Local Neighborhoods As Early Predictors of Innovation Adoption

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We investigate whether certain network neighborhoods are reliable predictors of overall network adoption. We show analytically that for success-failure predictions, random samples are less useful than specific clusters in the network. The empirical results show that certain neighborhoods do predict adoption better than random and stratified samples.

[to cite]:

[url]:
http://www.acrwebsite.org/volumes/1012792/volumes/v40/NA-40

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Driving Diffusion: How Social Networks, Sender Motives, and Item Characteristics Shape Social Epidemics

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Paper #1: Share and Scare: Solving the Communication Dilemma of Early Adopters with a High Need for Uniqueness

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Paper #2: The Cultural Success of Sensory Metaphors

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Paper #3: Ideation and the Spread of Innovative Ideas in Social Networks

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Paper #4: Local Neighborhoods as Early Predictors of Innovation Adoption

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SESSION OVERVIEW

Why do some products, ideas, and behaviors catch on? Some products become popular, some innovations spread, and some catch-phrases or sayings become successful. Others never seem to get traction and fade quickly. What makes certain things diffuse more than others?

These questions have been investigated from a number of research perspectives. Sociologists and marketing scientists have examined how social network structures impact diffusion (Christakis and Fowler 2009, Goldenberg, Libai, and Muller 2001). Behavioral researchers have examined how psychological motives influence what people decide to share (Cheema and Kaikati 2011; Wojnicki and Godes 2008). Others have looked at how characteristics of the cultural items themselves, such as whether stories are more or less emotional, shapes what goes viral (Heath, Bell and Sternberg 2001; Berger and Milkmam 2012). But while each of these research streams has separately examined diffusion, little work has integrated these perspectives.

This session brings together diverse work on social networks, sender characteristics motives, and item characteristics to shed light on the behavioral processes behind diffusion. While early adopters are seen as the key to diffusion, might their psychological motives actually lead them to share less, reducing diffusion? Might sensory phrases (e.g., “bright student” rather than “smart student”) be more likely to diffuse over time? How do social network structures impact both the creativity of ideas people generate, and their diffusion? How can success in certain local neighborhoods be used to predict overall success in the broader social network?

This session addresses these, and related questions, as it integrates multiple research perspectives to shed light on what drives social contagion. The first two papers focus on psychological drivers of transmission. Moldovan, Steinhardt, and Ofen demonstrate that early adopters are motivated to share word-of-mouth to boost their social status, sharing information can also reduce their uniqueness. Consequently, they often adopt a tactic of sharing while scaring, or telling others about how difficult the product is to use. Using both experiments, and 200 years of data from 5 million books, Akpinar and Berger show that phrases which create a metaphorical link to the senses (e.g., bright student or warm welcome) diffuse more widely than their semantic analogues (i.e., smart student or kind welcome) because they are more memorable.

The next two papers examine the role of social networks in diffusion. Stephen, Zubcsek, and Goldenberg show that having more sources of inspiration (i.e., higher degree and thus more neighbors) does not necessarily improve one’s ideas. Rather, it depends on how interconnected (i.e., clustered) one’s neighbors are, and the nature of the idea generation task (general vs. specific task). Goldenberg et al. use a social networks database to show that large and dense clusters in a social network are better predictors of success of innovative adoption than other clusters and random samples.

Taken together, these talks illuminate the psychological and sociological processes that shape diffusion and cultural success. Given recent interest in social networks, social media, and social contagion, the session should appeal to broad range of researchers including those who study user-generated content, diffusion and new product adoption as well as those interested in social influence, attitude change, needs for distinction, social networks, and embodied cognition more broadly. The co-chairs (Jonah Berger and Ezgi Akpinar) will integrate the talks and open discussion about potential directions for future research.

Further, as highlighted in this year’s program, the session also brings a diversity of methodological perspectives to address these important research questions. The papers cover a wide span of methodologies from experiments and social network analysis to analytical modeling, and empirical analyses of large datasets. As a whole, the talks will deliver diverse but complementary insights on what factors shape diffusion and social epidemics. While sociologists, physicists, and marketing scientists have begun to pay more attention to social contagion, this session integrates a variety of perspectives to examine how psychology and consumer behavior shape these important phenomena.

