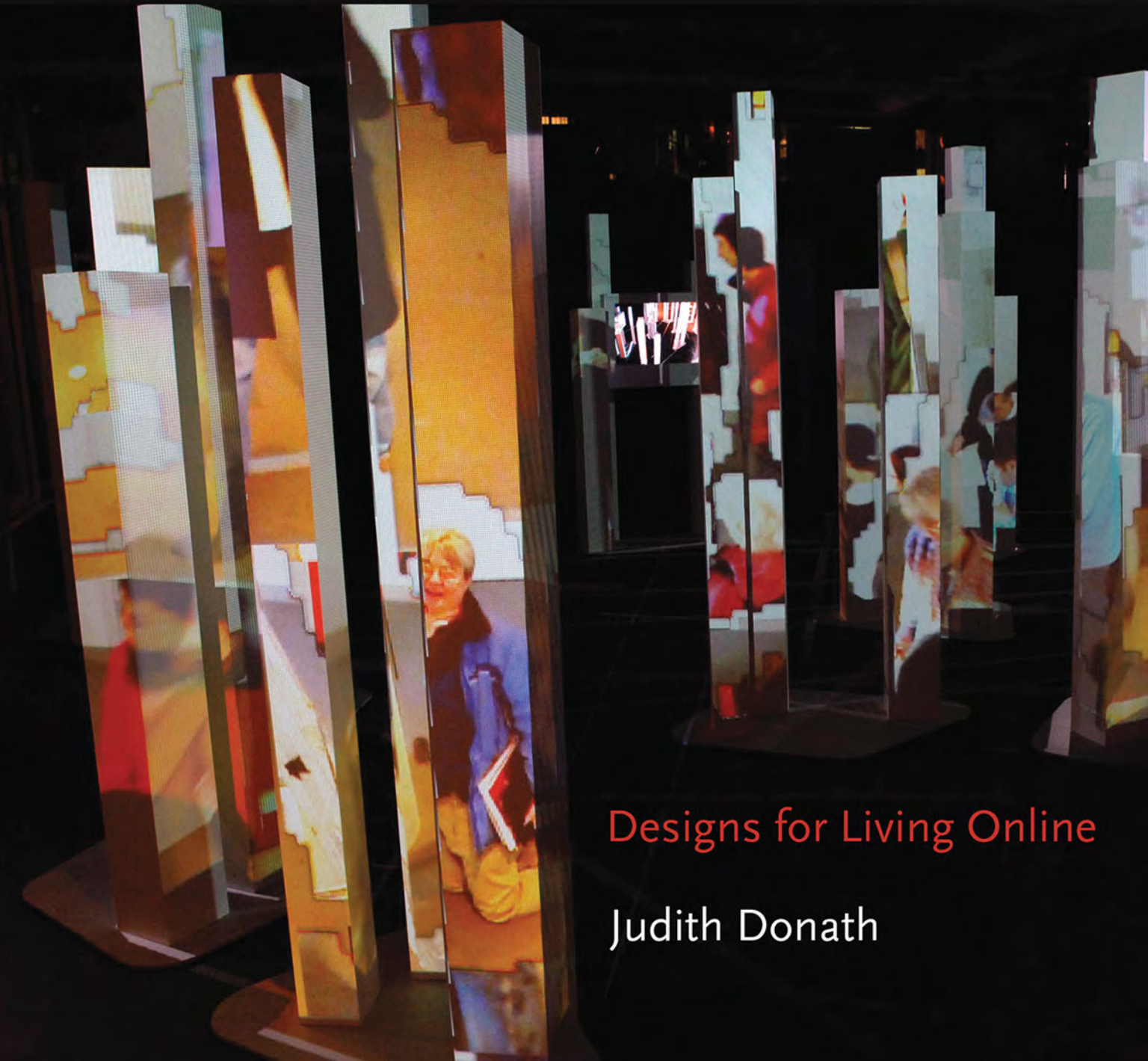


# THE SOCIAL MACHINE



Designs for Living Online

Judith Donath

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## OUR EVOLVING SUPER-NETWORKS

The previous chapter closed with the image of the world drawn entirely with Facebook connections. Such global connectedness is a modern phenomenon, made possible only with communication and transportation technologies. We will start by looking at the questions—and designs—it has inspired.

Global travel and increasing social mobility have made our personal acquaintance networks larger and more diverse. At the same time, many of the needs these networks traditionally fulfilled have been outsourced to the market: we still value friendships, but no longer have to rely on them to build our homes, watch our children, or even recommend movies to see. What then is the function of the social network in contemporary life? In this chapter we will look more closely at how social networks are evolving and how our need for them is changing too.

### A SMALLER WORLD?

In a short story by the Hungarian writer Frigyes Karinthy, the narrator recounts his friend's suggestion that they "select any person from the 1.5 billion inhabitants of the Earth—anyone, anywhere at all. He bet us that, using no more than five individuals, one of whom is a personal acquaintance, he could contact the selected individual using nothing except the network of personal acquaintances" (Karinthy 1929, 2). The characters easily imagine a social chain linking themselves to a Swedish novelist or, with a bit more difficulty, to an obscure riveter working at the Ford Motor company.

The point of this thought experiment was "to prove that the population of the Earth is closer together now than they have ever been before." The year

was 1929. By then, telephones were commonplace and the first trans-Atlantic phone calls had been made. Millions of cars were on the road, explorers had reached the poles, and traders and travelers were establishing contact with the remaining isolated tribes and remote communities. For the first time in history, it seemed plausible that every person on Earth could be reached through a finite—and perhaps even rather small—number of personal connections.

Such games and the promise they held of a world united through continuous links of acquaintance resonated with many people.<sup>1</sup> In *Life and Death of Great American Cities*, pioneering urbanist Jane Jacobs recounts playing a similar game with her sister: “The idea was to pick two wildly dissimilar individuals—say a head hunter in the Solomon Islands and a cobbler in Rock Island, Illinois—and assume that one had to get a message to the other by word of mouth; then we would each silently figure out a plausible, or at least possible, chain of persons through which the message could go” (Jacobs 1992, 134). These games were entertaining, but the connections made in them were conjectural. Would it be possible to actually make them?

In the mid-1960s, social psychologist Stanley Milgram conducted a series of experiments to study “the small world problem” in the real world, to see how people would actually create paths of personal connections to a distant, unknown person. He picked a target person in one community and distributed letters to participants in another community with the instructions to give the letter to the target if they knew him (or her) personally and if not, to give it to some other person whom they believed would be closer to the target. Milgram found that the average number of steps needed to make the connection was 5.5. The popular magazine *Psychology Today* published his findings (Milgram 1967; see also Travers and Milgram 1969), the story caught people’s imagination, and “six degrees of separation”—the idea that we are now, at most, six links of personal relationships away from any other person on Earth—became a popular truism, inspiring TV shows, parlor games, a Broadway play, and a Hollywood movie.

