstrate the negative impact that a single act can have on an SNS user.

In order to protect users’ welfare and create a healthy and sustainable online social environment, it is imperative to understand these regrettable actions and, more importantly, to help users avoid them. In the large body of SNS literature, little empirical research has focused on the negative aspects of SNS usage. We try to address that gap by examining accounts of regrettable incidents on Facebook collected through surveys, interviews, and user diaries.

With more than 600 million users, Facebook has become the world’s largest social networking site (according to Alexa, as of August 3, 2010, Facebook has the highest traffic among all SNS sites in the US [6]). While well-evolved norms guide socialization and self-disclosure in the offline world, in the online world it can be more difficult to identify one’s audience, control the scope of one’s actions, and predict others’ reactions to them. As a consequence, Facebook users might not always anticipate the negative consequences of their online activities, and end up engaging in actions that they later regret.

Since they are common experiences that people can recognize and describe, we use regrets as an analytic lens to investigate users’ negative experience with a social networking site. In all studies presented in this paper, we asked our participants about things that they posted on Facebook and then regretted. Since one of our goals was to understand how Facebook users think about regret, we used the word “regret” without defining it, and left the interpretation to our participants. In doing so, we sought to give voice to participants’ own ways of understanding regrets and related concerns. After analyzing our participants’ responses, we can summarize regret as a feeling of sadness, repentance, or disappointment over one’s own actions and their factual or potential consequences.

While regrets in the real world have been studied extensively (e.g., see [44] for a meta-analysis), little work has investigated regrets in online contexts. Our work takes a first step into examining people’s regrets in social media in general, and Facebook in particular. We identify different kinds of regrets, analyze their causes and consequences, and examine users’ existing coping mechanisms.

1.1 Related Work

In this section, we review related work on privacy and social networks. We focus on work that identifies risks, studies privacy concerns and practices, and details coping strategies for reducing privacy risks.

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1.1.1 Privacy Risks

Previous work has identified potential privacy risks associated with social networks. Gross and Acquisti first highlighted risks such as stalking, identity theft, price discrimination, or blackmailing [24]. In addition, Boyd and Ellison identified privacy risks such as damaged reputations, unwanted contacts, surveillance-like structures due to backtracking functions, harassment, and use of personal data by third-parties [10].

Skeels and Grudin studied SNS use in the workplace and identified tensions due to the mixing of users' personal and professional circles (for example, the crossing of hierarchy and/or power boundaries) [47]. When users' actions on SNS make these risks materialize or lead to negative consequences, they may experience regret.

1.1.2 Privacy Concerns and Practices

A significant portion of previous research on risky SNS behavior has focused on users' privacy concerns and practices. These studies shed light on the types of SNS activities that may cause negative outcomes and thus can inform our study of regrets associated with SNS activities.

Findings from early empirical studies of student Facebook users in the United States suggest behavior inconsistent with stated privacy concerns, excessive sharing of personal data, and rare changes to default privacy settings. In a 2005 study of Facebook users at Carnegie Mellon University, Gross and Acquisti found that the majority of users shared a large amount of personal data, and only a very small percentage of users changed their default privacy settings [24]. In a follow-up 2006 study, Gross and Acquisti found that even users who claimed to be concerned about privacy tended to reveal a great deal of their personal information — a discrepancy between stated privacy attitude and actual behavior [5]. Ellison et al. found that only 13% of Facebook profiles in the Michigan State University network were restricted to "friends only" in 2007 [18], and this was confirmed by a longitudinal study of the same population from 2006 to 2008 [30].

However, these studies only examined American college students, and the results might not generalize to other populations. For instance, Joinson conducted a study with primarily non-student Facebook users in the U.K. in 2008 and found that the majority of the respondents (57.5%) reported having changed the default privacy settings [25]. We conducted online surveys and in-person interviews to examine a broader segment of the population than just students, but did not include participants outside the United States.

More recent studies seem to suggest that users are becoming more privacy concerned and more likely to change their privacy settings [33, 11]. For instance, according to a 2009 report by the Pew Internet & American Life Project, 71% of SNS users between the ages of 18 and 29 reported changing their privacy settings [33].

Demographics seem to affect privacy attitudes and behavior. Fogel and Nehmad found that in general men had less privacy concerns than their female counterparts, and thus tended to disclose more personal information such as telephone numbers and physical addresses on SNSs [20]. Stutzman and Kramer-Duffield found that female users and users who have more Facebook friends are more likely to have friends-only profiles [48]. In a study of MySpace users, Gilbert et al. found that rural users have fewer friends and comments than urban users. Further, rural users, particularly women, have a higher level of privacy concern and use privacy settings more often than urban users [21]. Boyd and Hargittai also found that individual characteristics such as Internet skill, frequency, and type of Facebook use are correlated with making modifications to privacy settings [11].

Users display more concern about sharing with their weak-tie friends than with outsiders or companies. Stutzman and Kramer-Duffield suggest that users adopt friends-only profiles mainly to deal with unintended disclosure to their weak ties rather than outsiders [48]. Raynes-Goldie found that users cared more about protecting information from members of various social circles, rather than protecting their information from companies [41]. Besmer and Lipford found most photo privacy concerns were about identity and impression management within the user's social circle. These photo-privacy concerns revolve around revelation of incriminating evidence (e.g., underage drinking), unflattering photos, and unwanted associates (e.g., ex-significant others) [8].

Social influence seems to play a role in privacy attitudes. In a 2008 study of Facebook users at Harvard University, Lewis et al. found that students are more likely to have private profiles if their friends and roommates have them [26]. In a 2009 study of privacy settings on Flickr, Nov and Wattal found that sense of trust and sharing norms of a community positively affect community members' privacy concerns and information sharing behavior [36].

1.1.3 Coping Strategies to Reduce Risk

A number of strategies to counter or defuse privacy risks have been identified in the literature. Lampinen et al. found users "dividing the platform into separate spaces, using suitable channels of communication, and performing self-censorship" [31]. Similarly, in Lampe et al.'s study, some users reported active management of their profile, e.g., restricting who can see it and removing "sensitive" content. Their interview respondents reported incidents of minor embarrassment but did not report any strong negative consequences [30]. Tufekci analyzed college students' information disclosure behaviors on social networks and found that "students manage unwanted audience concerns by adjusting profile visibility and using nicknames but not by restricting the information within the profile" [51]. In a year-long ethnographic study of Facebook users in their 20s, Raynes-Goldie found various strategies including using aliases, deleting wall posts, untagging photos, and creating multiple accounts to circumvent Facebook's default privacy settings [41].

1.2 Research Questions

Most previous work focused on users' privacy attitudes and use of privacy settings. Very little is known about what actually goes wrong in users' SNS activities and what causes regrets to occur. We chose to directly investigate regrets on SNSs and their causes, with the ultimate goal of designing counter-measures to help users avoid them. In this paper, we aim to answer the following research questions:

- What posts do users regret sharing on Facebook?
- Why do users make regrettable posts?
- What are the consequences of these regrettable posts?
- How do users handle regrettable posts?
- How do users currently avoid regrets?

2. METHODOLOGY

We first analyzed reader comments on a *New York Times* article about Facebook privacy [2] and developed a survey to probe whether the concerns expressed in those comments were typical of American Facebook users. After analyzing the results from that survey, we conducted semi-structured interviews to ask in-depth questions about users' experiences on SNSs.

While the interviews capture the most memorable experiences of the interviewees, we also wanted users' daily, often mundane Facebook experiences which they might forget or take for granted. We also hoped to explore how regrets might affect users' subsequent behavior on Facebook. For these reasons, we designed a diary study and invited the interviewees to log their daily Facebook experiences for a month. These studies raised additional questions about regrets on Facebook, and we conducted another online survey to gain further insights.

While Facebook's user population is quite diverse, the majority of prior research was conducted with college students. Our research seeks to gain a more comprehensive understanding of the SNS user population by studying American Facebook users from a wider range of ages and occupations. We recruited survey participants using the Mechanical Turk crowd sourcing site and recruited interviewees from the Pittsburgh Craigslist website. We report on two surveys in this paper, and refer to them as "survey1" and "survey2." Our studies were approved as minimal risk studies by our university's Institutional Review Board (IRB).

2.1 Survey 1

On May 6, 2010, the *New York Times Bits Blog* posted an article titled, "Ask Facebook Your Privacy Questions." This blog entry invited readers to submit their questions to Elliot Schrage, Facebook's Vice President for Public Policy, in the blog entry's comments section [2]. We analyzed the responses from 268 users and identified three main themes: (1) people feel strongly that certain types of information are private, (2) people are frustrated with Facebook's privacy controls, and (3) people have strong views against Facebook's opt-out model regarding sharing users' information with third-parties.

Based on these findings, we designed a survey to further investigate users' privacy-related attitudes and behaviors on Facebook.

2.1.1 Questions

The online survey was designed to gain a better understanding of Facebook users' privacy related experiences and behavior on Facebook. In this paper we only focus on the responses to the question: "Have you ever posted something on a social network and then regretted doing it? If so, what happened?"

