Social Network Sites: Users and Uses

Abstract

Social network sites (SNS) have rapidly become very popular, challenging even the major portals and search engines in terms of usage and commercial value. This chapter introduces key SNS issues and reviews relevant academic research from sociology, communication science, computer science, and information science. The chapter introduces a broad classification of SNS friendship and demonstrates the range of types of SNS, each with its own unique combination of functionalities and objectives. The users and uses for SNSs are also varied, both in terms of the broad range of reasons for using a site and also, at the micro-level, in terms of the understanding of the core concept of friending. The commonly discussed issues of privacy and security are reviewed, including the extent to which they are taken seriously by users and SNS designers. New forms of electronic communication seem to always generate their own new language varieties and SNS language is briefly discussed. The chapter is supported by a series of MySpace investigations to illustrate key points and give additional information. Finally, the potential for programmers to create small applications to run within SNSs or with SNS data is discussed and speculations made about future developments.

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Introduction

Social network sites (SNS) like Facebook, MySpace and Bebo developed mass user bases during the middle of the first decade of the twenty-first century, but who are their users, how are they used and are social network sites a passing fad or will they be a relatively permanent feature of the Internet? At the same time, a number of specialist sites have emerged that incorporate social networking features, including digg.com (news filtering), YouTube (video sharing) and Flickr (picture sharing): Are these the future in the sense that social networking will become embedded into other applications rather than maintaining a relatively independent existence?

Social network sites have attracted significant media interest because of their rapid rise and wide user base, especially amongst younger people, and because of various scares such as the posting of inappropriate material by minors and the potential SNS use in identity fraud. There is also an understandable concern from parents about their children spending a significant amount of time in an unknown online environment. But there is a little systematic research into social network sites to examine the prevalence of desirable and undesirable features and to get concrete evidence of patterns of users and uses. This chapter reviews such research and many qualitative and mixed-method investigations into specific aspects of SNS use or into specific groups of users. One of the problems with gathering data about SNSs is that they are profit-making enterprises and information about aspects such as user demographics and usage patterns are commercial secrets. In addition to the implementation of privacy policies to protect members' information, this makes systematic analyses difficult. MySpace is a partial exception, however, and this chapter takes advantage of that to present several investigations of MySpace users to complement the literature reviews.

This chapter is structured as follows. First, a definition of social network sites is given, along with a brief history and an overview of the different kinds of web site that use social networking features. Second, characteristics of social network site members are reviewed, for sites with available data. This includes examinations of the international spread, age and gender of members. This is followed by a survey of how the different sites are used and why. Next, the core concept of friendship is discussed to assess its meaning in different sites and for different user groups. Language in social network sites is then explored with reference to patterns of language use for other forms of computer-mediated communication. The issues of privacy and security are discussed in a separate section. The penultimate section discusses how programmers can build their own applications to be embedded in one or more SNS. Several of the sections are complemented with small-scale MySpace investigations using new data. The conclusion summarises the key issues and speculates about the future of social networking technology. Finally, note that this chapter is aimed at a general audience, but with a focus on computer science. As such, it gives only a surface description of many of the topics reviewed. Readers wishing to gain a more in-depth understanding are urged to consult the primary sources to engage with the theoretical underpinnings of the studies reviewed.

Definition, history and typology

In their editorial introduction to a journal special issue on social networks, danah boyd and Nicole Ellison (2007) define social network sites as: "web-based services that allow individuals to (1) construct a public or semi-public profile within a bounded system, (2) articulate a list of other users with whom they share a connection, and (3) view and traverse their list of connections and those made by others within the system." The term *social network* site was preferred to the more common *social networking* site in recognition that the most popular sites seem to be used for socialising amongst existing friends (i.e., social networks) rather than *networking* in the sense of seeking new friendships or interacting with acquaintances or friends of friends (see the section on friendship below). This definition and terminology has been criticised by Beer (2008) as being too broad because it includes sites like YouTube for which friendship is not the main focus. Although YouTube matches the definition above, it is neither primarily for social *networking* nor for social activity within existing social (friendship) networks. Confusingly, however, it could be viewed as a SNS in

the sense of *navigating* social networks: users can find YouTube videos by browsing selected video posters and their friends. In this chapter the broad boyd and Ellison definition above is used but a typology is introduced below to differentiate between different types of SNS.

The current (2008) most popular SNSs, like Facebook, MySpace, Cyworld and Bebo, are free to join with members having a profile page containing a photograph, some personal information, a list of pictures of registered friends, a list of comments recorded by friends (often called a guestbook, wall, or comment list). In addition, the profile page includes links to the member's blog/diary/journal, pictures, and videos (if any). The profile page *may* also contain other customised features, such as music, videos, a personalised layout and extra content, such as a self-administered personality questionnaire. Although each of these four sites has the same core set of social networking features, they have different emphases and capabilities. For example, Facebook profile pages often have sets of selected applications, such as a map of where in the world the user has been, or a quiz game. In contrast, MySpace has a particular emphasis on music and Cyworld stresses that each user's "mini-hompy" is a virtual social space by including a prominent animated diagram of the user and others living in an imaginary room.

From the perspective of the computer science of social network applications, relatively little is in the public domain because the owning companies have not announced their methods in academic publications. Some key issues are known, however. From a technical perspective, one of the challenges is storing and efficiently coping with the huge quantities of interrelated data, such as friend connections and comment data. Profile pages need to be constructed in real time in order to reflect the most recent new friend connections and comments and hence need to be dynamic rather than static. Serving large numbers of complex dynamic pages is clearly non-trivial. This apparently caused critical problems to Friendster in the U.S. (boyd, 2006). The founder of Bebo.com, Michael Birch, has described the key hurdle for a new SNS as being the attraction of the initial critical mass of users. Once there are enough users in the system then they can derive pleasure from interacting with each other but before this point users tend to be quite isolated and so the system has to be designed to be engaging even for these isolated users (Birch, 2008). Hence, human-computer interaction and design issues seem to be critical in the early stages. Facebook seems to be an exception to this rule because its early incarnations had little functionality for lone users. Presumably it was able to spread rapidly enough in college networks through novelty and rapid word-of-mouth communication to offset this problem.

Brief history

According to boyd and Ellison (2007), social networking features arose from relatively unsuccessful experiments, like sixdegrees.com, as well as the dating-oriented and community-based sites, like AsianAve (U.S.), BlackPlanet (U.S.), and MiGente (U.S.) around the turn of the century. Sixdegrees.com began in 1997 and was a full-scale SNS from 1998. It was designed to help people connect and communicate with each other. It seems to have failed because too few people were online at the time for friend networks to be established and the site did not offer enough to do other than connect and communicate in simple ways (boyd & Ellison, 2007). Launched in 1999 (without full social network support), BlackPlanet's mission was to connect people and to strengthen the Black community, partly by encouraging more to use the Internet (Corcoran, 2004). At the time, most successful sites were attempting instead to deliver useful content to Internet users. BlackPlanet therefore reflected an emerging shift to a new way of thinking about Web use, which later matured with additional technology – particularly the publicly-visible friend lists. AsianAve (formed 1997) predated BlackPlanet and had a similar emphasis on community identity and connecting people. It may have been the success of these sites for specific groups that encouraged others to attempt to build larger scale projects.

In some ways the Korean Cyworld can claim to have been in 2001 the first successful general-purpose social network site, since it did not focus on a particular community or activity but aimed at a mass user-base. Friendster, launched in 2002, was for a time the most popular of the U.S. sites but faded due to technology issues related to its rapid growth (boyd, 2006). It subsequently re-emerged as a major SNS in the Asia-Pacific area, according to

comScore (Fulgoni, 2007). Friendster's initial promise in the U.S. was fulfilled by MySpace, which launched in 2003 and in many ways replaced it (boyd, 2006). MySpace was better able to cope with large numbers of members and also had a musical orientation. Hi5 launched in 2003 and Orkut at the start of 2004 (boyd & Ellison, 2007).

From 2003 onwards, a range of new services with social network features were released, including LinkedIn (2003, business networking), Last.FM (2003, music), Flickr (2004, photographs), and imeem (2004, all media types). The success of these services demonstrated that social network features could be useful in a wider context than pure socialising. New SNSs have been released regularly since 2004, either with a new twist on the genre or aimed at a different user base. SNSs have also appeared in different languages and for different communities around the world (e.g., Cloob (Iran) – 2004; Mixi (Japan) – 2004; Ultra Egypt – 2007). Some important milestones are: Facebook (2005 as a college network, 2006 for everyone); Bebo (2005 as a social network) Windows Live Spaces (2006, mainly for its blog); Twitter (2006, fast microblogging).

Typology

In addition to the relatively general-purpose web sites like MySpace and Facebook, which are primarily social environments, many other sites have social networking capabilities to support a different purpose. Sites like digg.com (news), Flickr (pictures) and YouTube (video) are clearly different from general SNSs. These all have social network capabilities but their primary purpose is not social in the sense of interpersonal communication. Instead they are tools for collaborative filtering because they help users navigate content through friendship patterns (Lerman, 2006). For instance a digg.com user may ignore the main news stories of the day but read those posted or recommended by their friends sharing the same interests (e.g., computer software, soccer, Barack Obama). Similarly, a Flickr user may only look at the family pictures of their relatives, or the photographs taken by "friends" chosen for similar artistic taste or subject matter interests. An underlying difference is the *type* of friends sought and displayed by users. These can be: existing offline friends; new friends/contacts/acquaintances; or "friends" as an information seeking device (see below).

A slightly different and more convenient distinction is between the *purposes* for which friendship connections are made: socialising in the sense of interpersonal communication for recreational purposes, as an end in itself; networking in the sense of interpersonal communication for reasons other than socialising; and navigation in the sense of using the connection as a device to help locate information or resources. These three purposes are characterised below as socialising, networking, and social navigation.

- *Socialising SNSs* are designed for recreational social communication between members. Friend connections are normally (but not always) used for finding and displaying lists of existing offline friends. Examples include MySpace, Hi5, Bebo, Facebook, and Cyworld. Gaia Online is an unusual example – it is a social environment (see below) but one in which members may be anonymous and hence friend connections may be rarely offline friends, even though the purpose of the SNS is purely recreational.
- *Networking SNSs* are primarily designed for non-social interpersonal communication. Friend connections are used for finding new contacts. Friend lists probably include a substantial proportion of acquaintances and previously unknown people. LinkedIn is a good example: members are expected to make new contacts by examining friends' contacts.
- *(Social) navigation SNSs* have social network features but use them primarily as a way to help users find a particular type of information or resource. Friend connections are used for finding and displaying lists of people as a device to access the information or resources associated with those people. Many social navigation SNSs are sites in which social navigation is not the primary purpose, just the main purpose of the SNS feature. For instance, digg.com members (see below) can choose to read the widely recommended news stories on the front page or to use social navigation by reading the stories posted or recommended by their friends.

The classification above is fluid and concerns the intention of a site or the practices of its members more than its actual features. For instance LiveJournal can be categorised as navigation SNS: it has long been a blog with social network features and since it is oriented on the contents of its blogs, it is expected that members friend those with blogs of interest (boyd & Ellison, 2007). Nevertheless, many of these blogs are quite personal and so friending on the basis of a personal blog is likely to lead to an online friendship, and in this sense LiveJournal also supports socialising but it can also support networking through professional blogs. Another predominantly blogging site is Live Spaces: although it has all of the essential social network features and members could use it as a socialising SNS, the blogging element is emphasised, i.e., the production of relatively permanent textual content that is intended for a wider readership than personal friends. BlackPlanet is another example: although it can be used as a socialising SNS, it also supports dating via its BlackPlanetLove facility and this is essentially a form of networking, using the above definition.

A second important feature of SNSs is the extent to which their SNS functionality is core to their use. YouTube is an example of a web site with SNS features but which can probably survive very well without them. In contrast, MySpace appears to be totally dependant upon SNS connections, even though its music element is important (boyd, 2008). Figure 1 contains a representation of where a range of sites might sit in respect to the three classifications; sites having SNS features as core to their role are in **bold**.
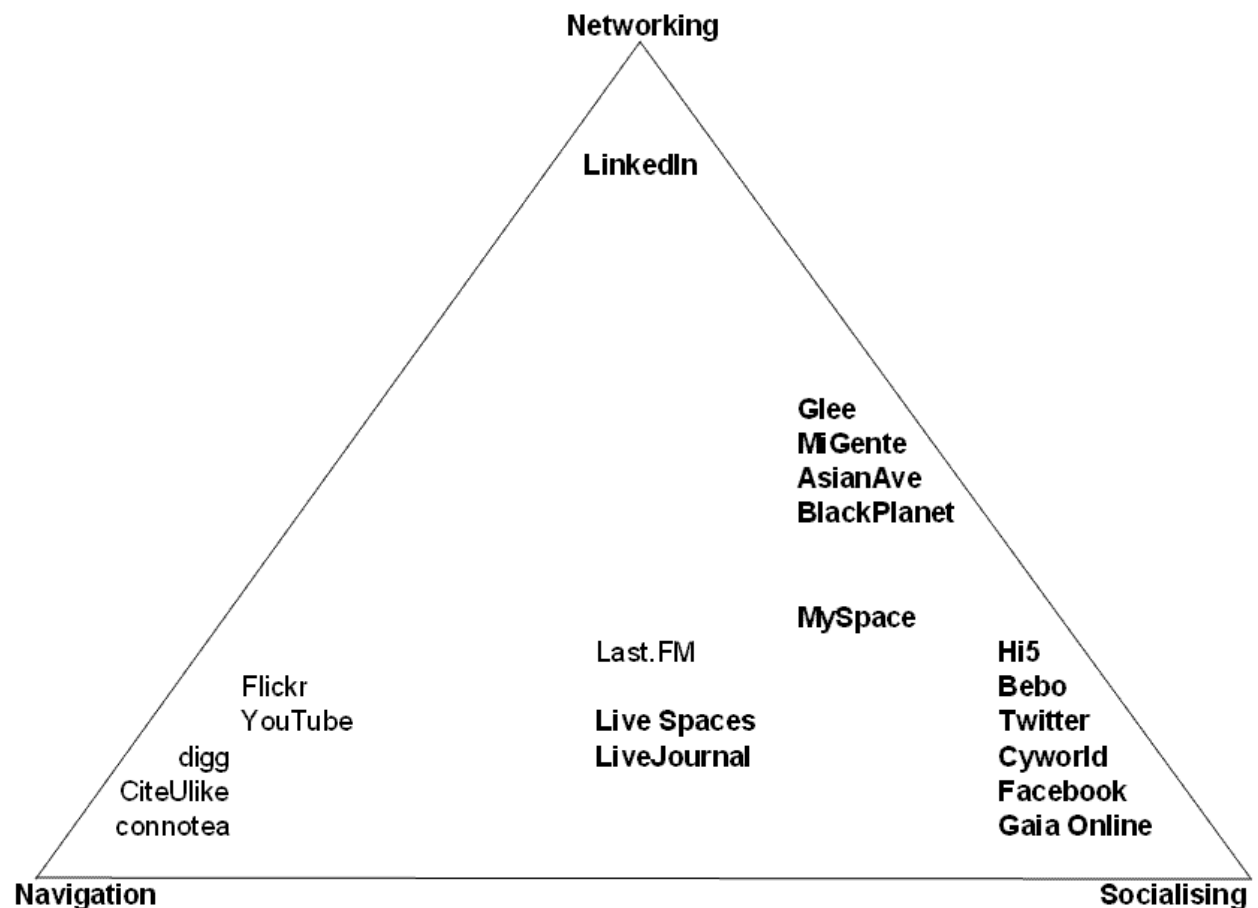
Figure 1. Examples of sites with varied purposes for SNS friendship.

