

## 5 Social Has a Shape: Why Networks Matter

One of the key ideas about human social networks is that in the addition of ties between people and specific patterns of ties that obey particular mathematical rules, the whole becomes greater than the sum of its parts. The collection of human beings have properties that do not reside within the individuals, and this collection of human beings is now able to do things that they previously were not able to do. And one of the illustrations or examples that I most like to give about this is something that most people are familiar with from high school or college chemistry and that is the example of carbon. So you can take carbon atoms and you can assemble the carbon atoms into graphite and here we put together a particular hexagonal pattern of ties and you get sheets of graphite and this graphite is soft and dark. Or we can take the same carbon atoms and assemble the bonds between the carbon atoms differently and we get diamond, which is hard and clear. These properties of softness and darkness or hardness and clearness first of all differ dramatically, not because the carbon is different. The carbon is the same in both, but rather because of the ties between the carbon atoms. And second these properties are not properties of the carbon atoms. They're properties of the group, properties of the collection of carbon atoms. Therefore, when we take constituent elements and assemble them to a larger whole, this larger whole can have properties that we could not have foreseen merely by studying the individual elements and properties which do not reside within the individual elements.

—Nicholas Christakis, "The Chemistry of Social Networks," 2010

All the skills you've been learning through this book and your own practice, from infotention to collective intelligence, are deeply intertwined with human and technological networks. We have always lived in a world dominated by networks, from our brain cells to social ties, but we have only recently started to understand how our networked nature affects us. In the late 1990s, scientists began to connect the dots between network structures in physics, biology, sociology, and technical systems, discovering that:

- Networks have structures, and structures influence the way individuals and networks behave.

- Human social networks maintained through the medium of speech go back to the origin of our species. Technologically networked communication media extend and amplify the reach of traditional social networks to make new forms of sociality possible.
- Online networks that support social networks share properties of more general network structure as well as the specific properties of human networks.

A line from a 1990 Broadway play, John Guare's *Six Degrees of Separation*, popularized a notion that turns out to be a linchpin of the new science of networks: "I read somewhere that everybody on this planet is separated by only six other people. Six degrees of separation between us and everyone else on this planet. The President of the United States, a gondolier in Venice, just fill in the names."<sup>1</sup>

In 1967, social psychologist Milgram and his student Jeffrey Travers experimentally discovered this startling idea. Milgram randomly selected 300 individuals in Omaha and Wichita, and gave each of them an information packet along with the name of a contact person in Boston. Each of the initial 300 were instructed to sign a roster included in the information packet and send it directly to the Boston contact if they happened to know them. If they did not know the contact, the subjects were asked to send it to someone they knew on a first-name basis who they suspected might be able to move the letter closer to the Boston contact. Each person in the chain of correspondence signed the enclosed roster before forwarding the packet, thus giving researchers a way to determine the chain's length. Many letters never reached the contact, but 64 of them did. The average "path length" was 5.5. Milgram's results were first published in the popular magazine *Psychology Today*, which made the "small world phenomenon" widely known.<sup>2</sup>

In 1998, Columbia University sociology professor Duncan Watts and Cornell University mathematician Steven Strogatz published a paper in *Nature* about the "collective dynamics of 'small world' networks" that revealed a common underlying structure of all networks that have small average path lengths between nodes despite having large numbers of nodes. Watts and Strogatz also proved that such networks existed in the nervous system of a kind of worm (*C. elegans*) and the power grid of the western United States.<sup>3</sup> Then physicist Albert-László Barabási demonstrated similar structure in the World Wide Web, metabolic networks, scientific collaboration networks, and ecological food webs. Once scientists started looking for it, evidence of small-world networks started showing up in every field—from the spread of epidemics to actors who have been in a film with Kevin Bacon.<sup>4</sup>

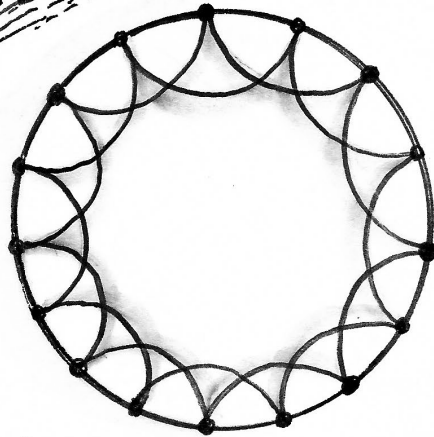
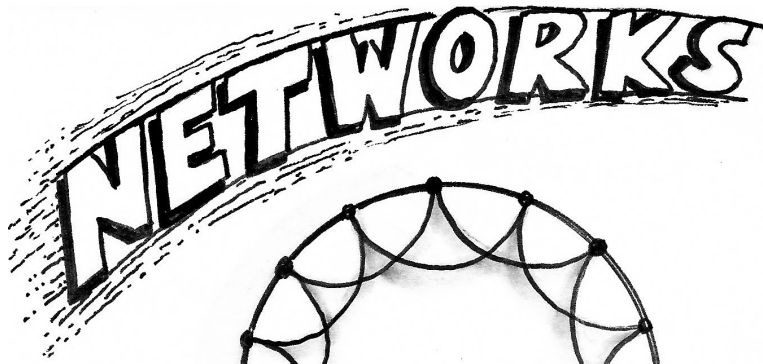
In 2001, Watts used email to re-create Milgram's experiment, selecting a random sample of 48,000 senders and 19 targets in 157 countries. Watts found that the average path length was indeed around 6. The *New York Times* reported on a 2010 study by a social media analytics monitoring firm that discovered over 98 percent of the people on Twitter are separated by only 5 steps.<sup>5</sup> In 2007, Jure Leskovec and Eric Horvitz, examining 30 billion instant message conversations among 240 million people, found the average path length among Microsoft Messenger users to be 6.6.<sup>6</sup> Social cyberspaces—whether they emerge from email, blogs, hyperlinks, instant messages, or tweets—are small-world networks, because they are electronic extensions of human social networks.

Usefully for digital citizens, Watts and Strogatz demonstrated how a large network can become a small-world one. You can ascertain the principle for yourself with a pencil and paper. Draw a circle. Around its perimeter, draw dots. Then connect each dot to its two immediate neighbors, one on either side. This is what is known as a highly clustered (dense) network, arranged in a configuration that is known informally as a bucket brigade after the human institution it resembles. Count how many steps it takes to travel from one dot to another on the opposite side of the circle (the path length, à la Milgram). Imagine a circle with seven billion dots on it. Now draw just a few random connections between dots and other dots in other parts of the network, crossing to other parts of the circle instead of restricting the connections to immediate neighbors. It turns out that introducing a relatively small number of random distant links in a highly clustered network transforms it into a small-world network. Do you know someone in Italy? You've now radically reduced the path length between you (and your network) and anyone else in Italy. Networked individuals benefit from having at least a small number of connections to networks that are distant (and different) from their immediate neighbors—and it is even more useful if they are the only person who can bridge two different networks.

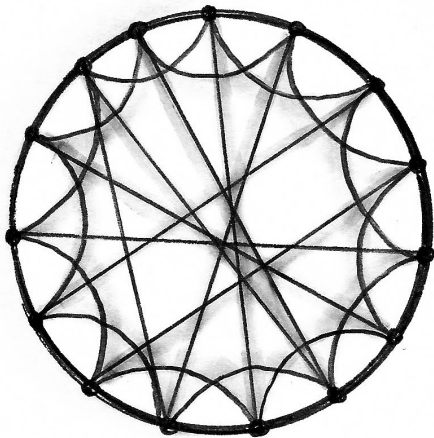
We'll see how sociologists are documenting a shift from group-centric societies (in which most of one's friends are likely to know each other) to network-centric societies (in which most of one's network contacts don't know each other). If a network is too densely clustered, Watts and Strogatz discovered, it won't have the short average path lengths that characterize small-world networks in cells or social systems.

If you analyze a small-world network and map the number of connections that each node in the network has with other nodes in the network, you'll find that most nodes will have a small number of connections, while a small number of nodes (supernodes) will each have a large number of

connections (a high degree). Your blog probably doesn't get too many inbound links, but Wikipedia gets a lot of links. The Internet is interconnected by a large number of low-degree nodes and a small number of high-degree supernodes, such as Google, Facebook, Wikipedia, or Yahoo! Think of the hub-and-spoke structure of airports versus the structure of the highway system. If you plot out on an x- and y-axis grid the number of nodes against those of inbound links to each node on a graph, you'll get a power



CLUSTERED NETWORK



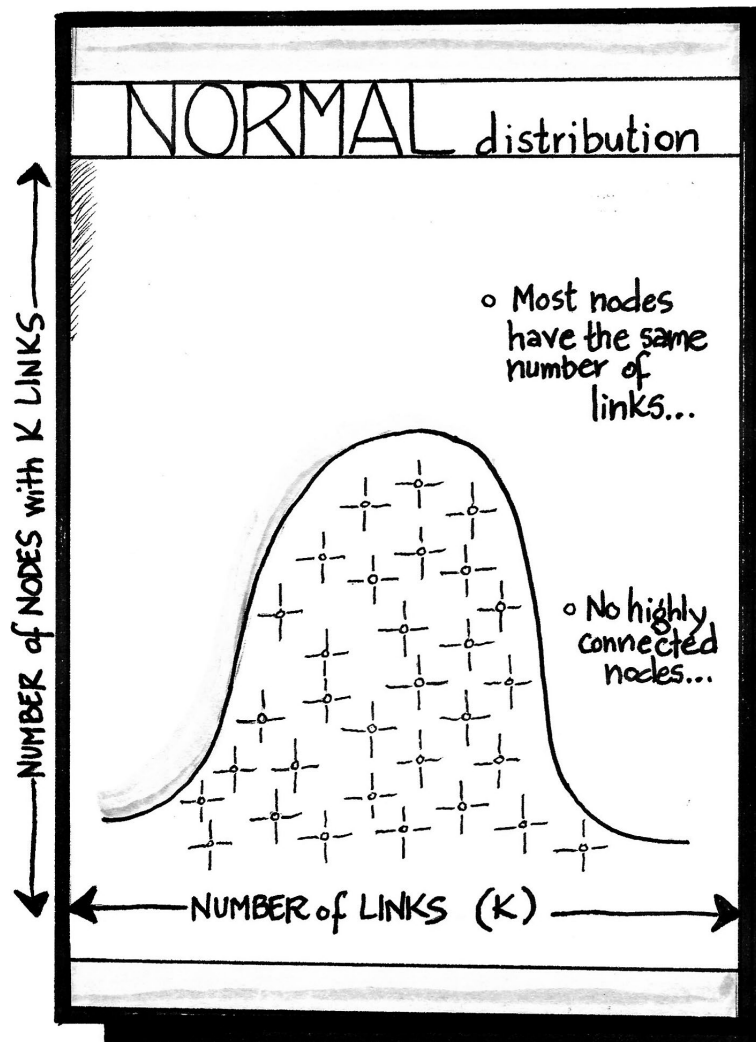
SMALL WORLD NETWORK

law distribution—a curve that’s worth knowing about if you are seeking to influence others or do business online.

