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Some antecedents and effects of trust in virtual communities

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Abstract

This study explores several downstream effects of trust in virtual communities and the antecedents of trust in this unique type of environment. The data, applying an existing scale to measure two dimensions of trust (ability and benevolence/integrity), show that trust had a downstream effect on members' intentions to both give information and get information through the virtual community. Both these apparent dimensions of trust were increased through perceived responsive relationships in the virtual community, by a general disposition to trust, and by the belief that others confide personal information.

Keywords: Trust; Virtual communities; Perceived responsiveness

1. Introduction

The rapid growth of virtual communities on the Internet (Gross, 1999; Petersen, 1999) and accompanying surge in interest by researchers (Fernback, 1999; Hill and Terveen, 1996; Hiltz and Wellman, 1997; O'Day et al., 1996; Wellman and Gulia, 1999b) raises the question of what encourages members to interact and make virtual communities more vibrant. This study suggests that trust is a key element in fostering the voluntary online cooperation between strangers seen in virtual communities.

Virtual communities are typically emergent, that is, they arise as a natural consequence of people coming together to discuss a common hobby, medical affliction, personal

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experience, or even develop relationships. They are usually not formed by a specific organization to perform a work task. The literature on virtual communities calls for the traditional meaning of community to be expanded beyond the notion of physical space, and to think of communities in terms of social networks or social relationships (Hiltz and Wellman, 1997; Van House et al., 1998). The members of communities are typically strangers to one another. Additionally, the nature of online interaction, without the cues that face-to-face contact affords, may require trust for successful communication, or, on the other hand, may inhibit the development of trust. This study seeks to examine the emergence of trust in this environment, the factors that lead to its development, and its importance to information exchange.

Despite the fact that virtual communities have existed in some fashion for almost 30 years, little is known about what motivations prompt people to use virtual communities. The scholarly literature in this area is usually anecdotal and without a systematic and empirically validated framework for determining why people use virtual communities. Indeed, Wellman, a prolific researcher who has been studying non-local social networks for over 30 years laments that few detailed studies of virtual communities exist (Wellman and Gulia, 1999b). Further Wellman and Gulia (1999b) argue that no studies exist regarding who is connected to whom, what people are communicating about, and for how long. A related stream of literature regarding virtual teams, virtual organizations, virtual classrooms, virtual offices, virtual enterprises, and virtual teamwork has emerged in the MIS literature. Past MIS research that dealt with information technology enabling group processes primarily focused on group support systems (GSS), computer-mediated communication (CMC), and electronic meeting systems (EMS) (Chidambaram and Jones, 1993; Constant et al., 1996; Horton and Biolsi, 1993; Jain and Ross, 1998; Sproull and Kiesler, 1991). However, these studies looked at the information technology in a business environment and how it impacted group communication, information sharing, and performance. Theories about trust (Gefen, 1997; Jarvenpaa et al., 1998; Mayer et al., 1995; McAllister, 1995) also set forth notions on how information sharing and communication operate, and again, these have been applied to online communication but typically in organizational settings. These theories now need to be extended to virtual communities. This research seeks to address this literature gap by applying theories of trust to understand motivations to use virtual communities.

Understanding virtual communities can provide valuable information about the digital economy. Virtual communities are places where people with common interests share knowledge. Both the knowledge base of the community and the members themselves can be extremely valuable to companies. The knowledge base, which is usually publicly available in the form of the community's conversation, provides insight into the members likes, dislikes, demographics, behaviors, and concerns. Members often critique products and services and thus organizations can glean market research by reading the conversation. In addition, since the members have a narrow interest, they can be a perfect target markets for advertising or even online selling efforts. Indeed, the World Wide Web has grown from a place of static web pages to one where interaction is touted, and companies are strongly encouraged to provide

customer-to-customer (C2C) capabilities in the form of virtual communities (Hagel and Armstrong, 1997).

However, such communities will not exist without conversation. Extrapolating from research on virtual human interaction (Jarvenpaa et al., 1998) and economic activity on the Internet (Gefen, 2000a) this study hypothesized that a virtual community member's trust in other members enables knowledge sharing within the community. How important is this trust and what builds this trust? Examining these questions is the objective of this study.

2. Literature review

2.1. What are virtual communities?

The Internet is a medium where people access not only information, but also other people in order to chat, discuss, argue and confide in Sproull and Faraj (1997). More specifically, people come to get information from and give information to other people. On the Internet, people come together to do this in what are commonly termed 'virtual communities'. Virtual communities can be defined as groups of people with common interests and practices that communicate regularly and for some duration in an organized way over the Internet through a common location or mechanism. The location of the virtual community, although not physical, is important because it establishes the virtual 'place' where the members meet. This location or mechanism may be a chat room, bulletin board, or listserv email program. The people in a virtual community have a notion of membership, whether formal or informal, and form personal relationships with others in the community (Sproull and Faraj, 1997), and communities often develop strong norms and expectations for behavior (Sproull and Kiesler, 1991). People typically form attachments to the communities and visit them often (Hiltz and Wellman, 1997), sometimes becoming so dependent upon the community that the user can be described as addicted (Hiltz, 1984). Although the literature does not specify a particular frequency, a virtual community is generally understood to consist of persistently interacting members (Smith, 1999).

