

# Culture

Leading Scientists Explore Societies,  
Art, Power, and Technology

**Edited by John Brockman**

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FIRST EDITION

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Library of Congress Cataloging-in-Publication Data

Culture : leading scientists explore civilizations, art, networks, reputation, and the on-line revolution / edited by John Brockman.

p. cm.

Summary: "A short, cutting-edge master class covering everything you need to know about culture. Edited by John Brockman, with contributions by the world's leading thinkers"—Provided by publisher.

Includes bibliographical references and index.

ISBN 978-0-06-202313-1 (pbk.)

1. Civilization, Modern—21st century. 2. Culture. 3. Popular culture. 4. Art and society. 5. Social networks. 6. Reputation. 7. Technological innovations—Social aspects. 8. Internet—Social aspects. I. Brockman, John, 1941-.

CB430.C88 2011

909.83—dc22

2010052195

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11 12 13 14 15 OV/RRD 10 9 8 7 6 5 4 3 2 1

## II.

# Social Networks Are Like the Eye

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Connected: The Surprising Power of Social Networks  
and How They Shape Our Lives

There is a well-known example in evolutionary biology about whether the eye was designed, or is “just so” because it evolved and arose for a reason. How could this incredibly complicated thing come into being? It seems to serve an incredibly complicated purpose, and the eye is often used in debates about evolution precisely because it is so complex and seems to serve such a specialized and critical function.

For me, social networks are like the eye. They are incredibly complex and beautiful, and looking at them begs the question of why they exist, and why they come to pass. Do we need a kind of Just-so Story to explain them? Do they just happen to be there, for no particular reason? Or do they serve some purpose—some ontological and also pragmatic purpose?

Along with my collaborator James Fowler, I have been wrestling with the questions of where social networks come from, what purpose they serve, what rules they follow, and what they mean for our lives. The amazing thing about *social* networks, unlike other networks that are almost as interesting—networks of neurons or genes or stars or computers or all kinds of other things one can imagine—is that the nodes of a social network—the entities, the

components—are themselves sentient, acting individuals who can respond to the network and actually form it themselves.

In social networks, there is an interdigitation between the higher-order structure and the lower-order structure, which is remarkable, and which has been animating our research for the past five or ten years. I started by studying very simple dyadic networks. A pair of individuals is the simplest type of network one can imagine. And I became curious about networks and network effects in my capacity as a doctor who takes care of people who are terminally ill.

In addition to my training in social science, I was trained as a hospice doctor. When I was at the University of Chicago (until 2001), I had a very special clinical practice that involved taking care of people in their own homes, and on Sunday afternoons I would take my little black bag to the South Side of Chicago and visit people who were dying. I had a sort of schizophrenic practice. About a third of my patients were very educated people associated with the University of Chicago, and two-thirds were indigent people from the South Side.

I have the very distinct image in my mind of experiences of myself driving to a borderline safe community, parking my car, looking around, walking up the short steps to the door, knocking, and waiting for what often seemed like a very long time for someone to come to the door. And then being led into people's homes, often by the spouse of the person who was dying. There were often other relatives around and my primary focus as a hospice doctor was not just the person who was dying, but also the family members. I became increasingly interested in this.

I began to see in a very real way that the illness of the person dying was affecting the health status of other individuals in the family. And I began to see this as a kind of nonbiological trans-

mission of disease—as if illness or death or health care use in one person could cause illness or death or health care use in other people connected to him. It wasn't an epidemic transmission of a germ; something else was happening. This is a very basic observation about what I now call "interpersonal health effects," but as I began to have more and more clinical experience with such patients, I began to broaden the focus. I became interested not just in dyadic transmission of illness and illness burden, but also hyper-dyadic transmission.

