Public displays of connection

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Participants in social network sites create self-descriptive profiles that include their links to other members, creating a visible network of connections — the ostensible purpose of these sites is to use this network to make friends, dates, and business connections. In this paper we explore the social implications of the public display of one's social network. Why do people display their social connections in everyday life, and why do they do so in these networking sites? What do people learn about another's identity through the signal of network display? How does this display facilitate connections, and how does it change the costs and benefits of making and brokering such connections compared to traditional means? The paper includes several design recommendations for future networking sites.

1.   Introduction

'Orkut [1] is an on-line community that connects people through a network of trusted friends'

'Find the people you need through the people you trust' — LinkedIn [2].

'Access people you want to reach through people you know and trust. Spoke Network helps you cultivate a strong personal network by keeping you in touch with your relationships' — Spoke [3].

'Friendster Beta [4]: The new way to meet people. Friendster is an on-line community that connects people through networks of friends for dating or making new friends'.

Social networking sites, in which participants create a self-descriptive profile and make links to other members, have recently become quite popular. 'Networking' is the ostensible purpose of these sites — using one's chain of connections to make new friends, dates, business partners, etc. Underlying all the networking sites are a core set of assumptions — that there is a need for people to make more connections, that using a network of existing connections is the best way to do so, and that making this easy to do is a great benefit.

The first dedicated on-line networking site was sixdegrees.com, which, like today's social networking sites, helped people connect to an extended network of friends of friends and beyond. Sixdegrees.com folded after four years in operation.

Since then, use of the Internet has greatly expanded and today it is much more likely that one's friends and the people one would like to befriend are present in cyberspace. People are accustomed to thinking of the on-line world as a social space. Today, networking sites are suddenly extremely popular.

Social networks — our connections with other people — have many important functions. They are sources of emotional and financial support, and of information about jobs, other people, and the world at large. The types of social networks that develop in different communities have a profound effect on the way people work, the opportunities they have, and the structure of their daily life [5, 6]. There are societies in which network ties reflect a rigid hierarchy and close kinship relationships, and others in which they reflect a mobile culture structured around work and school. Today, we are seeing the advent of social networks formed in cyberspace. People meet in on-line forums and through on-line dating services; they keep in touch with an unprecedentedly large number of people via electronic media.

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In today's society, access to information is a key element of status and power and communication is instant, ubiquitous and mobile. The social networking sites we will be discussing in this paper are a product of this emerging culture. They

function both as environments in which these new ties are formed and as depictions of these networks in the display of individual connections.

Social networking sites are on-line environments in which people create a self-descriptive profile and then make links to other people they know on the site, creating a network of personal connections. Participants in social networking sites are usually identified by their real names and often include photographs; their network of connections is displayed as an integral piece of their self-presentation.

The public display of connections is one of the most salient features of the social sites. The focus of this paper is on the social implications of this display. Why do people display their social connections in everyday life — and why do they do so in these networking sites? What do people learn about another's identity through the signal of network display? How does this display facilitate connections, and how does it change the costs and benefits of making and brokering such connections as opposed to doing so via traditional means?

The profile and network of links are the fundamental features of these sites, but the specific instantiation varies from site to site. The examples and observations in this paper are drawn from several contemporary services, including Friendster [4], Orkut [1], Tribe.net [7], Ryze [8] and LinkedIn [2]. These sites undergo frequent redesign and new ones appear often; thus, while we have grounded our analysis on observation [9], we try to speak generally about approaches to design.

Most networking sites share a similar model of interpersonal links — they are mutual, public, unnuanced, and decontextualised:

- links are mutual: if A shows B as a connection, then B has also agreed to show A as a connection,

- the links are public: they are permanently on display for others to see — here, the sites do differ, e.g. LinkedIn allows you to see only the connections made by your immediate links, and only if they allow it, whereas Orkut allows users to explore freely, and others limit network viewings to a still more broad class of friends of friends of friends,

- the links are unnuanced: there is no distinction made between a close relative and a near stranger one chatted with idly on-line one night,

- the links are decontextualised: there is no way of showing only a portion of one's network to some people — some sites do allow users to adjust the closeness by degree of the people who are to be allowed to see their connections, and within that degree everyone can see all connections (there is no ability to segregate one's links), and similarly for one's profile, and a few sites allow limiting parts of the profile to closer connections, but again connection degree is the only distinction made.

The features of the links in the displays of connection — that are public, mutual, unnuanced, and decontextualised — shape the culture that is evolving on these sites.