“Share and Scare”: Solving the Communication Dilemma of Early Adopters with a High Need for Uniqueness

EXTENDED ABSTRACT

Early adopters are frequently discussed in the literature as individuals who play an essential role in new product success (Rogers 1995). Early adopters are the first to adopt an innovation, and are therefore the first to recommend it to later adopters. The literature (and practice) consequently treats early adopters as “social salespeople” of new products (Goldsmith and Flynn 1992; Mahajan, Muller, and Srivastava 1990; Midgley and Dowling 1993; Rogers 1995). This, however, may not always be the case. In this research we explore the unwillingness of early adopters to “spread the word” about innovations they adopt. Specifically, we propose that early adopters often face a communication dilemma. While they are inherently motivated to share information about the innovation to others, and
reinforce their social status as early adopters, they are aware that this status is diluted as the number of adopters increases. To remain among a selected few who use or possess the innovation, they may intentionally scare others from adopting it too. We therefore name the solution of this dilemma as “share and scare”.

The current research reveals the underlying mechanism that drives this dilemma among the early adopters. This mechanism is a product of consumers’ need for uniqueness; namely, a positive need to be different relative to other people (Tepper and Hoyle 1996; Tian, Bearden and Hunter 2001). Need for uniqueness is strongly tied to the adoption of unusual and scarce products (Tian et al. 2001). By definition, innovations are scarce, since it is possessed by few or none in its early stages in the market. Therefore, we claim that this dilemma is experienced by early adopters who are driven by elevated need for uniqueness and thus value the uniqueness of the innovation as one of its most beneficial utilities. Early adopters with a high need for uniqueness will therefore desire to express their uniqueness in the presence of a group. However, by “showing off” their new adoption, early adopters increase the risk that other consumers will also adopt the innovation, thereby diminishing early adopters’ uniqueness.

Study 1 demonstrates the existence of the dilemma among early adopters with a high need for uniqueness and for different product categories.

Study 2 identifies a possible boundary condition for the dilemma. This study demonstrates that the dilemma would be experienced only when the innovation faces an immediate public launch, and is not experienced for innovations for which launch is expected to be in the future. Results show that when the innovation is not anticipated to be available on the market in the near future, early adopters with a high need for uniqueness are less likely to be concerned that others will imitate them, and therefore report on lower dilemma levels. However, in the future launch condition, there is not a significant difference within the levels of the dilemma across consumer groups.

Study 3 explores how the dilemma is affected by the type of audience that is exposed to the early adopters’ word of mouth. Its findings reveal that when the target audience is less likely to imitate the early adopter (i.e. laggard audience), or when the early adopters wish to be imitated by the target audience (i.e. superordinate audience), early adopters report on lower levels of the dilemma compared to when facing a peer audience.

Studies 4 and 5 shed more light on the “share and scare” solution of the dilemma by showing that early adopters with a high need for uniqueness are more likely recommend the product but at the same time to warn others about it. Study 4 shows that while all consumer groups are willing to recommend both innovative and non-innovative products, early adopters with a high need of uniqueness also intend to scare others from adopting an innovative, but not an existing, product. Study 5 explored additional aspects of the “share and scare” communication and showed that this behavior is relevant for a privately consumed product as well.

The communication dilemma and the “share and scare” solution indicate that, unlike what is “expected” from them, early adopters may not always be willing to spread the word about innovations they adopt, and may intentionally delay or even derail the diffusion process.

This research also integrates into and extends the chasm theory. The chasm is a break in the diffusion process between early and later adopters, presumably because of a lack of communication between the two markets (Moore 1999, Goldenberg, Libai and Muller 2002). However, we suggest that communications in fact exists between the two markets, as early adopters “share” information about the product. Yet, the nature of the information they provide may not accelerate the adoption of the innovation, as they sometimes “scare” others from adopting it.

Managers should be aware of the existence of the communication dilemma when launching innovative products and consequently execute campaigns that overcome this reluctance.