Web sites with social network features but focussing on content-sharing are important examples of Web 2.0 applications. Web 2.0 is a term coined for web sites driven by content created by users rather than by web designers (O'Reilly, 2006). It encompasses all SNSs but is especially significant to those that focus on the production of content or information for a wider audience than just personal friends. Social network features are not essential to Web 2.0 because Wikipedia is a prominent example of a successful Web 2.0 site that does not (currently in 2008) incorporate the core social network features.

Thelwall, M. (2009). Social network sites: Users and uses. In: M. Zelkowitz (Ed.), Advances in Computers 76. Amsterdam: Elsevier (pp. 19-73).

A feature common to many resource-oriented Web 2.0 sites that is not essential to social networking is folksonomy tagging: the user assignment of tags to resources in a system to aid the future retrieval of relevant information (Golder & Huberman, 2006). For example, a YouTube video might be tagged "funny" and a Flickr picture tagged "geranium". Visitors can use the tags to navigate, perhaps by clicking on tags associated with a resource they are currently viewing or by selecting a tag from a tag cloud generated by a keyword search. Although a folksonomy is a collaborative endeavour it is not a social network because the navigation is by tags rather than by the tagger. Often, however, both types of navigation are supported, as in Flickr and YouTube. Tagging can interact with friending in practice because users can make their videos findable to friends by giving them cryptic tags that only their friends know about (e.g., their user name) or that they know that a circle of acquaintants might search for (e.g., the name of a club that they are all members of) (Lange, 2007).

Popular Social Network Sites

Tables 1 lists the world's most popular sites with social networking features, according to Alexa's traffic analysis, as reported in May 2008. The Alexa statistics are derived from users of its toolbar and are probably not a representative sample of internet users since they rely upon people wanting to download and install the toolbar. Nevertheless, they are useful to help identify an international collection of popular web sites with social networking features. The rankings listed concern web sites of all types, and so the table indicates that SNSs are amongst the highest traffic web sites. This list includes some that are likely to be unfamiliar to many native English speakers, including Russian, French, Spanish, Japanese, Spanish and Taiwanese sites. There is only one social navigation SNS, suggesting that this type is less popular than the others or that there are not any single dominant social navigation SNS.

Table 1. Social network sites in the top 100 Internet sites, according to Alexa (May, 2008).

Alexa global	Global Alexa rank*	Comments
YouTube	3	Video sharing SNS
MySpace	6	Socialising SNS
Facebook	8	Socialising SNS
Orkut	11	Socialising SNS (Google)
Hi5	19	Socialising SNS
V Kontakte	30	Russian socialising SNS
Flickr	39	Image sharing navigational SNS
Friendster	40	Socialising SNS
Skyrock	41	French socialising SNS
Одноклассники.ru	44	Russian classmates socialising SNS
LiveJournal	56	Blog sharing social navigation SNS
Fotolog	57	Photoblog sharing social navigation SNS
Mixi	62	Japanese socialising SNS
PerfSpot	76	Business networking social navigation SNS
DeviantArt	77	Art sharing social navigation SNS
MetroFlob	84	Spanish Fotoblog sharing social navigation SNS
Wretch	100	Taiwanese photo album and blog sharing social navigation SNS

**Combined page views and unique users metric over 3 months http://www.alexa.com/site/ds/top_500

Tables 2 and 3 list the top 10 U.S. and U.K. SNSs according to Nielsen online/HitWise, and all sites with SNS features that are in the top 100 visited U.S. or U.K. sites, according to Alexa, with data taken from similar time periods. There are significant differences between the Nielsen and Alexa rankings and it seems likely that the Nielsen/HitWise statistics are more reliable, since they are based upon data from internet service providers rather than self-

selected users. The longer Alexa list is useful, however, because it illustrates a greater variety of web sites.

Table 2. Top U.S. social networking sites according to Nielsen online and/or Alexa.

Name	Nielsen U.S. SNS rank (Feb 08)*	Alexa U.S. rank (May 2008)**	Comments
MySpace	1	3	Socialising SNS
Facebook	2	5	Socialising SNS
Classmates online	3		School-centred SNS
Windows Live Spaces	4	(6)	Blog sharing SNS
LinkedIn	5	54	Business networking
AOL Hometown	6	(10)	Socialising SNS
Club Penguin	7		Socialising SNS for young children
Reunion.com	8		School-centred socialising SNS
AOL Community	9	(10)	Socialising SNS
Flixster	10		Movie review sharing social navigation SNS
YouTube	-	4	Video sharing social navigation SNS
Flickr	-	20	Image sharing social navigation SNS
LiveJournal	-	31	Blog sharing social navigation SNS
Digg	-	32	News-based social navigation SNS
DeviantArt	-	42	Art-based site with SNS-like features
Orkut	-	52	Socialising SNS
Imeem	13	57	Media-sharing social navigation SNS
Hi5	-	75	Socialising SNS
Gaia Online	-	87	Community roleplaying site with SNS features

*Unique audience data from Nielsen online: http://mashable.com/2008/03/13/social-networking-statistics-2/

**Combined page views and unique users metric over 3 months; bracketed numbers indicate the rank of a parent site http://www.alexa.com/site/ds/top_500

Table 3. Top UK social network sites according to HitWise and/or Alexa.

Name	Hitwise UK SNS rank (Nov 2007)*	Alexa U.K. rank (May 2008)**	Comments
Facebook	1	6	Socialising SNS
Bebo	2	12	Socialising SNS
MySpace	3	10	Socialising SNS
Faceparty	4		Socialising SNS for under 35s
Windows Live Spaces	5	(3)	Blog sharing social navigation SNS
BBC h2g2	6		Collaborative online encyclopaedia with SNS features
Stumble Upon	7		Resource discovery social navigation SNS
Club Penguin	8		Socialising SNS for young children
Friends Reunited UK	9		School reunion socialising SNS
Yahoo! Groups	10	(2)	Group discussion - not SNS
YouTube	-	5	Video sharing social navigation SNS
Flickr	-	18	Image sharing social navigation SNS
Orkut	21	25	Socialising SNS
hi5	16	52	Socialising SNS
LiveJournal	14	56	Blog sharing social navigation SNS
Digg	-	64	News-based social navigation SNS
DeviantArt	-	79	Art sharing social navigation SNS

Thelwall, M. (2009). Social network sites: Users and uses. In: M. Zelkowitz (Ed.), Advances in Computers 76. Amsterdam: Elsevier (pp. 19-73).

*Total internet visits http:://www.hitwise.co.uk/
**Combined page views and unique users metric over 3 months; bracketed numbers indicate the rank of a parent site http://www.alexa.com/site/ds/top_500

Figure 2 uses Google search term frequencies (as a proxy for exact figures on the number of users) to illustrate the rapid rise of three popular sites with social network features in comparison to the established site Yahoo!. Whilst Yahoo! exhibited a steady rise, MySpace grew spectacularly from mid-2005, although levelling out in 2007. YouTube grew even more rapidly from early 2006, overtaking MySpace by 2007 and not yet having peaked by mid-2008. Facebook grew more slowly from mid-2006 but overtook MySpace in the first half of 2008 (this is corroborated by Alexa site traffic statistics).
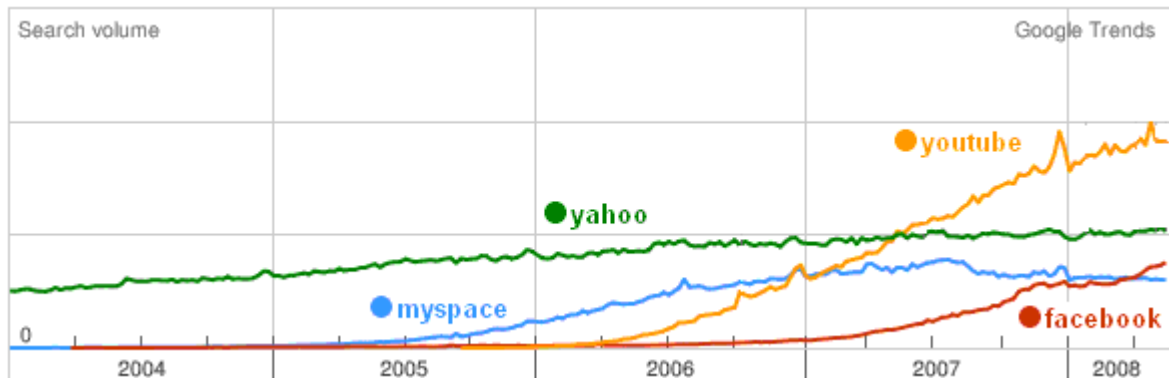
Figure 2. Google search volumes for four terms from 2004 to mi-2008.

Examples of SNSs with different features

This section describes a few SNSs in illustrate a range of different successful approaches. Note that all descriptions were current in 2008 but the sites may have subsequently changed.

LinkedIn, a business networking SNS, allows members to enter information about themselves, centring on their career and educational history, and tries to help them connect online with people that they know or that might be helpful to them at work. In contrast to most other popular SNSs, LinkedIn actively promotes the creation of new contacts (i.e., friends) by prompting members with information about new people registering from their university or workplace, and information about existing contacts adding new contacts. LinkedIn emphasises networking through friends-of-friends and includes both free and paid services, such as advertising and job seeking. Members may contact each other via their normal email accounts rather than through an internal LinkedIn messaging system.

Facebook, at least as of mid-2008, offered basic SNS features and did not have a particular focus on any additional service. It seems to have been successful because it was a simple and effective platform for online socialising with friends. A typical social network profile is dominated by a photograph of the owner at the top, together with some personal information (name, gender, birthday, home town, politics, relationship status). Immediately underneath this is a set of six friends' pictures, chosen by a Facebook algorithm from all the user's friends, and a "mini-feed" listing a few of the recent activities of the profile owner. This tells the visitor (normally a friend of the owner) something about who they are and what they have been doing. There are also some links to view "photos of me" and photos of "my friends". Facebook hosts photos (which seems to be popular: Raacke & Bonds-Raacke, 2008) and allows them to be tagged with Facebook identities, and hosts videos (via its own and third-party "Applications"). It has a form of blog, called Facebook notes, but this does not seem to be widely used. It also allows members to form groups which can be serious or "Pointless – just for fun" (e.g., "Official Petition to Bring Back Whose Line is it Anyway!", over 500 groups containing "flash mob", and "If Wikipedia Says It, It Must Be True"). In terms of communication, a profile visitor can click a link to send a private message, or scroll down to the "wall" to post a public message. Members can also be "poked", which means that they will be sent a message telling them who poked them. The significance of poking is deliberately obscure: members can infer or agree on its meaning, although in British English

there is a bawdy connotation: a male poking a female is having sex with her. Facebook gifts are pictures that can be sent to other users, for a price, and will then appear in the recipient's profile. Members can set their own status, which their friends can easily see, and this can be used to describe current activities (e.g., *Mike is editing his chapter*) or send a comic message (e.g., *Kim is updating his status*). Facebook users seem to spend time writing funny messages to each other, and perhaps also looking for new friends (e.g., Raacke & Bonds-Raacke, 2008). Facebook has an online marketplace where members can advertise to sell goods, and also has an Events feature that members can use to organise offline or online meetings. In March 2007 Facebook began to allow developers to create small programs to embed in user profiles, presumably as a way of giving Facebook a more varied feature set. These applications seem to have been predominantly fun communication rather than practical tools (e.g., games, gift exchanges, play fights) and could not be used to customise the overall appearance of a profile.

MySpace has a similar set of features overall to Facebook but with some significant differences. First, MySpace profiles have an embedded music player and in most cases if a member hears a song on a friend's profile or a musician's profile, they can add it to their own profile with a few simple mouse clicks. This makes MySpace very music-friendly which is important for young members as "music is cultural glue among youth" (boyd, 2008). A second key difference is that MySpace allows members to freely customise the appearance of their profile, including the whole colour scheme and by adding a background picture. This allows users to creatively express themselves through their profile appearance, although it seems that a minority take advantage: including inactive users, only about 22% have customised profiles, with a higher proportion of younger users (Parks, 2008). Although the process of changing the appearance of profiles is quite technical, it is widely achieved by members who are able to cut and paste from examples or specialist sites (Perkel, 2006). MySpace does not allow pokes and does not have a status that users can set but it does give brief user information and a photograph, as well as a list of friends' comments. MySpaces have fairly prominent blogs, but ot all MySpace users employ its blog feature and it seems that it is often used by those who are less socially integrated and who seek an online mechanism to cope with social stress (Baker & Moore, 2008). Members can upload pictures and videos, as well as commenting on friends' pictures, videos, blog postings and profiles. MySpace friends can communicate through private messages as well as public comments. In summary, MySpace emphasises personal expression through content production and customisation more than Facebook, which is more focused on direct communication.

Cyworld, of Korean origin, is a socialising SNS that is dominant in South Korea. Like MySpace, it has customisation as a major theme, but, unlike MySpace, this is embedded into its environment as an essential part of its business strategy. The member "lives" as an avatar in a virtual room (miniroom) pictured on the home page (minihompy), on their own or with friends and can buy coverings and contents for their room in order to decorate and customise the environment in which they live. This purchase is made in the virtual "acorns" currency which must be traded for real money (a significant source of income for the owning company, SK Telecom). This means that Cyworld is not dependant upon advertising for its revenue – an approach seen by some as being an alternative Asian business model for supporting online communication (Lewis, 2008). Members can also post blog (diary) entries, interact in chatrooms, upload and customise pictures, upload videos, customise their minihompy with standard skins, add background music and leave comments in friends' guestbooks (Haddon & Kim, 2007). Cyworld members seem to often see it as a venue for personal reflection and for sharing their inner thoughts (Kim & Yun, 2007), suggesting a very personal nature to the contents of this SNS. Perhaps related to this, Cyworld users seem rarely to meet in person new friends met online, possibly regarding online friends as acquaintances (Choi, 2006). Sharing digital photographs is one of the most popular Cyworld activities, as is the exchange of decorative virtual gifts (Choi, 2006). Mobile phone connections are also important, both for uploading photographs and communicating with friends (Haddon & Kim, 2007).

