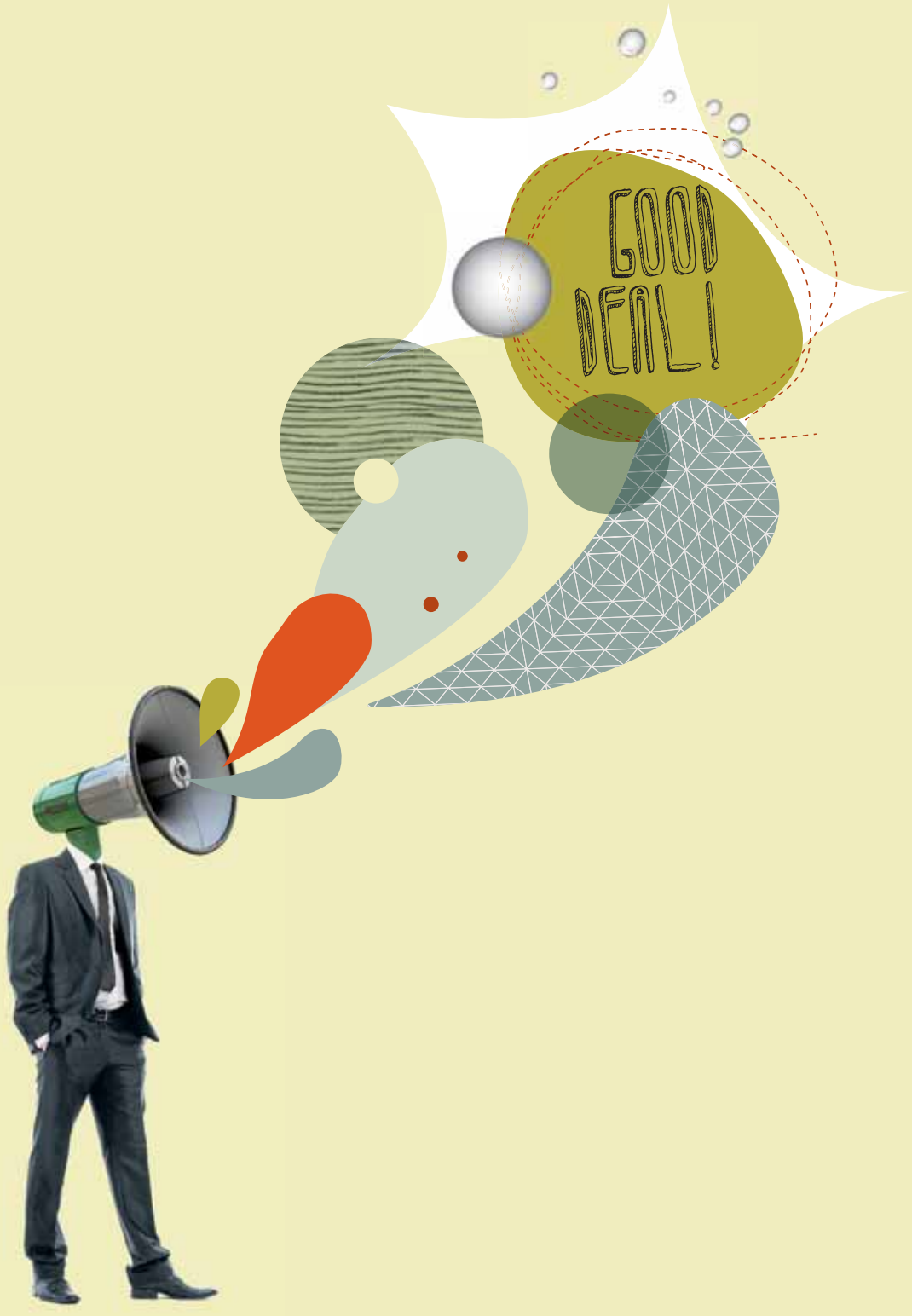

/// Targeting central people in the network gives more leverage to sales calls.