The Cultural Success of Sensory Metaphors

EXTENDED ABSTRACT

Language varies over time (Lieberman et al. 2007; Nowak, Komarova and Niyogi 2002; Pagel, Atkinson and Meade, 2007). There are often many ways to convey the same thing and linguistic variants often act as substitutes. In 1800s, for example, people used the phrase “popular topic” but now the phrase “hot topic” is more en vogue. Why are certain linguistic variants more culturally successful than others?

We suggest that linguistic variants which relate to senses in metaphoric ways should be more successful. A kind person can be described as “warm”, an unpleasant note as “sour”. Sensory experiences serve as analogical basis for expressing abstract concepts with metaphors (Gibbs and Tendhal 2006; Lakoff and Johnson 1980). Calling a person “warm” suggests the person is inviting, just like a warm shower might be.

Sensory metaphors have important consequences for human thought and behavior (Lee and Schwarz 2010; Zhong and Leonardi 2008). Humans scaffold abstract concepts onto existing knowledge acquired through sensory experiences with the physical environment. So when an abstract concept is encountered (e.g. feeling socially excluded at a reception), the sensory neural cues associated with the formation of that concept are triggered (e.g. feeling cold), and downstream behaviors (e.g. desire for warm foods and drinks) or expression of the concept (e.g. chilly reception) are based on the activated sensory cues. Thus, abstract concepts can be processed using cues of sensory experiences, even without physically interacting with any sensory stimuli.

Sensory metaphors (e.g., warm person) should be more culturally successful in part, because they are more likely to be remembered. Sensory metaphors may be easier to remember because they activate the same brain regions as sensory experiences (Stilla, Sathiana and Sathian 2012). Further, retrieval of sensory experience knowledge (e.g. “cat has fur”) is more automatic, and involves less processing than semantic knowledge (e.g. “cat needs training”; Golberg et al. 2007). Consequently, compared to semantic analogues, there should be stronger associations between sensory metaphors and sensory experiences which should make them easier to retrieve.

Sensory metaphorical phrases may also be easier to remember because they have multiple and accessible linkages with memory. While non-sensory phrases are only stored with their semantic meaning, sensory metaphors are stored both in semantic and sensory codes. Further, the sensory cues are prevalent in the environment. Thus, we expect that increased number of associative cues, some of which are more accessible in the environment may boost memory.

Two studies investigate whether sensory metaphors are (1) more culturally successful over time and (2) more memorable.

In first study, we examined the cultural success of sensory metaphors. First, we compiled an extensive list of sensory metaphors (e.g. bright student) and their semantic analogues (e.g. intelligent student and smart student). Then we recorded the success of each phrase over time using the Google Books corpus. This dataset allowed us to track the number of times phrases were mentioned every year in over 5 million digitized books from 1800 to today. We com-
pared the use of sensory metaphors and semantic analogues using a Poisson model with linear and quadratic effects.

As illustrated in Figure 1, rigorous modeling results show that sensory metaphors are more successful over time, with an increasing quadratic trend ($\beta_{\text{Time} \ast \text{Sensory Metaphors}} = .024, p < .001$; $\beta_{\text{Time}^2 \ast \text{Sensory Metaphors}} = -3.55E-5, p < .001$; higher than zero for all value of time).

Study 2 experimentally examines whether sensory metaphors are more memorable. Further, we test the underlying role of relation to the senses and greater prevalence of associative cues.

Participants received 32 randomly selected phrases from the pool used in Study 1. Some participants rated each phrase on the extent to which it relates to senses while others rated each phrase on the number of associations it has with other words and ideas. After filler tasks, participants completed an unaided-recall task where they wrote down as many of phrases as they could remember.

The results support our theorizing. First, compared to semantic analogues, sensory metaphors were more likely to be remembered. Second, as predicted, sensory metaphors were rated as more related to the senses and having more associative links. Third, a multiple mediation analysis shows that the effect of phrase type on memory is partially driven by the combination of their sensory nature and prevalence of associative cues.

