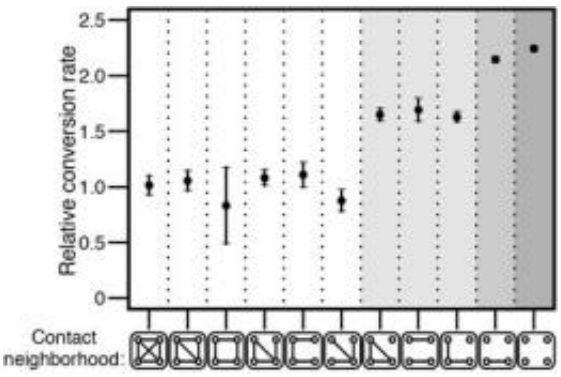
Researchers use Facebook to dispel notion that social contagion is like biological contagion

April 3 2012, by Bob Yirka

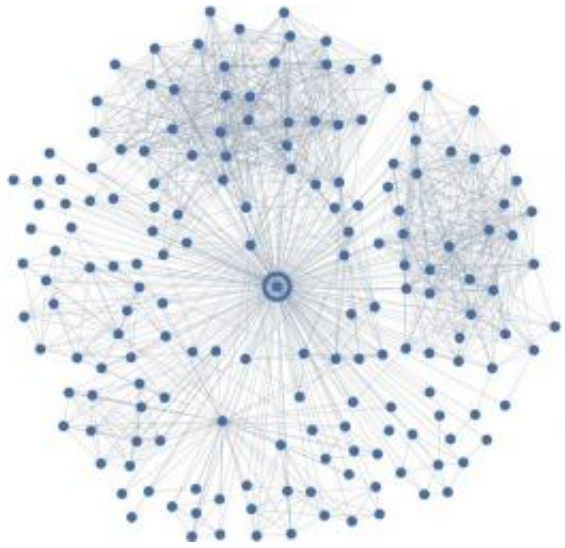


A comparison of how people who received invitations to join Facebook from four groups of friends responded. Connections between the groups are shown in the squares at the bottom of each column. The less connected those four groups were,the more likely they were to join. These are averages over millions of invitations. Credit: Provided/Kleinberg et al

(PhysOrg.com) -- Historically, diseases tend to spread most quickly when introduced into a crowded environment. The more neighbors there are, the more easily viruses can hop from person to person. More recently, the same sort of language has been used to describe how social ideas and adoption spreads. Facebook for example, has been described as spreading like a disease. Now however, researchers from Cornell University have shown that users adopting Facebook, tend to do so more predictably when receiving invitations from multiple sources, rather than

a lot of requests from members of the same group, which implies that Facebook and its growth, does not actually compare with biological contagion at all. They have published their results in the Proceedings of the National Academy of Sciences.

The team says that a users, rather than responding to requests to join Facebook from a bunch of friends from their normal social clique, tend to be more likely to accept requests to join if they come from a more divergent group, or in other words, people from different groups, even if they don't know a lot of the people in those other groups.



A Facebook "Neighborhood." This member has two large, closely interconnected clumps of friends, and a few smaller clumps. Each clump probably represents a different social context -- people from work, people from a hobby, and so on. Cornell research shows that many requests from one context are less effective in influencing decisions than requests coming from many directions. Credit: Provided/Kleinberg et al

The research team started out as just Johan Kleinberg and Jon Ugander,

researchers at Cornell, but soon grew to four as Lars Backstrom and Cameron Marlow, sociologists working for Facebook signed on. Together the team was able to study actual Facebook data. Specifically, they looked at what happens when a user first joins Facebook; their email contact list is examined and Facebook then offers to send an invitation to everyone on that list who is not already a Facebook member. Facebook also offers to send an invitation to "friend" other Facebook users who have the new user already listed in their contact list. In watching and analyzing the circumstances under which users respond to such requests the researchers found patterns emerging. The most striking of which was the fact that users are more likely to accept such requests if they come from people who reside in social different groups, than if they all came from the same one. An example would be, if a person receives invitations to join Facebook from people they work with, some friends, as well as some from people in their Book of the Month club, they are more likely to join than if they simply receive a bunch of invitations from their regular group of friends. They also found that upon accepting the invites, those that do so as a result of getting invites from a more diverse group tend to spend more time on Facebook, indicating perhaps, that a more diverse group of "friends" is ultimately more interesting.

Besides providing practical information for marketers, the results of the teams research help dispel the notion that social acceptance of new ideas or people spreads in much the same way as diseases do through human populations.

More information: Structural diversity in social contagion, *PNAS*, Published online before print April 2, 2012, doi: 10.1073/pnas.1116502109

Abstract
The concept of contagion has steadily expanded from its original

grounding in epidemic disease to describe a vast array of processes that spread across networks, notably social phenomena such as fads, political opinions, the adoption of new technologies, and financial decisions. Traditional models of social contagion have been based on physical analogies with biological contagion, in which the probability that an individual is affected by the contagion grows monotonically with the size of his or her “contact neighborhood”—the number of affected individuals with whom he or she is in contact. Whereas this contact neighborhood hypothesis has formed the underpinning of essentially all current models, it has been challenging to evaluate it due to the difficulty in obtaining detailed data on individual network neighborhoods during the course of a large-scale contagion process. Here we study this question by analyzing the growth of Facebook, a rare example of a social process with genuinely global adoption. We find that the probability of contagion is tightly controlled by the number of connected components in an individual's contact neighborhood, rather than by the actual size of the neighborhood. Surprisingly, once this “structural diversity” is controlled for, the size of the contact neighborhood is in fact generally a negative predictor of contagion. More broadly, our analysis shows how data at the size and resolution of the Facebook network make possible the identification of subtle structural signals that go undetected at smaller scales yet hold pivotal predictive roles for the outcomes of social processes.

Press release