

Applying Common Identity and Bond Theory to Design of Online Communities

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Abstract

Online communities depend upon the commitment and voluntary participation of their members. Community design — site navigation, community structure and features, and organizational policies — is critical in this regard. Community design affects how people can interact, the information they receive about one another and the community, and how they can participate in community activities. We argue that the constraints and opportunities inherent in online community design influence how people become attached to the community and whether they are willing to expend effort on its behalf. We examine two theories of group attachment and link these theories with design decisions for online communities. Common identity theory makes predictions about the causes and consequences of people's attachment to the group as a whole. Common bond theory makes predictions about the causes and consequences of people's attachment to individual group members. We review causes of common identity and common bond, and show how they result in different kinds of attachment and group outcomes. We then show how design decisions, such as those focused on recruiting newcomers versus retaining existing members, constraining or promoting off-topic discussion, and limiting group size or allowing uncontrolled growth, can lead to common identity or interpersonal bonds among community members, and consequently to different levels and forms of community participation by those so motivated.

Keywords: online community, member attachment, common identity, common bond, design

'There is nothing so practical as a good theory.' Kurt Lewin (1951: 169)

Introduction

The Internet has added online groups, voluntary associations, and communities to people's options for participating in groups even as some scholars argue that social participation has declined, at least in America (Putnam 2000). By 2000, a patient newly diagnosed with breast cancer in Chicago, for example, could join one of 50 or so local support groups dealing with her illness, organized by hospitals or the local branch of the American Cancer Society, or one of more than 200 online groups (Davison et al. 2000). Today, college students wishing

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to stay in touch with high school friends or meet new people can go to high school reunions and college mixers or they can use the social networking facilities of MySpace, Facebook, Meetup, Yahoo! Groups, and many other online resources. Software developers seeking help with an arcane technical question can ask others in their company or they can send their question to technical Usenet groups, email discussion lists of professional associations, or such IT-related groups or websites as Slashdot to get the answer.

Most of the information, social support, camaraderie, and entertainment available from these online collectives come from the voluntary contributions their members provide. We use the term 'online community' to describe these online groups, voluntary associations, organizations, and communities. Following Preece (2000), we define an online community as an Internet-connected collective of people who interact over time around a shared purpose, interest, or need. Almost all online communities rely upon people's voluntary commitment, participation, and contributions. They need visitors to return and members to interact with others to maintain the community infrastructure, generate new and updated information, and provide social and emotional support to other members.

One reason online communities are so dependent on members' voluntary contributions is that the people who run them usually have less authority and control over their members than do managers of conventional organizations. Unlike managers in formal work organizations, they generally cannot rely upon employment contracts or financial incentives to get organizational members to show up and work (although see <http://answers.google.com/answers/> for an exception). Instead they must design the online environment so that it encourages commitment and contributions from members. Practitioners (e.g. Kim 2000) and academics (e.g. Preece 2000; Kollock and Smith 1996) have proposed ways to develop online communities, but most of these efforts have not adequately harvested the insights available from social science theory and empirical research about the design choices they have.

In this article, we contrast two different ways that people can develop commitment to online communities — by becoming attached to the community as a whole or by becoming attached to individual members. We argue that the theories describing these forms of attachment, common identity theory and common bond theory, help us to understand and predict important outcomes in online communities, including the conditions under which these communities can recruit new members, retain old members, and successfully solicit contributions from them. These theories should help researchers understand how the creators and managers of online communities can make some of the myriad design choices that will influence members' commitment and contribution. These theories also foster a different way to think about research in online organization in which theoretical propositions drawn mainly from offline laboratories and domains are adapted to the structural and policy choices of the online situation.

Designing Online Communities

All online communities embody technical and social choices that influence how visitors or members interact with the information and people that comprise the

community. For example, in both netflix.com and movielens.org, two social recommender sites (Resnick and Varian 1997), subscribers' judgments of movies they have seen provide the basis for the site's making recommendations to others. Yet until recently, neither site made the social nature of the recommendations visible and thereby undercut people's willingness to rate movies to help other subscribers. Contrast this design with a cancer support group, in which direct conversation among subscribers makes the help one person provides another highly visible.

Technical and social choices that influence people's interactions in the community are implemented through 'community design', that is, the navigation architecture, site features, interactions, and organization structures and policies of the community. People involved in community design are the software developers, list owners, web managers, and managers or owners of the community, who construct and maintain the community. They also may include core participants in the community, whose actions and explicit comments set the norms for how peripheral members should behave. Sometimes, as in the immersive environment called *Second Life* (www.secondlife.com), core members are involved deeply in content and community development. We will refer to all these actors as 'community designers'.

Community designers make numerous large and small design decisions that influence the way the community motivates participants. For example, consider one choice that an owner of a health support group must make. Should the design of this site, through its moderation, policies, or structure, discourage members from having off-topic discussions? If members are using the forum to get advice about medications and their side-effects, off-topic posts about such things as the writer's dog or the latest football score can be distracting, and they may be especially off-putting to newcomers whose initial expectations are likely to be violated. On the other hand, off-topic discussion provides opportunities for self-disclosure and friendship (Preece and Maloney-Krichmar 2003). If designers discourage off-topic discussion, they might lose people who would like to talk with others like themselves. Discouraging off-topic discussion also may annoy old-timers, who have gotten to know each other. Thus, the choice that community designers make about off-topic discussion can influence who joins the community and who stays.

Similar trade-offs occur when designers determine whether to limit the size of an online community or allow unlimited growth, whether to cluster users into communities of interest or provide unstructured access to all content, or whether to require members to register with a verifiable identity or allow them to participate in the community anonymously. As we will show in this article, the first option in each case favors people who are seeking personal relationships whereas the second option favors those who are seeking specific information. These issues represent a challenge in online community design — how to configure and manage the community to satisfy members with divergent and possibly changing motives.

In the rest of this article, we describe common identity and bond theories, which describe different forms of attachment to groups. We review the literature comparing the two theories. We discuss the causes of common identity and common bond

attachments, and the consequences of these forms of attachment for community member behavior and community outcomes. We then present a set of theoretical predictions and use these predictions to understand online community design choices and trade-offs having to do with community growth, subgroup structure, managerial intervention or moderation, and reward policies. We conclude that applying social science theories, such as those describing common identity and common bond, provides a useful and usable perspective on people's experiences in online communities and community success. These theories are both prescriptive, helping designers of online communities to make managerial and technological choices that will contribute to the success of their communities, and predictive, helping to explain the evolution of online communities.

Common Identity and Common Bond Theories

The concepts of common identity and common bond derive from social psychological studies of voluntary real-world groups such as fraternities and clubs (Prentice et al. 1994). The distinction between identity and bond refers to people's different reasons for being in a group, that is, because they like the group as a whole — identity-based attachment, or because they like individuals in the group — bond-based attachment (Back 1951). Tajfel and his colleagues (1971) demonstrated that merely labeling people as, for instance, 'over-estimators' and 'under-estimators', could activate common identity, even if the research participants did not know others in their group. Identification with a group can be very powerful in real-world groups, where, for example, people become strongly committed to the Sierra Club or the National Rifle Association without knowing any other members. When people feel identity-based attachment to a group, they tend to perceive others in the group as interchangeable (Turner 1985). One implication of this perception is that identity is comparatively stable in the face of turnover in membership. In contrast, in bond-based attachment, people feel connections to each other and less to the group as a whole. Consider, for example, friends who decide to join a contract bridge club. In this case, the club members have a common bond with their friends who are also members, but they may not have a common identity with the club as a whole. Should their friends leave the club, they are likely to drift away as well (e.g. Krackhardt and Porter 1986).

