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Increasing Commitment to Online Communities: Designing from Theory

Abstract

An online community is not sustainable unless at least a core of members participates and makes repeated visits. This article describes strategies for increasing commitment to online communities through two mechanisms inspired by social psychological theory – identity-based commitment, in which members feel connected to a group as a whole and its purpose, and bond-based commitment, in which members are connected to particular members of the community. We translate the two conceptual mechanisms into online community designs and evaluate their effectiveness. To increase identity-based commitment, we provide members with targeted information about a group, repeated exposure to the group, and communication with the group as a whole. To increase bond-based commitment, we provide targeted information about particular community members, repeated exposure to these members, and communication with individual members. Results of a six-month field experiment show that both designs increased commitment compared to a baseline control condition, and the identity-based design was more effective. Identity-based designs led members to return to the community 44% more often than those in the baseline control condition, whereas bond-based designs led members to return 11% more often than the controls. Results of a supplemental laboratory experiment also show that identity-oriented designs led to greater self-report commitment than the bond-oriented designs. The strength of identity-based designs may reflect a shorter time required to build identity than bonds or idiosyncratic failures in implementing bond-based design features. More generally, the results

suggest that theory-inspired designs can lead to substantial increases in member commitment to online communities and greater understanding of underlying theoretical mechanisms.

Keywords: online community, design principles, social psychological theory, group identity

Increasing Commitment to Online Communities: Designing from Theory

Introduction

Online communities increasingly offer people important sources of information, social support and recreation (Horrigan and Rainie 2001). Their growth has been linked to increased social capital and tremendous business opportunities (Tapscott and Williams 2006). As with most groups, online communities with more committed members are more likely to succeed (Moreland et al., 1993). Following organizational scholars, we define commitment as an affective and behavioral connection to a community with which members identify, become involved, and enjoy (e.g., Allen and Meyer 1990). We use the terms commitment and attachment interchangeably. While organizational scholars use the term commitment, social psychologists use the term attachment to refer to the subjective state of feeling connected and loyal to a particular person, group, or community (e.g., Prentice et al. 1994). Depending upon the target with whom a member identifies – a community, subgroups within the community, or community members, design features can be created to increase commitment to the community, to its subgroups, or individual others.

Members who feel greater commitment to an online community are those most likely to provide the content that others value—e.g., answers to people’s questions in technical and health support groups (Blanchard and Markus 2004; Fisher et al. 2006; Rodgers and Chen 2005), code in open source projects (Mockus et al. 2002), or edits in Wikipedia (Kittur et al. 2007).

Committed members are those who care about and enforce norms of appropriate behavior (Smith

et al. 1997). They also are more committed to helping maintain the community, and perform behind the scenes work to keep the online community going (Butler et al. 2007).

Generating member commitment is not always easy, and many online communities fail to do so. Very large communities, such as Myspace.com and Wikipedia.org, can afford high turnover because their sheer volume ensures a core of committed members. Other communities, like Facebook.org, draw upon members' pre-existing real-world connections to schools or businesses to generate commitment to the online community. Nonetheless, these well-known success stories are more the exception than the rule. Typical online communities struggle to attract and retain members. For example, according to one investigation, 68% of newcomers to Usenet groups never returned after their first post (Arguello et al. 2006); 25% of guild members in the massively multiple-player game World of Warcraft left within a month (Ducheneaut et al. 2006); and 54% of developers who registered for the Perl open source development project posted a single message and never returned (Ducheneaut 2005). Because of this failure to attract and retain members, many online communities fail. For example, the vast majority of open source development communities at SourceForge.com have only a handful of members and no activity, and over 50% of guilds in World of Warcraft die within six months of forming (Ducheneaut et al. 2006).

Although online community designers and managers do not control many of the factors that influence members' commitment (such as competition from similar communities), designers and managers do control the features of their own sites. Several authors, and a proliferation of websites and university courses, provide advice about how to design features that make communities attractive and "sticky" (e.g., Kim 2000; Preece 2000; Spencer 2006). Much of this advice strongly advocates features that build sociality among community members. For instance, Kim (2000) recommends that all online communities provide opportunities for participants to exchange personal information so that they can build personal relationships. Contrary to this

advice, the editors of Wikipedia have developed policies such as “Wikipedia is not MySpace” (http://en.wikipedia.org/wiki/Wikipedia:What_Wikipedia_is_not) to explicitly discourage social exchanges and the formation of personal relationships.

We resolve these contradictions by arguing for a more nuanced approach, based on theory. Our theoretical approach links the goals of an online community with theoretical concepts that point to differential design features. For example, an online community whose main goal is to foster interpersonal relationships or networking would seek to create bonds between members through such design features as member profiles and messaging, but an online community whose main goal is to raise money for a cause or to build an encyclopedia may not need these features. Thus far, few scholars have taken theoretically-motivated positions on design for online communities (for one exception, see Kollock 1998), and there is little research to examine this approach empirically. This article illustrates how social psychological theories of *group identity* and *interpersonal bonds* can help designers articulate the goals of a community and use these theories to inspire designs for fostering commitment in the community. Following the design science framework presented in Hevner et al. (2004), we translated theoretical insights into design principles, linked them to community goals, implemented the principles as design features, and evaluated the effects of these features in a six-month field experiment. We show that theory-inspired design can differentially influence participants’ commitment to an online community as measured through members’ self-report, retention, and participation.

Identity-Based and Bond-Based Design Principles

Social psychological theory distinguishes two mechanisms through which people become committed to groups (Prentice et al. 1994). The first mechanism works through group identity, in which people feel connected to the group as an entity and to its purpose (Tajfel and Turner 1986; Hogg and Turner 1985). Members of the Sierra Club may know few other members, but they identify with the cause the group espouses. In the online context, frequent editors of Wikipedia

contribute to the community because they identify with its purpose of creating a member-generated encyclopedia (Bryant et al. 2005). The second mechanism works through interpersonal bonds, in which people become attached to a group through their relationships with other members (Festinger et al. 1950). Fraternity members feel attached to their fraternities in part because of the friendships they have developed with other members (Prentice et al. 1994). Member commitment to online, dating services like perfectmatch.com and social networking communities like mysapce.com develops in this way. As Prentice et al. (1994) argued, “the strength of bond-based attachment depends critically on the extent to which one knows, likes and feels similar to other members of the group...” (p. 485).

The primary mechanism for commitment to an online community will depend on its goals. Ren et al. (2007) argued that communities organized around a specific purpose or activity, or identity-based communities, will want to encourage identity-based commitment by focusing members’ attention on the community as a whole or on groups within the community. By contrast, communities organized to promote interpersonal ties, or bond-based communities, will want to encourage bond-based commitment by encouraging members to form personal relationships with one another. Identity-based communities will retain active members through their commitment to helping the group and promoting its purpose, whereas bond-based communities will retain active members through their interest in maintaining and building individual relationships with one another. These mechanisms, of course, are not mutually exclusive. Facebook.com retains members in part by organizing membership around common identities (i.e., school affiliations of its members) and partly around bonds (i.e., interpersonal links designated as “friends”).

As shown in Table 1, three general principles of community design can be derived from a vast store of research in social psychology to promote the two types of commitment. The first principle is *to provide members with targeted information about a community group* (identity-

based mechanism) or individual members (bond-based mechanism). This information is likely to engender shared knowledge and a sense of familiarity and similarity (Newcomb 1961; Byrne 1971; Utz 2003; Hollingshead 2001). The second principle is *to frequently expose members to the same group* (identity-based mechanism) or other members (bond-based mechanism). Frequent repeated exposure also will encourage feelings of familiarity with the group or individuals, respectively (Gruenfeld et al. 1996). The third principle is *to facilitate communication with a group* (identity-based mechanism) or with individuals (bond-based mechanism). Communication is a fundamental basis for group formation and individual bonds (Festinger et al. 1950). These guidelines represent only a subset of the factors that are likely to increase commitment to an online community. Other principles (such as minimizing costs of participation, setting goals, creating interdependent tasks and so forth) are relevant as well but we chose these three because they are likely to have a large effect on the amount and type of commitment that people develop to an online community and they have both identity and bond realizations so that we can compare the effects experimentally.