Why was there such interest in this social psychology experiment? One reason was the change in society it marked. Advances in travel and communication had made the world smaller, making such universal connections conceivable. As Karinthy (1929) had written: “Planet Earth has never been as *tiny* as it is now. It shrunk—relatively speaking of course—due to the quickening pulse of both physical and verbal communication.”

But the fascination with this experiment was also a response to the ways the world was becoming larger, both in the number of people and the distance between them. Population growth was rapidly accelerating: in just the decade and a half following 1960, more than a billion more people were added.<sup>2</sup> Jane Jacobs noted that she and her sister had felt rather isolated, having just moved to a big city from a smaller town—their game, she said, made them feel less alone.

And, by the mid-twentieth century, many people were experiencing life in what Marshall McLuhan termed the “global village,” a deceptively cozy term for a world in which you are governed by distant, inaccessible politicians and far-off CEOs, one in which you no longer know about your neighbors, but instead are enthralled by the marriages, scandals, and babies of celebrities you see on TV. In this world of one way mass-media experiences, where you can look but cannot touch, the promise that a small chain—just six people or fewer!—of personal, real connections bridges the gap between you and any other person makes the vast impersonal world seem close and comfortable.

Milgram’s work was quoted, repeated, and believed. But his actual results were rather different from the myth that grew up around them. We will look more closely at his experiments because (a) their failures tell us a lot about the function of—and friction among—the connections in social networks and (b) the mythologized version influenced the design of early social network sites.

### Navigation in Social Space

Milgram’s “small-world problem” showed how people navigate the social space between themselves and a distant person. Milgram gave the searchers the target’s name, town, and occupation. One strategy was to get the letter physically closer: searchers who did not know the target would often give the letter to a resident of or someone from the target’s city or state. Another strategy was to get it professionally closer. One target was a stock broker, and the path that reached him led through a series of bankers and brokers. The viability of this strategy depends on the target’s career. If you are trying to find, for example, a physicist, there is an international community that knows each other via publications and global academic conferences; finding someone in that community can help you reach the person, even if the intermediary is physically farther away. But if your subject is, say, a cashier, there is no network or trade association of cashiers.

The notion that a small-sounding number of links connects us all has fascinated many people. In John Guare's play *Six Degrees of Separation*, the character Ouisa says:

I read somewhere that everybody on this planet is separated by only six other people. Six degrees of separation between us and everybody else on this planet. The president of the United States. A gondolier in Venice. Fill in the names. I find that A) tremendously comforting that we're so close and B) like Chinese water torture that we're so close. (Guare 1994, 81)

The information provided about the targets shaped the searchers' strategies. Different data would change the paths: imagine that Milgram had given, instead of occupation, the target's favorite hobby, religious organization membership, or children's ages. Each of these would provide access to a network that would lead, via a different route, to some of the targets. Not all data are useful for way-finding in a network. Birthdate, for example, though it helps to uniquely identify people, is not much use for finding them. Sociologist Scott Feld used the term "foci" to encompass the range of interests and situations that bring people together—the forces that create our personal networks:

Foci may be many different things, including person, places, social positions, activities, and group. They may actively bring people together or passively constrain them to act. ... For foci where everyone is forced to interact much and often (e.g. families), all of the individuals associated with that focus will be tied to each other; but for foci that are less constraining on interaction (e.g. city neighborhoods), only a slightly higher proportion of individuals will be tied than would be tied in the general population. (Feld 1981, 1018)

Our social networks are not composed of random connections, but are structured around the interests and activities through which we meet and spend time with people.

With casual acquaintances we often know only about the part of their lives related to the focus that drew us together. One might be quite friendly with people at a gym or evening class without knowing what they do for a living. The searchers in Milgram's experiment—like all of us—were "blind" not only to the world beyond their immediate network, but also to many aspects of the people they personally knew.

Often, the most useful thing to know about a person was not their specific interests but their social role. The strategy that many successful searchers in Milgram's small-world experiment used was to find "bridge figures"—people who connect otherwise separate groups. If the target is in Boston and you not only don't know him, you don't know anyone in Boston—you're not even sure you know anyone who definitely knows people in Boston—what do you do? You look for someone who has a wide circle of diverse acquaintances, what Milgram terms "a sociometric star" (Milgram 1967, 271). If, as was the case with some of the initial participants in the experiment, you live amid an insular, dense network of close family and



friends, you seek the least confined person: someone who travels, or whose work means she meets people from different places and social circles.

Milgram's small-world problem did not, and was not intended to, measure the actual distance between source and target. Each person was acting somewhat blindly: if he didn't know the target, he was to give the letter to someone he thought would bring it closer. But there could well be unrecognized, more direct, connections: unknown to you, your second cousin might be best friends with the target's daughter, and so on. Many short paths exist that are unlikely to be discovered by blind social way-finding: a full network path would reveal them.

In the 1960s, such a map seemed like a fascinating but unrealizable idea. But with the advent of computer-based communication—and specifically, social network sites<sup>3</sup>—this changed.

#### THE MYTH OF FRICTIONLESS CONNECTION

The line from Stanley Milgram to the early social network sites is easy to draw: the first one was named *sixdegrees.com*. Created in 1997, it attracted users but was a few years too early: most participants had only a few friends who were also online, which limited its appeal. Five years later Friendster appeared; it was the first social network site to become widely known and, at least for a short while, wildly successful, signing up a million users in a few months.

Friendster's founder, Jonathan Abrams, envisioned it as the next wave in online dating. Although dating sites, such as *Match.com*, were among the most popular commercial websites (and at the time, they were almost alone in their ability to get people to pay for access), they did not appeal to everyone. Typical dating sites are places to meet strangers—the nameless profiles are unverified self-descriptions, modeled after the personal ads in the classified section of the traditional newspaper. The potential dates are unmoored from any common context and the safety of community. By contrast, meeting people through friends is comforting; it provides the sense that the person has been vetted and can thus be trusted. If a friend introduces me to a new person, I assume she thinks that we would like each other—or at least, not be a harmful combination. Yet most people are not inveterate matchmakers, assiduously introducing their niece to their jeweler and their downstairs neighbor to their best friend's cousin. Abrams saw a world full of unmade introductions and built Friendster to automate the process of meeting friends of friends.

The site rapidly became very popular. People made profiles and connected to friends, distant acquaintances, people they barely knew, and complete strangers. Friendster soon had millions of users. Yet by 2005, it was failing. What happened?