For example, one day I met with a pretty typical scenario: a woman who was dying and her daughter who was caring for her. The mother had been sick for quite a while, and she had dementia. The daughter was exhausted from years of caring for her, and in the course of caring, she became so exhausted that her husband also became sick from his wife's preoccupation with her mother. One day I got a call from the husband's best friend, with the husband's permission, to ask me about him. So here we have the following cascade: parent to daughter, daughter to husband, and husband to friend. That is four people—a cascade of effects through the network. And I became sort of obsessed with the notion that these little dyads of people could agglomerate to form larger structures.

Nowadays, most people have these very distinct visual images of networks, because in the past ten years, they have become almost a part of pop culture. But social networks were studied in this kind of way beginning in the 1950s—actually, there was some work done in the 1930s and even earlier by a sociologist by the name of Georg Simmel—and culminating in the 1970s with seminal work that was done by sociologists at that time (people like Mark Granovetter, Stan Wasserman, Ron Burt, and others). But all these were still very small-scale networks; networks of three people or thirty people—that kind of ballpark. But we are of course connected to each other

through vastly larger, more complex, more beautiful networks of people. Networks of thousands of individuals, in fact. These networks are in a way living, breathing entities that reproduce, and that have a kind of memory. Things flow through them and they have a purpose and can achieve different things from what their constituent individuals can. And they are very difficult to understand.

This is how I began to think about social networks about seven years ago. At the time when I was thinking about this, I moved from the University of Chicago to Harvard and was introduced to my colleague James Fowler, another social scientist, who was also beginning to think about different kinds of network problems from the perspective of political science. He was interested in problems of collective action—how groups of people are organized, how the action of one individual can influence the actions of other individuals. He was also interested in basic problems like altruism. Why would I be altruistic toward somebody else? What purpose does altruism serve? In fact, I think that altruism is a key predicate to the formation of social networks because it serves to stabilize social ties. If I were constantly violent toward other people, or never reciprocated anything good, the network would disintegrate, all the ties would be cut. Some level of altruism is required for networks to emerge.

So we can begin to think about combining a broad variety of ideas. Some stretch back to Plato, and thinking about well-ordered societies, the origins of good and evil, how people form collectives, how a state might be organized. In fact, we can begin to revisit ideas engaged by Rousseau and other philosophers on man in a state of nature. How can we transcend anarchy? Anarchy can be conceived of as a kind of social network phenomenon, and society and social order can also be conceived of as a social network phenomenon.

We can start with the tiny case of a man and a woman—a pair of individuals—one of whom is sick and the other of whom cares (partly out of altruistic reasons) for that person. Stepping back to see them not as individuals, but focusing on the tie that connects them as the object of inquiry, we see that they are embedded in larger sets of such networks, which forces us to engage with a set of fundamental social scientific and philosophical problems—in fact moral problems—that people have been concerned with for millennia.

There is another aspect to the intellectual history of the study of networks that is very interesting. In the fifties and in the seventies, several social scientists began to study social networks and struggled with the problem of nodes (people) and the ties or “edges” that connect them. In fact, “edge” is the formal network term for the connection between two people on a network “graph.”

They began to struggle with how to understand this phenomenon and developed a variety of ideas and statistical methods for studying social networks. They did not have data on a large scale and they were limited by the computational power available to them at that time, but they made a lot of progress. They invented a lot of techniques and pushed the field about as far as it could go then. After that there was a quiescent period; and the initial heyday of social network studies was back in the seventies.

These methods incidentally were built on some efforts by very well-known Hungarian mathematicians who studied a branch of mathematics known as topology, which itself has an interesting and old history stretching back to Euler. Beginning in the 1990s, there was a kind of resurrection of network science, initially caused by a group of physicists and mathematicians who were actually tackling problems in other domains: for instance, people interested in networks of genes, or cellular networks, or networks

of neurons, like my colleague László Barabási. If we have, for example, a simple worm that has two hundred neurons, can we map all of the connections between them and thereby understand how the worm learns, or how it behaves? Can we understand learning and behavior not by studying the neurons, but by studying the *interconnection* between neurons?