Insert Table 1 about Here

Design Principle 1: Provide Targeted Information

If an online community's goal is to foster identification with the group's purpose, then the features of the site should encourage group identity by giving members information about their group. Group identity in everyday life emerges from social categories such as people's ethnicity, political party, or sports team (Turner 1985; Turner et al. 1987). Researchers have induced identity-based commitment experimentally by categorizing people using group names (Postmes et al. 2002), uniforms (Worchel, et al 1998), or even random assignment to an arbitrary category (Tajfel and Turner 1986). Group identity can be enhanced online by emphasizing group homogeneity and downplaying individual members and their personal attributes (Postmes et al 2002). Wikipedia's projects, in which a group of editors collaborate on a specific topic within

Wikipedia (<http://en.wikipedia.org/wiki/Wikipedia:WikiProject>), or Facebook's groups, which link sets of members to external groups, are examples of this strategy in online communities. Group identity also increases with attention to outside groups that differ from or compete with one's own group (Hogg and Turner 1985; Postmes et al. 2001). Therefore, highlighting group boundaries and emphasizing the presence and comparison with out-groups should lead to greater identification to one's own group. Wikipedia uses this tactic when it pits its success as an encyclopedia against rivals, such as the Encyclopedia Britannica (http://en.wikipedia.org/wiki/Reliability_of_Wikipedia).

If the community's goal is to foster interpersonal ties, then its design should encourage relationships between individuals by providing information about them. Such bonds arise particularly from exchanges of personal information (Collins and Miller 1994; Postmes et al. 2001). Opportunities for self-disclosure and self-presentation shift attention from the group as a whole to individual members (Utz 2003) as does displaying photographs of individual members (Postmes et al. 2002; Sassenberg and Postmes 2002). The design should also emphasize interpersonal similarity that has been shown to cause positive evaluation of users (Cartwright 1968) and technological artifacts (Al-Natour et al. 2006).

Design Principle 2: Encourage Repeated Exposure

In early experiments, Zajonc (1968) and Milgram (1977) demonstrated a "mere exposure effect" such that the more familiar one is with objects, symbols, or people, the more one likes them. In communities with a goal of fostering identity-based commitment, making the group or its subgroups and their activities repeatedly visible to its members should increase member identification with the community and its subgroups. Many online communities provide a constant stream of updated information about the community. For example, in Wikipedia, the "my watchlist" feature shows editors changes to pages in which they have expressed an interest. A parallel recommendation can be made for communities whose goal is to foster interpersonal

bonds. That is, the more individuals encounter one another and are exposed to each other's activities, the more likely they are to communicate with each other and the more they will like and help each other (Festinger et al. 1950). The typical homepage on Facebook.com shows frequently updated information both about groups, fostering identity-based commitment, and particular friends, fostering bond-based commitment.

Design Principle 3: Facilitate Communication

If a community has the goal of fostering identity-based commitment, interaction of the community with its members (for instance, through newsletters) and even anonymous group interaction, as in some topic-related chat rooms, reinforce group identity. Community policies can suppress self-disclosure and the off-topic conversation. For example, Wikipedia's policies state, "Wikipedia is not a social network such as MySpace or Facebook. ... The focus of user pages *should not* be social networking, but rather providing a foundation for effective collaboration. (http://en.wikipedia.org/wiki/Wikipedia:What_Wikipedia_is_not)". To foster identity-based attachment, the community instead can emphasize multicast communication to the whole group, and de-emphasize the identities of individual communicators.

If the community has the goal of fostering bond-based commitment, the community should provide private, one-on-one communication channels among identified individuals. Personal, one-on-one interaction allows people to get acquainted and become familiar with one another. As they interact more, they will learn more about each other, are likely to like each other more and some will form bonds (Newcomb 1961; Moreland 1987). Frequency of interaction is a major determinant of the extent to which people build relationships online (McKenna et al. 2002).

Figure 1 summarizes our research framework and serves as an overview of the research we carried out. We developed and implemented identity-based and bond-based design features for each of the three design principles in an online community. These features included group and individual profiles, recent activity pages, and group and private commenting. If these features

were successful, they should lead members of the online community to develop the desired type of commitment to their group. Commitment should manifest in a set of visible behaviors. From theory, we predicted that some of these behaviors would occur whether the basis for commitment was group identity or interpersonal bonds. For instance, members becoming more committed through either mechanism should evaluate the community more positively, stay in the community longer, participate more, and exert more effort on its behalf (Blanchard and Markus 2004). Other consequences should differ depending on the mechanisms through which members became committed to the community. In our studies, we tested the differential prediction that members with identity-based commitment would be more likely to respond to appeals to act on behalf of the group as a whole whereas members with bond-based commitment would be more likely to respond to appeals to act on behalf of the specific members with whom they have developed relationships.

We formalized these arguments as two hypotheses:

Hypothesis 1: Compared with a base-line design, features based on the design principles summarized in Table 1 will increase members' commitment to an online community, and increase member retention and participation. Providing members with group-oriented information, repeated exposure to their group, and group-oriented communication will foster identity-based commitment. Providing members with information about individual members, repeated exposure to a subset of the individual members, and private interpersonal communication with individual members will foster bond-based commitment.

Hypothesis 2: Compared with a bond-based design, an identity-based design will cause members to report liking for their group and to contribute more when asked to act to benefit the group. In contrast, a bond-based design will lead members to report greater liking for other members they know and to contribute more when asked to act to benefit those individual members.

Insert Figure 1 about Here

We also tested a third hypothesis derived from group identity theory. In group identity theory, groups develop strong norms and a sense of “who we are” as members gain experience with the group (Moreland 1987). Norms differ widely in different communities. Wikipedians, for example, have a norm of civil discourse (<http://en.wikipedia.org/wiki/Wikipedia:Civility>), while the Usenet groups in the alt.flames hierarchy have norms encouraging uncivil discourse. Community norms are elaborated and tested repeatedly, making members resistant to new ways of behaving (Moreland and Levine 1981). The site we studied, movielens.org, is a movie recommendation website where subscribers rate movies, receive movie recommendations, and discuss movie-related topics. Until two years ago when discussion forums were introduced into MovieLens (Drenner et al. 2006), the site was strictly identity-based. Members came to MovieLens to get movie recommendations, and they had little awareness of the presence of other members (Harper et al. 2005). The introduction of discussion forums and movie tagging features (Sen et al. 2006) gradually changed the tone of MovieLens for a small set of active members among whom interpersonal friendships emerged. For these members, MovieLens became a social space. However, for the majority of members, MovieLens remained an asocial, movie-recommendation service, albeit one in which other people provided the data used for the recommendations. We therefore posited that experienced members of MovieLen or old-timers who perceive the site as asocial would be receptive only to identity-based features, whereas newcomers to the community might be equally open to identity-based and bond-based features.

Hypothesis 3: Old-timers will respond to identity-based features more strongly than bond-based features. Newcomers will respond positively to both identity and bond-based features.

Implementing Design Principles

In practice, site designers might want to foster both identity-based and bond-based commitment. However, to provide experimental control and to test the differential outcomes predicted in

Hypothesis 2 we created two distinct experiences based on two sets of features, one set purely identity-based and one set purely bond-based. We implemented these features in MovieLens.org, a movie-oriented community. It was initially built in mid '90s as a place for movie ratings and recommendations and had more than 100K users in the beginning of our study. A survey of MovieLens members conducted before the launch of discussion forums in 2006 revealed that users' primary reason to use MovieLens was to receive recommendations about which movies to watch, and that they had little awareness of the presence of other users (Harper et al. 2005). The introduction of discussion forums and movie tagging features (Sen et al. 2006) has gradually changed the tone of the website. We have observed explicit emergence of interpersonal ties and friendships in MovieLens, mostly among a small set of very active users. For this subset of users, MovieLens has become bond-based, a place to meet and interact with other movie-lovers.

We created ten subgroups within MovieLens called movie groups to which members may become committed to. Ten allowed for a sufficient number of groups for intergroup comparison but a small enough number to remember. For experimental control purposes, we assigned members to groups rather than let them self select into groups. We developed a clustering algorithm to partition MovieLens user with similar movie taste into the same group. We required our clustering algorithm to generate movie groups with approximately equal numbers of members, especially active members who rate movies and participate in the discussion forums on a regular basis, because we wished to highlight recent activities in each movie group, and groups with no activity would not be useful. Standard clustering algorithms did not meet this requirement; the k-means clustering algorithm (MacQueen 1967) placed 84% of the active MovieLens members in a single group. To create member groups that contained similar levels of activity, we developed our own algorithm, *activity-balanced clustering*ⁱ (Harper et al. 2007). We used wild animal names to label the groups: Tiger group, Eagle group, Polar Bear group, and so forth. We chose animal names because they did not have any obvious movie-relevant meaning

and would be easy to remember, thus highlighting group boundaries. The existence of more than one movie group allowed us to emphasize the presence of out-groups in the identity-based version of the community.