The problem was not a lack of interest in online social networking. MySpace, launched in 2003, was quickly overtaking Friendster (much as Facebook would a few years later overtake it—but in 2004 Facebook was a small site, accessible only to students on a limited number of campuses). Friendster attracted its millions of registered users because the concept of connecting to others in such a network is very appealing. But several key design flaws doomed it.

Abrams cited Milgram and the idea of “six degrees of separation” as one of his inspirations in designing the site (Calacanis 2012; Chafkin 2007).<sup>4</sup> Here, finally, would be a piece of software that, once everyone joined, would allow us to see the global web of connections between people.

Perhaps the fundamental mistake was thinking that distant connections are meaningful. When you logged in to Friendster, you would see a note about the size of your network, measured not in direct connections, or even friends of friends, but by several degrees out. This could quickly grow to an astronomical number. If I connect with only ten people, but some of them connect to hundreds of others and so do some of those connections, I could effortlessly acquire an extended network of hundreds of thousands of people. One view of this is that it is an exciting indicator of the computer’s ability to expand our social networks. What more could the lonely engineer, shy and awkward in person, but craving a richer social life, want?

At first, exploring this network was intriguing. Whenever you added a new person to your network, novel sections of the overall network become visible to you. But, the excitement of this wore off. The people beyond second degree are really just strangers, and reading their profiles—which on Friendster were fairly minimal—was not deeply interesting.<sup>5</sup> Once you had made your profile, found some old friends, and poked around a bit, there was not that much to do there.

And, in reality, the immense network was rather meaningless. Logging in and seeing that your twenty or forty connections gave you a network of hundreds of thousands did not really put you in touch with multitudes—the distant “connections” were still strangers. Moreover, since the site encouraged growing your network, people added connections indiscriminately. The



connections you had to those hundreds of thousands were via some extremely weak links (boyd 2004).

But, because Abrams had initially found the idea of delineating one's extended network so compelling, it became the central motif of the site. Not only were the numbers featured on your page, but enormous amounts of computing power were expended calculating it in as close to real time as possible. This slowed the site down, so that a page might take thirty or forty seconds to load—a very long time for an audience increasingly used to instant results. In an effort to speed it up, the company spent enormous amounts on bigger, faster computers—which ultimately were not big and fast enough for the network rendering challenge, but were a big enough drain on its finances that they accelerated its downfall (Chafkin 2007).

The delineated social network is an intriguing concept. The ability to see the path of connections to distant people makes the world seem a bit smaller, cozier—more connected. But that is an illusion. In practice, even second-degree relationships are tenuous.

#### THE COMPLICATION OF NETWORK FLOW

To talk about society as “connections” in a “network” is to use a simplifying metaphor to refer to a tangled web of complex relationships. One flaw that results from this simplification is the impression that once a connection exists, anything can flow through it. In fact, the existence of the connection is only the most basic requirement; the specifics of each situation—the nature of the relationship and of the thing to be transferred (money, support, ideas, a psychology experiment's letters)—add friction to the flow.

A closer look at Milgram's experiments shows that smooth flow of the letter from source to target was the exception, not the rule. Unpublished data reveal that in Milgram's initial experiment only 5 percent of the letters made it through at all (Kleinfeld 2002). Yet, the failures are as interesting as the successes, for they show us the complications of moving things through a network.

Although popular imagination claims that Milgram's experiments proved that everyone in the world, no matter how distant, is at most six degrees apart, in fact his seekers and targets were already quite close. They were socially similar—middle-class, English-speaking Americans. Milgram's notion of “distant” communities is almost comical: “We thought it best to

Milgram (1969, 274) himself noted:

Almost anyone in the United States is but a few removes from the President, or from Nelson Rockefeller, but this is only as seen from a particular mathematical slant and does not, in practical sense, integrate our lives with that of Nelson Rockefeller. Thus, when we speak of five intermediaries we are talking about an enormous psychological distance between the starting and target point, a distance which only seems small because we customarily regard 5 as a small manageable quantity.

draw our starting people from some distant city such as Wichita, Kansas or Omaha, Nebraska (from Cambridge, these cities seem vaguely ‘out there’ on the Great Plains or somewhere)” (Milgram 1967, 265).<sup>6</sup>

The closeness of seekers and target suggests that lack of a path did not cause the high failure rate; subjects chose to drop out.<sup>7</sup> Perhaps the person who got the package intended to pass it on, but forgot it in a welter of other responsibilities. Or perhaps he or she was being socially frugal. Milgram noted that the best people to pass this task onto were what he termed “socio-metric stars”: bridge figures with many and diverse ties. But such people are also valuable connections, and participants might be leery of using up their social capital with a well-connected acquaintance for this purpose.

Varied goals and perceptions motivated those who did pass on the letter and affected their choice of to whom to give it. Some may have participated because they felt an obligation (the “letter” was ornately designed, and prominently mentioned Harvard as its source). Those who saw it as an intriguing experiment may have felt that passing it on was a favor to their acquaintance, providing an opportunity to be part of an interesting project. Some may have chosen to give the letter not to the best person they could think of for the task, but to someone whom they did not mind embroiling in this slightly odd activity.

The path something (an idea, object, support, etc.) takes through a network depends both on how individuals value it and on the dynamics of their relationships. Think about who you would turn to for help with a technical problem, to borrow \$1,000, or for advice about a romantic relationship. Both your friend who started a software company and your thirteen-year-old niece might have the knowledge to solve your technical problem, but the former is not happy to be tasked with people’s computer problems whereas the latter is thrilled to have knowledge and abilities for which adults seek her assistance. A close, generous friend might willingly lend \$1,000, but you know it would be difficult for her. Our choices of from whom to seek support (or to whom to provide it) depend on the nature of the support, how close we are to the person, and their personality and circumstances.

Many of Milgram’s letters failed to reach their destination not because of a lack of a path—especially given how close his searchers and target were—but because of friction at the individual level. Milgram noted, “The subject operates under the restriction that he can send the folder on only to one other person. Thus, the efficiency with which the chain is completed depends in part on the wisdom of his choice in this matter” (Milgram 1967, 265). For the

numerous chains that did not complete, someone gave the letter to the wrong person—to someone too busy, uninterested, or shy to pass it on. Many chains broke not because of a lack of knowledge about the network structure, but because of a lack of knowledge about the interests and circumstances of one's immediate acquaintances. The challenge for designing social technologies is not just to connect people, but to help them learn more about each other. We will next look at how technologies are changing and expanding our social networks and then at how technology can help deepen our connections.

## SOCIAL SUPER-NETWORKS

Changes in communication and transportation have indeed made the world smaller, and there is now a chain of connections (or many chains) between nearly any two people anywhere.<sup>8</sup> The structure of our immediate, personal networks has also changed. We will now look at the nature of that change.

