

Research Statement

Dina Mayzlin

My primary line of research explores the firm's management of social interactions among consumers. My second related line of research investigates the firm's advertising and communication strategy. I summarize the contribution of my past work that spans eight years of active research,¹ as well as my current and future projects below.

1. The Firm's Management of Social Interactions

Traditionally, firms have communicated with consumers through advertising. However, it has always been known that a large fraction of the information flow about products occurs between consumers. In the past decade, the growth of technologies (such as the Internet, smart phones etc) has allowed firms to play a more active role in these consumer-to-consumer conversations, or, more broadly, "social interactions."² These changes have had impact on, and generated interest from, both industry and academia. My research has examined how firms can manage these interactions.

In Godes et al 2005 (a paper that came out of the workshop organized by David Godes and myself as part of the 2004 Choice Conference in Boulder, Colorado), we identify three roles which a firm can play in managing social interactions: 1) Observer – the firm listens to conversations, 2) Influencer – the firm fosters and shapes social interactions, and 3) Participant – the firm plays a role in these interactions. I use this framework to describe the contribution of my research in more detail.

1. Firm as Observer

The effectiveness of any management strategy relies in part on the ability to measure. However, there are two primary challenges to measuring social interactions: 1) How can one gather data on what are essentially private exchanges? and 2) What aspects

¹ I started in Yale in the summer of 2001 and was on maternity leave in the academic years 2004/2005 and 2007/2008.

² "Social interactions," which we defined in Godes et al 2005 as an action that a) is taken by an individual not actively engaged in selling the product or service and that b) impacts others' expected utility for the product or service," is broader than the traditional concept of word of mouth (WOM) since it encompasses new types of communication such as email, blogging, and text-messaging.

of conversations (highly unstructured data) should be measured and are managerially meaningful?

The lack of data availability has implied that researchers traditionally have had two measurement techniques available to them: surveys (Reingen and Kernan 1986)⁴ and inference (Bass 1969)⁶. Godes and Mayzlin 2004 – which was based on essay 2 of my dissertation – was the first paper to obtain measures of online word of mouth (WOM) conversations and to tie them to a firm's sales. Specifically, we collected posts about new T.V. shows on public Usenet forums as our measure of online conversations. We examined two measures of WOM: volume and entropy, or the degree to which these conversations are confined to few groups (low entropy) or are spread out across many groups (high entropy). In addition to collecting word of mouth measures, we also controlled for past sales (last week's viewership) as well as the show fixed effect.

This study had several important results. The most important substantive finding is that more-dispersed WOM is associated with higher sales (viewership) in the next period. In contrast, we show that the information provided by the volume metric (how many people mentioned the show) is already contained in the previous sales variable, and hence is not significant once we control for previous ratings. More generally, we show that it is important to consider how information travels in a network (more-dispersed conversations lead to more awareness) when studying the effect of online conversations. The issues raised in this paper - the importance of tying WOM measures to sales and the importance of controlling for past sales and the product fixed effect - continue to be addressed today.

This work has had a great deal of influence on subsequent research. To date, it has been cited 153 times according to Web of Science and 482 times based on Google Scholar - it is the most highly-cited paper in *Marketing Science* since 2001. It has had impact across fields: 1) quantitative marketing (it has been cited by papers published in journals such as *Marketing Science*, *Management Science*, *JMR*, *IJRM*, *JM*, and *QME*), 2) behavioral marketing (*JCR* and *JCP*), and 3) IT and Computer Science (*ISR*, *MIS*

⁴ Reingen and Kernan (1986), "Analysis of Referral Networks in Marketing – Methods and Illustration," *Journal of Marketing Research*, 23 (4), 370-378.

⁶ Bass, Frank (1969), "New Product Growth Model for Consumer Durables," *Management Science*, 15(5), 215-227.