Applying the Targeted Information Principle: Group and Individual Profile Pages

On many popular websites, profile pages let members (e.g. in Facebook) and groups (e.g. Project pages in Wikipedia) inform others about their interests, background, and roles in the community. Following the targeted information principle, we developed a novel form of group and individual profiles that were customized for each member. In the identity-based version of the community, we created a group profile page for each of the ten movie groups. Figure 2a illustrates a movie-group profile page as it appeared to members of the Tiger group. To emphasize the group and its shared interest, the top of the page shows the name of the group, the group's icon (in this case, a picture of a tiger), and a group statement describing the types of movies the group prefers. We tried to come up with statements that were both accurate and engaging, e.g., "Bears love to watch sci-fi and fantasy blockbusters while not hibernating."

To emphasize group homogeneity, we displayed a list of movies that the group liked. To highlight out-group presence, we displayed graphs that compare how the group was performing relative to the other nine movie groups in terms of recent movie ratings and login activities. To further emphasize inter-group differences, group profile pages were shown differently for in-group and out-group members. The top of the page informed out-group viewers that they were not members of the currently displayed group. The group ranking graphs highlighted the difference between the currently displayed group and the viewer's own group. Finally, the page displayed a list of movies the currently displayed group liked and the visitor's group disliked.

In the bond-based version of the community, we deemphasized groups and constructed an individual profile for each member. Members could update their profile pages and opt-in to a feature that automatically published movie-related information to their profile, based on their

movie ratings and forum posts. About 80% of MovieLens members who were assigned to the bond-based condition agreed to share this type of information on their profiles. Figure 2b shows an example of an individual profile page. The page contains personal information fields that are editable by the member, such as name, location, gender, an open-ended text field for members to leave personal comments, and a space to upload a personal picture. Each individual profile page also contained several tables that directly related the owner of the page to the viewer of the page. For instance, one table showed a list of movies that the owner and the viewer both rated highly. This display helped members discover what they had in common with one another.

Applying the Repeated Exposure Principle: The Recent Activity Page

Web forums such as Slashdot and social networking sites such as Facebook display recent activity about groups and individuals on a front page, personalized for each user. We adapted this design practice in our efforts to increase members' commitment to their movie groups or to one another. We implemented a personalized recent activity page in MovieLens to display information about recent posts and movie ratings. A short version was available on the site front page, and a longer version was available on a linked page called the Recent Activity Page.

Following the repeated exposure principle, we showed the activities of members' movie groups to increase identity-based commitment and the activities of other members to increase bond-based commitment. We developed a repeated exposure algorithm to choose content for the recent activity displays. For a target member, the algorithm first selected the group or members that were displayed in previous sessions, in order to create recognition of groups or members over time. If the algorithm did not find enough members from previous sessions, it selected members to display that had similar movie tastes as the target member. We fine tuned the algorithm to select 80% of the ratings and posts from the member's own movie group, to increase members' familiarity and thus commitment to their own movie groups in the

identity-based version or to increase the member's familiarity and thus commitment to individuals with similar movie tastes in the bond-based version.

We used the same algorithm to select the same set of members for display in both the identity and bond versions of the recent activity page but the two versions displayed different levels of information. As shown in Figure 3a, in the identity version, recent ratings and recent posts were attributed to a movie group rather than to individuals, and displayed with group names and group icons. As shown in Figure 3b, in the bond version, recent ratings and posts were attributed to individual members and displayed with member names and pictures.

Applying the Communication Principle: Group and Individual Commenting

Websites designed to foster online relationships, such as MySpace, let members leave messages for one another. Similarly, websites designed to support identity-based communities, such as Yahoo Groups, let members broadcast messages to their group. Following the communication principle, we created commenting on group or individual profile pages to enable members to communicate with members of their group or other individual members.

In the identity version, group members could leave comments on their group profile page. Figure 2a shows the commenting feature in the lower right corner of the group profile page. Comments were entered in a text-entry box and were displayed along with the date of posting, the author's name, and the author's group icon. All messages were displayed in reverse chronological order and were paginated so only five comments appeared at a time. Only members of a movie group could read and write comments on the group's profile page.

In the bond version, members could leave comments on one another's profile pages. Figure 2b shows the commenting feature in the lower left corner of an individual profile page. Any member could leave comments for any other member. When members viewed their own individual profile, they were able to see all the comments others left for them as well as all comments they left for other members.

Field Experiment

To these hypotheses on the impact of the identity and bond features, we introduced the design features into the live MovieLens web site and examined how these features affected member attachment and behaviors over a six-month period. The field experiment enabled us to examine behavioral measures of commitment and how the new features affected member behaviors over a longer period of time, and how members with different levels of prior experience (i.e., newcomers versus old-timers) responded to the new features.

Method

The field experiment took place from January 27, 2007 to July 27, 2007 in the natural environment of MovieLens. We recruited all participants (except seven extremely active members whose inclusion may bias our results) who visited MovieLens during the experimental period and randomly assigned them to one of the three conditions: control, identity-based, and bond-based. To investigate the effects of each principle and feature separately, we constructed a full factorial design for participants in the identity-based and bond-based conditions by crossing the presence and absence of the three design features. Consequently, participants in the identity or bond condition had access to one, two, or all three of the new features, and participants in the control condition had access to none of the new features. This experimental design led to 17 cells: types of commitment (identity versus bond) X profiles (present versus absent) X repeated exposure (present versus absent) versus commenting (present versus absent) plus a control condition. With this design, we hoped to understand not only how the three new features jointly affected commitment, but also how they functioned independently and the extent to which they interacted with one another. Our experimental design was between-subject, that is, each participant was assigned to only one of the 17 conditions.

We constructed a splash page that briefly described the experiment as a user study to explore a set of new features that were being considered and tested, including movie groups, recent

activity pages, and a volunteer center where members can rate movies to help designated groups or individuals. On the splash page, we also included a statement explaining that, as part of the testing process, members might be getting different features during the test, and that afterwards we planned to offer a carefully selected set of the new features to all members. Altogether 4,818 individuals participated in the experiment, with 1,625 assigned to the identity-based condition, 1,649 to the bond-based condition, and 1,544 to the control condition. In their first login session (after the launch of the experiment), participants reviewed the splash page with a brief description of the new features they were assigned, and they had the option to share their movie ratings (80% did so). The new features defined by a participant's experimental condition were available for the rest of the experimental period. When control participants returned to MovieLens, they continued seeing the old version of MovieLens; those in the identity-based condition first saw recent activities of movie groups on their front page and then had the option to click to view group profiles, to comment, and to participate in forum discussion as group members; those in the bond-based condition first saw recent activities of a small set of MovieLens members on their front page and then had the option to click to view individual profiles, to comment, and to participate in forum discussion as individual members.

At the end of the experiment, we emailed 2,073 members who had given permission to contact them for a post-test survey and 107 of the emails bounced. With an email reminder after a week, we received 280 responses, a response rate of 14.2%. Out of the 280 respondents, 107 were assigned to the control condition, 82 to identity-based conditions, and 91 to bond-based conditions. Compared with non-respondents, respondents were slightly more active before and during the experiment by visiting the site more frequently ($p < .01$) and rating more movies ($p < .01$), but did not read more posts ($p > .14$). We also asked participants to report their familiarity with the new features, the usefulness of the new features, how they liked their movie groups, and the reasons they visited MovieLens.

Dependent Variables and Statistical Analyses

Self-report member commitment. In the post questionnaire, we asked our participants to assess on a five-point Likert scale how strongly they feel committed to MovieLens as a whole, to their movie groups, and to a frequently seen MovieLens memberⁱⁱ. The four statements to assess commitment to MovieLens are: I like MovieLens as a whole, I intend to visit MovieLens in the future, I would recommend MovieLens to my friends, and MovieLens is very useful to me (Cronbach's alpha = .85). The statements to assess commitment to one's own movie groupⁱⁱⁱ are: I identify with the [Tiger] group, I feel connected to the group, I feel I am a typical member of the group, I am interested in learning more about the group, and I would like to be with the group in the future (Cronbach's alpha = .94) The statements to assess commitment to a frequently-seen individual member are: I felt close to [the member], the member has influenced by thoughts and behaviors, I would like to be friends with the member, I am interested in learning more about the member, and I would like to interact with the member in the future (Cronbach's alpha = .94). Responses were averaged across items to calculate commitment to MovieLens, to movie groups, and members.