Social networks are notoriously difficult to measure precisely, for the boundaries and definitions of categories such as “close friend” or “acquaintance” are subjective and shifting. But a number of studies seem to agree that, regardless of exactly how you define them, there is a trend toward larger networks of weaker ties (Hampton, Sessions, and Her 2011). Why is that? What does it imply for daily life—and how can we design technology to most usefully support the society we are moving toward?

In traditional societies, people lived in small villages among other lifelong residents, with densely connected networks in which everyone knew almost everyone else. People relied on their personal networks for assistance with major tasks, such as raising children, building a home, and harvesting crops. Their relationships were primarily strong ties. These are the ties that bind family members and close friends; they are the ties between people who share many interests, are emotionally invested in the relationship, spend much time together, and can be relied on for assistance.

A network of strong ties works well in a traditional setting, where social and material support is the most important function of community. However, this social structure is inherently insular: the network is densely connected (everyone knows everyone else) and the time it takes to maintain these ties precludes cultivating a wider world. People in these homogeneous, close-knit groups quickly share among themselves the information they have, and they have limited access to other sources of news and opportunities.

In much of the Westernized, urbanized world, things are now very different.<sup>9</sup> It is increasingly common for people to frequently move and change jobs, and to meet new acquaintances through activities outside of work and family. They build loosely connected personal networks, with numerous ties scattered among disconnected groups. Furthermore, tasks that people had exchanged with close friends and family are now outsourced to the market: babysitters watch the children, contractors build and repair the houses, and psychologists dispense comfort and advice (Hochschild 2012).<sup>10</sup>

In today's world, access to information and the ability to adapt to change are increasingly important. The old model of lifetime employment is quickly shifting to one of rapid turnover and short-term contracting—where keeping food on the table and a roof over your head requires frequent searches for leads on jobs. It is a world where people regularly uproot themselves, moving for college or for work, often needing to start over in a strange new place. With each move and job change, they need to acquire vast amounts of new information: where to find housing, schools, groceries; who among the new neighbors and coworkers is trustworthy and of whom to be careful. They need reputational information to navigate the marketplace that offers everything from household services to a dazzling and confusing array of new devices.

It is a world in which people strive to stay in style—in the clothes they wear, the slang they use, the cars they drive—following a subtle but ever-present trail of innovation information. In this world, where people hunt for trends and data rather than foraging for nuts and berries, there is tremendous benefit to having a wide and varied circle of acquaintances. Being in touch with a lot of people keeps you in touch with the changing zeitgeist. You learn quickly about new technologies, new ideas, and new places to go.

In contrast with the traditional society's dense network of strong ties, the large, diffuse network that epitomizes contemporary mobile society includes a large number of weak ties. These are ties that connect distant acquaintances: people who do not rely on each other and who may have only one or two interests in common.

Imagine someone whose job moves him frequently from one metropolis to another. He knows many people around the world: colleagues met at trade shows, squash partners from the gyms he joins in each new locale, fellow players of online games and participants in online forums—but none are intimate friends, and many are unknown to each other. This large network of

weak but varied ties works well for this prototypical mobile lifestyle. The network of professional colleagues helps him keep up with the rapid changes in his industry, and when he moves to a new city there is a good chance he already knows someone there or certainly can obtain introductions from his extensive network. Depending on the value you place on deep, strong relationships, this may seem to be an easy, efficient way of life—or an empty and lonely existence.

The Internet has made it easy to amass very big networks of weak ties. There is considerable evidence that new social technologies can expand their users' social networks, providing them with a larger and more diverse set of weak ties and helping to maintain connections with people over time.<sup>11</sup> They vastly extend the individual's voice, making it possible for people to broadcast to thousands anything from the mundane details of what they had for breakfast to their impassioned pleas for political engagement. (Broadcasting something does not mean that huge crowds are actually listening. Whereas celebrities can command a vast audience, the average person's acquaintance network is their audience.)

These technologies are enabling the development of social "super-networks": personal social networks of a scale far beyond what we could maintain unaided. The core of these networks—composed of the strongest ties—is not bigger; the growth is primarily in weak ties, in relationships with people with whom we have less in common and on which we expend relatively little time or resources.

Many popular articles decry this development. "The Internet allows only ersatz intimacy," says one (Marche 2012). Yet in some ways a social life that consists primarily of weak ties, of numerous diverse but distant acquaintances, is very suitable for contemporary mobile life with its constant change and the insistent necessity of keeping up to date, of being a consummate information forager. And our mobile life itself creates this sort of social structure, with our short-term jobs and restlessly changing domiciles. Yet taken to an extreme it is a lonely way of life, where most relationships remain at the surface, where you know most people through a single context—the guy from the online football club, the excellent doubles partner, the sales rep who knows the best new restaurants in town. To assess the advantages and drawbacks of this emerging social structure, we need to look more closely at weak ties, diverse networks, and ultimately at the question of what our social networks are for.

Sociologists characterize the relationships, or ties, between individuals that collectively compose a social network along several dimensions. Tie strength is measured by a number of factors, including how often the individuals are in contact, how long they have known each other, whether they are related, and whether they provide mutual support and confide in each other (Granovetter 1973; Wellman, Garton, and Haythornthwaite 1997). Strong ties are often also multiplex—the individuals have multiple interests in common and know each other in various contexts. Weak ties are the relationships between acquaintances who do not know each other well; they are usually are connected through a single context.

### Networks of Weak Ties

“The Strength of Weak Ties” is the title of an influential paper that argued that for gaining access to information, weak ties are valuable (Granovetter 1973, 1983).<sup>12</sup> Its thesis is that if you know many people through a variety of contexts who are themselves members of disparate communities, you become privy to a wide range of information from different sources.

However, it is important to recognize that it is not the weakness of the ties that is valuable, but rather their heterogeneity.<sup>13</sup> Knowing people from different communities and with different values, interests, and experiences gives you access to a wide range of information and a broad audience for your ideas.

The weakness of the ties is a drawback, but arguably it is necessary if you are to have a large number of heterogeneous ties. Such ties come from disparate backgrounds and are unlikely to know each other; one maintains these ties individually or in small separate groups. Maintaining a large network of diverse acquaintances from different walks of life necessitates expending relatively little time on each individual relationship.<sup>14</sup>

Yet, even for information access, weak ties may suffer from their weakness. If I have something I want to promote (whether I’m a marketer selling chocolates, an evangelist seeking converts, or anyone seeking status and attention), I am happy to spread that information broadly—here a big diverse network that connects me to many communities is ideal. But if the information I have is very valuable but would lose its worth if broadcast, then I will be much more selective with whom I share it. We may get—and spread—a broad range of information via weak ties, but not the most valuable information.

