

## Everything Is Contagious

Doubts about the social plague stir in the human superorganism.

By Dave Johns

Updated Thursday, April 8, 2010, at 10:19 AM ET

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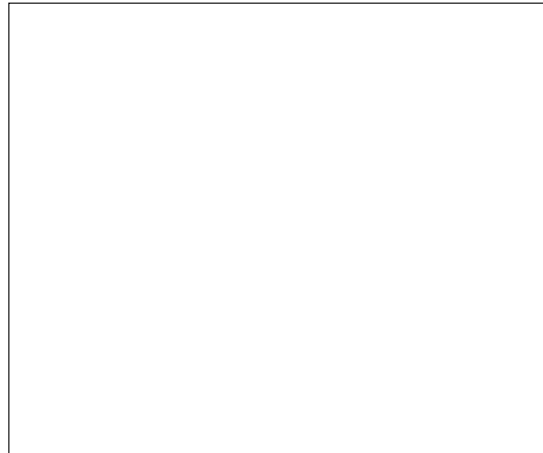
*This is the first of two articles on the recent outbreak of social contagion studies.*

If you've been following the news recently, you may be worried that a plague of social contagion has struck mankind. This week, a study found that drinking habits are socially transmissible. Last month, a paper said that both cooperation and selfishness can spread like a virus. In February, a study found that poor sleep and pot smoking are contagious among teens. All of these revelations come from the works of two scientists, Harvard's Nicholas Christakis and U.C. San Diego's James Fowler. They first brought fame to contagion in 2007 with a widely publicized paper suggesting that obesity is "socially contagious" and that it can spread like a pox from one friend to another, and then another, and then to one more. More contagions (depression and divorce) are in the works. In their 2009 book,

*Connected: The Surprising Power of Our Social Networks and How They Shape Our Lives*, Christakis and Fowler write that connection and contagion are "the anatomy and physiology of the human superorganism," and that "everything we think, feel, do, or say can spread far beyond the people we know."

The studies have provoked excitement in the public health community but also some head-scratching. Many were surprised by the claim that obesity, for example, could be transmitted from one person to another. We thought we knew the major causes of fatness: genes, for one thing, along with eating too many calories and living a sedentary lifestyle. The finding that loneliness can be contagious also caught some readers off-guard—wouldn't lonely souls be hard up for people to infect? In fact, the

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"surprising power" of contagion should come as no surprise at all, as scientists have been diagnosing social illness—and using the contagion metaphor to describe it—since antiquity.

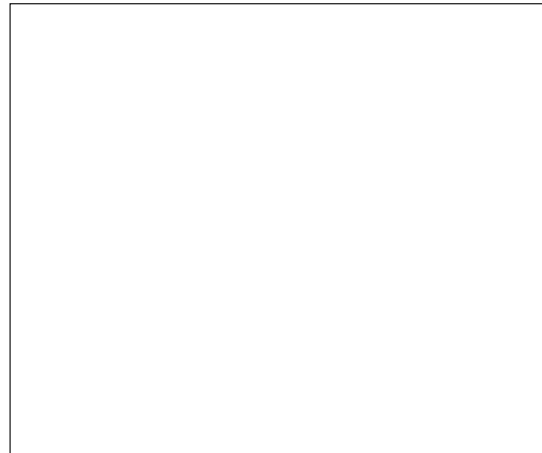
Long before the advent of germ theory, the word *contagion*—which means "to touch together"—was sometimes used to refer to the transmission of behaviors and ideas, especially dangerous ones. The Roman historian Livy told of how in 186 B.C. the debauched orgies known as the Bacchanalia had grown so wild that "the infection of this mischief, like that from the contagion of disease, spread from Etruria to Rome." The senate, concerned that the widening plague of contagious partying might swamp the commonwealth, sought to imprison and execute revelers.