Visit frequency. We recorded and analyzed the average number of sessions participants logged in during the experiment. More frequent visits signal stronger commitment to the site. The data were collected at the member level. Because the number of login sessions is count data, with a distribution truncated at one, we fit the data with a Poisson Regression model. We used PROC GENMOD in SAS to perform the analyses, with the type of commitment manipulation (control, identity, and bond) and feature manipulation (profile, repeated, and commenting) as the independent variables. To control for the fact that participants who joined the experiment earlier had more days to visit, we included days in the experiment as an offset variable.

Post views. During each login session, we recorded and analyzed the number of posts a participant viewed in the discussion forums. The forums provide a venue through which

members interact with one another. The forums were part of the original MovieLens site, were distinct from the commenting feature available in the identity and bond condition and were available to all participants. More post views may reflect greater commitment. The data were collected at the session level. Because the number of post views is count data and many members logged in more than one session during the experiment, we fit the data with a mixed Poisson Regression model with sessions nested within members. We used PROC GLIMMIX in SAS to perform the analyses, again with commitment manipulation (control, identity, and bond) and feature manipulation (profile, repeated, and commenting) as the independent variables.

Movies rated. During each login session, we recorded and analyzed the number of movies that members in the identity or bond conditions rated in the volunteer center. The volunteer center included a statement saying “We’ve put together a list of new movies for you to rate that will help groups of members or other members get better movie recommendations. Click on the link below to start rating.” The participant could click the link to “help a movie group” or to “help a member” or neither option. More movie ratings signal greater willingness to contribute to help a group or its members. The data were collected at the session level. Similar to the analyses of post views, we fit the data with a mixed Poisson Regression model. We used PROC GLIMMIX in SAS to perform the analyses with commitment manipulation^{iv} (identity versus bond) and the target to be helped (groups versus individual members) as the independent variables.

Newcomer or old-timer. We classified our participants as newcomers or old-timers based on their prior experience with MovieLens. We classified participants who had joined MovieLens for less than six months as newcomers and those who had joined MovieLens for six months or longer as old-timers. Out of the 4,818 participants, 3,676 or 76.3 percent were classified as newcomers and 1,142 or 23.7 percent were classified as old-timers. Our main results remain unchanged when changing the criterion from six month to one month or one year.

Results

During the experiment, an average participant visited MovieLens 5.43 times or roughly once per month, rated 83 movies and viewed ten messages in the discussion forums. In the identity-based conditions, participants were exposed to recent activities of movie groups about 36 times ($SD = 107.7$). 1,135 out of the 1,625 participants viewed group profiles one or more times (Mean = 0.79 and $SD = 3.12$) and 72 left 98 comments. In the bond-based conditions, participants were exposed to recent activities of individual members about 32 times ($SD = 107.1$). 578 out of 1,649 participants viewed individual profiles one or more times (Mean = 0.48, $SD = 11.42$), and 20 left 24 comments. Due to the low usage of the commenting feature, we do not expect that it could have much effect on member commitment. We therefore excluded this dimension from further analyses (but discuss the issue below).

In the questionnaire, participants reported that they had seen most features but most participants had not used the new features on a regular basis. The more popular features were the recent activity page, and the individual and group profiles. The part of the profile pages that compared ratings behavior was especially popular. Participants also reported the recent activity, profile page, and movie group features as more useful, and the commenting feature as less useful.

Effects of Identity-Based versus Bond-Based Designs

Hypothesis 1 posits that the application of our design principles to promote group identity or interpersonal bonds will increase commitment to MovieLens. More specifically, we expected that both the identity-based and the bond-based manipulations would lead to greater commitment to MovieLens as a whole, more frequent visits to the site, and more post views in the discussion forums. To test the hypothesis, we compared self-report and behavioral measures in the two experimental conditions with the control condition. The results, as summarized in Table 2, provide consistent support for the impact of identity-oriented features but only partial support for the impact of the bond-oriented features. Participants in the identity condition reported

significantly greater commitment to MovieLens, visited MovieLens more frequently, and viewed more forum posts than participants in the control condition. On average, the identity-oriented manipulations increased the number of logins within the six-month period from 4.96 to 7.15, a 44% increase (Table 2, second row). The identity-oriented features also increased the number of post views per session from 0.052 posts to 0.071, a 36% increase (Table 2, third row).

Compared with the identity-oriented manipulations, the bond-based manipulations were less effective. Participants in the bond condition visited MovieLens more frequently than did participants in the control condition. The bond-oriented features increased the number of logins within the six-month period from 4.96 to 5.52, an 11% increase (Table 2, second row). However, the bond-oriented manipulations had no effect on self-report commitment to MovieLens ($p = .64$, Table 2, first row) or on views of forum posts ($p = .74$, Table 2, third row).

Insert Table 2 about Here

A detailed analysis of the three identity-oriented and three bond-oriented features revealed a significant interaction between profile pages and repeated exposure ($p < .001$). The two features seemed to amplify one other but only in the identity condition. As shown in Figure 4, participants in the identity condition with access to both group profiles and repeated exposure to their group visited MovieLens almost twice as frequently (11.6 times) as participants in other conditions (an average of 5.7 times; $p < .01$). In the bond condition, there was only a main effect of the profile pages. That is, participants with access to individual profiles visited MovieLens more frequently ($p < .001$), but repeated exposure to individual member activities did not lead to significant changes in visit frequency ($p = .23$).

Insert Figure 4 about Here

To fully understand the causal links between our design features, commitment, and member behaviors such as visit frequency, we ran a mediation analysis by (1) regressing self-report commitment on commitment manipulations, (2) regressing visit frequency on commitment

manipulations, and (3) regressing visit frequency on both commitment manipulations and self-report commitment to one's movie groups and frequently seen others. The results revealed a partial mediation of self-report commitment between our design features and visit frequency. When both our design manipulations (control, identity-based, and bond-based) and self-report commitment were included to predict visit frequency, all independent variables turned out to have a significantly positive effect on visit frequency ($p < .01$) while the positive effects of identity-based manipulations decreased from 0.689 to 0.523 and the positive effects of bond-based manipulations decreased from 0.798 to 0.640. The results gave us more confidence in concluding that the effects of our theory-inspired designs on behaviors are at least partially mediated by changes in identity- or bond-based commitment.

Differential Effects on Commitment to Groups and Individuals

Hypothesis 2 posits that identity-based manipulations will lead to greater commitment to one's own movie group and more movie ratings to help one's own movie group whereas bond manipulations will lead to greater commitment to frequently seen others and more movie ratings to help the frequently seen members. Our results provide partial support for this hypothesis, again favoring the identity-based features. Participants in the identity condition reported greater commitment to their movie groups than to frequently seen others (3.02 versus 2.28 in Table 3, rows 1 and 2 in the Identity column). By contrast, participants in the bond condition reported a roughly equal level of commitment to their movie groups and to frequently seen others (2.32 versus 2.12 in Table 3, rows 1 and 2 in the Bond column).

Insert Table 3 about Here

To examine why only participants in the identity condition differentiated commitment to subgroups from commitment to individuals, we conducted post-hoc analyses of the various measures of self-report commitment. Previous research has found that commitment to the group as a whole and commitment to individual members are independent in identity-based groups,

such as university newspapers, music groups or sports teams, but not in bond-based groups, such as university eating clubs or fraternity (Prentice et al 1994). Similar results also occur among online groups. For example, Sassenberg (2002) also found no correlation ($r = .01$) between commitment to the group as a whole and to individual members in online identity-based groups but a substantial correlation between the two variables in bond-based groups ($r = .57$).

Results from the present field experiment are analogous to both of these studies. Participants in the identity condition reported a much greater level of commitment to their movie groups than to individual members (3.02 versus 2.28, $t(52) = 6.55, p < .001$) whereas participants in the bond condition reported a roughly equal level of commitment to their movie groups and to individual others (2.32 versus 2.12, $t(52) = 1.76, p < .08$). In addition, the correlations between self-report commitment to a movie group and to individuals in it were substantially and significantly lower ($p < .001$) among participants in the identity condition ($r = .38$) than in the bond condition ($r = .77$).