2.1.2 Procedure

We recruited adult Facebook users in the United States using Amazon's Mechanical Turk¹ (MTurk), a crowd sourcing service that is gaining popularity for use in HCI research [28]. We presented our survey as a "task" on MTurk and asked MTurk users to follow a link to our survey on the SurveyGizmo commercial web survey service. MTurk assigns each of its users an anonymous ID and we made sure that each MTurk ID only answered our survey once. We paid each participant \$0.50 for completing the survey. Since the survey would take about 10-15 minutes to finish, our compensation rate was about \$2-3 per hour, which is on par with the normal hourly pay on MTurk.

As suggested in the literature [28, 16], we used a combination of measures to help determine whether our participants from MTurk were taking their tasks seriously. We paid attention to unusually short completion time (two standard deviations from the mean), inconsistent answers (we asked the same underlying question with slightly different wordings), and verbatim repetition or nonsense free-response answers. If we found two suspect answers, we then excluded the participant's results. After manually checking the answers and filtering out suspect participants, we had 321 valid re-

sponses. There were 117 male respondents (36.4%) and 204 female respondents (63.6%). The average age of respondents was 31 years old ($\sigma=11.0$).

2.2 Interviews

2.2.1 Questions

The semi-structured interviews included open-ended questions about users' motivations and use of Facebook, privacy attitudes toward Facebook usage, experience with Facebook's privacy settings, and their own and their friends' regrettable experiences on SNSs. For instance, one important question was "Have you ever posted something on a social network and then regretted doing it? What happened?" We include all interview questions in Appendix A.

2.2.2 Procedure

We used Craigslist² to recruit Facebook users in Pittsburgh, Pennsylvania to come to our lab for in-person interviews. A pre-questionnaire was used to screen and balance our interview participants across age, gender, occupation, and frequency of Facebook usage. 301 people completed the questionnaire by January 21, 2011. Most of them were college students and the majority of them were women. We selected 19 users from this pool to interview (10 males and 9 females). Their ages ranged from 18 to 56 ($\mu=33.0$, $\sigma=13.0$). The interviewees came from diverse occupations: student, attorney, social worker, artist, telemarketer, manager, financial service staff, small business owner, teacher, career coach, and unemployed. Of the 19 participants, 8 of them visited Facebook multiple times per day, 8 of them visited Facebook about once per day, and the remaining 3 users visited Facebook less than once per week.

We conducted the interviews from August 2010 until January 2011. Each interview took approximately 1 to 1.5 hours. Interviewees were asked to log into their Facebook accounts to have a conversation with the researchers about their Facebook experiences. From time to time, the researchers took screen shots of interviewees' Facebook pages when participants consented. Each interviewee was paid \$20 as compensation. Interviews were audio recorded and then transcribed. One author coded the interviewee data and categorized it post-hoc into a list of common themes.

2.3 Diary Study

2.3.1 Questions

The diary study consisted of questions that collected data about the user's daily experience on Facebook. The diary asked if the user had accepted or rejected any friend requests, what activities the user conducted, if changes had been made to profiles or privacy settings, if the user had any regrets that day, and other questions about positive or negative experiences on Facebook. The regret question we asked was "Have you posted something on Facebook and then regretted doing it? Why and what happened?" We include the list of questions in Appendix A.

2.3.2 Procedure

Participants from the interview study were invited to participate in the diary study at the end of their interviews. Twelve interviewees actually participated for at least one day. We asked the participants to answer the same set of questions in a web form every day for a month. Participants who filled out the form for 22 or more days received \$15 as compensation. Two hundred and seventeen days of diary logs were entered by Sep. 15, 2010. As with the

¹<http://mturk.amazon.com>

²<http://pittsburgh.craigslist.org/>

interview data, one author coded the diary entries and categorized them by common themes.

2.4 Survey 2

Based on results from the preceding online survey and subsequent interviews, we designed a survey to focus on specific aspects of regrets. In survey1, the interview study, and the diary study, we did not focus solely on users who had regrets on Facebook. For this survey, however, we asked people to take our survey only if they had posted something on Facebook and later regretted it.

2.4.1 Questions

The second survey contained 34 questions. We began by asking survey participants “Have you ever regretted posting something (status updates, pictures, likes, comments, locations, etc) on Facebook? For example, have you ever posted something that you felt bad about later or wished you hadn’t posted?” We then asked how many times they regretted posting on Facebook in the last 12 months. In order to help participants recall specific details about their regrets, we asked them to think about the one posting that they regret the most and then answer the following questions with respect to that post. We then asked the participants several multiple-choice and open-ended questions to learn about their post, specifically: why the post was made, what happened after the post, when the regret occurred, the reason(s) they regretted the post, how much they regretted it, and what they did in response to the regret. We also asked about the participant’s mood when he or she posted the regrettable content (e.g., very happy or sad) and whether they were under the influence of drugs or alcohol. The list of survey questions can be found in Appendix A.

2.4.2 Procedure

As with survey1 (see Section 2.1), we hosted this survey on SurveyGizmo and recruited adult Facebook users in the United States who had regrets on Facebook. The survey was deployed on MTurk for about one week in early March 2011. We paid each participant \$0.50. We followed the same methodology to detect suspicious responses as in survey1 (see Section 2.1.2). After filtering out suspicious respondents and those who did not report any regrets on Facebook, we had 492 valid responses. There were 216 male respondents (43.9%) and 276 female respondents (56.1%). The average age of respondents was 28 years old ($\sigma=8.6$). Compared with the sample of survey1, the sample of this survey was younger and more male.

3. RESULTS

The results that we report below include data from the interviews and user diaries as well as answers to several regret-related open-ended questions in survey1 and survey2. As with the interview data, we coded the free responses from the two surveys and categorized them post-hoc to produce a list of common themes.

Our initial study was a three-part study consisting of a survey, and interview/diary study. For these initial studies, we recruited Facebook users regardless of whether they had any regrets. Some of our studies gather data on both the regrets of our study participants (first-party) and the regrets of friends of our study participants (third-party). We had a total of 340 participants from these initial studies including 321 survey respondents, and 19 participants in the interview/diary study. We found that 66 out of 321 survey respondents (21%) and 11 out of 19 (58%) interview/diary participants reported having first-party regrets. For the remainder of the paper we discuss only those participants who reported first-party regrets.

To protect the privacy of our research participants and to differentiate between studies, we use anonymous identifiers. The 11 participants in the interview and diary studies are denoted with P#. For instance, we use P1 to represent the first interviewee (and diary participant). Survey respondents are not identified by number. Instead, we specify which survey the data was from when we report it, e.g., “a survey1 respondent said . . .”

3.1 What Do People Regret Posting?

In this section, we focus on participants’ responses to questions of the form: “Have you posted something on Facebook and then regretted doing it? If so, what happened?”

3.1.1 Sensitive Content

Our participants reported several types of sensitive content that they regretted posting. We loosely categorize that content here. In some cases, e.g., illegal drug use, merely posting this content is enough to cause regret. In other cases, sensitive content can be part of a deeper cause of regret. For example, we find that profanity can sometimes be offensive on its own or it can be used to insult others.

Alcohol and Illegal Drug Use

Many participants regretted posts about drinking. One survey2 respondent said, “I posted photos from a party that got a bit out of hand, and the photos were not very flattering. What bothered me was that I realized I posted them and my profile was public and other people could see them.” He then explained why he posted them: “. . . out of habit; after an event with friends most of us post the photos.” This quote suggests that the culture and norms of a person’s social circle play a role in one’s decision to post. In this case, most of the participant’s friends post event photos.

If such posts are the norm, why did this participant regret it? He said, “I realized they weren’t something I wanted other people to see that didn’t know me, because they’d get the wrong idea.” This highlights the issues of unintended audience (in this case, people who did not know him) and impression management. He felt uncomfortable because these photos might lead to a particular impression that violates how he wants himself to be perceived by others. He also said, “one person asked me to remove the tag of their photo.” These posts can also violate others’ self-representations.

Some regrettable posts mentioned illegal drugs. One survey2 respondent said, “I regretted posting a picture of me smoking marijuana at a party. People in my family seen it and other people I didn’t want seeing it.” He posted it because “I thought it was cool at the time. I had an I didn’t care attitude.” He regretted posting because it embarrassed others: “Certain people around me give me a sense of disapproval when I was around them. My mom for example told me it was embarrassing for her.” Sometimes just a mention of drugs can cause trouble. One survey1 respondent said, “I posted a music video of a song called ‘I’m just a girl that you lost to cocaine’ and my parents were concerned I was using drugs, but they never listened to the lyrics of the song, which were actually about a girl leaving a boy who was addicted to drugs.”

The consequences of these posts can sometimes go beyond a problem of image. One survey2 respondent said “It was a photo that had underage drinkers in it. I thought no one in authority would see it . . . [as a result] some one lost their job from it.” Photos involving underage drinking were a common source of regret among our participants.