The Middle Ages saw its share of weird, contagious episodes. On several occasions between 1017 and 1518, groups of people began dancing uncontrollably in the streets of Germany, Switzerland, and France—with the mania spreading Medusa-like "by the sight of the sufferers like a demoniacal epidemic," according to 18th-century physician Justus Hecker, who compiled accounts of the dancing contagions in his 1835 book *The Epidemics of the Middle Ages*. Convents were hot spots for nutty outbreaks, too: In 1491, nuns in Cambrai, France, started

yelping like dogs, whereas the sisters in a Spanish nunnery took to bleating like sheep. (Naturally, there were also meowing nuns.) Today, these manias are seen as examples of hysterical contagion, which can spread from person to person like a panic virus. Hysterical contagion still occurs: See "the Bin Laden itch" and the dancing contagion that struck a Washington-state music festival last year.

The main ingredient for contagion, of course, is people. By the late 19th century, scientists could see from the madness of the French revolution, the peasant revolts of 1848, and the rise of chaotic mass politics that large agglomerations of humans were unusually susceptible to social whims. In 1895, the French psychologist Gustave Le Bon concluded that "[i]n a crowd every sentiment and act is contagious," with the gang mentality obliterating the

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personality to such a degree that the individual "is no longer himself, but has become an automaton who has ceased to be guided by his will."

This was a disturbing idea in an increasingly metropolitan France, where people were feeling over-stimulated by a flood of sensational newspapers and crime novels, carrying dangerous, contagious ideas. Coverage of London's 1888 Jack the Ripper murders had spawned a series of copycat killings, leading one sociologist to conclude that "epidemics of crime follow the line of the telegraph." At the time, scientists already believed murder, rioting, madness, suicide, yawning, facial tics, laughter, and crying were all communicable. Worse, the startling new science of hypnosis had revealed that the mind of man was fundamentally infirm, and susceptible to the power of suggestion. With bacteriology gaining ground, some scientists posited a germlike *contagium psychicum*—a microbe of the mind—as the vector behind so-called "mental contagion."

Still, it was believed that with a little sweat, these bugs could be resisted. In turn-of-the-century France, it became trendy for men to attempt to fortify their willpower against contagions via spa treatments and gymnastics. (Women didn't bother, since scientists said their

minds were hopelessly mushy.) It was well known that "better" men caught contagions at lower rates than did the peasant classes. In the United States, the journalist Jacob Riis wrote of a "moral contagion" that infested urban tenements—"the nurseries of pauperism and crime"—and gave rise to "a scum of forty thousand human wrecks" who were blighted with corrupt habits. Early ads for hygienic products such as soap and toothpaste reinforced the association between contagion and the ethnic poor by depicting germs as dark-skinned, hook-nosed monsters.

Yet by the early 20th century, economists began to see that unique contagions could strike the elite, too; the rich man's disease known as conspicuous consumption was seen to spread via "pecuniary emulation." (Today this contagion is sometimes called Affluenza.)

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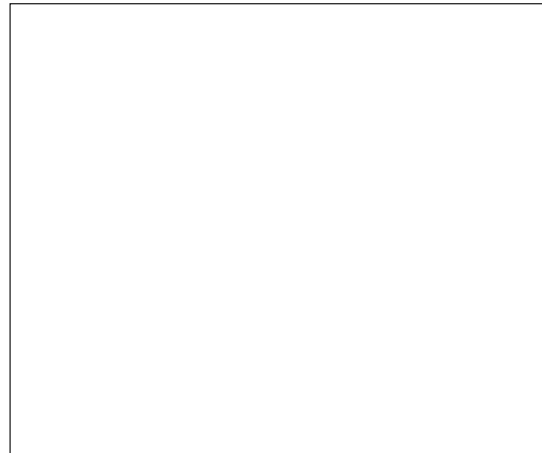
Not until midcentury did economists, sociologists, and psychologists begin to study contagion with rigor. One strand of research has examined the spread of relatively simple behaviors: things like coughing, applause, and face-rubbing. Another strand has looked at more complex contagions—speeding, baby-making, and suicide. A newer area of interest is emotional contagion, which has gotten a boost from the discovery of so-called "mirror neurons"—contagion receptors in the brain that supposedly facilitate the transmission of contagious anxiety, satisfaction and fear. Yet all the while, scientists have often struggled to agree on which processes make up contagion—imitation? learning? hysteria?—and which do not.

