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What Makes Users Rate (Share, Tag, Edit...)? Predicting Patterns of Participation in Online Communities

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Abstract

Administrators of online communities face the crucial issue of understanding and developing their user communities. Will new users become committed members? What types of roles are particular individuals most likely to take on? We report on a study that investigates these questions. We administered a survey (based on standard psychological instruments) to nearly 4000 new users of the MovieLens film recommendation community from October 2009 to March 2010 and logged their usage history on MovieLens. We found that general volunteer motivations, pro-social behavioral history, and community-specific motivations predicted both the amount of use and specific types of activities users engaged in after joining the community. These findings have implications for the design and management of online communities.

Author Keywords

Online communities; volunteers; motivation; participation; surveys

INTRODUCTION

Online communities derive great value from the contributions of their users. For example, Wikipedia editors have created the largest encyclopedia in history. Yahoo! Answers users have provided over one billion answers. And contributors to open source software projects have produced operating system, web browser, and web server software that rivals software produced by the largest software companies in the world.

Nevertheless, online communities have significant problems of contribution. Many communities fail [4]. Only a small percentage of users contribute content, and only a small proportion of these contribute significant amounts of content [24,35]. Even successful communities like Wikipedia face problems such as a large backlog of pending tasks [38], low retention of new editors [25], and highly unequal participation by men and women [8, 14].

Thus, it would be useful for website maintainers to be able to quickly identify whether a new user is likely to become an active participant. If the signs are not promising, perhaps an immediate “rescue” attempt could be made, e.g., getting an experienced user to welcome the

newcomer and suggest ways for the newcomer to get started. Further, online communities typically offer multiple ways for users to participate, and users often specialize in particular tasks and roles [6, 18, 37]; thus, being able to quickly identify roles that suit a new user and guide the user appropriately also may aid retention.

The present investigation frames the problem of attracting and maintaining user participation in online communities as analogous to the “problem of inaction” identified for participation in offline communities [31]. Volunteerism, for example, is a form of community participation that is widely valued throughout society. When it comes to actually volunteering one’s time, however, people’s actions fall short of their attitudes and beliefs, with barely 1 in 3 people serving as volunteers in their communities on a regular basis [11].

We believe that participation in many types of online communities can be conceptualized as a form of volunteerism. While one may not immediately view online participation as volunteerism, the defining characteristic of numerous online communities, such as Wikipedia, arXiv.org, Slashdot, open source software projects, or MovieLens (a movie recommendation community) is that people volunteer their time and effort to accomplish valued tasks together. These activities are neither required nor socially mandated. Rather, users choose to perform these activities for the benefit of the community, just like people who serve as volunteers in offline communities [39]. And by participating, they may discover additional ways of involvement beyond those that drew them to the site in the first place.

Of course there may be other types of online participation where a volunteerism model is less appropriate, such as consumers shopping on sites driven by financial incentives (Ebay, Amazon). As such, our research is specifically aimed at online communities that benefit from the unpaid, discretionary behaviors of community members.

In this research, guided by relevant theory and research on participation in volunteer communities [22, 33] we investigate the utility of several different types of information for predicting future behavior of new members of an online community:

- The general motivations they have for engaging in volunteer activities (e.g., to understand and learn about the world),
- Their relevant pro-social behavioral history (e.g., past volunteer behaviors), and
- Specific reasons they have for joining this community (e.g., to get movie recommendations or to have fun).

Our goal is to determine whether people’s motivations for volunteering, history of pro-social behavior and motivations for joining MovieLens predict overall participation in an online community and whether different motivations predict different types of behavior.

RESEARCH SITE: MOVIELENS

We conducted our study on MovieLens (www.movielens.org), an online community started in 1997 as one of the first Web recommender systems. In MovieLens, a user rates movies, and the system compares the user’s ratings to those of all other users in the system in order

to identify and recommend other movies the user is likely to enjoy. Getting movie recommendations was the original – and remains an essential – purpose of the site.

However, over the past five-plus years, MovieLens has been transformed into an online community with new and extensive opportunities for interaction and participation. Users so inclined can suggest new movies to be added to the database and edit the details (e.g., actors, directors, release date) of movies already in the database. They can tag movies to aid navigation through the movie database (and rate the tags others have assigned to movies). They can create personal profiles to represent themselves to other users, choose to make their ratings visible to other users, and interact on a Q&A-style discussion forum.

MovieLens is an active medium-sized online community. It has over 165,000 registered users, and about 30 new members join every day. Users collectively enter about 2500 new ratings and apply 150 new tags daily. Still, like most online communities, MovieLens has problems of contribution. For example, less than 2% of registered users have been active in the past year, the Q&A forum is little used, and it is a challenge to keep the database updated with timely and accurate information about new movies. Therefore, a better understanding of what motivates users to participate could be quite helpful in devising new techniques to elicit and direct user participation.