BlackPlanet is a U.S.-based SNS aimed mainly at black Americans. It includes a range of standard socialising SNS features, like a blog, instant messaging, chatrooms, groups, forums (e.g., "Who should Obama choose as his V.P. running mate?") and quizzes (e.g., "Which brother in the movie are you? The funny guy, the love interest or the guy who gets

killed in the first 5 minutes of the film? Take our quiz and find out"). It has several additional features, including a free dating service, style and "rate me" areas, job searches and searches for professionals. Dating features quite prominently on the site, perhaps because it added dating at an early stage in its development (Corcoran, 2004). As part of this, members can have a separate dating profile with additional information. Dating connections can be made through networking (friends of friends) or by geography, gender, age and sexual orientation. BlackPlanet awards Member Points for certain activities, which can be exchanged for "premium services", such as virtual gifts for friends or an enhanced dating listing. Some other U.S. SNSs also aim at particular sections of the community, including AsianAve, MiGente (Latinos), Glee ("gay, lesbian, bisexual, transgender, or everyone else" www.glee.com, accessed June 30, 2008), all owned by the same (non-ethnic) company, Community Connect Inc., that owns BlackPlanet (Byrne, 2007) and these sites seem to have more intrusive advertising than most other mainstream SNSs. Discussion forums seem to be active and political in BlackPlanet (as with AsianAve and MiGente), with a strong sense of ethnic identity, which Byrne (2008) argues is valuable for its users as a counterweight to racism within society.

Gaia online provides an interesting contrast to the sites discussed above (although it has features in common with Cyworld) because it has its own anime (Japanese animation) theme encompassing the whole service. The site is aimed at children aged at least 13 and contains safety and other information for parents. One key element of the site is its forums, which may include role-playing, and have the open nature of chatrooms. In forums, members are likely to meet people that they do not know offline. This is also likely to occur in the virtual events staged by the company. One such, a prom in April 2008 modelled on U.S. high school proms, was claimed by the developers to have attracted 500,000 members and to have hosted four million "dance sessions" (http://www.gaiaonline.com/prom, accessed June 8, 2008; see also http://themoment.blogs.nytimes.com/2008/05/16/hot-prom-mess/). Members do not upload a personal picture but have a cartoon avatar instead that they can customise (the avatar idea is also used by Club Penguin). Members can navigate a virtual world and can organise together into Guilds. Another important element is social game-playing, with members being rewarded with virtual gold for playing collaborative or competitive games (e.g., fishing, jigsaw, rally). Gold can be spent in shops selling virtual items for use within the system, although real money can also be used to purchase the same items. Gaia online contrasts with the hugely popular online role-playing game World of Warcraft in that it is not three-dimensional and war is not an element of the games, although a war game was set to be added in mid-2008. As with Cyworld, members have a home that they live in and can buy items with which to decorate or furnish their home (see Figure 3). Gaia Online is similar to the popular virtual world Second Life (Bainbridge, 2007), but with social networking features and with a two-dimensional cartoon interface instead of the three-dimensional navigation and more realistic appearance of Second Life.

Figure 3. A Gaia Online member in their (sparsely furnished) virtual room.

Digg is "a place for people to discover and share content from anywhere on the web" (digg.com/about, May 4, 2008). Digg works by members submitting the URLs of news stories (typically from major news web sites) and other interesting web pages. Other members may then digg these stories – registering their interest or approval. Digg's home page contains current lists of the most "dugg" (i.e., popular) of the submitted stories. The stories can also be viewed by category, and there is a separate page listing upcoming stories that have been recently submitted and may or may not subsequently receive enough diggs to appear on the home page. It is also possible to browse the news stories submitted by individual members and so it can be useful for someone to browse the stories of members with similar interests or who are known to be quick to identify interesting relevant stories. Statistically, friends tend to digg similar stories to each other and to digg friends' submitted stories (Lerman, 2006). Although social networking is possibly not essential to digg, members can register other members as friends. Presumably friends are mainly selected on the basis of having an interest in similar story types. Other sites with similar goals include del.icio.us, (sharing bookmarks, members can add others to their networks and can "subscribe to" tags to identify new content of interest) and StumbleUpon (uses collaborative filtering to help find sites "that you might like"). CiteULike and Connotea use the same principle applied to academic publications rather than web pages. Figure 4 is a network diagram illustrating links from Digg and StumbleUpon to other SNSs. Both send their links mainly to content-oriented SNS, with the exception of the two very large sites MySpace and Facebook. Figure 4 shows links from digg and StumbleUpon to the SNS in tables 1-3. Both popular sites and content-based sites tend to attract the most links.

Thelwall, M. (2009). Social network sites: Users and uses. In: M. Zelkowitz (Ed.), Advances in Computers 76. Amsterdam: Elsevier (pp. 19-73).

www.deviantart.com

www.imeem.com

www.skyrock.com

www.perfspot.com

www.vkontakte.ru

spaces.live.com

www.flickr.com

www.friendster.com

h2g2.com

www.orkut.com

www.bebo.com

digg.com

www.stumbleupon.com

www.linkedin.com

www.youtube.com

www.classmates.com

www.mixi.jp

www.gaiaonline.com

www.myspace.com

www.livejournal.com

www.flixster.com

www.odnoklassniki.ru

www.reunion.com

www.clubpenguin.com   www.fotolog.net

www.facebook.com

www.wretch.cc

hometown.aol.com

www.metroflog.com

groups.yahoo.com

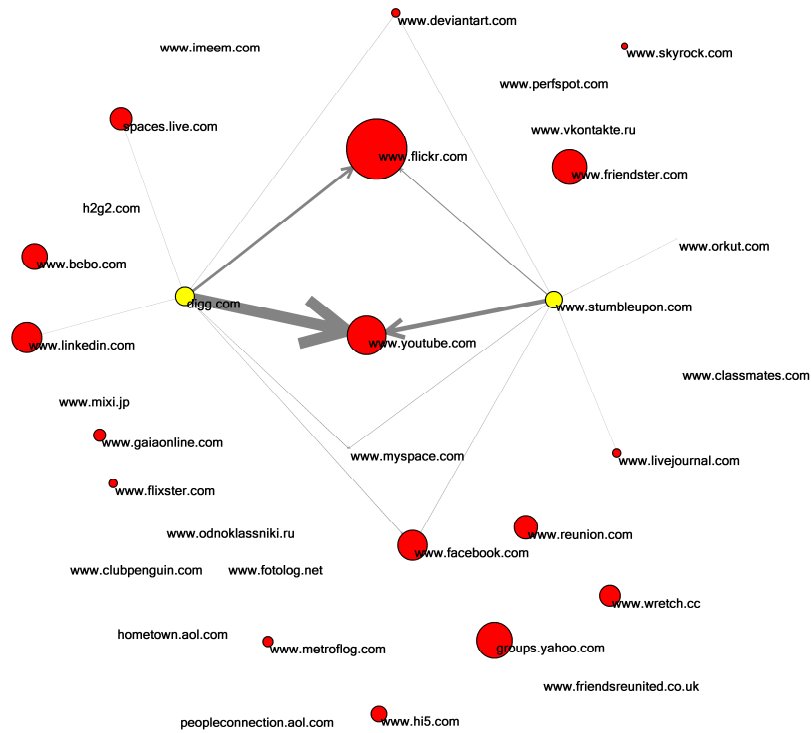www.friendsreunited.co.uk

peopleconnection.aol.com   www.hi5.com

Figure 4. Links from Digg and StumbleUpon to other popular SNSs. Circle areas are proportional to the number of site pages indexed by Yahoo! and arrow widths are proportional to the number of inter-site links reported by Yahoo! (May 2008).

YouTube is primarily a video hosting and sharing site but has additional social network capabilities. The site can be freely browsed by non-members but users must join in order to post content, comment on others' videos, save favourites and create groups of videos. YouTube members receive a profile page with a picture, some viewing frequency data and information about their posted videos and favourites. In addition they are allowed to add other users as friends, presumably if they think their videos worth watching (Lange, 2007), although there is a separate option to "subscribe" to a person's videos, which is different from the friendship status. Friending in YouTube, like DeviantArt, Flickr, Xanga and LiveJournal, seems to be more of a navigation aid than social friendship, although there are undoubtedly some users for both purposes. A similar site is imeem, which encompasses a range of media types, including music, video, and photos, and allows users to post their own content.

Last.FM is a music-based site that primarily attempts to help members listen to music that they like. Unlike YouTube, the music is not mainly uploaded by members but seems chiefly to be copyright material played with the permission of record companies. Although similar to MySpace in this respect, Last.FM is much more music-focused. Last.FM actively helps people to find (and perhaps befriend) others with similar music tastes. This might be for social friendship or as a navigation aid: to investigate the music liked by others with overlaps in taste. Last.FM seems to attract revenue through advertising online music shops: when listening to a track on Last.FM, links are provided to buy it online. Restrictions are placed on playing music within Last.FM so that there is an incentive to purchase tracks in order to have full control over when they can be played. Last.FM's AudioScrobbler database tracks the music tastes of people and uses this to guess music that they might enjoy. Similar to Last.FM is iLike, which launched in 2007. iLike grew rapidly based upon a Facebook application, although it also has its own separate web site. MOG is another similar site.

DeviantArt is a site for artists to exhibit their work and connect to other artists that they like. It is similar to Flickr in that it hosts images, but is different in that its target audience is restricted: practicing artists. It is thus surprising that it has a significant membership but it presumably plays a useful role in giving artists a virtual space in which to show their work as well as a knowledgeable and interested audience. It can also be useful in education, which must help it to gain new members (Weida, 2007).

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In addition to the sites reviewed so far, there are many more specialist initiatives (http://blogs.zdnet.com/social/?p=492), including: Fuzzster (SNS for pets); NurseLinkUp (professional site for nurses throughout the world); Yub ("meet, hang, shop…" shopaholics); Model Mayhem (connecting professional photographers and aspiring models); Gather.com ("Make lasting connections, read thought-provoking articles, publish your own thoughts & images" standard SNS but with more text content, apparently aimed at older users); meetup (enabling geographically close strangers to meet for shared interests). These show the potential for niche sites to thrive based upon satisfying specific needs. Indeed the site Ning allows users to set up their own social network for any purpose, including fan groups and political groups. Finally, one feature not mentioned for any of the above sites is present in the Japanese SNS mixi: an area where members can share product reviews.

User characteristics

In the West, the popular perception of social network users is probably of youth and students, predominantly in the richer, networked nations, and with richer people being disproportionately represented. But to what extent is this true?

Where are SNS users located?

The most reliable data on the international spread of social networking may be that of comScore (comScore.com), an online information company. They gather data on internet usage through a panel of about two million volunteers across the globe. Although comScore attempts to gather a representative sample of volunteers, its self-selected nature is not ideal but it seems to be reasonable for reporting a comparison of the extent to which SNSs are used internationally. The comScore data, which splits the world into five large zones, suggests that the most frequent SNS usage comes from the Asia-Pacific area, which accounts for 25% more uses than either Europe or North America. Latin America accounts for about a third as much usage as North America, and Africa and the Middle east account for half as much again (Fulgoni, 2007). The apparent domination of the Asia-Pacific area in these gross figures is due to the huge population concerned: on a per-capita basis (using population data from http://www.internetworldstats.com/stats.htm), North America has the highest proportion of users (37%), with Europe second (16%), Latin America third (7%), the Asia-Pacific area fourth (4%) and Africa/Middle East last (2%). In summary, although the Asia-Pacific region has the most users, they are spread thinly and are probably concentrated mainly in technologically advanced countries and areas, such as Japan, Taiwan, Korea and Australia. The take-up of SNSs by different countries is also quite varied (boyd & Ellison, 2007; Thelwall, 2008). For example, although Bebo's relative popularity in the U.K. compared to the U.S. could be related to the U.K. origins of its U.S.-based founders, the popularity of Google's Orkut in Brazil does not seem to have any linguistic or marketing cause.

There seems to be only one detailed study of SNS geography: An empirical analysis of U.S. MySpace profiles addressed issues of geography within a single country by comparing rural to urban users, finding that urban users had a much higher level of almost all types of online MySpace activity (Gilbert, Karahalios, & Sandvig, 2008). Another study has shown how geographic factors might be investigated by using Google Maps to plot the geographic location of friends in order to explore the spread of friendship networks (Escher, 2007).

Who are the typical social network users?

There isn't a typical SNS user because different general SNSs with similar features can have widely different audiences. In some cases this is understandable, as in the tendency for Facebook users to be more educated than MySpace users (boyd, 2007), presumably because of Facebook's educational origins. The most widely studied potential social network users are probably U.S. teens, due to the Pew Internet & American Life project. About half of U.S. teens had a SNS space in October-November, 2006 (Lenhart, Madden, Macgill, & Smith, 2007), in comparison to about 14% of adults (or 20% of adult Internet users) (Madden, Fox, Smith, & Vitak, 2007). This confirms that in the U.S. social networking has been especially relevant to teens even though the majority of social network users are adults. It seems likely

that this would not be true in other countries where computers are less available at home and school. Presumably, in such nations children would have few opportunities to use any internet facilities regularly. In the U.K. in 2007, a survey of Internet usage found that students were the social group most likely to have an SNS profile, with almost no pensioners having one (Dutton & Elsper, 2007). Perhaps surprisingly, men were more likely to report having a profile than women.

A study of over 1,000 first year students from an ethnically diverse U.S. urban public research university has investigated student SNS membership of Bebo, Facebook, Friendster, MySpace, Orkut, and Xanga in early 2007 (Hargittai, 2007). The majority used Facebook (79%) and MySpace (55%) and although most had heard of Xanga, only 6% used it; the others were less well known and less used. There were differences in usage based upon gender and ethnicity. Women were slightly more likely than average (for the students surveyed) to use MySpace (and Friendster), Hispanics were overrepresented in MySpace, and Asian-Americans and Asians were underrepresented in MySpace (and overrepresented in Xanga and Friendster). Students with more educated parents were overrepresented on Facebook (and Xanga and Friendster) whereas students with less educated parents were overrepresented on MySpace (see also boyd, 2007). The study also examined a range of factors that might influence whether a student uses an SNS, finding that these factors vary by service (Hargittai, 2007). For example, students living at home were less likely to use Facebook than students living at college, but this factor did not seem to affect MySpace use. Hargittai (2007) cautioned that differences between SNSs mean that research into one service does not necessarily generalised to other similar services and that research aggregating multiple SNSs may hide significant individual differences. This is particularly noteworthy because the study did not include any specific ethnic SNS, although Friendster, Orkut and Xanga may have substantial user-bases outside the U.S. that affect their uptake within the U.S.