Prentice et al. (1994) studied the distinction between common identity and common bond feelings in university clubs. They classified topic-based groups, such as art groups, the school newspaper, and sports teams, as common identity groups, and relation-based groups, such as residential units, fraternities, and eating clubs, as common bond groups. Members of the common identity groups reported feeling more attached to their group as a whole than to their fellow group members, whereas members of the common bond groups reported feeling attached both to the group as a whole and to group members. The authors argued that 'the two perspectives might ... be viewed as describing two separable processes in the development and maintenance of groups, either of which might dominate under a given set of circumstances' (Prentice et al. 1994: 490).

Following Prentice et al., many researchers have studied common identity and common bond by categorizing groups into identity-based versus bond-based groups, based on the typical motivation of group members (e.g. Sassenberg 2002). Thus, for example, a cancer-support group whose members exchange information about medication and keep up with each other's health status is more of a bond-based group than is a technical support group, whose members merely exchange technical information. However, it may be more fruitful to think of identity and bond as two dimensions of members' attachment to groups. A cancer support group can have long-term members who belong mainly because of their strong interpersonal ties with other members who have helped them in the past, and it also can have new members who belong because of their identity as cancer patients, who want to use the group primarily to learn useful information (Seeley et al. 2003). We believe a group's design can increase the likelihood of mainly bond-based or identity-based attachment to the group. One of the complexities, however, of purposeful design is managing the trade-offs among the design choices, so that decisions for example that increase the likelihood that group members will grow to like each other do not at the same time reduce their chance of becoming attached to the group as a whole (see Postmes et al. 2005, for an example of these trade-offs.)

The distinction between identity-based and bond-based attachment also has been applied to online communities (e.g. Postmes and Spears 2000; Sassenberg, and Postmes 2002; Utz 2003; Utz and Sassenberg 2002). In general, common identity in the online context implies that members feel a commitment to the online community's purpose or topic. The following message sent by an existing member of a cancer support group to a newcomer illustrates this type of attachment. 'Welcome to the list nobody wants to join. While it really stinks to have to be here, you'll find a wealth of experience. You'll find many excellent suggestions and tips prior to surgery in the archives.' Common bond in the online context, in contrast, implies that members feel socially or emotionally attached to particular members of the online community. This quote from a thank you note from one member of the cancer support group to another illustrates the type of bond developed between the two. 'Thanks for your kind words — YOU [sic] are an inspiration to me... ! I still remember that you were the first to respond to my first post on this list, more than 4+ years ago.'

Literature Review

As a basis for understanding the causes and consequences of identity-based and bond-based attachment to online communities, we reviewed research articles from the social psychological literature. We identified the relevant literature using a snowball sampling technique. We started with three highly cited papers on common identity and bond (Postmes, and Spears 2000; Prentice et al. 1994; Sassenberg 2002) and then used their bibliographies and the Social Science Citation Index to identify relevant research that was cited by or cited these papers, respectively. Our sample includes 22 articles whose authors made an explicit distinction between identity and bond attachment. All articles present

empirical evidence on the causes or effects of identity and bond motives. We summarize important constructs from these articles in Table 1.

Causes of Common Identity

Researchers have studied three main causes of group identity or commitment to the group as a whole: social categorization, interdependence, and intergroup comparisons.

Social Categorization

One can create group identity merely by defining a collection of people as members of the same social category (Turner 1985; Turner et al. 1987). Categorization can be based on objective criteria, such as organizational membership, or on subjective criteria, such as participants' political values or choices (Amichai-Hamburger 2005; Postmes and Spears 2000; Karasawa 1991). Researchers have categorized people using group names (Michinov et al. 2004; Postmes et al. 2002), uniforms (Worchel et al. 1998), and even random assignment to an arbitrary category (Tajfel et al. 1971; Hogg and Turner 1985). While earlier research used face-to-face groups, recent research also shows that random assignment can create feelings of group identity in online settings (Amichai-Hamburger 2005).

Many online health support group members are attached to their group because of their shared identity as sufferers or survivors of a particular illness or treatment. In these communities, people can share their common experience regardless of who specifically is listening and answering questions.

I knew they knew where I was coming from ... They understood what I was talking about. For someone who has not been there, they truly don't know how you feel ... And so I just think it's been really helpful to be able to be in contact with women who are going through the same thing. (Shaw et al. 2000: 146–147)

Interdependence

Groups whose members are cooperatively interdependent tend to become committed to the group. Interdependence through a joint task, a common purpose, common fate, or joint rewards fosters group identity. A joint task is a task that involves inputs from all members (Culnan 2005; Worchel et al. 1998; Sherif et al. 1961; Cartwright 1968). A common purpose is a goal that the group as a whole can attain, such as a high group score (Postmes et al. 2001). Common fate means that the group members benefit or receive the same treatment or outcomes (Michinov et al. 2004; Worchel et al. 1998).

Interdependence can cause feelings of common identity in online communities. Online communities that build open source software (e.g. <http://www.apache.org/>) or online reference books (e.g. <http://en.wikipedia.org/>) have an interdependent task and common purpose that focus motivations on the community as a whole. Bryant et al. (2005) describe how the common goal of developing the world's best encyclopedia led readers of Wikipedia to become 'Wikipedians', active contributors committed to the community and its goal. As three Wikipedians remark, 'I really got inspired by the idea [of the Wikipedia]. I'd say a lot of

Table 1. Summary of Studies on Common Identity versus Common Bond

Authors	Year	Concepts examined	Antecedents of identity	Antecedents of bond	Consequences measured
Amichai-Hamburger	2005	Group identity.	Participants allocated to group A or B based on a superficial decision-making task.	n/a	In-group evaluation, out-group evaluation.
Brewer, Gardner	1996	Collective level vs. relational level of identity.	Participants read a story that contained a narrative about attending and watching a football game at a large stadium – the large-group context.	The same story was told in the small-group context.	Similarity judgment of attitude statements, response latency.
Dholakia, Bagozzi, Pearo	2004	Network-based community vs. small-group-based community.	Participants were told to visualize up to five average members, using them as representatives of the other virtual community members.	Participants were told to imagine logging on to engage in a group interaction and to picture briefly in mind the names and images of five online friends.	Value perception of the community, participation behavior.
Hogg, Turner	1985	Categorization vs. interpersonal attraction.	Random categorization, criterion categorization.	Interpersonal attraction (liking/disliking using a personality and friendship questionnaire).	Group formation, group behaviors (affective, cognitive).
Karasawa	1991	Identification with group membership vs. identification with group members.	University students as members of the university.	n/a	In-group evaluation (of group and members with respect to six traits).
Michinov, Michinov, Toczek-Capelle	2004	Social identity vs. member identity.	Categorization using meaningless group names and comparison with other groups.	Individual meaningless pseudonyms and presence of different members.	Group identification, interaction patterns, group performance.
Ouwerkerk de Gilder, de Vries	2000	In-group identification.	Members of a department that is ranked high vs. low.	n/a	Performance improvement (time on a reaction task).
Postmes, Spears, Lea	2002	Depersonalized interaction vs. individuated interaction.	Study 1 participants identified by their initials and a group tag, either Dutch or English. Study 2 participants saw no pictures, only usernames of in-group and out-group members.	Study 1 participants identified by a group tag, by their first name, and by a random image. Study 2 participants saw randomly chosen pictures of in-group and out-group members, each labeled with a username.	Attitude change, intergroup differentiation.