Overall, participants rated slightly more movies for groups than for individuals ($p < .01$). Contrary to hypothesis 2, participants in the identity condition were slightly more likely to rate movies for frequently-seen members than for their movie groups whereas participants in the bond condition were more likely to rate movies for their movie groups than for frequently-seen members. The interaction was marginally significant ($p = .05$).

Differential Effects on Newcomers versus Old-Timers

Hypothesis 3 posits that old-timers will be more influenced by identity-oriented features than by bond-oriented features and newcomers will be influenced by both sets of features. Our results support the hypothesis. As shown in Figure 5a, compared to their counterparts in the control condition who logged in 4.8 times, old-timers in the identity condition visited MovieLens *more* frequently (5.5 logins or a 10% increase, $p < .01$) whereas old-timers in the bond condition visited MovieLens *less* frequently (4.2 logins or a 16% decrease, $p < .01$). In comparison,

compared to their counterparts in the control condition who logged in 5.0 times, newcomers in both the identity and bond conditions visited MovieLens *more* frequently (7.8 logins or a 56% increase for identity, $p < .01$ and 6.0 logins or a 20% increase for bond, $p < .01$). Across all three conditions, newcomers visited the site more frequently than old-timers ($p < .001$).

Insert Figure 5 about Here

We observed a similar pattern in post views in the discussion forums. As shown in Figure 5b, compared to their counterparts in the control condition (0.043 views per visit), old-timers in the identity condition viewed 53% *more* posts (0.066 views, $p < .01$) whereas old-timers in the bond condition viewed 12% *fewer* posts (0.038 views, $p = .39$). Compared to their counterparts in the control condition (0.09 views), newcomers in both the identity and bond conditions viewed *more* posts (0.12 views or a 33% increase for identity, $p < .05$ and 0.10 views or an 11% increase for bond, $p = .39$). Our results also suggest that on average newcomers viewed more posts than old-timers across all conditions ($p < .01$). Overall, identity-oriented features increased old-timers commitment to the community while bond-oriented features decreased their commitment. In contrast, both identity and bond features increased newcomers' commitment.

Laboratory Experiment

The field experiment just described had an important limitation. While we randomly assigned identity and bond-based features to MovieLens users, we had no mechanism to ensure that participants actually used them or were equally exposed to the features in the different experimental conditions. Instead, behavior data reported previously seem to suggest unequal exposure. While most participants did not use the communication features, participants in the bond condition used them at about 25% of the frequency of those in the identity condition. Participants in the bond condition also were 50% less likely to examine profiles than those in the identity condition. It is possible that the lack of significant effect of bond-based features on self-

report commitment in the field experiment occurred because of the lack of sufficient exposure to the features.

We conducted a supplementary, hour-long laboratory experiment to address this limitation. Fifty-six participants (half male, half female) were recruited from an experiment-scheduling website at Carnegie Mellon University. Thirty-eight participants were undergraduates and 18 were graduate students or staff. Participants were unfamiliar with MovieLens prior to the study. The first stage of the experiment involved registering for MovieLens and learning its basic features. As part of this process, participants rated at least 15 movies, and checked at least 5 movie detail pages. All participants spent 45 minutes exploring MovieLens.

This experiment replicated three experimental conditions from the field experiment – the control condition, in which participants used the classic MovieLens features, a identity-condition, in which they were exposed to all three identity-oriented features – group profiles, repeated exposure to group information and public commenting, and a bond-condition, in which participants were exposed to all three bond-oriented features – individual profiles, repeated exposure to a small set of users and private commenting. To enhance experimental control, we constructed a set of tasks, which made the participants explore the control, identity-based, and bond-based features and were comparable across conditions in terms of the information users were exposed to and the amount of effort required. For example, participants in the bond condition looked at movie ratings, posts, and profiles from individual users, updated their own profiles, and left comments for other users. In contrast, participants in the identity condition looked at movies ratings, posts, and profiles associated with groups, and left comments on their groups' profile page. This greater control allowed us to make sure all participants were exposed to all the design features in their experimental conditions.

After they had explored MovieLens, participants completed a questionnaire to assess their commitment to MovieLens as a whole, to their movie group, and to frequently seen others, using

the same scales as in the field experiment. They were instructed to imagine being a regular MovieLens user and to assess what their reactions would be if they had been using MovieLens for six months. Results from the laboratory experiment supported Hypothesis 1. As shown in Table 4, participants in both the identity-based and bond-based conditions reported stronger commitment to MovieLens than did participants in the control condition (3.66 and 3.61 vs. 2.97, $p < .05$). Results did not support Hypothesis 2. The interaction between experimental manipulation and target of the commitment was not significant ($F = 0.28, p = .60$). . Both experimental conditions increased commitment to movie groups and to frequently seen other members compared to the control condition ($p < .02$). The increased commitment was stronger toward groups than toward individuals in both experimental conditions ($p < .05$).

Insert Table 4 about Here

Overall Discussion

In this article, we examined theoretically-motivated effects of online community website design on members' commitment to an online community called MovieLens. We first translated group identity and interpersonal bonds theories into three design principles for making an online community more social. We then implemented these principles as features to foster either identity-based or bond-based commitment to the community. The identity-oriented features included a group profile page to display targeted information about a group to which members are assigned, a recent activity page to increase members' exposure to their group, and group commenting. The bond-oriented features included individual profile pages to display detailed information about individual members, a recent activity page to increase member exposure to particular other members, and private commenting to facilitate one-on-one conversations among individual members. We expected that both sets of features would increase self-reported commitment to the community as a whole, retention, and participation. We also expected that identity-oriented features would increase liking of and willingness to help the member's movie

group whereas bond-oriented features would increase liking of and willingness to help individual members. Finally, due to the identity-oriented nature of MovieLens, we predicted that old-timers would respond to identity-oriented features whereas newcomers would respond to both identity-oriented and bond-oriented features. Participants were divided into experimental groups and saw different versions of the same community – controls, identity-oriented, and bond-oriented. Table 5 summarizes the hypotheses and main findings from the experiments.

Insert Table 5 about Here

The results provide general support for the effectiveness of the new features in strengthening member commitment. In the field experiment both sets of features increased the frequency of visiting MovieLens, and the identity-oriented features also increased the self-report commitment to MovieLens and the number of post views in the forums. In the laboratory experiment, which provided more control over subjects' exposure to the features, both sets of features increased self-reported commitment. In both experiments, the strongest effects came from the identity condition. In the field experiment, for example, participants in the identity condition with access to both group profiles and repeated exposure to their group activities visited MovieLens twice as frequently as participants in other conditions. In a struggling online community inducing commitment in a way that doubles the number of visits could be the difference between success and failure. For a community supported by advertising, doubling the number of visits could double revenue.

In contrast, design features to increase commitment to individual members had weaker effects than design features to increase commitment to the group. One possible explanation is that identity-based commitment is easier to establish than bond-based commitment. Much prior research has shown that one can induce group identity easily, with the mere suggestion of group boundaries by assigning a random name or a distinctive t-shirt (see Hogg, 2001 for a review). By contrast, interpersonal bonds that matter to people – enough for them to spend time and energy

for other individuals and care about them – are often slow to develop (Berscheid and Reis 1998). Interpersonal bonds require repeated interactions and opportunities for one-on-one communication and disclosure. Hence, bonds can be very difficult to develop in communities whose members visit with infrequently. Future research needs to understand the minimum amount of communication and exposure required to create a strong bond-based community.

Another set of explanations relates to the specific community we studied and the bond-oriented features we implemented in that community. MovieLens was already established as a topic- or identity-based community. People visited MovieLens to rate movies and to get movie recommendations, rather than to meet people or to make friends. As a result, we faced a steep challenge to foster bonds in MovieLens. Members seem to have been predisposed to pay far less attention to the bond-oriented features than the identity-oriented features, a tendency born out in our newcomer versus old-timer comparisons. Both newcomers and old-timers responded positively to the identity-oriented features, by visiting the site more frequently and by reading more posts in the discussion forums. Newcomers responded to the bond-oriented features in a similar, positive manner whereas old-timers responded to the bond-oriented features in a negative manner, with fewer login sessions and fewer posts read per session. As one old-timer said, “I’d like to thank you for MovieLens. It’s a great tool and great fun for me. I do enjoy ratings, predictions, graphs and classifications. [The] social aspect of it doesn’t mean for me, but I’m sure that many people care about it.”

