Measuring Trust in Social Networks

A common assumption about social networks is that linked people trust one another's recommendations and opinions. University of Minnesota researchers test such assumptions in large-scale experiments conducted in live social networks in order to shed light on fundamental—and complex—human dynamics like *trust*.

THE STUDY

In the physical world, more shared social connections is a good predictor of trust between individuals. Because of this, it's often assumed to be the same in online networks. In this paper, Ravi Bapna and Alok Gupta, together with their co-authors, examine Facebook activity to test the strength of online social bonds.

Using actual Facebook friends as test subjects, the researchers custom-designed a Facebook app for a well-known investment game that uses real money to measure trust between participants. Combing game data with user characteristics and behaviors culled from the Facebook API, the researchers developed a predictive model for trust based on empirical evidence. The results showed:

» Number of common friends did not predict trust, whereas other kinds of Facebook activity did—especially wall posts and number of photos together.

» Results differed for some groups of people. For users who are more selective about connecting on a social network, and thus have fewer friends on average, there's a stronger relationship between Facebook activity and trust. For users who are less selective, and thus have a greater number of friends overall, only the photographs predicted trust.

METHODS

Randomized experiment using a previously tested game technique to ensure validity

Switching regression model used to examine difference in behavior between groups of people with different characteristics

TOOLS

php   STATA

MySQL   Facebook API

(cc) kimncris on flickr

IMPACT

Trust is a crucial element of many new business models in the sharing economy. Online services like Airbnb, GetAround car rental, and TaskRabbit connect individual buyers and sellers to unlock economic potential. For such models to work, the parties need to trust one another.

Broader applications include better digital marketing strategies for any brand trying to tap into the word of mouth potential of social networks. Traditional thinking about spreading marketing messages and promotions through people with high friend counts do not appear to be as effective as believed. Unbiased evidence like that found in this study can help marketers build more sophisticated approaches.

Bapna, R., Gupta, A., Sundararajan, A., Rice, S., 2012, "Trust, Reciprocity and the Strength of Friendship Ties: Experiments on an Online Social Network," National Bureau of Economic Research Summer Institute on the Economics of IT and Digitization, 2011, Cambridge, MA

Social Influence Online: Do Friends Make Friends Pay?

Do friends influence one another to buy products, embrace beliefs, and adopt behaviors? Whether it's among family members, peer groups, or social circles, *influence* is both naturally occurring and something people try to harness and use. It can be incredibly powerful and equally elusive.

(cc) Ian Crowther on flickr
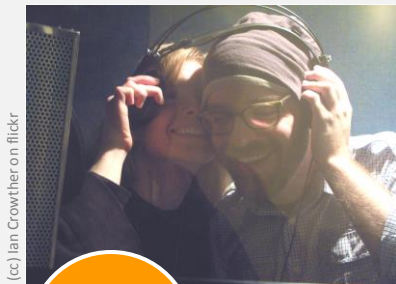
50% more likely to buy

Average users were 50% more likely to buy a subscription when an online friend was a paid subscriber, showing peer influence in the social network.

last·fm
the social music revolution

THE STUDY

If two friends buy the same product a week apart, did one friend influence the other's decision to buy? Or do they simply have similar taste? Or did they both see a promotion for the product?

Teasing out cause-and-effect evidence of social influence online is challenging when so many alternative explanations are possible. To tackle this question, University of Minnesota researchers Ravi Bapna and Akhmed Umyarov conducted a randomized experiment with Last.fm, a music-listening social network.

The experiment used a multi-threaded data crawler to track four million users over two years, resulting in a dynamic dataset with more than a billion rows. Testing included a control and treatment group to determine whether or not peer influence was present in the network.

The study showed that when a person becomes a paid subscriber of the Last.fm service, the odds her friends will buy a subscription increase by 50% due to peer influence.

METHODS

Large scale randomized trial with no self-selection of subjects for more valid, generalizable findings

TOOLS

Analysis using SAS and R for visualization and logistic regression

IMPACT

This research can help "freemium" businesses convert more users into paid subscribers. The same techniques and findings can help any kind of business develop more effective digital marketing strategies. Beyond product marketing, greater understanding of influence online may change political campaigns, public health education, and societal movements.

Bapna, R., Umyarov, A., 2012, "Are Paid Subscriptions on Music Social Networks Contagious? A Randomized Field Experiment," National Bureau of Economic Research Summer Institute on the Economics of IT and Digitization, 2012, Cambridge, MA

Collaboration Among Virtual Teams

Geographically dispersed employees and virtual teams have become a fact of the modern workplace. For some organizations, virtual teams are a strategic imperative; for others, an everyday necessity. Working this way offers several advantages, distinct costs, and unique dynamics. Coordinating work among virtual teams is one of the many ways social computing technologies are changing the nature of work and employment.