You already know one kind of statistical distribution curve well—the curve that your teacher graded your class on, with a small number of A and F grades, and larger numbers of B, C, and D grades. Most people know this Gaussian or so-called normal distribution as the bell-shaped curve, due to the shape it takes when graphed. Note that there is a smooth peak at the curve’s center, indicating that those who are average in whatever characteristic is being measured are dominant in the population. And note that the tails of the curve on either side of the center’s peak are relatively close to the peak. If you are graphing human heights, for example, no humans are as short as six inches or as tall as eighteen feet.

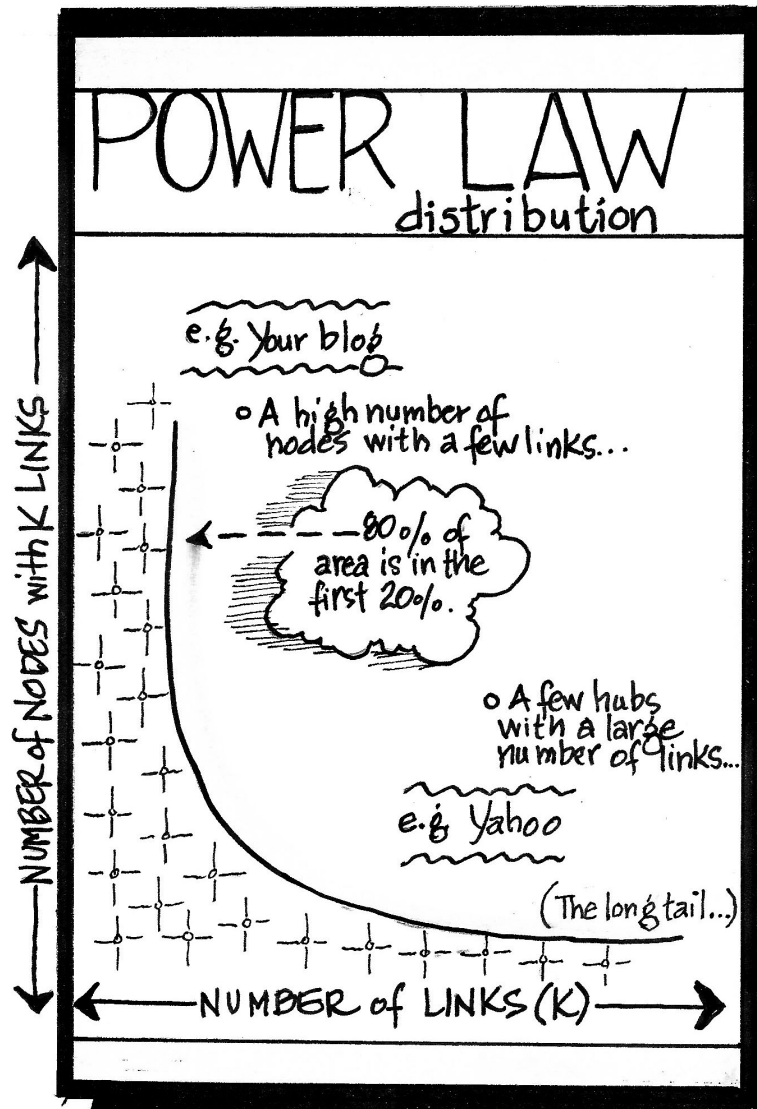
The power law curve looks and acts differently from the normal curve: 20 percent of the power law curve holds about 80 percent of the total area in the graph, which means that the number of nodes of low degree greatly outnumber those nodes with average or greater numbers of connections. These Pareto distributions (named after an economist who noticed its frequent appearance where the distribution of wealth is involved) are sometimes known as “the 80/20 rule,” which seems to recur in many kinds of distributions—the holders of wealth in a population, frequency of words in a language, amount of work done by Wikipedia contributors, or popularity of bloggers. It was the occurrence of the power law in the blogosphere that first brought it to the attention of digital culture. Shirky points out that a small number of blogs are the most highly trafficked, and that most blogs have, on average, a small amount of traffic.<sup>7</sup> *Wired* magazine editor Chris Anderson zeros in on the tail of the power law distribution, which unlike the normal distribution, goes off the right end of the page. While there are a small number of nodes in the head of the distribution, there are a much larger number of them in what Anderson calls “the long tail.”<sup>8</sup>

A few blogs get a jillion inbound links and hits, and a jillion blogs get a few inbound links and hits. Put this together with the small-world network structure of the Web, and you can see how videos and other Internet memes go viral—some obscure blogger like Bev Harris breaks a story about the Diebold voting machines and others link to it, and then a supernode blog like Andrew Sullivan’s links to it. Although the Web affords a large audience to only a few, that large audience is quickly accessible to other publishers when the conditions are right; supernodes diffuse attention to the long tail, the way hub airports feed the regional ones. Anderson is interested in the opportunities made possible by the long tail. While it’s more obvious that those nodes in the distribution’s head will find ways to profit



from their popularity, Anderson suggests ways that those unpopular nodes out in the long tail can be valuable as well.

A significant portion of Amazon's income doesn't come from the best sellers but rather from the obscure books and music that aren't easily available in brick-and-mortar stores. Netflix rents out a great number of films that were never hits. If you can aggregate all the fans of an obscure opera singer, people who breed a rare kind of dog, or those who collect antique Balkan tax stamps, you now have a market. The long tail can work for producers as well as consumers. Every niche blogger, curator, and video maker has a connection to potential fans and publics, aided and abetted by search and curation—and every culture producer whose distribution network has a low degree has the possibility of connecting to the head of the power law curve.



Social network analysis (SNA) of public health data has recently suggested that if your friends' friends (few or none of whom you actually know) are obese, smoke, or are unhappy, you are more likely to be obese, smoke, or be unhappy. University of California at San Diego political scientist James Fowler and Harvard Medical School sociologist and physician Nicholas Christakis reported startling research results in "Dynamic Spread of Happiness in a Large Social Network: Longitudinal Analysis over 20 Years in the Framingham Heart Study," strongly indicating that people's happiness is influenced by how happy their friends, neighbors, and coworkers are.<sup>9</sup> The investigators (who stipulate that happiness is, of course, the product of multiple factors) took advantage of a research database (the

Framingham Heart Study) that happens to contain data about people's health and behavior over a period of twenty years, along with data about their social networks that made it possible to use SNA to explore their relationships. According to Fowler and Christakis, friends of friends' friends have about one-third as much influence as people you know directly. The surprising implication is that at least part of your happiness might depend on people you never met. The research on what has come to be called social contagion also linked obesity, smoking, substance abuse, and other behaviors to social graphs.<sup>10</sup> This research is recent, and conclusions have to be regarded as tentative until others replicate the results with further data, but these findings strongly highlight that network awareness might be vital to your health and happiness.

The amount of freedom each node in a network has to connect with other nodes also influences the network's nature. Answers to the question "Who has the power to communicate with who in this network?" can predict not just the kind of structure but also the relative value that a networked medium is likely to have. David Reed, one of the original architects of the Internet, now an MIT professor, told me about Sarnoff's, Metcalfe's, and Reed's laws ten years ago over lunch across the street from the Media Lab, when I was seeking to understand technologies of cooperation. Sarnoff's law is named after television pioneer David Sarnoff. With a broadcast medium such as television or radio, the value of the network increases *arithmetically* with the number of receivers: add more receivers, add that much more value. Metcalfe's law is named after Robert Metcalfe, creator of the Ethernet, a precursor to the Internet architecture, who declared that the value of a many-to-many network like an Ethernet or Internet increases even more quickly than that of a broadcast network, because adding nodes *multiplies* the reach of each node. When every node can potentially communicate with every other one, then instead of adding another unit of value with each new node, you multiply the number of nodes by itself to determine the number of possible connections. If two nodes are worth four units of meaning or wealth, then three nodes are worth nine, and ten nodes are worth one hundred. The first fax machine was worthless. When there were two fax machines, there was a reason for the owners to have them, but when there were millions of fax machines, the fax network became as valuable as a million times a million.