MySpace investigation

This section reports the results of a study of the profiles of two samples of MySpace users: 40,000 Members who joined on March 10, 2007 and a systematic sample of 40,000 profiles from all MySpace users. The profile pages of the former were downloaded on March 10-11, 2008 and the profile pages of the latter sample were downloaded on March 3-4, 2008. The March 10 "yearlings" sample was chosen to compare the activities of members who joined on the same date whereas the other sample, "all members" was chosen to reveal differences in members over time. The samples were gathered using MySpace's member ID feature. Each MySpace member has a unique member number and inserting this into an appropriate URL gives the URL of their home page. Since member IDs are allocated consecutively it is possible to work out a person's joining date from their ID and it is also possible to take random and systematic samples of members through the ID feature. The all members sample included 40,000 IDs from about 51,000 (exact figure hidden for privacy reasons) in steps of 5,193 (excluding the very earliest members) and the yearlings sample included 40,000 IDs from about 166,846,000 in steps of 54. In the remainder of this chapter the data reported is the March 10 data set, unless otherwise stated.

After downloading the profile pages for each sample and extracting their data, former members' profiles were eliminated. Registered musicians, comedians and film makers also were removed because these may not operate as individuals but may behave with a commercial motive. Members with no friends or one friend were also removed because these are typically inactive – the one friend is normally the system help agent Tom. Members with private profiles were excluded from analyses except those of gender, age and last login date (i.e., the publicly available information). The procedures described so far mainly echo those of a previous study that processed earlier data, except that all analyses here exclude all members with less than two friends (Thelwall, 2008). The final number of profiles analysed were: yearlings – 16,364 (9,823 private, 6,541 public); all members – 16,977 (8,185 private, 8,792 public).

Figure 5 illustrates the range or reported ages for MySpace members, excluding the 10% of members reporting ages above 36. There is a clear trend for younger members to be

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female. The yearlings data set, which contains more recent members (on average) contains a much higher proportion of younger members than the other data set. This is unsurprising because the all members data is significantly older, with 82% of its members joining before March 10, 2007. For members aged above 17, the proportion of male and females is very similar overall.
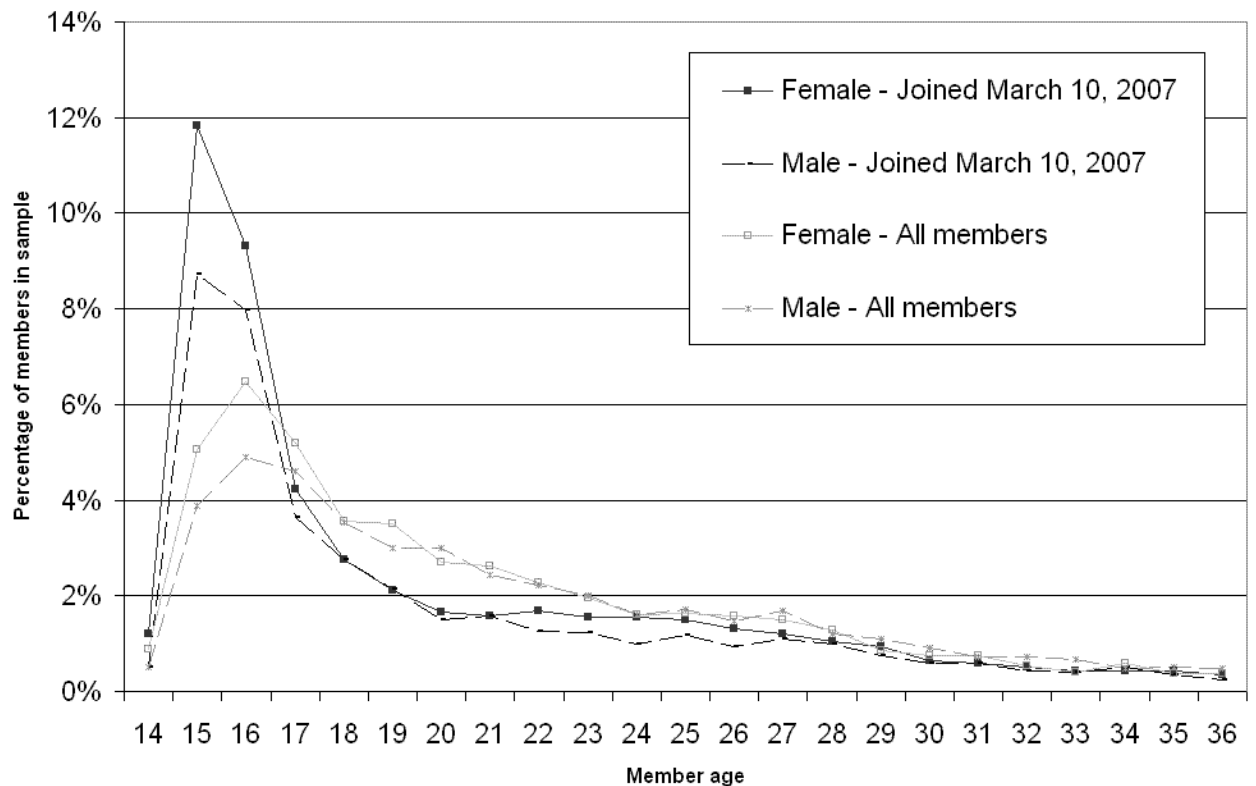

Figure 5. Ages of MySpace members in the two data sets, as tested in March 2008.

Usage

Why do we use social network sites?

Why have SNSs become popular so quickly? Are they a passing fad or do they have significant staying power? The answer seems to be that they satisfy a deep human need which implies that they are unlikely to disappear unless they are replaced by something more powerful addressing the same need. This need is the desire to investigate and gossip about human relationships (Donath, 2007; Tufekci, 2008b). Donath and Tufekci noted that from the evolutionary psychology perspective of Dunbar (1996), this desire may have evolved from social grooming by primates, which itself seems to be an evolutionary method to help bond together large enough groups of primates to be able to survive in a hostile environment. In particular, primates within a large group may form friendships/alliances through mutual grooming and these help promote their interests within the larger group (Dunbar, 1996). Examples of this local ape politics include female solidarity against over-zealous dominant males (Dunbar, 1996, p. 20-21), and dominant male coalitions to protect against other males (Dunbar, 1996, p. 27). From similar observations, such alliances are not formed in response to threats but are developed prior to times of need through patterns of grooming. Dunbar argues that language may have mainly evolved, via women, through an evolutionary drive for more effective intra-group politics (in the larger groups needed for survival in increasingly hostile environments) and that gossiping about relationships (e.g., hierarchies, alliances, and trustworthiness) would have been the key part of this. As Dunbar claims, this would explain the widespread love of gossip, whether between friends or in newspapers (including the "serous" press), magazines and fiction (in the sense that stories are often about relationships). Irrespective of whether this evolutionary theory is accepted, scientists have long recognised

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the importance of apparently trivial conversation, or "phatic communion", in human interaction (e.g., Malinowski, 1923). Dunbar's social grooming theory of language has been independently picked up by Donath and Tufekci as the key to explaining the popularity of SNSs.

Donath (2007) argues that much of the information provided by SNSs is about relationships (who are friends; how these friends communicate) and about the attributes of friends and acquaintances (how many friends they have; what they have been doing; where they live, what jobs they have). She claims that SNS "social supernets" are very efficient at transmitting the kind of information that would have previously been obtained through gossip, in addition to SNS use as an interface for gossip (e.g., via private or public messages). As a consequence, Donath sees SNSs as allowing us to "increase the scale of [our] social world" (p. 231) through their efficiency. This is also an argument for the longevity of SNSs: presumably we will not want to loose track of our social supernets and will only abandon SNSs if something more powerful emerges that can preserve our enhanced social ability. Tufekci (2008b) tested the hypothesis that social grooming is an important component of social network use through a statistical analysis of a survey of 713 U.S. college students, finding that people who did not value "social grooming (gossip, small-talk and generalized, non-functional people-curiosity)" were significantly less likely to use SNSs (and other online forms of social communication). This is useful evidence of the validity of the social grooming hypothesis. The same survey also found evidence in support of Donath's social supernets idea, in the sense that SNS users were able to keep in regular contact with more people than were non-users.

A study of specific motivations for using Facebook found seven different types from a factor analysis of the responses from an online survey of 137 members (Joinson, 2008). The main motivation was social connection: the desire to connect and communicate with others. The other factors were: shared identities (mainly joining groups or events); photographs (viewing, posting, tagging); content (applications, quizzes, games); social investigation (people watching, finding and meeting new people); social network surfing (viewing profiles of non-friends); status updates (viewing or updating). This survey both confirms the importance of the purely social aspects of Facebook and illustrates that it is flexible enough to be used for very different purposes. Note that all of these reasons could be viewed as social grooming motivations because even the games tend to be social.

Different types of people can benefit from SNS membership. A study of Facebook users found that it could be most useful for people with low self-esteem and low levels of happiness (Ellison, Steinfield, & Lampe, 2007). People operating in heterogeneous networks (i.e., with high "bridging social capital") were found to be particularly likely to be active Facebook users.

Some other suggestions have been made about reasons for SNS use. Tufekci's (2008b) survey found a motivation for students not using SNSs: concerns about privacy. Other reasons for avoiding SNS use include lack of internet access (or parental restrictions) and those who object on principle, seeing SNSs as being "stupid", or corporate-controlled (boyd, 2008). Finally, one negative result is significant: SNS use does not seem to be associated with people with more (or less) close friends (Tufekci, 2008b).

How do we use social network sites?

How do people do in SNSs? Much information about how SNSs are used can be inferred from the above section or is implicit in the findings elsewhere in this chapter. For instance the SNSs discussed here are all highly successful and so most of their services are presumably valuable to some members (e.g., music, forums, blogs, comment space, photo and video posting) or they would have been removed. This section covers the key issue of identity expression and a few studies that give additional insights into SNS uses.

A Pew Internet & American Life project has dealt with the issue of the *online activities of youth* in late 2006, some of which is relevant to SNS uses. A majority of U.S. teens had posted online content, including web pages, blogs, pictures, videos. Much of this content is likely to be either in SNSs – either general sites like MySpace (which allows blogging and the

posting of pictures and videos) or specialist sites like Flickr and YouTube. The majority of all content types was posted by girls, with the exception of video (Lenhart et al., 2007).

A study of *messaging* within Facebook found that most pairs of friends did not exchange messages: in other words a small proportion of Facebook friends are also online communication partners (Golder, Wilkinson, & Huberman, 2007). This supports the notion that friendship in Facebook is seen as a relatively trivial, although it is possible that these pairs of friends communicate offline or online via other mechanisms (e.g., email or chatrooms) instead. Messages tended to be exchanged between friends at the same college rather than between distant friends, suggesting that it was not primarily used to overcome geographic distance problems (see also Lampe, Ellison, & Steinfield, 2006). Nevertheless, an increase in messages during holiday times indicated that overcoming geographic distance was sometimes useful.

Some SNSs encourage *communication between non-friends*. For example, the forums in BlackPlanet, MiGente, AsianAve, Glee and Gaia Online and the groups in Facebook allow non-friend users to interact around specific topics. A few research findings about SNS forums have been published. A study of BlackPlanet forums found that Black community issues were a common theme but there was no evidence that typical online discussions translated into offline activism (Byrne, 2007). Within open discussions in the 'ethnic' sites BlackPlanet, AsianAve and MiGente, there seem to be discussions around ethnicity definitions and they seem to sometimes strengthen cultural identities and perform a useful social support function (Byrne, 2008).

Identity expression or performance

With an emphasis on teenage users of MySpace, boyd (2006) sees SNS profiles as digital blank slates that members use to "write themselves into being". She argues that SNS profiles can be seen as identity performances, much in the same way as choices of clothes are often a conscious part of portraying a desired image to others. Identities can be expressed in various ways, with profile appearance customisation (in some SNSs), the content of profile pages, and music, video and picture selection. In addition, following trends can be an important part of identity projection, such as through the use of deliberately incorrect spellings (boyd, 2008). The choice of friends is another important aspect of online identity (Donath & boyd, 2004). Young people may also customise MySpace and add content to it to entertain their visitors and because they have time to do it rather than to accurately reflect their identity or as part of a self-reflexive process, however (Brake, in press). Customising MySpace profiles may be of particular interest to younger members: older teenagers seem to prefer to express their identity through connections rather than customisation (Livingstone, 2008).

When do we use social network sites?

There is apparently only one detailed study of the usage patterns of a SNS (Golder et al., 2007). It analysed Facebook when it was predominantly a college network and used log files provided by the owning company in order to track the activities of members between February 2004 and March 2006. The data revealed that students tended to access the site at times when they were likely to be studying. This suggests that the students saw social networking as something that occurred as a natural part of computer use, and perhaps also integrated into studying routines, rather than seeing it as a separate activity that they would switch their computer on for. Facebook members were most active just before midnight, except on Friday and Saturday, and were least active on Saturday, suggesting that Facebook had not replaced the key social activities of going out on a Friday and Saturday night for most students. A similar usage analysis of the corporate networks within Facebook found a completely different pattern of use, with peaks during office hours and very little usage in the evening, at night and at weekends (Golder et al., 2007).