Finally, the relative strength of the identity-oriented features compared to the bond-oriented features may result from two problems with our implementations. Prior research suggests that one-on-one communication is one of the most powerful techniques for creating bonds whereas it is not needed to establish group identity. However, the communication features we introduced as part of the experiment were not successful and rarely used, in part because they were competing against existing movie discussion forums. This failure probably had a stronger effect on the bond

manipulation than on the identity manipulation. Second, the targeted information and repeated exposure manipulations may have been weaker in the bond condition than the identity condition because the information and exposures were spread across more unique targets in the bond condition. That is, in the identity condition, participants always saw some information about the one group to which they had been assigned during each visit. In contrast, in the bond condition, they might see information about tens or hundreds of individuals.

Implications for Online Community Design

Our design features could be readily adapted to increase member commitment in many online communities, particularly identity-based communities. Our results suggest that subgroups were an effective mechanism to increase member commitment. Although participants in the field experiment were randomly assigned to groups with arbitrary wild animal names, they reported significantly greater commitment to their own group than to other groups or individual members and this subgroup assignment increased their visits to the community and the number of posts they read. However, even though the clustering algorithms assigned members to a group that best matched their movie tastes, some participants commented that they did not fit with the group to which they were assigned. One participant said, “Once I found out the sort of movies the group [Tiger] was a fan of - romantic mainly - it didn't really make sense.” Comments like these suggest that it may be more effective to let members self-select into groups than to assign them. Clustering techniques could be used to suggest groups that members could consider joining rather than assigning them to a group.

Our results also suggest that implementing the repeated exposure principle in groups will be effective, but is more challenging when implementing it at the individual level. Typically, there are orders of magnitude more individuals than groups in an online community. In our field experiment, participants were exposed to ten movie groups in the identity condition and potentially thousands of individual members in the bond condition. Even though we selected an

algorithm to maximize the chance of a small set of members being repeatedly shown to a target member, repeated exposure to groups turned out to be much more effective than repeated exposure to individuals.

Recall that group profiles with repeated exposure doubled visit frequency but individual profiles with repeated exposure decreased visit frequency. One reason for this result may lie in the frequency at which information was updated on the profile pages. Information on a group profile page aggregates across hundreds of group members and changes much more frequently than information on an individual profile page, which remains static unless the owner of the profile logs in and uses the system or updates his or her profile information. Individual members returning to a profile page may be less likely to visit again if no new information is provided. Thus, featuring individual members on a front page with little information provided and updated (on the profile page) can result in the failure of the intended repeated exposure. This point also suggests that more features are not always better. A simple design with some information can be superior to a complicated design loaded with too much (or too little) information that confuses (or bores) members (Webster and Ahuja 2006). When new features are being considered, theory is meant to guide, rather than replace, the process of creative design and careful usability studies.

The results also suggest that when introducing new features, designers should assess the experiences of newcomers and old-timers separately. In our experience, when relational, bond-oriented features such as individual profiles and one-on-one interactions were introduced into an initially identity-based community, newcomers embraced them with enthusiasm whereas old-timers showed explicit signs of resistance. Thus, designers need to be cautious and very sensitive to the reactions of core members when they consider dramatic shifts in the themes or core offerings of a community. Generalizing the findings to other types of online communities, future research should investigate whether similar inertia or resistance will be observed in pre-established bond-based communities.

Implications for Online Community Theory

Perhaps the most important take-away message from this study is that theory-inspired design works. Despite the limits that we imposed on our design to insure appropriate experimental comparisons, identity and bond-oriented features led to substantial increases in commitment, both in terms of self-report and behavior. The main effects of identity-oriented features and bond-oriented features on commitment to MovieLens, supporting Hypothesis 1, demonstrate the effectiveness of theory-inspired design. At the same time, theory-driven design, by constructing a mid-level theory with actionable principles and testing theoretical predictions in a new context, may reveal gaps in the literature where identity and bonds theory can be further refined or extended.

The theory by Prentice and his colleagues (1994) that inspired our designs posits crisp distinctions between group identity and interpersonal bonds as the basis of commitment for online groups. This theory was group-oriented and static. That is, it emphasized differences between types of groups, ignoring heterogeneity among group members. In addition, it gave little guidance about how the differences among the groups emerged. Subsequent research suggests that this theory was incomplete. As indicated previously, both data presented in this article and in prior research by Prentice et al (1994) and by Sassenberg (2002) failed to find the distinction between identity-based and bond-based attachment in bond-based groups. Postmes and his colleagues (2006) argue that this merger of identity and bonds in social groups, like fraternities, may occur because people form social identities in part through their interaction with others. Because interaction between group members, however, did not occur in the laboratory experiment described here and was uncommon in the field experiment, other mechanism must also be in play to cause interpersonal bonds to cause a sense of shared identity with others. The mechanisms need to be further explored.

To develop theories for online communities, one phenomenon to pursue is the dynamic evolution of member commitment or community focus. For individual members of online communities over time, a shift from identity-based commitment to bond-based commitment seems to be quite common. For instance, members of an online chess group reported that by playing chess together they became friends with one other, as they talked to each other about common interests (Ginsburg and Weisband 2002). The transformation may occur at the community level as well, driven by either top-down design or bottom-up collective actions. We know less, however, about the way that forming personal attachments to particular others lead to the development of common identity (Ren et al. 2007). Future research should examine the processes through which one type of commitment evolves into the other and how the shift in commitment basis affects member attitudes and behaviors.

Limitations

We examined only one community, a primarily topic-based community. MovieLens was a good choice. The community was large and characterized by considerable churn. In addition, we had sufficient access to introduce new features, configure the system into parallel experimental conditions, and randomly assign participants to conditions. Nonetheless, the fact that the experiment was a case study of one community means that our findings need to be generalized to other types of communities, especially bond-based communities, with great caution.

We were also constrained by the desire to have parallelism between identity and bond, so our design principles and features comprised of only a subset of interesting theoretical ideas. For instance, even though group interdependence, through a joint task, purpose, or reward, strongly induces a common group identity (Sherif et al. 1961), we did not implement a full-blown feature based on group interdependence because there was no parallel implementation in the bond condition. In this project, we also limited ourselves to creating design principles to encourage commitment to a group based on theories of group identity and interpersonal bonds, even though

many other social psychological and economic theories are available as a source of design inspiration (e.g., Ling et al. 2005; Kollock 1998). In the future, researchers could and should explore a broader set of theories such as group interdependence, goal setting, public goods, and social exchange theories, just to name a few, to come up with theory-inspired design principles. We examined mostly commitment-related variables. Future research should examine other outcome and intermediate variables such as trust (Stewart and Gosain 2006), community dynamics, and network evolution (Oh and Jeon 2007).

Conclusion

This research provides a rich case study in theory-driven community design. Our findings confirm the conceptual distinction between identity-based and bond-based commitment, but also show gaps in the literature that call for future research on the comparative ease of fostering identity-based and bond-based commitment in online communities. Our theory-driven design principles provide a practical lens through which designers can look at their decisions in a nuanced and systematic manner, rather than using overly-general themes of sociality or as isolated pieces. We believe that theoretically-derived principles based on the vast social science literature are powerful tools that designers could leverage to increase member attachment and commitment to online communities. They will still need creativity to implement the design principles in specific communities. They will still need to make important choices to customize the principles to fit the technology being used, the class of members, and other particulars that may shape member experience. As Greif (1991) stated, “When it comes to design, there are often no correct answers, only wise tradeoffs among alternatives.” However, we think that the approach we have illustrated in this paper should help designers constrain and navigate the design space they need to explore.

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Table 1. Design principles to foster identity-based or bond-based commitment. For each design dimension, features of the site can be customized to promote identity-based or bond-based commitment

Design Principles	Features that Promote Identity-Based Commitment	Features that Promote Bond-Based Commitment
Provide targeted information about the community	Provide detailed information about groups Emphasize group homogeneity Highlight out-group presence	Provide detailed information about individual members Emphasize interpersonal similarity Highlight individual identities
Encourage repeated exposure to groups or individuals	Expose members repeatedly to one's own group and its activities	Expose members repeatedly to individual members and their activities
Facilitate communication within groups or among individuals	Facilitate communication with one's own group	Facilitate one-on-one communication between members

Table 2. Effects of Identity and Bond Manipulations on Self-Report Commitment to MovieLens, Visit Frequency, and Post Views Per Session

Dependent Variables	N	Commitment Conditions			Differences across conditions			
		Control	Identity	Bond	Control vs. Identity		Control vs. Bond	
					F	<i>p</i>	F	<i>P</i>
Self-report commitment	272	3.91 ^a (0.06)	4.19 ^b (0.07)	3.95 ^a (0.07)	9.52	.001	0.22	.64
Visit frequency	4818	4.96 ^a (0.90)	7.15 ^c (1.08)	5.52 ^b (0.90)	584.6	.001	43.52	.001
Post views per session	26198	.052 ^a (0.005)	.071 ^b (0.006)	.054 ^a (0.005)	6.70	.009	0.11	.74

Note: Superscripts (a, b, c) in the same row indicate significant differences between values ($p < .05$ for attachment and $p < .01$ for visit frequency and post views). Standard errors are included in parentheses.

