Privacy in Social Networking:

A Usability Study of Privacy Interfaces for Facebook

A Thesis presented

by

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0- ABSTRACT

Social networking websites are at the heart of many college students' lives, and the majority of users disclose vast amounts of personally identifiable information on these websites. Yet, the privacy interfaces for these websites are not well studied. In this thesis, I conducted a usability study with 25 undergraduates users of Facebook to understand both how users value the information uploaded to Facebook and who should be permitted to see each type of information. The study results indicate that users craft their online profiles for their friends despite realizing that adult authority figures also access the website. The most valuable information on Facebook is the same information users consider benign, and the information users consider sensitive has considerably less value. Users will not share profile fields with strangers if they don't control the contents of these fields, and also desire more finely grained control over who can see each part of their profile. We use these results from the usability study and user interviews to create a set of novel interface design recommendations. The goal of these recommendations is to more closely align the privacy capabilities of social networks with users' perceptions and expectations.

1- INTRODUCTION

In recent years, social networking websites have become nearly ubiquitous among teenagers and college students. [13] On many college campuses, over 85% of undergraduates have joined Facebook, one of the most popular social networks. [2] Furthermore, Facebook has the attention of its users. 75% of Facebook users log on at least daily, and the average user logs in 6 times a day. [11] Meanwhile, the majority of users disclose vast amounts of personally identifiable information, often including their birth date, preferences for books and music, and even their address and cell phone number in their online profiles. [10] This information is normally linked to a user's full name, and by default is visible to anyone affiliated with that user's college.

Outside observers who see students posting large amounts of personally identifiable information might assume that these students do not care about their privacy, but this is not true at all. In fact, Facebook users have reacted very strongly to any perceived privacy violations. For instance, when Facebook introduced a new feature in the fall of 2006 that aggregated profile updates a user's friends had made, hundreds of thousands of Facebook users joined in protest, forcing immediate changes in the site's privacy capabilities. Handling users' information on social networking sites thus remains a quite delicate process.

Despite Facebook's popularity and its users' nuanced expectations of privacy, its privacy interfaces have not been well studied. This oversight is particularly unfortunate

since Facebook has some of the most extensive privacy options among social networking sites. [12] As a result, improvements to Facebook's privacy interfaces would set a new privacy standard.

Previous privacy research on Facebook has focused on what types of information users are revealing and how these behaviors compare to their stated attitudes about privacy. [10, 1] All of these studies use a combination of data-mining and surveys as their methodologies. However, the limitations of these research methods prevents us from understanding the *rationale* behind users' behaviors. We know how users behave on Facebook, but not why they act that way. As a result, we cannot create usable privacy interfaces whose capabilities are well aligned with users' goals and expectations.

This thesis works to fill that knowledge gap by performing the first usability study and semi-structured interview of 25 undergraduate users of Facebook. These more informative research techniques delve into undergraduates' attitudes and motivations on Facebook, in addition to their actions.

Our usability study focuses on three major goals, all of which are novel contributions to the research literature on privacy interfaces. First, it seeks to understand the extent to which Facebook users value the information that they and others post on Facebook. Next, it tries to discover both the intended and potential audiences for users' Facebook data. Finally, it field-tests novel modifications to common social networking

privacy interfaces, investigating how these changes affect user behavior. Understanding users in these three ways allows us to more closely align the capabilities of privacy interfaces with users' perceptions and expectations.

Seminal works among the sociology literature help us hypothesize user reactions throughout the usability study. Erving Goffman's concept of the "presentation of self" describes individuals as actors engaged in a dramatic performance of "self" for a specific audience. According to Goffman, a different audience would receive a different performance, and the actor works hard to segregate these audiences so that no one sees conflicting presentations. Facebook's profiles are merely an online version of Goffman's "presentation of self."

As such, when we ask our subjects to choose which parts of their Facebook profile should be visible to different audiences, we hypothesize that subjects will reveal different information to each audience. We also hypothesize that users will insist on having very fine grained control over their profiles based on Goffman's belief that individuals demand complete control of their performance in order to best represent their idealized self.

We further predict the existence of trends and dependencies in the type of information Facebook users reveal to each type of audience, and in the types of data they value in the network. With the results of this usability study and user interviews, we

create a novel set of nine design guidelines for social networking privacy interfaces.

Advances in social networking privacy interfaces have become particularly urgent since social networking sites are becoming both more specialized and more copious, providing myriad opportunities for users to perform their "presentation of self" for distinct audiences. One recent New York Times article described how in a few years, individual topics such as fly-fishing will each likely have their own social networking website. [26] Of course, the audience for a fly-fishing website will be much different than for Facebook, and each of these websites would then require a modified privacy interface to meet its users' expectations. Understanding users' motivations for their actions allows us to make more prescient interface design choices.

Section 2 of this thesis provides a background overview of Facebook, its privacy capabilities, and privacy issues it has raised. Section 3 explores related work from both the computer science and sociology fields. Section 4 explains the experimental design for our usability study, and Section 5 discusses our results in detail.

Section 6 then distills our study results down to a set of nine recommendations for Facebook's privacy interface, and social networking privacy interfaces in general. Section 7 discusses future directions in research, and Section 8 summarizes our conclusions. A number of appendices provide more extensive background info on many of the topics discussed in this thesis, along with a more thorough analysis of our results.

2- FACEBOOK'S BACKGROUND AND CAPABILITIES

Facebook is an online social networking website particularly geared towards college students. It was founded in February of 2004 by Mark Zuckerberg while he was an undergraduate at Harvard University. At first, signing up for the site required having a valid @harvard.edu email address and was thus populated only by Harvard affiliates. Although initially confined to Harvard, the site quickly expanded to other elite universities, though membership was still restricted to holders of valid college email addresses. Most notably, members could only browse the profiles of other users from the same university. However, in late 2005, high school students became eligible to join the site, and 2006 saw the inclusion of the general public.

The site is centered around users' online "profiles," where they can post detailed information about themselves. However, the ability to add friends, message them, comment on each others' activities, and join groups are other essential parts of the Facebook experience. Section 2.1 first explains the choice of Facebook for this research. Section 2.2 then explicates the features of Facebook in detail, Section 2.3 examines its current privacy protection capabilities, and Section 2.4 provides background on major news stories concerning Facebook privacy violations.

2.1- Why Study Facebook?

Although Facebook is one among dozens of social networking websites, it is an ideal testbed for research on privacy interfaces for a number of reasons. First of all, it already has one of the most extensive social networking privacy interfaces, even though the interface is not entirely successful in all regards. [12] As a result, improvements made on Facebook would set a new standard for other sites to follow rather than dredging up issues which have already been solved. Further, Facebook's interface controls a wide range of data types, including detailed contact information, personal interests, billboard posts from friends, and photographs. These myriad data types allow a direct comparison between users' preferences for different types of data. Facebook also recently introduced a high-profile API (application programming interface), allowing third party developers the opportunity to build services that leverage Facebook users' existing data. With these new applications come new privacy concerns because of increased access to users' data.

On the level of scale, Facebook also proves ideal for research. Although MySpace has a larger overall user-base, Facebook dominates among college-age users. In fact, over 85% of undergraduates at most colleges have joined Facebook. [2] College users are excellent subjects because of their unique position between childhood and the working world. Users are often living on their own for the first time in their lives, juggling the inside jokes of their youth with the professional comportment expected during their job search. Indeed, stories of employers and school administrators

discovering inappropriate content in students' Facebook profiles have been widely publicized, highlighting Facebook users' immaturity and the serious consequences that can result. [14, 15, 18]

Facebook is particularly conducive to these misbehaviors because of what researchers have termed its “imagined community.” [1] Because there exists a barrier to joining a college's Facebook network, namely the possession of a valid college email address, users may think of Facebook as a closed community. However, this perception of Facebook as a closed community is “imaginary” in reality since school administrators, professors, and alumni of all ages also hold valid college email addresses. In contrast, MySpace is often perceived as a more open community since anyone can join. Whereas users who reveal personal information to the world on MySpace might best be termed naïve, Facebook users suffer from this “imagined community,” revealing information because they mistakenly believe they are only among friends. [1]

Of course, it is important to compare Facebooks' merits to those of other popular social networking sites. In comparison to Facebook, MySpace offers a much smaller range of data in an average user's profile, and also lacks well-developed privacy controls. Sites like Xanga and LiveJournal center around user journals, or “blogs,” and thus also suffer from this lack of profile data. Friendster has a much less extensive user-base, particularly among college students, and thus is not as widely applicable. Overall, then, Facebook's extensiveness and popularity make it an ideal subject for research.

2.2- Facebook's Features

To understand users' actions on Facebook, one first must understand its capabilities.

2.2.1- Facebook Profiles

User-created profiles are the cornerstone of Facebook. Individuals create one page virtual identities which include their self-reported interests, activities, education and work history, and contact information. A sample profile is displayed as Image 2.2.1-a. The fields in a profile are also described below, listed in the categories Facebook uses. All fields are open-ended text boxes, excepting fields indicated below as {Option A / Option B}. Users need not fill in all fields in the profile. However, past research has found users to be very forthcoming with their information anyway. [10,12]

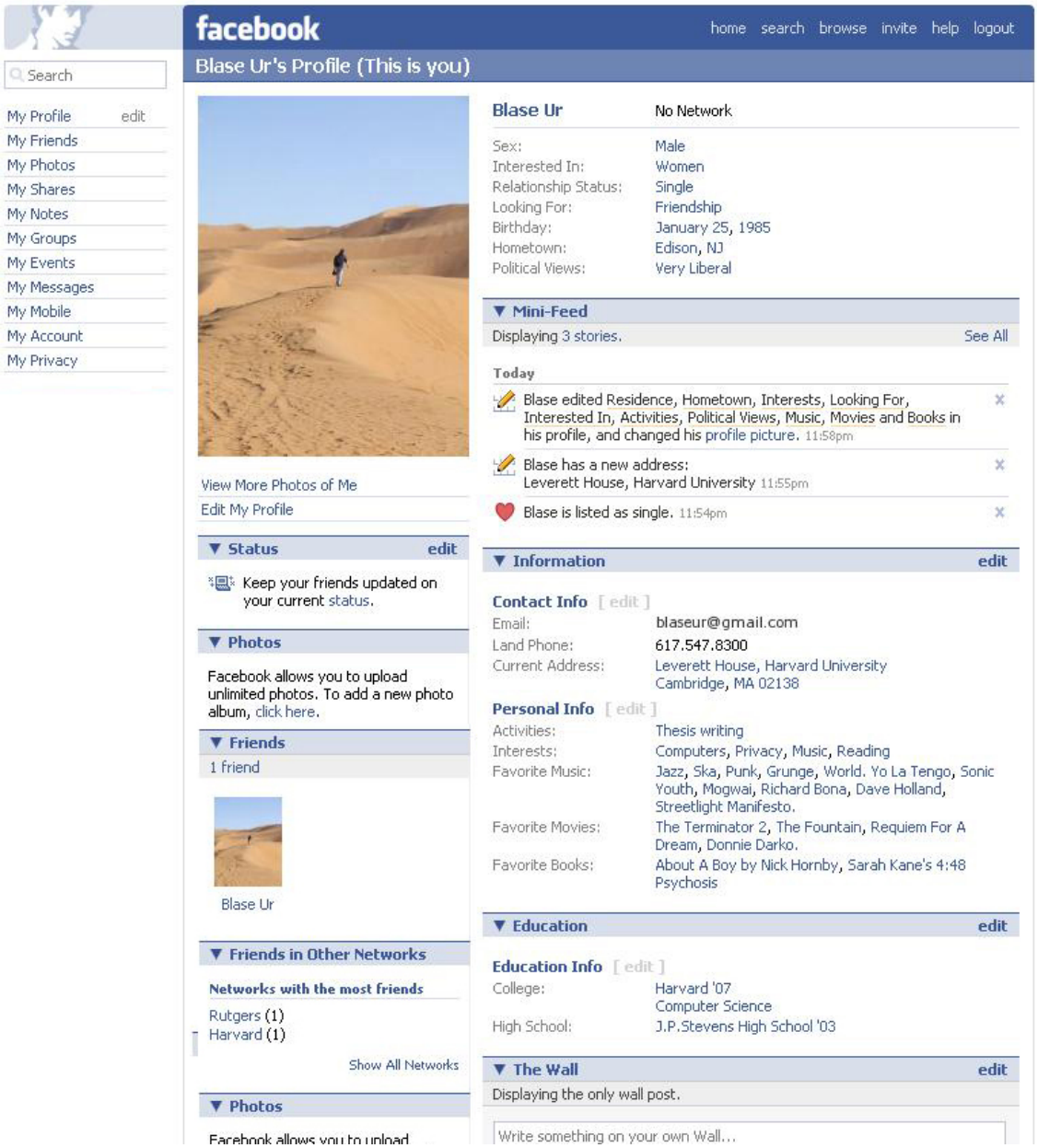

Image 2.2.1-a: A sample Facebook profile. Users provide a picture and list information about themselves and their interests. They can list their friends, 6 of whom are listed on the left-hand side of the profile. Photo albums and groups a user has joined are also listed, but are not visible in this screen shot. Also not entirely visible is "The Wall," a bulletin board on which a user's friends can post messages that are visible to the entire world. The Mini-Feed, a log of recent changes a user has made, is visible near the middle of this image. The above profile does not include all fields a user may fill out, and indeed contains less information than the "average" user's profile. [10,12]

The following types of information may be contained in a Facebook profile. Fields are grouped as they are in Facebook, using the same category names.

*Profile Picture

Users may upload a photo of themselves. This photograph is displayed prominently in the top-left corner of the profile.

*User Information

Facebook provides a wide array of fields in which users list information about themselves. The information in Table 2.2.1-b is termed "Basic Info" by Facebook and is displayed at the top of the profile, adjacent to the profile picture. "Contact Info" is listed further down in the profile (and included here in Table 2.2.1-c), followed immediately by "Personal Info" (Table 2.2.1-d). These categories are used in the Facebook profile, with "Basic Info," "Contact Info," and "Personal Info" serving as content subheadings. It is important to note a linguistic distinction used throughout this thesis. "Personal Info" refers to the group of fields referred to in Table 2.2.1-d, whereas personal info (without quotes) or personally identifiable information refers to any data a user uploads to Facebook.

"Basic Info"
-Sex- {Male / Female}
-Interested In- {Men / Women}
-Relationship Status- {Single / In A Relationship / In An Open Relationship / Engaged / Married / It's Complicated}
-Looking For- {Friendship / Dating / A Relationship / Random Play / Whatever I Can Get}
-Birthday
-Hometown
-State: (and country)
-Political Views: {Very Liberal / Liberal / Moderate / Conservative / Very Conservative / Apathetic / Libertarian / Other}
-Religious Views

Table 2.1.1-b: "Basic Info" that a Facebook user may enter into a profile.

"Contact Info"
-Email Addresses
-Screen Name(s)
-Mobile Phone
-Land Phone
-School Mailbox
-Residence
-Room
-Address
-City
-State (and country)
-Zip
-Website

Table 2.1.1-c: "Contact Info" that a Facebook user may enter into a profile.

"Personal Info"
-Activities
-Interests
-Favorite Music
-Favorite TV Shows
-Favorite Movies
-Favorite Books
-Favorite Quotes
-About Me

Table 2.1.1-d: "Personal Info" that a Facebook user may enter into a profile.

*EDUCATIONAL INFO

Users may indicate their high school and class year, as well as provide information about each university they have attended. For each university, they can include the school they attended, their class year, whether they pursued undergraduate or graduate studies, and their major and minors.

*WORK INFO

Users can post information about each job they have held. Each job allows a user to post their employer, position, job description, geographic location of the job, and time period of employment.

*COURSES

Facebook users who attend school may post their current courses. Clicking on a course in a user's profile shows all other Facebook users who have indicated enrollment in that class.

*STATUS

Users may also indicate a one line "status," which is intended to frequently change with users' moods and conditions. A status might be as simple as "I am at the library," although Facebook users often convey emotional states or random thoughts using their status.

*NOTES

Users can create notes, which are quick journal entries or comments, that will be displayed in their profile. The notes feature can also be linked to a pre-existing blog. Whenever a user updates his blog, that corresponding entry will automatically be posted on his Facebook profile.

2.2.2- Additional Facebook Features

A number of additional features extend Facebook beyond merely a repository for users' profiles.

Facebook users may add other users as "friends." A user's friends are publicly displayed on his or her profile, 6 at a time. Friends may indicate how they know each other, such as through a mutual friend or from participation in the same activity. The main tangible benefit to friendship is an increased capacity for access control, since users may restrict all or parts of their profile as visible only to friends.