MySpace investigation

Figure 6 gives a gender breakdown of the declared reason(s) for using MySpace. Although the most common reason is friendship alone, this is more frequently the main reason for women than for men. All other combinations (except "Networking, Friends" and Networking,

Serious Relationships, which differ by 1 in gender frequency), are more common for men than women. Although this is a minority goal, men are significantly more likely to be interested in – or prepared to declare an interest in – dating, serious relationships and networking.
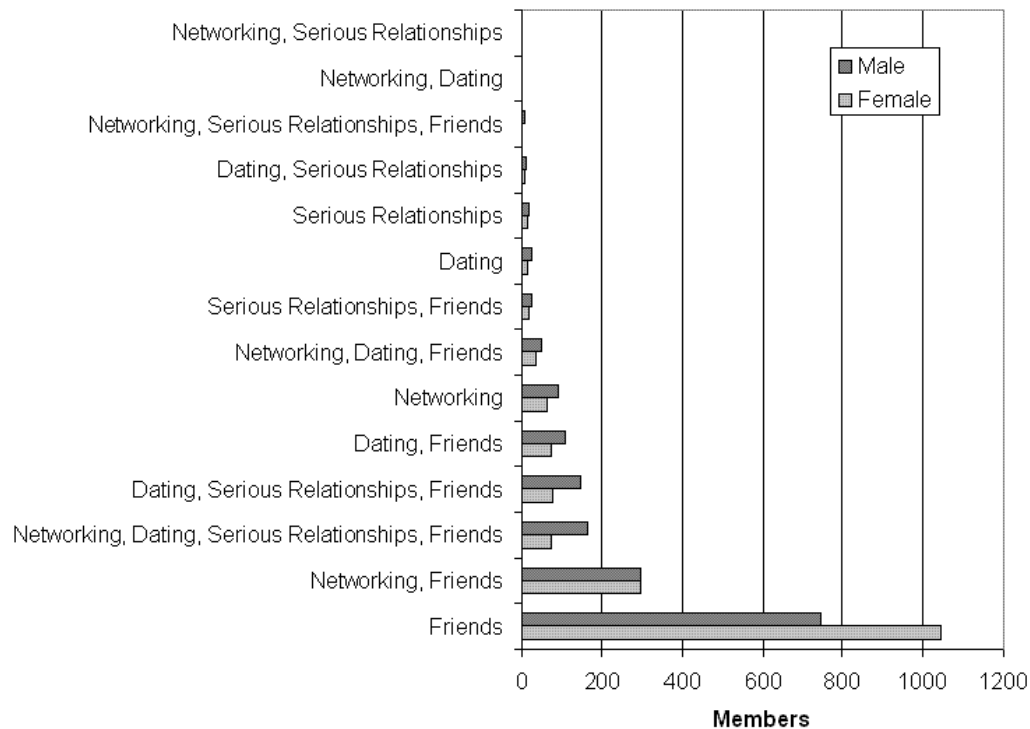

Figure 6. Declared purpose for using MySpace, broken down by gender.

Figure 7 shows the distribution of numbers of days since the last logon of the yearlings. About a third did not log on again a week after they had first joined and about a third had logged on in the previous week. This shows that some members regularly check their MySpace, and other members probably did not find a use for MySpace, forgot their logon information or only joined to see what it was like. In the middle are members that either ceased using MySpace or only logon occasionally. Recall that members with less than two friends were excluded from the data, so the graph represents people who have used MySpace to the extent of making at least one friend.

Thelwall, M. (2009). Social network sites: Users and uses. In: M. Zelkowitz (Ed.), Advances in Computers 76. Amsterdam: Elsevier (pp. 19-73).
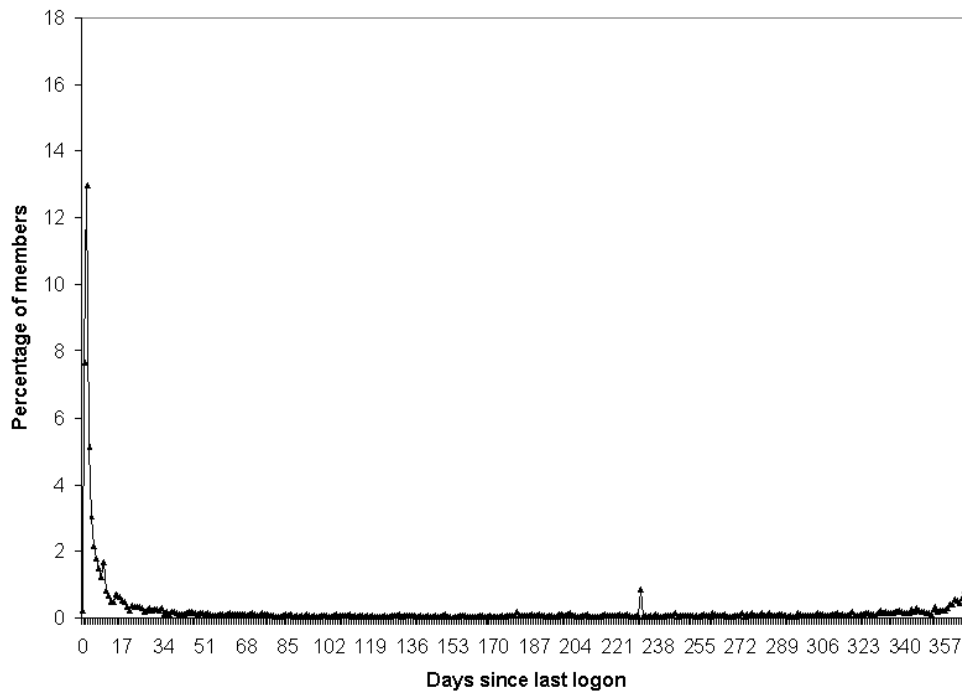
Figure 7. The range of days since the last logon of March 10 members.

Figure 8 shows that the number of comments received by MySpace members follows a typical power law (see below for more about power laws). The graph is for the yearlings data set but a similar pattern holds for the other data set and also if the results are split by gender. Only 32% of members had received any comments at all, suggesting that this feature is ignored by many active members. The power law shape indicates that a cumulative advantage or rich-get-richer approach may be occurring (Adamic & Huberman, 2000). It is possible, for example, that members who have many comments in their profile attract many more partly because of this reason. The largest number of comments on a single profile was 16,178 – these seemed to be part of a long series of conversations with MySpace friends, with each conversation made up of a long series of short instant messaging style MySpace comments. This user had a MySpace age of 16 at the time when most comments were made, and some of the comments seemed to refer to a game that was taking place.
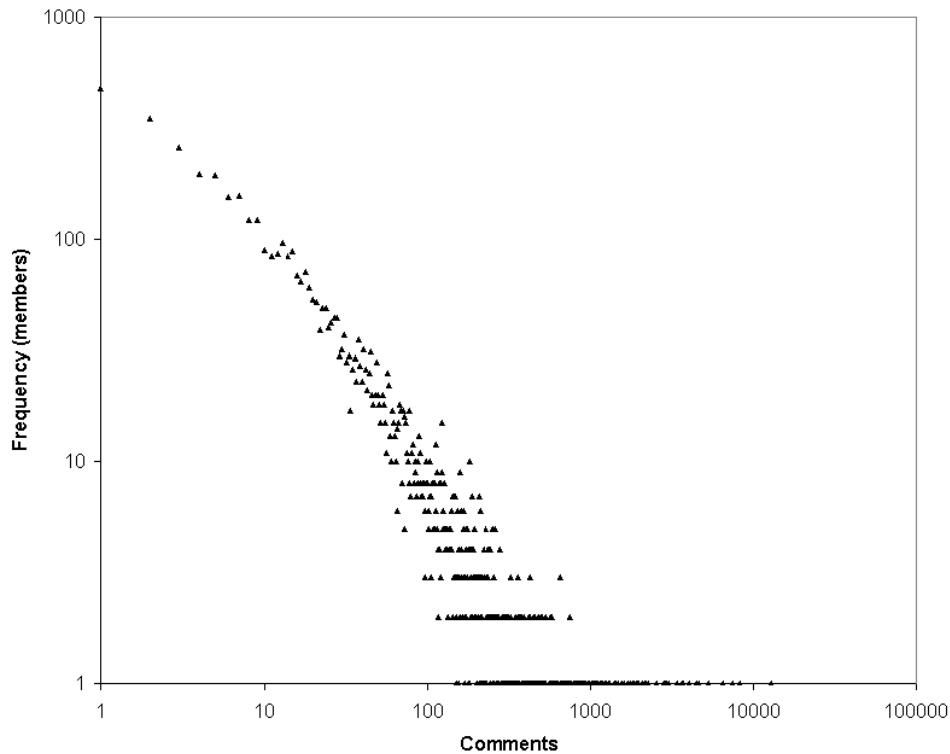
Thelwall, M. (2009). Social network sites: Users and uses. In: M. Zelkowitz (Ed.), Advances in Computers 76. Amsterdam: Elsevier (pp. 19-73).

Figure 8. The range of numbers of comments received by March 10 members (log-log scale).

Friendship

The key element in SNSs is friendship. This section focuses mainly on socialising SNSs, for which the meaning of friendship is least defined and most investigated.

Why do we form SNS friendships?

The general definition of a friend is "one attached to another by affection or esteem" (Merriam-Webster, n.d.), but this does not reflect social network practices. Most importantly, online "friending" is typically seen as different from offline friendship (boyd, 2006). In order to make an online friend in most SNSs, a member must first locate the potential new friend. This may be achieved through a name search or by searching for another attribute (e.g., musical taste), either in the site's internal search system or through a general search engine. Potential new friends are probably found most commonly by noticing the person in a friend's friend list. Once the potential new friend is found, they must be invited to become a friend. Except in a few sites such as LiveJournal, friending is a reciprocal arrangement that both parties must agree to. When the other person receives the invitation, as a message next time they log in, they will see some information about the person requesting to become their friend and then can choose whether to accept or reject this offer.

The number of friends per person ranges hugely from none to over a million, with a wide spread between (boyd, 2006). For people with many friends the meaning of friendship is clearly not that given in a dictionary. One difference is that MySpace includes many sites of musicians and these can be friended in the normal way. This is easily identifiable as a fan relationship even though it is ostensibly reciprocal and equal. The musicians benefit from the relationship because it performs a marketing function. In addition, some 'ordinary' members seek to collect friends as a kind of hobby with the competitive element of trying to gain the most, sometimes attracting the label "whore" from those who do not appreciate the activity (boyd, 2006). For the majority of members, there are many reasons for wanting or accepting somebody as a social network friend even when they are not a real friend and danah boyd gives the following list, summarised from interviews with many Friendster and MySpace users.

1.   Acquaintances, family members, colleagues

2. It would be socially inappropriate to say no because you know them
3. Having lots of Friends makes you look popular
4. It's a way of indicating that you are a fan (of that person, band, product, etc.)
5. Your list of Friends reveals who you are
6. Their Profile is cool so being Friends makes you look cool
7. Collecting Friends lets you see more people (Friendster)
8. It's the only way to see a private Profile (MySpace)
9. Being Friends lets you see someone's bulletins and their Friends-only blog posts (MySpace)
10. You want them to see your bulletins, private Profile, private blog (MySpace)
11. You can use your Friends list to find someone later
12. It's easier to say yes than no

(boyd, 2006)

This list contains an interesting variety of reasons, including social navigation opportunities (7,11), access to information (8,9,10), identity performance (3,4,5,6), other personal relationships (1), politeness (2) and laziness (12). A survey of student users of MySpace and/or Facebook found that almost all used it to keep in touch with old friends and also to keep in contact with current friends (Raacke & Bonds-Raacke, 2008).

A study of LiveJournal's non-reciprocal friending found additional practices. Since the LiveJournal focus is on the blogs produced, friending is designed primarily to represent interest in blogs. The number of people who have friended a blog author may thus be an indicator of the quality of their blog. Members sometimes seek to get people to friend them to get status for their blog in this way, or may offer to friend someone in return for a service, such as reading and commenting on their blog (Fono & Raynes-Goldie, 2007; see also Pearson, 2007). Similar motivations have been found for YouTube (Lange, 2007) and Cyworld (Haddon & Kim, 2007). Although Cyworld is a socialising SNS, photographs, customisation and diaries seem to be important content, with the number of minihompy visitors apparently being an indicator of value or success (Haddon & Kim, 2007). Related to this, Twitter members could be classified as information seekers, information providers or reciprocal friendship makers based upon their (non-reciprocal) friending patterns (Java, Song, Finin, & Tseng, 2007). One final reason, which could be added to the list above, is that friending is sometimes used primarily as a communication facilitating convenience, for example to coordinate offline activities (Fono & Raynes-Goldie, 2007).

Which types of people do we friend?

The saying "birds of a feather flock together" (academic term: homophily) applies to offline friendship: similar people tend to become friends. Based upon predominantly U.S. research, significant predictors of offline friendship include similarity in terms of race and ethnicity, age, religion, education, occupation and gender (McPherson, Smith-Lovin, & Cook, 2001). This study categorised two types of homophily: baseline and inbreeding. Baseline homophily covers the degree of friendship similarity that can be explained by environmental factors; for example children tend to have friends of their own age partly due to the organisation of schooling into age groups. Inbreeding homophily is the degree of friendship similarity that is not explainable by environmental factors; for instance, if black students in a 90% white college had on average 50% black friends then this suggests a degree of inbreeding friendship (e.g., for solidarity against a proportion of prejudiced students). As a result of this research, SNS friendship should be expected to display a degree of both types of homophily.

A quantitative study of Facebook investigated the profile factors that were most associated with friendship based on the profiles of 30,773 members of one U.S. university network in April 2006 (Lampe, Ellison, & Steinfield, 2007). About half of the friendships were between members at the same institution. Undergraduates were found to have more friends than graduates and faculty and people who filled in more profile information tended to have more friends. There was a small gender effect, with women having more friends than

men[1]. Also in terms of gender, it seems that both males and females choose a majority of female friends in MySpace (Thelwall, 2008), although this violates the homophily principle (see above) for males.

An investigation into ethnicity factors for Facebook friendship within ten Texas colleges found that race homophily was a very strong factor determining friendship within institutions, with the extent of race factors varying between institutions and between racial groups (Mayer & Puller, 2008). To give an extreme example, two black students at Texas A&M University are 16.5 times more likely to be Facebook friends than two random students at the institution (i.e., strong "inbreeding homophily"). Universities in Texas (and elsewhere in the U.S.) have significantly different student racial profiles from each other, so this additional racial clustering within universities exacerbates the existing partial ethnic separation which has potential negative social consequences (see, for example Bonilla-Silva & Embrick, 2007). For MySpace, online friends (especially those that interact most online) tend to also be offline friends, with MySpace perhaps often serving to allow friends to communicate or 'hang out' outside school hours (boyd, 2006; Brake, in press).

Some SNSs implement features that actively encourage communication (and hence eventual friendship) between people that are not already offline friends. This can clearly impact upon the type of people who become friends. LinkedIn promotes making new professional contacts through friends-of-friends and between people from the same workplace and university. This presumably harnesses occupation homophily and education homophily. Making friend connections via browsing friends' friend lists is probably the most common method in most SNSs. It seems likely that it is not the norm in role-playing SNS like Gaia Online and Club Penguin, however: typical friends may not be offline friends, because friends of friends are unlikely to be recognised as offline acquaintances or friends. In Gaia Online, friends are probably made primarily through encounters in forums and collaborative games – with friendships formed on a casual basis or perhaps through shared enjoyment in social interaction, the game or topic of discussion.

In the microblogging site Twitter, people appear to join communities based upon shared interests, so friendship seems likely to reflect this phenomenon (Java et al., 2007). Similarly, it is probable that SNS friendship circles broadly follow offline friendship patterns in terms of factors like age, gender and nationality (Hargittai, 2007). The Japanese site mixi explicitly attempts to bring people together not on the basis of shared or topic interests, but on the basis of offline geography. To support the latter it includes features so that a user comment on an event (it gives the example of a bakery opening) may be seen by others living nearby (Komaki, preprint).