(continued)

Table 1. (continued)

Authors	Year	Concepts examined	Antecedents of identity	Antecedents of bond	Consequences measured
Postmes, Spears, Sakhel, de Groot	2001	Group identity vs. member identity.	Participants were allocated to Group A and Group B to maximize group score and to receive group feedback to compete for the highest score with the other group.	Each message was identified with its sender's user name, consisting of a letter signifying the group, A or B, and a number indicating the individual in the group, 1 through 4.	Social influence, conformity to group norms (efficiency vs. prosocial behavior).
Postmes, Spears	2000	Common identity group vs. common bond group. Deindividuation (whether participants see pictures of other group members or not).	Participants completed a personal and political values questionnaire and were informed that their responses were used to 'match' them with people 'who are characterized by a similar weltanschauung to your own'.	Participants completed a detailed personality checklist and were informed that groups were formed to 'match' them with people 'who could well have been close personal friends'.	Social influence, group polarization (attitude change on a Likert-type scale after discussion).
Postmes, Tanis, de Wit	2001	Horizontal communication vs. vertical communication.	Horizontal communication.	Vertical communication.	Affective organizational commitment.
Prentice, Miller, Lightdale	1994	Common identity vs. common bond	Study 1: Authors observed unselective, sign-in clubs (membership maintained with a lottery system by which students sign into the club of their choice). Study 2: Authors observed groups organized around a common interest or activity.	Study 1: Authors observed bicker clubs (members selected from a pool of students who elected to bicker or interview at the clubs of their choice). Study 2: Authors observed groups that serve to build friendships.	Group attachment, member attachment.
Rogers, Lea	2005	Social identity.	Group worked and communicated anonymously, and compared with another group working on a similar topic. Each group's virtual environment was given a distinct look, say, a color corresponding to group name.	n/a	Social presence, group identification.
Sassenberg	2002	Common identity vs. common bond.	On-topic channels formed to discuss a single topic in domains such as computers, literature, and travel.	Off-topic channels formed as a virtual room to get to know people or to meet them again.	Adherence to group norms of paralinguistic symbols such as the keyboard smiley.

Table 1. (continued)

Authors	Year	Concepts examined	Antecedents of identity	Antecedents of bond	Consequences measured
Sassenberg, Boos	2003	Social identity vs. personal identity.	Groups were given group names and told that they all had the same major. Participants were informed that the other group members were also students of the University of Gottingen.	Differing individual characteristics were stressed. Participants received an individual code number and were asked to converse with two students majoring in other subjects.	Attitude change toward group norm.
Sassenberg, Postmes	2002	Anonymity of the group vs. anonymity of self.	Anonymity of group manipulated by showing vs. not showing pictures of group members to the participants.	Anonymity of self manipulated by taking pictures of the participants and telling them that the picture would be shown to the group vs. neither taking pictures nor showing them to the group.	Perceived unity of the group, attitude change toward group norm.
Seeley, Gardner, Pennington, Gabriel	2003	Collective nature of group vs. relational nature of group.	n/a	n/a	Common bond attachment, common identity attachment, group importance.
Utz	2003	Social attraction vs. interpersonal identification.	In-group versus out-group context: participants were members of a group of MUDDers whose goal was to know about MUDDers.	Intragroup context: no out-group was mentioned. Personal questions rendered personal identity salient. Duration of memberships and number of real-life contacts revealed.	Influence of situational context, evaluative in-group bias.
Utz, Sassenberg	2002	Common identity vs. common bond.	Study 1: members were labeled members of a volleyball team and members of a syndicate. Study 2: participants should imagine they were a member of an investment group with four other members.	Study 1: group members were described as friends playing volleyball together and friends taking part in a lottery together. Study 2: participants were asked to imagine that they had to make the decision together with four friends.	Distribution or allocation of a gain or loss outcome (judge whether an equality or an equity solution was more appropriate).

(continued)

Table 1. (continued)

Authors	Year	Concepts examined	Antecedents of identity	Antecedents of bond	Consequences measured
Worchel, Rothgerber, Day, Hart, Butemeyer	1998	Group identity.	<p>Study 1: participants described as a work team and expected to work as a team later. The group would be given a \$20 bonus if their group performance exceeded the average performance of previous groups.</p> <p>Study 2: group interdependence.</p> <p>Study 3: participants divided into two teams as Alpha and Beta. Participants were given a team uniform that was a white or red lab coat with team name written across the front.</p>	<p>Study 1 participants were told that they were working in a work station. The experimenter was interested in the total output.</p> <p>Study 2: no group interdependence.</p> <p>Study 3: no out-group condition and all participants were given lab coats, but each coat was a different color.</p>	<p>Individual and collective effort in making paper link chains.</p>
Yuki	2003	Depersonalized view of in-group vs. network view of in-group.	Perceived in-group homogeneity.	<p>Subjective sociometric knowledge measured as the extent to which respondents believed they correctly understood the relationship structure within the in-group and group members' individual differences, and the degree to which they felt personally connected to group members.</p>	In-group loyalty, in-group identity, in-group status.
Yuki, Maddux, Brewer, Takemura	2005	Shared category membership vs. sharing a network of interpersonal relations with others	Target person described as an in-group versus an out-group member.	Target person described as a member of a group where the participant had an acquaintance.	Trust of others with little or no personal knowledge or history of an interpersonal relationship.

what hooked me was the community aspect and knowing that I was contributing something that was going to be around for a while' (Participant 2); 'I believe in the integrity of the project. I want to see it succeed, especially the articles people will look up' (Participant 6); and 'It has a dedicated task and it's producing a product ... at least with the Wikipedia [versus Usenet and the like] you can convince yourself you're doing something to benefit mankind' (Participant 5).

Intergroup Comparisons

People who define and categorize themselves as members of a group compare themselves with other groups (Hogg and Terry 2000), and raising the salience of out-groups intensifies people's commitment to their in-groups. Researchers have divided participants into two or more groups to highlight group boundaries and to stimulate intergroup comparisons (Postmes et al. 2001; Rogers and Lea 2005; Worchel et al. 1998). The out-group do not have to be physically or even virtually present to elicit intergroup comparisons and in-group commitment (Utz 2003; Yuki et al. 2005). In online communities, designers can encourage members to attend to group boundaries and to assume in-group homogeneity by increasing members' awareness of an out-group. For example, postings on the Frequently Asked Questions (FAQ) on apache.org, home of the Apache web server open-source development project, compare the speed, performance, and market share of the Apache server with other commercial servers, fostering the common identity of those who work on Apache software. The Wikipedia project site uses a similar technique, for example by highlighting competition with other encyclopedias. The author of the entry on Wikipedia itself notes that Jimmy Wales, the founder of the project, 'intends for Wikipedia ultimately to achieve a "Britannica or better" level of quality and be published in print' (Anonymous 2006).

Causes of Common Bond

Researchers have identified three main causes of bond-based attachment to a group: social interaction with others, personal knowledge of them, and interpersonal attraction toward them often through similarity.