Table 3. Differential Effects of Identity and Bond Manipulations on Self-Report Commitment and Actual Contribution

Dependent Variables		N	Commitment Conditions		Interaction between commitment and target	
			Identity	Bond	F	P
Self-report commitment	Commitment to movie groups	116	3.02 ^b (0.121)	2.32 ^a (0.117)	12.14	.001
	Commitment to freq. seen others	116	2.28 ^a (0.132)	2.12 ^a (0.127)		
Actual contribution	Movies rated for movie groups	14055	.0061 ^a (0.001)	.0080 ^a (0.001)	4.78	.05
	Movies rated for freq. seen others	14055	.0073 ^a (0.001)	.0058 ^a (0.001)		

Note: Superscripts among the four means of self-report commitment or contribution indicate significant differences between values ($p < .05$ for attachment and $p < .01$ for contribution).

Table 4. Effects of identity and Bond Manipulations on Self-Reported Commitment in the Laboratory Experiment

Dependent Variables	N	Commitment conditions			Differences among conditions			
		Control	Identity	Bond	Control vs. Identity		Control vs. Bond	
					F	<i>p</i>	F	<i>P</i>
Self-report commitment to MovieLens	56	2.97 ^a	3.66 ^b	3.61 ^b	3.92	.05	3.30	.07
Self-report commitment to movie groups	56	2.42 ^a	3.56 ^b	3.82 ^b	5.33	.02	5.60	.02
Self-report commitment to freq. seen others	56	2.35 ^a	3.16 ^b	3.18 ^b	7.39	.009	10.92	.001

Note: Superscripts (a, b, c) in the same row indicate significant differences between values ($p < .05$). Standard errors are included in parentheses.

Table 5. Summary of Hypotheses and Main Findings			
	Field Experiment	Laboratory Experiment	Comments
The main effects of identity and bonds (H1)			
Greater self-report attachment to MovieLens	Supported for identity	Supported	
Greater frequency of visiting MovieLens	Supported	N/A	Strongest effect with profiles and repeated exposure in identity.
More post views in the discussion forum	Supported for identity	N/A	
Differential effects of identity and bond on groups versus members (H2)			
Greater self-report attachment to groups in identity and to members in bond	Not supported	Not supported	In the field experiment, identity features led to increased attachment to groups, but bond features did not. In the laboratory experiment, identity and bond features led to increased attachment to both groups and individuals.
More likely to help groups in identity and to help members in bond	Not supported	N/A	Interaction opposite to prediction.
Differential effects on newcomers and old-timers (H3)			
Greater response from old-timers to identity and greater response from newcomers to both sets of features	Supported	N/A	Identity features increased attachment for both old-timers and newcomers, while bond features increased attachment for newcomers but reduced attachment for old-timers.

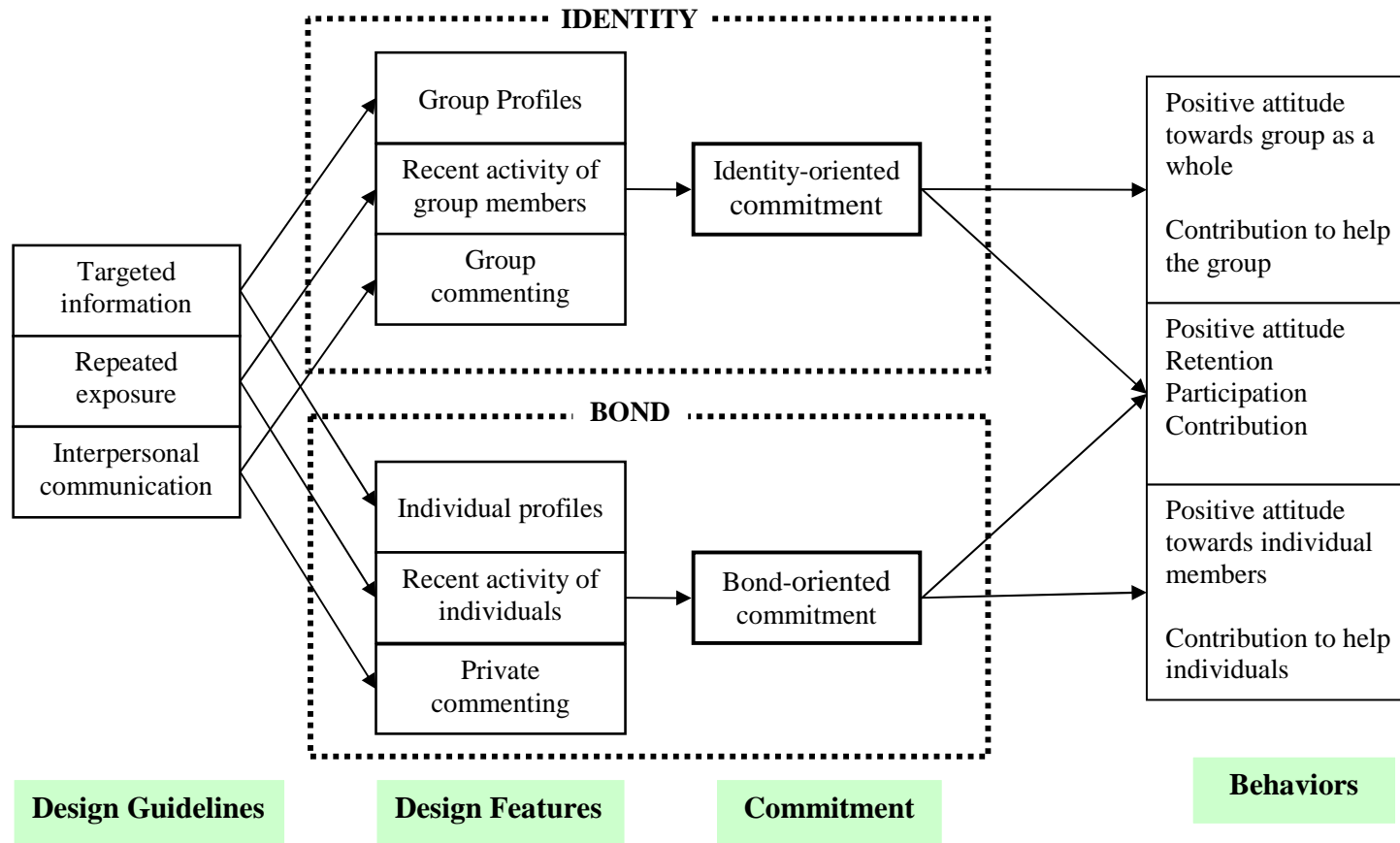


Figure 1. An Overview of Our Theoretical Framework

Tiger Group



You are a member of the Tiger Group

About this group: Tigers have complex relationships with their movies

The Tiger Group thinks these movies are cool.

Title
Lost in Translation (2003)
Match Point (2005)
Boondock Saints, The (2000)
Breakfast at Tiffany's (1961)
Closer (2004)

These movies have high ratings from the Tiger Group and low ratings from other groups.