Quarterly, and *IEEE Transactions*). Finally this paper won the 2011 INFORMS Society for Marketing Science Long Term Impact Award (awarded to a paper published in *Marketing Science*, *Management Science*, or another INFORMS journal in 2001-2005 that is viewed to have made a significant long run impact on the field of Marketing) and was a finalist for the 2005 Bass Outstanding Dissertation Award.

II. Firm as Influencer

In this role, the firm fosters and shapes social interactions among market participants. For example, in order to foster social interactions, the firm may choose to include consumer reviews on its site. The first fundamental question that needed to be addressed is whether reviews have a direct impact on sales, the alternative hypothesis being that both reviews and sales are associated with a common unobservable variable such as product quality.

Chevalier and Mayzlin 2006 examine the effect of Amazon.com and BarnesandNoble.com reviews on book sales. While both Godes and Mayzlin 2004 and Chevalier and Mayzlin 2006 deal with measures of social interactions and tie them to sales, the latter is able to address the issue of causality more directly. Determining that WOM has a causal effect on sales and is not simply correlated with product success is especially important when one considers the firm's role in managing social interactions through a communication strategy.

As an illustration, suppose that a new cookbook is heavily promoted by the publisher. This may generate a lot of word of mouth for the book as well as elevated sales. In order to conclude that it is WOM that is driving sales and not another factor such as the underlying quality of the book or the offline advertising campaign (that may be correlated with both WOM and sales), we utilize a difference-in-differences approach: we examine the effect of user reviews across BarnesandNoble.com and Amazon.com and across time. That is, we examine whether a scathing review of a Julia Child cookbook on Amazon results in the book's lower popularity on Amazon relative to BN.com. We also rule out that the difference is driven by differences in preferences across sites by differencing across time.

This study has several substantive and methodological results. Substantively, we find that the valence of reviews (the book's average star rating) drives a book's relative sales levels. Interestingly, we also find that the impact of very negative reviews is greater than the impact of very positive reviews. Methodologically, the study is the first one to tackle directly the issue of causality in the area of word of mouth.

This paper also had a significant impact on the field – it is the most cited *JMR* paper published since 2003. To date, it has had 170 cites based on Web of Science and 651 cites based on Google Scholar (in journals such as *Marketing Science*, *Management Science*, *JMR*, *JCR*, *IJRM*, *JM*, *QME*, *JEMS*, *JCP*, *ISR*, *MIS Quarterly*, *IEEE Transactions*, etc). The themes first explored in this paper continue to be addressed in the field today. For example, Hartmann 2010⁷ points out the importance of disentangling causality issues when estimating social effects, and Chintagunta et al 2010⁸ address the issue of causality in word of mouth by using instrumental variables. Finally, this paper received the 2011 O'Dell award (awarded to the paper published in *JMR* in 2006 that had the “most significant long-term contribution” to the field of marketing).

The firm may choose to take a yet more active role in influencing interactions by encouraging consumers to engage in WOM. Godes and Mayzlin 2009 implement a field study within the context of a “buzz” campaign conducted by a promotional company on behalf of a national restaurant chain. While previous work (including my own) has looked at the link between social interactions and sales, that work has dealt with “endogenous” or naturally-occurring WOM. This is the first paper to test empirically whether a firm can create “exogenous” WOM that impacts sales. In addition, we are able to test a number of hypotheses that have important implications on the optimal design of these types of campaigns.

First, we find that indeed the firm is able to generate WOM that increases sales. Interestingly, we also find that it is the less loyal customers whose incremental WOM leads to higher sales since their friends and acquaintances have not been previously exposed to information about the product. In order to more-precisely demonstrate the

⁷ Hartmann, Wes (2010) “Demand Estimation with Social Interactions and the Implications for Targeted Marketing,” *Marketing Science*, 29(4), 585-601.

⁸ Chintagunta Pradeep K., Gopinath Shyam and Venkataraman Sriram (2010) “The Effects of Online User Reviews on Movie Box Office Performance: Accounting for Sequential Rollout and Aggregation Across Local Markets,” *Marketing Science*, 29, 5, 944-957.

underlying mechanism, we replicate our results in a laboratory setting as well. Our results imply that the firm may optimally choose to concentrate on its new customers in spreading WOM as part of a viral campaign as opposed to the very loyal customers whose networks have already been saturated with WOM.