Granovetter’s paper on “the strength of weak ties” used the example of finding a job and argued that weak, heterogeneous ties were better because they would have a more diverse pool of knowledge. This assumes that the cost of providing the information about the job was low enough that a weak tie would be the best channel. However, in an economy where jobs are scarce and knowledge of upcoming openings rare, those who have this valuable information will use it carefully. They are more likely to give it to a strong tie, someone whose success they care deeply about. Alternatively, in a field where information about job openings is widely publicized and hiring done via exams or other formal procedures, people do not need information or



influence from their personal network to obtain employment; here the market replaces social networks (Putnam 1995).<sup>15</sup>

Furthermore, we may not trust weak ties or the information we receive from them. For some types of information, trust is less important: for example, news we are reading casually, a mild joke. Sometimes it is useful just to have a sense of what lots of diverse people are talking about—what events are people concerned about? What new products, fashions, and ideas are generating excitement? However, once we are ready to act on information—whether for deciding something as casual as what movie to see, as serious as who to vote for, or as consequential as determining whether a particular route is safe in a warzone, snowstorm, or on a steep mountain—we need to trust its source.

Trust comes from two main sources: either we know the person well ourselves, or we know their reputation among others whom we trust. In situations of frequent change (such as the increasingly project-based nature of contemporary work), which require us to frequently evaluate unfamiliar people and ideas, we rely on our networks to establish trust and convey sensitive information about reputation (Feld 1981). What sort of network is best for this?

In a close-knit group, maintaining a good reputation is essential. If someone treats another member of the group badly, everyone soon learns about it and the group can sanction the culprit. This creates a high level of trust among tightly connected groups, allowing, for example, diamond-traders who are members of close Orthodox communities to exchange millions of dollars of gems on simply a handshake (Ruffle and Sosis 2007). A dense network of strong ties is trustworthy, but provides relatively little information. Furthermore, the safety of the dense, homogeneous network comes at the cost of personal freedom, for such groups also put greater constraints on members' activities, enforcing compliance with the group's norms: the close-knit religious groups whose members can trust each other deeply relinquish much freedom in return (Sosis 2005).

There is less trust in a social network made of numerous weak, disconnected ties, but it provides a wider range of information and greater autonomy.<sup>16</sup> (Of course, this also means that an untrustworthy person with weak and disconnected ties has greater freedom to reinvent herself than one enmeshed in a dense network.) Among unconnected ties, however, reputation has little force. If a weak tie has repeatedly exploited people whom you do not know, you are unlikely to be forewarned.

Salaff, Fong, and Siu-lun (1999) observed how Hong Kong residents of varying social class used network connections to emigrate. Working-class émigrés relied on strong ties because they needed material assistance—financial help, a place to live—that is costly for the giver and thus provided only by close ties. Members of the upper class maintained and used larger networks of weak ties—they needed access to information about jobs, schools, and housing—but not material aid; the help they needed was less costly for the giver, and thus could be obtained from weaker ties.

Bian (1997, 1999) studied job seekers in 1980s China and noted that they relied on strong ties for job information, in contrast with the weaker ties that characterize Western job searches. The difference, he said, comes down to the need for trust:

Strong ties tend to act as bridges when an exchange of resources or favors between social actors (individual or organizations) is unauthorized or when mechanism for their operation are unavailable in the formal social structure. Thus, mutual trust is required to link these actors in order to reduce the uncertainties and potential risks that are likely to occur otherwise. (Bian 1999, 272)

Residents threatened by the 2007 southern California wildfires had a great need for local, immediate, and trustworthy information—they would be making life-and-death decisions based on it. They found that broadcast information sources such as television news were not updated frequently enough or had poor—and thus potentially dangerous—information. Social media let them communicate with others in their neighborhood, people whom they might not know personally, but with whom they shared the significant commonality of locale. One resident wrote: “What we learned in the Cedar fire [in 2003] is that there is no ‘they.’ ‘They’ won’t tell us if there is danger, ‘they’ aren’t coming to help, and ‘they’ won’t correct bad information. We (regular folks) have to do that among ourselves.” They developed websites that featured rapid updates and used other publicly accessible media to keep each other informed. This process relied on the community’s ability to converge on the most reliable sources, including some with advanced information, such as one with a press pass who went into the fire zone and sent updates to neighbors (Sutton, Palen, and Shklovski 2008).

For our rapidly changing, mobile, and diverse society, we can argue that the ideal network is what we will call a super-network: large and densely connected, yet consisting of heterogeneous (and thus relatively weak) links (Hampton, Sessions, and Her 2011). There should be enough awareness of what others are doing, so that the desire to maintain a good reputation motivates people to behave responsibly, but enough diversity that there is not an enveloping and repressive standard for thought and behavior (Donath 2007). We shall next look at how to create and maintain such networks.

#### Network Size: Natural Constraints and Technological Augmentation

If costs were no issue, bigger networks would be better. Having many close friends (strong ties) is good because it provides a great deal of material support in the form of people willing to supply time, energy, and social capital to help you. Having numerous and diverse acquaintances (weak ties) is also good: it exposes you to new and varied information and makes it possible for you to disseminate information broadly, whether to further a cause about which you are passionate or to enhance your status and reputation.

But big networks are costly. They require time and energy to maintain—we not only receive support from our friends and family, but are also obligated to reciprocate. Although much of our “supporting” may be outsourced to the market, we still visit friends and family when they are sick, attend their recitals, graduations, and weddings, help them move to new homes, and so on. Social activities such as talking, visiting, sending notes, and going out may be quite enjoyable, but they still take time. At work—do you finish that report or chat with your colleague? Even a casual chat with a neighbor uses several minutes. Moreover, there is a cognitive limit to how many people we can keep track of—not only their names and faces, but also their relationships, beliefs, and changing life situations. The size of the social network we can maintain is limited by both our available time<sup>17</sup> and our cognitive abilities.<sup>18</sup>

Unaided, our network size is limited. To cultivate a larger network, we need to find ways to nurture our relationships more efficiently. Much as the hammer extended the human hand and the car extended the human leg, we seek tools that extend human social abilities.

## Designs to Foster Multiplex Relationships

Is there a way that technology can help us maintain large, heterogeneous networks of *stronger* ties?

One strength of weak ties is that they are potentially stronger ties. Weak ties are by definition narrow; they are relationships between people who know only one or two aspects about each other. They are, for example, work colleagues one knows only in their professional role, the neighbor known only as an avid gardener or punctual dog-walker, the fellow participants in an online forum seen only through the lens of their knowledge of Linux or their dexterity at games. However, we might, in fact, have much more in common than we know.