2. What does the display of connections mean?

In the physical world, people display their connections in many ways. They have parties in which they introduce friends who they think would like — or impress — each other [10, 11]. They drop the names of high status acquaintances casually in their conversation. They decorate their refrigerator with photos. Simply appearing in public with one's acquaintances is a display of connection. These displays serve various purposes. The high status name-dropping may be a deliberate ploy to impress the listener of the speaker's importance or ability to effect some action. The refrigerator display may be prompted by the good feeling engendered by memories of pleasant times with friends [12]. The introductions may be done as a favour, as a way of gaining social capital, or as a way of uniting compatible but disconnected circles [10].

social status, political beliefs, musical taste, etc, may be inferred from the company one keeps

Seeing someone within the context of their connections provides the viewer with information about them. Social status, political beliefs, musical taste, etc, may be inferred from the company one keeps. Furthermore, knowing that someone is connected to people one already knows and trusts is one of the most basic ways of establishing trust with a new relationship [13, 14]. The reliability of the inferences drawn from these displays varies. The social climber who is continuously dropping the names of famous friends may be taking advantage of the listener's inability to verify the stories to create an impressive but imaginary resumé. An intimate dinner party in which the guests are clearly familiar with the host tells much more about the host's social circle than does a giant loft party where the attendees are only vaguely aware of the evening's provenance. The friends depicted in photos on the refrigerator are likely to be just that — but there does exist a market in faux family photos and other material meant to create the impression of aspired to life and history [15]. How important is the reliability of the information gleaned from the display of connections depends on what one is planning to do with it. If one is simply being entertained by a celebrity-laced story, suspension of disbelief is harmless. Yet, if one is being recruited for an investment scheme the desirability of which is based on claims of association with the rich and famous, a deeper analysis would be sensible.

A useful way of analysing the reliability of displays of connections is to think of them in the framework of signalling theory. This theory, developed in both biology [16—18] and economics [19, 20], describes the relationship between a signal and the underlying quality it represents. Most of the qualities we are interested in about other people — Is this person nice? Trustworthy? Can she do this job? Can he be relied on in an emergency? Would she be a good parent? — are not directly observable. Instead, we rely on signals, which are more or less reliably correlated with an underlying quality.

Some signals, often termed honest or assessment signals are inherently reliable because they are costly in terms of the quality they are signalling [18]. For example, a fast and energetic gazelle will exhibit a behaviour called 'stotting' when it sees a predator. Instead of running off, it jumps up and down in place, expending a lot of energy and wasting time. This is a reliable signal of its great speed, for a slower animal could not afford to do this and still outrun the predator. Sometimes, the expense of producing and/or assessing a costly signal is too high, and a less costly but also less reliable signal is used [16]. Such signals are often called conventional signals, because the connection between signal and quality exists by convention rather than necessity. For example, driving an expensive car is a signal of wealth, for to own such a car is quite costly in the domain being signalled, in this case money. Yet a car can be rented and thus a person who is unable to afford to buy a late model Jaguar may still be able to drive one around for a few days. If, however, we add the cost of time for extensive observation, we can increase the reliability of the signal. Seeing someone driving the Jaguar month after month is a more reliable signal of their ownership of it than is a single sighting. If one is only casually interested in the financial status of the driver, a long term investment of time in observing them is unnecessary and undesirable and one is likely to be satisfied with the possibly unreliable information gleaned from the less costly signal of a single observation. If the costs of being mistaken are high, then it is worthwhile to invest in the cost of the assessment signal, which in this case is the monetary investment of the driver and the temporal investment of both driver and observer.

the reliability of social connections can be analysed in terms of signalling theory

There is another important source of costs in determining the reliability of a signal and that is reputation and the ability of receivers to punish deceivers. In a system where interactions are not repeated and there is no communication within a community, receivers must rely on the signal alone. Yet in a situation in which there is persistent identity and repeated interaction, receivers can punish deceivers through the social mechanism of reputation. Here, the information gleaned through experience by an individual can spread through a community. The deceptive signaller then pays a cost in terms of difficulty in finding future interaction partners, etc. This is an important concept in evaluating social networking displays, for they place the individual within a social context that fosters co-operation through the structure of reputation maintenance.

Signalling theory focuses our analysis of the displays of connection in social networking sites on questions such as: What are the qualities that are being represented by the signal of the network display? What are the costs of producing these displays? What are the benefits that can come from them? What are the receivers attempting to discern? What are the costs they will bear if the signal is deceptive? It also focuses our attention on the signalling value of the network itself — what are the implications of an articulated social network, that is, a network in which the connections are explicitly depicted, in terms of reputation and the costs that a deceived receiver can impart?

3. Displaying connections to verify personal identity and ensure co-operation

A public display of connections is an implicit verification of identity. In order to understand the significance of this, we start by briefly discussing how widespread less reliable identity representations are in the on-line world. We then discuss two predictions that can be made about the effect of a public display of connections. First, since one's connections are linked to one's profile, which they have presumably viewed and implicitly verified, it should ensure honest self-presentation. Secondly, since the display makes one's connections and the means of contacting them public, it should ensure co-operative behaviour by putting one's reputation on the line with all transactions, for an unhappy date or client, etc, can easily contact the connections. The section concludes with a discussion of displays of connection and identity theft.

3.1 Verifying personal identity

Identity deception is prevalent in the on-line world. In the real world the body anchors identity, making it both singular and difficult to change. Identity deception, though not unheard of, is difficult — convincingly representing oneself as a member of the opposite gender is quite costly, requiring extensive makeup, costuming, and possibly surgery, while portraying oneself as a different person requires acquiring another's documents, avoiding known acquaintances, and risking a lengthy incarceration. On-line, identity is mutable and unanchored by the body that is its locus in the real world [21]. In many situations, creating pseudonyms has little cost and if one ruins the on-line reputation tied to one screen name, it is simple to acquire a new name and return afresh [22]. Behind the new name is the same problematic person, but the equivalence between the disreputable old name and the clean new name — the fact that they are both names for the same person — is invisible.