A lot of scientists became interested in other kinds of networks and latched on to many of the old sociological ideas. They developed the mathematics and applied them in new ways, tremendously improving the science of networks—people like Barabási and Duncan Watts and Steve Strogatz and Mark Newman. Now all of this methodological apparatus is flowing back to the social sciences, and social scientists are using it to revisit and understand again a topic that has been of great concern to them for some time.

We are thus at a moment where a leap forward in the methodology for the study of social networks has been made, first by building on past work. But second, we are at a moment where—because of modern telecommunications technologies and other innovations—people are leaving digital traces of where they are, whom they are interacting with, and what they are saying or even thinking. All of these types of data can be captured by the deployment of what I call “massive passive” technologies and used to engage social science questions in a way that our predecessors could only dream of. We have vast amounts of data that can be re-applied to investigate fundamental questions about social organization and about morality and other concerns that have perplexed us forever.

We have had advances in methods; we have had advances in data. We have also had advances in ideas. People are beginning to think more creatively about what it means to have these kinds of higher-order structures. Since the late 1990s and on into the

2000s, science more generally has been engaged in what I call the “assembly project” of modern science. Astronomers are beginning to think about how to assemble stars into galaxies, computer scientists are thinking about how to assemble computers into networks. With the rapid development of the Internet in the mid-1990s, everybody began to think about computers and their networks, and about how they interact and so forth. Engineers struggle with these problems.

Neuroscientists are beginning to think, Okay, well, we understand a lot about neurons, but how do they interconnect to form brains? Geneticists are saying, At the end of the day, we will have understood all 25,000 (approximately) human genes, and then what? How do we put Humpty Dumpty back together again? How do we reassemble all of the genes and understand how they interact with each other in space and across time? We have seen the recent birth of a new field of biology called systems biology, which seeks to put the parts back together.

And similarly, in social science, there is an increasing interest in the same kind of phenomenon. We have begun to understand human behavior, and we have models of rational decision-making—rational actor models—that have led to further innovations. But these models all pertain primarily to individuals. Adam Smith talked about markets as a phenomenon that emerges from the action of individuals, but nevertheless we have primarily focused on the actions of individuals. How do we put all these parts back together to understand groups? Again, the study of social networks is part of this assembly project, part of this effort to understand how you can then have the emergence of order and the emergence of new phenomena that do not inhere in the individuals. We have, for example, consciousness, which cannot be understood by studying neurons. Consciousness is an emergent

property of neuronal tissue. And we can imagine similarly certain kinds of emergent properties of social networks that do not inhere in the individuals—properties that arise because of the ties between individuals and because of the complexity of those ties.

Understanding all of this is what drives me and James Fowler to death right now. And as we have been thinking about it, we have come up with some initial simple ideas, and some initial intriguing and very novel empirical observations. The simple ideas are the following: It is critical when you think of networks to think about their dynamics. A lot of times, people fail to understand networks because they focus on the statics. They think about topology; they think about the architecture of the network. They think about how people are connected, which is of course incredibly important and not easy to understand, either. While on the one hand the topology can be understood or seen as fixed or existing, on the other hand this topology is itself mutable and changing and intriguing, and the origin of this topology and its change is itself a difficult thing.

But here is something else: Once you have recognized that there is a topology, the next thing you must understand is that there can be a contagion as well—a kind of process of flow through the network. Things move through it, and this has a different set of scientific underpinnings altogether. Understanding how things flow through the network is a different challenge from understanding how networks form or evolve. It is the difference between the formation and the operation of the network, or the difference between its structure and its function. Or, if you see the network as a kind of superorganism, it is the difference between the anatomy and the physiology of the superorganism, of the network. You need to understand both. And they both interconnect and affect each other, just as in our bodies our anatomy and our physiology are interrelated.