HOW SOCIAL NETWORKS AND OPINION LEADERS AFFECT THE ADOPTION OF NEW PRODUCTS

Raghuram Iyengar, Christophe Van den Bulte, John Eichert, Bruce West, and Thomas W. Valente

Do word-of-mouth and other peer influence processes really affect how quickly people adopt a new product? Can one identify the most influential customers and hence those who are good seeding points for a word-of-mouth marketing campaign? Can one also identify those customers most likely to be influenced by their peers? A pharmaceutical company seeking to improve its marketing effectiveness by leveraging social dynamics among physicians set out to answer these questions. There is indeed evidence of social influence, even after controlling for sales calls and individual characteristics. Also, people who are central in the network and those who use the product intensively are more influential. Finally, people who view themselves as opinion leaders are less affected by peer influence, whereas people who others really turn to for information or advice are not differentially affected. This last finding suggests that self-reported opinion leadership captures self-confidence, whereas a central position in the social network captures true leadership. Since sociometric techniques identify true opinion leaders more effectively than self-reports do, word-of-mouth programs targeting sociometric leaders are expected to be more effective than programs targeting self-reported leaders.

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A Reality Check for Assumptions that Word-Of-Mouth Marketers Make

Marketers are increasingly experimenting with various forms of network marketing. In the area of new product marketing, the rationale of many such efforts rests on three key assumptions: (1) social influence among customers is at work, (2) some customers' adoptions and opinions have a disproportionate influence on others' behavior, and (3) firms are able to identify and target those influentials or opinion leaders. These assumptions are quite reasonable and have been supported by prior research and experience.

Vocalpoint, a word-of-mouth marketing service operated by Procter & Gamble, has helped several new products gain traction by leveraging the social networks of homemakers with school age children. An example is the breakfast cereal Kashi Honey Sunshine, where the campaign generated a 27.8 % lift in sales between test and control markets. In the company's experience, women who are not only interested in the product but also have school age children are effective seeding points for many consumer packaged goods because mothers with small children are more likely to have extensive social networks. Many other companies, however, have found it very hard to identify influentials or opinion leaders. In at least one case, for the broad-spectrum antibiotic tetracycline, managers and industry observers long believed that its adoption had been driven by word of mouth among physicians until more careful analysis showed that all evidence of social influence disappeared once advertising effects were properly accounted for.

It is not only isolated case studies that give cause for concern. More systematic research has also shown that peer influence is not as important as often thought and has raised doubts about the importance of opinion leaders in truly speeding up the acceptance of new products. So, managers would be remiss to simply take those three assumptions underlying most word-of-mouth campaigns for granted.

The Challenges of Identifying True Opinion Leaders and their Influence

To maximize the leverage that word of mouth gives to their marketing spending, marketers must identify and target the most influential customers. Most marketing studies do so based on ***self-reports*** of how influential people think they are. Network studies, in contrast, identify opinion leaders based on their ***central position in social networks*** defined by who turns to whom for information or advice. These "sociometric" techniques have been gaining popularity among marketing practitioners to identify influential scientists, physicians, and engineers. Some consumer network marketing firms like P&G's Vocalpoint agree with the idea and target people with ***demographic characteristics*** associated with having a central network position.

Others, including most pharmaceutical companies, circumvent the entire issue and simply use heavy prescription ***volume*** as a proxy to identify physicians influencing the behavior of others. Based on the well-documented link between satisfaction and repeat buying behavior, one would expect that someone who adopted a product some time ago but is not currently using it is likely to be less enthusiastic and less credible than a current user. One would also expect that someone with greater product experience would be more credible as a source of information and influence. However, the notion that heavy users are more influential than light users does not always hold, as illustrated by a word-of-mouth campaign for the restaurant chain Rock Bottom Brewery by word-of-mouth marketing company BzzAgent. So, the impact of heavy users is another issue of obvious relevance to the identification and targeting of likely influentials that cannot be taken for granted.

» True opinion leaders are also opinion followers, but self-professed opinion leaders are not. «

So, which opinion leader identification methods are the best to use? Do they even identify the same individuals as leaders? Is there social influence operating over social ties, such that better connected adopters exert more influence than less connected ones, over and above the effect of marketing efforts and market conditions? And is peer influence emanating from prior adopters a function of how much they use the product rather than simply whether they have adopted it? Research conducted with a pharmaceutical company answers these questions.