The information requested by an SNS from a user when they register influences how easy people are to find and befriend. The lack of ethnic and international information in mixi, for example, would make it difficult for ethnic minorities and those with overseas connection to make friendships with others on the basis of ethnic and/or overseas connections because the data simple is not in the system to be queried (Komaki, preprint). This particularly affects questions that have a predefined set of answers built into the system. Komaki uses Nakamura's (2007) concept of "menu-driven" identities to describe this situation. BlackPlanet, AsianAve, MiGente and Glee also seem to attempt to bring together strangers via their dating features and their "Secret Admirer" game which is based upon identifying and tracking random attractive strangers. In addition to ethnic variations, a comparison of U.S. rural and urban users has shown significant differences in friendship patterns. Rural users tended to have fewer and less geographically distributed friends (Gilbert et al., 2008).

MySpace investigation

Figure 9 shows the distribution of friends for the yearlings – the graph for all members is similar. The graph is based upon the number of friends reported by MySpace on the profile page, which tends to be a small overestimate of the actual number of friends (Parks, 2008). The graph shape is a power law, as is common with network data (Adamic & Huberman,

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[1] One implication from this study for designers was that encouraging members to fill in profile information might make them more active users.

2000; Rousseau, 1997), but it should be noted that users with zero or one friends are absent because they were excluded in the data filtering stage. The power law appears to show three different slopes: one for 9 or fewer friends, one for 10-80 friends, and a third slope for over 80 friends. This would be consistent with a few friends tending to represent offline friends, more friends also including a number of acquaintances, and a large number of friends predominantly being strangers (see also Thelwall, 2008). This suggests that there are different friending dynamics at work, or that different concepts of MySpace friendship are being used. A majority of members have 18 or fewer friends and the largest number in this sample was 796,365.

Figure 9 is strikingly different from a similar graph for Facebook, which has a much more hooked shape and an almost flat left hand side (Golder et al., 2007). It seems that Facebook users, until 2006 at least, tended to have many more friends (median 144) and it was much rarer for individuals to have few friends. This suggests that the incentives to friend in Facebook are much higher than in MySpace, or it is much easier to do. This may be because Facebook is based upon networks of organisations (particularly universities) and it is relatively easy to find members of the same organisation in Facebook. Perhaps coincidentally, 150 has been claimed to be the largest effective human social group size (Dunbar, 1996).
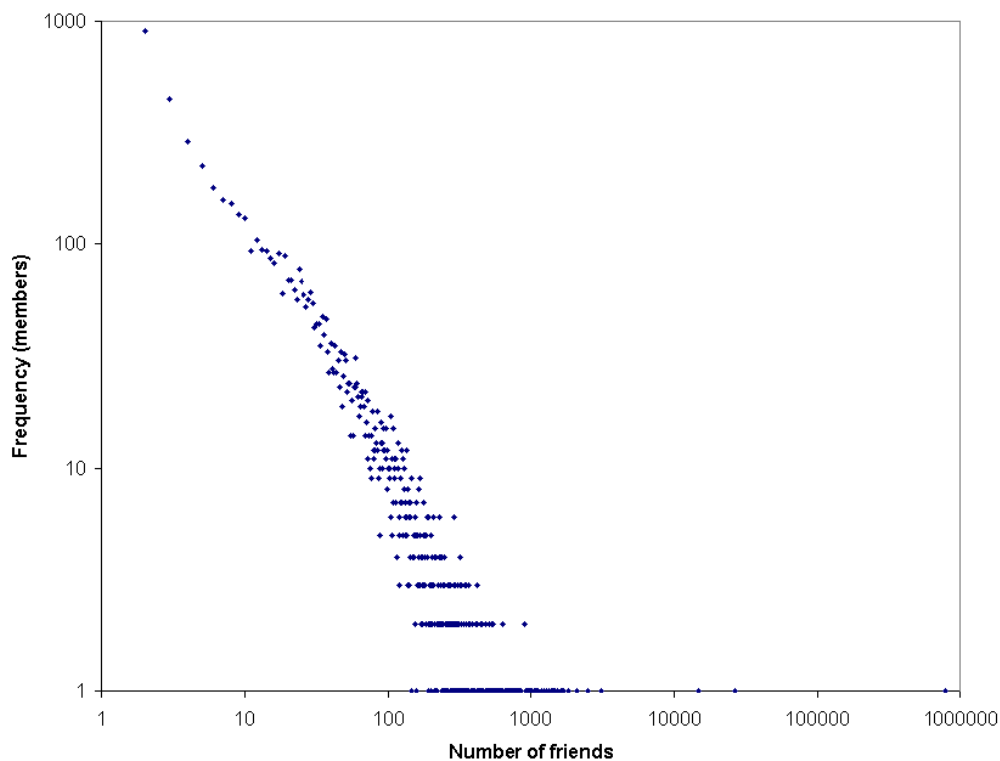

Figure 9. The range of numbers of friends for March 10, 2007 members (log-log scale).

There is almost gender equality in the number of friends: males have a median of 19 friends and females have a median of 16; this difference is not statistically significant (March 10 data, Mann-Whitney U test, $p=0.065$). As mentioned above, males and females prefer a majority of female friends and prefer a majority of females in the top friends list (Thelwall, 2008). There is also a significant trend for younger members to have more friends (Figure 10). The same trend is evident for both males and females and Figure 10 illustrates the pattern for males (the graph for females is almost identical and is not shown). A further investigation has shown that friendship homophily is prevalent in MySpace in many dimensions, including age, ethnicity and religion (Thelwall, 2009, to appear).

Thelwall, M. (2009). Social network sites: Users and uses. In: M. Zelkowitz (Ed.), Advances in Computers 76. Amsterdam: Elsevier (pp. 19-73).
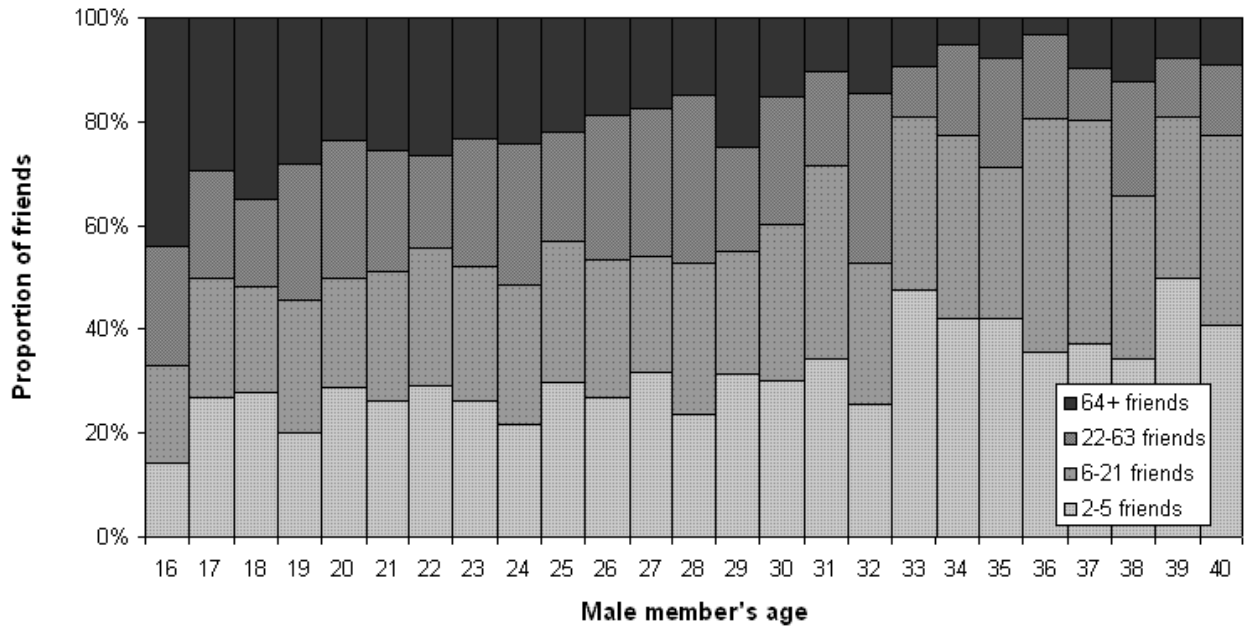
Figure 10. An age breakdown of the number of friends for male March 10, 2007 MySpace members.

Friendship issues

Social network friendship can be a big issue for users for whom social networks form an important part of their lives. This can cause two particular types of problem: the first occurs when there is a mismatch between norms of use between a person and their friends, and the second is an online variant of offline friendship issues. In addition, online friendship can have specific positive or negative impacts on members.

The *treatment of friends* becomes an issue when two online friends use different interpretations of the term. If one person views SNS friends as real friends but the other views them as casual acquaintances then there is the potential for the latter to take actions that would be seen as a breach of trust; such actions might include defriending due to inactivity (Fono & Raynes-Goldie, 2007). If someone thought that they had lost a real friend for such a reason then this would be distressing. In contrast, if the first person asked a friend to do a favour that would be normal to ask of a real friend, then the second person might be offended at the liberty taken by somebody who they did not view as a real friend (Fono & Raynes-Goldie, 2007). Friends and their activities can impact on the perception of members in at least two ways: having more attractive friends gives positive reinforcement, as does negative comments on male members' profiles, but negative comments on a female member's profile has a negative impact (Walther, Van der Heide, Kim, Westerman, & Tong, 2008).

The issue of *identifying close friends* has been investigated in MySpace, which gives insights into how offline friendship issues can reappear in a new way online (boyd, 2006). The Top 8/Top 12 friends in MySpace are those friends that are displayed on the member's profile page rather than being relegated to secondary pages listing all friends. MySpace users can select which friends are shown on their profile page (not possible with Facebook) and so these are normally the most important friends – perhaps best friends and most regarded musicians. The choice of top friends can be an issue with offline friends that can cause stress and resentment because it is a highly visible public statement of importance (boyd, 2006). Assuming that the first top friend is the most important one, if someone changes their best friend then reflecting this change in such an obvious way as reordering the top friends list is a potential source of trouble.

Cyworld has a form of close friendship that is similar to kinship but may play a role like that of top friends in MySpace. The terms cyberbuddies and cyberrelatives have both been used to describe Cyworld friends (Haddon & Kim, 2007), with the latter term reflecting the kinship analogy used within Cyworld friendships.

Thelwall, M. (2009). Social network sites: Users and uses. In: M. Zelkowitz (Ed.), Advances in Computers 76. Amsterdam: Elsevier (pp. 19-73).

Online friendship can also be used to *repair offline friendships*. A study of Cyworld has found that its design takes advantage of Korean social norms to provide an environment in which types of emotional communication can occur online that would not necessarily occur offline between friends (Kim & Yun, 2007). The authors emphasise that Korea has a collectivist culture supporting different kinds of interpersonal relationships and different kinds of communication styles to those in more individualist countries, such as in Europe, the U.S. and Canada. In particular, it is difficult to express emotions offline because these are implicit in relationships and do not often need to be spoken. Cyworld can help offline friendship issues by providing an environment in which users feel more comfortable to express emotion, for example to mend broken relationships after an argument. Related to this, SNS friendships may also particularly help people who are unhappy or who have low self-esteem (Ellison et al., 2007).

One perhaps negative impact of online friendship is that it can generate *social pressure to update* SNS profiles. It seems that Korean Cyworld members may feel this pressure particularly strongly (e.g., to update their diary, upload and decorate pictures, or change their profile customisation) to attract enough visitors to validate their popularity, because friends directly ask why they have not updated their minihompy recently, or perhaps because Korean culture includes a high sensitivity to the feelings and opinions of others (Haddon & Kim, 2007).

Privacy and security

The issue of SNS privacy is different from that of offline privacy for technical reasons. Boyd (2008) has identified four properties that differentiate the "networked publics" for an SNS profile from the normal offline public situation. These are: persistence (most SNS actions exist for much longer than speech and some may be effectively permanent); searchability (some or all SNS information can be searched for in search engines or internal site search services); replicability (almost anything digital can be easily copied); and invisible audiences (except for BlackPlanet, Glee, AsianAve, and MiGente, most SNSs do not report who views a user's page).

Privacy is particularly important for many SNSs because of the number of children that use them. There have been media reports of paedophiles using SNSs to identify and groom children and about 7% of U.S. teens, mostly girls, have felt uncomfortable when approached online by a stranger (Smith, 2007). Profile information may also be used by criminals for identity theft purposes (e.g., Jagatic, Johnson, Jakobsson, & Menczer, 2007), by stalkers to locate the homes or telephone numbers of their targets, by parents worried about children (e.g., wondering what they are talking about with friends), or by potential employers checking applicants' backgrounds. In addition profiles may contain information that the owners might consider embarrassing if it was widely known, such as their sexuality, relationship status or details of personal problems. Individual members may use SNSs to communicate informally with friends, discussing topics and using language that they would not want others (e.g., parents, teachers, employers) to read; this provides another privacy need.

Some of these concerns might be relatively minor in practice: for example, students seem to be mainly unconcerned about future employers checking their profiles, although this might be due to a focus on current rather than future privacy threats (Tufekci, 2008a). In addition to young users having special privacy needs, there are differences based upon other factors such as gender and geography. For example, in the U.S. rural women tend to have stronger privacy needs than urban users or rural men (Gilbert et al., 2008).

System affordances and policies

Many SNSs, including MySpace and Facebook, have a basic minimum privacy setting together with additional layers of privacy that users can choose to add. In MySpace, the minimum basic level of privacy is quite low: visitors must log in to MySpace in order to view others' pictures, videos and blogs but most other aspects can be made world-visible, including to search engines (as of April, 2008). In contrast, only minimal Facebook information is normally accessible in search engines and in full profile information is normally only be

visible to friends and others within the same network. This perhaps contributes to Facebook members' greater willingness to share identifying information, although, in practice, MySpace members are not discouraged by privacy concerns from meeting new people online (Dwyer, Hiltz, & Passerini, 2007). Within both sites, members can select a privacy level that displays minimal information. MySpace private profiles display a picture, a name, a personal message, gender, age, mood, general geographic location and last login date. Search engines are banned from indexing private MySpace profiles (using the metatag: `<meta name="robots" content="noindex" />`). Facebook minimal listings are similar, containing name, picture and some friends' pictures; members can opt to not be listed in search engines.