Reed noticed how those many-to-many networks that also served as platforms for human group formation (such as the Internet and Web) increase in utility radically more rapidly than Metcalfe's law, because the value of each node is multiplied by not only the number of other nodes it



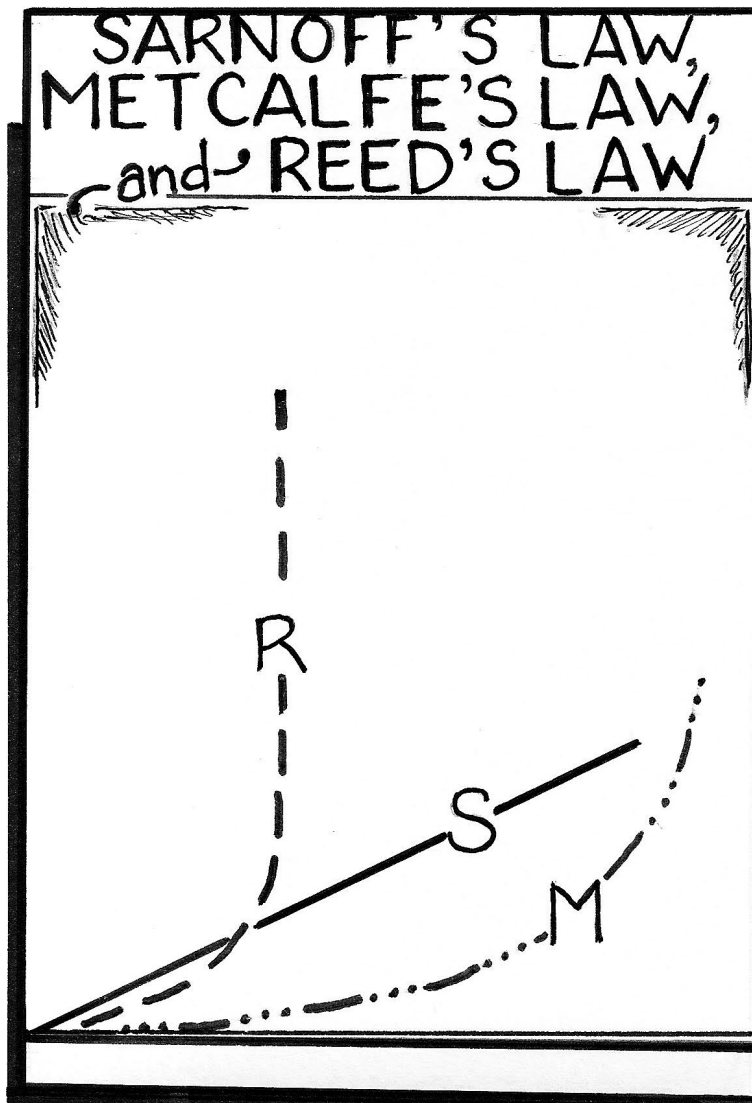
can communicate with but also by the potential number of *groups* it can communicate with. Fax machines or telephones don't generally communicate with groups, but humans do. Reed told me that he started thinking about group-forming networks (GFNs) when he wondered why eBay had become so successful: "eBay won because it facilitated the formation of social groups around specific interests. Social groups form around people who want to buy or sell teapots, or antique radios." I quoted my interview with Reed in my 2002 book, *Smart Mobs*: "I saw that the value of a GFN grows even faster—much, much faster—than the networks where Metcalfe's Law holds true," Reed told me, drawing ever-steeper curves on a napkin. "Reed's Law," he continued, "shows that the value of the network grows proportionately not to the square of the users, but *exponentially*."<sup>11</sup>

That means you raise 2 to the power of the number of nodes instead of squaring the number of nodes. Two to the 10th power is about 10 times larger than 10 squared. The value of 2 nodes is 4 under Metcalfe's and Reed's laws, but the value of 10 nodes is 100 (10 to the 2nd power) under Metcalfe's law and 1,024 (2 to the 10th power) under Reed's law—and the differential rates of growth climb the hockey stick curve from there. This explains how social networks, enabled by email and other social communications, drove the growth of the Internet beyond communities of engineers to include every kind of interest group. Reed's law links computer networks with social networks, which are all about group formation and intergroup communication.

In a much-linked article, "That Sneaky Exponential: Beyond Metcalfe's Law to the Power of Community Building," Reed connects these growth laws to the kinds of economic and cultural value each flavor of network tends to create:

There are really at least three categories of value that networks can provide: the linear value of services aimed at individual users, the "square" value from facilitating transactions, and exponential value from facilitating group affiliations. What's important is that the dominant value in a typical network tends to shift from one category to another as the scale of the network increases. Whether the growth is by incremental customer additions, or by transparent interconnection, scale growth tends to support new categories of killer apps, and thus new competitive games.

We can see this scale-driven value shift in the history of the Internet. The earliest usage of the Internet was dominated by its role as a terminal network, allowing many terminals to selectively access a small number of costly timesharing hosts. As the Internet grew, much more of the usage and value of the Internet became focused on pairwise exchanges of email messages, files, etc. following Metcalfe's Law. And as the Internet started to take off in the early '90's, traffic started to be dominated



SARNOFF'S LAW = \_\_\_\_\_

METCALFE'S LAW = \_\_\_\_\_

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by newsgroups, user created mailing lists, special interest websites, etc., following the exponential GFN law. Though the previously dominant functions did not lose value or decline as the scale of the Internet grew, the value and usage of services that scaled by newly dominant scaling laws grew faster. Thus many kinds of transactions and collaboration that had been conducted outside the Internet became absorbed into the growth of the Internet's functions, and these become the new competitive playing field.

What's important in a network changes as the network scale shifts. In a network dominated by linear connectivity value growth, "content is king." That is, in such networks, there is a small number of sources (publishers or makers) of content that every user selects from. The sources compete for users based on the value of their content (published stories, published images, standardized consumer goods). Where Metcalfe's Law dominates, transactions become central. The stuff that is traded in transactions (be it email or voice mail, money, securities, contracted services, or whatnot) are king. And where the GFN law dominates, the central role is filled by jointly constructed value (such as specialized newsgroups, joint responses to RFPs, gossip, etc.)<sup>12</sup>

Many new phenomena, from group-buying services (Groupon.com) to flash mobs, make more sense when viewed through the lens of network structures. As scholar and communications researcher Castells claims, the term "network society" is a much more useful to describe life today than "information society." We've been in an information society at least since Gutenberg. Castells wrote a two-thousand-page trilogy, *The Network Society*, arguing from a comprehensive body of statistical and other evidence that the intersection of social and technical networks is fundamentally reconfiguring human social, political, and economic institutions.<sup>13</sup> In "Why Networks Matter," Castells's introduction to *Network Logic: Who Governs in a Interconnected World?* he lays out seven ways that technologically mediated social networks are transforming society.<sup>14</sup>

First, these networks are global, and the worldwide transit time for information is nearly instantaneous, which Castells contends is the structural basis for globalization. Second, networked organizations outcompete command-and-control bureaucracies. Third, the networking of civil and political institutions is the emergent response to the governance crisis of nation states. Fourth, networks of activists are reconstructing civil society at local and global levels. Fifth, networked individualism, virtual communities, and smart mobs are redefining sociality. Sixth, media space—the public space of our time—now encompasses the whole range of human social practices. Finally, "in this network society, power continues to be the fundamental structuring force of its shape and direction. But power does not reside in institutions, not even in the state or in large corporations. It is located in

the networks that structure society.”<sup>15</sup> Networks are no longer as simple, rigid, or tightly bounded as power elites have been throughout history. Alternative networks now disrupt and contend with older power structures. Not all these changes are democratic or uniformly beneficial, nor are they wholly predictable, but Castells presents formidable evidence of the ways ubiquitous access to each other and the world’s information is reshaping the ways we do everything.

Small worlds, power laws, long tails, Reed’s law, network contagion, and network societies are the invisible forces driving many of the social and economic phenomena manifesting today in the behaviors of networked publics. Knowing what these phenomena mean will help you understand the systemic transformation that much of our environment is undergoing. Whether or not you take advantage of them, these network characteristics will continue to influence the way information comes to you as well as how you distribute your own messages, the ways people buy and sell and share, the operations of the levers of power, and the manner in which you and others learn. Moving from the general properties of networks to the specifics of human networks, you’ll find that the complex, animated interconnections that make up human social networks have been studied empirically for longer than the Internet has existed.

Fortunately for my purposes here, some of the tools that sociologists developed decades ago are well suited for studying the structure of today’s online publics. Early sociologists tended to study the way human groups behaved, but a group isn’t the only way human relationships take shape. There are also networks. Instead of examining only the groups people belonged to, some sociologists began asking people to list all the people they interacted with day to day, and then examined the connections between those people. The practice of applying mathematical analysis to these relationship networks to gain useful information about how people behave grew into the SNA discipline—a useful navigation tool for digital citizens.

### **Social Network Analysis**

Billions of people create trillions of connections through social media each day, but few of us consider how each click and key press builds relationships that, in aggregate, form a vast social network. Passionate users of social media tools such as email, blogs, microblogs, and wikis eagerly send personal or public messages, post strongly felt opinions, or contribute to community knowledge to develop partnerships, promote cultural heritage, and advance development. Devoted social networkers create

and share digital media and rate or recommend resources to pool their experiences, provide help for neighbors and colleagues, and express their creativity. The results are vast, complex networks of connections that link people to other people, documents, locations, concepts, and other objects. New tools are now available to collect, analyze, visualize, and generate insights from the collections of connections formed from billions of messages, links, posts, edits, uploaded photos and videos, reviews, and recommendations. As social media have emerged as a widespread platform for human interaction, the invisible ties that link each of us to others have become more visible and machine readable. The result is a new opportunity to map social networks in detail and scale never before seen. The complex structures that emerge from webs of social relationships can now be studied with computer programs and graphical maps that leverage the science of social network analysis to capture the shape and key locations within a landscape of ties and links. These maps can guide new journeys through social landscapes that were previously uncharted.

—Derek L. Hansen, Ben Shneiderman, and Marc A. Smith, *Analyzing Social Media Networks with NodeXL*, 2011

Although SNA predates the Web, it has turned out to be a powerful tool for exploring questions about online sociality. The basics are easy enough for anybody to learn, and can be helpful in understanding a surprisingly broad range of things that can happen to us online. It helps to have a pencil and paper at the start.