One of the most popular supplementary features on Facebook is the ability to upload photos and "tag" friends in the pictures. Users create a photo album and then upload pictures to it, with the ability to add captions. After uploading photographs, the user has the ability to "tag," or identify, users who are in the photo. Pointing the

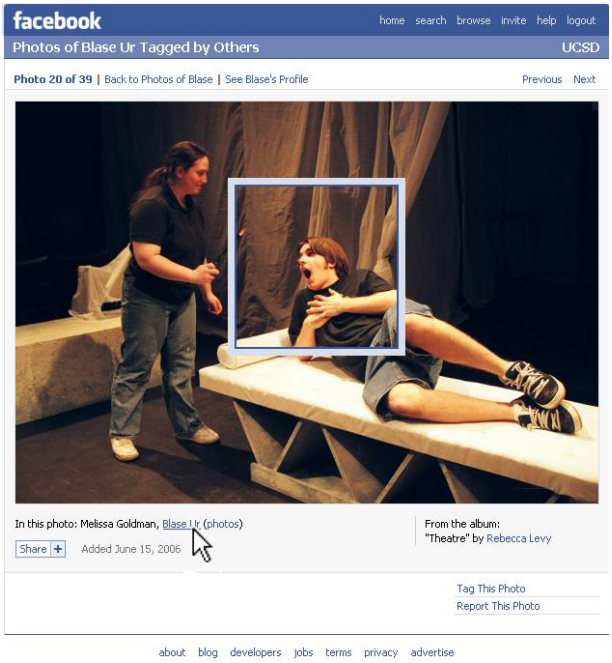

Image 2.2.2-a: A photograph "tagged" in Facebook. The individuals in this photo are "tagged," or identified, by the image's uploader. Passing the mouse over the name of a user places a square over them in the photograph.

computer's mouse at an individual in a tagged photo identifies them by name; pointing the mouse at a user's name in the caption places a square around them in the photo. Image 2.2.2-a shows a tagged photo.

Any photo albums a user has uploaded are visible on their profile, as is an option called "View More Photos Of [User]." The latter option cycles through all photographs in which the user has been tagged. Tags are applied by the photo's uploader, and so the view "View More Photos" option provides access not only to photos in which the user has tagged himself, but also to photos in which someone else has tagged the user. Users

have the ability to retroactively remove a tag, but there is no initial screening process. In other words, if a friend tags an embarrassing photo of a user, that photo is prominently displayed on Facebook until the user logs in to "untag" it.

Looking beyond photographs, users may join "groups," which are bare-bones communities for members who share interests, thoughts, or affiliations. The groups a user belongs to are listed in his profile. Each group has its own profile, which contains a list of its members, administrator-posted news items, a threaded discussion board, and a wall (upon which users may post non-threaded comments). Although groups may parallel student groups, there are also groups which champion causes as global as genocide awareness and as trivial as students who enjoy taking naps.

The "wall" is a feature which resembles a giant bulletin board and is located on the bottom of a user's profile. A user's friends may post messages on the wall. These messages are visible by default to anyone who can view that profile. The wall is, in essence, a public display of messages between users. Messages may be quite general boasts or personal conversations. A user can retroactively delete wall posts, but cannot moderate posts in real time. Example wall posts are seen in Image 2.2.2-b.

Image 2.2.2-b: The Wall is a virtual electronic bulletin board near the bottom of a user's profile. Any of a user's friends may post on his wall. Messages range from more general announcements to fairly personal communications which the sender wishes to publicly display. Wall posts are by default visible to anyone who can see a user's profile.

One of the more controversial features of a Facebook profile is the Mini-Feed, which is a reverse chronological listing of all changes a user has made to his account. In essence, it is similar to an RSS feed in that it automatically lists all updates to the profile. Adding or accepting a friendship, editing any profile field, and joining a group are all events which are indicated on the Mini-Feed. The Mini-Feed is visible in Image 2.2.1-a in the previous section.

All of a user's friends' Mini-Feeds are aggregated into a News-Feed, visible at log-in. From its introduction, the combination Mini-Feed and News-Feed generated large amounts of negative publicity from users who felt that these features violated their privacy. [4,20] After adding new privacy settings to minimize the impact of the News-Feed, though, Facebook administrators have chosen to keep both the Mini-Feed and News-Feed as active parts of the site.

2.3- Facebook Privacy and Access Controls

The privacy interface for Facebook is a tab called "My Privacy," which features several sub-pages. Facebook is particularly notable for its approach to access control, as well as its many options for types of privacy settings. Its privacy controls are among the most extensive of social networking websites.

Despite the number of privacy controls which can be set, none of these settings allows for perfectly fine-grained control. Some profile fields are always grouped together, or in some cases can't be restricted at all. Facebook's "Basic Info," "Personal Info," and "Educational Info" are the three most notable categories whose privacy settings cannot be controlled on a field-by-field basis.

2.3.1- "Network"-Based Access Control

Among social networks, Facebook stands out for its unique approach to access control. Facebook was originally deployed only to Harvard affiliates. Users who wished

to register for the service needed a valid Harvard email address in order to confirm their account. As such, a user's profile was restricted exclusively to others within the Harvard community. When other colleges were added to Facebook, this restriction remained. For example, a Yale student could see the profiles of other Yale affiliates, but could not see a Harvard student's profile unless he added him as a friend. As a result, Facebook earned a reputation as a reasonably closed community. Students who normally would be hesitant to create a social networking profile joined Facebook, attracted by the exclusivity to their own college.

As high school students and the general public subsequently gained access to the Facebook, the idea of limiting access to a profile persisted in the form of "networks." A university was a network. A geographic area was a network. An employer was a network. Facebook users could join any number of networks, revealing their profiles only to other members of those networks. A user could even join a network and choose not to let its other members view his profile. Facebook maintains its feel as a closed community through a series of separate networks even though anyone can create a profile on the site.

2.3.2- Privacy Controls

Facebook has three major types of privacy controls, each with a separate interface.

Under the "My Privacy" tab, Facebook users are able to control who can see the

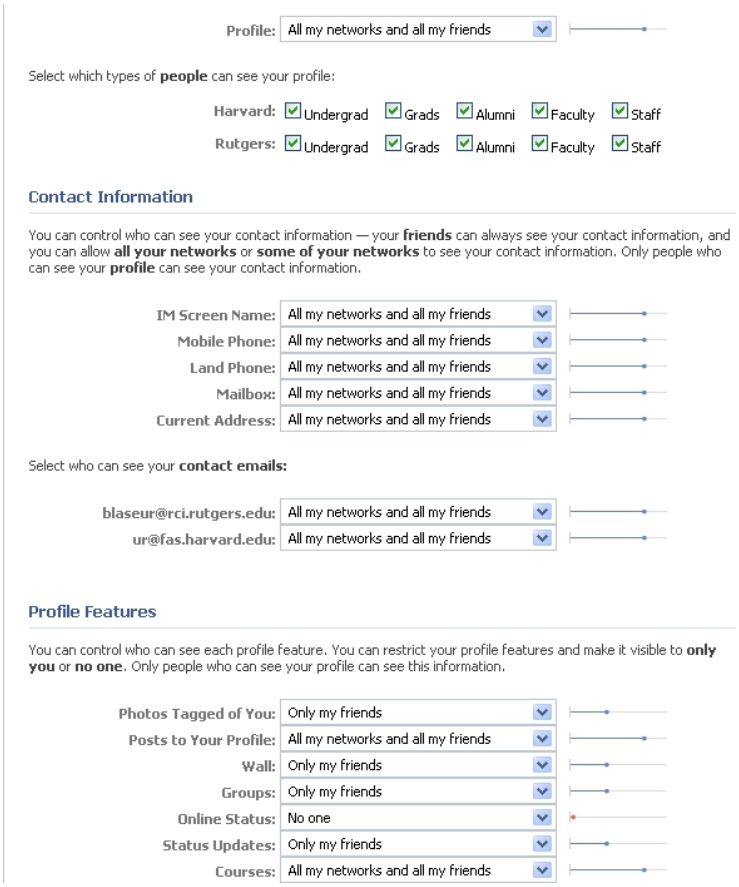

Image 2.3.2-a shows the possible privacy controls for a user's profile. A user's "Contact Info" can be controlled on a field-by-field basis, and a number of special features also have individual controls. However, this interface lacks privacy controls on all other fields in a profile.

information in their profile. Users can choose that everyone in their networks *and* all of their friends should see their profile (which will be referred to as a "public" profile), or can restrict their profile just to their friends (which shall be called a "private" profile).

In Facebook's main privacy controls, users have individual control over all fields grouped under "Contact Info," photographs, the wall, groups, online status, notes, and courses. These fields can be individually restricted to certain networks or just to that user's Facebook friends. However, these are the only parts of a profile which can be

controlled in this way. In particular, a user's "Basic Info," "Personal Info," and "Educational Info" lack not just fine-grained privacy controls, but privacy controls at all. A user's main privacy controls are seen in Image 2.3.2-a.

Limited Profiles are the second type of privacy feature, allowing users to block parts of their profile from a particular group of friends. This option was introduced in the wake of privacy complaints following the integration of high school students into Facebook. Facebook users were accustomed to posting information and pictures appropriate for their college-age friends. Once high school students could join Facebook, college users expressed worry that younger siblings or friends might see inappropriate information or photographs after being befriended. [5] The Limited Profile allows users to keep their normal profile visible to most of their friends, but block certain fields from a certain set of users. Although the Limited Profile allows for controls on "Basic Info," "Personal Info," and "Educational Info," its granularity extends only to the category level. In particular, "Contact Info" no longer has fine-grained controls, but instead is grouped at the category level. This interface is seen in Image 2.3.2-b. The Limited Profile's options thus contrast with Facebook's main privacy controls, which allowed a user to have fine grained access over a few fields in select groups such as "Contact Info" while allowing no control at all in other groups.

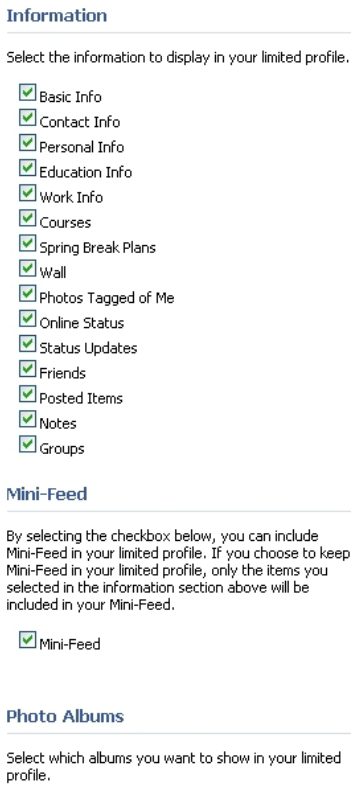

Image 2.3.2-b: The options above can be shared or blocked in a Limited Profile. Many fields in a Facebook profile are grouped together in these settings- for example, all of a user's "Contact Info" can be shared, or all of it can be blocked. However, fields cannot be individually excluded from a user's limited profile. That being said, the Limited Profile offers control over fields such as "Personal Info" which were excluded from Facebook's basic privacy controls.

There is a third separate privacy interface for applications built on top of Facebook using the "Facebook Platform" API, and these settings provide a third unique granularity. Applications to which a user has "opted in" are automatically granted full access to that user's profile**;** this setting cannot be tuned. However, when a Facebook member is using any Facebook application, their friends' data is also by default visible to that application, and this is the situation the Facebook Platform settings control. "Contact Info" is always excluded from the Facebook Platform in order to prevent misuse. The remaining settings for the "Facebook Platform" are similar to those for the "Limited

Image 2.3.2-c shows the privacy interface for the Facebook Platform. These settings are similar to those for the Limited Profile, but provide fewer controls over pictures yet greater controls over relationship status, sexual preferences, and religious views.

Profile," but provide less granularity over photographs, yet individual privacy settings for relationship information, sexual preferences, and religious views. This interface is seen in Image 2.3.2-c.

Facebook's three main privacy interfaces thus present three conflicting granularities of settings. From these interfaces, the ideal granularity for users is unclear. Further, it is impossible to have fine-grained privacy control over many individual fields in all three of these interfaces.

To better understand the ideal setting granularity, this thesis initially gives users complete control over every field before synthesizing the results into more optimized categories. In this way, users are free to fully express their ideal privacy preferences

based on the information they have included in their profile. With this information about users' true preferences, Facebook's privacy interfaces can be designed more in line with users' expectations and preferences.

2.4- Facebook Privacy Issues In The News

As might be expected for any service with nearly universal penetration on college campuses, Facebook has been the subject of intense media scrutiny. Understanding Facebook's privacy flaps provides a view of users' misconceptions about privacy on the social network. Knowing these misconceptions allows for the design of privacy interfaces which automatically safeguard users, making it more difficult for them to act on their misconceptions.

2.4.1- School Administrators

As a website centered around college students, Facebook has provided a false sense of a completely closed community for some of its users. These users post potentially embarrassing or incriminating information or photographs on Facebook, assuming that only their friends will view them. However, college students don't seem to be alone in scouring Facebook. For example, campus police at both Northern Kentucky University and North Carolina State University have charged students for alcohol violations based on photo evidence on Facebook.[8]

Injudicious Facebook postings have even resulted in very serious disciplinary

action. In one incident, two LSU swimmers were dismissed from their team after casting aspersions on their coach over Facebook. [23] Incidents such as these have led to policies among coaches preventing their athletes from using Facebook. One student at Fisher College was even expelled for criticisms of a campus police officer which he posted on Facebook. [11] In each of these cases, students posted information they felt comfortable revealing to their friends. However, it was then seen by authority figures, all of whom legitimately had access to Facebook due to their university affiliations.

2.4.2- Employee Screening

College administrators are not the only adults lurking on Facebook. They are joined by potential employers eager to get an inside look at students' lives. At NYU and Brandeis, even campus employers have admitted using Facebook to help screen job applicants. [11] Threats of widespread use of Facebook by high profile employers have made their way through campus rumor, even ending up in student newspaper pieces. One particular editorial at SMU explained how “the principal issue is that most people do not, or cannot, discern the difference between showing their best friends a photo album of their crazy spring break, and posting those same photos on the web.” [28] Indeed, due to the promise of access control restricting Facebook to affiliates of a university, users often feel comfortable posting their information. They of course forget that everyone from campus police to alumni who help in the hiring process for some employers all likely have valid university email addresses and thus can easily view users' posts.

On the flipside, though, students have begun to realize that some potential employers are actively watching Facebook. This shift in understanding has, no doubt, been hastened by educational campaigns. A number of college career offices have sent out emails or reminders encouraging their undergraduates to use tact when creating or editing their Facebook profiles. [18] Some have even implemented Facebook policies and guidelines. Scared of revealing an unsavory side to potential employers, nearly half of college job seekers in one survey confessed to changing the content of their social networking profiles on MySpace and Facebook to better fit in with their job search. [19]

2.4.3- The Controversial Introduction of the Mini-Feed and News-Feed

In the fall of 2006, new features called the Mini-Feed and News-Feed were introduced to Facebook. Each user's profile suddenly contained a Mini-Feed, a reverse chronological listing of all changes a user made to their profile, new friends that had been added, and new photos posted or tagged. The News-Feed took the Mini-Feed a step further. Located on a user's homepage when they logged in, the News-Feed aggregated all of their friends' Mini-Feed updates. In reverse chronological order, all of these friends' Facebook actions and profile changes would be displayed. For instance- “Alice added Nirvana to her favorite music” might be followed by “Bob is now single,” with a broken heart next to it.

Although all of the information available in the news feed already was publicly available to anyone's Facebook friends, the introduction of the Newsfeed sparked an uproar. [3,20] One Facebook group that professed members' hatred of the News-Feed grew to 750,000 members, or 8% of the Facebook population, within 2 days of the News-Feed's creation. [27] Students characterized the Newsfeed as an invasion of privacy and stalkerish. [4]

That a change only in the accessibility of information would lead to such criticism provides a unique insight into social networking privacy expectations. Individuals post extensive personally identifiable information about themselves online, yet assume that only their friends will put forth the effort to find that information. [10] When employers, school administrators, or even their own friends are revealed to have easy access to their personal information, students feel that their privacy is being invaded. Social networking privacy is thus a study in how user expectations and reality attempt to cohabitate, yet sometimes collide.

3- RELATED WORK

3.1- Previous Facebook Privacy Studies

Despite Facebook's popularity, there have only been two major technical studies of privacy issues on Facebook. These studies, conducted at MIT and Carnegie Mellon, look at the types of information Facebook users share, as well as users' general perceptions of privacy.

In 2005, Jones and Soltren from MIT provided the first examination of Facebook's privacy implications. They performed a detailed analysis of Facebook's design relative to the FTC's Fair Information Practices, and also ran a web spider of the Facebook networks of MIT, Harvard, NYU, and the University of Oklahoma. After downloading all public profiles on these networks, they performed a statistical analysis of what information students were revealing. They also conducted a multiple-choice survey of over 400 MIT affiliates which was designed to reveal users' familiarity with certain aspects of Facebook, in addition to their social networking usage patterns. [12]

Jones and Soltren' major findings are as follows:

*Facebook use is nearly ubiquitous on college campuses. Over 90% of MIT students who responded to their survey stated that they had a Facebook account, and over half of users update their accounts at least monthly.

*Most users share personally identifiable information. The high school a student attended is the most commonly disclosed information, whereas mobile phone number is the least frequently disclosed. Users' full disclosure patterns can be seen in Table 5.1.2 in the results section.

*There is a weak correlation between students in younger class years and disclosing more information.

*Students were generally knowledgeable about Facebook's privacy features (74%), yet a smaller percentage (62%) of students actually used those features.

Jones and Soltren performed a valuable first analysis of the types of information users publicly display on their Facebook profiles. However, since their research methods were limited to a survey and a statistical analysis of posted profiles, Jones and Soltren only discovered how users were behaving, rather than why they were behaving in a particular manner. Since this thesis interviews and studies users on an individual basis, it allows for a much clearer understanding of why users post each part of their profile and for whom they intend this information.