In some situations, such as game playing, the ease of creating imaginary personas and unsullied pseudonyms is acceptable. But for many purposes, such as providing support, exchanging goods and services, finding friends and seeking employees, it is not. Here, the cost of being deceived can be quite high, and it is worthwhile for people to assume and demand greater costs in order to be more confident in their belief in the other's identity.

A public display of connections can be viewed as a signal of the reliability of one's identity claims. If I write a description of myself for strangers to read, it is easy to prevaricate. Yet if I take that description and ask a number of people who know me to link to it and implicitly vet it, this should increase the reliability of the description. In theory, the public display of connections found on networking sites should ensure honest self-presentation because one's connections are linked to

one's profile; they have both seen it and, implicitly, sanctioned it.

A comparison of identity presentation in contexts with and without social networks can be made by comparing social networking sites and dating sites. Both are used to find dates and both feature self-written profiles. They differ in that the dating sites are pseudonymous and have no display of connection while the network sites feature real names and displays of connection. Dating sites are thriving, with millions of users reportedly every month [23]. Yet there have also been numerous reports of identity deception in such sites, ranging from the relatively innocuous misrepresentation of personal appearance and achievements, to more serious deceptions about marital status and intentions. The costs of creating a deceptive dating site profile are relatively low and are often not in the domain being advertised. For example, stating 'I am a kind, thoughtful and romantic person' does not impose any costs on one's kindness or romantic nature and requires little thought. Social networking sites should be more reliable. The use of one's real name and the network both imply that if one were to prevaricate extensively in one's profile, real acquaintances would see this and presumably, make some rebuke — or at least, one would be embarrassed to be seen exaggerating accomplishments in front of one's friends. More serious deceptions, such as a married person posing as an available single, are far more difficult to perform in a networking site. In order to remain innocent in the eyes of one's friends and family one would need to create a new persona and then surround oneself with invented friends and very weak ties or would need to appear as acutely alone. Appearing on a networking site with a full network of acquaintances is a relatively reliable signal that one's participation on the site is within the boundaries of acceptable behaviour within that network.

Does this mean that the display of connections on social networking sites makes the presentation of identity in these environments very reliable? If the connections listed on the profile were always a) real people who b) knew the subject and c) would impose sanctions on false self-portrayals, then yes, these sites would be quite reliable. Yet these assumptions do not always hold.

- Real people

    It is possible that the connections listed are not real people. There is often little or no verification of people when they sign up to join most networking sites. It is easy to create a false persona; the costs lie in building the network. The determined deceiver can create a series of false profiles and have them link to each other, creating the illusion of a network of well-connected participants. The cost here is the effort required to create these multiple personas. This cost is dependent on the registration requirements of the site and sites that make registration more difficult raise the cost and lower the likelihood of such deception. Today, most sites are free. Some require an invitation from an existing member, but it would be possible simply to invite the made-up profiles oneself. A site that requires an invitation from an existing member AND that keeps the host member's name on the invitee's profile (which is seldom if ever done today)

would make the cost of creating a circle of deception higher, by making it possible to trace the chain of links to a real person. While such elaborate deceptions are rare, if the benefits of creating a believable but false persona are high enough, it is likely that they will occur. Sites that value their own reputation as a place where people can find trustworthy others should be cognisant of the value of registration costs and of maintaining invitation chains.

- Who knew the subject

    It is possible that the connections are real people, but that they do not know the subject. The culture of the networking sites varies. In some, it is common for strangers to happen upon an interesting profile, and contact the person requesting a connection; in others, it is common for people to link only to others they know. Linking to externally unknown people became so common on Friendster that the phrase 'she's not my friend, she's my friendster' [9] arose to explain the relationship one has with a person known only through that site. This is not inherently bad — after all, the social sites are designed to help people meet and linking to one another is the obvious action to take upon introduction in this environment. The drawback is that this ease of meeting means that the degree of acquaintanceship signified by a link may be very minimal. If the people on someone's display of connections do not know the subject in real life, they have no way to verify the profile — they, like the receiver, know only the on-line presentation and thus they do not add new information. One cost here is that it can take more effort to get strangers to agree to link to you than real friends; friends, upon receiving the link request, are likely to say yes (the cost of establishing the relationship has already been paid) whereas a stranger is more likely to refuse such requests. What would make someone agree to link to a complete stranger? One possibility is that they simply want more links — perhaps they are a newcomer to the site and feel conspicuous in the small size of their network or they may be one of the participants who is seeking to build as large a network as they can. Another possibility is that the link seeker has created a particularly intriguing profile and people agree to link to it — or even seek out links with it — because it is so well crafted or features an aesthetic or political viewpoint they wish to espouse. By paying the cost of carefully crafting an interesting profile one can make more connections. Here we see how the various meanings of a link can be conflated by different participants — a link may be made in response to appreciation of a witty entry, and yet be interpreted as meaning that the linked people know each other.