We all have innumerable beliefs, concerns, interests, needs, experiences, hobbies, and so on, each of which can be a relationship-binding thread (what Feld [1981] called “foci”). We do not continuously display and advertise everything that concerns and intrigues us; thus, many such foci-in-common—and thus potentially multiplex relationships—go undiscovered. For example, many people face taking care of an elderly and failing relative. It is a very difficult task, requiring much new information (about medicines, disease progression, insurance, care facilities, etc.) and support for the caregivers, whose role is emotionally (and often physically) exhausting. Two acquaintances who discover that they are both in this role might bond over their shared plight, finding an opportunity to both share knowledge and commiserate. Yet people can know each other superficially for years, without realizing they share this concern.

Anything from illness to an intensive new hobby, even simply a new friendship, changes how we spend our time and with whom we want to—or can—spend it. We all experience friendships that grow and wane: the office-mate you once chatted with daily becomes someone you have an occasional lunch with after you move to another division; a neighbor you vaguely recognized becomes a closer confidant when you discover you are each caring for far-off, aging parents. People entering new romantic relationships lose touch with many of their existing friends: the time devoted to the new relationship takes away from the time available for other acquaintances. After having a baby, people often become closer with their family, make friends with other parents, and spend less time with childless friends.

The anthropologist Robin Dunbar argues that hundreds of thousands of years ago, the emergence of language in humans provided an early jump in this sort of efficiency, enabling our comparatively large scale society (Dunbar 1996, 1998). In the wild, apes groom each other to remove parasitic bugs. Besides being pleasant, relaxing and hygienic, this behavior establishes social bonds: apes who groom each other are more likely to help each other and not fight. But long grooming sessions are time consuming and since the ape must also find food, sleep, etc., grooming can sustain only a limited number of relationships (evolutionary biologists Dorothy Cheney and Robert Seyfarth note that apes also use vocalizations to communicate social information [response to Dunbar 1993]).

In human societies, language, especially gossip, has taken over the social function of grooming. Instead of removing lice from each other’s hair, we check in with friends and colleagues and chat about common acquaintances, the news, or local sports (Ellison, Steinfield, and Lampe 2007; Fischer 1994; Wellman and Gulia 1999). Language is much more efficient than physical grooming, for one can talk to several people at once. And language makes reputation possible—individuals benefit from the experience of others in determining who is nice, who does good work, and who to shun for their dishonest ways. By using language to maintain ties and manage trust, people can form more complex and extensive social networks.

Exactly how big and complex is this network is a difficult question to answer. Popular literature often cites 150 (sometimes called “the Dunbar number”) as the standard group size among humans, but even Dunbar’s own research shows a range of group sizes, from below 100 to well over 200 (Dunbar 1993). Dunbar’s notion of group is exemplified by the Hutterites, who limited their communities to 150; Dunbar argues that 150 was

the maximum group size that can be controlled by social pressure rather than an authoritarian police force. But “group” is not a well-defined concept—depending on what one calls a group, their size is even more variable.

Sociologist Linton Freeman points out that there is an important distinction between “group size” and one’s personal network, which is what cognition limits (response to Dunbar 1993). Personal network is in theory precisely definable and measurable, but in practice, measuring the size and structure of an individual’s network of close ties and casual acquaintances has difficulties both definitional (when does a close friend who has moved away cease to be a “strong tie”? Is a store clerk you see and greet frequently a familiar stranger or an acquaintance?) and empirical (how do you get people to reliably count how many people they know?). (See, e.g., Fu 2005; Hill and Dunbar 2003; Marsden 2005; Marsden 1990; Roberts et al. 2009 for a variety of approaches to taking these measures. See Castells 2000 and Rainie and Wellman 2012 for an extensive discussion on the history of the rise of networks as the primary structure of society, rather than groups.)

People seek to extend their social network when changes to their lives create new needs. But the process of finding and making acquaintances can be hard. Although a new stage in life—moving to a new city, having a baby, developing an illness, even becoming passionately interested in a new topic—creates a need for compatible companions, it does not automatically produce them.

In our immediate, face-to-face community, the pool of possibilities is limited. One of the big promises of the Internet was that it would hugely expand this pool—which it has done, to some extent. There are many online support groups and communities devoted to parenting, religion, surfing, dieting, programming, game playing, and so on. People do indeed find support and make friends online (Boase et al. 2006; McKenna, Green, and Gleason 2002; Rheingold 1993; Wellman and Gulia 1999).

Yet not all online discussions create strong bonds; many sites feature some desultory exchanges, but nothing that one would call a community. One reason is that the cues to the identity of the participants are so sparse. In a face-to-face setting, if you ask a stranger what time it is, you see also his face and clothing, you hear his voice when he answers—in other words, you are privy to innumerable identity cues about him, hints of other potential areas of common interest beyond simply the words of the exchange. In most online forums, one sees far less. The strong bonds that do form online are between people who interact extensively, whether playing games or participating in a wide-ranging discussion—people who, over time, see multiple dimensions of each other.<sup>19</sup>

Over time, our connections change us. You may, for example, become friendly with a work colleague who is a devoted salsa dancer. Though you’ve never done any formal dancing, she persuades you to join her; you enjoy it and begin taking lessons. People may become friends through a common focus, but over time, they influence each other, introducing new ideas and interests.<sup>20</sup> In this way, a weak tie based on a single shared focus grows into a stronger, multiplex relationship.

An ideal network for today’s world is large, with many diverse yet not very weak ties—the super-network. Yet such a network requires tools to support it, for its scale and diversity place it beyond the ability of the unaided human to easily develop and maintain. These tools must go beyond amassing an extensive collection of disconnected, weak ties. Such ties may bring us a wider range of information—but how do we know whether to trust it? And, if

the information is valuable, what would motivate a tenuous connection to share it with us? A more important role for social technology is to help us strengthen weak ties. An excellent party host is one who introduces her guests to others they might like and helps them discover their common interests. Similarly, social technology can function as such a host: by facilitating connections among them, it helps strengthen their relationships and makes their network denser (Ellison, Steinfield, and Lampe 2007; Hampton, Sessions, and Her 2011).

Friendster was eclipsed by other social network sites. Of these, Facebook quickly became the most successful.<sup>21</sup> Facebook's network is much more private. There is no exhortation to grow your network; rather, the site emphasizes connecting only to people you know in real life and tries to ensure that people use the site in the guise of their everyday identity. Facebook's salient feature is its news feed, where users see the updates that their connections post. Each person's friends can comment on his or her updates, thus turning the profile into a combination of personal performance and hosted salon. I see the updates my existing ties make; this helps me keep up with what is new with them. I also see the comments their friends make, which can give me a new perspective on what my ties are like around other people. And, these exchanges with friends of friends introduce me to people in the context of a mutual acquaintance.