THE STUDY

Examining pros and cons of virtual teamwork, University of Minnesota researcher Ching Ren co-authored a study of a large, global professional services firm. Among other results, the data showed that dispersed teams allowed for a better match of expertise to problem, and that such projects had higher net earnings. Forming teams with geographically dispersed members allowed the firm to access the unique—and valuable—knowledge and skills of its employees.

At the same time, coordinating a dispersed team presents challenges that co-located teams don't have. Virtual teams may struggle to create social bonds among members, build common understanding, keep each other informed, and adjust quickly when necessary. Despite such difficulties, the firm saw positive returns from dispersed team projects—up to a point. Depending on project size, the costs started to outweigh the benefits when 30-50% of team members were dispersed.

EXPERTISE
Dispersed teams allowed for a better match of expertise to problem, a valuable competitive advantage.

EARNINGS
Projects with dispersed teams had higher net earnings and positive returns, despite coordination costs.

COSTS
Depending on project size, coordination costs started to outweigh benefits when 30-50% of team members were dispersed.

(cc) Ya Ko on flickr

IMPACT

This research is part of a body of work Ren and others are creating, adding to the University's decades-long history of work in social computing. Group interactions, workplace structures, and forms of employment have evolved alongside social technologies. Understanding the changes can inform policy and help business take advantage of phenomena like open innovation and crowdsourcing.

Boh, W. F., Y. Ren, S. Kiesler, R. Bussjaeger. 2007. *Expertise and collaboration in the geographically dispersed organization*. *Organization Science*, 18(4), 595-612.

Member Attachment in Online Communities

Companies have spent millions to launch online communities only to see them fail due to lack of participation. Researchers at the University of Minnesota have examined various dynamics of online communities in order to develop a more robust understanding of why and how people participate in, or abandon, online communities.

(cc) danielfoster437 on flickr

THE STUDY

Social technologies have made it easy for people to connect via major social networks, as well as in niche communities for just about any topic imaginable. All kinds of communities exist online to help people work together, mobilize political activism, engage socially, support one another, conduct commerce, and exchange information. Some online communities prosper; others wither. Why? Technology and topic play a role, but success or failure of an online community is arguably determined by human participation.

There are many aspects to participation, including member attachment. Whether or not a person feels attached to a community can significantly affect how often, to what degree, and for how long that person participates in the community's activities.

Researchers from the University of Minnesota and Carnegie Mellon University tested member attachment in a study of participation in online communities. To do this, they designed community features based on two types of attachment from social science theory: attachment based on *group identity* and attachment based on *interpersonal bonds* between members.

Results showed that both feature sets increased member attachment and participation; however, the features based on group identity had a stronger effect. That is, features designed to strengthen members' feelings of connection to the group's purpose or characteristics had more impact on member attachment than features built to foster interpersonal connection between individual members.

IMPACT

Many organizations want to engage a community online, including companies that see it as an opportunity to connect with customers and promote brands. This study and others demonstrate how theory-inspired features can be integrated and empirically tested in online spaces, thanks to the data captured by today's technologies. This allows for experimentation and decision-making based on evidence, not guesswork.

Optimizing a Social Network for Desirable Outcomes

Social media has dramatically changed how people communicate, shop, do business, and more. The online systems and social networks we use to achieve such tasks affect our experience and outcomes. Small changes to system features can often have unexpected effects. Rigorous studies provide insight designers can use to build systems that satisfy users and improve businesses.

THE STUDY

Like most everything else, dating has gone online. In 2012, more than half of single people started their search for a mate online.

Working in collaboration with one of the top dating sites in the country, University of Minnesota researchers co-designed a randomized experiment to test the effects of anonymity in the network. The experiment gathered micro-level data to illustrate how 100,000 users interacted with two million others on the site.

Many sites offer features like anonymous browsing as part of a premium for-purchase service. In the dating network, anonymous profile browsing removed the ability to leave "weak signals" of interest. As a result, desirable outcomes—namely connections to possible dates—went down, especially for women. In short, the dating site's model conflicted with social norms and behaviors.

This experiment established a causal relationship between the anonymity feature and the outcome, based on actual human behavior in a live network. This is a good example of how the social graph can become a unique lab for study and learning.
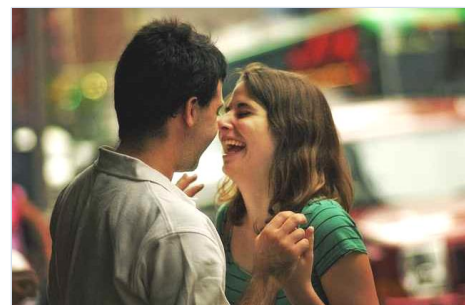
(cc) moriza on flickr

women are **8** times less likely to send the first message
////////////////////

Non-anonymous profile browsing signals interest in a more subtle way. Changing this feature of the system had a direct effect on outcomes.