Alternative mechanisms have difficulty explaining these effects. More emotional (Mackay and Ahmetzhanov, 2005), interesting, or descriptive phrases might be more memorable, and concrete, visualizable information may be easier for people to retrieve (Rubin 1995). The sensory metaphorical phrases used here, however, did not differ from the semantic analogues on any of these dimensions. Also, Study 1 still holds if we only look at non-visual sensory metaphors.

Taked together, these findings illustrate how senses shape cultural success in language. Compared to linguistic variants with similar meanings, sensory metaphors are more (1) memorable and (2) culturally successful over time. These findings not only speak to the reciprocal influence between individual psychological processes and collective outcomes (Gureckis and Goldstone 2009) but also embodied cognition, and neural linkages between sensory processing and language.

Ideation and the Spread of Innovative Ideas in Social Networks

EXTENDED ABSTRACT

A growing trend in marketing involves firms using crowd sourcing as part of the product development process. Firms tap the apparent wisdom of consumers to solicit ideas for new products and suggestions for how to improve or extend existing product. In practice, crowd sourced product ideation has led to a proliferation of firm-specific online communities where consumers can submit ideas. Typically the consumer community then discusses, criticizes, elaborates on, and votes on ideas, and firms use this information to help them decide which ideas to develop further. Firms using this approach include BMW, Dell, Delta Air Lines, Google, Kraft, Lego, P&G, and Starbucks. A challenge, however, is soliciting high-quality innovative ideas from consumers. Like any social network, information (in this case idea) can diffuse throughout these communities. While this may facilitate the propagation of good ideas that leads to even better ideas, it may also result in mediocre or even bad ideas spreading and negatively impacting the quality of the ideas provided by other members of the networked community.

This research examines the role played by network structure and an individual’s network position in product ideation networks/communities in affecting their ability to produce innovative ideas. A novel experimental approach was taken whereby participants were linked to each other through a custom-built online product ideation platform. The platform allowed us to manipulate the network structure, thereby allowing us to vary specific parameters related to participants’ positions and connectivity in their networks. We focused on manipulating participants’ numbers of neighbors (i.e., their degree), which influenced how many sources of inspiration they were exposed to, and how interconnected participants’ neighbors were (i.e., their clustering coefficient), which influenced how independent their sources of inspiration were. Our main hypothesis was that while being exposed to many sources of inspiration can potentially help participants produce highly innovative ideas, this would only happen when their neighbors were not tightly interconnected. In other words, we predicted an interaction between degree and clustering such that idea innovativeness is higher when participants have high degree but low clustering.

In four studies, participants were assigned to networks and various positions (nodes) in networks and contributed product ideas over multiple rounds. Participants could see ideas submitted by other participants to whom they were directly connected. Network structures were predetermined and varied between groups to allow us to examine how properties of individuals’ local networks (size/degree and interconnectedness/clustering) affected (1) social contagion and idea diffusion processes within each network over time and (2) ultimately the innovativeness of the ideas.

Our main hypothesis was supported across four studies. Having more sources of inspiration (higher degree) does not necessarily improve one’s ideas. In fact, more sources of inspiration can lower one’s innovativeness when their neighbors are connected to each other (i.e., a negative interaction between degree and clustering). This effect is moderated by the nature of the ideation task with respect to how general or specific it is. In more specific (and structured) ideation tasks, ideas diffuse over the network and, provided that individuals are exposed to multiple sources of inspiration with whom they are not tightly interconnected (i.e., lower clustering); good ideas...
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will spread and be improved upon, resulting in higher levels of output idea innovativeness. However, when the task is more general (and unstructured) initial ideas tend to be more eclectic, thus making it harder for any single concept to “catch on” and spread throughout the network. These effects were found in a variety of contexts, including generating ideas for mobile banking smartphone apps, ways to improve the air travel experience for commercial airline passengers, and ideas for making Facebook more useful to people.

Overall, this research shows that social networks and consumers’ positions in them can influence their ability to influence others and be influenced by others in the context of crowd sourced product ideation. While having connections indeed can facilitate the spread of ideas, those connections do not always facilitate the spread of innovative ideas.