A little scientific fuzziness has not stopped the spread of contagion. Throughout recent history, the metaphor has proved irresistible to scientists, journalists, and public officials. In the 1930s, a Nazi disease infected Germany. Another malady threatened students in the wake of *Brown v. Board*, as scientists wondered about the viral effects of desegregation: Would black kids contaminate whites with antisocial contagion? In the 1970s, heroin users were called contagious. In the 1980s, the United States drug czar dubbed crack users contagious "agents of infection." Conspiracy theorists were said to be

infectious, too; after the King croaked, "Elvis contagion" afflicted those who denied he was dead. A few years later the "Asian contagion" infected the marketplace. In New York City, first Amadou Diallo and later Sean Bell died in what police called outbreaks of "contagious shooting." After 9/11, scientists have said terrorist ideology (PDF) spreads like a virus. Today, the worry is Greek contagion.

In 2001, U.S. Surgeon General David Satcher issued a call to arms to confront America's growing "obesity epidemic." This image captured the attention of Christakis and Fowler, who began to wonder whether obesity might be *literally* contagious. Together the duo mined social network data from a long-running study of heart disease in a Massachusetts town that had tracked participants' physical and mental health for decades. In their data, they saw clusters of fat

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friends break out over time, and their statistical analyses suggested the cause was contagion. Evidence for other transmissible traits and behaviors emerge from the same dataset.

These new contagions appear sneakier and more potent than the mental microbes of old. Although Christakis and Fowler say they don't know for certain how contagions spread, they hypothesize that at least some of them propagate subconsciously. For example, when we see a fat person, obesity contagion can slip into our brains and reset our sense of what a normal person looks like: It gives us "permission," in effect, to grow fat. Loneliness contagion is even stealthier: When we see a frowning face, or observe a lonely person, the mirror neurons in our brains well up with misery, and we shrink into loneliness ourselves.

Perhaps the only thing more irresistible than these social germs is the contagion meme itself—in September, Christakis and Fowler's work was featured on the cover of the *New York Times Magazine*, and their book *Connected* made Oprah's fall reading list. The scientists seem to have hit on a simple recipe—socially contagious transmission, three degrees of separation—that has proved remarkably catching.

Contagionism is spreading more widely than ever before. But should we embrace the new socially infectious world that Christakis and Fowler are promoting? How much do we really know about the power of social contagion, anyway?

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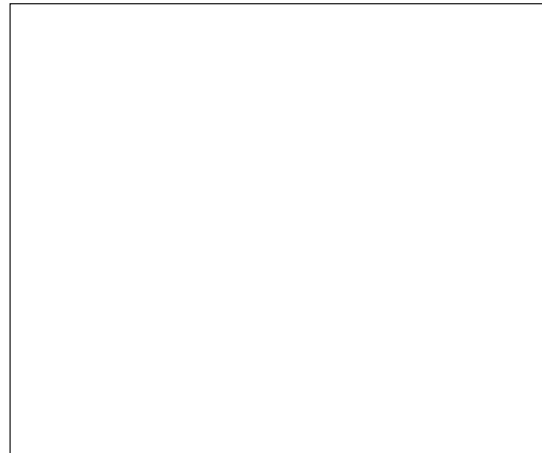
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*This is the second of two articles on the recent outbreak of social contagion studies.*

The newspapers are saying a social plague has struck mankind. Scientists contend that everything from obesity to happiness to loneliness can be "socially contagious"—meaning that if your friend

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gets fat, gets happy or grows lonely, you are at increased risk of doing the same. The leading advocates for the new social contagionism are sociologist Nicholas Christakis and political scientist James Fowler. Their work—now summarized in a popular book called *Connected*—suggests that our behaviors, emotions, and even our body types can be passed from friend to friend to friend like a flu virus. As Fowler told Stephen Colbert in a January interview, the research suggests that people don't really make individual decisions at all but, instead, function as part of a "human superorganism"—like a herd of buffalo or a flock of birds.

It's a strong claim—and an assault on a lot of traditional social science. Christakis and Fowler propose a new conceptual creature to embody their contagious vision: *Homo dictyous*, or "network man." (In Greek, *dicty* means "net.") Network man has contagion in his veins; he wants the same things as others to whom he is connected. He is meant as an alternative to *Homo economicus*, the tongue-in-cheek "economic man" who unfailingly pursues his own self-interest, contagions be damned. *Homo economicus* has been ailing in recent years—laid low by studies showing that nice-guy behaviors like altruism seem to be legitimate human traits. Indeed, *Homo dictyous*—and his social contagionist masters—seem poised to overthrow old

*Homo economicus* and his individualist paradigm once and for all. The question is: Do they have the data to do it?