METHODS
Randomized control trial with 100,000 subjects

TOOLS
SAS, R for visualization, zero inflated Poisson model

IMPACT

Dating sites aside, this study offers an important lesson for any company doing business online: small changes in feature design may have big impact on outcome. With so many services, systems, and activities happening online, such differences can translate to real dollars and even the success or failure of some online ventures. Studies like this one demonstrate how the social graph can be used to test system features and measure outcomes, even when the subject is something as elusive as romance.

Bapna, R., Ramaprasad, J., Shmueli, G., and Umyarov, A. (2013), "One-Way Mirrors and Weak-Signaling in Online Dating: A Randomized Field Experiment", National Bureau of Economic Research Summer Institute on the Economics of IT and Digitization.

Reveal or Conceal: How User Information Affects Crowdfunding Results

Crowdsourcing promises winning product ideas, lower customer service costs, support to launch new projects, and armies of brand evangelists. Has all of that panned out? Crowds can be uniquely effective in particular scenarios. Research on the crowdfunding phenomenon in particular reveals insight into the dynamics of group co-creation.

THE STUDY

Peer influence can have a major impact on money raised via online crowdfunding platforms. Earlier contribution amounts create reference points that influence later contributors. Specifically, smaller early amounts pull down subsequent contributions whereas larger early amounts create benchmarks that increase subsequent contributions.

But some platforms allow users to conceal the amount of their contribution from other users. University of Minnesota faculty member Gord Burtch and his co-authors studied what happened when users decided to conceal this information.

Working with a major crowdfunding platform (one million users and presence in 190 countries), the researchers showed how users' decisions to hide contribution information eliminated peer influence in the network. Advanced econometric techniques allowed the researchers to rule out alternative explanations and establish a clear cause/effect relationship.

Based on these results, the authors determined that the platform's reveal/ conceal mechanisms could be designed to nudge users in a desirable way. For example, the platform could conceal smaller contributions and reveal larger ones, by default. If users happen to be indifferent, and don't bother to override the default setting, this would remove some undesirable peer influence (or promote peer influence when desirable).

METHODS

Advanced econometrics (e.g., instrumental variables and panel fixed effects)

TOOLS

MySQL, Stata, Google Analytics

In 2012, campaigns raised

$2.7 *billion*

on crowdfunding platforms

IMPACT

In this study, changes to the platform's design and features affected user behavior, and consequently, outcomes. The real dollars attached to those outcomes are clearly important to both the campaign organizers and the platform operators. Taken broadly, this study demonstrates the application of econometric techniques to historical data. Such techniques can help businesses identify actual cause-and-effect relationships that simple correlational analyses cannot.
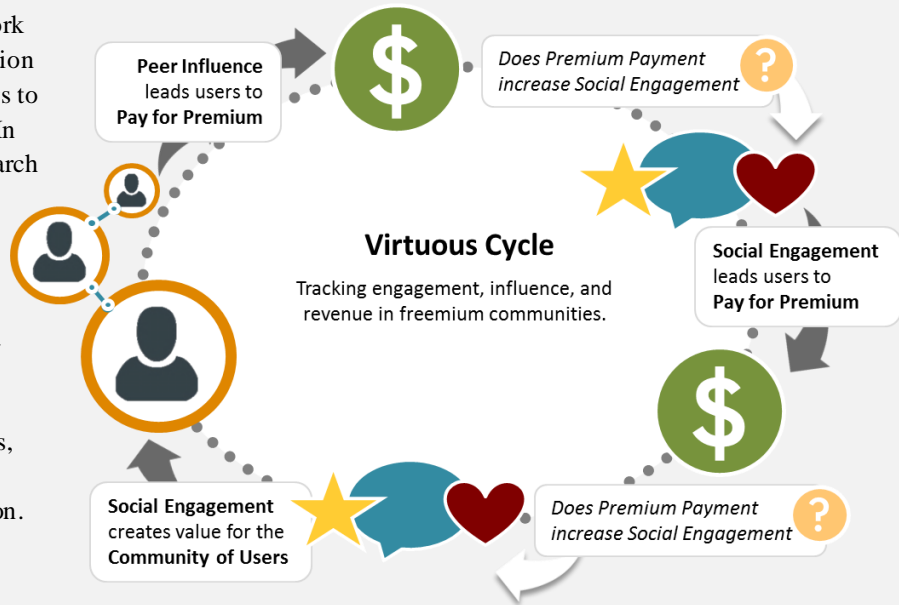
Burtch, G., Ghose, A. and Wattal, S. (2013) Private Displays of Affection: An Empirical Examination of Online Crowdfunder Information Hiding Behavior. *Working Paper.*

Is There Zen in Freemium?