Most people know how to draw a network diagram. First, draw a number of dots spread around a page in no particular order; next, draw lines between some of the dots. If you think of the dots (known as nodes or vertices) as people and the lines as ways those people could be related (known as ties when talking about the ways in which people are connected or edges when referring to the network's structural characteristics), you now know the fundamental elements of SNA. Ties can represent kinship, friendship, or acquaintanceship, and can also stand for economic transactions, sexual relationships, or prestige hierarchies (think org chart or “above my pay grade”); the kind of relationship that can create a tie is broadly defined. Consider yourself as a node, draw lines between yourself and the people you know and are related to, draw lines between those of your acquaintances who have ties to each other, and what you have is a graph of your personal (sometimes called your egocentric) social network.

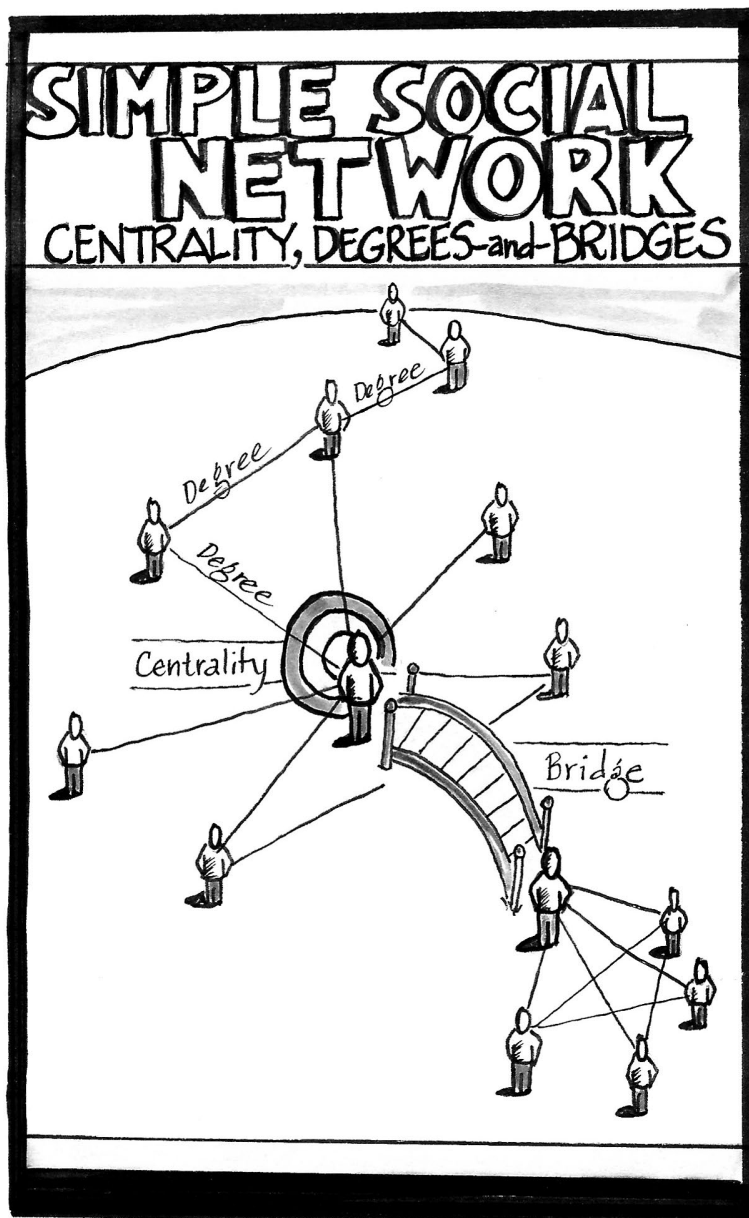
You may have heard people refer to Facebook “friends” networks as “social graphs.” Search on “visualize Facebook social network” and you’ll find a variety of tools for automatically creating a visual diagram of your Facebook social graph.<sup>16</sup> The structures of social graphs and the positions of individuals in the graph can have powerful impact on the nodes (people,

including yourself) as well as the graph as a social collective (the social equivalent of graphite or diamond). The business or social success of individuals, whether we survive disease epidemics, our health-related behavior, the reach of messages and transactions, and the effectiveness of political movements, civic organizations, or businesses are all vulnerable to network effects. Rumors, riots, happiness and depression, and knowledge all move through networks with greater or lesser speed.

Social networks can be analyzed in several ways. The strength of ties is one dimension. I'll take that up, but it helps to look first at all the relevant positions of the constituents of social networks. For starters, consider the position of the individual—you—in a network structure. If you list all the people you know and interact with—an “ego network”—then you are in the center and are the only node with some kind of tie to every other person/node. Your mother knows your sister, but your grocer doesn't know your professor; only you know them all. There are many other kinds of human networks besides ego networks. The sexual connections among college students, innovators in corporations, scholars in a particular field, movie collaborators (for instance, the six degrees of Bacon), terrorists, and interlocking directorships of corporations have been subjected to SNA scrutiny. In social systems, the amount of centrality (how well the node interconnects people in different parts of the networks) can be more powerful than the degree (again, the number of ties). In a corporation or a research network, you want to be in a position of high centrality, with many different information vectors coming in and out. In an epidemic, highly central individuals are also more likely to become infected and pass along infections, so occupying a position on the edge of a network becomes advantageous when fear of contagion is important—and centrality could be fatal. Another important SNA term is bridge, denoting a person who is a potential link between two separate networks. Bridge people can benefit from their position, and depending on the bridge person's social skills, so can both networks.

I first learned the jargon of SNA from Marc A. Smith, PhD. In 1991, when I was writing *The Virtual Community*, only a few social scientists were studying behavior in cyberspace. Smith, then a sociology graduate student at the University of California at Los Angeles, was able to answer my question about why people would give time, information, and social support to others online, even if they didn't know the other people well. “Social capital, knowledge capital, and communion,” Smith answered—a terse explanation that has stood the test of time.<sup>17</sup> More recently, when I asked Smith to help me figure out how SNA applies to network literacies, he directed me

to the work of Mark Granovetter on the ties that connect people in social networks. (My research methodology seems to be: stumble on something, become curious, ask others, and then look where others point. Knowing which others to ask is key to success; indeed, one social network problem in organizations is known as “Who knows who knows what?” Later in this chapter, I’ll introduce my power tool for knowing who to ask: the PLN.) I looked at the first place Smith pointed and soon discovered that Granovetter’s paper, “The Strength of Weak Ties,” in the *American Journal of Sociology*



in 1973, was famous among sociologists before and after SNA was applied to life online.<sup>18</sup>

As Granovetter defines it, “The strength of a tie is a (probably linear) combination of the amount of time of the emotional intensity, the intimacy (mutual confiding), and the reciprocal services which characterize the tie.”<sup>19</sup> If your house burns down, you are likely to stay with someone with whom you have a strong tie. Yet we all relate to multiple networks of people with whom we have weaker ties. Granovetter notes that the high clustering (density) of strong ties—your strong ties are more likely than your weak ties to know one another—combined with the human tendency to associate with others who share your characteristics and opinion (homiphily)—can limit the amount of information that people can get from our strong-tie networks. Everybody in a highly clustered, homophilous network tends to get the same news, and it is more likely that everybody in a clique (the actual technical term sociologists use) will have the same opinions and access to the same information. In his empirical studies, Granovetter found that numerous weak ties can be important in seeking new information or stimulating innovation. You are more likely to find a job, Granovetter demonstrated, if you have a large and diverse network of weak ties. Note the relationship to small-world networks: highly clustered networks do not exhibit the small-world feature; you need the random distant connections beyond your closest networks.

Granovetter also underscores the existence of absent ties—your friends in high school, former neighborhood, or previous job that you lost touch with. Absent ties have suddenly become more significant in the network society than they were in Granovetter’s day. Now that Facebook has changed the historical pattern of leaving old social networks behind when moving to a new school or city, online media make it possible to maintain latent ties at a low cost—which as most Facebook users know, can be both a blessing and a curse. Modern network weavers, as they increasingly call themselves, stress the importance of maintaining a mix of strong, weak, and activated latent (maintenance) ties.

Smith continued his research into the SNA of cyberspaces as a research sociologist at Microsoft Research. Now he is an independent consultant in the application of SNA to digital/social networks. “Be a bridge,” Smith advised me, when I asked him for practical tips based on what he knows about the SNA of digital culture. “In social networks, like real estate, the most valuable characteristics are location, location, location,” he continued.

*Where* are you in the network, in relation to others? Which people and which groups connect to each other—or could be connected—through you? If you look at a social



graph of a population, the person with the most followers or the most connections might not be the most powerful person in that network. For example, in a network diagram of a population of researchers interested in online sociality, I might identify one person who is the only computer scientist with a strong tie to a sociologist. The sociologists and computer scientists all share an interest in online sociality, but they are two separate kinds of networks with two different kinds of shared knowledge. This person who knows both cybersociologists and social computing scientists can bridge two networks. If that person wasn't there, that lack of connection between networks would be a "structural hole," and the smart person will look for ways to bridge it. Be a bridge. Don't fixate on the number of connections but on the quality of those connections and the diversity of your portfolio of connections. It can be worthwhile to connect to less prominent, less highly linked individuals, if they are different from the other people in your network.<sup>20</sup>

John Hagel and Brown report in the *Economist* that the management of the seven-thousand-person research organization MITRE created internal social media with forums and blogs in order to tackle the question, Who knows who knows what? Hagel and Brown note that for MITRE's management, "The 'Aha' moment was recognizing that their tools enabled some to become 'brokers' between different groups in other parts of the organization."<sup>21</sup> Turner calls such brokers "network entrepreneurs," and sees an emergent profession or position of power resulting from network entrepreneurial talent.<sup>22</sup>

Smith's "be a bridge" advice made such good sense that I asked him for more. "Eigenvector centrality!" he replied, smiling at my baffled expression. "Eigenvector centrality," I shot back, "is a term that is likely to be said aloud only by SNA geeks." He continued: "It turns out that many people outside SNA are familiar with the principle, if not the technical term, because Eigenvector centrality is an ingredient of Google's PageRank." Google and SNA recognize that not every link is equally important. A link from a hub that has many inbound links itself adds to your authority. "So—second piece of advice—get people to link to you. Links to you are proxies for endorsement."<sup>23</sup>

Smith's advice makes sense to any blogger. Most blogs have a form for others to submit suggestions. When I have something newsworthy on my own blog, I submit a link to my blog post to a supernode blog. And most bloggers look at "pingbacks" that tell them who is linking to their posts. Yes, there is structural inequality in the attention economy online, but there are also many routes to wider networks, if you know how to use them. I don't draw supernodes' attention to my own product unless I think those supernode bloggers or tweeters would benefit by passing the link along their publics. Becoming a repeated, reliable source strengthens your tie with

a supernode. You have to become a contributing part of the info food chain in order to rise up the chain to leverage supernode attention.