Sex

Posting sexual content was another common issue. P7, an artist in his forties, told us about a conversation (a status update and then

comments) he had with a friend on Facebook: “She said something like whenever the divorce is finalized, I should come out to New Mexico and we should have a party. And I said what will the party entail. And she said I was thinking of a lot of alcohol. And I said I was hoping for [sex].” He then told us at the time he did not think about it, but in hindsight he would not want his mother or young Facebook friends to see it.

Sometimes, people accidentally post sexual content. One survey2 respondent said, “I accidentally posted a video of my husband and I having sex ... I didn’t mean to post it, I had accidentally clicked on the video of my daughter taking her first steps and on that video and they both uploaded together ... I didn’t know I had posted it until the day after, when I logged on again, and saw all the comments from all of our friends and family, and my husbands coworkers (he’s in the army).” She regretted posting “because it was a personal video between my husband and I.” In this case, the posting was an accident, and not a result of failing to foresee consequences.

Religion and Politics

People can specify their religious or political beliefs in their Facebook profiles. However, posts that express these beliefs can cause debates, offend people, and damage relationships. One survey2 respondent said, “[I posted] my beliefs about religion. Because my name was also tied to my business, people who disagreed with my beliefs about religion took action against my business ... My business was given bad online reviews.” Another survey respondent said, “I got in a religious debate on Facebook. I did delete my comments but several people dropped me as their friend.”

P5 is a volunteer in a local church. When we were going through his photos on Facebook, we saw pictures of some people in his church getting baptized. He told us: “... I posted some of the photos and tag her name, later on either the tags were removed by themselves, or some of the people just warned against me on this, that is if you want to post them online you’d better ask for their permissions.” Later, P5 noted in his diary that “originally I set the privacy settings on photos as ‘friends of friends’, but I think it doesn’t make sense, so I switched it to ‘friends’.”

Another reason why people post about religion or politics is because they want to share their opinions. But sharing one’s religious or political belief can be perceived as pressuring others to have the same belief. For instance, one survey2 respondent said, “I agreed with a political statement made by a friend and reposted it on my own status ... because at the time I agreed with it. Even though I agreed with it, I partly regretted it because making statements about religious or political things are a fine line. I have my beliefs but I would never want my friends or family to think I was trying to force my beliefs on them. I was afraid some of them might think that.”

Profanity and Obscenity

Postings with profanity or obscenity can be a cause of regret. One survey2 respondent said, “I said something along the lines of Hey Bob at ST, stop treating us women like trash ... fuck you!” The profanity is often a result of the users’ mood at the time when they posted the content. In this case, the respondent explained, “I posted it because I was very angry. He is a customer at my place of business and hates women ... I was only venting my frustration.” Another survey2 respondent reported, “It was a status update that said that I hated someone I used to love very much in the past. It said word by word, ‘I fuckin hate you! You will never be loved again you anorexic piece of shit!’” We can sense his emotion as he explained why he posted it: “I posted it because I was upset at [her] because she broke up with me.”

Sometimes profanity causes problems of impression management. One survey2 respondent said, “Posting anything with a swear word in it now that I’m friends with my family. I’ve done this a couple times, and when you do it from your phone, you can’t delete right away!” He attributed this to a “spur of the moment decision” and explained, “It’s inappropriate for my family. ok for friends, but not family or church friends.”

Personal and Family Issues

Sometimes people share their personal issues to gain support, but it is tricky to balance how much to share and how much to keep private. One survey2 respondent said, “The status update included a curse and it described a medical condition I was experiencing. I had broken out in hives and I was posting about the discomfort. I don’t think all my friends needed to know about the itchiness and swelling. It was just complaining to everyone ... I regretted oversharing.”

Another survey2 respondent said, “I posted that I was no longer single and I was dating this guy in my class ... I was happy and excited about myself ... People read it and told my parents and they did not approve.” This shows that people sometimes post things when they are in an extremely positive mood that they later regret. On the other hand, sometimes family issues are brought up when in a negative mood. One survey1 respondent wrote, “I did post something about a fight with my husband once and regretted it after he saw it and was offended that I was airing our ‘dirty laundry’ for everyone to see.”

Work and Company

Our participants also reported regrets caused by posting about their work or company in a negative way. One survey2 respondent said, “When I badmouthed my job due to disciplinary I was on for b.s. stuff. My managers are my friends on facebook and ended up ugly at work.” He then explained, “I was mad ... I said it out of anger and not thinking.”

3.1.2 Content with Strong Sentiment

Participants reported that they regretted posting strongly negative or offensive comments as well as in engaging in arguments on Facebook.

Negative or Offensive Comments

People often post negative content because they are in a bad mood, and we heard many accounts of regret due to angry posts. One survey2 respondent said, “posted a negative comment to a man I care about ... emotions high with frustrations lashing out at him when I should instead be more in control ... I regret hurting him especially in writing when I can’t change it later. No back button or undo. It hurts to hurt him so I regret doing it.”

As mentioned previously, bashing one’s company or employer can also be troublesome. Another survey2 participant wrote, “I posted negative comments on the fan page of the company I work for thinking it would be anonymous, but they looked at my page and saw the franchise owner in my friends list and called him and told him. I got in huge trouble, fortunately I kept my job and was able to smooth things over. I was making comments that attacked the way the company hurts its dealers financially as well as our ability to give adequate customer service. I had also posted a picture of a friend/customer in our store on my profile, my wife posted ‘HAHAHAHAHAHAHAHA’ on it and they assumed I was making fun of customers. To try and get them to improve the way they treat us and to improve our ability to help our customers. I was put under a microscope for months, and almost lost my job, and

could have lost the job of my boss for him.” This example illustrates how interaction in the online social environment can cause unforeseen problems. Here, the wife’s comment about their friend was misinterpreted and made the situation even worse.

Arguments

One survey2 participant wrote, “The post I regret the most was a fight I was having with my 25 year old niece. We had a disagreement in her status, and we went back and forth for a long time arguing our points. Although we both took it too far, I feel I could have stopped it up front. I was angry enough to want the world to see that what she was saying didn’t make any sense. Afterward, I just regretted it all. I regretted posting it because it didn’t end up making any difference. My niece still believes she was right, and many other fights broke out because of it. No one contacted me about the post because there was no swearing in it. I ended up taking my niece off my friend list though.” At the time of posting, the participant wanted the argument to be out in public, but she later regretted the sentiment.

3.1.3 Lies and Secrets

Telling lies and revealing the lies of others are another source of regret. In some cases, such as when posts reveal illegal activities such as underage drinking, the consequences are serious. In many other cases the consequences are less severe, leading to misunderstanding and the need for difficult explanations.

One survey1 respondent said, “As an April Fool’s joke, I changed my relationship status to ‘Married’. My much younger cousin didn’t get the joke and told my aunt I’d eloped. A small misunderstanding, but sort of awkward to explain to my parents.” A survey2 respondent said, “I uploaded various photos I took while at a party with friends. These photos varied from group pictures, drunk pictures, and pictures of drinking games. I posted it to share the pictures I took that night with the people in them and with friends that weren’t able to attend. The photos I uploaded got a friend in trouble by catching him in a lie. He promised someone that he wouldn’t drink that night, but a few photos show him with a beer in his hand. Although he never told me to not upload them, I felt bad that I was the reason he got caught. I found out later that through a mutual friend that the photos caused our friend trouble. I then went to ask him about it and apologized.”

3.2 Why Do People Make Regrettable Posts?

In this section, we consider the reasons why Facebook users make regrettable posts. We first describe the intended purposes of the posts, and then we explore why they turned out to be problematic and led to regret.

3.2.1 Intended Purposes

In many instances, users report that they had no specific purpose for posting. In others, they explain the reason behind their posts in order to explain their regrets. We categorize and explain commonly reported reasons here.

“It’s Cool”

Some people reported wanting to be perceived as interesting or unique. However, when the content or behavior described in the post was controversial, this caused regret. One survey2 respondent said, “I posted a photo of me smoking hooka and got in trouble with it from my employer ... at the time I thought it was cool. I lost my job because of it. My boss talked to me about it and told me they did not want that image in the company.” Another survey2 respondent wrote, “I said that I was going to pretend that I was sick

and skip school. I was trying to be cool ... One of my teachers and my family members saw it. I got kicked out of the house because I was already on thin ice.”

“It’s Funny”

Trying to be funny is another source of regret when what was thought to be funny turns out to be offensive. One survey2 respondent wrote, “My post was about the Border Patrol not doing their job. I was trying to make an interesting event sound funny. One of my friend’s husbands is an agent and [my friend] was very offended.” Another survey2 respondent said, “It was a picture of a friend. The person was posing for a picture at a restaurant. The person did not look the best and later was upset that I had posted it because she said it made her look fat. I thought it was a funny picture and would get some laughs. I hurt my friend’s feelings after she told me how she felt.”

Venting Frustration

Users in a highly emotional state often vent their feelings on Facebook. A survey2 respondent wrote, “I posted something about my feelings about an argument I had with a friend. I didn’t mention her by name but it was fairly obvious to those who knew about the argument who I was referring to. I felt the need to vent and get the situation off of my chest. Also, I’m sure a small part of me wanted her to read it and feel bad.” Like the argument mentioned in Section 3.1.2, users want to express their frustration in a public forum, though they sometimes regret doing so.