Title	Tiger Group
Boondock Saints, The (2000)	★★★★
Closer (2004)	★★★★
Match Point (2005)	★★★★
Breakfast at Tiffany's (1961)	★★★★
Lost in Translation (2003)	★★★★

Group Rankings: Number of Movies Rated in the Last Week

Animal	Count
Rhino	828
Leopard	633
Polar Bear	620
Alligator	459
Lion	419
Eagle	360
Gorilla	358
Tiger	262
Snake	209
Bear	157

Frequently Rated Tiger Group Movies: All Time

Title	Average Rating	# of Ratings
Lord of the Rings: The Two Towers, The (2002)	★★★★	(457)
Shrek (2001)	★★★★	(398)
Lord of the Rings: The Return of the King, The (2003)	★★★★	(381)
Matrix, The (1999)	★★★★	(367)
Lord of the Rings: The Fellowship of the Ring, The (2001)	★★★★	(366)

Group Rankings: Active Members

% of members from each group who logged in during the past week

Animal	Percentage
Polar Bear	14%
Eagle	9%
Alligator	8%
Lion	8%
Rhino	8%
Leopard	7%
Gorilla	6%
Bear	5%
Snake	3%
Tiger	2%

Comments [prev | next]

 **myname** said on September 18, 2006
What's up?

 **muck_stirrer** said on September 18, 2006
How many of tigers are in this group?

 **TNTrucker** said on September 18, 2006
Breakfast at Tiffany's is pretty great!


 **snezhinka** said on September 18, 2006
The tiger group likes cool movies!


 **mr_rogers** said on September 18, 2006
You talkin' to me? You talkin' to me? You talkin' to me?

Leave a comment for the Tiger Group
type your comments here

[Add Comment](#)

galaxy




This user is in the  Tiger Group.

Personal Information


Name:
City:
State: Southwest
Country: United States
Gender:
Age:
Favorite color:
Web Page:


Joined MovieLens: May 2, 2005
Last visit to MovieLens: September 16, 2006


Comments [prev | next]

 **dadsdayoff** said on September 13, 2006
I'm supposed to see Spelldown, which you rated 4 stars. Why was it good?

 **bife** said on September 13, 2006
Our comedies are not to be laughed at.

 **magsy** said on September 13, 2006
Hey - where'd you get that picture?

 **MarcusLarson** said on September 13, 2006
I also liked 'a day without a mexican!...nice taste

 **marliez** said on September 13, 2006
Thanks for the seabiscuit recommendation in the forums

Leave a comment for galaxy
type your comments here

[Add Comment](#)

Did You Know?

You and galaxy rate these movies high:

Title	galaxy's Rating	Your Rating
Casablanca (1942)	★★★★★	★★★★★
Toy Story (1995)	★★★★★	★★★★★
Clerks (1994)	★★★★★	★★★★★
Smoke Signals (1998)	★★★★★	★★★★★
Wallace & Gromit: A Grand Day Out (1989)	★★★★★	★★★★★

You and galaxy rate these movies low:

Title	galaxy's Rating	Your Rating
Con Air (1997)	★	★
Addams Family Values (1993)	★	★★
Big Momma's House (2000)	★	★★
Flintstones, The (1994)	★	★
Ace Ventura: When Nature Calls (1995)	★	★

You and galaxy disagree on these movies:

Title	galaxy's Rating	Your Rating
Boogie Nights (1997)	★★★★★	★★
Office Space (1999)	★	★★★★★
Aladdin and the King of Thieves (1996)	★	★★★★★
Wizard of Oz, The (1939)	↓	★★★★★
Bull Durham (1988)	↓	★★★★

MovieLens recommends these movies that galaxy rated high:

Title	galaxy's Rating	Your Prediction
Moulin Rouge (2001)	★★★★★	★★★★★
Rashomon (Rashômon) (1950)	★★★★★	★★★★★
Out of the Past (1947)	★★★★★	★★★★★
Lower Depths, The (Donzoko) (1957)	★★★★★	★★★★★
Seven Samurai (Shichinin no samurai) (1954)	★★★★★	★★★★★

You and galaxy have posted together in these threads:

Thread

If you could only have 10 movies...

[New Feature: Movie Linking](#)

Figure 2a. Profile Page of the Tiger Group

Figure 2b. Profile Page of a fake member named Galaxy



Figure 3a. An Identity Version of the Recent Activity Page



Figure 3b. A Bond Version of the Recent Activity Page

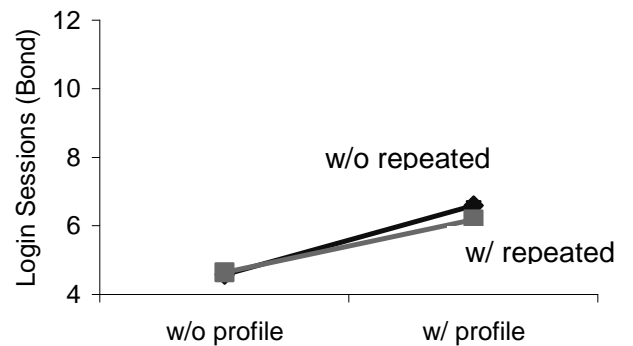
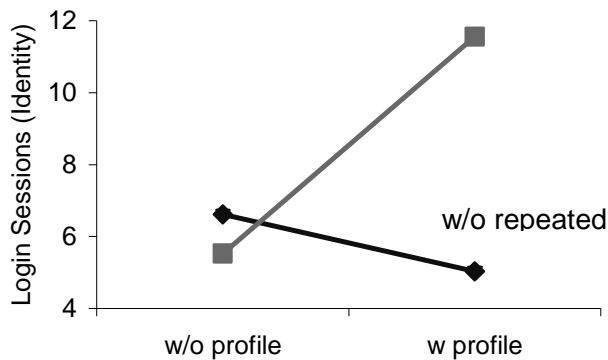


Figure 4. Accumulative Effects of Profile and Repeated Exposure

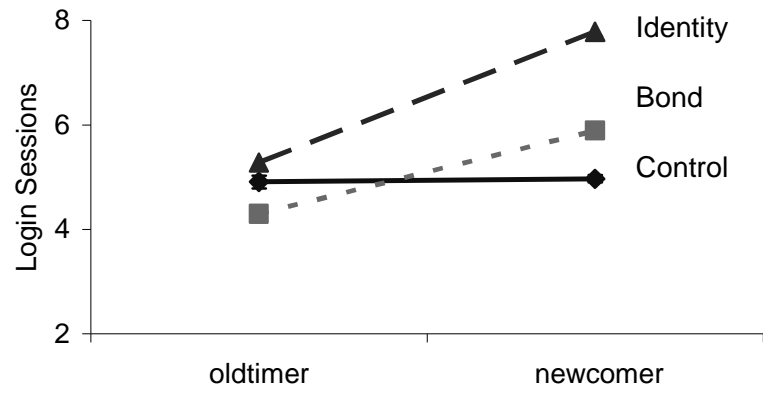


Figure 5a. Visit Frequency of Old-timers versus Newcomers

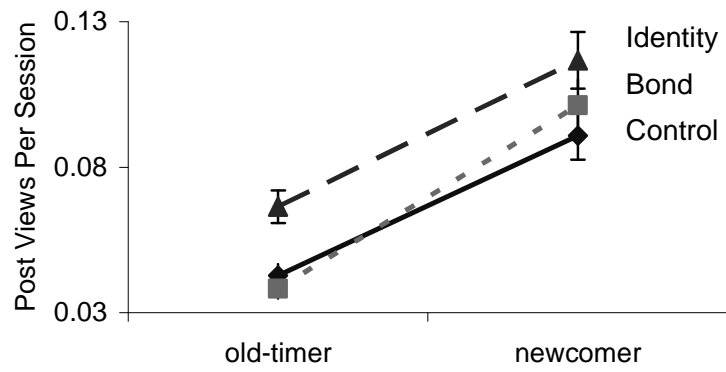


Figure 5b. Post Views of Old-timers versus Newcomers

Endnotes

ⁱ Our activity-balanced clustering algorithm is based on Banerjee and Ghosh's approach (2002) to generate equal-sized clusters. The algorithm first uses a (slow) balanced hierarchical clustering algorithm on a subset of data then uses a (fast) stable marriage-inspired algorithm to fully populate the clusters. Because we wanted members with similar taste to be placed in the same group, we computed similarity scores by measuring the cosine similarity between members' movie ratings vectors, weighted by the number of co-ratings (Sarwar et al. 2001). To generate our final movie groups, we ran the first stage of the algorithm on the MovieLens population who had been recently active, thus distributing recent contributors equally across the ten movie groups, then ran the second stage of the algorithm to distribute the remaining (recently inactive) members.

ⁱⁱ We selected the frequently seen members based on actual exposure. We showed participants three members whom they had seen during the experiment and asked them to report how familiar they are with each member. We then asked participants about their feelings toward the member with whom they reported as the most familiar.

ⁱⁱⁱ To make sure that all participants knew and could answer questions about movie groups, we inserted group names on the individual profile page in the bond condition (as shown in Figure 2b).

^{iv} Participants in the control condition had no access to the volunteer center. Therefore they were not included in the analysis of movies rated.