

Who controls Social Networks?

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Spam for science. Researchers used a Facebook app to track and measure people's influence on each other.

In the world of Facebook, users are either kings or lemmings. That's the conclusion of a new study, the largest to analyze how information spreads across social networks—and who does the spreading.

The debate about how ideas, opinions, and behaviors radiate within groups of people goes back decades. According to the so-called influentials hypothesis, made popular by books such as *The Tipping Point* by Malcolm Gladwell, a small number of highly influential people drive most of the spread. For example, if the popular kids in a high school get iPhones and all the other kids soon follow, the hypothesis says that it was because of the sway of the cool kids. But critics counter that influential individuals play only a minor role, and what matters is whether people are susceptible to the new idea.

The debate has remained unsettled because studying peer influence is notoriously difficult. Studies of the real world are messy and rarely allow for controlled experiments, whereas social experiments in laboratories are expensive and involve contrived situations. So, researchers are turning to online social networks such as Facebook. Such approaches make it easy to track the behavior of huge numbers of people, while third-party software applications, or apps, allow researchers to run virtual experiments on Facebook users, often for free.

To test peer influence, Sinan Aral and Dylan Walker, economists at New York University's Stern School of Business in New York City, used a Facebook app that allows users to rate and recommend movies. (Aral and Walker are keeping the identity of the app confidential at the request of the company, but they say that it is similar to Flixster.) As users interact with the app—for example, you give the 2011 movie *The Tree of Life* four out of five stars—it sends messages to a random selection of your Facebook friends notifying them of the rating and providing a link to the app. The more friends that adopt the app after receiving a notification from you, the greater your influence. The shorter the time period between receiving a notification and adopting the app yourself, the higher your susceptibility.

Over 44 days, the apps of nearly 8000 users sent over 40,000 notifications to 1.3 million friends, and about 1000 of those friends adopted the app. Aral and Walker then built a model of the app's "contagion" through this massive social network. If the influentials hypothesis is true, most of the spread should be catalyzed by a small number of key people.

Reality seems to fall somewhere between influence and susceptibility. Both are important, but contagion depended on the personal traits of the people, the team reports online today in *Science*. For example, people older than 30 were more influential than those who are younger than 30, and people of the same age had the most influence on each other. Women tended to influence men more than they influenced each other. But most surprisingly, influence and susceptibility almost never occurred in the same person. At least in the Facebook network, there are only trendsetters and followers.

The study is on "a phenomenally large scale," says Brian Uzzi, a social scientist at Northwestern University in Evanston, Illinois. The division between influence and susceptibility could have a large influence on online marketing, he says, allowing companies to predict not only whether you will be interested in a particular product, but also whether you're the kind of person who can help it go viral. However, says Uzzi, "to know if virtual world social influence substitutes, complements, or is independent of the real world, we need another experiment that looks at the diffusion of the same product on Facebook and [in] the real world."

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