There's a famous social-science conundrum called "the Reflection Problem" that goes something like this: If you see a group of teens smoking weed in a parking lot, how did they end up together? Did one of them start using pot first, and then influence the others to try it? Or did the group start hanging out because they all liked to get high? Ask a sociologist, and he'll likely tell you the cause is peer pressure, aka social contagion. Ask an economist, and she'll probably say they're simply "birds of a feather." Without extensive interviews, it's really hard to tell who's right. But figuring out the truth is important: If it's contagion, then getting a few trend-setting teens to quit drugs could cause others to follow suit. But if it's a birds-of-a-feather thing—sometimes called

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"homophily"—then there is no social multiplier; you need to cure the entire flock.



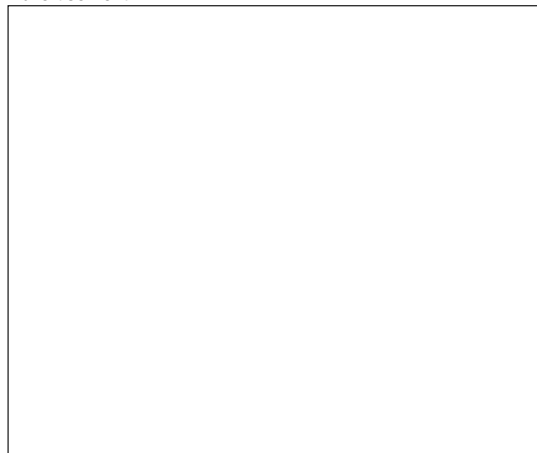
This observational puzzle lies at the heart of the contagious epidemic. When Christakis and Fowler got interested in networks and health, they devised a way to draw on records from the famous Framingham Heart Study, a decades-long analysis of heart disease in a Massachusetts town. Physicals were done every four years, on average, and at these exams participants gave information about their families and named one of their friends. From these data, the scientists were able to construct a social network for the town. When they filled out the network with information on subjects' weight, happiness, and smoking status, they saw clusters of smokers, clusters of happy people, and clusters of fat people break out over time. But were these clusters "birds of a feather" or pockets of contagion? It was a gnarly math problem, but Christakis and Fowler's analyses seemed to rule out homophily or an environmental effect. In the end, they concluded that the cause was contagion, with the influence extending out three degrees, on average. With obesity, they even found that friends could contagiously influence one another when they lived hundreds of miles apart.

It was a lot of contagion. While many studies have documented the impact of peer influence, the magnitude of Christakis and Fowler's three-degrees-of-infection claim, as well as their emphasis on contagious transmission, was unusual.



Indeed, studies that have tried to parse the relative contributions of contagion and homophily have sometimes found the latter has a more potent effect. For example, papers on teen behavior from the 1970s concluded that the importance of "birds of a feather" may be equal to or greater than that of peer pressure. More recently, Cornell scientists studying the online encyclopedia Wikipedia found that site editors who communicated were highly similar to one another even before they first met (PDF), indicating a key causal role for homophily. A December paper on the adoption of the Yahoo Go

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mobile-phone application across the company's instant-messaging network of 27.4 million users concluded that the flocking together of similar people may explain more than 50 percent of the clustering that is often attributed to contagion in network studies.