This is what James and I are tackling right now; we have started with several projects that seek to understand the processes of contagion, and we have also begun a body of work looking at the processes of network formation—how structure starts and why it changes. We have made some empirical discoveries about the nature of contagion within networks. And also, in the latter case, with respect to how networks arise, we imagine that the formation of networks obeys certain fundamental biological, genetic, physiological, sociological, and technological rules.

So we have been investigating both what causes networks to form and how networks operate. In terms of their operation, we have tackled some initial problems. For example, a few years ago, we became interested in the claim that there was an obesity epidemic. The word “epidemic” has a couple of meanings. First of all, it means that there is a higher prevalence now than in some previous time. It also includes the basic idea that there is something contagious that is spreading from person to person. There is no doubt that the prevalence of obesity is rising. What was not obvious to us was whether obesity could be seen as an epidemic in the other sense of the word. Was it spreading from person to person?

We wanted to study whether this was the case. Could obesity flow through networks? Could one person’s body type actually influence the body type of others around him, and around them, and around them, in a cascade effect? People often take for granted that things can spread in a network, like fashions in clothes, but they were often surprised when we were able to show that obesity spreads in a network. How did we do that? We needed to come up with a source of data that contained information about people’s position in a network, the architecture of their ties—who they knew and who those people knew and who those people knew and

so forth. We also needed a source of data on people's weight and other information about them. And we needed it for a long period of time with repeated observations on these people. This was a difficult challenge. No data set to our knowledge existed before we made the one I am about to describe.

We hit upon the idea of working with a very well-known epidemiological study called the Framingham Heart Study, which was funded by the federal government and had been ongoing since 1948 in Framingham, Massachusetts, not far from Boston. In a basement there, we found a bunch of records in which the people who were responsible for tracking the thousands of participants kept information about how to reach the participants every two to four years so that they could come back for an examination and to fill in surveys and the like.

When we saw these paper records, it was immediately obvious that they contained valuable information, because they told us where the people lived, who their family members were, who friends of theirs were, where they worked, and so on. And it occurred to us that we could computerize these records, and that by dumb luck a lot of the people who were relatives or friends or neighbors of these individuals would also be participants in the heart study.

Therefore, we could reconstruct the social network ties of a sample of 12,000 people over the course of thirty-two years and have information about them that had been collected repeatedly across time. In so doing, we could set the stage for a set of analyses that looked at how weight gain in one individual spread from that individual and caused weight gain in other individuals, and how that in turn cascaded through the network. What we found when we did this study is that weight gain in your friends makes you gain weight, and weight gain among people beyond what we call

your "social horizon" ripples through the network and affects you.

To us, it is a very, very fundamental observation that things happening in a social space beyond your vision—events that occur or choices that are made by people you don't know—can cascade in a conscious or subconscious way through a network and affect you. This is a very profound and fundamental observation about the operation of social life, which we initially examined while looking at obesity. We found that weight gain in a variety of kinds of people you might know affected your weight gain—weight gain in your friends, in your spouse, in your siblings, and so forth. Moreover, people beyond those to whom you were directly tied also influenced your weight, people up to three degrees removed from you in the network. And, incidentally, we found that weight loss obeys the same properties and spreads similarly through the network.

It is one thing to observe the spread of phenomena through the network; it is another to take the next step and begin to identify a mechanism of spread. In the case of obesity, we formulated a variety of ideas and were able to test some of them. And we have a variety of new experiments in mind to continue to investigate the spread of obesity and other phenomena.

One possible mechanism is very simple: biological contagion. There is a variety of work being done by biologists looking at viruses and bacteria that could spread from person to person and contribute to the obesity epidemic. Our work is completely consistent with that, but this is not what we are interested in.

We are interested not in biological contagion, but in social contagion. One possible mechanism is that I observe you and you begin to display certain behaviors that I then copy. For example, you might start running and then I might start running. Or you might invite me to go running with you. Or you might start eating



certain fatty foods and I might start copying that behavior and eat fatty foods. Or you might take me with you to restaurants where I might eat fatty foods. What spreads from person to person is a behavior, and it is the behavior that we both might exhibit that then contributes to our changes in body size. So, the spread of behaviors from person to person might cause or underlie the spread of obesity.