Physicians and their Adoption of a New Drug: A Case Study

The company was keen on leveraging word-of-mouth dynamics among physicians by identifying the most influential physicians and using that information in its medical outreach, education and sales programs. Managers realized, however, that their basic premises about the effects of word-of-mouth were in doubt. The company was therefore very interested in facilitating a study about the importance of social networks, opinion leadership, and marketing effort.

The focal product was a newly launched prescription drug used to treat a viral infection that could be lethal if left untreated. As the medical condition was chronic, physicians could not observe drug efficacy quickly and adjust a patient's therapy if necessary. There was considerable uncertainty in the medical community about what was the best treatment. Even though the new drug seemed an excellent treatment option given its low rate of resistance and outstanding potency, there was little information available about how the drug's long-term efficacy compared to that of two older drugs already on the market. In short, the drug treated a potentially lethal condition but there was considerable ambiguity and risk in making the decision to adopt.

In a situation like this characterized by high risk, high complexity and low observability of results, peer influence is likely to be a significant driver of adoption behavior.

{*Box 1*}

INVESTIGATING SOCIAL INFLUENCE

Three large US cities were selected for the study: San Francisco, Los Angeles, and New York City. The physicians were selected based on membership records of the American Medical Association and internal records of the pharmaceutical company. Prescription data was obtained from IMS Health (a well respected data provider in the pharmaceutical industry). Given the specific medical condition that the new drug was treating, the company defined the target market as those physicians who had prescribed at least one of the two drugs in the same category in the two years prior to the focal drug's launch.

A ***mail survey*** was used to collect data on the physicians' social network ties and self-reported opinion leadership. The response rates varied from 24 % in New York City to 45 % in San Francisco. The data from the mail survey was matched with monthly physician-level sales call data from the company and monthly physician-level prescription data from IMS Health. Prescriptions were tracked for 17 months from the day the drug was introduced. Overall the data contains 185 doctors, 65 of whom had adopted the new drug after 17 months. This adoption rate of 35 % is not very high, consistent with the notion that adopting the drug is far from an easy decision for physicians to make.

Self-reported opinion leadership was determined using six questions about how often the respondent physician influences other physicians on issues related to the chronic disease of interest in this study (see below). All items were measured on a scale of 1 to 7. The self-reported leadership score is the average score across the six questions.

Six items used to measure self-reported opinion leadership

1. In general, do you talk to other doctors about ___? (Never/Very often);
2. When you talk to your colleagues about ____ do you ... (Offer very little information/Offer a great deal of information);
3. During the past 6 months, how many physicians have you instructed about ways to treat ____? (Instructed no one/Instructed multiple physicians);
4. Compared to your circle of colleagues, how likely are you to be asked about ways to treat ____? (Not at all likely to be asked/Very likely to be asked);
5. In discussions of ____, which of the following happens more often? (Your colleagues tell you about treatments/You tell your colleagues about treatments);
6. In general, when you think about your professional interactions with colleagues, are you ... (Not used as a source of advice/Often used as a source of advice).

For ***network or "sociometric" leadership*** we counted how many times each physician was named by other physicians as someone with whom they feel comfortable discussing the clinical management and treatment of the medical condition, or as someone to whom they typically refer patients with the condition.

» Self-reports are likely to measure self-confidence rather than true influence. Sociometric leadership or centrality in the network is likely to be the more valid measure. «

Personal selling was the main marketing instrument. There was only very limited medical journal advertising, no free product sampling, and no direct-to-consumer advertising due to the complex nature of the treatment decision.

When studying opinion leadership and social influence among physicians, it is important to consider the local nature of social influence. The importance of local as opposed to national opinion leaders is well documented in modern medical literature. Whereas nationally reputed ''expert opinion leaders'' may be respected for their research or their credibility, to most physicians their input is less informative than that from local ''peer opinion leaders'', who are members of their own community and face patients and working conditions similar to their own. Local leaders are also more accessible. The pharmaceutical industry is keenly aware of the importance of such social dynamics at the local level. Better understanding the local opinion leadership dynamics within the geographic locales was the main motivation of the pharmaceutical company to make our study possible.

Since the three cities in the study (see box 1) are major metropolitan areas, the local networks also contain several national opinion leaders. The fact that the physicians who the company considered to be national opinion leaders also emerged as local opinion leaders within their city made the network data fully credible to the managers, who were also quite interested in the identity of local opinion leaders they had so far overlooked.