Social Interaction

Social interaction provides opportunities for people to get acquainted, to become familiar with one another, and to build trust. As the frequency of interaction increases, their liking for one another also increases (Cartwright and Zander 1953). In online communities, members' frequency of interaction with others is a major determinant of the extent to which they build relationships with one another (McKenna et al. 2002). More exchanges among community members, through private messages, for example, provide opportunities for members to build social connections and create both liking and trust. Utz's (2003) study of Multi-User Dungeons and Dragons (MUD) players showed that the longer their involvement in the MUD and the more real-world contact they had with others, the more they felt a bond with other players. Attachment increases if members have a sense of virtual co-presence or a subjective feeling of being together with others in a virtual environment (Slater et al. 2000).

Personal Information

Opportunities for self-disclosure — the exchange of personally revealing information about the self — are both a cause and a consequence of interpersonal bonds (Collins and Miller 1994). Accordingly, members of online communities are more likely to form relationships if they have opportunities to self-disclose and learn about each other. Opportunities for self-disclosure and self-presentation shift attention from the group as a whole to individual members (Postmes et al. 2002; Sassenberg and Postmes 2002). In online communities, private messaging, including both personal electronic mail and synchronous communication tools, such as chat rooms and Instant Messaging, is the basic mechanism for self-disclosure and social interaction more generally. In addition to these communication channels, awareness tools that show who is currently online and what they are doing may help people gain and maintain a sense of others and their habits. In addition, many communities offer user profiles, containing personal information such as photos, background, experience, and interests, that helps members know more about the people in the group. Some communities even allow people to append a personalized signature or an avatar to their postings. These personalized options can signal a member's style and personality.

There is some evidence that personal information promotes interpersonal bonds even among people who have not yet interacted (Walther 2002). Personal information increases the likelihood of interaction. Including members' home towns and current residences in their personal profiles enables others to identify those who live in the same region. They can then become real-life contacts. Likewise, the inclusion of contact information such as phone numbers, email addresses, and instant messaging (IM) accounts enables members to connect and interact through multiple channels. Seeing social networking information about others also helps to build bonds with them. For example, Yuki et al. (2005) found that people were more trusting of those who they knew had a shared acquaintance among their in-group members. A friend's friend was a friend online.

Personal Attraction through Similarity

People like others who are similar to them in preferences, attitudes, and values, and they are likely to work or interact with similar others. In his pioneering longitudinal study of college students, Newcomb (1953, 1960) found that high interpersonal attraction developed among those who initially had attitudes in common. In the studies we reviewed, researchers frequently manipulated perceived similarity among group members to vary group members' attachments to each other. Typically, participants completed a personality and friendship questionnaire and were told that they were assigned to a group whose members probably would become close friends (Hogg and Turner 1985; Postmes et al. 2001).

Similarity can create common identity as well as interpersonal bonds. Similar member background such as profession, school, locality, race, ethnicity, occupation, and age, especially when these attributes are shared among people who otherwise are strangers, may lead to common category membership. Further, people tend to dislike groups whose members are heterogeneous, and these groups experience high turnover, especially when conflict arises (Williams and O'Reilly 1998). Similarity of background or expertise leads to common identity

mostly when the similarity is relevant to the group's context and functioning (Cartwright 1968).

Behavioral Outcomes

The research that we reviewed examined the effects of identity versus bond attachment to groups on group outcomes including the following: in-group evaluation and out-group differentiation (Amichai-Hamburger 2005; Karasawa 1991; Utz 2003; Yuki 2003), social influence and attitude change (Postmes et al. 2002; Postmes et al. 2001; Sassenberg and Boos 2003), group formation and performance (Hogg and Turner 1985; Michinov et al. 2004; Ouwerkerk et al. 2000; Worchel et al. 1998), and distributive justice in group outcome allocation (Utz and Sassenberg 2002). We examine these constructs in the context of online community and make predictions for the outcomes that are relevant to online community dynamics and member behaviors.

Cohesion, Commitment and Evaluation

In terms of evaluation of a group and commitment to it, identity-based attachment and bond-based attachment seem to have similar effects. Both lead members to perceive a group as cohesive and to evaluate their group more favorably than other groups (Back 1951; Hogg and Turner 1985; Michinov et al. 2004). Likewise, both increase positive feelings toward the group, participation, and the likelihood of remaining in the group (Back 1951; Levine and Moreland 1998).

Content of Discussion

Communication is the core of many online communities, with collective action, exchanges of social support, and sense of community rooted in the conversations that members of the community have with each other (Culnan 2005; Ginsburg and Weisband 2002). The nature of the communication exchanged is likely to depend on the type of attachment most members have to the group. In an early social psychological study, Back (1951) created identity-based groups by telling participants that they were working for a special group prize in a group that had all the qualifications to be the best group. He created bond-based groups by telling participants that they had been matched with a person who was very much like themselves and whom they would like. He found that members of the identity-based groups completed their tasks efficiently and discussed only those matters that they thought were relevant to achieving their purposes, whereas members of bond-based groups engaged in longer conversations on a broader range of topics. Fifty years later, members of online communities in which people engaged in discussions on a narrow range of topics reported high group identity and high evaluation of the group as a whole, whereas those who discussed a wide variety of topics reported that other members of the group were more personally likable (Sassenberg 2002). The Sassenberg study is correlational but, together with Back's study, suggests that online community members who feel bond-based attachment to the community will be more likely to engage in off-topic discussion and will be more tolerant of off-topic discussion than people who feel identity-based attachment to the community.

Social Loafing

In laboratory experiments, group members contribute more money to public goods, work harder to achieve group goals, contribute more, and slack off less when they feel more committed to their group (Karau and Williams 1993; Karau and Hart 1998). They also tend to prefer equal rewards for their contribution. These effects, however, seem to differ depending upon the nature of members' attachment to the group. Utz and Sassenberg (2002) found that labeling others as members of a volleyball team (common identity) versus friends playing volleyball together (common bond) led to significant differences in members' preferences for how to distribute responsibility within their group. When participants were primed to focus on the volleyball team (identity-based attachment), they agreed to contribute an equal share of money for a broken window even though they were not directly responsible for it. When participants were primed to focus on their relationship with fellow members (bond-based attachment), they were not willing to contribute money for the broken window and preferred a solution whereby only the guilty person paid for the broken window. From this work, we suggest that people with identity-based attachment to an online community may be more likely to take over responsibilities from lurkers or slackers and compensate for their lack of contribution. At the same time, they are also likely to have strong opinions against behaviors that jeopardize group survival or success such as social loafing. By contrast, people with bond-based attachment to the community may be more tolerant of one other's lurking and social loafing and they may feel less obligated to compensate for others' lack of effort.

Group Norms

Generally, anonymity fosters common identity and strong group norms. By contrast, making personal identity salient or individual members identifiable increases common bond-based attachment and weakens group norms (Postmes et al. 2005; Sassenberg 2002; Sassenberg and Boos 2003; Sassenberg and Postmes 2002). Postmes and Spears (2000) compared the influence of group norms in common-identity versus common-bond online groups. They found that attitudes were more similar in common identity groups than in common bond groups. Sassenberg (2002) found similar results using a behavioral measure of compliance to group norms. Thus research so far indicates that online community members who feel identity-based attachment to the community will be more likely to conform to group norms than those who feel bond-based attachment to the community.