Earlier we discussed how one characteristic of stronger ties is that they are multiplex—you know a variety of things about a person that help you see them as a multidimensional individual. The Facebook model of social networks supports this by expanding the audience of our small-scale statements. It provides a forum where one can publish one's thoughts on topics great and small, from your take on world politics to the blister on your toe. The key role of technology in supporting social super-networks is to help us turn weaker ties into richer relationships by helping us discover more about each other.

#### POSTSCRIPT: WHAT ARE SOCIAL NETWORKS FOR TODAY?

Our expanding social networks present a paradox. At the same time that our networks are growing, nourished both by our highly mobile lives (we meet a lot of people) and our new communication technologies (we can keep track of and maintain connection with more of them, with greater ease), our actual need for connections has arguably diminished.

FIGURE 5.1

Letter to Alderman John Johnson (1718).  
A letter addressed with only the recipient's  
name and "New York" to guide its delivery.  
Courtesy Siegel Auction Galleries, Inc.



Many years ago, the person-to-person letter delivery chain of Milgram's experiment would have been not the artificial construct of a sociology experiment, but a common method of getting letters to a distant person. Letters were typically addressed with no further identification than name and town (figure 5.1). When a ship arrived in a colonial port, for example, people came by to claim not only letters that were addressed to themselves and their family members, but also for any other people they knew. Unclaimed letters would be left at a popular tavern, and those going to distant recipients would, eventually, be given to a minister or other official (i.e., a bridge figure) from that area to deliver (Gavin 2009). The delivery of a letter was a social process.

Over the last few centuries, street addresses became commonplace in most areas except for the most rural, making it possible for postal services to deliver mail without any further knowledge about the recipient or community. Today, we are hyper-reachable, with email addresses and cell phone numbers that stay with us wherever we go. At the start of the twenty-first century, Duncan Watts and colleagues replicated Milgram's experiment, using email messages rather than letters (Dodds, Muhamad, and Watts 2003; Watts, Dodds, and Newman 2002). But the experiment felt oddly forced; in



the intervening decades, Google had profoundly changed the way we searched for unknown information—and people.

Although our network reach is becoming greater, our reliance on networks is diminishing. We still like to have friends, perhaps more than ever. We like having an audience and sources for all kinds of information. But, much as the need for strong ties and their material support has been outsourced to the market, is much of our need for weak ties and their diverse information being outsourced to an ever faster and broader world of digitized knowledge, sophisticated searching, and democratized publishing?

It has been clear for a while that our need for strong ties is diminishing. For a growing number of people, the market, not family and friends, provides the means of obtaining shelter, food, childcare, and the like.

But we also see a diminishing reliance on connections to provide information, the resource most resonant with contemporary, online, networked living—the one that big networks of diverse ties are deemed so useful in obtaining. Today, we are more likely to search the Web rather than ask a friend.

For example, let's look at changing strategies for finding childcare.<sup>22</sup> People living in tight-knit communities could rely on the close ties of extended family to help raise their children. But as society became more geographically mobile, frequent moves and other social changes disrupted these close networks. A history of childcare says of the post–World War II migration to the suburbs, “The scarcity of grandparents and ‘maiden aunts’ posed a [childcare] problem that few young suburbanites had considered in their flight from the extended family ties that many had found both ‘stultifying and oppressive’” (Forman-Brunell 2009, 94).<sup>23</sup> For parents without nearby family or close friends (or whose close ties were increasingly busy with their own jobs and lives), hiring strangers to take care of their children became increasingly common.<sup>24</sup>

Strangers, however, are not always reliable—unlike family, they have no personal stake in the well-being of the child—so the big challenge with sitters is finding one who will be trustworthy and attentive. A family newly arrived in town would need to befriend their neighbors to learn who was a good babysitter (and a host of other clues about life in their new location). While people may have ceased relying on close ties to take care of their children, they still needed acquaintances to provide introductions to and recommendations about those they would hire to do so—that is, they relied on personal

ties for information. But today, even that need has commercial solutions, such as the website [sittercity.com](http://sittercity.com), which provides, for a monthly fee, listings of babysitters, rated by previous clients. The new parents in town no longer need to develop friendships in order to access local information.

We can now access all kinds of advice online, without needing to ask anyone. Yelp.com tells us where to dine, whether we want a four-course French meal or a quick breakfast to go; it can also recommend hair salons, church services, tattoo parlors, hardware stores, and so on. We can get book recommendations that are algorithmically generated from the reading habits of anonymous strangers who are reading the same novels we are, and they are likely more suitable than the suggestions of a good friend with different taste.

Almost anything we can think of for which we have relied on our friends and acquaintances we can now find online or hire someone to do (Hochschild 2012). We no longer need to ask friends to help us find romance—dating services are a \$2 billion industry in the United States alone (Marketedata Enterprises, Inc. 2012); nor do we need them to help us work out our emotional problems—we can hire therapists or find online support groups for that. Services such as TaskRabbit provide a market for the sorts of favors once exchanged among friends—such as helping to lift an air conditioner to the window, or advising you on which clothes to keep and which to discard as you do your spring cleaning.<sup>25</sup>

The concern here is that without the acute need for networks, they can seem optional—and wither away, dispensable in the search for a more efficient life. Yet, we are still social beings. We still deeply enjoy the company of friends, the excitement of being out at a party as well as the warmth of being home with family. Dunbar's metaphor of gossip as grooming has strong resonance. It's not just that grooming maintains ties—but that maintaining ties is pleasurable. Even at a distance, much of what is compelling about participating online is making a comment and receiving a response—we exchange information for the pleasure of contact. The contact is an end in itself. In the next chapter, we will look at designs that foster online conversations, the fundamental form of mediated contact.