Next, we discuss the related research and theory that serves as a foundation for this work.

RELATED WORK

There is a substantial body of prior work that aims to apply psychological theory to online communities. Most closely related are studies that analyze people's motivations for participating in online communities or that invent new techniques to elicit participation. For example, Ridings and Gefen [26] found that, across several different types of online communities, the desire to exchange information with other members was the most frequently cited reason for joining. However, the second most cited reason varied depending on community type. While the desire to obtain and receive social/emotional support was the second most important reason for joining communities oriented around health/wellness and professional/occupational issues, the desire simply to make new friends was the second most important reason for joining communities oriented around personal interests/hobbies, pets, or recreation.

Further research has focused on assessing the motives of members of specific kinds of online communities. Lakhani and Wolf [13] surveyed open source software developers, identifying motivations such as intellectual stimulation, desire to improve programming skills, and adherence to the principles of open source software. Nov [19] found that fun and adherence to the principles of open source were leading motivations for Wikipedia editors, and that the fun motivation was moderately positively correlated with higher self-reported participation. Oreg and Nov [23] surveyed Wikipedia editors and open source contributors, finding differences in motivations between the two domains and uncovering relationships between psychological dispositions and motivations. And among members of a professional legal association, contributions to the association's online message board were significantly

predicted by members' perceptions that doing so would enhance their professional reputations [36].

Lampe et al. [15] studied members of the Everything 2 online encyclopedia and creative writing community using surveys and behavioral log analysis. They identified a range of theory-derived motives and found that different motives were associated with different behavioral patterns. Similarly, Butler et al. [5] found that specific benefits derived from participation were linked to specific self-reported patterns of participation among Internet listserv owners and other members. Finally, Ling et al. [16], Cosley et al. [7], and Vassileva [34] reported on theory-based interaction techniques and intervention studies designed to elicit user participation in online communities.

The present research builds on and extends prior work in the following ways. Unlike nearly all the analytical work, we combine the use of survey data and behavioral log data. It is quite useful to be able to analyze actual behavioral data, since the relation between self-reported behavior and actual behavior is not as strong as one might expect [3]. In this way our work is similar to that of Lampe et al. The current work also complements Lampe's work in several important ways. We study a different community with different properties. MovieLens is interesting to study because of the wide range of behaviors it provides. This work evaluates the roles of different psychological motivations and prior behaviors in predicting MovieLens behaviors. And it focuses solely on new members of an online community, which is useful since their expectations and attitudes have not yet been influenced by participation in the community, and the earliest stage of membership is the point of maximum leverage for potential interventions. Finally, while the current work does not create or test design interventions, the results suggest promising directions for intervention.

We next outline the theoretical approach guiding our investigation.

A FUNCTIONAL APPROACH TO COMMUNITY PARTICIPATION

This research takes a functional approach, a theoretical perspective on motivation that has guided much research on volunteerism and community involvement [6, 20]. The functional approach has shown that people may have distinct motivations to participate in the same behavioral domain [32]. In other words, different people can perform the *same behavior* to satisfy *different psychological needs*. Guided by previous theory and research on motivations for volunteering [6, 20, 33], we consider three general classes of motivations that we hypothesized might influence user participation in online communities: general volunteer motivations, pro-social behavioral history, and community-specific motivations.

General Volunteer Motivations

Research on volunteerism has identified several key motives for volunteer behavior [6, 22]. For example, people might volunteer to express or act on important values, to learn more about the world, or to grow and develop psychologically. By identifying people's underlying motivations and corresponding behavioral patterns, one can encourage volunteerism by matching individual volunteers to the activities for which they are best suited and that they

are most interested in performing. A growing body of empirical research has supported this theoretical framework and extended it to a wide variety of volunteer endeavors, e.g., recreation volunteerism [30], and types of volunteers, e.g., senior volunteers [21]. There also has been some application to participation in online communities [19].

We build on and deepen the application of this approach to online community participation. We investigate whether, for example, people who volunteer for relatively more self-oriented reasons engage in more activities that benefit them directly, and whether people who volunteer for relatively more other-oriented reasons engage in more actions that benefit the community as a whole. If such relations do exist, and if user motivations can be assessed, online community maintainers gain a powerful tool for directing users to activities that they are likely to find appealing.