As soon I learned a little bit about SNA, I grew interested in whether it could shed light on perhaps the most crucial question I can pose to my own work: Is life online eroding or enriching our embodied lives? Clearly, some people hang out online way too much. And some people drink or gamble too much. Some people care too much about making money. It's clear that alienation exists, and economic systems and mesmerizing media have something to do with it. The political analyses of media by scholars such as Michel Foucault, Theodor Adorno and Max Horkheimer, Jean Baudrillard, and others, situating deliberately created media illusion within capitalist control mechanisms, are worth keeping in mind. And yet now that we have at least some empirical tools in addition to philosophical analyses, we can ask, In what ways do the new connections afforded by digital networks, both the strong- and weak-tie variety, add more value than they destroy? That inquiry brought me to Wellman, who together with his students at the University of Toronto's NetLab, has conducted extensive, long-term, empirical research into the sociology of life online. I read his papers, and then traveled to Toronto to talk with Wellman and his lab colleagues about our mutual interests.

As a person, Wellman is friendly and soft spoken; the term avuncular is custom made for him. As a scientist who has been pursuing questions about the social impact of media, he is mercilessly empirical, methodologically exacting, and always asking, Where is the data for your assertion that life online is or isn't unhealthy? How was that data gathered and analyzed? After so many years of observing (and, I admit, contributing to) armchair theorizing about what life online means for humanity, I found it refreshing to be offered assertions backed up by scientific observation.

Wellman and I discussed these issues via Skype and Twitter as well as over dinners in San Francisco and Toronto. Like me, he is an active user of social media. Like me, Wellman knows that a critical stance is important for enthusiasts; he's aware that our activities, no matter how pleasurable or empowering, are embedded in systems of economic, political, and social relations. Unlike me, he knows how to apply social science techniques to questions about online sociality. Wellman and his students have published the results of their extensive empirical studies in major peer-reviewed journals. Their findings cast doubt on fears that computer-mediated relationships are alienating people from one another. Most significant, in my opinion, is the way Wellman's NetLab has detailed the social consequences of a shift from a group-centric sociality to what Wellman calls networked individualism.

When I asked Wellman what he thought was the single most important überchange that digital socializing was helping to bring about, his short answer was “the shift from group-centered to network-centered life.”<sup>24</sup> A group is densely knit (most members know each other) and tightly bounded (there aren’t many connections to people who don’t know everyone else), whereas a network is sparsely knit (most members do not know most other members) and loosely bounded (plenty of those small-world-making distant connections to people outside the core). Although groups have been privileged with the warm-and-fuzzy term community, Wellman and others point out that people have always maintained at least a few heterogeneous ties outside their core strong-tie group in order to meet needs that close-knit communities can’t provide.

In one fundamental text by Wellman that I assign to my students, he situates present-day fears about cyberalienation in centuries of reaction to modern institutions—and offers evidence that people now find support, information, and a sense of belonging in digital networks as well as physical communities.<sup>25</sup> In the prestigious journal *Science*, describing the conclusion of his team’s research into behavior in “Netville,” a “wired suburb” of Toronto, Wellman writes,

Computer networks are inherently social networks, linking people, organizations, and knowledge. They are social institutions that should not be studied in isolation but as integrated into everyday lives. The proliferation of computer networks has facilitated a deemphasis on group solidarities at work and in the community and afforded a turn to networked societies that are loosely bounded and sparsely knit. The Internet increases people’s social capital, increasing contact with friends and relatives who live nearby and far away. New tools must be developed to help people navigate and find knowledge in complex, fragmented, networked societies.<sup>26</sup>

It becomes tricky to generalize too far in regard to normative (“how it should be for everybody”) conclusions. I have personally found abundant support, information, and a sense of belonging—the community attributes that Wellman references—online. What we hold in common is a commitment to examining and reexamining whether we are fooling ourselves, or losing out on something vital through the way we use media.

Nevertheless, despite the importance of individual differences, it’s possible to ask some general questions about populations—a fundamental assumption of sociology. When a developer built a new suburb in Toronto in which each household was given the option of access to a broadband Internet connection, Wellman and his team had an opportunity to compare those neighbors who used the high-speed network with those who did not. They found that “those who were part of the high-speed service knew

three times as many neighbors as the unwired and visited with 1.6 times as many. Nor was the Internet only used socially: Netville residents used their local discussion list to mobilize against the real estate developer and the local Internet service provider."<sup>27</sup> In this one community, Wellman and his colleagues were able to say with statistical precision that connecting online enhanced most people's off-line lives. It must be said that Canadians affluent enough to move into a high-tech suburb should probably not be used to predict the behavior of people living under different cultural and economic circumstances.

In addition to NetLab, the Pew Internet and American Life Project has conducted extensive scientific polling into the social effects of online media in the United States. In "The Strength of Internet Ties," a report coauthored by the Pew Research Center's Rainie, John Horrigan, Wellman, and Jeffrey Boase, the authors conclude:

Our evidence calls into question fears that social relationships—and community—are fading away in America. Instead of disappearing, people's communities are transforming: The traditional human orientation to neighborhood- and village-based groups is moving towards communities that are oriented around geographically dispersed social networks. People communicate and maneuver in these networks rather than being bound up in one solitary community. Yet people's networks continue to have substantial numbers of relatives and neighbors—the traditional bases of community—as well as friends and workmates.

The internet and email play an important role in maintaining these dispersed social networks. Rather than conflicting with people's community ties, we find that the internet fits seamlessly with in-person and phone encounters. With the help of the internet, people are able to maintain active contact with sizable social networks, even though many of the people in those networks do not live nearby. Moreover, there is media multiplexity: The more that people see each other in person and talk on the phone, the more they use the internet. The connectedness that the internet and other media foster within social networks has real payoffs: People use the internet to seek out others in their networks of contacts when they need help.

Because individuals—rather than households—are separately connected, the internet and the cell phone have transformed communication from house-to-house to person-to-person. This creates a new basis for community that author Barry Wellman has called "networked individualism": Rather than relying on a single community for social capital, individuals often must actively seek out a variety of appropriate people and resources for different situations.<sup>28</sup>

Our lives and societies are networked, but in a paradox that would have made McLuhan smile, network technology has also put the individual at the center, often displacing the traditional role of the place or group. It requires more work on the part of networked individuals to make their

way successfully in an always-on, quickly moving world, and a new set of norms and skills—just as the transition from rural, agrarian life to urban, industrial life required. As Turner, Scholz, and Schäfer have pointed out, individual empowerment is constantly in danger of being co-opted and enclosed by commercial interests (for example, playbor). As with the transition to modernity that has taken place over the past three centuries, the transition happening today comes at a cost and yet also has its benefits. What you know, as always, can make the critical difference between being exploited or alienated by your use of social media, and enriching your life and community by your use of the same media.

### **Networked Individualism**

Changes in the nature of computer-mediated communication both reflect and foster the development of networked individualism in networked societies. Internet and mobile phone connectivity is to persons and not to jacked-in telephones that ring in a fixed place for anyone in the room or house to pick up. The developing personalization, wireless portability, and ubiquitous connectivity of the Internet all facilitate networked individualism as the basis of community. Because connections are to people and not to places, the technology affords shifting of work and community ties from linking people-in-places to linking people at any place. Computer-supported communication is everywhere, but it is situated nowhere. It is I-alone that is reachable wherever I am: at a home, hotel, office, highway, or shopping center. The person has become the portal. This shift facilitates personal communities that supply the essentials of community separately to each individual: support, sociability, information, social identities, and a sense of belonging. The person, rather than the household or group, is the primary unit of connectivity.

—Barry Wellman, Anabel Quan-Haase, Jeffrey Boase, Wenhong Chen, Keith Hampton, Isabel Isla de Diaz, and Kakuko Miyata, “The Social Affordances of Networked Individualism,” 2003

I remember the exact moment when I recognized the shift to what Wellman’s NetLab colleagues label networked individualism. I was in Tokyo, observing the way young people were adopting new modes of communication with cell phones. A local friend of mine, a parent, complained to me: “I don’t know my children’s friends anymore. They used to have to talk to me when they called my house, but now they just call or text my son’s or daughter’s mobile phone.” In the early years of the cell phone, the phrase most often used at the beginning of a voice or SMS conversation was “Where are you?”—because we had shifted from calling places in the landline era to calling people—who could be anywhere—in the mobile era.

When I started writing about online sociality, the community of interest was the center of cybersociality—the breast cancer chat room on AOL, the media hangout on WELL, and the newsgroup about your hobby, pet, disease, or political interest. Individuals looked for online “places” where they could find others who shared their interests. It was expensive and/or technical to create an online chat room, BBS, or other social venue. Now technology has shifted the center from the community to the individual. I can create a blog, Twitter, or YouTube account in a matter of seconds. I still frequent online places, but I am also the center of my Facebook and Twitter networks, I carry my list of contacts on my smart phone, and I check to see what Yelp users say about restaurants in my neighborhood.