Local Neighborhoods as Early Predictors of Innovation Adoption

EXTENDED ABSTRACT

“As Maine goes, so goes the nation”. This proverb of U.S. politics suggests that what happens in a particular neighborhood can be a good predictor of a much larger population (in this case the United States, or more precisely who wins the presidential election). More generally, both political scientists and managers spend considerable effort trying to find ways to predict the behavior of large populations. This paper focuses on predicting innovation adoption based on what we term predictive neighborhoods (groups of connected individuals whose adoption patterns evolve similarly to, yet earlier than, overall population behavior). We demonstrate that some neighborhoods can indeed be used to predict overall adoption and that their predictions are superior to those of random samples.

Previous research has shown that product adoption decisions are influenced by social peers and relationships (see Godes et al. 2005; Goldenberg et al. 2009; Libai 2005; Libai et al. 2009; Trusov et al. 2008b; Valente 1995; Van den Bulte and Joshi 2007; Watts and Dodds 2007). Research also provides evidence of the benefits garnered from an advantageous network position and the structural properties of one’s local network. These properties include the resources of one’s direct network (Burt 1997; Lin 2001), the number and strength of ties (e.g., Granovetter 1973) and closure or local clustering (Coleman 1990; Lin 2001).

A few studies have found that the individual adoption process is driven by group adoption (Jones and Ritz 1991; Kim and Srivastava 1998). However, these studies focus on cases where group adoption precedes individual adoption within that group. Here we consider the case of social networks characterized by a high clustering coefficient (Watts and Strogatz 1998). This paper first investigates how the individual adoption decisions within a neighborhood are influenced by the properties of the clusters to which they belong, and second, whether certain local neighborhoods can be reliable predictors of overall network adoption (i.e., are predictive neighborhoods).

We first show analytically that for success-failure predictions, random samples (the common standard in marketing) are less useful than specific clusters in the network. If correct, this means that using a random sample may not be the best way if a network structure exists, and if it is known. We predict that large and dense clusters that have high betweenness centrality (at the cluster level) should be better predictors of success than other clusters and random samples.

We then tested empirically this conjecture using a network data with multiple diffusion processes over it (the Korean Cyworld newtrok).

In the period of this study, the number of members in the Cyworld database grew from 2,492,036 in December 2003 to 12,685,214 in July 2005. In October 2006, there were about 22 million registered members and an average of 20 million monthly unique visitors. Many people considered Cyworld a part of their everyday life and as a tool for building relationships and sharing information about their lives on their homepages. A key aspect of the service, for our purpose, allows people to customize their homepages by including documents, photos, and other “goodies” at no charge. Members can also decorate their minihompy (personal homepage) with paid items such as virtual household items—furniture, electronics, wallpapers. People can also adopt items such as pictures or video clips directly from the minihompy they visit (called “scrapping” in Cyworld). This study focuses on this latter type of adoption, using data from December 2003 to July 2005.

We examine a set of 114 neighborhoods analyzed earlier. We identified the number of scraps (adoptions) for each item and eliminated those with fewer than 20 adoptions (i.e., niche products and abject failures which had very sparse data on which to base analyses). Of the remaining products, the top 10 items (in effect the “mega hits”) were adopted by between 104 and 7952 people while the bottom 30 were adopted by 20-25 individuals, meaning highly successful items were adopted at a rate of at least four times greater, and in many cases at an order of magnitude greater, than less successful ones.

As a measure of how well a local neighborhood predicts adoption in the total network, we used the correlation between adoption in a neighborhood at the time 5%, 16%, and 50% of the eventual market had adopted it (i.e., early adoption in the neighborhood), and eventual total network adoptions after the adoption process is completed. Using these 40 items, (the top 10 plus the bottom 30), we then compared the ability to predict total adoption in the overall market based on a) a random sample (the “gold standard” of market research) of size 200, similar to the average cluster size of 214, b) the average of all the neighborhoods in the network, and c) the 20 clusters with the highest correlation between their adoption at the time 16% of the market had adopted and eventual market adoption.

The empirical results show that certain neighborhoods do predict adoption better than random and stratified samples as well as samples of innovators. Further, they predict about as well as samples of social hubs whose use requires knowledge of the entire network structure.