Response to Newcomers

Groups are more welcoming of new members when the groups are newer or when they are understaffed or can otherwise benefit from the resources that newcomers bring (Moreland and Levine 1989). Because bond-based groups depend upon the development of friendships between pairs of members, we speculate that it will be harder for newcomers in online communities, who do not yet have these connections, to feel welcome in bond-based communities as compared with identity-based communities. The off-topic conversations typically found in bond-based communities may be confusing or off-putting to

newcomers. Bond-based communities also may set up greater obstacles for newcomers to join than identity-based groups do. As reported in Prentice et al.'s (1994) study of university clubs, common bond groups such as eating clubs were discriminating and vetted new members before accepting them, whereas common identity groups such as art clubs selected members using a lottery system. Under extreme circumstances, old-timers may not want newcomers at all out of the fear that increased group size may dilute their friendship and lead to more conflict and subgroups.

Reciprocity

People often help others with the expectation that their help will be compensated or reciprocated, either by those they have helped or by the group as a whole (Blau 1964; Emerson 1972). Thus, reciprocity can occur at the dyadic level or at the community level. A direct exchange occurs between two people in a dyad when one's giving is reciprocated by the other. In contrast, a generalized exchange occurs when one's giving is reciprocated by a third party rather than the recipient (Mauss 1925/1967; Faraj and Johnson 2005). People who are committed to community purpose, such as open source software developers or members of electronic knowledge networks, are more likely to engage in generalized reciprocity because they are attached to the community as a whole. For example, in open source development communities, old-timers often give help to newcomers, even though the newcomers have not yet contributed to the community (e.g. Lakhani and Hippel 2003). Members who have bond-based attachment to the group, in contrast, are more likely to exchange help with particular others. We hypothesize that they will be less likely to help unless they know the other person or feel obligated to return a favor that they have received in the past. The research indicates that those with bond-based attachment to an online community will be more likely to engage in direct reciprocity, and those who feel identity-based attachment to the community will be more likely to engage in generalized reciprocity.

Group Robustness

A person's feelings of common identity, and the role of the group in his or her life, changes with the situation (Ashforth and Johnson 2001; Brewer 2001; Brewer and Gardner 1996). For example, a young man's status as a cancer patient will be salient in his online cancer support group, but may be much less salient when he is participating in a parent-teachers' association meeting. His identity-based attachment in the cancer support group may remain strong as long as the group continues talking about relevant health-related topics. Further, it should be robust against turnover in the membership in the group.

Common bond-based attachments may be less affected by context, especially if the relationships on which attachment is based cross group boundaries. Thus it should matter less what the cancer support group is discussing if the young man has personal friends in the group. Attachment to the group should be robust against drift in conversation topic. On the other hand, common bond-based attachments are vulnerable to member turnover because friends can leave as a clique (e.g. Krackhardt and Porter 1986).

Implications for Designing Online Communities

Figure 1 summarizes the generalizations and hypotheses we have abstracted from the empirical literature on the causes and consequences of identity and bond-based attachment to online communities. As our discussion and this summary shows, specific design choices are likely to influence whether members of online communities become attached to communities by identifying with the community as a whole (identity-based attachment) or by growing to like individual members (bond-based attachment). Both identity-based attachment and bond-based attachment increase members' evaluation of the community, their commitment to it, and their levels of participation. Nonetheless, these types of attachment are likely to have different effects on the ease with which communities attract new members and the experiences that newcomers have, the topics people talk about, the degree of social loafing in the community, the amount and type of reciprocity that members exchange, and the types of changes in the community against which the attachment is robust.

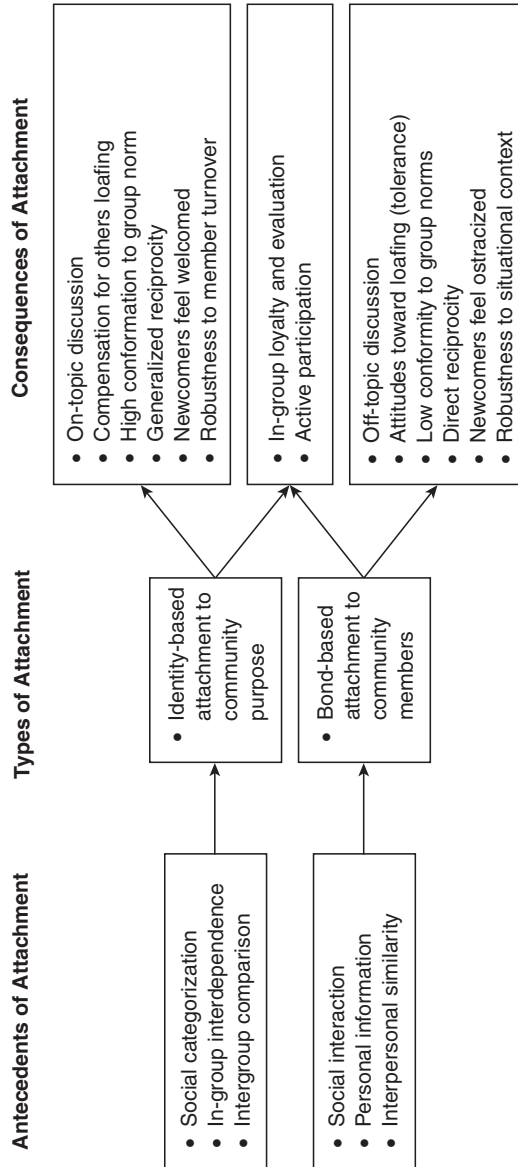
The implication of differences in the causes and consequences of identity-based and bond-based attachment is that communities' designers are confronted with design trade-offs, whose choice will depend upon the goals that they have for the communities they are supporting. Appropriate design choices differ depending on whether the goal is to create identity-based communities with a mission to discuss and exchange information about defined topics, such as the emphasis in www.tech-forums.net on the configuration of personal computers, or to create bond-based communities, such as www.myspace.com, where a primary goal is to promote relationships among individuals. When community design is well aligned with the type of attachment members have in a community, the two factors should enhance each other (Postmes et al. 2005).

In the sections below, we discuss the implications of our review of the common identity and common bond literatures for design choices and trade-offs along five dimensions: newcomer socialization, discussion moderation, community size, the role of core members, and community goals at multiple levels. After doing so, we discuss implications for research and theory.

At the outset, design decisions will be more straightforward in communities with a predominant purpose, either identity or bond. Identity-based communities should have clear mission statements and policies to keep conversation on-topic, can tolerate anonymity and large numbers of participants, and can conduct all communication in public forums. By contrast, bond-based communities should phrase their mission statements to encourage members to engage in and to tolerate conversations on wide-ranging topics, and would improve if the numbers of participants were limited, and if they had mechanisms for private communication and identifying members. Many design features like these are in widespread use in online communities.

Design decisions will be more challenging in communities with dual purposes that blend members with divergent and dynamic preferences. Typically, these communities are larger and have a longer history. Because these online communities attract some members with identity-based goals and some with bond-based goals, the design challenge is to reconcile what can be conflicting recommendations.

Figure 1. A Conceptual Framework of Identity vs. Bond in Online Communities



Newcomers

Being able to recruit and retain newcomers on a regular basis is vital for all online communities. Without new members, any community will invariably die out, because there is no one to replace members who depart. Newcomers not only refresh and sustain the community population, but they also bring in new knowledge, perspectives, and energy. Community designers try to attract newcomers by lowering entry barriers, encouraging them to be engaged in conversation, and providing feedback (Arguello et al. 2005; Lampe and Johnston 2005).