LinkedIn has a similar privacy policy to Facebook to support its business networking. Users can opt to hide all their information from search engines and unknown users, or select which elements of their profile to reveal to them (called the "public profile"). Cyworld is slightly different: users can segment their content into different levels of privacy, keeping some "secret folder" information for themselves alone (Kim & Yun, 2007). In MySpace, and probably in all other SNSs, users probably implement their own privacy policy by not including information too personal for others to see – assuming that other forms of communication can be used for this, if necessary (Brake, in press). MySpace supports this policy in a sense, by warning users under 18 about the risks of uploading a personal picture or disclosing private information (Brake, in press).

Anonymity is the core privacy strategy of child-friendly sites like Club Penguin. Perhaps because of its additional security, Japanese site mixi makes a relatively large amount of information visible to all users, including blood type, favourites, hobbies and a brief biography (Komaki, preprint).

Exceptionally, security issues are relatively minimal in the Korean Cyworld SNS because it has a strict identity verification system, in line with common practice in South Korea (Kim & Yun, 2007). Similarly, for security reasons mixi only allows new members to join that are invited by existing members, and requires them to be 18 years old (Komaki, preprint).

Marketing and surveillance

As the examples above illustrate, the privacy settings of SNSs can be quite extensive and seem to offer, in theory, sufficient privacy for most purposes. The exception is access to profile information by the host company. Most SNSs use profile information for their own targeted advertising (Preibusch, Hoser, Gürses, & Berendt, 2007) and although this allows them to be free, it has privacy and ethical implications. For example, Facebook has been criticised for allowing loan advertising to be targeted at young people (e.g., http://news.bbc.co.uk/1/hi/uk/7395344.stm). Access to large amounts of personal data is common to many internet applications, including online email and search engines, and means that some internet companies can discover extensive information about their users (Zimmer, 2008). This can be used for marketing purposes and perhaps also in criminal and government investigations, including counter-terrorism. Specific concerns have been raised about the selling of profile information to advertisers to help them set up targeted marketing campaigns (e.g., via Facebook's Beacon technology), leading Facebook to give unhappy members easier access to stop this (http://news.bbc.co.uk/1/hi/uk/7395344.stm).

User perceptions and strategies

Despite the extensive availability of privacy options in SNSs, they may not be used or fully understood by all members (e.g., Gross, Acquisti, & Heinz, 2005; Livingstone, 2008). Perhaps in response to this, young users may have a policy of not mentioning very private topics in SNSs but use another online or offline mode of communication to discuss them (Livingstone, 2008). Another important user strategy for privacy is the use of a nickname or pseudonym to retain anonymity from non-friends. This seems to occur rarely in Facebook but to be more common in MySpace (Tufekci, Forthcoming).

One study has systematically analysed a random sample of the public MySpace profiles of youths under 18 to discover how much personal information was revealed

(Hinduja & Patchin, 2008). The results showed that the majority of members were responsible in not disclosing personal information. For example, only 0.3% included their phone number and 8.8% reported their full name. A significant minority discussed alcohol use (18.1%), tobacco use (7.5%) or marijuana use (1.7%), however, some of which they would presumably wish to keep secret from parents, teachers and law enforcement agencies. Another survey has shown that most online U.S. adults were careful with posting personal information but that the majority (60%) felt comfortable with the amount of data about them that was online (Madden et al., 2007). The majority of U.S. teenagers with online social network profiles were aware of some privacy issues and took some steps to protect their online safety (including publishing false information) or to protect some of their content from access from others, including parents. Regardless of this, most teens believe that they could be identified from their profile by someone who was prepared to invest sufficient time (Lenhart & Madden, 2007). Overall, however, security issues in social networks seem to have been exaggerated in terms of serious threats to online young people (Ybarra & Mitchell, 2008).

A study of privacy issues related to YouTube has emphasised the extent to which users consciously choose a privacy strategy to meet their needs. This strategy may be quite subtle and include recognition that their videos may be almost impossible for strangers to find even if they are publicly available to be viewed. Lange (2007) identifies the "publicly private" strategy of making full information available to everyone but recognising that only friends are likely to access it, and the "privately public" strategy of ensuring that a set of videos were widely viewed but limiting access to personal information. This distinction explains why the Facebook news feeds feature caused resentment when it was released: ostensibly it is privacy-neutral because it repackages existing public information (what users have been doing) but it delivers this information prominently to friends, many of whom could perhaps be relied upon not to seek it out. As a result, some users who felt safe to conduct activities publicly were not happy to have these activities broadcast to all their Facebook friends (boyd, 2008).

Software issues

Relatively little SNS software development is reported in academic papers or otherwise publicly described, but some research has tackled relevant issues. One study analysed the extent to which anonymized social network data, as given by companies for use in research, could be mined to recover the identity of members. Both theoretical arguments and a case study of LiveJournal data were used to demonstrate that network structure information could be used to reveal apparently private information about some members from the anonymized data (Backstrom, Dwork, & Kleinberg, 2007). This is an indication that apparently private data could be extracted from social networks by those willing to expend sufficient effort. A second study took an opposite perspective, developing software that could save SNS members from spam friendship requests by identifying fake or marketing profiles (Zinman & Donath, 2007, August). It could be useful to developers to understand how communities are formed. Techniques for this have been demonstrated through a mathematical modelling approach to understanding community formation in LiveJournal which found a clear relationship between a member's tendency to join a community and the number of their friends that were already members (Backstrom, Huttenlocher, Kleinberg, & Lan, 2006).

MySpace investigation

Table 3 gives information on privacy settings as well as an overall gender breakdown. It shows that females and newer members are more likely to set their profiles to private. It also reveals that a majority of members are female, especially for more recent members.

Table 3. Privacy settings for MySpace accounts.

Privacy setting	Yearlings		All members	
	Female	Male	Female	Male
Public	36%	45%	45%	59%
Private	64%	55%	55%	41%
Total	8976	7388	8764	8199

Thelwall, M. (2009). Social network sites: Users and uses. In: M. Zelkowitz (Ed.), Advances in Computers 76. Amsterdam: Elsevier (pp. 19-73).

Figure 11 gives more detailed information about the revelation of personal information, broken down by age. In terms of privacy settings, all users aged 14 and 15 must have private profiles, according to MySpace policy. In addition, 10% of the 16 year-olds had changed their profile from private to public since becoming 16. For the remainder of users, about 30-40% set their profiles to private, and there is little difference between ages. All users with public profiles must declare a marital status, but other personal information is optional. The remainder of the lines on Figure 11 illustrate the proportion of users *with public profiles* that have not given definite answers to a range of standard questions. This information is part of the set of additional questions that members can choose to answer or ignore. There is a tendency for older users to answer more of these questions, as evidenced by the downward trend to most lines. Least popular overall is the declaration of a religion, and most popular are attitudes to children (e.g., "I don't want kids", "Proud parent") and sexual orientation. It also seems that reasons for use (friendship, dating, networking, serious relationships) are given significantly more frequently by those who are 28+ than by younger users.
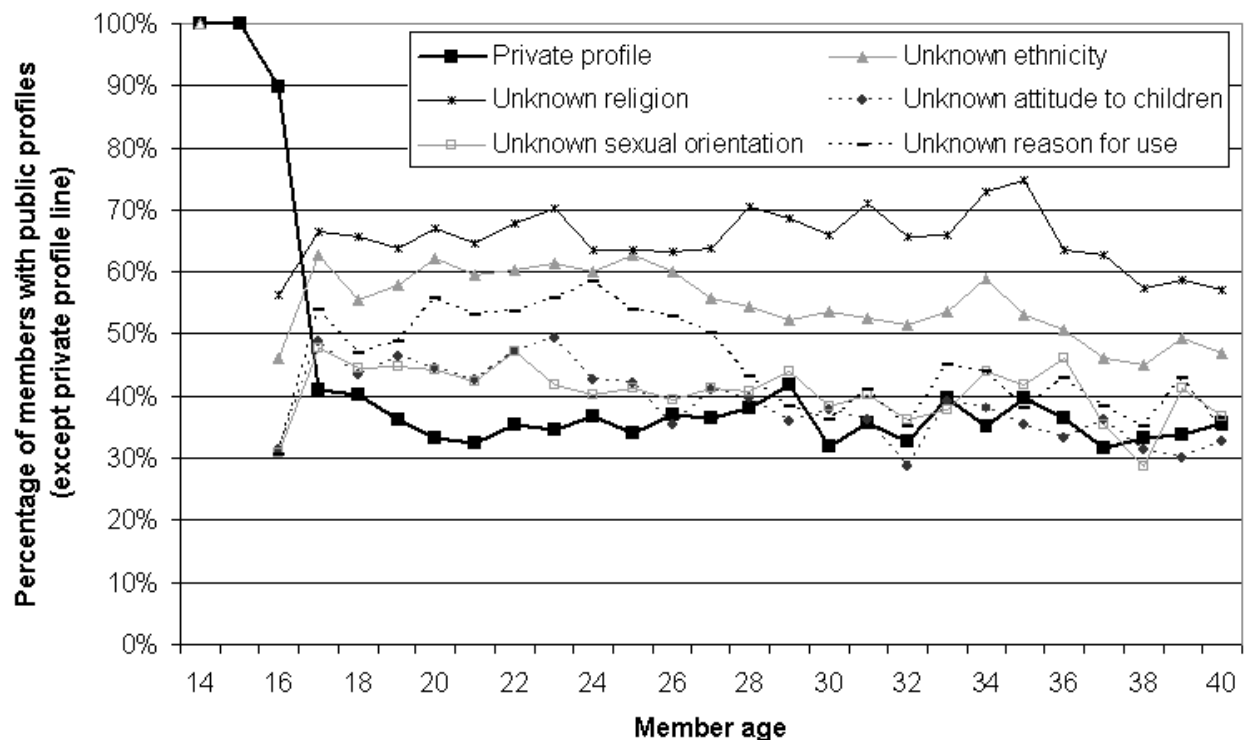

Figure 11. The percentage of members with private profiles and the percentage of members with public profiles that have not answered a range of standard profile questions.

Language

Relatively little research has investigated SNS language but much is known about other electronic communication styles. These styles are probably all found to some extent in a typical SNS and so are reviewed here before a discussion of SNS-specific findings. The Internet and other forms of computer-mediated communication (CMC) have given rise to numerous spelling and other language variations. Internet messaging and mobile phone text messaging abbreviations like m8 and l8r are well known, as are pictograms like :-) (Thurlow, 2003) and numerous international variations (Anis, 2007; Lee, 2007; Palfreyman & Al Khalil, 2007). It is also known that language varies between software and between devices, depending upon the affordances of the technology and the social context in which it is used (Herring, 2002). For example, abbreviations initially developed for quick mobile phone text messaging using keypads might subsequently be used in email, where they are not convenient, to show group membership (Crystal, 2006). There are many different varieties of "internet language" and CMC language, even for English, and the following list indicates

some features that may be found in them (del-Teso-Craviotto, 2006; Grinter & Eldridge, 2003; Grinter, Palen, & Eldridge, 2006; Radić-Bojanić, 2006; Thurlow, 2003).

- Acronyms, e.g., irl (in real life), lol (laugh out loud), bfn (bye for now)
- Abbreviations, e.g., h8, @
- Portraying an accent, humorous spelling, or phonetic spelling, e.g., luv, choon (tune), wiv for with, lata for later, clipping the final 'g' of words ending in 'ing'
- Letter and number homophones, e.g., h8, 2, r, u, cu, k (for qu in French)
- Merged words, e.g., cu, carcrash, seeya, ad-hoc omitting spaces between words
- Repeated letters for emphasis, e.g., hellllloooo, hiiiii
- Frequent use of swear words
- Use of all lower case letters, or all upper case letters
- Omission of all punctuation or omission of apostrophes, e.g., dont
- Slang, e.g., scaggy, hotty
- Spelling mistakes, e.g., copyed, doign, mixs
- Use of numbers for similar-looking letters, e.g., c0de, 5tyll, l3t (let)
- Pictograms, e.g., :-), >8-|
- Interjections, e.g., boohoo, muahzz, awwww, haha
- Shortened, fragmented or otherwise incomplete sentences, perhaps missing all verbs
- Multiple languages within a sentence

The language of SNSs probably contains all of the above with the frequency varying considerably according to context. A professional and business-oriented site like LinkedIn is likely to contain predominantly formal language whereas a general social network like MySpace contains very informal content. Even within a SNS, the language is likely to vary. For example, MySpace profile comments (shown on members' profile pages and typically written by their friends) use all of the features listed above, with only around 3% of English comments exclusively using formal standard English (Thelwall, submitted). An important theme in MySpaces comment language is playfulness and creativity, perhaps because messaging friends is a social activity that should not be treated too seriously. Swearing is common, but rarely in an abusive context (Thelwall, 2008). Language switching also appears likely to be common in some non-English speaking populations (Carroll, 2008).

In contrast to comments, which are typically two-way communication and not intended to be frequently read, most of the rest of profile page contents may potentially be viewed by all visitors or by all friends and hence may be constructed with more care. Similarly, the blog element of MySpaces may tend to adopt a diary-like style. Although there have been newspaper reports of the threat to written language standards caused by the various new forms of electronic communication, it seems that people are able to switch writing style easily between contexts. Emphasising this point, a 2008 U.S. survey found that teenagers did not think that sending short electronic messages was a form of writing (Lenhart, Arafeh, Smith, & Macgill, 2008).

MySpace investigation

The data for this part is the list of comments from the profile pages of all yearlings with public profiles. These comments were parsed from the profile pages and then scanned to eliminate common spam comments using simple string matching (e.g., *CashGift*, *ringtones*). The comments were then split into words (via whitespace characters) and statistics compiled on the number of words per comment and the most common words used.

Table 4 lists the most common terms in the MySpace comments, after converting all letters to lower case. The items are predominantly English but some are Spanish, French and Italian. In contrast to general English, date-related terms are particularly common and some Internet-only terms are present (e.g., *ur*, :-), *lol*, *u*) as well as abbreviated spellings like *im* for I'm, and *2* for to and too. A punctuation mark is included at rank 58 because it occurs frequently surrounded by whitespace, which is rare in standard English.

Table 4. The 100 most common words in the March 10 MySpace comment data.