Good Intentions

Sometimes regrettable posts are made with the best of intentions. One survey2 respondent said, “I posted something about a friend who had gained a lot of weight recently. I hadn’t seen her in a long time and I just thought my friend was pregnant at the time I posted it. I was congratulating her on her upcoming pregnancy. So I asked if she was pregnant and she told me no, she had gained a lot of weight. I felt horrible.”

Another survey2 respondent wanted to provide useful information but then was misunderstood. He said, “[I] made a location check in at a club with some friends ... to let a friend we were waiting for know we arrived. The boyfriend of one of my friends I was with thought she was cheating on him with me and they started to argue. He called me and started to yell that I was stealing his girl. He then broke up with my friend, his girlfriend.”

“I Didn’t Think about It”

When posting on Facebook becomes habitual, people rarely think about why they post things. The following survey2 respondent’s story is telling: “... I was so addicted to facebook! It’s like an involuntary action. You feel something and you express that in facebook.”

Some users also did not think about the potential consequences of their postings. One survey2 respondent reported posting a photo of his underage friend getting drunk and tagging him in it: “I didn’t think his parents would see it, and I didn’t think about any of the consequences at the time.” Another respondent said, “I regret posting a joke a friend told me, that could be thought of offensive to women. I posted it because I didn’t think about who would read it, and I thought it was funny. I think I offended many of my friends.”

3.2.2 “Hot” States

Users often regret things they posted while in a highly emotional state, or while under the influence of alcohol or drugs. One survey2 respondent said, “a few occasions if I was emotional or had too much to drink I wrote some things that were personal that I later took down.” Another survey2 respondent wrote, “I made a very negative post about a local politician because she one of her staffers had written a very generic response to a specific reply. I stated that no one should vote for this candidate for governor because she obviously ‘did not give a damn’ about her constituents ... I was angry at the lack of response that I received from her office ... this politician is a parent in the school district in which I work.”

“Hot” states can lead to a lack of concern for consequences. One survey2 respondent said, “...I told them that they are nothing but a desperate loser. I knew the post would hurt her feelings, and I would probably regret it; however, at that time I just didn’t care.” This respondent actually considered the possible consequences, and foresaw his own regret, but posted anyway.

People sometimes also make regrettable posts when they are in a positive mood. Another respondent wrote, “I cheerily announced my good grades at the end of the term, punctuated with something like ‘Wahoo!’ ... I felt like I was on top of the world and wanted to shower everyone with my joy. It was the most important thing I had posted in the past year. Who cares what I had for dinner or what the cat is doing? I’m rockin’ in college, baby! ... OK, so I just posted one of the coolest things I had done in a long time and for three weeks, no love. No one cared, not even the people who respond to everyone’s posts. I went from feeling like a social butterfly (I totally responded to at least half of everyone’s posts) to a self promoting prick. Yuck.”

3.3 How Posts Become Regrets

In this section we examine various errors that can lead to regret. They often stem from unforeseen or ignored consequences, but they can also be caused by a misunderstanding of SNSs and usability issues.

3.3.1 Unforeseen or Ignored Consequences

Unintended Audience

Users often do not remember or know who might see their Facebook content. In some cases, they were only concerned about their Facebook friends. For example, one survey1 participant said, “I once posted how frustrated I was with an interview and I regretted the minute I pressed ‘share’ because I suddenly realized some former employers were friends to me on Facebook.”

In other cases, they regretted because people beyond their Facebook friends were involved. A survey2 respondent told us, “It was a picture of me and my girlfriend together in front of a Waterfall kissing, nothing obscene or disturbing. I posted it because she wanted to see all the pictures we took from our trip to the waterfalls. I regret posting it because relatives saw the pictures on facebook and started commenting on it. When I thought on restricting the image it was too late because a lot of people had posted on it and the harm was already done. It became some sort of gossip in the small town I live in, especially because I hadn’t told anyone, not even my parents that I had a girlfriend. So the first thing they see is me kissing my new girlfriend, and it is not a good idea coming from a catholic conservative family to let your relatives see this online. They always assume the worst.”

We also heard several reports in which users’ SNS content ended up in the hands of judges and prosecutors. P7 told us that he and his wife were undergoing a divorce and their fight spread into Face-

book: “My wife didn’t pay spousal support ... she posted on her Facebook that she got a job from somewhere. I took a screen shot of that post and gave it to the court and judge can use it as evidence. She was mad and blocked me on Facebook ... My daughter called me and suggested me to change my privacy setting to ‘friends only,’ and I did it.” P12 told us “A friend of mine disappeared, and the police were looking for him. They found his MySpace and I was the last person wrote on his wall. They took my profile to my University ... They knocked on my dorm door and asked me some questions about him.”

Underestimated Consequences

Sometimes users expect a negative consequence but misestimate its severity. For example, one survey2 participant explained: “I posted a photo of me and my best friend. My friend hated the way she looked in the picture and asked me not to post it. I likes how I looked and ‘forgo’ not to post it. I knew my friend would be mad but I didn’t think it was that bad. I regretted posting it because my friend got mad at me and I felt really bad.”

3.3.2 Unfamiliarity with or Misunderstanding of SNS

Relatively new Facebook users tend to have problems understanding the Facebook platform, and experienced users can still be caught by surprise. For instance, one survey2 respondent said he did not know what everyone could see about him on Facebook: “I accepted a friend request from an ex girlfriend. My wife found out about a sexual experience we had together when she posted it on my wall. It was about the night of my birthday we had gotten a hotel room. I reposted to the comment on my wall that it was a fun night and I would never forget it ... I was new to the facebook thing i didn’t know alot about what everybody could see. My wife got extremely angry about it. I regret even bothering with the website totally but now I understand it more.” Another survey2 participant did not realize that it was possible for a friend’s friend on Facebook to see what he posts: “I stated something about daughter’s boyfriend which was observed by him through a mutual friends facebook wall.”

Some users don’t understand that their identities can be tied to their actions, such as the participant mentioned previously who did not anticipate that the negative comments he posted on his company’s fan page would be associated with him.

Other users forget to update the privacy settings on their content. For instance, one user said, “... added some pictures. Didn’t realize that privacy settings needed to be changed.”

Facebook Usability Problems

Facebook usability problems contribute to some user regrets. In one case we described in Section 3.1.1, the user accidentally posted a sexual video of hers: “I didn’t know I had posted it until the day after.” Facebook could better prevent users from making these types of mistakes if they provided clear feedback on content being posted. In another case we mentioned in Section 3.1.1, a user said that when he posted things from his phone, he could not delete them. Users expect the same functionality from Facebook on every platform.

3.4 How Do Users Avoid or Handle Regrets?

Users on social network sites often employ strategies that help protect their privacy, avoid regrettable actions, or alleviate the negative effect of a regret.

Rules for Information Sharing

Many of our working respondents talked about disentangling different contexts of their lives on Facebook, especially separating their professional sphere from their personal sphere. For instance, P10, a part-time teacher, told us that he is concerned that some of his pictures on Facebook might be seen by other teachers (for example, he showed us a picture in which he was not wearing a shirt). One survey1 participant said, “I try not to put anything up that a coworker couldn’t see.”

Another common rule is based on social rank or age, especially common among our younger respondents. P9, a 23-year-old professional, said that he does not want his parents, uncles, and aunts (older family members) to read about his personal life and emotional feelings on Facebook. He said his comfortable audience age range is 20-35. P15, an 18-year-old student said age is a big factor for her and her comfortable audience age range is 18-25. Similarly, P16, another 18-year-old student said her comfortable audience age range is 16-29. P2, a mother of four children advocated for age-based privacy controls such as age verification and even settings for her daughter’s Facebook such as “people older than her age cannot see her profile.”

Older participants tended to adopt an even simpler rule. P1, a 55-year-old unemployed man said, “my ideal privacy setting is binary, either anyone on Facebook can see it or nobody can see it. Fine-grained control is too complicated and I trust my integrity, taste and self-editing.” P3, a 47-year-old small business owner, explained her simple rule of thumb: “if I cannot shout it out in the middle of downtown, I’d not say it online.”

In addition, our participants mentioned a wide range of proactive and reactive measures such as rejecting requests, self-censoring content to be shared, untagging photos, deleting posts or comments, reading but not posting content, selecting private or offline communication channels, configuring privacy settings, using multiple accounts or fake names, and following friends’ or parents’ advice.

Delay

Some users commit themselves to a delay before posting content they might later regret. One survey1 respondent said, “I don’t post anything that I wouldn’t want others to read. If I think it might be questionable, I wait until the next day and reconsider if I want to still post it.” Another survey1 respondent said, “i think about posting things alot before doing so.”