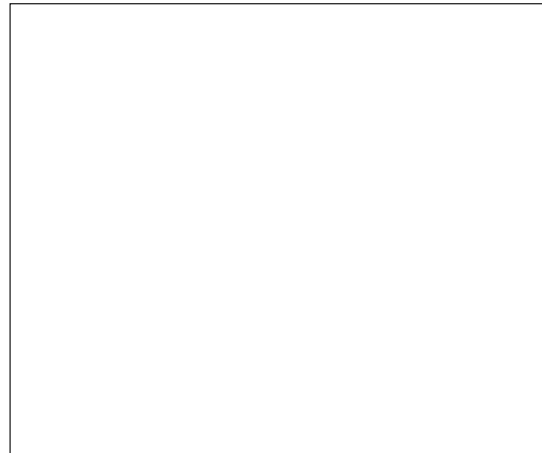
Christakis and Fowler do attempt to account for the influence of homophily and environmental influence in all of their papers, but the size of their contagion effect—and some of its unusual features—has led some experts to wonder whether their methods may be overstating the case. Indiana University mathematician Russell Lyons, for example, says the claim that obesity can jump from friend to friend over hundreds of miles should be taken as evidence *against* contagion. It's not obvious how fatness might be transmitted from afar, he says, whereas homophily should apply as normal. Friends who share many traits might see their weights rise and fall in concert regardless of geographical distance.

Lyons is hardly the first to question the social epidemic. In 2008, economists Jason Fletcher and Ethan Cohen-Cole published a study showing that implausible traits like acne, headaches, and height could appear contagious if you used statistical techniques similar to those used by Christakis and Fowler.

When Fletcher and Cohen-Cole applied stricter methods to control for environmental influences, the contagion effect disappeared.

Christakis and Fowler responded by suggesting that acne, headaches, and even height might indeed be contagious, because the adolescent data used by Fletcher and Cohen-Cole were self-reported. A teen with acne might influence his friends to worry more about zits, so they would start reporting more acne problems; the same would apply to headaches. Even height could be contagious, they said, in the sense that short teens with tall friends might exaggerate their stature. Thus, Fletcher and Cohen-Cole's peer-reviewed *cordon sanitaire* was breached by the logic of the social contagionists. In e-mailed comments and a phone interview, Christakis took issue with Fletcher and Cohen-Cole's analytical methods, pointed

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out that other researchers have found evidence that is suggestive of contagious obesity and noted that the acne and headache effects were not statistically significant at conventional levels. (The evidence for contagious height, however, *was* statistically meaningful.)



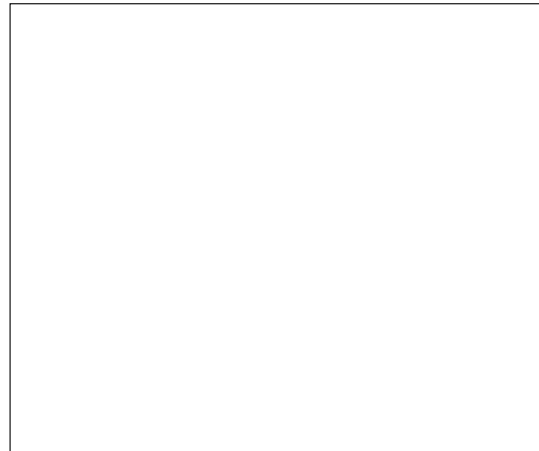
Yet the social contagionists appear to have statistical problems of their own. Russell Lyons says he has identified numerous logical flaws in each of the Framingham studies on contagious obesity, smoking, happiness, and loneliness—flaws that appear to undermine seriously the authors' arguments for contagious transmission. He has compiled his criticisms in a new paper, now under review, entitled, "The Spread of Evidence-Poor Medicine via Flawed Social-Network Analysis."

One of Lyons' key criticisms relates to a central feature in Christakis and Fowler's contagion claim—that in the Framingham networks, "one-sided" friendships and mutual friends produce different effects. Consider two hypothetical friends who participated in the obesity study, Harry and Nancy. Let's say that Harry considers Nancy a friend, but not vice-versa. In that case, the contagion only goes one way: If Nancy gets fat, then Harry's risk for obesity goes up. If Harry got fat, on the other hand, there would be no effect on Nancy's risk

for obesity—since she doesn't consider Harry a "friend." Christakis and Fowler propose that obesity contagion follows the arrow of esteem; in essence, people can only infect you with fatness if you admire them. They tout this as proof that the environment isn't causing their clusters of obesity. If, say, a McDonald's opened up near Harry and Nancy, it should make both of them gain weight simultaneously; the direction of esteem would not matter.

But Lyons says the authors have misinterpreted their data. In fact, their numbers show that these two scenarios are statistically indistinguishable. The margins of error are so big that when analyzed properly, there is no evidence for the "esteem" effect at all—meaning that it's impossible to diagnose contagion. This problem plagues each of the papers on obesity, smoking, happiness and loneliness.