    Furthermore, a connection may know the subject, but not all aspects of his or her personality, work history, etc. Relationships are contextual — a friend known as a supportive shoulder to lean on may not be recognisable as the ruthless poker player or somewhat lax manager he or she also is. Identity is faceted [24]; we have different interests, beliefs, traits, etc, and share different ones with different people. Feld's [10] formulation of how networks form uses the word 'focus' to encompass the different

situations, people, ideas, etc, that bring people together. These foci, he pointed out, organise the structure of social networks because they are the circumstances and reasons people meet each other and form ties with each other. The type of information that flows through a tie, whether about the person or about the world at large, depends on the focus that brought them together and on the shared facets of their identity.

The subject's profile may touch upon various facets of his or her identity, and those who are displayed as links may know only some of these. Other claims in the profile may be untrue, yet unquestioned by friends and colleagues, who may simply assume this is an aspect of their acquaintance about which they do not know.

LinkedIn has developed an interesting approach to recognising the focused natured of people's connections. Like several other sites, it includes testimonials, which are comments people write about the subject and which appear alongside the profile and display of connections (see Fig 1 for a sample User Profile page). Unlike links, these need not be reciprocal. They are almost invariably complimentary, since they are displayed at the discretion of the subject (though notions of what is complimentary is quite context dependent). On LinkedIn, these testimonials are situated in specific sections of the profile, rather than as general comments. This is a professional site, aimed at business connections, so the profile sections correspond to different jobs; the testimonials speak about the work the subject did at each work place. The endorsement of one aspect of the profile does not imply any knowledge about the rest. As we will

discuss later in this paper, there are a number of reasons for making a self-presentation more faceted; these situated testimonials are a step in that direction.

- Who would impose sanctions

Finally, it is possible that the connections are real people, and they know the subject and know that the profile is deceptive, but they do not care. The culture of the networking sites varies. Some are more playful and participants may see them as an environment for performative expression. On Orkut, a law professor lists his career skills as 'small appliance repair', his career interests as 'large appliance repair'. To those who know him, the joke is obvious. Presented on a site where people often creatively embellish their profiles we can see it not as a deceptive self-description, but as a signal of the author's dry humour[1]. Other sites, such as LinkedIn, are quite business-like and emphasise one's personal responsibility in vouching for another person. Here, a clearly deceptive statement, such as claiming a higher title at a previous job than was actually held, might indeed be challenged.

3.2   Ensuring co-operation

Yet confrontation is difficult. It is easier to ignore such actions, especially when acting as an individual. But social groups have

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[1] In fact, Orkut features the category 'sense of humour' as a line in everyone's main profile, with the multiple choice answers including 'obscure', 'clever/quick witted', 'raunchy', etc. Note that this description of one's humour is a conventional signal, with no cost in that domain. Creative and funny use of the profile, however, is a much more reliable signal of one's wit, even as it becomes a less reliable description at face value.
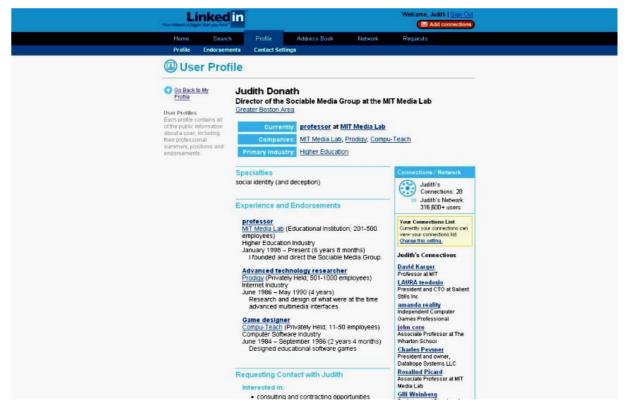

Fig 1   Sample LinkedIn user profile page.

considerable power in enforcing norms. The power of reputation to enforce co-operative behaviour lies not in confrontation with the subject, but in conversation surrounding him.

Displaying connections is a way of signalling a willingness to risk one's reputation. In the real world, as Burt [13] has pointed out, reputation is a powerful force in groups with dense affiliations. This can be due to repeated interactions — we gather a reputation around our identity that, if good, is quite valuable and we benefit from continuing to act in ways that enhance that reputation. But it can also be due to having mutual acquaintances — he cites Granovetter who says that the 'mortification' at having mutual friends discover one's poor behaviour towards another friend is 'unbearable' [25]. A public display of connections, listed along with contact information, arguably provides all viewers of one's network site profile with a virtual set of mutual acquaintances.

a public display of connections can help someone else establish that they are you

In the pseudonymous dating scene, a frequent complaint is that people act rudely towards each other in ways that they would not do to people they knew in a more integrated social environment. A common complaint concerns dates who break off communication with no explanation, as well as dates who behave boorishly in person. By publicly displaying connections, one provides others with a means of getting in touch with one's circle of friends and acquaintances. One is less likely to treat a date rudely when they are equipped with contact information for many of one's friends. Similarly, poor behaviour is a problem in many on-line discussion forums, where pseudonymity and disconnection provide cover for angry or malicious postings. Several of the social networking sites, such as Orkut and Tribe.net, include user created discussion forums. Here, the participants can be seen in the context of their on-line social network, a context that provides accountability.