The networked environment, proliferation of networked devices, ease of summoning our own networks with text messages and tweets, and ways in which our media powers have shifted our social attention from groups to networks are a constellation of social transformations that Rainie and Wellman call “the triple revolution.” The drivers of this revolution, according to Rainie and Wellman’s forthcoming book, *Networked: The New Social Operating System*, are the rise of the personal Internet, spread of powerful mobile information and communication devices, and shift from groups to networks as the primary focus of sociality.<sup>29</sup>

I’ve already examined the role of technology and power of participation in online media. In “The Social Affordances of the Internet for Networked Individualism,” Wellman and his colleagues detail the conclusions of their research into the social shift toward networks:

Communities and societies have been changing towards networked societies where boundaries are more permeable, interactions are with diverse others, linkages switch between multiple networks, and hierarchies are flatter and more recursive. Hence, many people and organizations communicate with others in ways that ramify across group boundaries. Rather than relating to one group, they cycle through interactions with a variety of others, at work or in the community. Their work and community networks are diffuse, sparsely knit, with vague, overlapping, social and spatial boundaries.<sup>30</sup>

My own daily activities today offer a window into how networked individualism operates for many of us. My daughter is traveling in Asia, so I video Skyped with her this morning—a mediated renewal of a strong tie. I checked my infotention dashboard for any new information about the topic of this chapter that might have arrived overnight via RSS. I answered email, dipped into Twitter (where I asked and answered questions of networks of people elsewhere in the world I might or might not have communicated

with before), participated in a discussion thread in an online class I'm teaching, used search engines a dozen times, and found an expert by climbing the tree of links from a social bookmarking tag to the first person to post the link to a fundamental article. My wife arrived home and got my attention through an instant message from the other room. She wanted to try a new place for dinner and instant messaged a link to me, so I checked two online rating services to see what my neighbors had to say about the food. I'll get exact directions to the restaurant on my phone on the way. None of these acts were extraordinary. As Rainie and Wellman assert, backing up their claims with substantial empirical data, networked individualism is woven into our lives. The Web is no longer a special place but rather part of most of what we do.

Rainie and Wellman present a detailed description of the kind of people they think will thrive in the emerging environment in which networked individualism plays a strong role. A few short excerpts from their list, along with my annotations, offers a practical resource for those who seek to gain leverage from their knowledge of networked individualism:

- *"Those who can act as autonomous agents to cultivate their personal networks and their 'personal brands':* Social advantages and privileges accrue to those who can 'prospect' for network ties the way effective sales agents can prospect for clients."<sup>31</sup> Smith even has automated this prospecting process.<sup>32</sup> Using his NodeXL SNA software, Smith explores the networks of people on Twitter who participate in a TweetChat using a hashtag that interests him, such as "#socialnetworkanalysis." He looks for both degree and centrality, follows those people, and retweets their most valuable output. Smith has found that 20 to 30 percent of the people he follows this way also follow him back.
- *"Those with bigger and more diverse networks:* Personal networks can now run to thousands of people, if you count the most remote, but still meaningful acquaintances. Although bigger is not always better, those with diverse, broad-ranging networks are often in better social shape and have a greater capacity to solve problems than those who have smaller networks. Those with many functional 'weak ties' can find support and solve problems more adeptly than those who are deeply embedded in a small, tight social network."<sup>33</sup> Remember Dunbar, the anthropologist who believes speech may have evolved from social grooming for the purpose of gossip? His work correlating the size of primate groups with their brain size suggests that the maximum number of people that a human can maintain a strong-tie relationship with is around 150—the somewhat-famous "Dunbar Number."

Further research is required, but common sense indicates that there is only so much time in any day to engage in communications that go deeper than the email, tweet, or text message. The key to a tie's strength is not so much whether your communications are face-to-face or digitally mediated but instead how much of yourself you can put into them. Rainie and Wellman are proposing that networked media make it possible to maintain relationships with larger and more diverse portfolios of weaker ties. This doesn't mean that strong-tie relationships have to go away, as their research confirms. Both strong- and weak-tie relationships can be sustained through media, but strong ties take more time, shared experience, deeper trust, and more frank self-disclosure.

- *“Those who can function effectively in different contexts and ‘collapsed contexts’:* The act of joining and belonging to multiple groups requires a development of group understanding or knowledge as each has different histories, norms, and folklore. People must learn the ropes in these different milieus. The more gracefully they can do this, the quicker they can assume greater roles within multiple communities and networks.”<sup>34</sup> Remember Jenkins's advice (and mine) that the first step in online participation is to understand the social norms of the online context you seek to participate in?

- *“Those who have high levels of trust and social capital:* This is true online as well as offline. A bedrock law of social networking is that people need to discover and interact with those who can provide resources. Humans seem to be hardwired for reciprocity. Social capital has its own rewards as it allows us to gain prestige with individuals or within groups, get things done, and enhance our sense of self. The essential point is that trust and reciprocity are primary currencies for networked individuals.”<sup>35</sup>

- *“Those who learn how to manage their boundaries:* As the power of formal, densely-knit groups wanes in light of the buildup of personal networks, personal and community boundaries are less distinct. Does a person want all 300 of her Facebook friends to know what she did last night? With digital technologies, more private information is potentially available to interested members of the public—and to government and organizational surveillance authorities. Networked individuals need to develop new understandings of what to make public, which publics to make information available to, and to intermix technologies of privacy with those of public narrowcasting.”<sup>36</sup> We'll see what boyd has to say about this capability, which becomes particularly important with regard to Facebook and Twitter.

- *“Those who like technology and use it enthusiastically and nimbly:* Beyond appreciation of technology and having the skills to use it, media literate people are in better shape as networked individuals in their ability to find



information, assess it, react to it, and even remix it with their own spin on it. With this sort of media realism, people can manage their networks better.”<sup>37</sup> Note that Rainie and Wellman’s “media literate people” also know how to be critical. I know that Rainie and Wellman agree—because I’ve discussed this with them—that enthusiasm must be tempered with crap detection in order for it to be the kind of media realism they advocate.

- “Those who manage their time well, especially strategic multi-taskers: People need to manage their attention more carefully than ever before. Effective networkers exploit this new digital environment more powerfully than those who get lost in their browsing or swamped by information inputs.”<sup>38</sup> This is what I call mindful infotention.

Smith along with Rainie and Wellman agree on the importance of social capital—another term originally applied to face-to-face networks that has value to digital citizens as individuals and to the commons.

### Social Capital

In all societies, to summarize our argument so far, dilemmas of collective action hamper attempts to cooperate for mutual benefit, whether in politics or in economics. Third-party enforcement is an inadequate solution to this problem. Voluntary cooperation (like rotating credit associations) depends on social capital. Norms of generalized reciprocity and networks of civic engagement encourage social trust and cooperation because they reduce incentives to defect, reduce uncertainty, and provide models for future cooperation. Trust itself is an emergent property of the social system, as much as a personal attribute. Individuals are able to be trusting (and not entirely gullible) because of the social norms and networks within which their actions are embedded.

—Robert Leonardi, Raffaella Y. Nanetti, and Robert Putnam, *Making Democracy Work*, 1993

I learned about online social capital decades before I heard the term, when I was one of dozens in an online community to coalesce into a support network around Philcat, a community member whose son had been diagnosed with leukemia. As I described the incident in *The Virtual Community*, I had come to know Philcat through WELL, an early online community where we both participated in discussions about parenting. We bragged and shared the joy when others bragged. We complained, commiserated, and traded parent lore. We got to know each other. I was an editor at the *Whole Earth Review* at the time, and Philcat was a pretty good freelance writer; I gave him a few assignments. Later, when he was an editor at the *Yoga Journal*, I

wrote an article for him. After our online parenting conversations had been going on for months, Philcat organized a picnic for all the virtual communitarians who had engaged in intense discussions with each other daily, but who mostly had not met face-to-face. The picnic attracted a hundred parents and children. We cooked, schmoozed, and played baseball. After that, the Parenting Conference Annual Picnic and Softball Game became a milestone in WELL's cycle of rituals.

Then, late one night, months after the ball game, Philcat started an online discussion in the parenting conference. That afternoon, his teenage son Gabe had been diagnosed with leukemia. His doctors and family weren't awake to share Philcat's midnight fears, but a few of his online friends were available. By the next morning, twenty or thirty people had joined the dialogue, including a medical doctor, nurse, and leukemia survivor. The support community grew as word spread. We didn't know then that online health support communities would become a big deal decades later. In 1989, all we knew was that Philcat could use our help. We passed the hat, raising over fifteen thousand dollars to aid Philcat's family. When Gabe died, the last pews in a packed church were filled with people who knew Philcat from WELL.

Twenty years went by. Philcat and I drifted apart, although we still both lived in the San Francisco Bay Area. Then I was diagnosed with cancer (I'm cancer free now). I started a blog and posted my daily treatment schedule. People I had known from different parts of my life, including dozens of people I knew almost entirely online, began to volunteer to drive me to radiation treatments. One of those people was Philcat. During the drive to and from the treatment facility, I renewed ties with people I had known from one BBS, newsgroup, chat room, Listserve, or another—as well as some of my face-to-face friends and acquaintances. Social capital accrued, was rebuilt, and became convertible into real-world action, initiated and facilitated by ongoing online discussions among people who shared an interest but had not previously known each other.

Another way to look at how online social capital works is the empirically validated value of paying it forward: doing favors for strangers in a network with no anticipation of direct reciprocation. I spend a lot of time answering email from students of virtual community studies all over the world—expecting no direct compensation. When I know the answer to a question I see on Twitter or a blog, I often pause to post what I know. I do it because I consider it my duty to improve the quality of discourse about social media, and I benefit from the efforts of others who feel the same sense of duty. I want to signal to people who take the time to correct misinformation or

answer a stranger's question that I appreciate their efforts and pay them forward.