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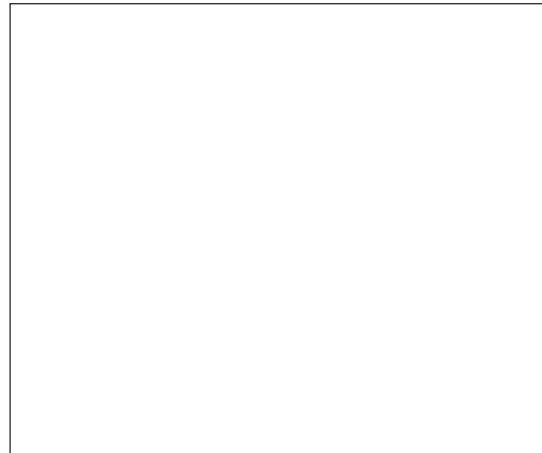
Lyons also points to a deeper logical flaw in the "esteem" argument: Even if the effect were visible in the data, it could be caused by any of contagion, homophily, or an environmental effect. For example, suppose Harry chooses Nancy as a friend entirely because they are "birds of a feather." If Nancy gets fat, we would expect Harry's obesity risk to increase, too, because they share so many traits. If, on the other hand, Nancy names Harry as a friend, but Harry names someone else, we would expect Nancy's weight gain to have less of an effect on Harry. (Harry's choice of someone else indicates there is someone more similar to him than Nancy, because no one knows Harry better than Harry!) An identical argument can be made if Harry and Nancy's friendship is based entirely on environmental similarity. We would still see the same directional differences that the social contagionists interpret to be an "esteem" effect.

After discussing these issues with Lyons, Yahoo social-network researcher Duncan Watts, who wrote a blurb for *Connected*, says he thinks there are serious problems with the studies. "I think it's pretty clear that they did not do things properly," he said in a phone interview. When I reached Christakis for comment, he told me that he thought technical questions like these are best resolved in peer-

reviewed journals rather than in the pages of *Slate*.

These critiques don't mean that peer pressure is a myth. (Remember high school?) The skeptics would never claim that contagion doesn't exist; they simply believe the contagionists have exaggerated its power using faulty methods and thin data. Christakis and Fowler have also begun to insinuate that "contagious" individuals ought to clean up their act based on their findings. In his appearance on *The Colbert Report*, Fowler said that he had "actually made a positive change" in his own life by losing five pounds and keeping it off after realizing that his behavior might affect people as distant as his "son's best friend's mother." Here, Fowler implies that before he lost weight, his love handles were doing harm to others, like a puff of secondhand smoke in the faces of his friends and family.

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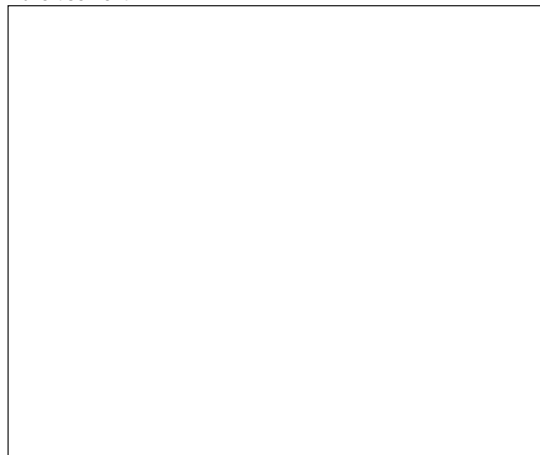
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It's not clear that the social contagionists have enough evidence to be telling people that they owe it to their social network to lose weight. It's also not clear that it was ever a great idea to call fat people contagious in the first place, because stigma carries its own negative health consequences. Social network analysis undoubtedly will play a key role in deciphering how social relationships affect health. But as the field develops, there is a danger that health professionals may fall too hard for this attractive new web of causation, while giving short shrift to key environmental factors that undeniably shape health. As for *Homo dictyous*—although he may be less of a selfish jerk than *Homo economicus*, he seems to have caught a bad case of the contagions. Perhaps it's best to flock away for now.

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