Jones and Soltren's heuristic analysis of Facebook's privacy practices is similarly stunted by the limitations of their method. A heuristic analysis allows researchers to walk through a system and comment on its flaws and possible areas for improvement. However, researchers generally possess extra knowledge of a system, and thus cannot fully simulate a user's typical experience with an interface. The usability study which is conducted in this thesis allows researchers to observe real users' interactions with an interface, creating a more realistic portrayal of a system. Users are also asked to explain their actions, revealing the motivations for many observed behaviors. Finally, a usability study allows variations on an interface**;** as a result, researchers can test how users react to modifications rather than merely predicting the usefulness of these modifications.

At Carnegie Mellon, Ralph Gross and Alessandro Acquisti initially performed similar work. [1] They downloaded 4,540 Facebook profiles of CMU affiliates from Facebook in June of 2005, and analyzed what information these students were revealing.

Gross and Acquisti found that:

*CMU students disclose what the researchers call an “astonishing amount of information.” The percentage of users who disclose each type of information are found later in this thesis, in Table 5.1.2.

*The data on Facebook is of very high quality. 89% of profiles contained the user's real name (matched to their CMU email address), whereas only 8% of users gave a fictional name. Similarly, 80% of profile pictures either identified or semi-identified the user, while only 12% of profile pictures were joke images or unrelated.

Since the methodology of Gross and Acquisti's work is very similar to that of the MIT study, this thesis expands upon Gross and Acquisti's early work in similar ways.

Gross and Acquisti then performed follow-up research in 2006, comparing users' perceptions of privacy on Facebook with their behaviors on the network. [1] They performed a survey of over 300 CMU respondents, and then downloaded each survey respondent's Facebook profile for comparison. In essence, Gross and Acquisti compared a user's actions on Facebook with his stated beliefs.

They found that:

*Non-undergraduates' privacy concerns generally had a visible effect on whether or not they joined Facebook. However, among undergraduates, high privacy concerns did not seem to drive students away from Facebook. They joined anyway.

*Once a member has joined the network, there is very little difference between the amount of information revealed by users who care about privacy and those who don't.
*The majority of Facebook users realize the visibility of their profile, yet a significant minority vastly underestimates how accessible their profiles are.
*Members of multiple social networks trust the Facebook system more than Friendster or MySpace.
*However, the authors explain that the idea of Facebook as a closed community only exists in the imagination of members. Joining a college's Facebook network requires that the user have a valid email address from that college. However, Facebook's permissive default privacy settings and the ubiquity of college-associated email addresses makes this expectation of a closed community merely "imaginary."

Overall, Acquisti, Gross, Jones, and Soltren show that Facebook users tend to reveal large amounts of personal information, yet their methods don't allow them to explain why, opening the door for the work in this thesis.

3.2- Sociological Background on the "Presentation of Self"

Hypothesizing the results of our usability study proved difficult because of the lack of prior work on Facebook. However, while there is a dearth of computer science literature examining users of social networking sites, a rich body of work in the sociology canon touches on many relevant themes. We thus base our hypotheses of user behavior in social networks on the behaviors suggested by these works.

It is very valuable to look at the creation of a Facebook profile as a type of "presentation of self," which is a well-studied sociological behavior. The work of Cooley, Mead, and Goffman, all eminent sociologists of the last century, is particularly relevant.

3.2.1- Explanation of Sociologists' Theories

Charles Horton Cooley's provides a first look at how humans create the "self" in his work from 1902. In his "looking-glass self" concept, humans define themselves by figuratively looking in a mirror and passing judgment on what they see from the point of view of another. [6] An individual imagines how they look to an outside observer, passes judgment on this image from that observer's point of view, and then reacts emotionally to that judgment. This concept is particularly relevant in the study of social networks because it emphasizes the imagined judgment of others as a crucial part of the definition

of self. Social networking users would likely imagine how others would view their profiles, and thus censor their information accordingly.

George Herbert Mead revises Cooley's concept by asserting that the concept of self is developed entirely through interaction rather than any sort of innate sense. [16] The development of "self" is an iterative process of changes based on the interactive responses of others. Mead's work is important to social networks because it suggests that *interaction* with others is quite essential. Social networks are interactive environments, and Facebook in particular offers many opportunities for user feedback, including features such as the "wall." Through these social features, users will continually develop the "self."

Although their individual contributions are noteworthy, Cooley and Mead may be most important for laying the groundwork for Erving Goffman. His seminal *Presentation of Self In Everyday Life* provides the most complete picture of how one creates a "self," and is thus commonly referenced throughout this thesis. Goffman uses a theatrical analogy through his text, portraying the individual as an actor in front of an audience; this audience has expectations for what kind of "self" the actor will portray. At the actor's disposal are props, a costume, a setting, and fellow actors. The actor's setting consists of both a "front stage," where the acting takes place, as well as a "backstage," where the actor generally lets down his guard. Interactions with individuals are performances in which the actor attempts to give the audience some desired impression.

Herein, Impression Management is the attempt of an actor to convey the audience with some particular first impression. It is noteworthy, then, that different audiences thus compel actors towards different performances.

Goffman also emphasizes that an actor must maintain tight control over his performances when switching between different audiences. He explains that "front region control is one measure of audience segregation. Incapacity to maintain this control leaves the performer in a position of not knowing what character he will have to project from one moment to the next, making it difficult for him to effect a dramaturgical success in any one of them." [9] To Goffman, then, knowing what character to project is extremely important in order for an actor to maintain a consistent and correct identity for a particular audience.

3.2.2- The Relevance of Goffman's Work to Electronic Communities

There of course should exist a concern that the work of Goffman and his cohorts is not applicable to the internet age because electronic technology lacks many of the subtle cues present in personal interaction. Indeed, when scholars first considered Goffman's relevance to Usenet, they lamented the inability of Usenet posters to learn about their audience, concluding that it was unlikely that the "presentation of self" was applicable to these early online communities. [7] As scholars then examined personal home pages on the internet, they began to believe that many of Goffman's ideas could

remain relevant on the internet, though the absence of interactivity and unintended subtle gestures in personal home pages might doom any attempt to fully equate Goffman with electronic "presentations of self." [17,25]

However, recent changes in internet communities have eliminated these limiting factors, suggesting that Goffman's work would likely be directly relevant to technologies such as social networks. Social networks are quite interactive, demographically representative of society, and filled with the subtle gestures that are essential for a Goffman-esque "presentation of self." As a result, scholars believe that Goffman's "presentation of self" can effectively be used in electronic communities. [21]

3.2.3- Using Sociology to Create Usability Study Hypotheses

At first, it makes sense to consider a more abstracted application of sociological theories inside social networks in order to provide a broader perspective. Inside social networks, users can be expected to create profiles based on how others will view their words, borrowing from Cooley's "looking-glass self." However, the importance Goffman gives the concept control will likely also influence social networking users. They will want to maintain strict control over their "front region," which on Facebook is their visible profile. Of course, one cannot forget Goffman's conception of multiple audiences.

Social networking users will want to segregate the different audiences for their profile, and create a different performance for each of them.

However, the following hypotheses attempt to more concretely ground these abstractions, and thus form a basis for our usability study predictions:

Hypothesis 1: Users will craft their Facebook profiles based on what they think others would want to hear, rather than trying to create an objective self-portrayal. As such, the profile fields which provide the most vivid representation of a Facebook user are the fields they most craft.

This first part of this hypothesis follows directly from Cooley's "looking-glass self," while the second part simply values the information which most exemplifies the profile. If the profile overall is carefully crafted, the most valuable individual fields will also be the most carefully crafted. Of course, fields which can be carefully crafted reveal information about a user's personality. In contrast, a user's hometown, for instance, cannot be crafted to the same extent.

Hypothesis 2: Users will try to reveal different information to the different groups of people who might view their Facebook profile. Adults in a position of authority, peers who are strangers, and peers with whom a working relationship must be established will all receive different information from users.

The second hypothesis is derived from Goffman's belief that the "actor" will give different performances to different audiences. We hypothesize both that Goffman's belief will apply, and that adults in a position of authority and two different types of peers are sufficiently different audiences.

Hypothesis 3: In order to create different performances for different audiences, Facebook members will want to exert very finely-grained control over each field in their profile, and will want to edit the contents of each field for different audiences.

Goffman believed that the "actor" needed complete front region control in order to segregate his audiences and craft an appropriate performance. In the case of Facebook, front region control involves appropriate control over each piece of information in a profile. Controlling information on the level of fields allows for a large amount of control, and being able to edit fields for each audience provides an even greater amount of control.

4- EXPERIMENTAL DESIGN

Picking up where previous privacy research on Facebook left off, our usability study is designed to better understand Facebook users' motivations, reasoning, and impressions. In particular, the study focuses on three major goals:

*Understanding the extent to which Facebook users value each type the information that they and others post on Facebook.

*Discovering both the intended and potential audiences for users' Facebook data.

*Field-testing novel modifications to common social networking privacy interfaces and investigating how these changes affect user behavior.

Understanding users in these three ways allows us to more closely align the

capabilities of privacy interfaces with users' perceptions and expectations. Section 4.1 describes the design of the usability study and how these design choices work towards the aforementioned three goals and testing the three hypotheses. Section 4.2 then provides demographic information on the users who took part in our study.

4.1- Design of the Experiment

4.1.1- Demographic Survey and Introduction of Scenario

After reviewing a consent form and choosing to participate, each of our 25 participants completes a demographic survey. This survey gathers information not only about their inherent characteristics, but also their past usage of online social networking sites such as Facebook. This demographic survey can be found in Appendix B-1.

Subjects are then informed of the scenario for the study. They are told to imagine they had just enrolled in a class. Their professor likes to stress teamwork in his class, so all of their assignments are to be completed in groups of 4. Unfortunately, very few people in the class know each other**;** in particular, the subject doesn't know any of his teammates. To remedy this, their professor puts together a computerized web interface allowing teammates to see each others' Facebook profiles, all collected on one web page. This application is called the “Teammate Tool.”

We choose a scenario which centers around an academic class for its realism, its familiarity, and diversity of potential audience members. The use of Facebook and other

social networking tools in the classroom is far from unprecedented; a number of professors have used Facebook in their classes. A classroom scenario also possesses two major advantages. First of all, it is not much of a departure from users' normal conception of Facebook. Facebook was created in a university setting, and its most common networks enforce access control by college. As a result, subjects could be studied using Facebook in a fairly realistic and ordinary context.

Secondly, a classroom scenario necessarily includes individuals with significantly different relationships to the subject, and each of these types of individuals could be considered a different audience for subjects' "presentation of self." "Teammates" are defined as fellow students with whom the subject would work closely on small-group assignments. "Classmates" are other academic peers of the same age range, but the relationship between the user and his or her classmates would not necessarily involve any interaction outside of normal class hours. A staff of "teachers" and professors are also present in this scenario. These individuals are older than the students and hold a position of authority.

It is interesting to note that all audience members in this scenario already have access to the university's Facebook network. This study introduces no one new to a subject's Facebook network. It merely makes these individuals' presence more explicit.

4.1.2- First Teammate Tool

The first of two designs for the Teammate Tool is then introduced to subjects on a laptop. It completely mirrors the layout of a Facebook profile, except that each field contains not just one person's information, but four people's. For instance, rather than "Favorite Book" containing just "Lord of the Rings," that field now contains:

"*Subject's Name*: Lord of the Rings

Anna: War and Peace

Candiece: University Physics

Xiao-Yu: On The Road"

Teammates' names are color coded and consistently ordered throughout the tool in order to help differentiate between individuals. For visual clarity, fields which are left blank by any teammate contain a question mark, following Facebook's standard for users who lack a photograph.

The subject's own Facebook profile is automatically imported for the first teammate using a CGI script we wrote. Three fictional identities are used for the other teammates. These fictional teammates are designed to provide a wide cross-section of a student population. The teammates are diverse in their interests, background, geographic identity, ethnicity, and interests in pop culture. The types and amount of information they reveal are consistent with Jones and Soltren's study of Facebook information

revelation at Harvard. [12] Image 4.1.2 presents a screen shot of the First Teammate Tool.

Subjects are asked to take a few minutes to get to know their teammates. They are instructed to say any of their thoughts or comments out loud, particularly concerning their teammates or what these teammates had written in their Facebook profiles.

The First Teammate Tool is designed to elicit subjects' reactions about the value of information currently shared on Facebook, without considering privacy preferences.

In fact, the First Teammate Tool contains no options for setting privacy preferences, or for the user to opt-out of having their profile data used. Of course, the absence of these features is not explicitly mentioned to the subject. As a result, subjects concentrate just on the information they see, the Facebook profile data displayed.

A series of semi-structured interview questions which follow subjects' use of the First Teammate Tool inquire about the most valuable types of information subjects learned about their teammates, as well as subjects' impressions of their teammates and the data they had included. These four questions test Hypothesis 1, examining whether the data deemed most valuable to users is indeed that which can be carefully constructed as part of a "presentation of self." The questions are the first 4 listed in Appendix B-3.

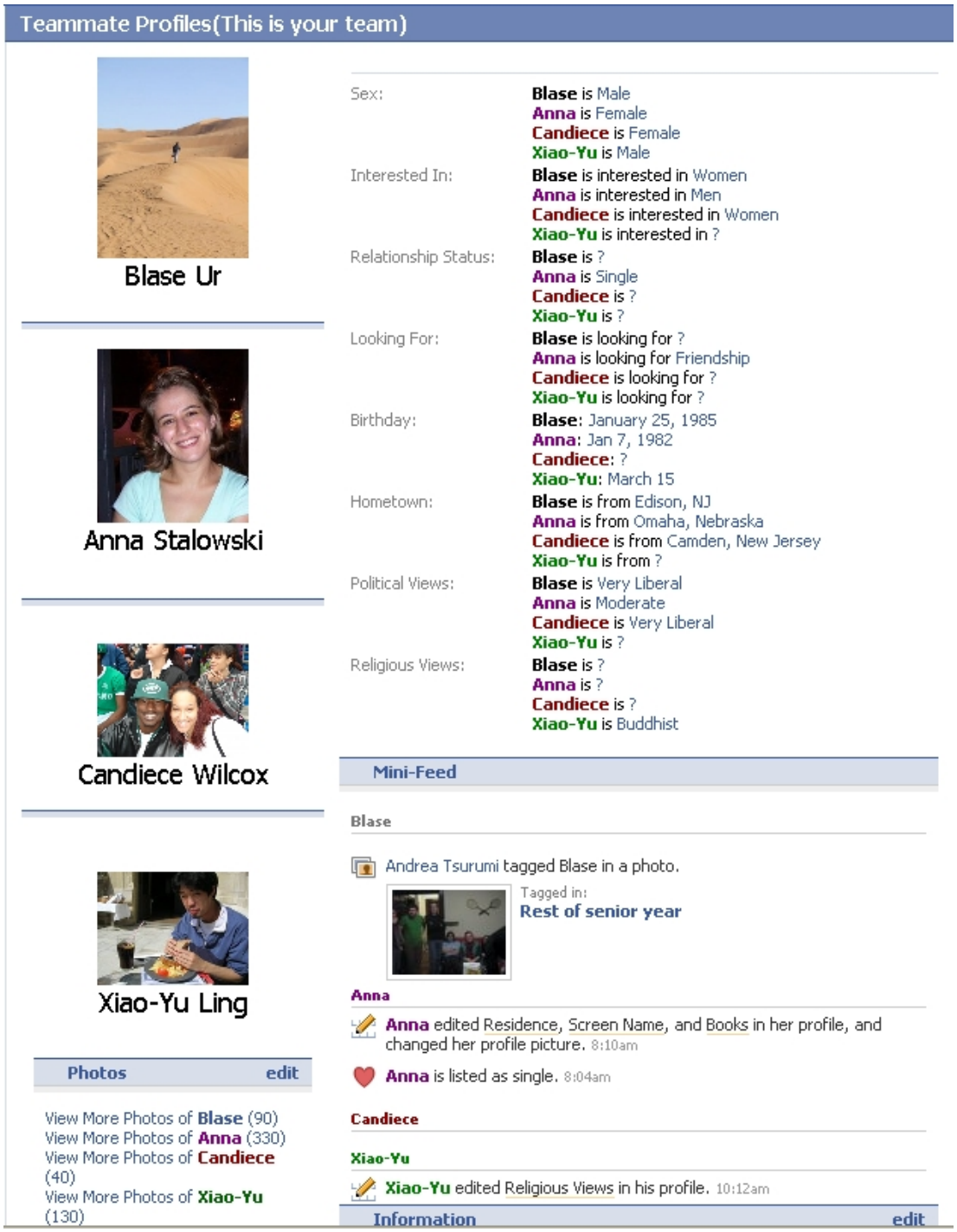

Image 4.1.2: This screen shot examines the first teammate tool. After subjects log in to their Facebook accounts, a CGI script scrapes the information from their profile and then displays the above interface. Teammates 2 through 4 are static, and Teammate 1 is always the current study subject. The layout of the Teammate Tool is identical to a normal Facebook profile, except that each field now contains information for 4 individuals.

4.1.3- Second Teammate Tool

Subjects are subsequently informed that Professor Jones has decided to modify his tool, based on student feedback. The new version of the tool allows each student to choose what parts of his Facebook profile members of the classroom would be able to see and what parts members of the classroom would not see. The Second Teammate Tool is identical to the First Teammate Tool in all other ways. Subjects choose to share their information on a field-by-field basis with:

1- Teammates, Classmates, and Teachers- This setting is the most permissive, with the subject allowing everyone associated with the class to see that information. Although the explicit inclusion of the teacher might call attention to their presence, in most cases it does not grant them any access they don't already have. Indeed, as holders of university email addresses, they can easily join Facebook. Only if the study subject has a private profile would the teacher not already have access to the profile.