A completely different mechanism would be for there to exist not a spread of behaviors, but a spread of norms. I look at the people around me and they are gaining weight. This changes my idea, consciously or subconsciously, about what is an acceptable body size. People around me who start gaining weight reset my expectations about what it means to be overweight or thin, and this is what spreads from person to person: a norm. It is a kind of meme (but it is not quite a meme) that goes from person to person.

In our empirical work so far, we have found substantial evidence for the latter mechanism, the spread of norms, more than the spread of behaviors. It is a bit technical, but I will explain it. In our empirical work on obesity, we found two lines of suggestive evidence for a spread of norms. The first line of evidence caught everyone's attention, and frankly it caught our attention when we noted it. It showed that it did not matter how far away your social contacts were; if they gained weight, it caused you to gain weight. This was the case whether your friend lived next door, 10 miles away, 100 miles away, or 1,000 miles away. Geographic distance did not matter to the obesity effect, the interpersonal effect.

Another finding from looking at the spread of smoking behavior was that if you stop smoking, it makes me stop smoking and there is a spread of smoking-cessation behavior, which itself is something we are investigating. Pertinent for the present purpose, however, is that, after taking into account the spread of smoking-

cessation behavior, it did not efface the spread of obesity. In other words, accounting for one particular behavior, smoking cessation (which is known to increase weight at the individual level), did not undo the spread-of-obesity effect. This is an example in which it is not a spread of a behavior that causes the spread of obesity. This finding, coupled with the finding regarding the lack of decay with geographic distance, suggests to us that it is a norm rather than a behavior that is spreading.

Why? Because for a behavior to spread, typically, you and I would have to be together. We would have to go running together, share meals together, or copy each other's behavior in some way. And that should decay with geographic distance, because the farther away you are, the less time we can spend together. But a norm can fly through the ether. I might see you once a year and see that you have gained a tremendous amount of weight, which resets my idea about what an acceptable body size is. And minimal contact might be enough.

If I go see my brother Dimitri for Thanksgiving, no matter how much food we eat, no matter how much we share the behavior of eating, it will not change my weight that one day. But if I see him and he has gained a lot of weight, it can change my idea about what an acceptable body size is and, in that way, the spread of the norm can cause the spread of obesity.

Clothing fashions spread in our society. One way this can happen is you see people who reset your idea of what is fashionable. Another is more pragmatic. I take you shopping and we pick something out together. I say, "Oh, I heard about a new store," whatever. Those are two different ways in which fashions might spread.

We also have found in our work that things beyond obesity and smoking cessation spread in networks. Happiness spreads in networks. If your friend's friend becomes happy, it ripples through

the network and can make you happy. We see clusters of happy and unhappy individuals in the social network like blinking lights in this complex fabric where some people are happy and some people are unhappy and there is a kind of gray zone between them. There is an ongoing kind of equilibrium that is reached in this social space. We have found that depression can spread, and drinking behaviors can spread, and the kinds of foods people choose to eat can spread (a taste for tastes can spread, as one of my graduate students is studying). All of this using the initial Framingham Heart Study social network dataset.

The spread of obesity occurs via a variety of mechanisms, but we find evidence at a minimum for the role of norms. How can it be that there is a role of norms in the spread of obesity when the ideology in our society regarding thinness is the same as it ever was? The supermodels are just as thin as they ever were. Interestingly, there has been some change in the weight status of celebrities (there were always overweight celebrities, but I think there may be more now than there used to be); but supermodels are certainly as thin as they ever have been.

This is the difference between ideology and norms. People see these images of supermodels, but they might be less influenced by them than by the actions and appearance of the people immediately around them. For example, we see that people might behave badly and engage in criminal acts. We still have the ideology that the Bill of Rights and the Constitution hold, and that there is goodness and there is evil. But people still behave badly when they are surrounded by people who behave badly. Again, it is the difference between norms and ideology, and this is how we square the circle in terms of why it is that there can be a spread of obesity, or an obesity epidemic, even though as a society we still seem to revere a kind of body type different from the one we are increasingly seeing.