A few years ago, I was invited to participate in a stimulating and lucrative exercise in imagining the future of a major office equipment manufacturer. When I got to the workshop, the person who had hired me said: "Ten years ago, I emailed you to ask how to become a futurist. You gave me a long and detailed reply." I had not been thinking about reciprocation at the time I responded to that graduate student's query, but when I started investigating social capital research, I discovered that answering email from students, posting answers to questions from strangers in online forums, and other somewhat-irrationally time-consuming forms of online participation are practical ways to behave in a network society.

In the aptly titled "It's Not Who You Know, It's How You Know Them: Who Exchanges What with Whom," Gabriele Plickert, Wellman, and Rochelle Côté presented various SNA of relationships in a (physical) Toronto urban neighborhood that led them to conclude: "The evidence is extraordinarily clear on one subject. The overwhelmingly direct cause of reciprocity is giving support in the first place."<sup>39</sup> Or as Wellman put it in a lecture at the Clinton School of Public Service, "The most important criteria for getting help is helping somebody else. If you want help in the future, help somebody now. Pay it forward. We have hard data on that."<sup>40</sup>

Like social networks, social capital is a way to describe an aspect of human behavior that had a rich history long before the Internet came along, but is now an important part of the socializing that online media make possible. Consider the economic conditions of two hypothetical groups of neighboring farmers. Each farmer in both groups has income and expenses alongside an amount of work to get done in order to bring more money in than goes out. One group of farmers doesn't indulge in much socializing or exchange of favors. The other group gathers informally—perhaps its children play on the same ball team or, like the Amish, go to the same church—and exchange favors. For example, if one farmer is sick or injured at harvesttime, the other farmers might take turns helping their neighbor bring in the crops, or the more sociable farmers might lend and borrow tools, increasing the size of each farmer's tool set. The second group of farmers has a sort of wealth that can't be accurately measured by looking at its overall financial income and expenditures. What this group has is social capital—networks of trust and norms of reciprocity that enable the farmers in this group to get things done together that they might not have been able to do otherwise.

We live in societies of laws (the third-party enforcement mentioned in the quote at this chapter's opening), and markets that have written rules and can be measured in dollars, yet we also live in social groups that share human relationships and informal norms. In addition to money, people make use of interpersonal obligations, information exchange, feelings of affection and solidarity, and informal institutions for collective action. Social capital is also key to the power of online social networks, where individuals and groups can cultivate, grow, and benefit from it. The term has a long history, apparently originating around 1916 with studies that sought to explain goodwill, fellowship, and solidarity among people at rural school community centers.<sup>41</sup>

I begin my own framing of social capital with social theorist Pierre Bourdieu's use of the term in the 1970s to describe the resources available to people as a result of durable relationships.<sup>42</sup> In the 1990s, sociologist James Coleman looked at social capital's value to nonelite or marginalized groups as a way of fulfilling needs in the absence of economic capital.<sup>43</sup> In 1990, Wellman and Scot Wortley considered social capital in terms of social ties and social support.<sup>44</sup> (Strong ties are far from the only necessary relationship when it comes to favors, support, and information, as Wellman and Wortley discovered.)

In 2000, Putnam popularized the concern that social capital is also a measure of social cohesion—a measure that seems to be diminishing in the United States, according to the data in his best-selling book *Bowling Alone: The Collapse and Revival of American Community*. Putnam presented a series of demographic and behavioral measures that seem to indicate a steady decline in social capital in the United States in recent decades (fewer people bowling in leagues, for example), which he correlated with the rise of television.<sup>45</sup> A 2011 national survey by the Pew Internet and American Life Project supplied evidence that Internet use may reverse the kind of decline Putnam feared, finding that 75 percent of U.S. adults are active in a group or voluntary association, with 80 percent of Internet users participating in groups compared to only 56 percent of nonusers. Social media users are the most active, with 82 percent of social network service users and 85 percent of Twitter users active in such groups.<sup>46</sup>

In terms of life online, I find it helpful to combine Bourdieu's, Coleman's, Wellman and Wortley's, and Putnam's frameworks. I think of social capital as both an individual's stock of resources that can emerge from sustained social relationships and the capacity of a population—a network or community—to accomplish collective action. An individual can tap into social capital by doing for others and benefiting from what others can

do for the individual, but social capital emerges from the interactions of groups and networks in relationship, not from the insulated behavior of any individual. Like the diamond or graphite metaphor for network structures, social capital arises from the shape of ongoing relationships as well as the characteristics of individuals. The two keys to that shape are networks of people who trust each other to some degree, and norms those people share that encourage both reciprocity and occasional uncompensated contribution to a commons.

Although trust and reciprocity seem like fuzzy concepts, there are ways to measure them. Some of the best empirical research on social capital was conducted in the early 1970s, when the government of Italy decided to create a new layer of regional government between the city and national levels. Putnam recognized that this institutional change in Italy constituted a massive social experiment. He mobilized teams of social scientists who measured many aspects of Italian citizens' attitudes and behavior, comparing them with civic and economic statistics. When he wrote about the results of the multidecade research, Putnam posed a number of questions, including, Why is the north of Italy so much more economically successful than the south? His answer, backed by careful long-term surveys and measures, was that historical social circumstances enabled citizens in the north to build social capital that increased both their prosperity and satisfaction with the new civic institutions in comparison with the southern populations. In addition to economic measures, Putnam's team looked at the roots of today's norms and informal institutions in historical social differences.

The city-state-dominated regions in the north had centuries of informal voluntary civic associations such as choral societies, cooperatives, and guilds that led to horizontal social networks. Historically, the south was dominated for centuries longer than the north by the feudal system of the kingdom of Naples. There are fewer horizontal associations in a feudal system, dominated by vertical obligations upward to lords and downward to those lower in the order (such as vassals or peasants). The result, Putnam and his colleagues conclude, was that "some regions of Italy, we discover, are blessed with vibrant networks and norms of civic engagement, while others are cursed with vertically structured politics, a social life of fragmentation and isolation, and a culture of distrust. These differences in civic life turn out to play a key role in explaining institutional success."<sup>47</sup>

Putnam's team asserts that in civic communities, citizens are bound by horizontal relationships of reciprocity, rather than vertical relationships of authority and dependency. Over time, the strands of these relationships weave a kind of fabric that enable the civic community to more easily work

around what economists call ‘opportunism,’ in which shared interests are difficult to realize because individuals in isolation succumb to incentives to defect from collective action. (Ostrom would recognize this social dilemma as the problem of public goods that are underprovisioned because too many people fear that others will free ride on their contributions.) Participation in civic organizations trains people in cooperation skills and strengthens a sense of shared responsibility, thereby building trust that reduces the fear of free riding. These groups don’t have to be political; choral societies and soccer clubs knit people together socially and culturally, but the bonds of trust and social networks serve as effective vectors for economic as well as political activities.

The northern Italian cities—Genoa, Pisa, Venice, and later Florence—took off in the eleventh and twelfth centuries in part because the contract and extension of credit were new legal strategies for creating partnerships as well as raising capital. Banking and credit, essential elements for the birth of capitalism, were invented in northern Italy.

Putnam’s team doesn’t think this was accidental. As Europe arose from feudalism, the bonds of personal dependence (lord and vassal) grew weaker in the northern regions, but in the south of Italy they became stronger. Northern populations learned to be citizens, and southern populations remained subjects. “In the cities, a horizontal arrangement emerged, characterized by cooperation among equals. The guild, confraternity, university, and the commune—a guild of guilds—reflected the new ideals in new institutions.”<sup>48</sup> Mutual aid societies flourished in preunification Italy (circa 1850)—pragmatic institutions in which cooperation conveyed benefits on contributing individuals in a changing society. Italian cooperatives grew out of the mutual aid societies. “Networks facilitate flows of information about technological developments, about the creditworthiness of would-be entrepreneurs. . . . Innovation depends on continual informal interaction in cafes and bars and on the street.”<sup>49</sup>

Social networks allow trust to spread transitively. People learn that trusting one another pays off, and then institutionalize that learning. Unlike financial capital, trust increases when you use it and becomes depleted if not used. Social capital, unlike conventional capital, is a public good, not the property of any of the individuals who benefit from it, and must often be produced as a by-product of other social activities. Cooperation must also be enforced in a lightweight (and therefore inexpensive) manner by norms, which are less formal, yet frequently as powerful as laws in regulating aspects of social behavior. Because of norms, people in elevators don’t usually look at each other; they are engaging in what sociologist Goffman

calls civil inattention. People pretend not to see each other's naked bodies in public locker rooms. Norms are generally enforced by fear of both breaking taboos and shaming as informal sanctions (punishments for breaking unwritten rules). "Norms are inculcated by modeling and socialization (including civic education) and by sanctions," writes Putnam and his colleagues.<sup>50</sup> Recall that Ostrom identified graduated sanctions as one of the norms required for successful institutions for collective action.

Observing reciprocity is another norm that is important to the formation of social capital. Reciprocating—paying back—can be specific (*quid pro quo*) or generalized (diffuse). Diffuse reciprocity means you don't pay back only to individuals but also to the network or community. Communities in which the norm of diffuse reciprocity is high can more efficiently restrain free riding and more easily resolve collective action problems. Networks of civic engagement increase the potential cost to defectors who risk losing benefits from future transactions. The same networks that foster norms of reciprocity also facilitate the flow of reputational information. Remember Dunbar's theory about speech emerging from social grooming in order to facilitate gossip—the dissemination of reputational information? When someone in your network asks for a favor, and it's easy to grant it, do it even if you don't know the person. The word might get out that you grant favors and therefore are a good person to do a favor for. Passing along information about untrustworthy actors is tricky business; if you are going to do it, you should carefully detect your sources thoroughly. Try trusting strangers in small ways if they are in one of your networks. Do pass along information about trustworthy actors.