2- Teammates and Classmates only- The second most permissive setting allows all of the subject's peers in the class to see his profile, but does not allow the older authority figures (the teachers) to see this information.

3- Teammates only- This setting restricts the information to just the subject's 3 teammates. Teammates are expected to collaborate extensively outside of the classroom on academic matters.

4- Pre-existing Facebook friends only- The most restrictive setting only grants access to the subject's current Facebook friends. This setting is the direct analogue of Facebook's "Private Profile" option.

Subjects are asked to choose with whom they would share their profile information for every field they included in their profile. They are automatically not given the option to select sharing preferences for fields which they had left blank. A partial screen capture of the Second Teammate Tool, replete with its privacy options, is included as Image 4.1.3.

In other words, this revised design of the Teammate Tool adds in privacy preferences, although the term "privacy" is never mentioned until users had completed this part of the study.

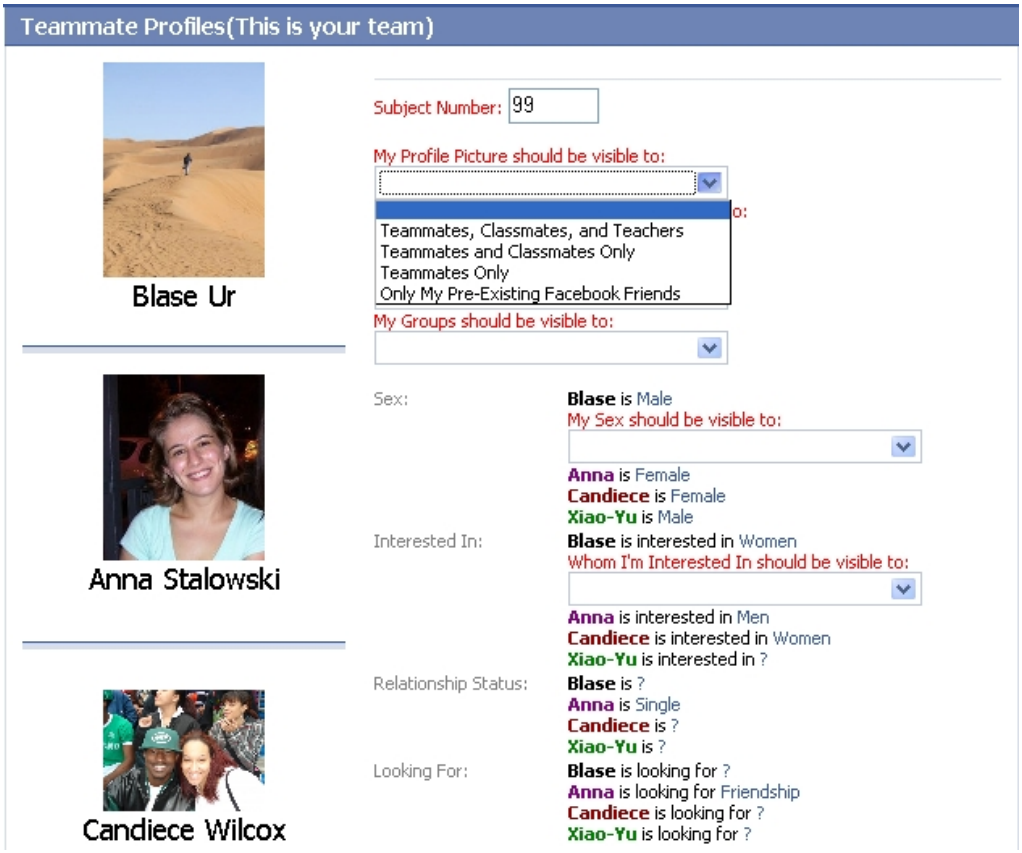

Image 4.1.3: This screen shot of the Second Teammate Tool shows a user choosing with whom he would like to share his information. Fields which he had left blank in his profile automatically omit the option to set preferences. Except for the red-colored sharing preference boxes, the Second Teammate Tool is identical to the First Teammate Tool.

The Second Teammate Tool is designed to test Hypothesis 2 and Hypothesis 3. It assesses what profile information users would want to share with the different audiences in the class. If subjects generally choose privacy preferences which are not uniform across audiences, they support Hypothesis 2. If users choose different settings for fields which are related or otherwise categorized together, they support Hypothesis 3.

Only by investigating a user's idealized preferences on a field-by-field basis are a user's complete privacy wishes revealed. These privacy preferences are then compared to what is possible with Facebook's current privacy interfaces. Again, if these preferences are not possible using Facebook's current interfaces, Hypothesis 3 is supported.

After subjects submit their preferences for the Second Teammate Tool, they are asked to fill out a survey about their experiences with the tool as well as their general perceptions of social networking. The questions about social networking perceptions are included in this later survey rather than in the demographics survey to avoid biasing the study.

This survey is designed to further understand users' perceptions of their Facebook audience and the Facebook site in general. Although surveys had already been used as a methodology by previous Facebook researchers, we decided to include survey questions in order to gather quantitative information about subjects. Questions probe subjects' comfort with different scenarios, and also investigate the extent to which subjects had heard news reports of employers, school administrators, and law enforcement looking at Facebook profiles. Subjects also rate 6 types of audience members on a 7-point Likert scale regarding how comfortable they would be with each group viewing their Facebook profile (1=totally comfortable, 4=neutral, 7=totally uncomfortable). These groups are 1) friends, 2) academic classmates, 3) professors, 4) other students the same age, 5) anyone in the world, and 6) law enforcement/school administrators.

4.1.4- Semi-Structured Interview

As the final part of the usability study, we conduct a semi-structured interview. A semi-structured interview always asks a certain set of predetermined questions in a particular order, yet differs from a regular interview in that the interviewer may ask the subject additional questions. In particular, 3 questions closely probe users' motivations for their privacy preferences in the Second Teammate Tool, and another 4 questions investigate users' preferences for the interface. The full list of questions is included in Appendix B-3.

Subjects' explanations during the semi-structured interview provide a novel insight into the logic behind their behaviors on Facebook. Subjects are questioned about why they set the privacy preferences they did, and also ask subjects to consider changes to privacy interfaces.

The combination of this semi-structured interview and allowing subjects to choose what profile information is visible to which audience members allows for the unique insight and contributions of this thesis.

4.2- Participant Demographics

25 individuals participated in our usability study and semi-structured interview in February 2007. All 25 individuals were undergraduates at Harvard University.

4.2.1- Personal Demographics

9 Males and 16 Females participated in the study. Their ages ranged from 18 to 23. 5 participants were freshmen, 5 were sophomores, 9 were juniors, and 6 were seniors in college. Their academic majors were well mixed. More detailed demographic information is included in Appendix C.

16 out of 25 (64%) subjects reported that Facebook is the only social networking site on which they hold an active account. 6 out of 25 subjects (24%) also had Live Journal accounts, but only 2 of these users (8%) reported logging in with any regularity. 4 out of 25 subjects (16%) had MySpace accounts, but only 1 logged in regularly. 2 out of 25 subjects (8%) had Xanga accounts, but neither was a regular user.

4.2.2- Subjects' Facebook Usage

13 out of 25 subjects (52%) reported having a "public" profile, meaning that anyone in their networks could see their profile. 8 out of 25 (32%) had "private" profiles, meaning that only their Facebook friends would be able to see their profiles. 3 of the 25 subjects (12%) did not know whether their profile was public or private.

Subjects generally had more social friends than academic classmates on Facebook, although this was not a hard and fast rule. 12 of 25 subjects (48%) indicated that their Facebook friends are mostly friends who are not classmates, while 7 out of 25

subjects (28%) had more classmates than social friends. The remaining 6 out of 25 subjects (24%) were split evenly between social friends and classmates. Even though subjects' friends on Facebook were mostly social friends, a large number of academic classmates are also "Facebook friends," lending credence to the classroom scenario as realistic; a classroom audience is only a tiny step removed from the current Facebook.

For the most part, all of a subjects' Facebook friends were very close in age. Only 9 of 25 subjects (36%) reported having *any* Facebook friends at least 5 years younger. However, 21 of 25 subjects (84%) reported having Facebook friends at least 5 years older than them, but only 11 of 25 subjects (44%) had *any* Facebook friends at least 10 years older than them. In short, the vast majority of users' Facebook friends are concentrated closely in age, in their teens or early twenties.

Although Facebook allow access to users of any age, student members of the Facebook have friends who are mostly their own age. The very small age range of their Facebook friends likely feeds into users' "imagined community" of Facebook as a place for students only.

5- EXPERIMENTAL RESULTS

This section recounts and analyzes the results of both our usability study and interviews, using both quantitative and anecdotal evidence from interviews to explain quantitative results. Results are categorized by the hypothesis they address or category of information they augment, rather than chronologically.

A- THE RELATIVE VALUES OF PROFILE INFORMATION

5.1- a) What Information Should Others Include In Their Facebook Profile?

b) What Information Do Subjects Actually Include in their Facebook Profile?

When working with privacy interfaces in the context of social networks, it's important to consider the overall goals and purpose of the interface. Users must first feel that their privacy is protected. However, the privacy interface must avoid hurting the network by restricting access to what users consider its valuable information. For instance, the interface which would most protect users' privacy on Facebook would by default not allow any information to be shared, making users go through a tedious process to share anything with a user who hadn't been friended. Of course, the utility of the network would decrease dramatically if this were the case. Without much information easily accessible, users wouldn't spend very much time browsing Facebook. The ideal privacy interface is thus a trade-off between providing the greatest amount of privacy for users and providing a large amount of valuable information in order to encourage users to browse others' profiles.

Isolating what information is actually considered useful and valuable by users greatly helps in designing privacy interfaces since it identifies what should by default be shared widely. If this information is shared widely even while other information is restricted, users will still feel that there is a lot of useful and valuable data in the network and continue to browse Facebook.

To best understand what information users considered valuable, subjects were first asked to identify what they considered to be the most valuable information they had learned about their teammates, described in Section 5.1.1. These results were then considered in light of the information subject participants actually revealed in their own profiles, described in Section 5.1.2.

5.1.1. Information Users Prioritized about their Teammates

Subjects most hoped that others would share "Personal Info" (interests and favorites) and "Educational Info," supporting Hypothesis 1. "Contact Info," however, was not included among these responses by most users.

One of the earliest questions in the study aims to understand what subjects particularly value about the information on Facebook so that these types of information can always be shared by default. After seeing the first Teammate Tool, subjects were asked, "What is the most valuable information you learned about your teammates?" We expected to see a bias towards academic information and contact information in subjects'

answers since the study indeed was framed in a classroom scenario.

Despite the bias in its favor, academics was relegated to subjects' second most frequently mentioned item; their teammates' **interests and favorites** were most frequently mentioned. In fact, **12 of the 25 subjects** declared that interests or favorites of some kind were among the most important things they learned from their teammates' profiles. Favorite movies was the most frequently mentioned individual field in this set, but was only mentioned 5 times. The majority of individuals just mentioned the abstract category of "interests" rather than any particular profile field.

Subjects viewed a user's interests as a whole to be a window into others' personalities. However, subjects also used common interests as first impressions of their teammates. For instance, Subject 2's first remark during the study was, "Anna and I both like the Beatles. And Anna likes plays. She seems pretty cool." Subject 13 even used his teammates' interests to balance out some of the other information they had included, saying that "Anna, however, is pretty damn cool for someone from Omaha." Subjects overall seemed to appreciate how interests were socially useful yet posed little danger. Subject 15, in particular, enjoyed that books and movies "are fairly innocent topics that could help start conversation."

Academics was the second most popular response, mentioned by **9 subjects**. A teammate's major was the most popular field mentioned within academics, but this

overall result may be caused by the bias of the study. Subject 19 supported this conclusion, stating that she was particularly interested in others' majors mainly because it was a classroom context.

Activities and personal or biographical information were **each** mentioned by **7 subjects**. **Activities** were often deemed important because they would allow better connections between teammates. For instance, Subject 3 characterized his teammates by saying, "One does choir and one does HRDC, so it makes me more comfortable to work with them knowing that." Like interests, activities were a common bond between teammates. However, interests were generally more universal. Only a few subjects shared common activities with their fictional teammates even though the fictional teammates were members of the most popular organizations at Harvard.

In contrast to activities, **Personal or biographical information** was most often mentioned in a negative light. Subject 15 was one of many who commented on the religion and sexual orientation of his fictional teammate Candiece. She appeared to be Christian, and also indicated that she was "interested in" women. A handful of subjects thought that this information would be important to know so that they could censor themselves; Subject 8 even mentioned that Candiece's inclusion of this information made her want to slap her teammate. However, despite the polarizing nature of teammates' personal or biographical information, only **7 subjects** considered this information valuable.

Surprisingly, **contact information** was mentioned only **5 times** by subjects. Even though a bias towards valuing contact information had been hypothesized, subjects still didn't seem to find it particularly important.

In the end, the ability for users to find out otherwise inaccessible information without seeming socially inappropriate led users to appreciate Facebook. Subject 8, in fact, characterized the most valuable information she learned from her teammates' profiles as "the kind of questions you don't normally ask someone." Whereas it would seem normal to ask a teammate for a phone number, asking a teammate for their religion or favorite TV show might be considered inappropriate. However, many of these socially malapropos subjects are contained in an average Facebook profile.

Overall, users find a lot of Facebook's value in the interests and favorites that fellow users list. Fewer users find value in fields such as contact information. As a result, privacy interfaces should prioritize the sharing of fields such as "Personal Info" and "Academic Info" while making contact information less accessible outside of a user's friends. More concretely, it would likely be acceptable to share "Personal Info" and "Academic Info" to strangers by default, but require action on the part of the user to achieve similarly lax settings for "Contact Info.".

5.1.2- Information Users Included in Their Facebook Profiles

Many subjects included "Personal Info," "Educational Info," "Basic Info," and photographs.

It is a valuable exercise to compare the information users valued about others with what they revealed in their own profile. The types of information that study subjects included in their unmodified Facebook profiles were generally consistent with previous results from the December 2005 MIT study of Harvard Facebook users and the June 2005 CMU study of Carnegie Mellon users. [10,12] The methodology of this thesis differs in one important way from the other two studies, though. Whereas they ran a spider of all public profiles at each university, this study looked at a self-selected 25 subject group, some of whom had private profiles which are normally visible only to their Facebook friends. As such, information which subjects might not want to share with the world was still counted as "revealed" in this section. Further, since the sample space for this user study was much smaller, these results should not be considered as statistically representative of all Harvard users, but rather a confirmation that the study subjects display behavior that is typical of Facebook users. A comparison of all 3 studies is seen in Table 5.1.2.

Subjects were very forthcoming with "Basic," "Personal," and "Academic" info, although they were for the most part also very giving of their photographs. More than 80% of subjects revealed their birthday, hometown, gender, college, major, high school,

and courses. Interestingly, 84% of subjects also revealed favorite quotes, and 96% of subjects gave an email address. All but one student (96%) had a profile photo, as well as the option to "view more photos" (any photos on Facebook in which the user had been "tagged" by himself or his friends). 88% of subjects had even uploaded their own photo albums. Given the controversies commonly associated with photographs on the Facebook, it was quite surprising that so many students included photographs, despite the more restrictive privacy settings a number of subjects enacted.

On the flipside, only 24% of subjects revealed religious views, and only 12% revealed what they were "looking for" romantically, their land telephone number, or their address. Religious views have historically been quite controversial, and so it is not surprising that most students would not publicize them. Landline telephones are increasingly uncommon among students, many of whom have cellphones, and it is thus not surprising that most students do not list one. More surprising is the lack of addresses and what type of relationships students are "looking for." There aren't simple explanations for the absence of these fields like there were for landline telephones, particularly since all students would presumably have an address and some sort of relationship preference. It seems likely, then, that students chose not to reveal that information, thinking it was either too personal or irrelevant to their profiles.

Only 1 participant out of 25 chose to reveal no information about her favorites or interests. By category, over half of the subjects revealed favorite music and activities,

and more than 2/3rds of subjects gave favorite movies, books, and interests. As previously stated, 84% of subjects listed favorite quotes. Users are thus quite forthcoming with their interests and favorites.

In short, the very information which was valued by users was also likely to be included in their own Facebook profiles! As a result, privacy interfaces which by default share interests and favorites won't merely reveal information about a select few members**;** most members will have information shared.

Category	*This Study- Harvard February, 2007*	*MIT Study- Harvard December, 2005*	*CMU Study- CMU June, 2005*
Profile Photo	96%	-	91%
“More Photos Of Me”	96%	-	-
Photo Albums	88%	-	-
Sex	84%	76%	-
Interested In	40%	-	53%
Relationship Status	40%	-	69%
Looking For	12%	-	-
Birth date	84%	-	88%
Hometown	84%	-	72%
Political Views	60%	-	52%
Religious Views	24%	-	-
Email Address	96%	-	-
AIM Screenname	28%	46%	78%
Mobile Phone Number	56%	48%	40%
Land Phone Number	12%	-	-
Address	12%	-	51%
Website	32%	-	-
Activities	60%	49%	-
Interests	76%	48%	64%
Favorite Music	56%	51%	66%
Favorite TV Shows	44%	-	-
Favorite Movies	68%	60%	65%
Favorite Books	68%	64%	61%
Favorite Quotes	84%	-	-
About Me	48%	-	-
College	96%	-	-
Major	96%	-	-
High School	88%	41%	87%
Courses	80%	-	-
Work Info	72%	-	-

Table 5.1.2 compares the percentage of users who revealed each type of information in this 25 person user study to the percentages found by Jones and Soltrens' 12/05 study of all of Harvard and Gross and Acquisti's study of all of Carnegie Mellon. Although the sample size for this study is orders of magnitude smaller, the percentages are generally fairly consistent. Outliers are discussed in section 5.1.2 of this thesis.