Pro-Social Behavioral History

We also consider people's history of engaging in pro-social behaviors, including their history of volunteerism, level of community involvement, and engagement in everyday altruistic behaviors (e.g., giving up their seat on a bus). These behaviors are plausible predictors of online community participation since they all are activities that people freely choose (or don't choose) to perform for the benefit of others [33, 39]. Therefore, in MovieLens, it is reasonable to conjecture that people with a history of engaging in pro-social behaviors may be more likely to engage in community-benefiting activities like adding new movies into the database and editing details about a movie. Additionally, according to Omoto and Snyder [22], individuals feel compelled to act on behalf of a group if they feel a sense of connection to and identification with the group. Previous research on participation in online communities [2] has also found members' level of commitment to a specific online community to be an important predictor of participation in that community. Therefore, among new users of MovieLens, we hypothesize that people who are generally more inclined towards feeling a sense of community connectedness also should be more likely to participate in MovieLens.

Community-specific Motivations

Finally, any group or community, online or offline, will have specific attractions for potential members: people may join a book club for the intellectual stimulation, an adult hockey league for the fun of physical activity, and a sports website to get the latest scores and news and to chat with fellow fans. We therefore also examine reasons for joining MovieLens that are specific to the site's domain (movies) and the site itself, such as getting accurate movie recommendations and expressing one's opinion about movies. While these reasons are community-specific, there may be cross-community generalizations. For example, whatever the online community, one motive to join always will be to use the essential function of the site (such as getting movie recommendations), while other common classes of motives – communicating with fellow enthusiasts, expressing one's opinions, having fun – transcend utility.

STUDY AND METHODS

The goals of our study were to determine whether people's motivations for volunteering, history of pro-social behavior and motivations for joining MovieLens predict overall participation in MovieLens and whether different motivations predict different types of behavior. To make these determinations, we had to first identify users' motivations. We did this by developing a survey to administer to new MovieLens users.

Survey

In October of 2009, we modified MovieLens to administer a survey to new MovieLens users immediately after completing the signup process (which includes rating 15 movies) and before they continued on to the normal MovieLens site. The survey contained measures (based on standard instruments where available) for each of the three classes of motivation. Users who agreed to take the survey were entered into a raffle for the chance to win Amazon.com gift certificates. 3,904 users provided usable data, although most users did not provide data for all measures. Response rates for the different measures were dependent on survey order. 3,890 users completed the community specific measure (presented first), 2,307 completed the volunteer motivations measure (initially presented toward the end of the survey and later presented just after the community specific measure), and 1,651 completed the pro-social behavioral history measures (presented toward the end of the survey). Participants who completed the survey were given a tracking number so that we could link their survey data with their actual behavior on MovieLens. We next describe the measures included on the survey.

General Volunteer Motivations: The VFI

We measured general psychological motives for volunteer participation using an abridged 18-item version of the Volunteer Functions Inventory (VFI) [6]. The VFI assesses six volunteer motives on a 7-point scale (from *1 = not at all important* to *7 = extremely important*). The motives are defined as follows:

- *Protective* – volunteering to reduce negative feelings, such as guilt, or to address personal problems ($M = 3.03$, $SD = 1.64$);
- *Values* – volunteering to express or act on important values, such as humanitarianism helping those less fortunate ($M = 4.61$, $SD = 1.81$);
- *Career* – volunteering to gain career-related experiences and benefits ($M = 3.31$, $SD = 1.71$);
- *Social* – volunteering in order to strengthen one's social relationships ($M = 3.13$, $SD = 1.66$);
- *Understanding* – volunteering to learn more about other people and the world ($M = 4.03$, $SD = 1.72$); and
- *Enhancement* – volunteering to grow and develop psychologically ($M = 3.82$, $SD = 1.70$).

Consistent with suggestions [20] that much of the variability in motivations for volunteering is captured in a two category classification system in which motivations are grouped into those that focus on *others* who are the beneficiaries of volunteerism (e.g., values and understanding motivations) and those that focus on the *self* and the benefits that accrue to the self from volunteering (e.g., career advancement, esteem enhancement), we combined these six motives to get at relatively more *self-oriented* volunteer motivation (a combination of the Enhancement, Social, Career, and Protective motives) and relatively more *other-oriented* volunteer motivation (a combination of the Values and Understanding motives). Exploratory factor analysis (using maximum likelihood extraction with promax rotation) confirmed these interpretable other and self-oriented volunteer motives. The motives, though distinct, were highly correlated ($r = .78, p < .001$).

- *Other-oriented* – volunteering to learn about or benefit others ($\alpha = .92, M = 4.33, SD = 1.67$); and
- *Self-oriented* – volunteering to gain benefits for the self (e.g., friends, skills, or mood enhancement) ($\alpha = .94, M = 3.31, SD = 1.47$).