The cost of this accountability is a reduction in privacy. The pseudonymous dating sites give people at least the illusion that none of their friends need know how much they would like to find a mate; the pseudonymous forums allow people to express opinions or ask questions on topics that they prefer their acquaintances not know. In the social networking sites, one acts in the company of friends and acquaintances. The security of the named and networked systems comes at the cost of reduced privacy.

The value of the display of connections for ensuring co-operation depends upon the type of connection they represent. If they are vague acquaintances, people known only in the context of the virtual world, there may be little repercussion for poor behaviour, even if the victim complains to the subject's list of contacts. Still, for many people, having bad things said about them, even to distant acquaintances,

would be painful and embarrassing. Knowing that everyone they interact with knows of and can communicate with a group of their acquaintances can influence their behaviour. The public display of connections places them in a still virtual, but now public, space.

3.3   Identity theft

The public display of connections can help verify that you are who you say you are. But it can also help someone else establish that they are you, too.

In the face-to-face world, people signal status and seek common ground by selectively divulging information about their own social network.

Name dropping is used to position oneself in a status hierarchy. People may claim connections to celebrities or other high-status people to raise their own status. Here, the goal is not to seek mutual acquaintances but to impress. Such claims to the proximity of fame are often questionable, for once the signaller ascertains that the receiver does not know the famous person he may feel free to make stronger claims of friendship, weaving them with unverifiable yet convincing details.

Name display is also used to discover whether there is a common bond between new acquaintances. People who lived in the same city or attended the same school may go through long lists of names seeking common ground. They find cues about the other's social position in both the lack and presence of mutual acquaintances. There is seldom a question of the veracity of the friendship claims to non-celebrities. If you do not know them, then my claim of friendship with them is meaningless to you and if you do know them, you will be able to easily discover that my claim is false.

Both of these displays of social connection rely on the premise that one's social network is, while not secret, not public either.

John Guare's play 'Six Degrees of Separation' [26], based on the true story of David Hampton [27], is about the power of name-dropping and deceptive display of social network information. The central character is an imposter, Paul, who manoeuvres his way into the lives of several wealthy families with the claim of a close connection to a very famous celebrity and by displaying detailed social network information about their children. Paul says he is the illegitimate son of Sidney Poitier. His listeners cannot directly corroborate or disprove his claim and they end up believing it both because of the wealth of details he supplies, all of which he was able to find in public documents, but also because of their own desire to believe it and to thus have this connection with fame. He becomes even more deeply enmeshed in their lives by saying that he attends Harvard with their children. He know all their children's names and information about them, and he also knows their children's friends and where they live and what they do; this is what gives him the greatest credibility. It turns out that he had acquired the address book of Trent, a friend of one of the children and had used this normally private information to weave a convincing but deceptive display of what he claimed to be his own network.

Trent had fallen in love with Paul and was coaching him on upper class manners, and offered to provide him with information about all the people in the address book:

Trent: 'I don't want you to leave me, Paul. I'll go through my address book and tell you about family after family. You'll never not fit in again. We'll give you a new identity. I'll make you the most eagerly sought after young man in the East….

Trent: Paul stayed with me for three months. We went through the address book letter by letter. Paul vanished by the L's. He took the address book with him …'

'Six Degrees of Separation' shows the power of social network display. Paul's knowledge of each person was minimal, but he was able to weave a convincing portrait of himself as a member of the group with a few well-chosen details about each.

Participants in social networking sites make this sort of information about their personal social world publicly available — an extensive list of their friends, with a wealth of detail about each individual. Perhaps one day if social network displays become ubiquitous, the signalling value of detailed social network information will decline. But that decline will only occur because the signal loses value through repeated deceptive use. In the meantime, users of on-line social network systems should be aware of the value of the data they are making available on-line — and of the ways that it can potentially be used.

4. Forming connections and combining contexts

The main point of social networking sites is to help people make new connections. Underlying their model is the assumption that having a mutual acquaintance, or even just being connected via a chain of acquaintances, provides context for connecting.

This is born out in our everyday experience. When people meet, they often attempt to establish mutual acquaintances: 'Oh, you were in Colorado in 1997? Did you know so-and-so?' Finding a mutual acquaintance establishes common ground — to whatever extent knowing that person defines a certain set of beliefs and interests, mutual acquaintanceship establishes that both people share some of these. Claiming to have close ties with the person makes it likely that many things are shared, disavowing close ties also provides key contextual information: 'Yes, but not well. He was part of that weird astro-therapy scene.'

4.1 Forming connections around foci of interest

People can meet randomly in all kinds of ways. But to turn an encounter into a connection, there generally must be some common ground. Feld [10] used the term focus to refer to the situations, interests, and individuals, etc, that bring people together and shape the dynamics of network formation. Connections between people, he said, are often, but not exclusively, made through these foci. He characterised foci in terms of how constraining they are. People who share a highly constraining focus, such as being in the same close-knit family, interact with each other frequently and are all tied to each other. People who share a lightly constraining focus, such as living in the same urban neighbourhood, may have only a slightly higher chance of interacting with and being tied to others with that focus. People form ties when they share a focus; the more constraining the focus and/or the greater number of foci they share, the more likely it is that they will form a tie.