5.1.3- Users' Motivations for Including Information

Subjects were involved in a "presentation of self" and include information to characterize themselves in some way. This supports the assumptions behind Hypothesis 1, as well as Goffman's basic theories. However, subjects included a fair amount of information in general because that's what is culturally expected on Facebook.

The interview component of this thesis study provided a novel opportunity to understand why users chose to include certain information in their profile at all. Even though no question was specifically designed to investigate users' motivations for crafting their profiles as they did, subjects often recounted this sort of information while responding to other questions. Their comments painted a picture of users who are consciously trying to create an image that would impress their peers, in an environment in which the disclosure of information is expected.

Consistent with Goffman's sociological explanations, subjects very commonly created their profile as a sort of performance reflecting the "self" they wanted to portray to others. For instance, when deciding what to put in her Facebook profile, Subject 17 said, "I was thinking mainly of my future roommates when I first made [my profile]. It was the summer before freshman year. I was thinking, 'I don't know these people, so what do I want them to think of me?'" She chose what to include based on what she wanted others to think of her. Subject 24 used a similar approach in constructing her

profile. She said, “You know people are looking at it, so you put things other people would like, leave out certain things people wouldn't think are cool, or put things up so that other people see them.” Her performance of a “presentation of self” was quite explicit. She considered what her audience would think was cool, and then posted that information so that others would look at it and use that identity to judge her.

Subject 13 even discussed the importance of the finer details of his profile as part of his performance. He explained, “It's not just a matter of thinking 'Do I want them to know that I like this artist,' but I try to balance the overall presentation and the order. Does liking all of these artists reflect me?” Subject 13 is describing the phenomenon which Goffman called “front region control.” Actors use all the tools at their disposal, including props, costumes, and scenery, in order to make a point.

While subjects used their interests and favorites to craft identities as part of their “presentation of self,” they also felt a cultural pressure to include a fair amount of information. Subject 5 described this pressure by explaining, “In Facebook, there's the assumption of reciprocity of sharing information.” She considered it socially unacceptable to omit too much information from her profile, lest she not fit in with others in the network. In fact, a number of subjects complained about their fictional teammate Xiao-Yu for violating this unwritten rule of Facebook. His profile was intentionally crafted to reveal less information than his teammates, although it was far from blank. However, subjects were not accepting of his sparse profile. Subject 18 claimed to be “a

little puzzled about Xiao-Yu" since "he doesn't have much information about him." This subject's use of the word puzzled reveals condescension on his part, since he finds it unbelievable that Xiao-Yu would have left so much information blank. Subject 7 claimed to "wonder why" Xiao-Yu had omitted so much information. Meanwhile, Subject 15 found it "interesting" that Xiao-Yu "didn't put down favorite movies." [emphasis added] The culture of Facebook is one in which members are expected to reveal information about themselves as part of the network, and not doing so violates unwritten rules.

From a privacy interface point of view, two main lessons can be learned from subjects' explanations. First of all, the extent to which users carefully craft even the finest details of their profile suggests that users need a very flexible and thorough privacy interface in order to have control over everyone who can see their profile. When the details matter so much, it is important to be fully in command.

Further, the privacy interface, by default, must allow a certain amount of information in order to maintain a healthy social network. Users include information not just to craft a "presentation of self," but also because it is expected of them. If the default settings on a privacy interface were overly restrictive, the plurality of users who do not change this default setting might create a new standard for information revelation-revealing very little. If this were the case, users would not be tempted to include as much information in their profile, decreasing the network's utility.

5.2- UNDERSTANDING A PROFILE'S AUDIENCE

The importance Goffman gave to actors segregating their audiences led to our Second Hypothesis: Facebook users will want to present different profiles to different audiences. Testing this hypothesis involved not only ascertaining users' intended audiences for their data through interviews, but also allowing giving subjects highly granular control over privacy settings and then investigating what they chose. Section 5.2.1 first looks at subjects' qualitative descriptions of their profile's intended audience, and then the quantitative results of our usability study are presented in 5.2.2. The subsequent sections then consider subjects' explanations of their actions..

5.2.1- Users' perceived audience

Users perceive their audience on Facebook to be their friends. However, they do indeed realize that adults have access to the network. Subjects are not naïve, they merely expect that Facebook should be for students only.

During their interviews, subjects revealed a number of distinctly nuanced impressions of the intended audience for their Facebook profile, yet all of these impressions centered around the idea that Facebook is intended for students only.

"I intended my profile to be seen by peers and not people in positions of authority or adults." With this quote, Subject 7 neatly summed up the attitude of study

participants. Although many subjects realized that adults also had access to Facebook, the intended audience for their profiles was their peers. Subjects 5 and 20 echoed each others' words when they said that they made profiles or posted pictures "for [their] friends." Subject 5 even looked at Facebook more exclusively, stating, "I think Facebook was made on the premise that only other students would be able to look at it." Even though she accepted that non-students were part of the network, she felt that their presence violated Facebook's ideals. Despite the overall awareness that adults were part of the Facebook network, students resisted their presence, with Subject 19 explaining, "I think Facebook is its sort of own very peer-oriented networking tool, and I think some people wouldn't be interested in extending it out of those parameters."

Subjects' conviction that Facebook should be a space for students was quite strong in many cases. Subject 1 characterized adults' presence in Facebook as an invasion of territory, claiming that "the problem is that Facebook is supposed to be a very private institution. Teachers belong to the public school site. When they are on Facebook, it seems as if the teacher came home to your house, like trespassing." To her, Facebook's lack of physical barriers was not an invitation for adults to join. Walking on neighbors' front lawn is rarely physically restricted, yet it is not considered acceptable for an individual to do it. Subjects felt similarly about Facebook**;** adults should not join even though they were able to.

Subject 5 further expanded the assumption that Facebook is for students only, stating, “I think it's assumed that in my profile, I'm writing for a very specific audience- my friends- while if I were writing for a general audience, I'd have a different profile or share less information.” She considered the barrier to others viewing her profile to be ethical rather than enforced through access control. Even though others could see the information she wrote, they shouldn't be looking at it without realizing that it's intended for her peer group. Subject 3 extended this set of ethical barriers to teachers specifically, explaining, “I think that whatever barriers exist between a student and professor are likely to be maintained by a student or professor. One of my [teaching assistants] is on Facebook and has pictures on there, but I never look at them. She would probably perceive the same barrier. Having the information available doesn't mean she's accessing it .”

A complex set of Facebook ethics for student-faculty interactions was also described by Subject 24. She explained, “I'm [Facebook] friends with some of my [teaching assistants]. A couple waited 'til the semester was over, and waited 'til then to friend me, and I thought that was fine. A couple of [teaching assistants] have friended me during the semester, and I think that's extremely inappropriate. One professor is on Facebook and friended his students, and I thought that was pretty creepy. Another professor found out about a Facebook group about him, and asked class if it was appropriate for him to see it since he thought it was a site for students and thought they should say what they wanted on there. We all appreciated that.” These length and

complex distinctions demonstrate students' idea that adults should not interact with students on Facebook while in a position of authority, but that interactions in other scenarios might be fine if Facebook is properly respected as a student social space.

Despite possessing the information to realize that Facebook is not really a closed community, users persisted in creating an "imagined community," as suggested by Gross and Acquisti. Users consciously admitted that teachers were on Facebook and described interactions with them, yet still claimed that Facebook was for students. Subject 6 articulated this contradiction, saying, "I'd feel kind of uncomfortable if I had a professor messing around with my Facebook since it's kind of a personal social thing. Even though it's on the internet, it seems like a personal social thing."

Overall, subjects realized that adults were present on Facebook and able to access their information, yet felt other students were the intended audience for most Facebook profiles. Rather than enabling a physical barrier to prevent professors from seeing their information, subjects hoped their teachers would respect a complex set of implied ethical boundaries.

Privacy interfaces, then, could potentially do a better job of turning these implied boundaries into physical ones. While ethical boundaries have a place in society, enacting actual access control barriers in Facebook would be quite simple. We need only restrict

access to parts of students' profiles, by default, to anyone who is not a student. The gap between users' "imagined community" and reality would thus be reduced.

5.2.2- From Whom Was Data Restricted?

By and large, subjects restricted data from their teachers.

With the knowledge that users create profiles for their friends, it is telling to see what parts of these profiles actually should be restricted to friends, and what parts are generally appropriate for a greater audience. It is well known that computer users often leave the default settings of their computer interfaces unchanged. [22] Understanding the acceptable audiences for each part of a user's profile would allow default settings to better reflect users' privacy wishes.

When subjects were shown the Second Teammate Tool, which allowed them to choose who could and couldn't see parts of their profile, they were asked to choose settings for *each* field. The audience for each field could be:

1- Everyone in the class (labeled "Teammates, Classmates, and Teachers")

2- Only students in the class (labeled "Teammates and Classmates Only")

3- Only a subject's 3 teammates (labeled "Teammates Only")

4- Only a subject's preexisting Facebook friends

Setting 1 is equivalent to the default settings on Facebook, sharing with everyone in a user's network. Setting 2 is very similar to users' "imagined community" on Facebook, restricting access to fellow students in a certain age group. Setting 3 has no Facebook equivalent, although it explores the differences between academic peers with whom there will be close contact and academic peers who may remain at a distance. Subject 4 is equivalent to Facebook's most private settings.

5.2.2.1- Photographs

Users restricted photographs, except for their profile pictures, from most members of the class.

Given the number of news reports of improprieties and scandals involving photographs on Facebook, it was expected that users would be fairly restrictive with them. This turned out to be true. Most participants didn't mind sharing the profile picture they posted. However, 38% of users chose the most restrictive setting for photographs which others had tagged, and 45% of users chose that same restrictive setting for photo albums they had posted. Photo albums were particularly polarizing, as 72% of subjects chose *either* the most lenient or most restrictive setting.

Subjects' comments reflected this same sort of polarization and conflict. Explaining why she chose to restrict her publicly available photographs, Subject 1

compared looking at the photos of users she didn't know to listening in on one of their conversations, explaining, “My friends know me, so there are things a stranger could see and judge me by, which would be weird. Photos and things like that are certain discussions I'd like to keep to myself, even though it's a public forum... [looking at photos of people who aren't my friends is] like me eavesdropping on a conversation.” Although looking at Subject 1's photos and eavesdropping on her conversations are both physically possible, she has an expectation that others will restrict themselves..

Since subjects' preferences for photograph privacy varied so widely, it is fairly difficult to generalize these results. However, an overall understanding of users' preferences must hold that users post photographs for their friends, and then leave these photographs public in their “imagined community” of Facebook. Even merely making a professor's presence explicit causes a number of users to rethink their stance on photographs, restricting them entirely.

As a result, photographs should generally not be shared by default in any application that gives access outside of a user's friends, even if those photos are publicly accessible.

Category	*Visible to all Students and Teachers*	*Visible only to Classmates and Teammates*	*Visible Only to Teammates*	*Visible Only to Pre-Existing Facebook Friends*
Profile Photograph	19 (79%)	5 (21%)	0	0
Other Tagged Photographs ("View More Photos")	4 (17%)	9 (37%)	2 (8%)	9 (38%)
Photo Albums posted by the user	6 (27%)	5 (23%)	1 (5%)	10 (45%)

Table 5.2.2.1 displays whom subjects permitted to see their photographs. Users were highly divided.

5.2.2.2- "Basic Info"

Anyone could see "Basic Info," although relationship status and political and religious views give users pause.

Overall, subjects were very forthcoming with their "Basic Info," as seen in Table 5.2.2.2. More than 80% of subjects had no problem revealing their gender, birth date, or hometown. However, political and religious views found subjects less willing to share their information. Of course, these are two very divisive subjects, so this result is not surprising. Subject 8 verbalized this choice by saying that "politics and religion can be uncomfortable topics," and so she didn't think it was necessary for her professor to see. Religious views on Facebook in general already seemed to show a large amount of self censorship, as only 6 of the 25 subjects (24%) had listed any.

Romantic details also gave users pause, but these fields were also initially fairly self censored. Most users had left romantic details blank in their original Facebook profile. "Looking for" was particularly unpopular**;** only 3 out of 25 subjects (12%)had filled it out. Facebook overall has developed a reputation as "Stalkerbook" as a result of the prevalence this sort of information, so it should not be particularly surprising that many subjects left these fields blank. [24] Although these fields were fairly self-censored in subjects' actual Facebook profiles, many subjects who did include this information permitted others to see it. However, relationship status proved more thorny than the other fields, as 30% of subjects chose to restrict it to just their preexisting Facebook friends.

Because of the permissiveness shown by users with their "Basic Info," it can be seen as relatively safe to default to sharing most of this information, at least among older social networking users and in a fairly closed environment. However, political and religious views, as well as relationship status, were all a bit more controversial, so they potentially should be restricted by default.

Category	*Visible to all Students and Teachers*	*Visible only to Classmates and Teammates*	*Visible Only to Teammates*	*Visible Only to Pre-Existing Facebook Friends*
Sex/Gender	20 (95%)	1 (5%)	0	0
(Romantically) Interested In	6 (60%)	4 (40%)	0	0
Relationship Status	6 (60%)	1 (10%)	0	3 (30%)
(Romantically) Looking For	2 (67%)	1 (33%)	0	0
Birthdate	17 (81%)	1 (5%)	0	3 (14%)
Hometown	19 (90%)	0	0	2 (10%)
Political Views	9 (60%)	3 (20%)	0	3 (20%)
Religious Views	4 (67%)	1 (17%)	0	1 (17%)

Table 5.2.2.2 displays whom subjects permitted to see their "Basic Info." Overall, users were permissive with these fields, with romantic information and political and religious views the most controversial.

5.2.2.3- "Contact Info"

There were few simple patterns for "Contact Info." Most subjects showed everyone their email address, but any other information sharply divided subjects.

Users' settings for Contact Information tended to be very unpredictable, as seen in Table 5.2.2.3. Email Address was the only field where subjects showed any consistency, with 92% of subjects choosing the least restrictive setting. However, none of the other fields had more than a 2/3rds plurality for any setting. Although the percentage of users who chose the most permissive setting was generally fairly large for each field, enough subjects chose other settings that it was hard to find any trends or logic in their decisions. In fact, for AIM Screnname, no more than 29% of subjects chose each setting.

Category	*Visible to all Students and Teachers*	*Visible only to Classmates and Teammates*	*Visible Only to Teammates*	*Visible Only to Pre-Existing Facebook Friends*
Email Address	22 (92%)	1 (4%)	0	1 (4%)
AIM Screenname	2 (29%)	2 (29%)	2 (29%)	1 (14%)
Mobile Phone Number	8 (57%)	2 (14%)	2 (14%)	2 (14%)
Land Phone Number	2 (67%)	0	1 (33%)	0
Address	2 (67%)	0	1 (33%)	0
Website	5 (63%)	2 (25%)	0	1 (13%)

Table 5.2.2.3 displays whom subjects permitted to see their "Contact Info." Overall, users had unpredictable preferences with these fields. AIM Screenname was particularly divided, with subjects almost evenly divided among the 4 settings.

Subject 8 showed a very characteristic vague discomfort with sharing contact information when she explained that "You should definitely be prompted to share your phone number, or address. It's one of those things you should be really careful about." She perceived some threat from giving out her contact info, yet didn't know what it was. As such, it's likely that contact information should be restricted by default from external applications and protocols.

Overall, there seems little compelling reason to share more than, at most, an email address by default. The email address gives others a reliable way to contact the user, making other information unnecessary.

5.2.2.4- "Personal Info"

Most subjects let everyone in the class see their "Personal Info." However a number of subjects display idiosyncratic preferences for particular fields.

"Personal Info," which subjects identified as the most valuable information in the network and the most revealing about users' personality, was widely shared by subjects. Although a fair number of subjects chose to block this information from their professor, preferring to have an almost completely professional relationship with their teaching staff, subjects were otherwise very forthcoming. In fact, over 80% of subjects for each field chose unrestrictive privacy settings. "Personal Info" is some of the most interesting information on Facebook, providing what Subject 8 calls "a pretty good read on someone's personality," yet seems to offer fewer threats for misuse than, say, photographs.

A handful of subjects showed surprising aversion to certain information being shown to professors or even fellow classmates, though. For instance, Subject 19 explained, "I have like *Calvin and Hobbes* listed as my favorite book, which maybe isn't the best thing to be showing your professor." She didn't feel threatened by others knowing that information. However, she wanted to craft her "presentation of self." She wanted professors to judge her differently. Subject 10 also mentioned the importance of others' judgments in her decision, explaining that "it's not necessarily that I think those

things are inappropriate, I thought it was just unnecessary info and potentially could be weird, like giving them too much information about me. Maybe having something frivolous listed under a favorite book would make me seem less intelligent."

Cooley's "Looking Glass Self" contains a particularly telling explanation of this phenomenon. He claims that "we are ashamed to seem evasive in the presence of a straightforward man, cowardly in the presence of a brave one, gross in the eyes of a refined one, and so on. We always imagine, and in imagining share, the judgments of the other mind. A man will boast to one person of an action--say some sharp transaction in trade--which he would be ashamed to own to another." In essence, the particular facets of their personalities that subjects wished to show their friends might have made them ashamed in front of their professor. Subject 19 surely felt her friends would appreciate her inclusion of *Calvin and Hobbes* as a reflection of her personality, yet she wanted to show a different sort of personality to her professor. As Goffman would have explained, Subject 19 wanted to segregate her audiences.