Pro-Social Behavioral History

We assessed three distinct aspects of prior pro-social behavior:

Volunteer History—Participants were asked to list all past volunteer positions held, along with the average number of hours per week served in each position. Our measure of volunteer history was the sum across all past positions of the average hours served per week ($M = 2.39, SD = 6.72$).

Altruistic Behavior—This measure was an abbreviated version of one created by Rushton, Chrisjohn, and Fekken [29]. It simply asked the user how frequently he/she engages in five helpful everyday behaviors (e.g., giving up one's seat on a bus). We created a composite score by averaging the user's responses over those five behaviors ($\alpha = .86, M = 2.83, SD = 1.21$).

Community Involvement—We developed a unique measure to capture community involvement. We simply asked participants to list all the communities (subjectively defined) to which they belonged (e.g., church, New Yorker, hunting, Labour Party, vegetarian, American, etc.). We then operationalized community involvement as the and number of communities listed ($M = 1.96, SD = 2.81$). This is a reasonable operationalization, since studies have found that the number of communities people report is associated with how closely they identify with their communities as well as their volunteer history [17].

Altruistic behavior was not related to volunteer history or community involvement ($r's < .03$); volunteer history and community involvement were positively correlated ($r = .19, p < .001$).

Community-specific Motivations

We used an 11-item scale that asked participants to rate the extent to which various reasons for joining MovieLens were important to them (from $1 = \text{not at all important}$ to $7 = \text{extremely important}$). Although the items could be viewed as assessing a single dimension ($\alpha = .88$, $M = 4.07$, $SD = 1.17$), exploratory factor analysis (using maximum likelihood extraction with promax rotation) showed that the items captured three distinct reasons for joining MovieLens. These reasons were (a) getting movie recommendations (e.g., “I want to receive accurate movie recommendations,” $\alpha = .69$, $M = 5.85$, $SD = 1.17$), (b) having fun (e.g., “I like to rate movies,” $\alpha = .87$, $M = 3.92$, $SD = 1.82$), and (c) connecting with other users and expressing oneself (e.g., “I like to share my opinions with other people,” $\alpha = .91$, $M = 3.24$, $SD = 1.55$). We refer to these as *utilitarian*, *fun*, and *social/expressive* reasons. Utilitarian reasons were modestly related to fun ($r = .31$, $p < .001$) and social/expressive reasons ($r = .26$, $p < .001$); fun and social/expressive reasons were highly correlated ($r = .64$, $p < .001$). Utilitarian reasons for joining were more common ($M = 5.85$) than fun ($M = 3.92$) and social/expressive ($M = 3.24$) reasons ($F(2,3886) = 4759$, $p < .001$).

MovieLens Behavioral Indicators

We analyzed the behavior of users for their first three months of MovieLens membership. We consider this sufficient time to understand the range of actions MovieLens provides. We studied the following specific behaviors: (1) logging into MovieLens ($M = 3.5$, $SD = 9.0$), (2) rating movies ($M = 70.3$, $SD = 210.6$), (3) editing movie descriptions (1% of users edited a movie), (4) applying tags to movies ($M = 1.9$, $SD = 23.5$), (5) voting on the quality of previously applied tags ($M = 2.2$, $SD = 20.0$), (6) sharing ratings with others (76% of users share ratings), (7) adding other users as “buddies” (3% of users had a buddy), (8) editing one’s user profile (3% of users edited their profile), (9) visiting the Q&A forum ($M = 2.8$, $SD = 27.2$), and (10) visiting the volunteer center (3% of users visited the volunteer center).

For clarity of analysis and ease of presentation, we group these behaviors into three clusters:

Basic—These behaviors are either required (logging in) or essential to the purpose of the community. Rating movies is the one truly essential behavior because you cannot join MovieLens and get recommendations without rating at least 15 movies. Logging into MovieLens and rating movies were highly positively correlated ($r = .59$, $p < .001$).

Discretionary—These behaviors are not required and are not necessary to use the site, but are still closely related to the community purpose, which for MovieLens is learning and thinking about movies. We therefore put editing movies, applying tags to movies, and voting on tags in this cluster. Editing a movie was positively related to tagging movies ($r = .23$, $p < .001$) and voting on tags ($r = .16$, $p < .001$); tagging movies and voting on tags were highly positively correlated ($r = .49$, $p < .001$).

Social/Community—The final cluster consists of behaviors that are less closely related to the core purpose of the site, but are more social and community oriented (rather than oriented on individual benefits). We include sharing one’s ratings, adding buddies, editing one’s user profile, using the Q&A forum, and going to the volunteer center in this cluster.