While this paper has been published relatively recently, it has already impacted the field. It has been cited 28 times according to Web of Science and 129 times according to Google Scholar. This paper was also a Finalist for the 2009 John D.C. Little Best Paper award. In addition, the paper has generated interest in the popular and business press. (For example, it has been cited in a cover story of the *Sunday New York Times Magazine* entitled “The Hidden (In Plain Sight) Persuaders” and is discussed in the popular book “The Anatomy of Buzz Revisited” by Emanuel Rosen).

In a current project (Campbell, Mayzlin and Shin 2011) we present an analytical model that addresses the question of how the firm can use a combination of buzz marketing and traditional advertising to maximize the diffusion of information about its product. We show that when consumers engage in word of mouth to enhance their image (that is, consumers send a positive signal about their type through word of mouth), withholding information to certain groups maximizes the overall diffusion of information.

Another option for firms is to manipulate conversations surreptitiously by exploiting the anonymity afforded by online communities. This approach raises some fundamental questions regarding the viability of online word of mouth since a large amount of this kind of promotion would undermine the credibility and, thus, usefulness of online conversations. Mayzlin 2006 was the first paper to study this blurring of the lines between advertising and word of mouth. In this paper, I develop a game theoretic model where two products are differentiated in their value to the consumer. Unlike the firms, the consumers are uncertain about the products’ quality. Firms have the option of posting anonymous, positive reviews about their product. One question that immediately arises is whether – given this anonymity and given the firms’ obvious self interest – consumers would be influenced by online reviews? Broadly speaking, as more and more consumer purchases are being influenced by reviews posted by anonymous others and as the incentive grows for firms to surreptitiously manipulate these reviews, should

consumers in equilibrium continue to place faith in them? In a unique equilibrium where online word of mouth is persuasive, I conclude that the answer is yes. In this equilibrium, firms spend more resources promoting inferior products: the firm with the better product optimally free-rides on unbiased word of mouth.

This paper was awarded the 2006 Bass Outstanding Dissertation Award (the best marketing paper derived from a Ph.D. thesis published in an INFORMS-sponsored journal) and was a finalist for the 2006 John D.C. Little Best Paper award. It has been cited 52 times according to Web of Science and 175 times based on Google Scholar.

My current work (Mayzlin, Dover and Chevalier 2011) undertakes an empirical analysis of the extent to which manipulation occurs and the market conditions that encourage or discourage this activity. Specifically, we examine hotel reviews, exploiting the organizational differences between two travel websites: Expedia.com and TripAdvisor.com. That is, while anyone can post a review on TripAdvisor.com, a consumer could only post a review of a hotel on Expedia.com if she actually booked at least one night at the hotel through the website. Thus, the cost of posting a fake review on Expedia.com is quite high relative to the cost of posting a fake review on TripAdvisor.com. We show that the differences in the distribution of reviews for a given hotel between TripAdvisor.com and Orbitz.com are affected by the firm's incentives to manipulate. Note that while several papers in marketing and computer science/IT journals have attempted to empirically document the existence of manipulated reviews, the methodology we propose in this paper avoids the challenge of classifying individual reviews as fake and, instead, uses differences between sites to infer manipulation. I presented some early findings from this project in my keynote speech at the Centre for European Economics Research Conference on the Economics of Information and Communication Technologies in June of 2011.

III. Firm as Participant

Finally, the most active role that the firm can play in managing social interactions is to actually participate in consumer conversations. For example, the firm can post its views on a corporate blog, inviting and responding to comments and feedback. One key question here is how the firm's posting behavior affects the size of its audience. Mayzlin

and Yoganarasimhan 2011 starts to address this issue by analyzing the role of links to other blogs as signal of blog quality.