However, since most subjects were relatively permissive, it is fairly safe for interfaces to share "Personal Info" by default. That said, many subjects show an interest in modifying particular and unpredictable pieces of information, so allowing users to set privacy preferences on a field-by-field basis would be appreciated.

Category	*Visible to all Students and Teachers*	*Visible only to Classmates and Teammates*	*Visible Only to Teammates*	*Visible Only to Pre-Existing Facebook Friends*
Activities	11 (73%)	3 (20%)	0	1 (7%)
Interests	9 (47%)	7 (37%)	1 (5%)	2 (10%)
Favorite Music	6 (43%)	6 (43%)	1 (7%)	1 (7%)
Favorite TV Shows	7 (64%)	2 (18%)	1 (9%)	1 (9%)
Favorite Movies	11 (65%)	4 (24%)	1 (6%)	1 (6%)
Favorite Books	9 (53%)	5 (29%)	1 (6%)	2 (12%)
Favorite Quotes	14 (67%)	5 (24%)	1 (5%)	1 (5%)
About Me	7 (58%)	3 (25%)	0	2 (17%)

Table 5.2.2.4 displays whom subjects permitted to see their "Personal Info." Users tended to be fairly permissive with this information, as at least 80% of subjects shared each field with all of their academic peers, usually adding their teaching staff into the mix as well.

5.2.2.5- "Educational Info"

Subjects let everyone in the class see their "Educational Info."

By and large, subjects were very permissive with their "Educational Info." These preferences are shown in Table 5.2.2.5. All of the fields had at least 70% of subjects choosing the most permissive settings, while college and major were each given this setting by over 90% of subjects. The handful of objections again tempted to be rather idiosyncratic. For instance, Subject 20 explained his very restrictive setting for his college by saying, "I hate being pinged as being from Harvard because, then, it makes people react to you differently." While he felt this was important, the other 96% of subjects did not mind, and so it would be unwise to let this one objection affect the default settings very much.

Category	*Visible to all Students and Teachers*	*Visible only to Classmates and Teammates*	*Visible Only to Teammates*	*Visible Only to Pre-Existing Facebook Friends*
College	23 (96%)	0	0	1 (4%)
Major	22 (92%)	1 (4%)	0	1 (4%)
High School	16 (73%)	1 (5%)	1 (5%)	4 (18%)
Courses	15 (75%)	4 (20%)	0	1 (5%)

Table 5.2.2.5 displays whom subjects permitted to see their "Educational Info." Subjects were overall very permissive with these fields.

Because subjects were very permissive about their "Educational Info," it seems reasonable to share this information by default. However, it is important to note that the classroom scenario perhaps biased subjects towards being more permissive.

5.2.2.6- Miscellaneous Features

Subjects definitely did not to share their wall or Mini-Feed with anyone outside their friends, and were also fairly hesitant about sharing groups and work information.

The Mini-Feed, Wall, Groups, and Work Information all proved controversial fields for subjects, as seen in Table 5.2.2.6. Subjects' stated rationale for restricting the Mini-Feed and Wall are discussed in detail in the following section (5.2.3) and will not be covered here.

Subjects often did not mind most of their groups being visible, but a tendency towards joining humorous groups and ones which represent inside jokes often gave them pause. Subject 23 wanted to show others her groups, but she was stopped because of one inappropriate group. "If I didn't have that one about dropping out of college and becoming a stripper, I probably wouldn't have blocked it." Subject 24 added that she was worried about groups along the lines of "Students Who Have Not Been To Class All Semester." Among friends, a sense of academic ennui is seen as "cool," yet professors certainly take umbrage at these sorts of displays. The humorous groups whose members expressed an interest in skipping class and perhaps becoming burlesque performers were intended for friends, so subjects tended to follow Goffman's suggestion of segregating their audiences. Interestingly, groups tended to be less self censored than profiles themselves, perhaps because users could not choose the phrasing of group titles themselves or were invited to join groups by their friends and felt peer-pressured to do so.

Work information, on the other hand, generally seemed more of a personal decision for those who blocked it. Although 61% of subjects gave it the most permissive privacy setting, another 28% assigned it the most restrictive privacy setting. Users generally felt that this was personal information that only friends would care about, and thus didn't find it as relevant to classmates and instructors in the Teammate Tool.

In the end, features that are not easily categorized, such as the Mini-Feed, Wall, Groups, and Work Information, all generally should be restricted by default.

Category	*Visible to all Students and Teachers*	*Visible only to Classmates and Teammates*	*Visible Only to Teammates*	*Visible Only to Pre-Existing Facebook Friends*
Mini-Feed	4 (17%)	1 (4%)	2 (9%)	16 (70%)
Wall	3 (12%)	5 (20%)	1 (4%)	16 (64%)
Groups	10 (40%)	9 (36%)	1 (4%)	5 (20%)
Work Information	11 (61%)	2 (11%)	0	5 (28%)

Table 5.2.2.6 displays whom subjects permitted to see their Mini-Feed, Wall, Groups, and Work Information. These fields generated some of the most controversy as subjects chose very disparate answers, although their preferences tended towards the more restrictive. 16 subjects each blocked the Mini-Feed and Wall from their classmates and teachers!

5.2.3- Why Did Users Restrict Certain Information?

Because they lacked control over it, and thus could not exercises Goffman's "front region control." As such, their performance would have been sub-par.

When examining profile sections which users most commonly restricted, a user's lack of direct control over a field was highly correlated to the most restrictive settings.

The 4 fields most commonly blocked from everyone except preexisting Facebook friends were the "View More Photos" option, Photo Albums posted by the user, the Wall, and the Mini-Feed, ordered from most permissive to most restrictive. These fields are summarized in Table 5.2.3. Tellingly, these are the only 4 fields which are *not* under a user's direct control. Users desire control, and do not feeling comfortable sharing information they can't control.

The most worrisome part of the "View More Photos" feature is that a picture is linked to a user first. They can afterwards "untag" themselves. In the interim, everyone can see the photo. Subject 23 explained that she blocked the view more photos feature from everyone in the class because "sometimes people post things without you knowing about it, and you don't have control over what people can see in between then and untagging your picture." When users couldn't control the photos posted, they didn't want their teachers or their peers to have access.

Photo albums posted by a user contain a more subtle lack of control. Although a user can create an album, upload his pictures, and tag his friends in them, his friends can leave comments once these photos are posted. Comments can then become a glorified bulletin board for witticisms such as "this is right before we got really drunk."

64% of subjects blocked their wall from all non-Facebook friends. All of a user's Facebook friends are able to write on their wall, and this lax barrier prejudiced users against sharing the wall. Even when users were in the middle of the study, they expressed surprise at what they saw on their wall. One subject was particularly flabbergasted when the most recent post on her wall was a friend calling her a "Sexy Kiwi," and she hadn't yet noticed this. Similarly, as Subject 6 explained, "I blocked my wall because people write things that could be construed in the wrong ways, or even personal things that are personal or private." Subject 10 added that "I... blocked my wall and photos from my teachers since you have less control over that and you never know

what someone's going to put up of you." Subject 13 worded this same sentiment even more strongly, saying "I blocked my wall because I have less control over that. I edit my wall, but I may not notice everything that goes up on my wall before everyone else does. And if I can't control what they see, I don't want them seeing it." Users don't have the same control over their friends' words as they do over their own, so most subjects do not want their academic peers and teachers viewing their wall.

Finally, 70% of subjects restricted their mini-feeds to just preexisting Facebook friends. Overall, users saw the Mini-Feed as a bad idea, albeit one that encourages them to spend more time on Facebook. Subject 17 explained, "The minifeed annoys me because I don't feel like announcing to the world every time I change something or do something, which is hypocritical because it amuses me when other people have it." In expressing both her non-symmetric expectations for the mini-feed as well as a desire to be more subtle when making changes, Subject 17 captured an interesting sort of control: the control over how things are announced. If a subject wanted to make a public announcement of some sort of news, such as being hired for a prestigious job, he could update his Status on Facebook to be something like "Excited for my new job." In contrast, accepting a job and being dumped by a significant other are ***both*** very publicly announced on a user's own Mini-Feed and his friends' aggregated News-Feed. A user can't distinguish good news from bad news from no news when the Mini-Feed announces his actions, and thus he doesn't have control over this announcement.

Subjects' reasoning still suffered through a complex set of conflicts when considering uncontrollable information. Subject 20 wanted to keep his friends separate from his academic life and thus blocked his wall, claiming "That's my friend stuff**;** [I like] keeping separate spheres." Subject 7, on the other hand, only selectively restricted her Wall. When asked why, she said explained that it was "to let people know I have friends!"

Control factored explicitly into many subjects' decisions, though. As Subject 1 stated, "I know that anyone can see anything anyway, but I like to give myself the illusion that I have some privacy and control." Despite her pessimistic perception of the possibility for control, she was not alone in desiring control over her data. 9 subjects in total specifically mentioned a lack of control as a reason for restricting information in the Teammate Tool.

As a result, it seems that extreme caution must be taken with parts of a profile over which a user lacks control. The best course of action for an interface designer is to restrict these uncontrolled spaces to a user's friends only, at least by default.

5.2.4- Why did users share information?

After investigating users' reasons for restricting certain information, it is helpful to then see why they chose to share other information.

The importance Facebook users place on displaying some particular public persona as their "presentation of self" was a frequently mentioned motivating factor. Subject 1 shared the following anecdote: "I heard this girl on the train. 'If you don't change your status back to in a relationship, I'm going to be really mad. It matters to me that you change your status from single in the next 15 minutes.'" Subject 1's train-mate felt it very important that her boyfriend make their relationship a part of his "presentation of self," and she even judged it to be a particularly urgent matter.

Many subjects also mentioned how they put harmless information in their Facebook profiles, and therefore didn't mind sharing it. Subject 18 explained, "I didn't really censor it, but I was careful to put certain things. I dunno, like I tried to put information about myself that could not be misunderstood or be controversial. I was as clear as possible since I know strangers can view my profile, and I didn't want strangers to get the wrong idea." He didn't see much of a possibility for strangers to get a wrong impression of him based on the information in his Facebook profile, so he chose to share parts of it. Subject 3 added, "What I have on there already is what I'm comfortable sharing with people. My profile's public. Everything that's on there can be accessed by anybody. That's the public persona I have." He didn't see the harm in letting others see this information since he had already screened it.

Subject 3, however, expressed a *desire* to share information just because it was benign. "At first, I blocked the pictures I had from my teachers, but then there's nothing that scandalous in there anyway." Despite an initial hesitation to restrict information from his professors, he reconsidered and shared it anyway simply because it wasn't inappropriate, *not* because he felt it would add to interactions with his teacher. Subject 16 also showed this initial hesitation, but she also chose to share information *because* it was harmless, not because she needed to. She explained, "I was originally going to pretty much block everything, and then I changed my mind and went, 'Would it bother me if they knew this information?'" The expectation for information sharing on Facebook is thus reinforced by these subjects' actions. Students share information because that's what they're supposed to do if the information doesn't seem immediately harmless.

This cultural norm has two major ramifications for privacy interface design. First of all, it becomes even clearer that a privacy interface cannot be too restrictive, since that would violate users' expectations for shared information on Facebook. However, it also means that interface designers should take the step of restricting by default information that could be dangerous. As long as users judge information to be harmless in the moment, they will likely share it. Therefore, information which may be malignant in more subtle ways is best blocked by interface designers rather than relying on a nonexistent user diligence.

5.2.5- The World as an Audience

Most subjects did not want anyone outside their network to see anything about them. The rest of subjects wanted to share only a modicum of information.

Since Facebook is quite unique among social networks in its reliance on "network"-based access control, subjects were asked how their privacy preferences would change if they set preferences for a network that is visible to the world, such as MySpace.

Subjects responded very negatively to the idea that their profile could be visible to the world. Nearly half of the subjects who responded to this question announced that they would block all of the information from this network that was visible to the world, or that they wouldn't join a service like that in the first place. Subject 16 was one of the more moderate subjects, at first considering revealing information, but then deciding not to join. He said, "I'd probably have blocked all of my favorites just to be on the safe side, since there are some crazy people out there. But I mean, I probably wouldn't have subscribed to it in the first place." It is notable that he mentioned blocking his favorites. This was the least commonly restricted piece of information when subjects were among classmates and teachers, and yet even this seemingly benign information was still deemed inappropriate for the world to see.

No subject allowed his entire profile to be visible to the world, even though some had allowed it to be visible to their teachers. Subjects overall showed strong aversion to having complete strangers view their information. Just like Subject 16 felt threatened by "crazy people out there," Subject 19 declared she was "a lot less comfortable with the wide world of cyber networking." Even though subjects often don't have any specific threat in mind, they feel that they should be wary of strangers. The key to Facebook instilling comfort is its network-based access control system. As Subject 16 said, "The thing that makes me feel more comfortable about Facebook is that it's only accessible to people in a certain network, and that only those people can see your profile."

As a result, privacy interfaces must not allow the "whole wide world" access to a user's information.

5.3- INTERFACE MODIFICATIONS

A number of novel privacy interface innovations were tested on subjects, providing some of the first feedback on these mechanisms. Jones and Soltren had mentioned merging privacy features with profile edits, but the other interface modifications are novel.

5.3.1- Privacy Preference Granularity

Deciphering users' ideals for the granularity of control they wanted over their privacy preferences centered on letting subjects use a fine-grained interface, and then investigating if the preferences they set collapsed easily into categories. This work is particularly important since Facebook's three major privacy interfaces use different granularity, and thus a unified standard would make the interfaces more usable.

5.3.1.1- Users' Opinions on Granularity

Subjects *wanted to control certain information on a field-by-field basis, supporting Hypothesis 3.*

Conventional wisdom holds that interfaces should allow users to set privacy preferences, but not involve a large time commitment. In fact, privacy and security are often secondary goals for users, so bundling similar privacy choices together and carefully choosing default settings are both critical. [22] Although users often claim to be very concerned about their privacy and security settings, they won't often spend time modifying them. As such, limiting the number of settings users need to modify seems to be the most sensible course of action.

However, subjects contradicted this wisdom, preferring the ability to set privacy preferences on a field by field basis. Subjects were asked the following question:

"*Currently, the Teammate Tool asks you on a field-by-field basis with whom you'd like to share information. Alternatively, certain fields could be grouped together, allowing you to choose your preferences for, say, Favorite Movies, Books, TV Shows, and Music all at once under the heading of "Favorites" with just one mouse click. Which system do you prefer?*" If they responded that they preferred the field-by-field infrastructure, they were asked whether it was acceptable that these more granular settings took more time.

Out of the 24 subjects who responded to this question, 20 (83%) declared that they preferred to set their preferences on a field by field basis, while only 4 (17%) preferred that fields be grouped together. All 20 subjects who preferred the field by field basis responded that they didn't mind this interface modification took more time. Of course, what users say and what they do can be quite different, so it would require further experimentation to determine if they would actually practice what they preach.

Regardless, if subjects didn't seem to take advantage of a field by field granularity, it would have no purpose. Had subjects set privacy preferences using only the "Basic Info," "Contact Info," "Personal Info," and "Educational Info" categories , 72% of subjects (18 of 25) would have had *different* privacy preferences than had they set their preferences individually. In other words, 18 subjects had differing privacy preferences for at least 2 different fields in one of those groups.

It is important to note that Facebook's main privacy settings currently offer many fewer options than even this categorical granularity. Facebook allows its users to set privacy preferences individually for their courses and all "Contact Info" fields except for their website. However, 20 other profile fields cannot be blocked from strangers unless a profile is set to private.

With Facebook's Limited Profile feature, though, privacy settings are afforded granularity at the category level. On a universal basis (users can only create 1 limited profile, which will be used for all limited friends), "Basic Info," "Contact Info," "Personal Info," and "Education Info" are all separate categories which can be either included or excluded. Even though the Limited Profile feature is more granular than Facebook's main privacy settings, 72% of users still would not be expressing their ideal privacy settings with this interface. As such, it makes sense to offer users even more tightly-grained control.

5.3.1.2- A Category-level Analysis of Conflicted Privacy Settings

In order to determine which categories most often had conflicting privacy settings among their ranks, these categories are investigated individually in this section. These results are broken down in Tables in Appendix D.

Whereas Facebook currently only provides any sort of privacy controls for

"Contact Info" on a field by field basis, these privacy settings were not the most commonly conflicted**;** a subject's "Basic Info" was most frequently conflicted. Further, it wasn't just one field that often stood out in conflict with the others. The percentage of subjects who allowed perfectly unfettered access to each basic biographical field ranged from 60% (Political Views, [Romantically] Interested In, Relationship Status) to 95% (Gender). Yet, only 48% of subjects chose identical privacy settings for all 8 fields. Particularly for the controversial fields of political views and romantic/relationship information, subjects express an interest in having highly granular privacy settings for their "Basic Info."

Among contact information, 62% of users had identical settings for each field. It is important to note, however, that there were only 6 contact information fields, 4 of which were used infrequently. More importantly, among the 38% of users, the privacy settings which were conflicted varied widely. Some users had different settings for 3 different fields, and the most lax and most restrictive settings were rarely consistent between users. Overall, when subjects adjusted who could see their contact information, there were few visible relationships, and thus it makes sense to allow users to choose privacy settings individually for these fields.