Sharing ratings was positively correlated with having a buddy ($r = .06, p < .001$), editing one's profile ($r = .08, p < .001$), visiting the forums ($r = .08, p < .001$), and visiting the volunteer center ($r = .06, p < .001$). Having a buddy was positively correlated with editing one's profile ($r = .17, p < .001$), visiting the forums ($r = .21, p < .001$), and visiting the volunteer center ($r = .13, p < .001$). Editing one's profile was positively correlated with visiting the forums ($r = .24, p < .001$) and the volunteer center ($r = .31, p < .001$). Visiting the forums was positively related to visiting the volunteer center ($r = .28, p < .001$).

We make no large claims for this categorization. Its purpose is simply to help us organize and present our results, and we analyze each behavior individually. We think it has some generality (e.g., to sites whose primary purpose is obtaining information and that also have a social component), but exploring its scope is beyond the concerns of this paper.

ANALYSIS AND SUMMARY OF RESULTS

We did two classes of analyses to assess how the various motivations are associated with and predict user behavior. We first computed correlations to provide an overview of the bivariate relations between predictors and behavioral outcomes of interest (see Table 1). We then did a set of regressions to investigate these relationships more deeply (see Table 2). Table 2 groups the results of three separate sets of regressions, one for Community-specific Motivations, one for General Volunteer Motivations, and one for Pro-Social Behavioral History. Continuous criterion variables (e.g., counts of logins, ratings, and tags) were log transformed to correct for outliers and skewness. Ordinary least squares regression was used when the criterion variable was continuous and logistic regression was used when the criterion variable was dichotomous. In Table 2, overall model R^2 values are reported for each regression analysis. Standardized beta weights are reported for continuous variables, whereas odds ratios are reported for dichotomous variables. An odds ratio greater than 1 indicates that the behavior becomes more likely as the predictor increases, and an odds ratio less than 1 indicates that the behavior becomes less likely as the predictor increases.

General notes—The reader might notice that the effect sizes in Tables 1 and 2 are fairly low even when the p-values indicate a significant relationship between a motivational factor and a behavior. However, as Rosnow and Rosenthal [28] have argued, a small effect can have a powerful impact on outcomes over time, especially in the aggregate. Further, since the behaviors we are predicting are (somewhat or very) rare, small effect sizes are to be expected. Additionally, the large number of analyses conducted arguably increases the likelihood of type I error. As such, the significance levels for the correlation table should be interpreted with caution. Furthermore, to preserve a true family-wise type I error rate of .05 for statistical significance and .10 for marginal significance, a Holm's procedure was employed for each family of regression analyses [1]. That is, each family of predictors was treated separately and a Holm's correction was made within the community specific motivations analyses, the VFI analyses, and the pro-social history analyses.

General Volunteer Motives

Tables 1 and 2 show that the self- and other-oriented motives from the Volunteer Functions Inventory were related to specific MovieLens behaviors. As a reminder, the other-oriented motive is defined as volunteering to learn about or benefit others while the self-oriented motive is defined as volunteering to gain benefits for the self (e.g., friends, skills, or mood enhancement). Table 1 shows that the other-oriented motive was modestly positively correlated with sharing ratings ($r = .09, p < .001$). The self-oriented motive was modestly positively correlated with sharing ratings ($r = .09, p < .001$), but was negatively correlated with logins ($r = -.06, p < .01$), ratings ($r = -.06, p < .01$), and forum visits ($r = -.04, p < .01$). The regressions reported in Table 2 provide a better understanding of the unique predictive power of self- versus other-oriented volunteer motives by considering the motives together and controlling for inflated type 1 error. Other-oriented motivation positively predicted the basic MovieLens behaviors of logging in ($\beta = .11, p < .05$) and rating movies ($\beta = .14, p < .01$), as well as participating in the Q&A forum ($\beta = .12, p < .01$). Conversely, self-oriented volunteer motivation negatively predicted those same behaviors (β 's = $-.15, -.16, -.14, p$'s $< .001$).