Self-Reported Leadership Does Not Equal Network Leadership

The first set of results is about how to identify opinion leaders. The plots in Figure 1 show that self-reported opinion leadership does not correspond very well with the number of actual discussion partners or the number of colleagues who actually refer patients to him or her. The correlations are positive, but well below the maximum of 100 %: 45 % in San Francisco, 32 % in Los Angeles, and 41 % in New York City. The R^2 measure familiar from regression analysis indicates that one measure of opinion leadership ''explains'' only between 10 % and 20 % of the variation in the other measure. Clearly, someone who says he is an opinion leader may not be so in the eyes of his peers. (Figure 1)

Correlations between early adoption and each measure of opinion leadership were higher for network leadership (25 %) than for self-reported leadership (11 %), indicating that sociometric leaders tended to adopt earlier than self-reported leaders. However, that difference arose at least in part because the company targeted more sales calls to network leaders than to self-reported leaders. After controlling for the number of sales calls received and for physician characteristics like area of medical specialism, leadership of both types was still associated with earlier adoption, but the effect was about the same for self-reported and network leadership.

Differences in Susceptibility to Peer Influence

The statistical analyses controlling for sales calls and monthly market-level fluctuations in adoption—a very stringent test to identify the presence of social influence—show that only the 43 % of physicians with the lowest self-reported leadership score were significantly affected by peer influence. That is, the only physicians who were influenced were those who perceived themselves not to be leaders. Interestingly, physicians who received few nominations as discussion or referral partners were no more or less susceptible to peer influence than sociometric leaders who received many nominations.

This may be somewhat surprising at first, but actually makes a lot of sense. People with low self-confidence are more likely to turn to their peers for information and advice. In contrast, people with a high sense of self-importance may be unwilling to take into consideration,