Mayzlin and Yoganarasimhan 2011 model bloggers as producers, and readers as consumers, of information (or “breaking news”). We allow bloggers to differ along two dimensions: (1) the ability to post news-breaking content, and (2) the ability to find news in other blogs. By linking, a blog signals to the reader that it will be able to direct her to news in other blogs in the future. The downside of a link is that it is a positive signal about the rival's news-breaking ability. Hence, one action (a link) sends multiple signals to the reader: a positive signal about the quality of a focal blog as well as a positive signal about the quality of a potential rival. We show that linking will be an equilibrium outcome when the heterogeneity on the ability to break news is low relative to the heterogeneity on the ability to find news in other blogs.

One implication of the linking mechanism is that blogs that are high on the news-breaking ability are more likely to gain readers. Hence, despite the fact that bloggers link for purely selfish reasons, the macro effects of this activity is that readers' learning is enhanced. While the setting of the model is blogs, the mechanism outlined here could be used to explain other instances of referrals in the absence of an explicit referral payment structure. That is, a Nordstrom salesperson who refers a customer seeking a particular brand of bag to Lord and Taylor may benefit by appearing well-informed to the customer. This is the first paper to address the issue of referrals in the absence of explicit incentives.

2. Firm's Advertising and Communication Strategy

My second area of interest is the firm's advertising and communication strategy. This is of course related to the participant role that the firm plays in managing consumer interactions since both involve information flow from the firm to the consumer. The primary difference is that the firm can communicate through advertising even in the absence of consumer interactions. In particular, I examine the role that advertising, and the firm's communications in general, can play in resolving the consumer's uncertainty about product's quality. Below, I discuss the papers that relate to this topic.

Mayzlin and Shin 2011 focus on the firm's decision on advertising content in cases of consumer uncertainty on product quality: whether the firm should choose an

attribute-focused appeal versus an appeal with no direct information about product attributes. We make two key assumptions: 1) the bandwidth of advertising is limited: the firm can only communicate about a limited number of attributes and 2) consumers can choose to engage in costly search to obtain additional product-related information. We show that there exists an equilibrium where the high-quality firm chooses to produce messages devoid of any attribute information in order to invite the consumer to engage in search, which is likely to uncover positive information about the product. In contrast, the mediocre firm, which is less confident of the outcome of consumer search, chooses a message that contains product attribute information.

While most of the previous literature has focused on the decision to advertise as a signal of quality (see the literature on money burning starting with Nelson 1974)⁹, we show that message content, coupled with consumer search, can also serve as a credible signal of quality. Moreover, unlike the money-burning models where advertising content plays no role, we find that the message, and not just the amount of advertising, is informative. This result is particularly important since in reality an enormous amount of resources is devoted to creating advertising.

In an ongoing project (Shin, Mayzlin and Dover 2011) we model the firm's optimal response to a negative rumor about its product. We show that the firm with an excellent product may choose not to respond to a negative rumor, while the firm with a mediocre product may choose to respond in equilibrium.

In Godes and Mayzlin 2011 we look at strategic communication between the firm and an agent. In particular, we examine how the power of the incentive scheme signals to prospective employees the quality of the product: whether the product is difficult or easy to sell. We demonstrate the existence of a separating equilibrium where the high-type firm (that with the easier-to-sell product) distorts its incentive scheme in order to signal its type to prospective employees. Depending on the context, the distortion may be in the direction of higher- or lower-powered schemes.

⁹ Nelson (1974), "Advertising as Information," *Journal of Political Economy*, vol. 81 (4), 729-54.

3. Conclusion and Future Directions

As a scholar, I have attempted to consistently raise questions that others have not yet asked and to produce insights that are both rigorous and managerially relevant. At the end of the day, I am most proud of the fact that my papers have impacted and influenced others in the field of marketing and beyond.