Decline or Ignore Requests

The majority of our study participants report that they reject friend requests if they do not know or recognize the person. P12 said, “I have to know you to accept the friend request.” Some respondents also report taking advantage of the ability to ignore requests. P13 told us, “There was a request from one of my co-workers’ husband. I continue to ignore the request because this person’s demeanor has always been a little odd and off-putting . . . I put it in limbo, because you can tell if someone rejects you. I didn’t want to offend the person . . . I will probably have it in limbo indefinitely.” Sometimes, respondents even reported friend requests to Facebook. For instance, P4 wrote, “4 people I did not know and they gave no indication of playing the games I play, and I reported one of them, would have reported the others but I was too lazy.” People also reject group invitations. P13 has a friend who requested her to join a controversial group that advocates for legalization of marijuana: “I spiritually support what you do, but I’m not gonna associate myself with that group.”

Self Censoring

As P12 said, “I’m very careful what I write [on Facebook],” many respondents claimed that they are actively self censoring. For instance, P4, a 56-year-old usher, is a heavy gamer on Facebook but she does not like her professional friends to know she plays games. She commented, “I’m not doing anything that’s gonna harm me . . . I use my own discretion. Most of the time, I don’t post from games.”

Self Cleaning

Many respondents reported deleting regrettable content after posting. One survey1 respondent commented, “I go back and delete them every time after I happened to post it.” Untagging photos is another common form of self cleaning. For instance, one survey1 participant said, “I’ve had to untag some photos of me (nothing terrible, but no one needs to see my slightly tipsy face).” P12 also told us she removed her tattoo pictures and drinking pictures.

Apologize

If a user’s post offends others, they sometimes apologize in addition to deleting the post. A survey2 respondent said, “I removed the post as a result and apologized.” Others decided to make up excuses. For instance, a survey1 respondent said, “I’ve tried to delete it but it was there to stay. Normally I’ve made up excuses as to why I posted it.”

Read but Not Post

Some participants went so far as to not post any content on Facebook. For instance, P13, a lawyer, told us she has friended other lawyers and even judges on Facebook, therefore she is very cautious about her postings and rarely posts status updates or comments on Facebook. In fact, we noticed that during the 18 days of her diary, she only posted once about a news story.

Select Appropriate Communication Channel

Some participants also carefully select a communication channel based on the sensitivity of the material. Many respondents reported using private messages frequently. For instance, P13 explained, “Sometimes, when I want to have a conversation with a person, but I don’t want to post on their page, I’d send a private message.”

Use Privacy Settings

All of our interviewees claimed to be aware of the privacy settings on Facebook. Most reported that they check these settings occasionally, and a few reported that they check them regularly. “Friends only” is by far the most common setting among our interviewees, but some users had more open settings like “friends of friends” or customized settings. Both P3 and P12 set their settings such that any friend can post comments but only they can write on their own walls. P13 said that even before she posted anything on Facebook, she changed her privacy settings to “friends only.” P10 was concerned about his high school students seeing his Facebook content. He was considering putting this group of high school students into a group and hiding his posts from this group, but he had not yet done so. He thought grouping friends would be a good way to manage his privacy.

On the contrary, P1 ignores privacy settings and self-censors. He told us about a lesson he learned the hard way: “a reply to an email that I commented about my ex-wife and it went to over 2000 people in [my company], I was embarrassed. I hit the ‘reply all’.”

Multiple Accounts for Auditing

Because of the complexity of Facebook’s privacy controls, some participants did not find it straightforward to determine exactly what other people can see about them on Facebook. For example, P11 found Facebook’s privacy controls tedious and overwhelming, and thus he relies on self-censoring and use of a dummy account to see what others can see about him on Facebook. Facebook provides a feature that allows users to see how their profile looks to other users, but some of our participants were unaware of it.

Fake Names or Status

A few respondents use a fake name on Facebook. One survey2 respondent said, “I did not like using my real name to set up an account with facebook, but the family members who wanted me to join did not understand or share this concern, so I’ve felt I had to adapt. Still do not post my plans for where I’ll be, or my children’s real names. The sudden drop in concern for privacy amazes me.”

Friends’ and Parents’ Advice

Sometimes friends or families offer feedback about a user’s posts. P8 fought with his friend over “unhealthy comments.” P9 uses a more diplomatic approach to advise others: “I have seen posts that are offensive, empty, wrong, etc.. I sometimes comment to let the person know, usually through humor.” It is not surprising that some parents watch over their children on Facebook. For instance, P8 wrote, “a good friend told me that she had to remove me from fb because her mom said so.”

4. DISCUSSION

Prior literature has shown a positive association between Facebook usage, psychological well-being, and social capital of users [18]. While this paper focuses on the negative experiences reported by the users in our studies, our research did find many positive experiences.

However, our research also shows that user regrets are not unusual on Facebook. In our first three studies, where we recruited users regardless of whether they had regrets or not, 23% of 340 study participants reported having regrets.

We identified 574 regrets from our participants. Most of these were centered around: consuming drugs and alcohol; sensitive topics such as sex, religion and politics; the use of profanity; venting personal and family issues; comments about work; expressing overly negative opinions or comments; regrets regarding arguments with others; making “bad jokes,” and (9) revealing lies and secrets. These regrets usually have consequences. In Lampe et al.’s 2008 study [30], their interview respondents reported small problems such as minor embarrassment but did not report any strong negative consequences. However, our study reveals not only relatively minor consequences such as misunderstanding and embarrassment, but also significant consequences such as threats to important relationships, e.g., husband and wife fights, and loss of jobs.

In this section we discuss the underlying causes of regrets and the mental models users have for protecting themselves on Facebook. We also compare what we learnt about regrets on Facebook with the literature on real-world regrets. We then provide some lessons for designing tools and interfaces to help users avoid making posts they are likely to regret. We also reflect on our methodology and discuss study limitations.

4.1 Underlying Causes

We have seen from our data that users have many reasons for making posts on SNSs. For instance, a user might post things be-

cause they hope to be perceived as cool or funny. In other words, users sometimes try to present themselves in a way that matches how they want to be perceived by other people. In his influential book *The Presentation of Self in Everyday Life*, sociologist Erving Goffman explains that we “perform,” producing different images of ourselves depending on context, similar to the way actors perform in the theater [23]. For example, we may look or behave quite differently in a business meeting than at dinner with a close friend. This performative aspect of our lives was later conceptualized as “impression management” [45]. This conceptual framework has been used to explain both offline and online behavior. In the domain of SNSs, for instance, boyd and Heer suggest that users’ profiles on SNSs are dynamic performances of their online identities [12].

Impression management theory can be used to understand the problem of unintended audience, mentioned in section 3.3.1. The “wrong” self-presentation was perceived by the unintended audience. For instance, one participant explained his use of swear words: “It’s inappropriate for my family. ok for friends, but not family or church friends.” His comment expresses a desire to convey a different impression to each group.

Sometimes unintended audience becomes an issue when posts are taken out of their original context [9]. Philosopher Helen Nissenbaum has introduced an analytical construct called contextual integrity. She notes that “contextual integrity ties adequate protection for privacy to norms of specific contexts by demanding that information gathering and dissemination be appropriate to that context and obey the governing norms of distribution within it.” A teacher holding alcohol in a school or public context may conflict with its social norms, whereas the same person holding alcohol in a bar during her vacation seems reasonable with the social norms of that circumstance. The problem is that sites like Facebook are becoming what danah boyd calls “network publics” [9] — public places on the Internet, where different conflicting contexts and social norms coexist. We observed that some users posted troublesome content like drinking pictures because most of their friends post this kind of content. Thus, posting pictures of oneself drinking became the accepted norm of those users’ small social circles, but this norm clashes with norms of other contexts. For example, this personal context could clash with the professional context if a user “friends” their coworkers.

Even if a posting was only seen by its intended audience, it could still backfire because users cannot always foresee how others might perceive their postings. Users may not have enough information at the time of posting or they may underestimate the consequences of their posts.

We observed many incidents where people posted things when they were in an overly emotional mood (“hot” state) and later regretted their posts. For instance, one survey2 respondent said “It was, ‘I’m so fucking pissed right now.’ I was overwhelmingly angry at something that had happened, and needed some sort of outlet. At the time, Facebook made sense, for some reason.” We also found that when people were overly happy or excited, they can also post things they later regret. We mentioned one example where a girl posted that she was excited about dating a new boyfriend, but her parents saw the post and disapproved of this relationship. In the social science literature, researchers have shown that being emotional may cause people to behave irrationally. Behavioral economist George Loewenstein showed that visceral influences overwhelm logical thinking and contribute to people being “out of control” [32]. Another survey2 respondent’s experience was a telling example, “emotions high with frustrations lashing out at him when I should instead be more in control.”

Several users' regrettable postings could have been averted if they were better able to utilize Facebook's granular access controls. Usability improvements that take into account users' mental models could help eliminate regrettable posts.

4.2 Mental Models and Protection Strategies

We found that Facebook users take a number of strategies and measures to conduct their impression management, protect their privacy, and avoid regrets or mitigate their negative effects. Our research identifies various mental models of protection and seems to suggest that users at different life stages tend to have different mental models. Young people (e.g., undergraduate students) seem to focus on social rank (e.g., parents, uncles, aunts, and teachers) and age (e.g., comfortable age of intended audience 16-29). Professionals' mental models are primarily geared toward creating professional (formal) and personal (informal) boundaries. Older users (e.g., retired people) tend to apply simpler, more binary models, i.e., either share with anyone or not share at all.