Pro-Social Behavioral History

Our measures of pro-social behavioral history were volunteer history, altruistic behavior, and community involvement. Table 1 shows that volunteer history was modestly positively correlated with movie edits ($r = .09, p < .01$). Altruistic behavior was negatively correlated with logins ($r = -.08, p < .01$), ratings ($r = -.11, p < .001$), tag applications ($r = -.07, p < .01$) and votes ($r = -.05, p < .05$), forum visits ($r = -.09, p < .001$), and visits to the volunteer center ($r = -.05, p < .05$). Community involvement was positively associated with logins ($r = .06, p < .05$), ratings ($r = .05, p < .05$), sharing ratings ($r = .06, p < .05$), profile edits ($r = .06, p < .05$), and visits to the Q&A forum ($r = .07, p < .01$). As with the general volunteer motivations, the regressions in Table 2 provide a clearer picture of the unique associations of pro-social history variables with MovieLens behaviors. Volunteer history positively predicted editing movies ($OR = 1.05, p < .10$). Community involvement positively predicted Q&A forum visits ($\beta = .07, p < .10$). Conversely, altruistic behaviors negatively predicted logins ($\beta = -.08, p < .05$), ratings ($\beta = -.11, p < .001$), tag applications ($\beta = -.07, p < .05$), forum visits ($\beta = -.09, p < .01$), and visits to the volunteer center ($OR = .80, p < .10$).

Community-specific Motivations

As discussed above, a factor analysis revealed three community-specific motivations to join MovieLens: (a) *utilitarian* (e.g., getting accurate movie recommendations) (b) *fun*, and (c) *social/expressive* (i.e., connecting with other users and expressing one's opinions). Table 1 revealed all three community-specific motivations were positively associated with most MovieLens behaviors, with a few exceptions. Movie edits was not associated with any community-specific motivation, and the utilitarian motive was not associated with having a buddy nor volunteer center visits. The Table 2 regressions, which consider these predictors together and control for inflated Type 1 error, show that these community-specific factors differentially predict MovieLens behaviors. Utilitarian reasons positively predicted logins ($\beta = .10, p < .001$), ratings ($\beta = .09, p < .001$), tag applications ($\beta = .05, p < .10$), and forum visits

($\beta = .06, p < .05$). Fun-related reasons positively predicted ratings ($\beta = .19, p < .001$), tag applications ($\beta = .06, p < .10$) and votes ($\beta = .08, p < .01$), and forum visits ($\beta = .08, p < .01$). Finally, social/expressive reasons negatively predicted ratings ($\beta = -.10, p < .001$), but positively predicted having a buddy ($OR = 1.30, p < .05$) and sharing ratings ($OR = 1.71, p < .001$).

DISCUSSION AND IMPLICATIONS

Our findings shed light on our guiding questions: Can we predict who will participate in an online community? What activities are specific individuals most likely to engage in? We now summarize and interpret our findings and draw out some implications for design.

Predicting Participation

Both general and community-specific motives predicted the most basic form of participation, simply logging in. Specifically, the two general VFI motives, a personal history of altruistic behavior, and the community-specific motive of receiving accurate recommendations each predicted logging into the site. Interestingly, other-oriented volunteer motivation predicted more logins, whereas self-oriented volunteer motivation and altruistic behavior negatively predicted logins.

Predicting Specific Patterns of Participation

Consistent with functional theorizing, we found that different motivations, and different histories of pro-social behavior, led to different patterns of behavior. We interpret the findings, first considering only positive predictions and organizing the discussion around the three classes of predictors:

- General motivations for engaging in volunteer activities (e.g., to understand and learn about the world),
- Pro-social behavioral history (e.g., past volunteer behaviors), and
- Specific motivations for joining the community (e.g., to get movie recommendations or to have fun).

General Volunteer Motives—People's volunteer motivations were related to general participation in MovieLens. Specifically, the other-oriented motivation predicted more basic engagement in MovieLens through returning to the site and rating movies as well as connecting with other users via the Q&A forums. The Q&A forums allow users to ask/answer questions for other users about the site or movies. It is possible then that some people use MovieLens and the Q&A forums to help satisfy an other-oriented motivation to volunteer. That is, users may come to MovieLens and use the forums partially to connect with and help others. This finding is consistent with functionalist theory and research that finds that people prefer and are more likely to engage in behaviors if those behaviors match their specific volunteer motivations [12].

Pro-Social Behavioral History—Users' pro-social behavioral histories also were related to specific patterns of behavior in MovieLens. People with more volunteer experience were

more likely to edit movies. Editing movies is a task similar to editing a Wikipedia page and requires more effort and thought than other behaviors on MovieLens. Indeed, this behavior is non-compulsory and other-oriented. The main objective is improving the MovieLens experience for all users. This is similar to traditional offline volunteering where people engage in effortful, non-compulsory behaviors for the benefit of others. Thus, past volunteerism may be a useful predictor of who will go “above and beyond” in online communities similar to MovieLens.