A person can be a focus — people who host regular get-togethers of their various friends function this way. People on social networking sites are foci, bringing people together in a common list. Being on such a list is very lightly constraining; like sharing a neighbourhood, it brings only a minimally greater likelihood of interaction. Yet as one peruses the connection display of one's various acquaintances, it often happens that a particular person appears repeatedly — here, the connection is stronger, for multiple foci are shared, and the likelihood of making a real connection higher.

Connections are not just the natural effect of shared interests: people deliberately try to reconfigure the network in order to bring disparate acquaintances together: '[W]hen an individual is confronted with the typical situation of ties to disconnected others, he or she may try to change the situation by creating and/or finding a new focus around which to organise his or her joint activities with the others… Individuals are most likely to engage in such creative network manipulation in situations where relationships involve a high proportion of their time, effort and emotion, and where the relationships are based on compatible foci' [10]. Feld's conception of ties emphasises the cost of maintaining them, as well as the benefits that ensue from having them.

we use time and space to keep incompatible contexts of our lives separate

For Feld, bringing one's friends together makes social life easier and more efficient; activities that used to sustain one group of friendships now sustain two. This is an important concept for social networking sites, for it posits a benefit to the person who serves as the introducer of two others. Some sites are designed to help users create foci. Tribe.net, for instance, encourages users to form topical discussion groups (i.e. tribes) and to invite people whom they would like to bring together, in the context of that topic, to join them.

4.2 Incompatible connections

Feld is careful to always add the caveat that bringing people together is desirable only if the foci are compatible. His formal definition of compatibility is that it is the extent to which two foci are involved in similar interactions and activities, a somewhat bland description that sounds as if the worst that would happen should the two groups be introduced is mutual boredom. Yet in a parenthetical statement he gives as a more vivid example of incompatibility: '… a married man will be

unlikely to introduce his friend from the singles bar to his family or his work associates'.

In the physical world, we use time and space to keep incompatible contexts of our lives separate. We may choose not to introduce some acquaintances to each other and may carefully orchestrate our activities to prevent overlap. Of course, some chance encounters we would have preferred to avoid inevitably occur — you are running around a park playing silly games with your children, and run right into a colleague you have been trying to impress with your steely coolness; Goffman [28], who wrote extensively about the performance of identity, discussed the salvaging of such situations as the repair of face.

By making all of one's connections visible to all the others, social networking sites remove the privacy barriers that people keep between different aspects of their lives. One school-teacher in San Francisco described the discomfort she felt as her high school students became involved with Friendster. She had originally joined with some friends, many of whom had created 'crazy, fun' profiles, including suggestive testimonials, risqué photographs, and references to wild times at the Burning Man festival. Friendster allows users to set who can see their profile — immediate friends, friends of friends, their friends, or everyone (see Fig 2 for a sample MyProfile page). She had set her profile to be viewable only by friends — but then was asked by one of her students to be a 'friend'. Although she could edit her own profile to be quite sedate, her friends' profiles were not. Accepting her student's friendship request would reveal her full network to her class, while saying 'no' felt rude and distancing. When people from different contexts in one's life meet, it is possible that the different facets of one's life will be revealed to each other. This need not involve explicit gossip or even any discussion of the common friend at all; sometimes simply encountering people from different aspects of someone's life can be quite revealing. The discomfort can be felt both by the performer caught in two roles and the observer. A posting in a discussion group on Tribe.net about social network sites says:

> 'My issue with Tribe is that the boundaries between personal and professional are TOO fuzzy. I want to get to the person, rather than to the pitch. On the other hand, I really DON'T want to know that the person I'm getting ready to do business with is in an open marriage and into kinky redheads. I don't want to see half-naked pictures of them from Burning Man. It's not that I'm a prude, or offended by that stuff in general, it's just not stuff that I want to have pushed on me when I'm talking business'.

One solution for the uncomfortable mixing of too hetero-geneous a set of connections is for the sites themselves to be well-defined and limited contexts, places with a clear set of situational rules. LinkedIn does this by emphasising the business focus. The profiles are limited to material that is appropriate in a business setting and every aspect of the interface encourages a relatively impersonal style of interaction. Such an approach is less likely to be successful in the social sites, however. There would need to be a vast Balkanisation in which each group with incompatible mores

made its own site. This would also be counterproductive, as the creation and strengthening of heterogeneous ties, when they are not actually incompatible, is one of the key benefits of these sites. It is, however, possible to design social networking sites that allow for contextual privacy.

For example, today some sites allow users to designate that some information will be seen by everyone and some only by people within a particular degree of connection. On Orkut, one can decide whether everyone, or just immediate connections, can see information such as birthday or sexual preference. However, connection degree is a very broad classification — it does not allow you to make any distinctions among the people you are linked to.

A more promising design solution is the ability to define a set of categories and designate each person as a member of one or more of these categories. One could then set which sections of one's profile or people in one's network were for viewing by particular acquaintances. Thus, to close friends one might still show everything, but one could have a category of 'work colleagues' who would see only work related information, and not be made aware of the more outrageous connections. This faceting of profile and network would not be apparent to anyone unless two people sat down and compared what each could see of a third; that is analogous to real world situations in which two people discuss a third whom they each know in a different context. One could readjust what people saw as relationships and individuals grew and changed. A friend who starts off with a fairly innocuous self-presentation might be made visible to all friends. But if he then chooses to use his profile to make extremist political statements that one disagrees with, he could be made visible as a connection only to, say, other friends who are very politically engaged or to close friends with whom everything is shared; to the rest, the friendship would not be advertised. The ability to make one's network display nuanced and adaptable could be an important piece in making social networking sites more generally useful.