Newcomers nonetheless can be a problem. They ask questions and make comments that old-timers have seen and responded to multiple times in the past; their chatter is one source of information overload that drives others away (Jones et al. 2004). They are less likely than old-timers to conform to community norms, driving away existing members. Therefore, the design challenge for online communities is to recruit a supply of new participants, socializing them to the norms of the community, without alienating existing members. The techniques for accomplishing these goals are likely to differ for predominantly identity-based or bond-based communities and for newcomers whose goals primarily concern the topic of the community or the social relationships available there.

Newcomers to online communities often lurk for extended periods before they become active members (Rafaeli et al. 2004). They lurk for a variety of reasons (Preece et al. 2004). Over half believe that they can get the information and advice they seek simply from reading existing posts. Because lurkers are silent, their presence has no overt effect on the active participants. In the not-infrequent extreme, however, a community comprised only of lurkers is a failure, because no one contributes content to attract and retain members. Research by Butler reflects this problem, showing that over half of a broad sample of Internet social, hobby, and work mailing lists had no message traffic over a 4-month period.

Lurkers represent a pool from which active participants can be drawn. The challenge is to recruit them to active membership without having their presence disrupt the ongoing community. Many lurkers spend time learning about the group before plunging in, because they do not know that their contributions are welcome, or because they are shy (Preece et al. 2004). Many lurkers might be lured to a more active role with explicit invitation messages saying something like, 'please join in the discussion'. Such prompts can be used to greet and welcome newcomers in all types of communities.

Common practices for socializing newcomers include having lower thresholds for reading messages than for posting them, to give newcomers an incentive to learn about the community before posting, displaying frequently asked question lists and mission statements that outline norms of interaction, creating welcoming centers or newbie gardens, mentorship from old-timers, and explicit invitations to contribute. These practices make the social nature of the community evident and help minimize potentially negative effects that newcomers may have on existing members of the community. They also help protect newcomers from being intimidated or discouraged by their unfamiliarity with the place or people (e.g. Honeycutt 2005).

The emphasis in identity-based communities tends to be toward helping newcomers to navigate through information traffic, to understand community norms,

and to engage in community conversations in meaningful ways. In identity-based communities such as Slashdot, the greeting page is organized around community topics such as books, hardware, Linux, games, and politics, and activities that a newcomer may be interested in exploring such as interviews, comments, moderation, and meta-moderation. Identity-based communities often encourage or mandate newcomers to wait and observe before contributing content.

In bond-based communities, the focus shifts more toward helping newcomers to connect with existing members, to join group interactions, and to form lasting relationships with a subset of community members. In communities like MySpace and Facebook, newcomers are advised to use the site to ‘create a profile and start meeting new friends’ or ‘look up people at your school, see how people know each other, and find people in your classes and groups’. They often make purposeful efforts to assimilate and promote newcomers by putting their profiles or pictures on the first page of the community. Also, bond-based communities care more about people-finding than information-finding, making it easy to find and meet specific members through a directory or personal profile search page.

Newcomer socialization is the most challenging in communities with mixed member preferences. Newcomer socialization in these communities requires a flexible mechanism such as direct mentorship by existing members. Tappedin.org, an online community for teachers with about 20,000 members, uses greeters and mentors to help new teachers join the community, get oriented to the many different specialized resources available, and find other teachers to work with as collaborators. Mentors ask newcomers what they are looking for and encourage newcomers to explore while assuring the appropriateness of the content they contribute and channeling them into new relationships or existing subgroups.

Off-topic Discussion

Community designers must decide whether to impose policies to control the discussion on the site, to keep it on topic. Identity-based communities are likely to want to have people talk primarily about the nominal topic of the community. As the introductory message to JoBlo’s Movie Club emphatically states, ‘Our board is for MOVIE TALK only. If you bring personal issues up on our board, you will be banned. If you discuss your ex-girlfriend, you will be banned. If you announce your comings and goings or gossip about so-and-so, you will be banned. ... This is ... not a place for you to discuss your personal life or boo-hoo about how your lover just broke up with you’ (JoBlo Movie Club 2005).

Online communities post no-off-topic rules as introductory messages or as frequently asked questions archives. They may use moderators to keep conversation on topic, as the welcome page for jewishgen.org indicates, ‘the role of the moderator is to keep the discussion on track and to let it not get cluttered with irrelevant, inappropriate, or personal messages of no interest to the general readership’. Site administrators, moderators, or even ordinary members may give remedial feedback when someone violates this policy by posting inappropriate material.

In contrast to the tight topical focus encouraged in identity-based communities, bond-based communities encourage personal relationships, and their introductory materials often encourage participants to post on a wider range of

topics. The Yahoo Personal site, for example, recommends that new posters 'Gather your thoughts, tell your story, and see who stops by to say, "Hi!"' (Yahoo.com 2005). In the newsgroup X-Fileaholics, whose nominal topic is discussion of the TV show X-Files, it is normal for members to discuss anything except the show, including favorite music, other television shows or movies, humorous polls, unpleasant events, and recent achievements. Newcomers, in an official welcome message posted within the joining thread, are encouraged to 'act demented [because] it runs in the family' (Honeycutt 2005).

Broad policies that constrain or encourage topics of conversation may fail to support individual differences in members' types of attachment to the community or encourage a shift of attachment from topic to people as members spend more time in the community. Constraints on content make the site less appealing to people who want to know individuals better, whereas off-topic conversation and personal information on a site can undercut identity-based attachment (Postmes et al. 2002).

A more flexible approach could serve both needs. Communities like slashdot.com use member evaluations to serve a moderation function. Members of the community rate posts in a forum for relevance and quality. Readers can then decide to view messages rated above some threshold. Similar functions can be supported through automation. Information retrieval techniques (e.g. Landauer et al. 1998) can be used to estimate how similar a focal message is to other messages recently posted on a forum, and readers can decide to view messages of different relevance. An administrator could set a threshold so that newcomers to the community would only see the information most similar to the core themes in the community, or could set off this information visually.

Online communities can also segregate bond-building interactions. When traffic in the group expanded on the soap opera newsgroup rec.arts.tv.soap, people started complaining about messages that were unrelated to soap operas. Some members proposed marking messages that were not directly related to soap operas by 'TAN' (for tangent) in the subject line so that members who were not interested could easily ignore them while preserving them in the group for those who were interested (Baym 1997). Many topic-based communities, such as the movie web-forum RottenTomatoes (rottentomatoes.com/vine), a Lego club (club.lego.com), and the computer reviewing site, CNET (reviews.cnet.com), provide separate off-topic discussion boards. As of December 2005, the 'Off Topic Discussion' forum on the www.rottentomatoes.com site was its second most popular forum, and the off-topic 'Speakeasy' forum on the CNET site was its most popular forum. The personal pages on Wikipedia provide an opportunity for contributors to get to know each other, whereas the discussion pages allow topic-based discussions about the editing for encyclopedia articles.

Community Size

Many communities strive to grow by actively recruiting new members. However, the communication volume from many members can overwhelm people with limited attentional resources and result in high turnover in the group. In one analysis of a large sample of Usenet newsgroups, the more messages posted in a

group during a month, the smaller was the proportion of posters who returned in the subsequent month (Jones et al. 2004). Another study also found similar results: larger online groups with more traffic had more turnover (Butler 2001).