Likewise, people with higher community involvement were more likely to invest effort in MovieLens, notably the discretionary and other-oriented behavior of visiting the Q&A forums. These findings suggest that people who see themselves with higher general community involvement may be more likely to form a sense of community towards MovieLens and engage in behaviors that go beyond just rating movies. This complements findings that show a psychological sense of community to be an important predictor of volunteer behavior [22]. That is, it seems reasonable that those who are more oriented towards communities in general might be more likely to engage with MovieLens as a community and as a result be more likely to engage in discretionary behavior in that community. In future research, it will be important to determine which users develop a sense of community regarding MovieLens and if this sense of community predicts behavioral engagement.

Community-Specific Motives—Different community-specific reasons for joining MovieLens predicted different patterns of behavior. Utilitarian and fun reasons for joining predicted engaging in the basic behavior of rating movies, whereas social/expressive reasons predicted connecting and sharing with others. Interestingly, people with a greater desire to connect with other users and to express themselves were less likely to engage in the most basic behavior of rating movies. However, these users appeared able to find other behaviors, such as finding a buddy and sharing their ratings with others, which did match their reasons for joining. Although we did not measure users’ satisfaction with their experience, prior research on volunteerism suggests that people whose experiences fulfill their motivations are more satisfied and more likely to continue participation in the long term [6]. In future research, it will be important to assess the motivations and experiences of established users as a way to understand and affect rates of attrition and continued participation.

One Site Does Not Fit All

We also found that certain motives actually led to less participation in MovieLens. We will now consider this in some detail.

Our results suggest that MovieLens may not be a place to satisfy certain types of motives. For example, users high in self-oriented motivation to volunteer were less likely to login to MovieLens, rate movies, or visit the Q&A forums. It is possible these users did not perceive MovieLens or using the Q&A forums as ways to satisfy their more self-directed motivation to volunteer. Indeed it may be that these users are choosing other activities to fulfill this motivation; for example, the self-oriented motive of career-building is prominent for open source software participation [13].

We also found that different aspects of pro-social behavioral history predicted different kinds of activities. While volunteer history and community involvement generally led to increased participation, greater self-reported altruistic behavior led to lower levels of several behaviors we tracked. It may seem contradictory that different measures of prior pro-social behavior would differentially predict MovieLens behaviors. However, careful consideration of how volunteerism and every day altruistic behaviors differ helps explain these findings. While both volunteering and altruistic behavior benefit others, volunteering and altruistic behavior are distinct and were not correlated in our study.

Altruistic behaviors (as measured by our instrument) explicitly require face-to-face interaction, but may not require great effort (e.g., giving up a seat on a bus). Volunteering, on the other hand, may not require social interaction, but often requires a substantial commitment of both time and effort [26]. Indeed, research on informal helping and volunteerism finds that although these are similar forms of pro-social behavior, they are not identical. For example, helpfulness is an important predictor of person-focused pro-social behavior but not task-oriented pro-social behavior [9]. Consistent with this finding, our research suggests that those who are generally more helpful in their day-to-day interactions are not more likely to engage in volunteer-like behavior in sites like MovieLens. It may be that volunteering in MovieLens is more task-oriented and that the kind of active helpfulness captured by our altruistic behavior measure requires a social contract that only actual interaction can provide. At best, MovieLens provides limited ways for users to help each other.

Implication: Personalized Community Interface—Many new users of MovieLens and other similar sites do not connect with the community, participate little, and eventually drop out. Most online communities are complex and users may find that the opportunities these communities afford do not suit their motivations. Our findings suggest that we can identify the features of a site most likely to appeal to individual users. Community designers can tailor the interface to highlight for a user features most likely to appeal to the user, thus increasing retention and participation. Moreover, communities may want to actively seek new members with prior behavioral histories that correlate with increased participation in activities that benefit the entire community.

Implication: New Features to Attract New Users—We have seen that MovieLens does not satisfy a number of possible motivations. Several types of new features have the potential to attract and retain users with these motivations. For example, enhanced opportunities to help other users directly, e.g., by directly recommending movies for them to view, and enhanced social interaction (say, Facebook-style social networking) might satisfy the community-specific social motive or attract users who engage in altruistic behaviors offline.

Implication: Recommender System—Given our finding that other-oriented volunteer motives and community-specific social motives predict MovieLens behaviors, connecting users to each other may help increase engagement with MovieLens. As a part of the basic MovieLens experience of rating movies, users provide a great deal of information about their preferences. Using this information, the MovieLens system could recommend similar

users to connect with as buddies. Such recommendation systems have been shown to be effective at increasing engagement in socially oriented sites [10].

Implication: An Efficient Survey—The survey we administered to new MovieLens users was not terribly long: it typically took about 12 minutes to complete. Nonetheless, we still think the survey must be streamlined significantly before it could be deployed permanently in a site like MovieLens. Given our findings, the most promising route would be to ask just about Community Involvement, Volunteer History, Utilitarian and Social/Expressive motives for joining MovieLens, and the general volunteer motives. Such a survey could be completed in less than 5 minutes.