5.   The expanding network

The great exhortation of the social networking sites is to 'grow your network now!' Meet new people, form new connections. The goal is ever increasing social girth. The networking sites make it much easier to form some kind of connection with other people. On many of them, a simple click on the profile of a person who intrigues you is all that it takes to launch an e-mail to them, stating that you would like to be their 'friend' or 'connection'. But what is our ability to sustain larger networks? The emphasis of the networking sites is on network growth, but the cost of maintaining large numbers of ties is not addressed. Can new communications technologies expand the number of people we can keep track of as friends? Having a meaningful conversation with 500 friends would be very temporally costly — but does sending a mass e-mail to all of them in any way substitute for that bonding experience?

Wellman [5, 6] emphasises that network structures vary considerably, both from culture to culture, and from person to person. In some societies, one's personal network is essential for obtaining the necessities of daily life, including access to health care, work, repairs, etc. In others, such as

Fig 2   Sample Friendster profile page.

contemporary urban North America, the close personal network often focuses on domestic life, providing companionship and emotional support. Ties have many characteristics: the context in which they formed, the frequency of contact, the closeness of the relationship. Individuals also have a wide social variability across characteristics such as gregariousness, range of interests, available time, resources, etc. To understand an individual's network-based social situation is necessary to look beyond just their immediate structure. Two people who each have a network consisting of a few close ties can have structurally quite different access to information and support. One whose network is composed of ties within a single dense cluster is likely to have more support, but less access to information than one whose ties are to busy people who themselves have large, heterogeneous networks.

For this discussion, we will use a simplified typology of strong and weak ties and their effect on support and information flow. Strong ties, the kinds of ties that exist among close friends and families, the kinds of ties that connect dense clusters, are, in general, good sources for social support. Such ties can be costly to maintain, requiring much time and attention. Strong ties generally feature frequent contact,

multiple foci, and are found in dense networks. A person who is a member only of a densely linked group will be privy to all the information that flows through that group, but is limited to the opportunities present in that cluster. Weak ties, the kinds of ties that exist among people one knows in a specific and limited context, are good sources for novel information. Such ties often bridge disparate clusters, providing one with access to new knowledge [13]. Weak ties can be less costly to maintain, and a person who has many weak yet heterogeneous ties has access to a wide range of information and opportunities (see Wellman and Potter [5], Wellman and Gulia [6], Burt [13], Granovetter [25, 29] and Lin [30] for more detailed models of social networks).

Wellman observed that a typical personal network included 3—6 very close and intimate ties, 5—15 less close but still significant and active ties, and about 1000 more distant acquaintances. People have made connections all along this continuum via social network sites. There are people who have ended up married to someone they met via such a site, thus making a very close connection. Especially for people whose local network is limited (such as someone who has recently moved to a new city), the networking sites provide a useful service, helping them find new friends and community. In many cases, the resulting personal network is similar to the sort of network they would have had had they met through more traditional means. There are also people who use the networking sites to make a very large number of new connections — connections made more quickly, for less cost and in much greater numbers than is commonly done. It is this phenomenon that we will examine here.

We hypothesise that the number of strong ties an individual can maintain may not be greatly increased by communication technology (although such technologies may decrease the importance of physical proximity [6, 29]), but that the number of weak ties one can form and maintain may be able to increase substantially, because the type of communication that can be done more cheaply and easily with new technology is well suited for these ties. If this is true, it implies that the technologies that expand one's social network will primarily result is an increase in available information and opportunities — the benefits of a large, heterogeneous network [25, 31].

Given that benefit, is there any reason not to grow one's network as large as possible? Certainly there are participants on these sites whose goal is to build huge personal networks, for a variety of reasons. For some amassers of giant networks they are an end in themselves. On Friendster, which provides personal network counts showing how many 1st, 2nd, and 3rd degree connections one has, people made a game of collecting as many connections as possible. One user said, 'What else is the site good for? It's not like you can do anything there besides look at the number of people in your network.' These energetic collectors of links were often referred to as 'Friendster whores', a pejorative term that was sometimes used self-mockingly, but also reflects the negative reaction of people who realised that an invitation to join someone's network of friends arrived not because they were perceived as an interesting or desirable person, but simply as an addition to a collection of links, one among hundreds. For other extensive network builders, the network is a means to an

end. One participant on LinkedIn with over 3500 connections says in his profile: 'You just clicked through to the most active networker in London, the UK and aiming to be the most connected person in the world by 2050 when I reach 86 years of age.' His business is social networking and he claims to have found numerous associates through his LinkedIn network; testimonials describe him as acutely gregarious.