Community growth often leads to diversification in community purposes and member preferences. The social networking site MySpace was among the world's most popular websites as of May 2006 (Alexa.com. 2006). It offers identity-based interactions to independent musicians, who upload and distribute their music and find jobs, and bond-based interactions to millions of teenagers, who link with their friends. For communities in which both types of attachment are important, one option might be to group participants into clusters with similar backgrounds or needs. Many national associations such as the National Parent Teacher Association (PTA) organize local groups so that people from the same region can interact and get to know one another. Another option might be to segment groups based on their preferred topics or activities. Flickr, Wikipedia, and Second Life have followed this path. A cap or an entry barrier can be considered to filter out people who do not fit or who are less committed. Second Life has separate spaces for children and teens, people with Asperger's syndrome, and people looking for 'adult content'. We have observed much better quality participation in online movie discussion forums that carefully screen and admit new members, such as JoBlo's Movie Club, as compared with those that have no screening such as RottenTomatoes.

Having large numbers of members and high turnover is less a problem for identity-based communities than for bond-based communities because for the identity-based groups the large membership provides their core-resource, rich new content. For people seeking bond-based attachment to group, by contrast, unconstrained growth can be overwhelming and the turnover it fosters can make the community seem impersonal. In particular, it is often difficult to repeatedly come across and converse with a small set of others when communication volume and turnover is high. For example, the movie site, IMBD, hosts messages from thousands of people ranging from teens to movie producers. Posts arrive at the site in such quantity that a new post is likely to remain on the front page less than 20 minutes. Under these conditions, it will be difficult for pairs of people to come across each other frequently enough for them to form interpersonal bonds.

Community members need mechanisms to synchronize communication among subsets of the population. One solution is to create 'neighborhoods' within the larger online community, where a subset of the population can congregate. Massively Multiplayer Role Playing Games, like World of Warcraft, use consistency of the server on which an individual subscriber plays the game as a device to insure that that subscriber will repeatedly run into others assigned to the same server. In addition, these games typically have special communication features that alert subscribers when other members of their marauding teams, known as guilds, are online and that allow them to broadcast communication exclusively to guildmates, wherever they are in the sprawling virtual worlds they inhabit. The 'rooms' in a traditional MUD site serve a similar function to increase repeated interaction among a subset of users. Good search facilities that let members find group members would augment these online neighborhoods.

Core Members

An online community's core group, defined as the most frequent and loyal posters, are the critical mass of the community. The core group is defined by the power law in message distribution, indicating that a very small group contributes significantly more content than do average members (e.g. Mockus et al. 2002). Members of the core group often perform a large proportion of community building and maintenance work such as infrastructure maintenance, writing and reading messages, and moderating and policing the site (Butler et al. in press).

Core members in identity-based communities such as Open Source Software (OSS) projects are normally defined or identified by their level of expertise. As a result, their contribution promotes an ordered and productive group atmosphere (Mockus et al. 2002)). Members of the core group in identity-based communities are generally accorded advanced status and reputation. In OSS communities such as Apache and Mozilla, for instance, attaining higher status in the hierarchy gives the member more privileges, i.e. moving from someone who reports bugs to someone who contributes patches to someone who can check in others' contributions, to board member. Some professional and technical groups display the names of distinguished contributors in a leader list.

Core groups in bond-based communities are normally defined by persistent relationships among known group members. The Yahoo! Group, workingpei, whose members compete with their Chinese shar pei dogs in various performance events, has 31 members and a smaller core group of about 5 people who show up daily on the message boards, reply to one another's posts, congratulate one another on their competitions in agility, obedience, and tracking, and trade training advice. Everyone knows the names of the core group members, their competition standings, their hobbies and family members, and the names and detailed health and personalities of their dogs, whose photos and videos are posted on the community site. Members who are in the same geographic region seek one another out at real-life competitions. A group of core members can sustain a small community for years but also potentially has detrimental effects on community growth by dominating conversations, intimidating new users, and diluting peripheral members' sense of belonging. Most of these communities do not pressure lurkers to participate. Some authors argue that bond-based communities should be designed to encourage participation of a majority of members (Fisher et al. 2006).

As a community grows and shifts from primarily identity-based or bond-based to one with mixed goals, community designers have to consider how to recognize and motivate core members to continue their above-average contribution while at the same time encouraging contributions from more peripheral members. Intimate ties among core group members may need to be downplayed or even hidden from the rest of the community, to the extent that these are off-putting to new or peripheral members. Technical interventions such as people recommenders, similar to commodity or item recommenders, could be deployed to identify peripheral members who have the resources needed by the group and invite their participation. For example, in open source development communities it might be possible to analyze posts and patches contributed by

peripheral members in the past to assign them more substantial work in the future.

Another way to support social interaction over time is to promote virtual presence by making member actions visible to each other. As Milgram's discussion of the familiar stranger (1977) and Zajonc's research on familiarity (1968) suggest, merely seeing other people in an online group repeatedly, even without communicating with these others, may be a precursor to forming a personal attachment to them. Providing rich choices for both public and private communication can help recognition develop into personal bonds. Although most online communities provide mechanisms for public communication, through distribution lists and forums, fewer support private or semi-private communication. Examples include private email exchanges and instant messaging in MySpace, easy-to-create, private chat-rooms in America Online, the 'Whisper Command' in LamdaMoo, and chat bubbles in immersive games and play communities.

In addition to helping people communicate, designers seeking to support interpersonal bonds can provide ways for community members to visualize the online social networks that they have with each other. Although sites like Facebook and Friendster provide tools for forming explicit social networks, where members can nominate others as friends, these tools do not show communication ties among people. Visualizations of the actual flow of communication among community members could help to build ties among friends-of-friends by helping people fill in gaps. New technologies allow for such displays as well as location information on each member of a friendship group.

Subgroups

Although merely naming a group provides some basis for identity-based attachment to it, the literature indicates that interdependent goals intensify this attachment. The introductory pages of Wikipedia, the online encyclopedia, say, 'You can help build Wikipedia into a better encyclopedia and wiki community by editing and creating new articles' (www.wikipedia.org). The community creates sub-goals, in the form of collaborations, challenging members of the community to work on an article or a topic for a defined period of time to improve quality or scope. It uses communal language and provides metrics that show the extent to which the group is achieving its goal (e.g. 'we are currently working on 851,516 articles'). It also provides a community history and highlights competition with other encyclopedias, such as the Encyclopedia Britannica.

Subgroups within a community can potentially undercut the overarching goal of the community as a whole. Many communities, however, organize subgroups around the general theme of the community to complement rather than supplant the overall community purpose, for instance sharing a particular type of picture in Flickr. However, like member growth, subgroup growth can overwhelm people. After Flickr.com introduced its group feature, for instance, invitations to join groups arrived in members' inboxes at such a large volume that many members inquired about ways of ignoring or stopping the invitation spam. In comparison, Facebook made a decision to forbid mass-messaging.

Subgroups are more compatible with bond-based communities than they are with identity-based ones. They are often designed specifically to support

subgroups of friends. For example, social networking sites like Friendster, MySpace, or FaceBook encourage members to invite others to join (e.g. 'Friendster is fun on its own, but it's even better with friends') and provide tools to make the invitations easier to issue. The introductory pages on Myspace.com encourage members to 'Start viewing your friends' profiles. Learn their interests, read their online journals, and view their pictures. Browse through everyone's "Friends List" and see whom you are connected to. ... [I]nform your circle of friends with info on current events, or start an organization or group with people that share the same ideas as yourself.'