Users' privacy settings for their personal information were similarly erratic. 6 users had conflicting privacy settings, and 2 of these users had 3 different strata of settings. A lack of patterns makes it quite difficult to broadly characterize users.

Facebook gives a user's courses fully granular privacy control, yet does not offer individual control for any other field contained in "Educational Info." However, courses were not the most frequently restricted field among subjects. 5 subjects gave their high school the most restrictive setting, while only 2 gave their courses the most restrictive setting. It then seems unnecessary for Facebook to give courses fully granular privacy options while grouping together College, Major, and High School. In fairness, the biases of the way this study is framed likely has some effect on this result. Since subjects took part in a classroom scenario, they might have been particularly worried about their teachers' impressions. On Facebook in general, however, a student's courses might be considered sensitive since it would allow a stalker to determine that student's location at particular points in the day. This concern wouldn't be as evident for subjects in this study since they already have a class with the other individuals who would view the Teammate Tool.

As students attempt to craft their image, then, they appreciate the ability to fine-tune their self portrayal. Highly granular settings make this crafting possible. Of course, forcing subjects to set preferences for each field individually is quite burdensome. Indeed, most subjects often just had one field in conflict with the others inside a category. As a result, it makes the most sense to allow users to set preferences for each category, but then be able to choose highly granular privacy preferences for particular fields.

5.3.2- Merging "My Privacy" Preferences with "My Profile"

Subjects prefer seeing the contents of their profile when choosing their privacy settings.

Jones and Soltren recommended merging the interface for setting privacy preferences and the interface for editing a profile. [12] They suggested this infrastructural change in order to increase the number of views that a user's privacy settings get daily. However, in this study, we also hypothesized that seeing a profile's contents would allow users to make more informed decisions about their privacy preferences.

After selecting their settings for the Second Teammate Tool, subjects were asked the following question: "*When you were deciding with whom to share the information in your profile, you could see what you had entered. For instance, you would see "Favorite Music: Band A, Band B, Band C" right above the preferences you could set for that field. On the other hand, Professor Jones could have distilled this selection process down to showing just the field name "Favorite Music" followed by the chance to set your preferences. Which system do you prefer?"*

19 of 25 subjects (76%) preferred being able to see what was in their profile when they were setting privacy preferences, while only 4 of 25 (16%) preferred to eliminate the clutter and set preferences away from their profiles. The remaining 2 subjects considered themselves neutral.

Participants in favor of seeing their profile contents while modifying their privacy settings championed their ability to catch subtle details which could be considered controversial or offensive. They further expressed how easy it is to forget what information they had in their profile. Subject 8 pointed out a situation in which she "might forget that one of [her] interests is stripping, and be like, whoah, my professor just saw that." Since many Facebook users indeed craft their profiles for their friends, they include many "inside jokes" which are humorous to college-age friends but offensive to others. Subjects 5, 10 and 15 all specifically mentioned that they had included "inside jokes" among their professed interests, and all had restricted who could view their interests in the Teammate Tool as a result.

Seeing what they had written also gave subjects extra time for reflection and clarification, prompting them to restrict parts which they had initially expected to be innocuous. Subject 10 explained, "Like I know my quote's in French, but it's a little scandalous if you can read French. So looking at that, I wasn't going to share that with my teacher." Had she not taken another look at this quote while setting her preferences, she likely would have given unrestricted access to it since her main memory of her quote was that it was in another language.

However, merging privacy settings with the contents of the profile wouldn't necessarily always encourage users to restrict information**;** in some cases, it could encourage users to reveal more information. As Subject 13 explained, "It's an easy way

to check to see if maybe I have something on there I don't want them to see. Otherwise, I probably would have gone through and said yes yes yes yes yes... or maybe no no no no no if I were less comfortable with my profile." His general perception of his own profile would have dictated his actions, potentially discouraging him from sharing information he might perceive as harmless. However, it just as easily might have encouraged him to reveal information he considered sensitive.

Overall, selectively merging the interface for privacy settings with profile contents was promising. However, since this one interface modification was not the main focus of this study but rather a tertiary goal, a comprehensive assessment of its merits was not possible. A controlled evaluation of this modification's merits is left as future work.

5.3.3- The Utility of Editing Fields For Different Audiences

Being able to edit profile fields for particular audiences provided little tangible benefit.

Considering Goffman's suggestion that individuals would want to modify their "presentation of self" for different audiences, subjects were asked whether there were any fields they would have edited while using the Teammate Tool. No widely used social network has privacy controls that sufficiently allow users to segregate their audiences, so this is another novel suggestion.

Subjects were mixed about the usefulness of being able to edit fields. In fact, 60% of subjects had no fields in their profile that they wanted to edit. Most of these individuals thought that editing was superfluous. Given the ability to control particular fields, editing individual fields became unnecessary.

That so many subjects felt this way sets an upper-bound on Goffman's ideas about subjects painstakingly crafting their self-representations. Subjects demanded front region control in choosing to block fields of information from certain audiences, but subjects didn't often want to edit every single detail. Indeed, to paraphrase Subject 13, their lives are busy. They don't have infinite time to devote to their self presentation, even though they think it is very important.

The 40% of subjects who did choose to edit fields, though, fit in with the sociological predictions. Goffman predicted that the situation of a performance "will involve the over-communication of some facts and the under-communication of others." [9] Subject 2 fit this definition perfectly, explaining, "I probably wouldn't want to be 'that guy' who had 30 artists for his music, so I might have picked the top 3." A number of subjects also expressed an interest in using the editing process to refine the details they presented, again consistent with Goffman's "presentation of self." In order to impress her teachers, Subject 10 would have added "some more legitimate academic interests, or life interests. And the same with books." She wanted to represent herself as an intellectual to her teacher, yet professed an interest in "sparkly pink umbrellas" to her friends.

In the end, the ability to edit fields for different audiences seems to have less value than other possible interface modifications. If users are afforded control over who can see what fields, the majority of them will not see the need to further edit each field.

6- NINE OVERALL INTERFACE RECOMMENDATIONS

This section synthesizes the quantitative results of our user study and the qualitative results of user interviews. We then produce a set of nine novel privacy interface design recommendations . Both the user study and interview were designed to better understand how users value the information on Facebook, the intended audience for the information they post, and how users might react to interface modifications.

6.1- Recommendations Based on Users' Intended Audience

Previous research on Facebook had identified it to be "imagined community," one in which users believed the network to be more closed than it actually was. [1] Because there existed a barrier to entry into the network, namely an email address affiliated with a particular college, users tended to think of Facebook as a social space only for undergraduates.

Our study observed that users persisted in their belief that Facebook was for students only, yet identified that this "imagined community" was not merely a product of users' naiveness. Rather, users acknowledged the presence of adults and authority figures in the network, yet still chose to craft Facebook profiles with "inside jokes" and other social behavior that these adults would likely find offensive. Study subjects identified an ethical boundary, rather than a physical one**;** they thought that professors, for instance, should police themselves and avoid this network. Students self-censored their Facebook behavior in a general sense, yet this degree of censorship was not enough. Users wanted their profile information even more tightly restricted from their professors, yet often did not take action.

Although users desire that Facebook be a student-centric site, its rarely changed default privacy settings allow professors, staff, and alumni equal access to the network. However, this disconnect between users' intentions for the system and the network's reality is quite easily rectified by modifying the default settings of Facebook. Allowing staff, alumni, and faculty equal access to Facebook networks does not greatly increase the utility of the system since undergraduates constitute the vast majority of users on the site.

> **Recommendation 1:** By default, information on Facebook and other social networking sites should be accessible to students' peers only. Users must explicitly choose a different preference if they want to share their profile with adults, staff, or faculty who are not their friends.

However, restricting profile data to just an age group does not fully capture users' intended audience. Researchers had previously suggested that one of Facebook's major

draws was its approach to access control, only allowing other affiliates of a particular university to see a user's profile. Our study subjects reinforced this suggestion, indicating that this type of access control indeed made them comfortable with the network. Suggesting a modification that would allow Facebook profiles to be seen by anyone in the world led about half of subjects to block their profiles entirely, and led the other half to hide all but a minimum amount of information. This restrictiveness contrasts with subjects' more open behavior when they were discussing their profile inside their university network. Even when it was indicated to subjects that their teaching staff, authority figures with a lot of power over users, could view their profile, many subjects still shared a fair amount of information.

Users thus intend the information they post in their Facebook profile to be seen only by affiliates in their university network. That an attempt to stretch this boundary to the entire world elicits such strong user reactions suggests that sharing users' profile information with the world should require explicit user consent, if it is to be permitted at all. This recommendation will become particularly pertinent as applications which build on top of Facebook proliferate, suggesting that this recommendation mostly applies to the Facebook Platform's privacy interface.

Recommendation 2: Information entered into a Facebook profile should not be shared outside of that user's network. If sharing this data with others is necessary for some application or service to function, users must be explicitly advised of who might see this data and give their consent.

6.2- Recommendations Inspired By How Users Value and Share Information

In past work, Facebook has been seen as a treasure trove of sensitive personally-identifiable information, including contact information and photographs. [10] However, this type of information is not what users value most about Facebook. To them, the most valuable information in profiles are individuals' interests and favorites, the types of data which provide a window into others' personalities yet would seem awkward to ask in conversation.

Subjects thought their teammates' "Personal Info" was the most valuable thing they learned about their teammates, followed by "Educational Info." This valuable information fortunately was closely correlated to the information subjects themselves were least restrictive with during the user study. Although Facebook indeed contains large amounts of sensitive information, it is the more benign information which actually contain the network's value. Since users generally feel comfortable sharing this type of information yet find it especially valuable, it makes sense for privacy interfaces to share this information by default.

> **Recommendation 3:** Users consider "Personal Info," "Educational Info," "Basic Info," and email addresses to be both benign and valuable. These types of information should be shared by default within users' networks.

Not only was sharing this sort of information merely considered valuable, but it was also expected in what might be viewed as a reciprocal arrangement. Study subjects disapproved of how little information one of their fictional teammates was sharing in his

Facebook profile, elucidating a cultural expectation that users would share some minimum amount of information. It is not unwise nor deceitful for a privacy interface to encourage a user to share a certain amount of profile information across a network. Instead, this action is perfectly in line with user expectations, yet also helps provide more content for the network.

A concrete implementation of this recommendation could be made when investigating users' "private profiles," those which are restricted to only their friends. Currently, the simplest way for users to block access to their sensitive information is to restrict their profile to their friends, effectively blocking the network's access to all of that user's information. Instead, it may be more beneficial to the network, yet still very acceptable to users, if the setting for "blocking" a profile merely blocked the most common types of sensitive information. Then, if users felt uncomfortable, they still would be able to restrict access to their profile entirely.

Recommendation 4: Users should easily be able to block sensitive information on Facebook, without blocking all of their benign information as well. Users expect that others will share information about themselves, and the reciprocity of information on Facebook encourages them to do the same.

Although Facebook users will share a fair amount of information that's considered benign, there's also a good deal of information that is considered sensitive. Photographs, contact information, political and religious views, and relationship statuses are viewed by most users as sensitive information. When given the opportunity in this study, users

commonly restricted this information to just their friends, and the majority of users chose not to let their class teaching staff view it. These settings were often more restrictive than the privacy preferences they had chosen for their Facebook profile on the actual network. Of course, Facebook's default settings bias users towards sharing this sensitive information since users rarely change default settings. However, this bias betrays users' privacy wishes, and these fields should be blocked from everyone except a user's friends by default.

Recommendation 5: Photographs, "Contact Info," Political and Religious Views, and Relationship Status are all considered sensitive by Facebook users. By default, these types of information should be blocked from everyone except that user's Facebook friends.

6.3- Recommendations Inspired By How Users' Desire For Control

Long before most humans were using online social networks, let alone computers, Erving Goffman had observed that people acted out an elaborate "presentation of self," and in doing so demanded total control of the "front region," or the metaphorical props, costumes, and scenery in their environment. Applied to Facebook, it seems that users would still want to retain control over the front region since social networking profiles are a digital "presentation of self."

This hypothesis held true in our study, as the four profile fields subjects most frequently restricted were the four over which users had the least amount of control. A user's friends could add information to these fields, and the user was unable to moderate

these changes. Subjects lacked control because their friends could contribute to most, but not all, of these fields, either through messages, comments, or tags. Since users mostly restricted the fields they didn't control, it does not make much sense to share this information by default.

Recommendation 6: By default, fields over which a user lacks control should be blocked from everyone except that user's Facebook friends. Social spaces on which a user's friends can post are included in this recommendation.

While a lack of control was an excellent predictor of users blocking fields, users' desire for additional control in a slightly different sense of the word was also very insightful. Goffman had predicted that "actors," or individuals engaged in a "presentation of self," would demand front region control, and this prediction was again proven true by study subjects.

Even when dealing with information which was termed benign overall, subjects showed privacy preferences which were difficult to categorize or predict. Certain profile fields would prove particularly offensive to subjects, often for subtle reasons related to subjects' attempts at "presentation of self." For instance, some subjects were extremely opposed to their professor seeing their favorite books, while others considered the college they attended to be quite sensitive.

These peculiar preferences translated into difficulties collapsing users' privacy preferences into only a few settings. For the vast majority of subjects, when they were permitted to declare privacy preferences on a field-by-field basis, their desired settings could not have been achieved had fields been logically grouped together. However, it was often only the setting for one field which was in conflict with the others. As a result, it is most efficient for users if privacy preferences continue to group fields together into logical categories, but these preferences need to allow users the ability to choose different settings on a field-by-field basis when necessary.

> **Recommendation 7:** When users choose privacy preferences, fields may be grouped together into categories in order to provide ant efficient experience. However, users must have the ability to choose differing privacy preferences on a field by field basis as desired. This ability should be easily accessible and simple for the user.

6.4- Recommendations For Modified Privacy Interfaces

During the user study, novel interface modifications were tested or suggested. These changes departed from what is typically seen in social networking privacy interfaces, yet were suggested by previous researchers in one case and indirectly by sociological theories in the others.

One interface modification, the proposed ability for users to edit the content of fields in their profile for different audiences, did not prove as successful as hypothesized. Although Goffman's work had suggested that users would need fine-tuned control over how they present themselves to others, the ability to edit fields was deemed superfluous

by users when they were also given the more simple option to exclude fields from certain audiences. It is important to note that the ability to exclude fields is a second novel interface modification suggested in this thesis, and so there was no prior work to suggest that this ability alone would meet users' demands. However, once users were able to exclude fields, they mostly felt that they had enough control over their self presentation.

Recommendation 8: When users are given the ability to exclude fields from certain classes of audiences in a social network, the ability to further edit the content of fields is deemed superfluous by users, and should thus be excluded.

While subjects did not see the necessity of an interface to edit fields' content for their different audiences, they did find significant value in the ability to see the contents of their profile fields when they were choosing their privacy settings. A similar modification had been suggested in by Jones and Soltren, but had not been tested on users until this thesis. Interfaces in this thesis used this modification, and when questioned whether they preferred this interface or a more standard interface (where privacy settings are kept separate from profile contents, as on Facebook), users overwhelmingly preferred the modified interface. Seeing their profile information helped users make more informed privacy decisions, and they thus thought this modification was valuable even though more information cluttered one screen.

Recommendation 9: Including the contents of a user's profiles in Facebook's privacy interface in order to let users make more informed privacy decisions.

7- FUTURE WORK

This thesis lays the groundwork for improving social networking privacy interfaces, as well as further understanding users' behavior. However, it represents only a first step in social networking privacy interface design.

Although this thesis makes design recommendations for privacy interfaces, these recommendations have not been rigorously tested. Rather, they are just suggested by the findings of our usability study. A necessary next step for this work is to conduct another user study to directly evaluate these recommendations against current privacy interfaces. The simplest experiment would involve a controlled comparison between an interface which follows all of our proposed recommendations and Facebook's current interfaces. To consider the qualitative notion of a preferred interface, researchers might ask subjects to identify potential privacy violations in their profile after setting privacy preferences with each interface. They might also rate the usefulness of their profile to themselves and to others at this same point. An interface which produces profiles with the minimum number of privacy violations and the greatest amount of "usefulness" are to be preferred.

Quantifying Facebook users' reactions to an even wider range of different audiences would also prove enlightening for interface design. As more specialized social networking sites and applications are introduced, producing content for ever varying audiences will become very common. In this thesis, we only investigated the audiences

which were suggested by a classroom scenario. A more comprehensive study of social networking audiences might look at audiences such as acquaintances, high school friends, fellow members of clubs, law enforcement, younger siblings, younger community members who are strangers, and so on. The study would proceed by asking the subject to choose what information from his Facebook profile he'd like each particular audience to see, and repeating this step for a random ordering of audiences. The results of this study would much more narrowly characterize how users view each type of audience, and would thus lead to suggested default settings for applications or networks with particular target audiences.

Better understanding how users react to a wide range of audiences would likely suggest an access control mechanism based upon users' relationships. For example, Facebook currently provides different access control mechanisms for friends, strangers who are still members of a common network, strangers outside of a network, and "limited profile" viewers. However, Facebook also contains an oft-forgotten feature that allows users to define their relationship to their friends. For instance, Alice can say that she knows her Facebook friend Bob through the drama club at school, or that they dated but have since broken up. If users were better incentivized to include this sort of information, and researchers better understood how the average Facebook user characterizes each possible audience, researchers could test access control mechanisms which segregated users based on personal relationships.

On a much simpler level, researchers could also benefit from a comparison of privacy interfaces in different social networking sites, and how these interfaces affect both users' membership in the networks and the amount and type of data they share. With a more thorough comparison of commonly used social networking sites, the results from this thesis could more easily be applied broadly.

