Social Comparisons and Contributions to Online Communities: A Field Experiment on MovieLens

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Abstract

With the increasing popularity of the Internet, information technology is changing the way we interact, entertain, communicate and consume. Concurrently, traditional social forums, such as the League of Women Voters, the United Way, or the monthly bridge club, have seen a decrease (Putnam 2000). Supporting thousands of online communities, the Internet poses an opportunity to create new social capital to replace what is lost by the decline of bowling leagues and fraternal societies. In online communities, groups of people meet to share information, discuss mutual interests, play games and carry out business. Users of communities such as SourceForge (`http://sourceforge.net/`) and Wikipedia (`http://www.wikipedia.org/`) contribute information goods, which are typically shared as public goods. However, despite the popularity of online communities, many such communities fail due to nonparticipation and under-contribution. For example, Butler (2001) found that 50% of social, hobby, and work mailing lists had no traffic over a 122 day period. Under-contribution is a problem even in active and successful online communities. For example, in MovieLens (`http://www.movielens.org`), an online movie recommendation website that invites users to rate movies and, in return, makes personalized recommendations and predictions for movies the user has not already rated, under-contribution is common. More than 22% of the movies listed on the site have fewer than 40 ratings, so few that the software cannot make accurate predictions about which users would like these movies (Cosley, Ludford

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and Terveen 2003). Similarly, Eureka, a Xerox Corporation online information sharing system, which enables its 20,000 worldwide customer service engineers to share repair tips, also suffers from under-contribution. While many service engineers download machine repair tips from Eureka, only an estimated 20% have submitted a validated tip to the system (Bobrow and Whalen 2002).

To resolve the problem of under-contribution, economists might turn to the theories of incentive-compatible mechanisms for public goods provision. However, most mechanism design theories regarding public goods rely on tax-subsidy schemes.[1] Thus, they cannot be directly applied to online communities, as these communities rely on voluntary participation and contribution of time and effort rather than monetary transfers to encourage contributions.

Furthermore, compared to traditional communities, online communities have distinct characteristics, which give the mechanism designer a new set of options. Most notably, the designer has more information than is traditionally assumed in mechanism design theory.[2] For example, some software can track the detailed activities of each user, including a user's click stream and a time stamp for each activity. From these data, the designer can infer important underlying user preferences and the time cost of each activity. Such information has been used to target customers in e-commerce, as in Amazon.com's book recommendations.[3]

In this paper, we explore how users change behavior due to the provision of social information in online communities. In particular, we investigate whether applying social comparison theory (Festinger 1954) can alleviate the problem of under-contribution in such communities. Social comparison theory is based on the idea that people evaluate themselves by comparison with other people. Festinger (1954) theorized that we compare ourselves to others who are better off for guidance, and to others who are worse off to increase our self-esteem. A

[1] See Groves and Ledyard (1987) for a survey of the theoretical literature and Chen (forthcoming) for a survey of the experimental literature.

[2] In dominant strategy and Nash implementations, it is usually assumed that the designer knows nothing about the underlying distribution of preferences or the production technology, while in Bayesian implementation, it is usually assumed that the designer knows the distribution of agent preferences, but not the realization in individual agents.

[3] For example, the book *Touching the Void* (Simpson 1988), a mountain climber's account of near death in the Peruvian Andes, received good reviews and modest success when it was first published, and was soon forgotten. Years later, another mountain-climbing tragedy, *Into Thin Air* (Krakauer 1999), became a publishing sensation. Amazon began to recommend *Touching the Void* to readers who bought *Into Thin Air*. Eventually *Touching the Void* outsold *Into Thin Air* more than two to one (Anderson 2004).

large body of literature in social psychology shows that social comparisons affect behavior, since individuals gain information on what constitutes the "right behavior" in various contexts, as well as how successful one might be based on a comparison target's performance. Furthermore, social comparison theory suggests that people lean toward social comparisons in situations that are ambiguous (see Buunk and Mussweiler (2001), Suls, Martin and Wheeler (2002) for recent surveys), a condition which is true in many online communities. Although we are not aware of a mathematical formalization of social comparison theory, three special cases of this theory have been formalized in economics. In the first case, when information regarding prevalent behavior is available, people exhibit the tendency to copy this behavior, a phenomena referred to as conformity (Asch (1956), Akerlof (1980), Bernheim (1994)). In the second case, when outcome information regarding other people's payoffs or net benefits is available, people show distributional concerns, such as inequality aversion (Fehr and Schmidt (1999), Bolton and Ockenfels (2000)). In this case, participants in the laboratory act to reduce payoff inequalities. A third related literature model interdependent preferences, where utility functions depend not only on the absolute value of consumption, but also on either the average level of consumption (Duesenberry (1949), Pollak (1976)), or the ordinal rank in the distribution of consumption (Frank (1985), Robson (1992), Hopkins and Kornienko (2004)). Samuelson (2004)'s evolutionary model provides a justification for preferences that incorporate relative consumption effects in order to compensate for incomplete environmental information.

Most studies of the impact of social comparison in economic decision making are conducted in the laboratory, using variants of the dictator games (e.g., Cason and Mui (1998), Krupka and Weber (2005), Duffy and Kornienko (2007)), the ultimatum bargaining games (e.g., Knez and Camerer (1995), Duffy and Feltovich (1999), Bohnet and Zeckhauser (2004)), or coordination games (Eckel and Wilson 2006). In comparison, we designed a *natural field experiment* (Harrison and List 2004) to compare the effects of different types of social information on contributions to an online community. We implement our experiment through a combination of email newsletters and direct modification of the MovieLens website. A natural field experiment provides a bridge between a laboratory experiment and direct field observations. Specifically, it allows us to study behavior in a more natural environment than the lab with participants who are the actual users of the site. Meanwhile, it gives the researcher more control than field observations as we can randomly assign users to different

treatments and keep all aspects of the environment constant across treatments except for the type of social information.

To our knowledge, this is the first embedded online field experiment which examines the effects of social information on non-monetary contributions.[4] To study this question, we implement a randomized field experiment on MovieLens by sending users an email newsletter which contains one of two types of social information: the median number of ratings or the net benefit score of an average user in her cohort. The control group receives information about only their own past rating behavior. We then modify the interface for each user, with new shortcuts that lead to different types of contributions, including rating popular or rare movies, updating the database, inviting a buddy or just visiting MovieLens. We then track user behavior for a month after the release of the newsletter. From this experiment, we find that, after receiving *behavioral* information about the median user's total number of movie ratings, users below the median have a 530% increase in the number of monthly movie ratings, while those above the median decrease their monthly ratings by 62%. Movements from both ends converge towards the median, indicating conformity towards a newly-established social norm in a community where such norm was absent. Furthermore, when given *outcome* information about the average user's net benefit score, consistent with social preference theory, we find that users with net benefit scores above average contributed 94% of the new updates in the database. In sum, we demonstrate that social information can be effective in increasing contributions to online communities.

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[4]Two field experiments examine the effects of social information on contribution to fundraising campaigns (Frey and Meier (2004) Shang and Croson (2005)). Our study differs from these in both the context and the medium of implementation.

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