For the wholesale collectors of links, the 'Friendster whores', the benefit of creating a huge network was the game — the challenge and competition. But what about the more serious network builders? What benefits do they derive from amassing big sets of links? For some, the sites function as an awareness tool, a way to be reminded of friends and acquaintances. For others, the sites — as promised — provide opportunities to find information, dates, and jobs. These are the people who are using these sites as exploratory vehicles for navigating an extended social network.

The cost of growing a network varies from site to site. The more socially oriented sites, such as Orkut and Friendster, make adding new connections very easy: just click on a link and a message is sent with the connection request; one can optionally add a message to the request. LinkedIn makes this process a bit harder, by requiring the requestor to provide the desired connection's e-mail address, as proof that he or she knows the person (or has been able to find it through Google). Otherwise, LinkedIn will facilitate an introduction. Here, one supplies a note explaining why the connection is desired, and LinkedIn will forward it along the chain of connections reaching from requestor to target. Each of those people must read the request and forward it on with their approval or the connection is not made. Everyone is paying a cost in time and energy; furthermore, they are paying a cost in terms of social favours. Each person is requesting a favour of the person above. The initiator stands to gain a desired connection but the benefit to the intermediaries is less clear. It is important that the requestor make a compelling case for the introduction, something that will make the intermediaries feel that they are doing the recipient a favour, rather than using up some of their own good will with the recipient for the benefit of an unknown requestor. By adding these costs into the process of making connections to unknown people, LinkedIn makes the display of connections more significant — either they are known to each other, or some higher cost has been paid for the connection. Furthermore, LinkedIn members are reminded in the connection request e-mail that they may be asked to vouch for the person who is making the request, a reminder that accepting a connection is an implicit endorsement. A large network will engender numerous connection requests; here, connectivity has a cost.

networking sites streamlines the introduction process, but at a cost

It is interesting to note that even though the cost of making connections is higher on LinkedIn than on the social sites, the large-scale network builders on LinkedIn have far more links

than the top participants in Friendster and Orkut. Presumably, the benefit of having a large network here outweighs the cost.

Being the bridge between two otherwise disconnected people or groups is a strategically important role [13], particularly if there is valuable information or opportunites to be shared between them. The bridge, being connected to these disparate groups, has access to a broad range of information. And, the bridge may be seen as valuable for the connections he or she can make. In the traditional realm of personal interaction, being the bridge requires considerable output in time and energy to maintain a heterogeneous network, to transmit information and to make introductions. Networking sites streamlines much of this process, but does the loss of the cost paid in personal interaction devalue the structure? A truly personal request is enmeshed in a complex weave of social obligations, but a semi-automated one, freed from this entanglement, may in the end feel more like spam.

the socially promiscuous networker could be the unwitting conduit of the next generation of spam

Indeed, that has been a problem with some of the more socially oriented sites. Orkut and others make it possible to broadcast messages to one's network of friends and friends of friends. In theory, this is a wonderful idea. Everyone has had situations where they needed something — a babysitter, an apartment — and asked everyone they could for leads. The networking sites make it possible to do this with just a click and a note. Then again, by making the process so low cost, the value of asking people with whom one is at least indirectly connected is lost. We look to our network of connections for favours such as apartment leads not because they are the people most likely to know about these things, but because they are the people most likely to want to help us. We may feel obligated to help out a friend, or by request, the friend of a friend, in a way we may not feel towards an unconnected stranger. When the ties are too loose, when their cost is too low, their function as the distinction between connection and stranger is lost.

It is possible to imagine a scenario in which social networking software plays an increasingly important role in our lives. For instance, e-mail is becoming increasingly unusable as spam fills inboxes, keeping one step ahead of the filtering heuristics. Perhaps a social network based filter is the solution — e-mail from your connections would always go through, and perhaps from the next degree out. Anyone else would need to go through a chain of connections to reach your inbox (or at least, to reach it with the seal of approved non-junk). Here we see again the balance of growth versus boundaries. A larger network lets you be more easily reachable, and connections who themselves are highly connected bring more opportunities for easy contact — or for renewed junk mail. The socially promiscuous networker who happily accepts every connection request could easily be the unwitting conduit of

next-generation spam. Here, one might choose to limit one's connections to people who in turn chose their connections carefully — thus making indiscriminate connections costly in terms of opportunities lost in what might be preferred connections.

Networks are the extension of our social world; they also act as its boundary. We may use the network to extend the range of people we can contact; we may use it to limit the people who can contact us. Most of the networking sites so far are designed to grow networks, not limit them. Yet costs and limits can add value. The expenditure of energy to maintain a connection is a signal of its importance and of the benefits it bestows.

6.   The evolution of social networking sites

Social networking sites are booming. Many have received venture funding and there are numerous enthusiastic reports that cite them as the next great wave in technology, business and/or social life. Yet, there are also signs that social networking, at least in its present incarnation, may be more craze than lasting revolution. The early and once enthusiastic users of these sites are frequently quoted as saying that they are 'over', that once one has amassed a big collection of 'friends' there is really nothing to do on the sites, and that they have ceased using them. This is a typical fashion diffusion pattern. The innovators lead, then when the rest imitate, it is time for differentiation. This has been happening among these sites, as users moved from Friendster to Tribe.net to Orkut, but will at some point the fashion that is over be the sites themselves? Or will they play an increasingly important role in defining one's personal on-line neightbourhoods?

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