8- CONCLUSIONS

This study demonstrates that users' information revelation and restriction in social networks is governed by a complex set of guidelines and motivations, and that current privacy interfaces fail to account for these rationales. Prior to this thesis, the reasoning and logic of users themselves in social networking websites had not been studied in depth. Previous research had examined the more abstract privacy attitudes of Facebook users, as well as how those attitudes corresponded with the amount of personally identifiable information users displayed on their Facebook profiles. The literature had also explored the idea that Facebook was better characterized as an "imagined community" since the barrier for entrance into a Facebook's university networks was both low and possessed by many adults. However, surveys nor statistical analysis could not capture users' nuanced opinions about the data and audiences in Facebook. We performed a usability study to better understand users' reasoning about information revelation in social networking.

Our user study of 25 undergraduate Facebook members revealed that users do indeed craft their online profiles for their friends and peers. However, this behavior is motivated by the expectation that Facebook is meant only for students, not a naiveness about adults' Facebook presence. As a result, social networking privacy interfaces should by design restrict users' information to their peers. Users' information should generally be kept from adults, authority figures, and particularly the "whole world."

Although Facebook is full of sensitive information, the most sensitive information is among the least valuable information on the network. When asked who should see each piece of their Facebook profile, users very tightly restrict their contact information, photographs, their relationship status, and political and religious views. However, users did not consider these types of information to be particularly valuable in the first place. Instead, as predicted by our first hypothesis, users most valued "Personal Info" and "Educational Info." Fortunately, users were very forthcoming about their own "Personal Info" and "Educational Info," revealing a social network whose most valuable information is also its most benign and freely shared. As such, Facebook and similar social networks could by default restrict the visibility of sensitive information without badly damaging the utility of the network.

Facebook users greatly valued control inside their social networks, fulfilling the predictions of Goffman's sociological work and our third hypothesis. The four sections of Facebook profiles which users could not control were the four most tightly restricted

sections. Users demanded control of their portrayal, preferring that their friends not contribute. Users also desired more finely grained control over which audiences can see the different pieces of information in their Facebook profiles, supporting our second hypothesis. Our third hypothesis was partially supported when the majority of users expressed some unique privacy preferences for a very limited number of fields. Although users overall chose privacy preferences consistently within categories, the vast majority of users had at least one idiosyncratic preference, suggesting that privacy interfaces should offer granularity on a category level which can optionally be set on a field-by-field basis as needed.

Users particularly supported two novel privacy interface modifications, but found the third superfluous, partially disproving our third hypothesis. Users enjoyed the aforementioned finely grained control over their information, and they also enjoyed being able to see the contents of their profile when making privacy decisions. However, they felt that the ability to edit the contents of profile fields for different audiences was unnecessary.

Overall, members of Facebook used their online social network as a complex "presentation of self," for an audience that these members felt should be restricted to their peers. Among different audiences, these users chose different privacy preferences, changing their "presentation of self" as predicted by sociology literature. When these users segregated their audiences, they demanded tight control over the content of their profile fields, and also desired highly granular control over which audiences could see which parts of their profile.

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APPENDIX A

An Overview of Usability Study Techniques

(Based on James Hom's *Usability Methods Toolbox*)

User studies take a number of forms, but can best be categorized by who or what is being studied.

The first flavor of users studies revolves about inspection. These studies involve researchers performing a walkthrough of an interface without any users present. For instance, a heuristic evaluation entails researchers evaluating an interface's design compared to some well-known set of usability principles. Jones and Soltren performed a heuristic evaluation when they evaluated Facebook's privacy interface based on the Fair Information Practices. Cognitive walkthroughs are another inspection technique in which researchers or experts role-play a user "walking through" the interface. Data gathered from inspection methods generally are qualitative evaluations, recommendations, and thoughts.

Inquiry methods are another flavor of usability study in which experts ask users for their opinion. For instance, surveys are one type of inquiry study. Survey data can be quantitative or qualitative. The main limitation of surveys is that users are restricted to answering only the questions on the page, and can not receive any sort of clarification.

However, surveys can be distributed widely.

Interviews are another inquiry method. Researchers ask users a set of questions, and users provide open ended responses. Interviews can be structured, in which researchers do not deviate from a predetermined list of questions, or semi-structured, in which additional questions may be added at any point in the interview based on users' conversations and answers. Data for interviews can be reported anecdotally, or through counts. We use both of these techniques in the semi-structured interviews we conducted for this thesis. It is generally not possible to report interview results with statistical rigor.

A third category of usability studies are user tests. User tests allow a user to take part in an interface. Researchers watch how the user performs. Subjects can be asked to think aloud, in which they say all comments and thoughts that come into their heads. This method is most useful for testing how easy or difficult it is for users to work with an interface. Alternatively, quantitative data can be taken. In this thesis, users' settings for the Second Teammate Tool were recorded as quantitative data. This data was then counted. Since counting was used, rather than a comparison of two different groups, there are no statistics we would logically compute.

This thesis conducts interviews and user tests, whereas previous research in this area had only performed surveys and statistical analyses of data-mined information. User tests are chosen to demonstrate how users would actually set their privacy preferences in

the interfaces we investigate, and interviews allow subjects to speak their mind in an open ended fashion, explaining their motivations, thoughts, and ideals.

APPENDIX B

Experimental Materials

B-1: Demographic Survey

Subject Number _____

Gender: _____MALE _____FEMALE

Age _____

Student Status: _____UNDERGRADUATE
_____GRADUATE STUDENT
_____OTHER , Please Specify _____

Major field of study: _____ Year in school: _____

How long have you had your Facebook account?
_____Years and _____ Months

How often do you log in to Facebook?
_____ More than once per day
_____ Daily
_____ Twice a week
_____ Weekly
_____ Every other week
_____ Monthly

Are you "Facebook friends" with anyone more than 5 years younger than you?
_____ YES _____ NO

Are you "Facebook friends" with anyone more than 5 years older than you?
_____ YES _____ NO

Are you "Facebook friends" with anyone more than 10 years older than you?
_____ YES _____ NO

If you answered yes to either of the three previous questions, how do you know these friends/what is your relationship to them (i.e. Former teacher, academic mentor, fellow musician, know from a class)?

_____
_____
_____

Are your Facebook friends mostly classmates, mostly friends you met outside of class, or about the same number of each?

_____ Mostly classmates
_____ Mostly friends who are not classmates
_____ About the same number of classmates and friends from elsewhere

Is your Facebook profile set to Public or Private?

_____ Public (anyone in my networks can see my information)
_____ Private (only my friends can see my information)
_____ I don't know

About how much time did it take you initially to create your Facebook profile?

_____

How often do you edit your Facebook profile?

_____ More than once per day
_____ Daily
_____ Twice a week
_____ Weekly
_____ Every other week
_____ Monthly
_____ Less than once a month

Each month, about how much time do you spend updating your Facebook profile (including adding/tagging photographs, writing notes, etc.)

_____

Do you maintain profiles or blogs on any other social networking sites? If so, on which sites do you maintain accounts, and how often do you use them?

_____
_____
_____
_____

What are the major ways in which you use your Facebook account?

_____
_____
_____

B-2
Post-Experiment Survey

Subject Number _____ Post-Experiment Survey

If your real-life professors used a tool to allow you to easily see your teammates and classmates' social networking profiles in a class where you didn't really know anyone else, do you feel like it would help or hinder the teammate-building process?

_____ Help (It would be good)
_____ Have an effect that is neither good nor bad
_____ Hinder (It would be bad)

Why?

_____

_____

_____

If Professor Jones had designed his Teammate Tool so that the information about you was NOT imported from your Facebook profile, but instead you filled out the fields just for this tool, would you have filled out more information or less information about yourself?

_____ More Information
_____ About the Same Amount of Information
_____ Less Information

Why?

_____

_____

_____

_____

Is there information that was not part of your Facebook profile that you would have liked to let your classmates know? If so, what information would you have included?

_____

_____

_____

_____

Have you ever used an internet-based collaboration tool (i.e. a discussion board, social networking site, blog, etc.) in a class? If so, please describe what was used and in what sort of class(es). Was it effective in helping you to learn?

_____

_____

_____

On a scale of 1 to 7, with 1 being "completely agree", 4 being neutral, and 7 being "completely disagree", please respond to the following statements:

I would have looked up my teammates on Facebook anyway if I didn't know my teammates from class.

(completely agree) 1 2 3 4 5 6 7 (completely disagree)

Using Professor Jones' teammate tool would help increase participation in online classroom-based activities (i.e. class-related discussion boards or reading-response tools)

(completely agree) 1 2 3 4 5 6 7 (completely disagree)

I thought it was easy to reuse the data from my Facebook profile for Professor Jones' tool.

(completely agree) 1 2 3 4 5 6 7 (completely disagree)

I would feel comfortable letting other websites/services reuse my **full** Facebook profile if I gave explicit permission for them to do so (similar to how Professor Jones' **first** tool reused your Facebook profile).

(completely agree) 1 2 3 4 5 6 7 (completely disagree)

I would feel comfortable letting other websites/service reuse **parts of** my Facebook profile if I gave explicit permission for them to do so (similar to how Professor Jones' **modified/second** tool reused your Facebook profile).

(completely agree) 1 2 3 4 5 6 7 (completely disagree)

I would feel comfortable if other websites/services used data from my Facebook profile without asking me.

(completely agree) 1 2 3 4 5 6 7 (completely disagree)

I've heard news reports about employers, law enforcement, or school administrators viewing students' Facebook profiles.

(completely agree) 1 2 3 4 5 6 7 (completely disagree)

I think Facebook's inclusion of a mini-feed on each person's individual profile is a good idea.

(completely agree) 1 2 3 4 5 6 7 (completely disagree)

I think Facebook's inclusion of a mini-feed of all my friends' actions when I log in is a good idea.

(completely agree) 1 2 3 4 5 6 7 (completely disagree)

I think professors should actively communicate with their students using new technologies such as Facebook.

(completely agree) 1 2 3 4 5 6 7 (completely disagree)

On a scale of 1 to 7, with 1 meaning that you are totally comfortable, 4 meaning that you are neutral, and 7 meaning that you were totally **un**comfortable, what is your comfort level with your friends viewing your Facebook profile?

(totally comfortable) 1 2 3 4 5 6 7 (totally uncomfortable)

What is your comfort level with your academic classmates viewing your Facebook profile?

(totally comfortable) 1 2 3 4 5 6 7 (totally uncomfortable)

What is your comfort level with your professors viewing your profile?

(totally comfortable) 1 2 3 4 5 6 7 (totally uncomfortable)

What is your comfort level with other students your own age viewing your profile?

(totally comfortable) 1 2 3 4 5 6 7 (totally uncomfortable)

What would your comfort level be if anyone in the world could view your profile?

(totally comfortable) 1 2 3 4 5 6 7 (totally uncomfortable)

What is your comfort level with law enforcement/school administrators viewing your profile?

(totally comfortable) 1 2 3 4 5 6 7 (totally uncomfortable)

B-3

Semi Structured Interview Questions

1- Do you think you know your teammates better from using this tool?

2- What is the most valuable information you learned about your teammates?

3- Were you surprised at any information your teammates had included in their profiles?

4- Professor Jones chose to automatically take the information from everyone's Facebook profiles for the Teammate Tool. In contrast, he instead could have just used the layout of Facebook but given all of his students a "blank slate" into which they could enter their information for the tool. Which approach do you prefer, and why?

5- If you chose to block information from anyone in this study, why did you block those fields?..... [If profile is Public] Do you mind that anyone at Harvard can already see this information?

7- For the information you chose to share with others: When you initially entered this information into your Facebook profile, did you consciously craft your responses based on how strangers would view you, OR did you enter information mainly for your friends to see, yet decide in this study that it would be appropriate for strangers to see?

8- Professor Jones chose to automatically take the information from everyone's Facebook profiles for the Teammate Tool, yet in the second part of the study, he first allowed you to choose which fields to share or block. In contrast, he instead could have just used the layout of Facebook but given all of his students a "blank slate" into which they could enter their information for the tool. Which approach do you prefer, and why?

9- Currently, you can only choose who, if anybody, can see each field in your profile. If you were given the chance to edit fields, instead, i.e. sharing your favorite music but eliminating an artist you didn't want your teammates to know you liked, are there any fields you would have edited?

9b- When you were deciding with whom to share the information in your profile, you could see what you had entered. For instance, you would see "Favorite Music: Band A, Band B, Band C" right above the preferences you could set for that field. On the other hand, Professor Jones could have distilled this selection process down to showing just the field name "Favorite Music" followed by the chance to set your preferences. Which system do you prefer?

12- Currently, the Teammate Tool asks you on a field-by-field basis with whom you'd like to share information. Alternatively, certain fields could be grouped together, allowing you to choose your preferences for, say, Favorite Movies, Books, TV Shows, and Music all at once under the heading of "Favorites" with just one mouse click. Which system do you prefer? [If they answer field by field]- Are you ok that this takes more time?

14- In this scenario, you had the chance to transfer all or part of your profile from Facebook, which exists mainly in a university environment, to another university environment. Had you been transferring your profile from Facebook to MySpace, which is publicly viewable, would you have changed the amount or type of information you chose to share or block?

APPENDIX C

Additional Demographic Materials

Major	*Major*
English- 6 Subjects	Earth & Planetary Sciences- 1 Subject
Social Studies- 3 Subjects	History of Science- 1 Subject
Undecided- 3 Subjects	Literature- 1 Subject
History- 2 Subjects	Mathematics- 1 Subject
Visual/Environmental Studies- 2 Subjects	Music- 1 Subject
Applied Mathematics- 1 Subject	Neurobiology- 1 Subject
Economics- 1 Subject	Romance Languages/Literature- 1 Subject

Table 5.2.1-a: Academic Majors of user study subjects.

Profile Update Patterns

Subjects reported spending a little over half an hour, on average, initially creating their Facebook profile. Most respondents (12) indicated that they updated their profile monthly. The 2 most frequent updaters changed their profile about twice a week, while 8 respondents reported updating their profile less than once a month.

On average, subjects spent a little over 1 hour updating their profile each month, although these responses ranged from 2 minutes to 4 hours per month. Profile maintenance seems to be a nontrivial investment of time for some respondents, yet something that is mostly ignored by others. However, comparing the frequency with which users update their profiles and the frequency with which they log into Facebook, a large discrepancy arises. While 80% of respondents (20) update their profile no more than *once each month*, 88% of respondents (22) log in at least *once each day*!

It seems, then, that Facebook users invest *much* more time looking at other people's profiles and pictures than in maintaining their own. Although each individual user's online image remains fairly static for long periods of time, Facebook users seem to sense enough changes among friends' profiles in order to log in frequently to observe

these updates.

APPENDIX D

Extended Experimental Results

Examples of Subjects' Conflicting Settings

Subject 18 had 3 different settings for his email address, screenname, and mobile phone number. Subject 15 allowed everyone to see his email address, only his teammates to see his address, and only his pre-existing Facebook friends to see his screenname and mobile phone number.

Subject 1 had a more restrictive setting for her land phone number than she did for her email address and website. Subject 10 blocked her website from her teacher, although she let everyone see her email address, AIM screenname, and mobile phone number. Subjects 2, 7, and 21 had more restrictive settings for their mobile phone than for their other contact information (email address & mailing address**;** email address & screenname & website**;** email address, respectively). Subject 14 and 23 both allowed everyone to see their email addresses and mobile phone numbers, but Subject 14 prevented his teachers from seeing his AIM screenname, whereas Subject 23 prevented everyone except his teammates from seeing his AIM screnname.

Both Subject 15 and Subject 23 thought their activities were less virulent than their other information, although they picked different degrees of settings**;** Subject 15 thoughts his activities were appropriate for his teammates and classmates, while his other personal information was only appropriate for his teammates, while Subject 23 thought everyone should see her activities, and everyone except her instructors could see the rest of her favorites. In contrast, Subject 2 blocked his favorite quotes and interests from his teachers, yet let everyone see the rest of his personal information while Subject 16 blocked his interests from his teachers, yet allowed everyone to see the rest of his favorites.

"Basic Info" (8 fields)

Subjects who had conflicting settings for Biographical fields	**12 (52%)**
Subjects who had the same settings for each field	**11 (48%)**
(Subjects above who filled out only 2 or fewer fields)	(2)
Subjects who left all fields blank in their profile	**2**

"Contact Info" (6 fields)

Subjects who had conflicting settings for Contact Information fields	**9 (38%)**
Subjects who had the same settings for each field	**15 (62%)**
(Subjects above who filled out only 2 or fewer fields)	(11)
Subjects who left all fields blank in their profile	**1**

"Personal Info" (8 fields)

Subjects who had conflicting settings for Personal Information fields	**6 (25%)**
Subjects who had the same settings for each field	**18 (75%)**
(Subjects above who filled out only 2 or fewer fields)	(4)
Subjects who left all fields blank in their profile	**1**

"Educational Info" (4 fields)

Subjects who had conflicting settings for Educational Information fields	**9 (38%)**
(Subjects who had conflicting settings for Educational fields even when Courses are excluded from this category)	(7)
Subjects who had the same settings for each field	**15 (62%)**
(Subjects above who filled out only 2 or fewer fields)	(1)
Subjects who left all fields blank in their profile	**1**

This Table shows which of Facebook's categories would not adequately address the privacy preferences users chose on a field-by-field basis. If 2 fields within a logical grouping had different settings, excluding those fields which were left blank, that group was determined to be in conflict.