The "freemium" business model is widely used by the makers of software services, mobile apps, games, and online social communities. From Dropbox to Angry Birds, Spotify to LinkedIn, freemium underlies many digital-age products. But companies using the model grapple with an inherent challenge: how do you make money on something you're giving away for free?

THE STUDY

Freemium services offer free and premium (i.e., paid subscription) versions of a product simultaneously. Free versions may attract users and generate some revenue, often through advertising; however, premium subscriptions are much more valuable and therefore critical to the long-term viability of freemium businesses. In this study, Ravi Bapna, Jui Ramaprasad, and Akhmed Umyarov explore the relationship between payment and social engagement in an effort to identify mechanisms and strategies that can increase premium subscriptions.

The authors build on previous work that showed how social participation and peer influence drive free users to convert to premium subscribers. In addition they cite marketing research that links payment to product performance. Using the online music-listening community Last.fm, the researchers investigated whether paying for a premium subscription increases social participation in the community. They find that it does, suggesting a "virtuous cycle" between payment and participation.

Peer Influence leads users to **Pay for Premium**

Does Premium Payment increase Social Engagement

Virtuous Cycle
Tracking engagement, influence, and revenue in freemium communities.

Social Engagement leads users to **Pay for Premium**

Social Engagement creates value for the **Community of Users**

Does Premium Payment increase Social Engagement

METHODS Look-ahead propensity score matching, random effects   **TOOLS** SAS, R

IMPACT

Mechanisms of payment, participation, and influence within an online social community are powerful tools if correctly understood. Companies can use such knowledge to design more effective product features, marketing strategies, and incentive programs based on empirical evidence of cause and effect, and not correlation. Evidence from studies like this one can help generate revenues, ensure an online community's health, and ultimately fortify the future viability of the business.

Advertising Across the Multi-Screen World

In today's increasingly multi-channel advertising environment, marketers want to understand how advertising in one medium affects patterns in another. For example, does television advertising change consumers' online search behavior? If so, how and to what extent? Such cross-media effects can be elusive, but they are potentially very meaningful for brands and the companies that own them.

THE STUDY

A review of top advertising agencies revealed surprisingly few with expertise in both television and online advertising, despite a 20-year trend toward integrated marketing communications. To help address this apparent gap between old and new marketing techniques, a study co-authored by Professor Yi Zhu set out to measure what effect television advertising might have on online search behavior.

The researchers analyzed data from 58,226 televised advertisements for 15 financial services brands, and more than one billion Google searches for financial services keywords during the same time period. In particular, they measured the number of searches for *category* (e.g., fund, investment, retirement) and *brand-specific* (e.g., Ameritrade, Edward Jones, Schwab) keywords. Empirical analysis revealed changes in search behavior attributed to the ads:

» Television ads had a small positive effect on search activity for the financial services *category*. The authors called this effect subtle, but sustained (observable for about three days following the advertisement).

» Television ads also increased searches for *brand-specific* keywords. This effect was stronger: a 10% increase in ad expenditure increased searches for branded keywords by 1.7% within 96 hours.

58,226
televised ads

1 Billion
searches
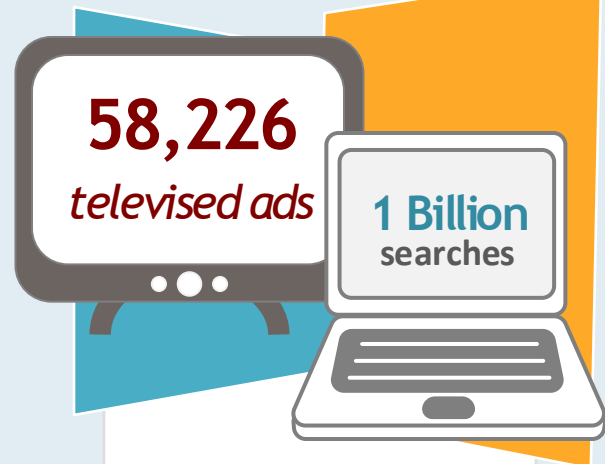
METHODS

Logit regression model utilizing Almon Parameterization of Advertising Effects; Using Arellano-Bond test for serial correlation

TOOLS

MATLAB, R, SAS

IMPACT

This change in search behavior is especially interesting in light of two additional factors: *a.*) customers who search for a branded keyword uncover less information about competitor brands, and *b.*) branded keywords typically cost less than generic category keywords sought by multiple companies. According to the authors, "the primary effect of a brand's advertising expenditure is to 'steal' query share from competitors …" Evidence useful for marketers who want to create more effective campaigns.