Rank	Word	Rank	Word	Rank	Word	Rank	Word
1	2007	26	are	51	jul	76	can
2	i	27	up	52	y	77	some
3	you	28	dec	53	know	78	miss
4	to	29	get	54	jun	79	one
5	the	30	just	55	out	80	i'm
6	a	31	but	56	sep	81	going
7	2008	32	be	57	if	82	about
8	and	33	was	58	.	83	from
9	u	34	how	59	good	84	when
10	mar	35	we	60	see	85	or
11	for	36	this	61	lol	86	its
12	me	37	at	62	what	87	well
13	feb	38	apr	63	do	88	e
14	my	39	nov	64	been	89	back
15	in	40	with	65	hope	90	am
16	is	41	de	66	que	91	en
17	it	42	all	67	ur	92	by
18	on	43	te	68	not	93	he
19	of	44	ya	69	got	94	un
20	your	45	no	70	will	95	as
21	so	46	may	71	la	96	n
22	have	47	aug	72	new	97	da
23	love	48	oct	73	2	98	o
24	jan	49	like	74	:)	99	x
25	that	50	im	75	go	100	el

Software issues

Programming SNS applications

Many SNSs make additional functionality available to members via programs written in Java or Flash. There are three approaches to this in terms of openness. Gaia Online's Flash games are designed or commissioned by Gaia and there are only a few different types. In conjunction with the MochiAds games-based advertising network, Gaia Online has run an online competition to find new games to add to its small portfolio (Gaia Online/Mochi Media press release: http://www.marketwire.com/mw/release.do?id=857312).

Facebook is more open than Gaia Online, having launched Facebook Platform in May 2007, an applications programming interface (API) allowing any programmer to create applications to run in Facebook. If a member sees an application that they wish to use, then they have to register with the application in order to add it to their profile. Once in their profile, the application is typically allowed to access some of their personal information and post news stories to their personal feed so that it can embed smoothly within the SNS. The applications tend to be interactive so are able to communicate with multiple members.

The Facebook *(Lil) Green Patch* application is a typical example. It allows members to send a picture of a plant to a friend, for displaying in their profile. In order to send or receive a plant, you must have registered with the application. Hence the sender must first register and attempt to send a plant to a selected friend. The friend will then receive a notification that they have been sent a gift and this notification will tell them how to register for the application. If they register, then the application will be allocated space within the user's profile and can use this space to display the gift picture. The (Lil) Green Patch application can also have access to members' news feeds so that others can be notified about the exchange of gifts. Presumably applications are successful if they are charming or interesting enough for users to want to have them in their profile. Another popular type of

Thelwall, M. (2009). Social network sites: Users and uses. In: M. Zelkowitz (Ed.), Advances in Computers 76. Amsterdam: Elsevier (pp. 19-73).

application is the comparative quiz: friends can answer questions about a selected topic, such as favourite films, and then forward the quiz to their friends. If their friends take the same quiz, then a score is reported about how well their tastes match. Other games are competitive, with the goal being to beat the opponent or attain the highest score.

A claim has been made that applications running in SNSs, such as those written for Facebook Platform, are potentially very powerful marketing devices that operate in a new way. Fogg (2008, to appear) has coined the term Mass Interpersonal Persuasion for this type of phenomenon, describing six key components: a persuasive experience; an automated structure; social distribution; a rapid cycle; a huge social graph; and measured impact. Most of these are self-evident and rely on the ability for SNSs to rapidly transmit ideas through a form of viral marketing. The ability to measure impact is particularly interesting. Facebook applications are able to send information back to their creators to report on how they are used, with one developer claiming to embed 200 measurement points into an application (Fogg, 2008, to appear). The instant feedback of these metrics allows the creators to try different methods of persuading users to adopt the application and to quickly identify successful strategies. As a result, a successful Facebook application is likely to have an invitation statement that has a proven persuasive ability and is also perhaps customised for the type of person sending the invitation. The success of many applications has been spectacular, but there has been a backlash against some of the persuasive practices, in the form of Facebook groups like "Official Facebook Petition: To ban the inviting of friends on Applications", which had over a million members in June, 2008.

OpenSocial is a November 2007 (alpha status release) Google proposal for a universal SNS API. The purpose of the API was to allow developers to write application that would run on any SNS that supported the core features. The API allowed developers to create applications that used JavaScript and HTML alone, rather than Flash or Java, although it has been criticised as being too weak, not secure and not portable enough. Google claimed that OpenSocial was being implemented by Friendster, hi5, iMeem, LinkedIn, MySpace, and its own Orkut (http://code.google.com/apis/opensocial/, accessed May 4, 2008). Apparently in reaction to this, Facebook announced Facebook Open Platform (http://developers.facebook.com/news.php?blog=1&story=117) and released some of the source code for Facebook Platform in June 2008 (http://developers.facebook.com/opensource.php/).

Using SNS data

Some SNSs, including Flickr and Last.FM, have made available sections of their data for others to access, via an API. This allows programmers to construct non-SNS applications that use SNS data. Last.FM has a Web service interface (http://www.audioscrobbler.net/data/webservices/) for its AudioScrobbler database of the music tastes of individuals so that researchers and developers could access this huge database of musical tastes. The Flickr API (http://www.flickr.com/services/api/) gives access to information about the images and tags entered in Flickr: it is freely available for non-commercial purposes (e.g., Angus, Thelwall, & Stuart, 2008) and available by agreement for commercial applications. At the moment, however, these opportunities seem to be SNS byproducts rather than core to SNS functionality or future developments.

Computer scientists have already used SNS data on a large scale for published data mining applications, and this seems to be a promising general direction for future research. For example a text-analysis of 100,000 social network profiles was able to create cross-domain "taste maps" based upon word co-occurrences and using machine learning techniques (Liu, Maes, & Davenport, 2006). This approach was then used for a detailed analysis of taste in MySpace (Liu, 2007). Another visualisation-based project used social network data to map friendship connections (Heer & boyd, 2005). A very large scale study of Flickr and Yahoo! 360 illustrates a more theoretical approach, attempting to understand the topology of community formation and the key types of roles in terms of friend formation (Kumar, Novak, & Tomkins, 2006). Some Google research into Orkut shows the potential commercial applications of data mining in social networks: a study of how to recommend communities to Orkut users based upon existing community membership (Spertus, Sahami, & Buyukkokten,

2005). Finally, some SNSs have the potential to be mined to discover aspects of public opinion, although a study of news in Live Spaces found that there was very little evidence of non-trivial topics being discussed in a way that was easy to mine (Thelwall, 2008, to appear).

Conclusions

It is clear from the discussions above and research reviewed within this chapter that many different types of site have social network functionality. Perhaps the core sites are those like MySpace, Cyworld and Facebook that emphasise the recreational side of SNSs. These have been enormously successful in terms of growth, probably based mainly on viral spreading amongst groups of friends and acquaintances. Social networking is an international phenomenon, but the most popular sites vary by country. This is partly due to language issues but in some cases there is not an obvious reason why a country has adopted a particular SNS (e.g., Orkut in Brazil). The core members are normally assumed to be teens and although these seem to be particularly heavy users, they are in a minority, even within teen-friendly MySpace. There are some small gender and education divisions in SNS usage and membership, but these are not strong. The largest difference, at least in the U.S., seems to be ethnic: with successful SNSs that are targeted at one section of the community (e.g., BlackPlanet, AsianAve, MiGente).

The evidence about how SNSs are used is fragmentary because although there are a few studies of specific sites or types of user, there is too little information to make many generalisations about how the different types of SNS are used. It seems clear that members exploit the affordances of a particular SNS in varied ways, rather than following a common pattern. For example, although Facebook is primarily about social communication between friends, game playing is also important for some members, whereas finding out about friends of friends is important for others. The evidence about the utility of overcoming geographic distance is mixed: for some users this is a key aspect but online communication seems to be most frequent between people who often meet face-to face at school, college or (perhaps) work.

The concept of friendship varies between sites and between individuals. Friends in LinkedIn are "contacts" and in LiveJournal are often people who wish to read the friend's journal. In MySpace, a member's friends could be just their close personal offline friends, could also include acquaintances, or could include a large number of strangers. The range of reasons given by MySpace members for friending or accepting a friend request includes relatively trivial ones, such as the need to avoid giving offence by refusing a request. In many sites, a person's friends may include celebrities or bands that they are a fan of, stretching the meaning of the term friend. The differing meanings of friendship are a potential cause of conflict when two users interpret the rights and responsibilities associated with it differently.

Although privacy and security are commonly discussed issues, it seems that SNS owners take personal security seriously and give users control over who can see certain information about them. Users also tend to be aware of the issues and often take steps to protect their privacy online. There is a tension, however, between the need to reveal enough information to use a site effectively and the need to protect it from unwanted others.

Linguistically, socialising SNS are probably between blogs and chatrooms in terms of the formality of language used. In particular, comments exchanged between friends are relatively permanent, if unlikely to be viewed after they have disappeared from the main page (e.g., because 50 comments have subsequently been posted). Moreover, unless the comment facility is used to engage in a real-time conversation, for which instant messaging would be more natural, the commenter has the time to be careful with their composition, if they desire. Nevertheless, the evidence from MySpace is that comments are rarely made using correct formal English and that slang, spelling deviations/mistakes and fragmented or incomplete sentences are common. This could be explained by social rather than technological factors. Users may deliberately use informal language and comic elements in order to reinforce friendship ties or group membership.

Many social networking sites include embedded applications for additional connectivity or game playing. Some sites, including Orkut and Facebook, give open access to some of their functionality so that other developers can create new applications that can be

added to profile pages. It seems possible that Google's OpenSocial will emerge as a standard for SNS so that applications can be created that run on multiple sites. Such applications may never be allowed on sites for which the recreational social element is less important, such as LinkedIn.

Current and future developments

The future will probably bring more connectivity between SNSs and mobile phones as a logical step towards ubiquity. The microblogging SNS Twitter allows mobile phones to be used easily to update sites and to receive broadcast status updates from friends (also available in Facebook) – both for information dissemination and reporting daily activities (Java et al., 2007). This follows Flickr and Cyworld, which have allowed users to upload photographs from their mobile phones for a long time (Cyworld since 2004), with Cyworld having a range of other mobile phone services, such as paying to be texted the number of visitors (Haddon & Kim, 2007). Dodgeball is an interesting mobile phone-based SNS that uses geographic information to prompt members with information such as the location of nearby interesting places and even friends of friends but it does not seem to have gained a major user-base. Nevertheless, it seems to have a significant influence on the behaviour of its users, particularly in terms of bringing people together for offline social activities (Humphreys, 2007).

A second important direction is to increase connectivity between competing sites so that friends can be transferred from one to another or communication between people on different sites may be supported. The social network browser Flock supports this in a sense because it makes it easy to switch between the different SNSs in order to quickly maintain multiple profiles. There is already a mechanism for open expression of friendship relationships, the XFN (XML Friends Network) microformat (http://www.gmpg.org/xfn/). If adopted by SNSs or a third party application, this could be used to build extended multi-site friendship relationships. MySpace's data availability project from May 2008 (http://news.bbc.co.uk/1/hi/technology/7391405.stm) addresses the issue in a different way by allowing members to synchronise selected profile information (including friend lists) across different SNS services. This initiative was designed to make it easier for people with multiple SNS memberships to update them all. Data security in MySpace system is handled by the open source OAuth protocol.

A third new direction is facilitating the importing of social network functionality into traditional web sites so that developers can easily allow visitors to connect and interact via existing social networks. This has been supported to some extent for a long time via traditional hyperlinks, such as the BBC's standard "Bookmark with: Delicious, Digg, reddit, Facebook, StumbleUpon" links at the bottom of many of its stories. Facebook Connect, in May 2008, was introduced to allow third party "partner" web sites to incorporate some elements of Facebook interactivity (http://developers.facebook.com/news.php?blog=1&story=108). A similar initiative is Google Friend Connect (May 2008, http://news.bbc.co.uk/1/hi/technology/7397470.stm, http://www.google.com/friendconnect/) which is a service allowing web sites to easily add SNS features (using Google's OpenSocial API, see above) for existing SNS members by logging on to their SNS of choice, as long as it supports OpenSocial. Google's initiative is more generic than that of Facebook but it remains to be seen which is most successful. Neither is completely open in the sense that users have to be approved. It is not clear whether the approval hurdle will ever be removed because this would allow SNS branding or features to appear on web sites that might be seen as problematic to many SNS users (e.g., pornography, hate groups).

A fourth new direction is for social networking sites to add extra functionality to become more like portal sites. This occurred in May 2008 to Cyworld in Korea, which added a large search panel to the top of its home page. This was seen as a response to SNS saturation in South Korea (Jin-seo, 2008) so that Cyworld had to change from being a pure SNS service into being a general portal to the Internet in order to retain its members or their activity level.

In terms of business models, there are currently three main types: advertising (e.g., Facebook), micropayments (e.g., Cyworld, partially Gaia Online), and premium membership

(e.g., mixi, Flickr). It seems likely that advertising will remain the dominant overall source of revenue because the commercial logic of selling targeted advertising on the basis of users' personal data within the system seems irresistible. Perhaps mixed model strategies based upon advertising and micropayments or premium membership will become the norm. This is because there are advantages to micropayment – for example supporting the social function of gift exchanging and allowing more powerful connections to mobile phones without prohibitive one-off charges. In contrast, premium membership (e.g., to add extra storage space or features) has the advantage that it allows a mature site to add expensive functionality, and hence become more attractive and guard against the power users in the system having to move elsewhere. This business model would also allow popular SNS to keep adding additional features in order to be come larger and more powerful, perhaps adding most services found popular with the users of any other similar site.

The future will probably also see more researchers taking advantage of the friendship connection data implicit in SNSs in order to model patterns of friendship or the forces involved in social activities. One such study is based upon supplied by agreement with Facebook (Lewis, Kaufman, Gonzalez, Wimmer, & Christakis, 2008, in press), but other studies could also use publicly available data in MySpace or other SNSs. Computing research may develop data mining predictive algorithms that might help to make SNSs more user-friendly by making intelligent suggestions for future activities (e.g., Hsu, Lancaster, Paradesi, & Weninger, 2007; Schedl, Knees, & Pohle, 2008) or may make intelligent socially-relevant applications such as identifying suicide risks from the contents of their profiles (Huang, Goh, & Liew, 2007). Marketers will probably also exploit these sites in increasingly innovative ways in order to make closer connections with their customers (Bernoff & Li, 2008).

It is difficult to speculate about the overall future of SNSs because they have emerged so rapidly that it seems possible that new variants will emerge to replace the current generation. The core idea of contacting friends online and re-connecting with former friends (e.g., classmates) is so strong that social networking in some form seems to be an inevitable part of the future of the web. It is not clear whether the future promises a few powerful sites that dominate social networking and can be used for many types of activity, from business networking to socialising. In contrast, there may be an ever-increasing range of specialist SNS that offer functionality to support clearly defined user needs. There are two opposing factors at work here. SNSs benefit from large numbers because more people bring more chances to interact. Conversely, SNSs can benefit from being restrictive because people will probably not be able to use a site fully to chat with their friends if they know that a boss or parent is also a friend and will see what they are doing. Perhaps future SNS functionality will include ways around this problem or people will naturally use multiple SNSs, one for each aspect of their life (e.g., work, school friends, and close friends).

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