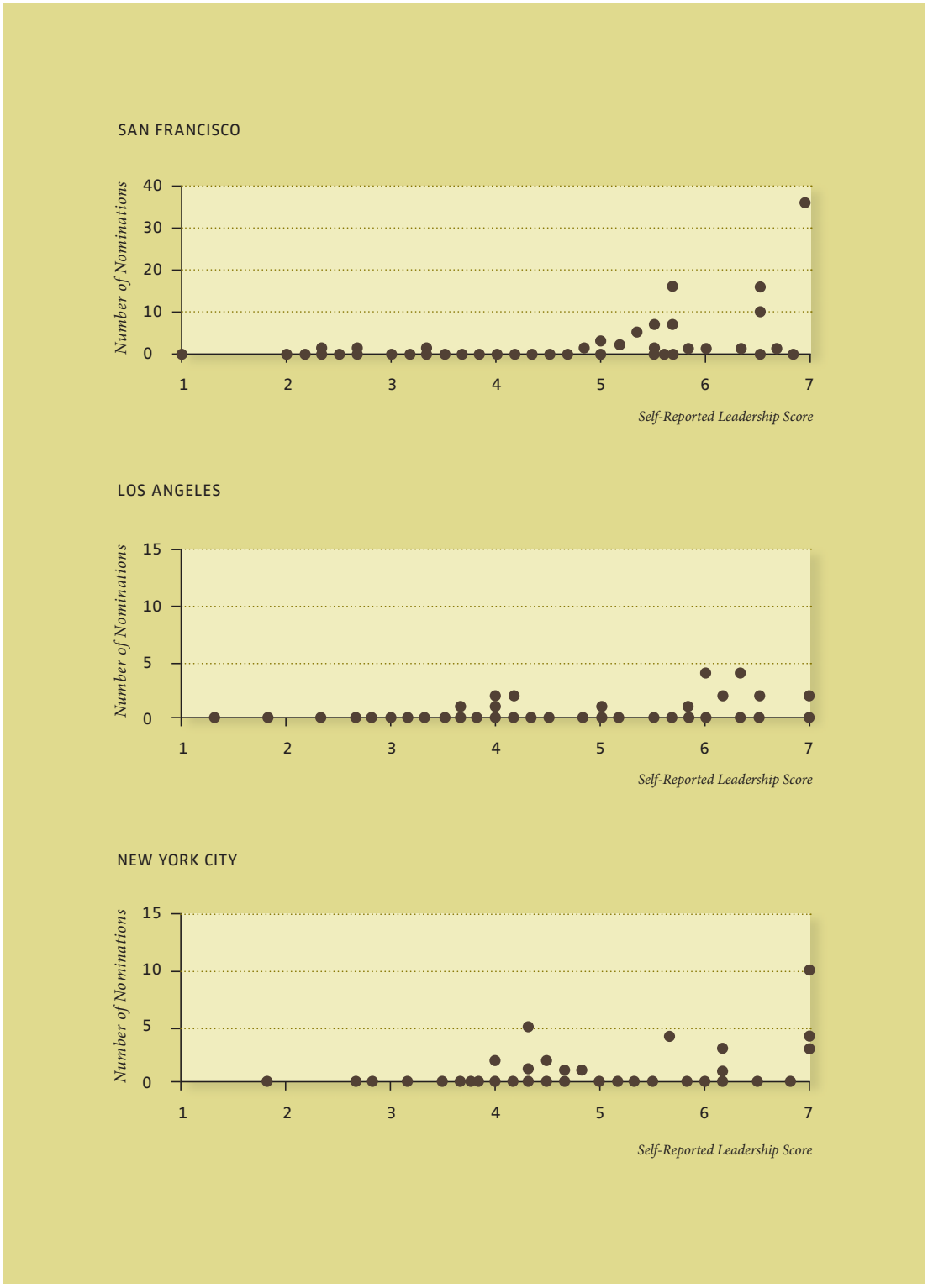
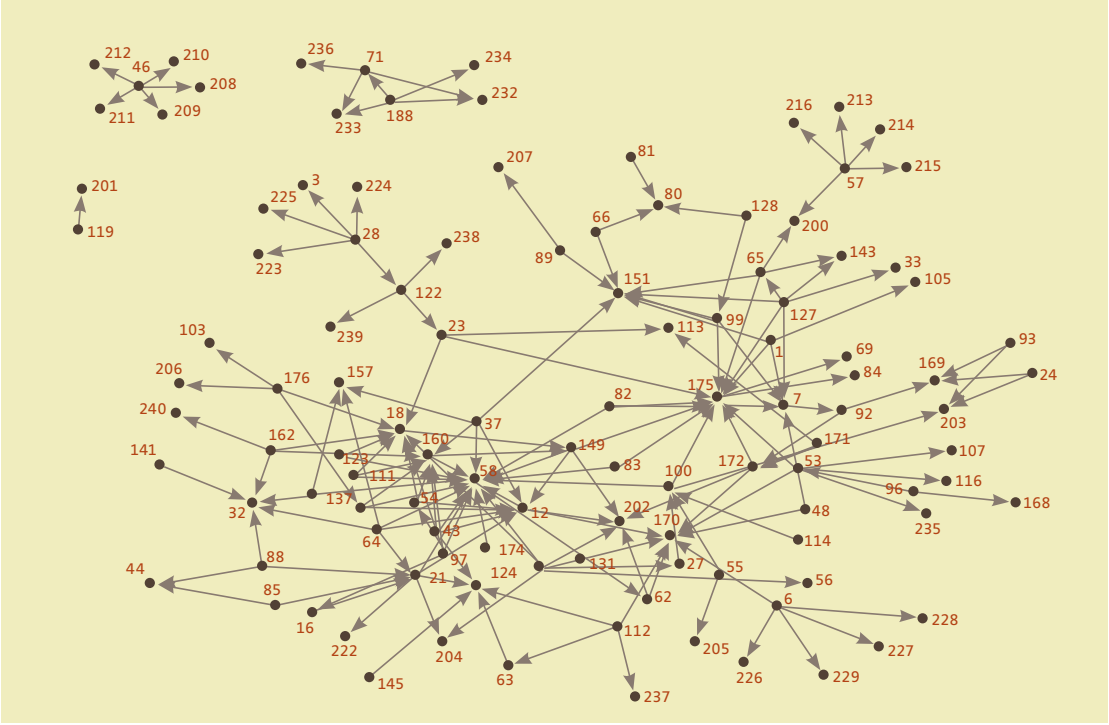


FIGURE 1:
Self-Reported Leadership Scores versus Number of Nominations Received (Both Discussion and Patient Referral Ties)

FIGURE 2:
The Network of Discussion in San Francisco



let alone imitate, the behavior of their perceived lower-status peers. True experts, in contrast, do consider the opinions and experiences of all their peers, including those who are less prestigious. In short, true opinion leaders are also opinion followers, but self-professed opinion leaders are not.