Facebook users' specific protection mechanisms can be roughly categorized into proactive, in-situ, and reactive measures. Proactive measures are measures that happen before users post content, including: rejecting or ignoring friend requests or invitation requests, selecting appropriate communication channels, configuring customized privacy settings, and using multiple user accounts or fake names. In-situ measures occur while users are consuming or making sharing decisions and include reading but not posting and self-censoring. Reactive measures that are taken after the questionable content has been posted or shared include: self-cleaning (e.g., deleting content or untagging photos), modifying privacy settings, and taking friends' reminders. Perhaps the most frequent strategy we observed was simply deleting problematic posts. However, by the time a user deletes a post it may be too late to avoid a negative consequence if the post has already been viewed by other users.

4.3 Facebook Regrets vs. Real-World Regrets

There is a large body of social science literature on regrets in the real world. Here we briefly compare what we learnt about Facebook regrets with some key findings from that literature.

In a recent study of regret among a representative sample of Americans, Morrison and Roese found that the top six life domains that people most commonly regret were: romance, relationships, career, education, finance, and parenting [35]. From our research, the most common Facebook regrets revolved around sensitive topics such as alcohol, sex, politics and religion; relationships; profanity; and negative comments. We also collected a few regrets regarding one's job or company. However, unlike the Morrison and Roese regrets study, we did not encounter many cases of regrets in education and finance. It is important to note that while the Morrison and Roese regrets study examined major life regrets (e.g., I shouldn't have married so early), which may be related to a series of events, actions, or missed opportunities, our regrets study focused on individual Facebook posts, which are more likely to be thought of as one-time incidents with more immediate direct consequences rather than consequences that may be realized over a period of years. Therefore, the two studies may not be directly comparable. However, we can see that relationships are a common topic of regret both offline and online.

Knapp et al. conducted interviews about things that people wish they had not said in the real world, and they found 11 types of regrettable messages: "blunders, direct attacks, group references, direct criticisms, revealing or explaining too much, renegeing on agreements, expressive or cathartic remarks, lies, implied criticisms, behavioral edicts, and double entendres." They also found the rea-

sons people said these things ranged from stupidity and selfishness to humor [29]. Our findings on regretted Facebook postings overlapped with their findings on regrettable messages in that both studies found similar categories of negative comments that tend to cause regrets. However, our study offered a broader list of causes of regrets. For instance, unintended audience seems to be a particularly salient cause of Facebook regrets but not real-world regrets. As we discussed, compared with the offline world, in the online world it is sometimes more difficult to identify one's audience and control the scope of one's actions. Facebook's complex privacy settings can also lead to the issue of unintended audience.

Gilovich and Medvec found evidence that actions generate more regret in the short term, while inactions generate more regret in the long term [22]. Morrison and Roese found support for this as well [35]. Substantial evidence from the real-world regret literature also indicates that people are prone to an "omission bias" in which they tend to favor inaction over action because of the fear of immediate negative outcome of regrettable actions (e.g., [43]). In contrast, our research on Facebook regrets uncovered some evidence indicating the opposite — Facebook users may have a "commission bias" in which the impulsiveness of sharing or posting on Facebook may blind users to the negative outcomes of posts even if the outcome is immediate. This is reflected, for example, in this paper's title quote from a participant who posted about frustration with a job interview and immediately regretted it.

Regret regulation theory suggests that outcome importance (i.e., severity of consequence) heightens any regret [39]. Our qualitative results were consistent with this principle. In general, we found our participants expressed deeper regrets for postings that caused worse consequences.

4.4 Lessons for Design

One of our motivations for studying Facebook user regrets was to inform the design of user interfaces and tools that help users avoid making posts they may later regret. One strategy is to facilitate and strengthen the user's existing coping mechanisms. For instance, even when users applied self-censoring, many regrets still occurred because users did not stop to realize that their posts might be offensive or touch on sensitive topics. A content-based reminder could be triggered when a user posts a message that contains swear words or words or phrases indicative of posts about sex, religion, politics, or other controversial topics.

Lessons can be learned from persuasive technologies (e.g., for encouraging physical wellness [15]) and behavioral economics (e.g., for nudging privacy [4]). For example, behavioral economists have been exploring the use of "soft paternalism" to subtly nudge instead of force people to take actions that will benefit them in the long run [49]. If we could build a tool capable of identifying posts that users are likely to regret, that tool might intervene with reminders or warnings. Or it might delay the posting for a few minutes to give the user the opportunity to reconsider. Further work is needed to determine the types of nudges that work most effectively without annoying users.

Some regretted posts expressed strong sentiments, especially very negative sentiments. Existing sentiment analysis techniques can already detect sentiments with about 80% accuracy [38]. A sentiment analysis technique (e.g., SentiWordNet [19]) could be used to build tools to detect SNS content with strong sentiment and nudge users accordingly. In fact, such techniques have already been used in other online communication domains such as email [3].

The unintended audience problem is another recurring issue. One way to curb unintended audience errors is to restrict the visibility of posted content using Facebook's granular privacy controls,

which allow users to customize their privacy settings for each post. However, these controls are not widely used and they seem to be difficult for users to manage [34]. Because of the large number of friends Facebook users typically have (an average of 130 friends³), users may have trouble remembering who they are. Anthropologist Robin Dunbar proposed that the cognitive power of human brain limits the size of our stable social networks of about 150, known as the “Dunbar number” [17]. Recent evidence suggests that the same principle seems to hold in online space [42, 40]. Besides, data from Facebook suggests that while a user can have a large group of Facebook friends, the size of the core network (i.e., friends that a user frequently interacts with on Facebook) is dramatically smaller. Facebook data scientist Cameron Marlow said “an average man — one with 120 friends — generally responds to the postings of only seven of those friends by leaving comments on the posting individual’s photos, status messages, or wall. An average woman is slightly more sociable, responding to ten.” [1]. It is then not too surprising that many of our participants reported forgetting that they had friended someone because they probably hardly interact with these “friends” on Facebook. For example, one participant forgot that his employer was his Facebook friend and posted about interviewing for a new job.

In addition, privacy settings are often rigidly separated from users’ sharing tasks. Palen and Dourish built on social psychologist Irwin Altman’s privacy boundary regulation theory [7] and argued that personal privacy management is a “dynamic and dialectic process” in which people make sharing decisions contingent upon the constraints at the moment of sharing rather than enforcement of pre-specified rules [37]. Kelley et al. found participants in a laboratory study who were asked to group their Facebook friends created groups that were not very useful when they were later asked to make fine-grained sharing decisions in response to several hypothetical scenarios [27]. Users might benefit from improved interfaces for grouping Facebook friends and specifying fine-grained control, as well as tools that identify friends for whom a particular post might not be appropriate (e.g. suggest blocking an employer from seeing party pictures).

4.5 Methodological Reflections

We adapted our research methodology in an iterative manner. Our initial survey included a few general questions about regrets. Participants usually omitted specific details such as why they posted them or information about the context. Next, we performed a series of interviews, coupled with a diary study. The interviews provided us with rich qualitative data to help us understand larger contexts of these regrets, but each interviewee typically described only one or two regrets in a sixty-to-ninety-minute session. Analyzing each interview typically took an additional two hours. A subset of the interviewees agreed to also participate in a month-long diary study. The diary study did not turn out to be very useful, partly because a vast majority of our participants did not have many regrets that occurred during that period.

Because of the insights we gained from the interviews, we were able to articulate further questions about specific aspects of users’ regrets such as what they posted, why they posted it, what happened after the user made the regretful post, and why the user regretted making the post. We deployed a second survey that included these detailed questions about regrets. The second survey gave us a sea of semi-structured information about user regrets. We received 492 responses that each reported on the posting the participant most re-

gretted. The data from this survey provided more specific evidence about why users posted, and why users regretted their posts.

We also noticed an interesting phenomenon: when interviewees were asked about their regrets, they usually did not explain the nature and reasons of their regrets in detail, but rather described the regrets in general terms (e.g., I was stupid, or it was inappropriate). Even when the interviewer asked follow-up questions, some interviewees seemed reluctant to participate in further discussion. In contrast, on the second survey, participants wrote a large number of detailed answers. Previous research has consistently found that the presence of the interviewer affects an interviewee’s willingness to disclose sensitive information. This effect, known as social desirability bias, can be reduced through the use of confidential, anonymous surveys. In fact, the literature highlights computer-administered surveys as the most successful solution to the problem [50].

4.6 Limitations

Prior research has shown that there is a dichotomy between users’ stated privacy preferences and their actual privacy-related behavior on SNSs [5]. Since our data is mainly self-reported data, it may not always match users’ actual behavior. It would be desirable to complement our survey data with real behavioral data.