None of this is rocket science. Indeed, Wales told me that most people learned on the playground most of what they need to know to be good Wikipedians. Tune your networks; pay attention to who you grant some of your attention. Feed your networks; give freely what you know people can use. (I learned "feed your networks" from Kevin Kelly's *New Rules for a New Economy* in 1996.)<sup>51</sup> Increase trust by avoiding bad actors and spreading the word about good ones. Recall how collective intelligence research suggests that social intelligence (rather than strictly intellectual capability) increases the network's intelligence—and that increasing the number of women can increase a network's social intelligence. Networks that are more diverse, in which individuals are different from each another and connect with different networks, provide richer environments for circulating knowledge as well as social capital. A certain amount of clustering is good. People need to know what shared interests or qualities connect them to one another, and if trust is at least partially transitive, then I can take the word of a person

I trust highly that a third party is trustworthy. Too much clustering, however, creates social and knowledge insularity.

Just as there are different strengths of ties (that is, strong, weak, and latent), social capital ties come in several different flavors. *Bonding* social capital refers to ties between people who share strong mutual contexts and invest relatively heavily in their relationship, such as strong-tie friendships, family, neighbors, and coworkers. *Bridging* social capital is a function of weaker and more distant ties—again, between people who have more in common than not. *Linking* social capital involves ties to people in dissimilar circumstances and communities, or the kind of ties that are necessary for small-world networks. Bonding capital increases feelings of solidarity, trust, and specific reciprocity. Bridging social capital helps cliques to break out of their insular worldviews and bring in external information, and assists in diffusing information across multiple networks. “Bonding social capital consists of a kind of sociological superglue, whereas bridging social capital provides a sociological WD-40.”<sup>52</sup>

A recent study examined the relationship between Facebook use and the formation and maintenance of social capital, surveying college students regarding their relationships and comparing the survey to their Facebook behavior. It found that the increased use of Facebook among this population strongly increased all three types of social capital, with the strongest relationship to bridging social capital. In addition, the Facebook researchers identified a dimension of social capital that online networks magnify in ways that traditional face-to-face ones do not: “one’s ability to stay connected with members of a previously inhabited community, which we call maintained social capital.”<sup>53</sup> Facebook, as most people know, is not an unalloyed social benefit. Privacy and reputation concerns can balance or outweigh social capital benefits, as I’ll discuss shortly. But this study offers empirical evidence that knowing how to use Facebook can increase your ability to cultivate and harvest social capital.

Recall Smith’s advice about “be a bridge,” and the potential power in being able to fill “structural holes.” Ronald S. Burt, a University of Chicago sociologist who is also an executive at Raytheon, a large electronics manufacturer and defense contractor, investigated the importance of structural holes to organizational innovation. Using archival and survey data along with SNA techniques, Burt studied the people who managed the worldwide supply chain for Raytheon, and discovered that those who actively bridged structural holes gained a competitive advantage for themselves, their division, and their company by delivering more good ideas (Burt’s paper on this study is titled “Social Origins of Good Ideas”). He asked several hundred



managers to write down their ideas to improve Raytheon's supply chain management, and then asked other executives to rate the ideas, finding that managers who discussed ideas beyond their work groups consistently made the highest-rated suggestions.<sup>54</sup>

Burt also found four different levels in the organization through which people could create value by being brokers between networks: They could "make people on both sides of a structural hole aware of interests and difficulties in the other group."<sup>55</sup> People who transfer best practices from one network to another perform a second, "higher level of brokerage" (say, "the tribe in the next valley invented the wheel, so we don't have to reinvent it"). A third level of brokerage involves making networks that were apparently irrelevant to each other aware of their potential commonalities. Combining and synthesizing elements from disparate networks is a fourth level of brokerage. Intensification of these kinds of brokerage may be one of the most essential cultural values of cities. Another study of innovation at a broader scale than Burt's, conducted by computational social scientist Samuel Arbesman at Cornell, has provided SNA evidence that larger cities generate more connections between different kinds of people and networks, leading to higher levels of innovation.<sup>56</sup> Add to "it's not what you know, it's who you know" the addendum that success also depends on "how different the people you know are from each other."

Turner has devoted considerable scholarly resources to tracing some of the roots of digital culture back to the *Whole Earth Catalog's* precomputer counterculture. In his book *From Counterculture to Cyberculture: Stewart Brand, the Whole Earth Network, and the Rise of Digital Utopianism*, Turner focuses on Stewart Brand (and me) as examples of an emerging social role of network entrepreneurs. Brand's *Whole Earth Catalog*, Turner claims, was not just a kind of independent living catalog for off-the-grid (or fantasizing about doing so) counterculturalists but instead the intersection of diverse social networks that Brand brought together—the people who would come to be called environmentalists, those interested in tools and technologies including the new personal computers, the independent living people, and the alternative energy and holistic health care people.<sup>57</sup>

I interviewed Turner about network entrepreneurship in the context of this book, asking him what might be useful for readers to know to succeed online. "I ended up coming up with this term, network forum, to try to describe the places, physical or textual, online or off-line, where different networks are brought together by an entrepreneur," Turner told me.

An entrepreneur may recognize different social worlds and might be a kind of peripheral member of different social worlds, but unless they have a place to bring

those people together, those worlds never actually meet. When they meet, they need to not only come together in some place. They need to do something together. So Stewart Brand would have these wonderful festivals to support them like Alloy in 1959, where he brought together technologists, counterculturists, and other kinds of folks to build a camp for a weekend. Burning Man would be another example of this. Everybody gets together. They make art. Half of the fun of the gathering is seeing all the different tribes that are represented there. So a network forum to be successful needs a defined space. That can be a real physical space, or it can be an online space, or a textual space like a catalog or magazine. It needs members from different social intellectual communities and it needs a gathering kind of host person—a person who pulls people together and helps them do what they do better.

Another way to think of the host person, the entrepreneur, is as a “Barnum.” A Barnum is somebody who organizes a circus, even though they themselves may not be able to do any of the special things in the circus. P. T. Barnum couldn’t fly a trapeze, couldn’t ride an elephant, couldn’t ride a horse bareback, and yet he became arguably the biggest, most visible voice for the circus of the century. So what did P. T. Barnum do? Well, he built rings and spotted performers and invited the performers into the rings. Then he turned around and said, “Ladies and gentlemen, we have a circus, and I’m your ringmaster.” He gave everyone a great and entertaining show, but he also gave himself a lot of authority with regard to the action that is going on in the ring. He became the ringmaster. And I think that’s the work of the network entrepreneur. The rings and the tents, so to speak, are the network forum.<sup>58</sup>

I asked Turner if he could think of examples that weren’t countercultural. “Online neighborhood groups are actually especially good for this,” he answered.

I recently bought a new house. I’m living in a new neighborhood. And I’m discovering that there’s an online neighborhood chat. We all come from different worlds. Some of us work in the tech industry. Some of us are retired. Some of us have new kids. Some of us are students. It’s a diverse community. Online we find small things that we care about. For example, sidewalks, flowers, the state of gardens. We talk about those things, but as we do that we also learn a lot about the world that we come from. So I’m learning quite a bit about Google from the neighbors who work there. I’m learning quite a bit about social services for retired members. The chat makes me a better citizen and a better citizen of my neighborhood.<sup>59</sup>

In fact, sociologist Keith N. Hampton and his colleagues Chul-joo Lee and Eun Ja Her have produced extensive data, reported in “How New Media Affords Network Diversity: Direct and Mediated Access to Social Capital through Participation in Local Settings,” so Turner’s example appears to be more than anecdotal.<sup>60</sup> Turner added:

I think the whole idea of the network entrepreneur in the network forum scales down as well as up. Stewart Brand did it on a big level. But you really can do it with

your friends. I think the biggest challenge to effective network entrepreneurship is being open to people who are very different from yourself and inviting them in. I think that's the biggest challenge. You have to not just live in your home world but be open to members of other worlds and open to projects that might bring people from other worlds together with yours.<sup>61</sup>

Thinking about your social relationships in terms of maximizing your social capital can be useful as well as beneficial to you and others, just as striving to be mindful of how you deploy your attention, approaching online information with an investigative crap detector, knowing how to be an online participant and collaborator, and knowing how to persuade others to collaborate can be useful as well as beneficial. But humans are not reducible to strictly economic terms, and several social scientists warn that the use of the term capital can be dangerously misleading given that not all social relationships are strictly utilitarian. Neither is the phenomenon called social capital limited to the prosperous; the ability to get things done with friends, neighbors, and networks is vital to those at the bottom of the economic ladder.

Social capital is a useful tool, but should not be the only one in your tool set. If all you use is a magnifying glass, all you see are expanded versions of small things. If all you use is a telescope, all you see are unrealistically close-up versions of faraway phenomena. Empathy, friendship, and community always have heart and soul if they are to be authentic. Too much calculation hardens hearts and deadens souls. Video Skype with your daughter when she's faraway, but put down the smart phone and look her in the eye when she's in the same room. Join the neighborhood chat *and* talk over the garden fence. Think of the tips I've gleaned about maximizing social capital as lenses for seeing your social networks more mindfully and productively. At the same time, always keep in mind that you are never seeing the whole or living through just online communication channels, and you can never truly characterize families and communities only by their network benefits.

A good example of a network that can (and should) be cultivated and authentic, instrumental and sociable, is the PLN—something all digital citizens need to learn to grow and maintain.

### Tuning and Feeding **Personal Learning Networks**

If individualized learning is chained to a social vision prompted by “prisoner dilemma” rationality, in which one cooperates only if it maximizes narrow self-interest, networked learning is committed to a vision of the social—stressing cooperation, interactivity, mutuality, and social engagement for their own sakes and for