Differences in Peer Influence: Network Centrality and Heavy Use

People central in the network influence more peers than people on the periphery. That is important for the company to know, as it implies that targeting central people indeed gives more leverage to their sales calls.

We also find that heavy prescribers are more influential than light prescribers, and that mere adoption by itself does not trigger others to adopt. So, what influences the adoption of a new drug is not whether influential physicians have adopted but how much of the new drug they prescribe. Detailed analyses suggest that this does not only happen because heavy users are more central in the network. Having a central, well-connected position allows them to reach and influence more people, but that does not drive the fact that heavy users are more persuasive once the connection exists. Nor do we find evidence that heavy users of the new drug are more influential because they are more enthusiastic about it and shift a greater proportion of their prescriptions to it (the equivalent of a "share of wallet" effect). Instead, the results indicate, heavy users are more influential and persuasive because prescribing more of the new product makes them more credible as a source of information.

Additional, Unexpected Insights for the Company

Those findings provided an important proof-of-concept to the management team of the company. They documented that physicians indeed influenced each other through their network connections, and that network analysis was able to identify opinion leaders influencing the adoption of the new drug.

Knowing the structure of the network provided several additional benefits to the company. To illustrate, let us focus on the network of discussion ties in San Francisco shown in Figure 2. Each circle represents a physician, and each arrow going from one physician to another means that the sender mentions the receiver as a discussion partner.

The four physicians receiving the greatest number of nominations are physicians 18, 58 and 160 (all in the lower left quadrant), and physician 175 in the middle. The first three doctors were known to the company to be influential experts publishing regularly in medical journals, but the last (175) came as a big surprise. The company was not aware that this physician was such a valuable source of information to his local peers. He was valued in the local medical community because he was very involved with treating patients suffering from the disease, and worked tirelessly and closely with colleagues to solve day-to-day clinical problems.

Physician 175 did not fit the description of an individual who marketers thought would be the most effective opinion leader for their product—an outgoing, high-profile doctor with academic credentials whose name often appears on peer-reviewed clinical research papers or on conference speaker lists. Physician 175, in contrast, was a humble, self-effacing and clinically active physician who did not want to speak on behalf of pharmaceutical companies. He was highly respected by the local community because of his vast experience and knowledge in treating the disease. His central network position and importance was something that the company's local sales and medical education teams were not aware of until the network map was generated.

Figure 2 also shows that there are basically two major clusters in the network. One cluster is in the bottom left quadrant and the other in the upper right quadrant. Note how physician 175 is a key bridge linking the two clusters. Though he does not have the highest number of nominations, he plays a critical role in spanning what would otherwise be a structural hole between two disconnected sub-communities of physicians. The results are even more surprising when the names of the physicians are included on the graph. Almost all the names in the lower left are of European origin, whereas those in the upper right are mostly of Asian origin. This ethnic pattern makes physician 175 even more important in the flow of influence within the local medical community.

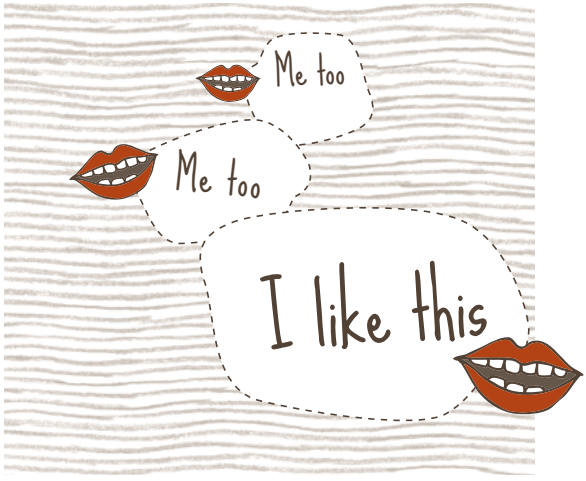
The map also provides important information about the three opinion leaders in the lower left quadrant. Physicians 18, 58 and 160 all tend to have the same followers, implying that there is no need for the company to get all three on board. It is more efficient to target only one or two of them, and re-allocate the resources towards other opinion leaders.