James Fowler and I never expected to get the level of attention that we have for our work. On the morning of July 26, I knew we were going to be in the *New York Times*, because we had been interviewed by all these reporters prior to the appearance of our paper in the *New England Journal of Medicine*. I'd been in the newspaper before, and the work was in a prominent journal, so I thought I knew what to expect, but when I went out to my driveway that day, the article was unexpectedly on the front page of the *New York Times*. I went inside and said to my wife, "You're not going to believe this." And after that, it just did not stop. But what was interesting to me was that it wasn't just the *Times*—pretty much every newspaper thought this was something interesting. The coverage by the *Washington Post* and the *Chicago Tribune* was especially impressive. We had been working on the project for five years and we thought it was interesting, but we didn't think there would be so much popular interest.

Incidentally, we are not claiming that the fact that obesity might spread through social networks—or that the social network phenomenon might be relevant to the obesity epidemic—is the *only* explanation for the epidemic. No doubt there are many explanations. Those explanations, however, are not genetic. Our genes haven't changed in the past thirty years.

The real explanations for the obesity epidemic are exclusively socio-environmental—things having to do with the increasing consumption of calories in our society: Food is becoming cheaper, the composition of food is changing, there is increasing marketing of foodstuffs and the like. Also, clearly, there has been a change in the rate at which people burn calories due to an increase in sedentary lifestyles, the design of our suburbs, and a whole host of such explanations.

We are not claiming that such explanations are not relevant. No

doubt they are all part of the obesity epidemic. We are just saying that networks have this fascinating property whereby they magnify whatever they are seeded with. And so if you get something like obesity going in a networked population, it can spread.

It should also be possible to trigger a spread in weight loss. We see this on a micro-dynamic scale in high schools, in niches of girls who start trying to compete with each other in terms of weight loss. One of the articles that came out about our work in the *Guardian* had pictures of the Spice Girls and the women in *Sex and the City* and talked about the "skinny flu" spreading from performer to performer. I think it was the first time Posh Spice and James Fowler were featured in the same paragraph.

So, you can get a kind of rush to the bottom, as well. In fact, after our work was published, we were contacted by a bunch of people who were seeking to treat people with eating disorders and who wondered if some of these network properties could be exploited clinically to improve the health of various individuals.

We also mention in our paper in the *New England Journal* the possible relevance of so-called mirror neurons, which is a mechanism that I didn't touch on earlier. One possibility besides biological contagion is that by watching you exhibit certain kinds of behaviors like eating or running, I start to copy those behaviors mentally in a mirror-neuron kind of way. And this facilitates my exhibiting the same behavior.

It is actually quite complicated to know how to exploit these network phenomena in a situation like the one we have been discussing, because if you have a lot of people of one body type and you introduce somebody of a different body type, it is unclear who will influence whom. The thin person might gain weight, or the overweight people might lose weight. Or both. It is a very com-

plicated dynamic, which again requires a kind of deployment of a certain kind of data and methods to begin to understand.

I should also stress something very important, which is that James Fowler's and my primary focus is not obesity, it is networks. Obesity happens to be an incredibly important public health problem and was something very important to study, above all because it showed how obesity was something that could spread in social networks, which people might not have realized. If we had shown, for example, that fashion spreads in social networks, that might be much less interesting to people. But if you can show that something like obesity or happiness or even goodness spreads in social networks, you are on new terrain.