SUMMARY

We identified three classes of motivations that we thought might impact the amount and type of participation in the online community of MovieLens. We developed and administered a survey to new MovieLens users to assess these motivations. We then analyzed behavioral data to determine the power of the motives for predicting behavior. We found a number of interesting relationships, discussed their meaning, and drew several implications for design that we believe can be generalized across a range of online communities.

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Table 1

Correlations between different classes of motivation and clusters of behaviors. Logins, Ratings, Forum Visits, Tags, and Tag Votes are log transformed. Shares Ratings, Has a Buddy, Profile Edits, Volunteer Visits, and Movie Edits are dichotomous.

	Basic Behaviors			Discretionary Behaviors			Social/Other-Oriented Behaviors			
	Logins	Ratings	Movie Edits	Tags	Tag Votes	Shares Ratings	Has a Buddy	Profile Edits	Forum Visits	Volunteer Visits
Community-specific Motivations										
Utilitarian	.11 ***	.12 ***	.02	.06 ***	.05 **	.08 ***	.01	.03 ^	.09 ***	.02
Fun	.08 ***	.14 ***	.001	.07 ***	.08 ***	.19 ***	.04 *	.07 ***	.11 ***	.04 *
Social/Expressive	.05 **	.04 *	.02	.04 *	.05 *	.30 ***	.07 ***	.08 ***	.07 ***	.04 *
General Volunteer Motivations										
Other-oriented	-.005	.01	-.01	.01	-.01	.09 ***	-.03	.03	.01	.002
Self-oriented	-.06 **	-.06 **	.004	-.02	-.04	.09 ***	-.03	-.005	-.04 *	-.01
Pro-Social Behavioral History										
Volunteer History	.02	.04	.07 **	.02	.03	.03	-.02	-.02	.02	.01
Altruistic Behavior	-.08 **	-.11 ***	-.02	-.07 **	-.05 *	.03	-.01	.00	-.09 ***	-.05 *
Community Involvement	.06 *	.05 *	-.01	.05	.04	.06 *	.04	.06 *	.07 **	.01

Key to significance:

- ^ p < .10,
- * p < .05,
- ** p < .01,
- *** p < .001.

Table 2

Using multiple regressions to evaluate how different classes of motivation predict MovieLens behaviors. Coefficients are standardized beta weights for continuous dependent variables and odds ratios for dichotomous variables.

	Basic Behaviors			Discretionary Behaviors			Social/Other-Oriented Behaviors			
	Logins	Ratings	Movie Edits	Tags	Tag Votes	Shares Ratings	Has a Buddy	Profile Edits	Forum Visits	Volunteer Visits
Community-specific Motivations										
(n=3869)	R ² = .01	R ² = .03	R ² = .01	R ² = .01	R ² = .01	R ² = .14	R ² = .02	R ² = .03	R ² = .02	R ² = .01
Utilitarian	.10 ***	.09 ***	1.28	.05 ^	.03	1.01	.95	1.03	.06 **	1.05
Fun	.05	.19 ***	.85	.06 ^	.08 **	.98	.98	1.13	.08 **	1.08
Social/Expressive	-.01	-.10 ***	1.25	-.01	-.009	1.71 ***	1.30 *	1.22	.003	1.08
General Volunteer Motivations										
(n=2295)	R ² = .01	R ² = .01	R ² = .01	R ² = .002	R ² = .003	R ² = .01	R ² = .004	R ² = .01	R ² = .01	R ² = .003
Other-oriented	.11 *	.14 ***	.80	.06	.05	1.09	.97	1.24	.12 **	1.12
Self-oriented	-.15 ***	-.16 ***	1.26	-.07	-.08	1.07	.91	.82	-.14 ***	.85
Pro-Social Behavioral History										
(n=1643)	R ² = .01	R ² = .02	R ² = .03	R ² = .01	R ² = .01	R ² = .01	R ² = .01	R ² = .01	R ² = .01	R ² = .01
Volunteer History	.02	.03	1.05 ^	.01	.03	1.01	.97	.97	.01	1.01
Altruistic Behavior	-.08 *	-.11 ***	.85	-.07 *	-.05	1.07	.98	1.01	-.09 **	.80 ^
Community Involvement	.06	.05	.91	.04	.03	1.05	1.09	1.11	.07 ^	1.02

Key to significance:

^

p < .10,

*

p < .05,

**

p < .01,

p < .001, using a Holm's correction for multiple tests.