Our survey respondents were all recruited from Mechanical Turk and thus our results may not necessarily be representative of the whole Facebook user population. Furthermore, in survey2 we explicitly solicited participants for a study about regrets on Facebook, and then asked them to describe a Facebook regret in detail. Thus, our survey2 sample is likely biased towards participants who were interested in telling us about Facebook regrets, and these participants may have overestimated their regrets. In addition, since almost all of our study participants use Facebook as their primary social media platform, our data may not be applicable to other social media such as Twitter and MySpace.

Our current analysis does not differentiate where on Facebook users post regrettable content. It might be useful to examine user behavior in terms of Bruce Schenier’s taxonomy of SNS data [46]. There are three types of SNS data that are particularly relevant here: disclosed data, entrusted data, and incidental data. Disclosed data is what a user posts on her own page. Entrusted data is what a user posts on other people’s pages. Incidental data is what other people post about the user. It would be interesting to investigate whether users have differing privacy settings, practices, and coping behaviors when they post these three different types of data, and how this may influence the formation and consequence of regrets. Lastly, our current analysis mainly focuses on Facebook posting, but there are several other kinds of behaviors on Facebook that could be regrettable, e.g., adding an application, friending, unfriending, or tagging a photo.

5. CONCLUSION

Previous research has shown that Facebook usage is positively associated with psychological well-being [18]. However, little is known about the problematic aspects of Facebook usage. Our research fills that gap by showing that regrettable postings are not unusual. We devised a detailed taxonomy of regrets and discovered that they are mainly centered around sensitive topics, emotional content, and unintended audience. Furthermore, our results agree with many news stories that report that regrettable postings on Facebook can yield serious ramifications for users.

While our research provides some good insights into the regret phenomenon on Facebook, more research questions arise. For example, are certain kinds of users more likely to take regrettable

³<http://www.facebook.com/press/info.php?statistics>

actions on Facebook? If so, what are their characteristics? What is the long-term effect of regrets on users' subsequent behavior on Facebook? Can we develop models to predict the occurrence and severity of regrettable posts before they are published? These questions and more await future research.

6. ACKNOWLEDGEMENTS

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APPENDIX

A. SURVEYS AND INTERVIEW PROTOCOLS

Protocol for Interviews

Interview Guide

<Date>

<Subject #, gender, age range, category of social media use>

<Recording file>

<Setting>

<How long it takes>

Introduction:

Our research group (CUPS) is studying experiences with and impressions of Social Media in general, and Facebook, in particular. We appreciate you taking the time to talk with us today. Everything we talk about will be anonymous and you don't have to answer anything that you don't want to. Having said that, we really want to hear anything that you think will help us understand your experience of Social Media.

Consent – Get their consent (written or oral).

Recorder (if face-to-face or telephone):

Do you mind if we use a recorder? It will be just to make note-taking easier and you can have us turn it off at any point.

1. Brief Intro

Tell us a little bit about yourself:

- Name
- Your social life – strong/weak ties with family, colleagues, friends, etc. How do you stay connected with them?

2. FB attitudes and usage

Tell us about your FB usage. Where, how frequent, what, and why.

- Tell us what you know about Facebook (the tool/site)? How did you hear about it?

If they use it:

Can you log into FB and show us your homepage? (ensure we turn away or use their laptop, ask for the participant's permission if we can video tape the computer screen without recording the participant's face in the video)

- When/how did you start using FB? What did you expect from using FB?
- How frequent do you use FB, when during the day, for how long? Where do you usually log on FB (home/school/workplace/anywhere/mobile)?
- What do you usually do on FB?
- Tell me about the last time you used it? Is this typical?
- How else have you used it? Is that typical?

Page 1

- Facebook, the company
- A 3rd party vendor, identity undisclosed.
- Government
- Social Groups (like Church, Clubs, Professional Association)

If necessary, probe on each of these aspects:

- Situations when you want to disclose your FB activities/info? Why?
- Situations when you do not want to disclose your FB activities/info?
- Situations you would want to know about that this person's FB activities/info?

5. General privacy attitudes toward FB usage

- Who will have access to your data on FB?
- Do you have any privacy concerns on FB? Explain with examples if possible.
- Have you ever posted something on a social network and then regretted doing it? What happened?
- Why did you regret?
- What do you think might help you not share that content? Or how could this be avoided? (What information do you need to make the decision?)
- Have you seen any posts from your friends on Facebook that you think they should not have posted? Why?
- What do you think might help them not share that content? Or how could this be avoided?
- Have you had anything happen like that?
- What do you consider as “too personal or inappropriate” to post on Facebook?
- Have you ever felt that Facebook invaded your privacy? Why?
- Have you ever felt uncomfortable or embarrassed due to someone learning something about you or your activities on Facebook?
- Have you ever felt uncomfortable when you learned something about someone on Facebook?
- Has something bad ever happened to you as a result of something posted on Facebook?
- Has something bad ever happened to anyone you know as a result of something posted on Facebook?
- Has something good ever happened to you as a result of something posted on Facebook?
- Do you know and/or use Facebook connect? If so, can you explain to me how it works.
- Any other stories/anecdotes you want to share that relate to your FB privacy, or online privacy, more broadly?

6. Practices with FB privacy settings

- Have you ever read the FB privacy policy? If so, what do you think about it?
- Do you know about the privacy settings on FB? Tell me what you know about it.
- Have you ever read or changed it? Are they useful? Do you understand them?

Page 3

- Do you notice any change in terms of your usage pattern on FB? Say compare your usage now with when you first started using it.

- What do you like about FB? Can you give/show me an example?

- What do you dislike about FB? Can you give/show me an example? What was your reaction?

- Did you have any surprises in using FB?

- How many friends do you have? Who are they?

- Do you group your friends? What groups have you created? When and how did you make these groups? (explain the process) Who are the people in each of these groups? Why did you create groups this way? Do you change these groups regularly besides adding people?

Can you show us your friend list? (ask for the participant's permission if we can video tape the computer screen without recording the participant's face in the video)

- Note down how many friends they actually have.
- Who are these people again (i.e. Your relationship with them)?
- Do you hide people/things from the live stream? Do you block people? Do you use suggest to add friends? Do you ignore or reject friend requests?

If they don't use it:

- Why don't you use FB?
- What could be changed so that you do?

If they did use it before but then stopped using it or quit outright:

- Why did you stop using it or quit FB?
- What could be changed so that you would consider resuming your usage?

3. FB Groups

- Are you a member of any groups on FB?
- Any positive or negative experience with these groups?

4. Testing the boundaries

For each of the following audiences in the list, ask how participant would feel having the person know your activities and info on FB:

- Significant Other <first find out if he/she has one>
- Close friend
- Acquaintance
- Parent
- Sibling
- Other family member
- Coworkers/Fellow Students <if applicable>
- Neighbors
- Stranger
- Academic Research

Page 2

- When was the last time you changed it? What did you change, do you remember (please don't go to your settings)? Why did you make the change?

- Do you know FB recently made some changes to the design of privacy settings and some of their default values? How did you hear about it? What do you know about the changes?

- Have you tried the new settings? What do you think about the new privacy settings?

- What do you think about the fact that FB has been adjusting the privacy settings?

- Have you ever complained about FB privacy online? How? (blog/forum/Facebook Groups/send FB team emails)

- Tell me ideally how you want to manage your privacy on FB.

Now, can you show me your privacy settings? (ask for the participant's permission if we can video tape the computer screen without recording the participant's face in the video)

- Note down if they have difficulty finding it.

- Can you walk me thru your settings and tell me your rationale for your current settings?

- To what extent these settings support your ideal way of managing your privacy on FB? What's missing? Any suggestions to improve the privacy control design so it would better support your privacy needs?

7. Usage of other social media tools/sites

- Do you use other SNS or social media tools/sites, e.g., Twitter. What's your experience with them? Do you have any privacy concerns there? How do you currently cope with these concerns/needs?

Compare your usage on different sites:

- Would you post things on FB but not on Twitter, or vice versa? Why?

- Are you more open on FB than Twitter, or vice versa? Why?

- Are you more privacy concerned on FB than Twitter, or vice versa? Why?

- Are there different people that you interact with on FB versus on Twitter? Who are they? Why?

8. Wrap-up

- Would you consider yourself technically savvy?
- Would you consider yourself an early technology adopter?
- How do you feel about Facebook as a company?
- Do you know of Marc Zuckerberg (FB founder/ceo)? What do you feel about him as a person?

Page 4

Diary Study Survey

<Date>

<Subject # >

<Setting>

<How long it takes>

Introduction:

Thank you for participating in our study. For this part of the study, we ask you to answer the following questions on a daily basis. You will be provided with a URL/link to a web form. Please keep the URL private. Your entry to the web form will only be accessible by the researchers.

Your entry will be kept CONFIDENTIAL – only the researchers have access to it.

