

Are Consumers Independent or Interdependent?
Firm-Driven Advertising versus Consumer-Initiated Word-Of-Mouth

Jeonghye Choi
Marketing Department
The Wharton School

*Proposal Prepared for the 2007 Russell Ackoff Doctoral Student Awards
for Research on Human Decision Processes and Risk Management*

October 05, 2007

Descriptive Summary

The proposed research examines the differential effects of the firm-driven advertising efforts and consumer-initiated word-of-mouth activities on individual decision making. While research on the effect of firm advertising on consumer decisions has a long tradition in marketing and economics, the effect of word-of-mouth interactions among individuals has received less attention. In recent years however, research on word-of-mouth interactions has increased in response to data availability and widespread recognition of its theoretical importance. Of the studies that do exist, most treat the two processes as independent; hence, little is known about the joint effects of advertising and word-of-mouth on market evolution. I aim to contribute by addressing this gap in the literature.

Consumer Decision Making Internet technology provides consumers with a convenient way to engage in search and look for product information. Unsurprisingly, firms have taken advantage of increasing consumer reliance on this medium by engaging in a variety of online advertising activities. One of the most common and affordable approaches (pioneered by Google) is the linking of “search terms” or “key words” with portal sites. A consumer search on the word “diaper”, for example, directs them to diaper-carrying retailers (e.g., 1800diapers.com, diapers.com, etc.). The advantage to the firm is that payment is made on the basis of varying levels of consumer response, and that key word searches can be targeted geographically. Consumers who engage in this kind of search process are more apt to learn about the advertiser and to respond to their product and service offerings. To the extent that this kind of information is obtained by individual consumers directly, we refer to it as an *independent* information source (i.e., obtained without aid from other users).

The major rival or alternative information source is traditional word-of-mouth. Word-of-mouth is often thought to be more credible than firm-directed advertising, and this increase in credibility should lead it to be more effective. Naturally, firms may have incentives to facilitate and influence the word-of-mouth process (see Godes and Mayzlin, 2007). An important consequence or by-product of word-of-mouth is more *interdependent* information gathering and decision making.

Application The framework outlined above is used to analyze the driving forces of the emergence of new buyers in an online market environment. Specifically, I model advertising and word-of-mouth impacts on the spatial diffusion of new customers at 1800Diapers.com. 1800diapers.com is an online retailer of baby products shipping goods from three separate warehouses to the entire contiguous United States. In two short years the firm has amassed in excess of 120,000 customers and is currently the second fastest growing Internet retailer in the United States (see internetretailer.com) with growth of 340% from 2005-2006.¹ In my empirical application I develop a conceptual and statistical framework for analyzing the emergence of new buyers as evidenced by: (1) the firm's search advertising and (2) customers' word-of-mouth. New buyers indicate "information sources used" when signing up the site and I am also able to track online referrals from existing to potential customers. Unlike prior studies which typically focus on two processes separately, I propose a model which embraces both processes simultaneously. Beginning with a simple utility model of consumer behavior I derive a co-joined and correlated Poisson process for search and word-of-mouth based ordering. In preliminary analysis, this simultaneous model outperforms a variety of null models is able to capture important latent and underlying behavioral phenomena (for applications of the model, see Aitchison and Ho 1989, Gueorguieva 2001).

¹ On Thursday October 4, 2007 a *Wall Street Journal* reporter investigating online baby product retailers ("Keeping Baby Dry: We Buy Bulk Diapers") reported that 1800diapers.com was the site users she was "most likely to order from again."

Preliminary Findings Preliminary analysis suggests the following. First, the numbers of new buyers generated in each region through search advertising and WOM are highly correlated. This positive correlation remains significant even after controlling for important regional characteristics (e.g., demographics) and differences in retailing environments. This finding suggests that two outcome variables measured on the same region are affected by shared latent characteristics (e.g., inclination to look for new product and/or service information) and the positive association indicates that individuals who live in a region where word of mouth is active are also more likely to search online. Second, some region-level covariates have differential effects on two outcome variables in a manner that is consistent with theories of search and information sharing. For example, agglomeration or concentration of certain ethnic groups and income tiers has strong marginal effects on word-of-mouth, while their effects on search activities are insignificant. Third, this analysis sheds light on competition between online retailers and local brick-and-mortar businesses. Higher densities of general stores (e.g., Wal-Mart) are associated with greater extent of search and word-of-mouth activities while the presence of warehouse clubs (e.g., Costco) suppresses both activities, suggesting different patterns of complementarity and substitution between the online provider and various offline (or “outside”) options.

Market Experiment In the empirical analysis, I plan to uncover what areas are under- or over-performing compared to model predictions for search advertising and word-of-mouth generated sales, and intervene by engaging in locally-varied search advertising and referral reward system.² In particular, with the cooperation of 1800diapers.com management, I intend to intensify local search advertising and

² Godes et al (2005) stress firms’ role not as a mere observer of word-of-mouth activities among individuals toward but as a moderator and/or mediator and even a participant to effectively manage them.

increase referral rewards locally in three different sets of regions as classified from my model. These are: (1) under-performing regions, (2) over-performing regions, and (3) control regions. Outcome measures from these experiments will allow me to test the following two competing hypotheses. If large residuals from models are solely attributable to random variation, then local intervention should adjust regional performance to the model-based prediction. If, on the other hand, large residuals represent regional idiosyncrasies that the model fails to capture, then market intervention should accentuate their extremeness (i.e., intrinsically large or minimal sensitivity to search and / or word-of-mouth).

Summary I plan to explore the “advertising versus word-of-mouth” phenomenon in consumer behavior with a theory-driven empirical model. In doing so I take advantage of a unique dataset in which robust measures of both search and word of mouth are observed. Finally, I plan to test the implications of the model for “market seeding” by using the empirical results to develop a market experiment.

References

- [1] Aitchison, J. and C. H. Ho (1989), "The Multivariate Poisson-Log Normal Distribution," *Biometrika*, 76, 4, 643-653.
- [2] Godes, David, Dina Mayzlin, Yubo Chen, Sanjiv Das, Chrysanthos Dellarocas, Bruce Pfeiffer, Barak Libai, Subrata Sen, Mengze Shi and Peeter Verlegh (2005), "The firm's management of social interactions." *Marketing Letters*, 16, 3/4, 415-428.
- [3] _____ and _____ (2007), "Firm-created word-of-mouth communication: Evidence from a field test," Working paper, Yale SOM, Yale University.
- [4] Gueorguieva, R (2001), "A Multivariate Generalized Linear Mixed Model for Joint Modeling of Clustered Outcomes in the Exponential Family," *Statistical Modeling*, 1, 3, 177-193.