Incidentally, some of these things also touch on very old philosophical and social scientific concerns, as I mentioned earlier, because they raise questions about free will. If my behaviors and my thoughts are determined not just by my own volition, but by the behaviors and thoughts of other people to whom I am connected—and are even determined by the behaviors and thoughts of other people whom I do not know and who are beyond my social horizon but connected to people to whom I am connected—it speaks to the issue of free will. Are my thinking and my behavior truly free, or are they constrained because I am part of a social network? To the extent that I am part of this human superorganism, does that reduce my individuality? And does this give us more or less insight into human behavior?

Because we are talking about networks of human beings rather than networks of neurons or computers, it is the case that I am not just plunked down in a network that is determined by some kind of exogenous physical law. There is no doubt that the topology obeys certain biological and psychological rules and laws, but it is also

true that I can choose who my friends are and say, "You know, I don't like these friends; I am going to pick new friends."

That is, your desires and ideas can influence the structure of your network. For example, if you have ideas that foster certain kinds of ties, those ties in turn foster and support certain kinds of ideas. You can imagine a circumstance in which certain kinds of ideologies can survive and offer certain kinds of advantages because they bind the group together, or tear it apart, in particular kinds of ways. We have been thinking a little bit about this in terms of groups of people who seem to evince what would appear to be self-destructive behaviors, but our thoughts in this regard are still very preliminary.

Let's talk about our work with Facebook. The Framingham Heart Study network was something we had to painfully assemble using archival records about particular kinds of individuals. Even in the five years since we began to work on that project, the leaps in telecommunications and the emergence on the Internet of sites and technologies that are affirmatively organized as social networks—whereby people actually form and display their networks—have provided amazing research opportunities. When it comes to the Internet, we are no longer merely talking about networks of computers or networks of people who are in communication with each other, but we are talking about truly social networks, such as Facebook and Myspace and Friendster and LinkedIn.

The emergence of these technologies is a gold mine for social scientists in general, and certainly for people like James Fowler and myself, who are interested in social networks. We have begun a set of projects that exploit naturally occurring social networks on the Internet, like Facebook, or that seek to exploit the Internet to manipulate social networks in a variety of experimental ways—

for example, in some work I have been doing with Damon Centola and others.

Our Facebook project is only tangentially related to health, but is very much related to other concerns we have regarding the connection and contagion that take place with regard to the formation and operation of networks. We have been working at one particular university, where we have taken repeated cuts through the network. That is, a key feature is that we have longitudinal resolution across time and so can observe the network at several points in time, which prior generations of social scientists could not easily do.

We have trawled through this large social network and grabbed the information about people in the network and their social ties that is available on Facebook—information having to do with their tastes, with the people with whom they appear in photographs, and so on. For example, a person might have an average of 100 or 200 friends on Facebook, but they might only appear in photographs with ten of them. We would argue that appearing in a photograph constitutes a different kind of social tie than a mere nomination of friendship.

By exploiting these kinds of data and a variety of computer science technologies, we have been able to build a network that changes across time and to trace the flow of tastes through the network (for instance, how as I start listening to a particular kind of music, you start listening to a particular kind of music). We have been able to study homophilic properties—the idea that birds of a feather flock together. How and why do people form unions? Do they depend upon particular attributes, tastes, and the like? We have been able to study how these types of things—both the topology of the network and the things that flow through it—change over time.

In one project developed from this research, we considered whether someone wants to keep his or her information private on the Internet. Initially, without trivializing this serious topic, the issue of privacy was a methodological nuisance. But then we realized that, in addition to its conceptual importance, we could treat privacy as a taste. And we saw that the taste for privacy flowed through the network so that if I adopt privacy settings on Facebook, the people to whom I am connected will be more likely to adopt privacy settings.

So here we observe yet another phenomenon. We have talked about the flow of obesity through a network, we have talked about the flow of happiness through a network, we have talked about the flow of smoking cessation through a network, and we have talked about the flow of fashions through a network. Now we are talking about the flow of tastes in privacy through the network. And tastes in all kinds of other things, like music, movies, or books, or a taste in food. Or a flow of altruism through the network. All of these kinds of things can flow through social networks and obey certain rules we are seeking to discover.