Questions:

1. What activities have you done on Facebook (FB) today?
 - a. Friend requests. Did you add any new friends? How did you find them on Facebook (e.g., you searched them on FB, or FB recommended them to you, or they sent you requests)? Did you ignore any requests? why? who are the people whose friend requests you ignore?
 - b. Have you posted anything on FB? E.g., status updates or photos. what did you post?
 - c. Have you changed anything in your profile? what and why?
 - d. Have you changed anything in your privacy settings? what and why?
2. Important incidents (you can write down your experience today or in the past.)
 - a. Have you posted something on FB and then regretted doing it? why and what happened?
 - b. Have you seen any posts from your friends on Facebook that you think they should not have posted? why and what happened?
 - c. Did you feel that Facebook invaded your privacy? why and what happened?
 - d. Did you feel uncomfortable or embarrassed due to someone learning something about you or your activities on Facebook? why and what happened?
 - e. Did you feel uncomfortable when you learned something about someone on Facebook? why and what happened?
 - f. Did something bad happened to you or anyone you know as a result of something posted on Facebook? what happened?
 - g. Did something good happened to you as a result of something posted on Facebook? what happened?
3. Anything else you want to tell us about your experience on or musing about FB today?

Online Survey II

Page
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Please answer this survey only if you have posted something on Facebook and later regretted posting it.

Page
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1. Have you ever regretted posting something (status updates, pictures, likes, comments, locations, etc) on Facebook? For example, have you ever posted something that you felt bad about later or wished you hadn't posted?

- ☐ Yes
- ☐ No

2. In the last 12 months, how many times have you regretted posting something on Facebook?

- ☐ 0
- ☐ 1
- ☐ 2-5
- ☐ 6-10
- ☐ more than 10

Page
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Now, please think about the things that you regretted posting on Facebook (status updates, pictures, likes, comments, locations, etc). Choose the one that you regret the most. For the rest of the survey, think about that post when answering the questions.

Page
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3. Describe the post that you regret the most. If it was a status update or comment, what did it say? If you remember the exact words, put them in quotes. If it was a photo or video or something else, describe it.

[free-response text field]

4. Why did you post it?

[free-response text field]

5. Why did you regret posting it?

[free-response text field]

6. What happened after you posted it? For instance, did someone contact you about your post?

[free-response text field]

7. Which of the following reasons best explain why you posted it? (choose all that apply)

- ☐ I thought it was useful or interesting
- ☐ I wanted to congratulate or wish someone happiness
- ☐ I wanted to give emotional support
- ☐ I wanted to share good news
- ☐ I wanted to share bad news
- ☐ I thought it was fun or humorous
- ☐ I thought it would make me look good
- ☐ I wanted to share my feeling or opinion
- ☐ I wanted to tell my friends what I was doing

Page 1

- ☐ Your extended family
- ☐ Your ex-spouse, ex-partner, ex-boyfriend, or ex-girlfriend
- ☐ Your employer
- ☐ Your work colleagues
- ☐ Your customers or business partners
- ☐ Your students
- ☐ Your teachers
- ☐ None of the above

16. Were you under the influence of alcohol or drugs when you made the post?

- ☐ Yes
- ☐ No

17. On a scale from 1 to 5, which of the following best describes your mood when you posted it?

- ☐ 1 - Very negative (e.g., depressed, angry, frustrated)
- ☐ 2
- ☐ 3 - Normal/neutral
- ☐ 4
- ☐ 5 - Very positive (e.g., very happy, very excited)

18. When did you regret posting it?

- ☐ Within 1 minute after I posted it
- ☐ Within 10 minutes after I posted it
- ☐ Within 1 hour after I posted it
- ☐ The same day that I posted it
- ☐ The day after I posted it
- ☐ Within 1 week after I posted it
- ☐ More than 1 week after I posted it

19. What triggered your feeling of regret over the post?

- ☐ I thought about the post
- ☐ Someone else commented on the post on Facebook
- ☐ Someone else mentioned the post privately
- ☐ Something bad happened
- ☐ Other, please explain

20. Did you have any concerns about your post before you posted it?

- ☐ I didn't think about it
- ☐ I had some concerns about it before posting, but I posted it anyway
- ☐ I thought about it, but I did not see any problem with it before posting it
- ☐ I thought about it, but I was not sure

21. What were your concerns and why did you decide to post it anyway?

[free-response text field]

22. What did you do about the regret? (Choose all that apply)

- ☐ Nothing
- ☐ Delete the post
- ☐ Add a comment to the post
- ☐ Apologize to the people who were affected/offended
- ☐ Change my privacy settings
- ☐ Other, please specify

23. Ideally, if you were given the chance to re-do your post, what would you want to do?

- ☐ Post it as is, but restrict it to certain people
- ☐ Change the wording but post something with roughly the same meaning
- ☐ Do not post it at all
- ☐ Other, please specify

24. Has your behavior on Facebook changed since that incident? How?

- ☐ I adjusted my Facebook privacy settings.
- ☐ When I post something sensitive, I adjust the privacy settings for that post.
- ☐ I am more careful about posting on Facebook
- ☐ I post less frequently on Facebook
- ☐ I visit Facebook less frequently
- ☐ I quit Facebook
- ☐ Nothing has changed
- ☐ Other, please specify

Page 3

- ☐ My friends made similar posts
- ☐ I wanted to get some advice
- ☐ I was mad at someone or something
- ☐ I was excited about someone or something
- ☐ I didn't think about it
- ☐ None of the above

8. When did you make that post?

- ☐ In the past week
- ☐ In the past month
- ☐ In the past 6 months
- ☐ In the past year
- ☐ More than a year ago

9. On a scale from 1 to 5, how much did you regret making that post?

- ☐ 1 - Only a little bit, it wasn't a big deal
- ☐ 2
- ☐ 3 - I somewhat regret it
- ☐ 4
- ☐ 5 - I deeply regret it, there were serious consequences

10. Did the post contain any of the following? (Choose all that apply)

- ☐ It contained swear words or profanity
- ☐ It contained sexual content or images
- ☐ It contained pictures or content about alcohol or drug use
- ☐ It contained pictures or content about guns or violence
- ☐ It contained pictures or content about religion
- ☐ It contained pictures or content about politics
- ☐ It contained typos, grammar mistakes, or spelling mistakes
- ☐ It contained sensitive information about my work, employer, or company
- ☐ It contained a lie
- ☐ None of the above

11. How was that post perceived? (Choose all that apply)

- ☐ It was perceived as insulting someone or a group of people.
- ☐ It was perceived as overly negative or critical.
- ☐ It was perceived as overly emotional.
- ☐ It was perceived as revealing too much information about yourself.
- ☐ It was perceived as revealing too much information about someone else.
- ☐ It was perceived as serious even though it was meant to be sarcastic.
- ☐ It was perceived as racist, sexist, homophobic, or otherwise disparaging a group of people.
- ☐ It was perceived as not appropriate for people to view at work.
- ☐ It was perceived as criticizing my work, employer, or company
- ☐ It was perceived as revealing too much information about my work, employer, or company
- ☐ I don't know

12. What were the consequences of that post? (Choose all that apply)

- ☐ It offended someone or a group of people
- ☐ It embarrassed you
- ☐ It was misunderstood by other people
- ☐ You got fired
- ☐ You got into legal trouble
- ☐ It revealed a secret
- ☐ It hurt your relationship with your spouse, partner, boyfriend, or girlfriend
- ☐ Other, please specify

13. Was your post viewed by people who you didn't realize would see it?

- ☐ Yes, but it didn't matter
- ☐ Yes, it caused problems
- ☐ No
- ☐ I don't know

14. Were they your friends on Facebook?

- ☐ Yes
- ☐ No

15. Who were the people you didn't realize would see that post? (Choose all that apply)

- ☐ Your spouse, partner, boyfriend, or girlfriend
- ☐ Your parents
- ☐ Your children

Page 2

25. Our university is designing a free Facebook application that helps you by giving a warning before you post things you may regret later. How likely would you be to use this application?

- ☐ 1 - not at all likely to use it
- ☐ 2
- ☐ 3 - not sure
- ☐ 4
- ☐ 5 - very likely to use it

26. Can you explain why you would, or would not, use the above application?

[free-response text field]

27. Do you use any of the following strategies to avoid posting things that you may later regret?

- ☐ Self-censor while posting content
- ☐ I don't post anything
- ☐ Use appropriate channels to communicate with intended audience (e.g., private messages)
- ☐ Use privacy settings
- ☐ Use multiple accounts
- ☐ Use fake or pseudonymous name to create account and post
- ☐ Listen to suggestions from my family or friends
- ☐ I don't use any strategies
- ☐ Other, please specify

28. What is your gender?

- ☐ Male
- ☐ Female

29. What is your age (in years)?

30. Which of the following best describes your highest achieved education level?

31. How long have you been using Facebook?

- ☐ Less than 1 month
- ☐ 1 month - 1 year
- ☐ About 1-3 years
- ☐ More than 3 years

32. How frequently do you use Facebook?

- ☐ Never
- ☐ Less than once per month
- ☐ Approximately once per month
- ☐ Approximately once per week
- ☐ Every day
- ☐ Multiple times per day

33. How often do you post content on Facebook?

- ☐ Never
- ☐ Less than once per month
- ☐ Approximately once per month
- ☐ Approximately once per week
- ☐ Every day
- ☐ Multiple times per day

34. If you have any additional comments, please write them here.

[free-response text field]

Thank You!
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Page 4