There are several future directions for my research. First, I will continue my research stream on social interactions. For example, one theoretical question that arises from Mayzlin, Dover, and Chevalier 2011 are the circumstances under which a site would choose to only allow a customer to post content (as is done by Expedia, for example) versus allowing anyone to post content (which is the case for TripAdvisor). Another interesting phenomenon is that while all the reviews on Expedia are anonymous and reviewers are not given the tools to develop a reputation based on posting history, TripAdvisor allows users to post their names and to create reputation through multiple postings. Again, under what circumstances are these different policies optimal? Finally, what is the effect of these decisions on the competition between sites?

Second, I hope to continue pursuing questions in the area of advertising. One way in which advertising differs from social interactions from the firm's perspective is that in traditional advertising the firm exercises tight control over the message while the firm has less control on the final message when it tries to influence conversations. However, by ceding some of the control of the message (by allowing customers to post reviews, for example), the firm may have much more credible communication. I think that it would be interesting to study the tension between the risk inherent in the loss of control versus the credibility that this affords, and the implications that this would have on the firm's communications strategy.

List of Published Papers

1. Mayzlin, Dina and Hema Yoganarasimhan (2011), "Link to Success: How Blogs Build an Audience by Monitoring Rivals," *Management Science*, forthcoming.
2. Thomadsen, Raphael, Robert Zeithammer, Dina Mayzlin, Yesim Orhun, Amit Pazgal, Devavrut Purohit, Ram Rao, Michael Riordan, Jiwoong Shin, Monic Sun, J. Miguel Villas-Boas, "A Reflection on Analytical Work in Marketing: Three Points of Consensus," *Marketing Letters*, forthcoming.
3. Mayzlin, Dina and Jiwoong Shin (2011), "Uninformative Advertising as an Invitation to Search," *Marketing Science*, 30 (4), 666-685.
4. Godes, David and Dina Mayzlin (2009) "Firm-Created Word-of-Mouth Communication: Evidence from a Field Study," *Marketing Science*, 28 (4), 721-739.
5. Chevalier, Judith and Dina Mayzlin (2006), "The Effect of Word of Mouth on Sales: Online Book Reviews," *Journal of Marketing Research*, 43 (3), 345-354.
6. Mayzlin, Dina (2006), "Promotional Chat on the Internet," *Marketing Science*, 25 (2), 155-163.
7. Godes, David, Dina Mayzlin, Yubo Chen, Sanjiv Das, Chrysanthos Dellarocas, Bruce Pfeiffer, Barak Libai, Subrata Sen, Mengze Shi, Peeter Verlegh (2005), "The Firm's Management of Social Interactions," *Marketing Letters*, 16 (3), 415-428.
8. Godes, David and Dina Mayzlin (2004), "Using Online Conversations to Study Word of Mouth Communication," *Marketing Science*, 23 (4), 545-560.
9. Gruber, Jonathan, John Kim, Dina Mayzlin (1999), "Physician Fees and Procedure Intensity: the Case of Cesarean Delivery," *Journal of Health Economics*, 18 (4), 473-490.

BOOK CHAPTER

10. Lehmann, Donald and Dina Mayzlin (2007), "Communication and New Product Adoption," *The SAGE Handbook of Advertising* (Editors: Tellis and Ambler).

WORKING PAPERS

11. Godes, David and Dina Mayzlin (2009), "Using the Compensation Scheme to Signal the Ease of a Task" (invited revision at *Marketing Science*)
12. Campbell, Arthur, Dina Mayzlin, and Jiwoong Shin (2011), "A Model of Buzz and Advertising"

CURRENT PROJECTS

13. Mayzlin, Dina, Yaniv Dover, and Judy Chevalier (2011), "Promotional Reviews: An Empirical Investigation of Online Review Manipulation"
14. Shin, Jiwoong, Dina Mayzlin, and Yaniv Dover (2011), "A Model of Rumor Management"
15. Lu, Michelle Yi, Dina Mayzlin, and Jiwoong Shin (2011), "Optimal Review System Design under Platform Competition"