Theoretical Issues

This paper started with a review of the theoretical and empirical literature on identity and bonds as a basis for members' attachment to groups. From this review, we extracted a set of generalizations about the features of online communities that are likely to lead members to develop attachment to an online community through bonds or identity and the implications of the type of attachment for the commitment, participation, and behavior they are likely to exhibit. We then used these empirical generalizations to inform suggestions for designing online communities to promote identity-based attachment and bond-based attachment, addressing some of the important choices and trade-offs that designers must make. These design suggestions can be considered testable hypotheses for the application and further development of identity and bond theory in the online environment.

This approach to thinking about online communities is novel. Most research has taken a natural history view of observing and describing community demographics, member behaviors and attitudes, and the emergent structures of a particular type of online community. In this article, we have applied a more social engineering theoretical approach to community design and treat online communities as social-technical systems in which design decisions strongly influence user behaviors. Although other authors have offered guidelines and principles for some of the same design decisions we discuss (Kim 2000; Preece 2000), there exist comparatively few attempts to apply social science theory systematically to community design. Exceptions include Kollock and Smith (1996) emphasizing public goods economics, research by Kraut and his colleagues derived from a collective effort model of social loafing (Ling et al. 2005), and Ostrom's work on governance (1990). As far as we know, no authors have examined implications for the design of online communities derived from common identity and common bond theories.

Our arguments imply that through design choices, online communities favor either identity-based or bond-based attachment. Although social psychologists have often attempted to cleanly distinguish differential effects of the type of connection people have to their groups (e.g. Postmes et al. 2005), as we have indicated above, groups and individuals often have mixed goals. Many people are connected to their churches, for example, both because of identification with their faith and because of ties they have made with other congregants. That situation makes the church community a mixed-motive community as well. We have described some ways that the online environment makes possible

the creation of such mixed environments, for example, by segregating types of members. However, the online environment, unlike the church, may have difficulty segregating members. The church can channel teens to special activities on Tuesdays in the church basement, making it less likely that teen flirtations and other 'off-topic' interactions will bother the rest of the congregants. By contrast, an online religious community member can broadcast an off-topic message to everyone. As yet, little research has examined the conditions under which both identity-based and bond-based attachment coexists and ways to successfully combine these types of attachment in online communities.

Further, despite their conceptual distinction, identity-based attachment may evolve into bond-based attachment and vice versa. This result would be predicted from the fact that both types of engagement lead people to participate in the community. This participation, in turn, should create opportunities and conditions under which people develop the other type of attachment. Thus, those who begin interacting in an online sports community because of their interest in a local team might later make friends in the community. Conversely, people who join to be with friends might later become attached to the team and the community surrounding it.

There has been little research on the dynamic evolution of online communities or on the transformation of an individual's attachment from one type of goal to the other. Without the research literature as a guide, we can only speculate how this evolution might occur. A shift from identity-based attachment to bond-based attachment seems to be quite common, although not inevitable. Members of identity-based online communities may experience difficulty identifying and getting to know individual members unless the community makes explicit efforts to encourage or facilitate relationship formation among members. In Sassenberg's study (2002) of on-topic and off-topic chat groups, members' attraction to other members of the online groups they studied was negatively correlated with identity-based attachment to the group in identity-based, on-topic groups, but positively correlated in bond-based, off-topic groups (Sassenberg, personal communication, January 23 2005). Yet members of an online chess group reported that by playing chess together they became friends with one other (Ginsburg and Weisband 2002).

Some identity-based communities shift eventually toward supporting and promoting interpersonal connections among members. For instance, Flickr.com was established as an online application for photo management and sharing but it later evolved into a community where people not only share, tag, and comment on photos, but also join groups and interact in its public and private forums. Likewise, Backstreets.com, a Bruce Springsteen fanzine that began as an online common identity group in which registered members could discuss Springsteen and his music, later brought about social and emotional attachments among members (Culnan 2005).

We think attachment also can change in the other direction, from bond to identity, although we have found fewer examples of such movement and speculate this path is less common. Most communities that foster relationships grow ever stronger in this direction and rarely become common identity communities. Thus, many individuals learn about and join MySpace through acquaintance referral, and then start making new friends and joining interest groups without any particular attachment to MySpace as an important source of identity.

Interpersonal relationships and interaction among members could facilitate the formation of common identity if the situation made this identity particularly salient. Perhaps an external threat, such as a disaster, can give a group of friends a common cause and thus transform their interpersonal relationships, temporarily or permanently, into explicit awareness and appreciation of their common identity. For example, disparate programmers and their friends set up people- and pet-finder websites after Hurricane Katrina, then banded together to work on database aggregation problems (Scaffidi 2006). Another plausible scenario is that a group of friends discover a common interest and create an interest group to sing, dance, or play sports together, which later evolves into a primarily interest-oriented group after all the old friends have left.

Another open theoretical question is how bond and identity predictions scale to a large and complex online environment. Online community boundaries can be indistinct due to the ease with which people can move alone or together with others from community to community and link into related communities to pursue their interests. As well, people can have multiple community sources of information on the same topic, and overlapping memberships. Most studies of online attachment focus on one or a few communities. As far as we know, no studies have investigated the specific multiple sources of identity and bond that people have online, and how these relationships stack up against real-world communities and one another. For example, many sports fans in Pittsburgh care about the Steelers as much as they do about football; we do not know whether online sports communities engender that level of loyalty.

The question of which community size is best for which type of attachment also is related to the scale of the Internet. Group size has not come up much in the small groups literature, where groups of size 12 are considered 'large'. Jones et al. and Butler's work on the effects of size and numerous posts suggests that attentional overload is a problem in many online communities, and that members may be driven away from communities they like when they perceive it has become too hard to find the information or interactions they seek. Thus, successful communities that grow can fuel their own demise. In this regard, however, we do not know either theoretically or empirically at what levels of size overload and negative impact occur, whether the relationship is linear or otherwise, and whether the impact of size affects core and peripheral members differently.

Conclusion

Research suggests that understanding community members' different kinds of attachment to the community can help us understand and make key design decisions ranging from policies for off-topic discussion to how much personal information about members will be allowed. Our review takes a first step toward mining social science theories to inform community design. We also argue more generally that we can study theory in social psychology, sociology, and economics to help us take a more principled approach to understanding online communities. Nonetheless, there are limitations to theory that was developed in

laboratories and contexts other than online. We have discussed some theoretical questions about identity and bond theory that arise from attempting to apply these theories to the design of online communities. We advocate research using approaches such as field experiments in online communities and agent-based modeling techniques to develop both theory and practice. Our specific design ideas drawn from the identity and bond literature offer a way to approach these questions. That is, by testing the impact of these design choices we can contribute to theory and practice.

We acknowledge that online communities are not only about top-down theoretical design. We recognize that communities evolve and members strongly influence the structure and interaction in them. We also recognize that designers should not forsake creativity, iterative design, or community participation, by slavishly adapting their designs to the types of social science generalizations identified here. Instead, our approach is meant to support thoughtful community designers and members by illustrating what social science research implies about the reasons different people join online communities and the consequences of various explicit and implicit design decisions for supporting those different groups. We used common identity and common bond theories as exemplars to illustrate the social engineering approach.

The design guidelines we presented here should be treated as yet-to-be-tested research hypotheses. The leap from theory to design is often a perilous one (Ling et al. 2005). Theorists are not necessarily good designers. Also, in many cases the theories being exploited as a basis for design may not provide sufficient detail or sufficiently describe when theoretical principles apply. For the enterprise we described here — theory-guided design for online communities — to be successful, empirical tests of the design suggestions and more theoretical development applied to the online environment are all needed.

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