## 5 Our Evolving Super-Networks

1. Social scientists had also been pondering the chain of connections among people. See de Sola Pool and Kochen 1979.
2. It took 125 years, from about 1800 to 1925, for world population to grow from 1 to 2 billion. It then took only 35 years to add the next billion (3 billion by 1960) and just 12 years to reach 4 billion around 1972.
3. Social network sites are websites where users create a self-descriptive profile, link to others on the site with whom they are acquainted (often, but not always, such links require mutual recognition), and explore the connections of the people with whom they are connected (possibly to several degrees out). For more on the history and structure of the first generation of these sites, see boyd and Ellison 2007.
4. Around the time of Friendster's founding, Malcolm Gladwell's best-seller *The Tipping Point* had brought a resurgence of popular interest in Milgram's "small-world problem" experiments.
5. The Friendster profile consisted of a name, photo, perhaps a list of favorite books and movies, and in an especially complete one, a paragraph of self-description and perhaps a "testimonial" from a friend or two.
6. Socioeconomic distances were harder to bridge than were geographic ones. Milgram carried out a subsequent study looking at whether having initial seekers and a target of different races would make a difference—and it did. Only a third as many cross-race attempts were completed, compared with ones where both seeker and target were white (Korte and Milgram 1970). A related study showed that social class mattered: chains composed of higher-status participants were more likely to succeed (Lin, Dayton, and Greenwald 1978). They were more likely to have a more diverse set of acquaintances, a result of a more mobile life (going away to college, meeting colleagues at conferences), and to have similarly diverse friends whom they could afford to burden with this task.
7. Surveys conducted in a later recreation of the small-world experiment confirm this (Dodds, Muhamad, and Watts 2003).
8. It is now newsworthy—and rare—when hitherto isolated people are discovered. There are a few small groups in the Amazon and in New Guinea that are known of, but who are for the most part uncontacted. Occasionally, a lost soldier, hiding from a long-since over war, emerges from the jungle. But otherwise, the world's population is an immense and connected network.
9. Insular dense networks do exist in contemporary urban settings as well as in the rural past. Think of someone who works for his uncle alongside several cousins and whose wife exchanges babysitting and other family care duties with her sisters-in-law; they are part of a big extended family that frequently has dinner together and whose leisure time is often spent celebrating holidays and anniversaries with relatives. See Young and Willmott's 1992 ethnographic study of ties in a close-knit urban community.

10. When resources are scarce, people turn to their immediate community (Oliver 1988). People who are well off seldom need to ask material favors; but if you are poor, you are more likely to need to barter for babysitting, a ride, or a place to stay. Having limited material resources makes having tight-knit, strong ties especially important—and those with neither money nor strong ties are in a precarious position.

The value of strong ties becomes vividly apparent in a disaster, when having close friends and family can be essential for survival (Klinenberg 2003, 2013).

11. Ellison, Steinfield, and Lampe (2007) examine how the use Facebook expands college students' personal networks, helping to "crystallize relationships that might otherwise have remained ephemeral"; Hampton and Wellman (2003) discuss how use of social media increases contact with weak ties and can strengthen local relationships; Tufekci (2008) shows that users and nonusers of social media have similar numbers of close ties, but that social media users have more contact with weak ties; Hampton, Lee, and Her (2011) provide evidence that "an internet user who frequently goes online at work and uses a social networking service has a network that is nearly one-half a standard deviation more diverse than those who do none of these things." See also Boase et al. 2006; Ellison, Steinfield, and Lampe 2007; Hampton, Sessions, and Her 2011.

It is important to note that *how* one uses the medium also has a big effect. Simply reading others' updates on Facebook is very different from actively communicating (Burke, Kraut, and Marlow 2011).

12. Granovetter (1973, 1983) used four dimensions to assess tie strength: time devoted to the relationship, emotional intensity, mutual confidences, and reciprocal services.

13. Weak ties are not necessarily heterogeneous. Some of the follow-up studies to "The Strength of Weak Ties" did not find that weak ties were useful in expanding one's prospects, but closer examination showed that they were too much like the subject's existing strong ties, e.g., relatives of other members of a close-knit family (Granovetter 1983).

14. Strong ties take a lot of time and energy to maintain: they involve providing support and spending time together, talking and sharing experiences. Networks of strong ties are usually homogeneous, for one can maintain a multitude of these costly ties only in the context of a group that does many activities together. The homogeneity of a group of strong ties is both a cause of their closeness (the people have enough similar interests to be doing many of the same things) and an effect (in spending so much time together, they influence each other and become increasingly similar).

15. Declining network capital is not always a sign of a society in distress (but see Kraut et al. 1998; McPherson, Smith-Lovin, and Brashears 2006; Putnam 1995 on the decline of social capital and shrinking social networks). If food and other goods are abundant, and educational and employment opportunities filled by merit rather than connections, people will have less need to maintain strong ties to get by in life (Wellman and Gulia 1999).

16. In the design of online social software, an interesting tension emerges between history and reputation in establishing trust. If I know a lot about your history I can use this to decide whether I trust you and to have a good sense of what you are like, or at least, how you will act—I don't need to establish relationships with mutual acquaintances to acquire this information via their experiences, i.e., reputation. Thus, the data portraits (see chapter 8) are, in effect, a mechanism for establishing trust and predictability and for encouraging

good behavior—all the things for which traditionally we needed close community ties—without relying on community.

17. Robinson and Godbey (1999) analyzed how Americans use their time. After accounting for work, television, household chores, etc., not many hours remain for socializing. That said, it should be noted that not all our social interactions take place as distinct activities: we chat with others at work, we maintain close supportive relationships with family members in the context of household activity, etc.

18. Robin Dunbar has done extensive studies of the cognitive and temporal constraints on human (and primate) sociability. See Dunbar 1993, 1998; Roberts et al. 2009; Stiller and Dunbar 2007.

19. Nicolas Ducheneaut, Nick Yee, and their colleagues have written a series of excellent analyses of social interaction in online games. See, e.g., Ducheneaut, Moore, and Nickell 2007; Ducheneaut et al. 2006.

20. Nicholas Christakis and colleagues have made a series of studies of the spread of behaviors in networks, ranging from smoking and obesity (Christakis and Fowler 2007; Christakis and Fowler 2008) to privacy settings in Facebook (Lewis, Kaufman, and Christakis 2008).

21. Facebook has 1.15 billion monthly active users, as of June 2013: <http://newsroom.fb.com/Key-Facts>.

22. See Sarah Blaffer Hrdy's *Mother Nature* (Hrdy 1999) for an excellent and extensive survey and history of child-rearing and childcare, among both humans and primates.

23. See Young and Willmott 1992 for an account of how an urban renewal project created similar rifts.

24. The prevalence of nonparent—and nonkin—childcare has varied throughout history; it is certainly not a modern innovation. Wet nurses were common in wealthier households in Asia and Europe, starting in medieval times; they were also, at times, common among the poor, but with far higher infant mortality rates (Hrdy 1999).

25. TaskRabbit (<http://www.taskrabbit.com>) describes itself as “an online and mobile marketplace that connects neighbors to get things done.” The service runs background checks on people who sign up to be “TaskRabbits,” who can then bid for the posted errand-like jobs. The company’s marketing materials emphasize efficiency: “Wouldn’t it be amazing to have a few more hours in your day? Or to be in two places at once? That’s exactly what TaskRabbit makes possible,” while cloaking the transaction in cozy, feel-good neighborliness: “Neighbors helping neighbors—it’s an old school concept upgraded for today.”