Conclusions

> ***Network ties affect the adoption of a new product***
The study presents compelling evidence of influence over network ties affecting the adoption of a new product after controlling for marketing effort and other confounding factors.

> ***Focusing on central influentials is recommend***
The study supports the use of network-leveraging campaigns focusing on central influentials exerting above-average social influence on other customers, a practice about which doubts have arisen recently. However, a caveat is due. Sizeable contagion from trusted peers is more likely to be a key driver of buying behavior when the stakes are high and when customers are uncertain about how well the product works or about how using it will affect their status among their peers.

> ***Sociometric techniques to identify opinion leaders are more valid***
Market researchers traditionally use self-reports, formal position or metrics of visibility like publication or blogging activity to measure opinion leadership. These methods are not without problems. Self-reports are likely to measure self-confidence rather than true influence, while formal positions and mere visibility need not translate into actual influence. Sociometric leadership or centrality in the network is likely to be the more valid measure. It also has the advantage that it can even be computed for people who do not respond to a survey.



» Heavy users are more influential and persuasive because prescribing more of the new product makes them more credible as a source of information. «

> ***Sociometric maps provide additional insights***

Mapping the network also provides insights into the specific connections of each opinion leader. This information can prove useful when choosing which leaders to focus on in order to get maximum impact while reducing inefficient redundancy in one's word-of-mouth marketing efforts. In this study, physicians 18, 58 and 160 in San Francisco, for instance, tend to have the same followers, so targeting all three would probably be redundant. Also, physician 175 is an especially appealing target, both because he is the only key player in the "Asian" sub-network and because he plays a critical role in bridging the divide between the "European" and "Asian" sub-networks.

> ***Benefits and risks of targeting sociometric opinion leaders.***

The study demonstrates the existence of the hitherto neglected benefits of focusing one's efforts on sociometric opinion leaders. The standard argument is that they influence more peers than less centrally located people do. The results support this idea, but suggest two additional benefits. First, the "stand-alone" customer lifetime value (CLV) of opinion leaders may be higher than that of other people because they tend to be early adopters and heavy users. Second, their "network" value may be higher, not only because they reach more people but also because, by being early adopters and heavy users, they start influencing others sooner and more effectively than less connected people.

Some caveats are due, though. First, if opinion leaders tend not only to adopt but also to disadopt sooner than others, and if the firm's discount rate is low, then the "stand-alone" CLV of an opinion leader need not be systematically above average. Second, a customer's heavy use may boost his "network" value only when the product is perceived to be risky and when heavy users are more credible or otherwise more influential than light users. Third, when the new product challenges the power base or norms of the opinion leaders, the product is likely to be resisted by them and to be adopted by members at the fringe of the network first.

- ***Benefits and risks of targeting heavy users.***
  In our study, heavy prescribers of the last drug previously launched in the category tended to adopt the new drug early and also tended to be opinion leaders. This finding suggests that the industry practice to overly target one's marketing efforts at launch towards heavy prescribers generates not only quick sales but also a larger social influence effect. Specifically, heavy users have a higher "stand-alone" value both because they adopt early and because they use more after they adopt. They also have a higher "network" value, both because they tend to have more connections and because they tend to be more influential within each of those connections. However, since the correlation between prescription volume and sociometric leadership is only moderate, just focusing on heavy users will fail to leverage all potential influential seeding points.

- ***Generalizability of results***
  The evidence from this case pertains to a risky product for which one would expect peer influence to matter, and does not invalidate the warning that peer influence cannot simply be taken for granted in each and every situation. Prior research and theory suggests that our findings are more likely to apply to expensive than cheap products, to purchase decisions that are made infrequently rather than frequently, to products whose quality cannot be assessed before purchase (credence and experience goods rather than search goods), to radical rather than marginal innovations, and to identity-relevant rather than identity-irrelevant products. •

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