Virtual communities can be implemented technically in one of several ways (Lazar and Preece, 1998). Listservs are one type of community, where the members communicate through a common email program. Chat rooms are another place where members interact. Multiuser domains (MUDs) are similar to chat rooms, but attempt to model physical places as well as face-to-face interaction by using text-based virtual realities that maintain a sense of space by providing 'rooms', 'exits', and other objects. Finally, bulletin boards or newsgroups are places where members interact asynchronously. Communities that use bulletin boards or newsgroups offer a unique characteristic in that one can observe the community interaction without explicitly joining the community. Even if one could observe a chat room or MUD without joining first, the interaction between members typically only exists for the duration of the conversation (Erickson, 1997). In bulletin boards, the conversation is preserved. Some virtual communities keep the conversations for weeks or months, others

indefinitely, allowing potential members to observe the norms of the community before jumping into the conversation (Erickson, 1997). This condition affords the researcher an opportunity to observe a community before deciding to include it in a study. In addition, bulletin board communities have the potential of having more members than synchronous communities. Only a finite number of people can exist in a chat room before it becomes too crowded and the conversation unmanageable. However, hundreds of people can easily participate in the different threads of a bulletin board community.

Sproull and Faraj (1997) note three differences between electronic communities and face-to-face communities: (1) physical location is irrelevant to participation in electronic communities, (2) most participants in electronic communities are relatively invisible (i.e. if an individual only reads messages and does not post, other members may not be aware of his/her presence at all), and (3) logistical and social costs to participate in electronic communities are lower. Compared to communities offline, virtual communities tend to be larger, more dispersed in space and time, more densely knit, and to have members with more heterogeneous social characteristics, such as lifecycle stage, gender, ethnicity, and socioeconomic status, but with more homogeneous attitudes (Hiltz and Wellman, 1997). At the present time, the interaction in virtual communities is based mostly upon written communication. Face-to-face group interaction is fundamentally different from written communication in that it allows an exchange of a variety of verbal and non-verbal information (Chidambaram and Jones, 1993; Hiltz, 1984). The additional meaning found in voice and face-to-face communication that is carried by inflections in the voice, gestures, dress, tone, posture, and other indicators is missing (Sproull and Kiesler, 1991), so that the medium remains open to multiple interpretations (Korenman and Wyatt, 1996). Another key characteristic of virtual communities is that there is no turn-taking in communication, as there is in face-to-face or phone communication (Sproull and Kiesler, 1991). This gives the users greater equality in participation (Hiltz and Wellman, 1997). These differences between online and offline communication are important because member trust in electronic communities must accordingly be made on the basis of written communication only.

Knowledge exchange has been found to be a motivation for using emergent virtual communities (Wasko and Faraj, 2000). There are two basic modes in which individuals can use a virtual community—they can either get information or give information. Getting information is simply reading the ongoing conversation in the community, as well as actively soliciting information by posting questions and comments. Giving information, on the other hand, is done by posting conversation, either in direct response to another member's post or simply starting a new topic in the community by posting commentary. Overall then, giving information thus involves a greater measure of active participation and exposure. This study accordingly differentiates between the two modes on account of this difference.

Information sharing has been found to be influenced by prosocial attitudes and organizational norms (Constant et al., 1996). This study examines information exchange in virtual communities and the effect of trust and other social aspects on this exchange. Section 2.2 proposes that a virtual community member's trust in

the other members of the community should be a significant predictor of his/her intentions to take part in the information exchange—i.e. getting or giving information. The research model and hypotheses are then presented to suggest some possible antecedents of this trust. This model is then empirically examined in the context of bulletin board-based communities.

2.2. The concept of trust

Trust is an implicit set of beliefs that the other party will refrain from opportunistic behavior and will not take advantage of the situation (Gefen, 2002b; Hosmer, 1995; Moorman et al., 1992). When rules do not provide sufficient guarantees that others will behave as they are expected to, as is often the case with virtual communities, trust serves as a subjective substitute to such rules, creating the necessary atmosphere that makes engagement with others more open (Butler and Cantrell, 1994). Consequently, trust rules out undesirable, yet possible, opportunistic behavior on the part of others (Luhmann, 1979). Such behavior may be rife in a virtual community where unscrupulous members might flame or ridicule posts or provide member email addresses to external organizations without permission. Trust is important in virtual communities where the absence of workable rules makes a reliance on the socially acceptable behavior of others, i.e. trust, essential for the continuity of the community. This is especially noteworthy in the case of virtual communities because research has shown that people in traditional communities work better with others they trust, while actively avoiding contact with those they do not trust (Blau, 1964).

Yet, the importance of trust in co-located workgroups may be somewhat different from trust in virtual organizations and societies where people may never actually meet in person. Contributing to this complexity is the observation that the very definition of trust is problematic in the literature (Barber, 1983; Crosby et al., 1990; Hosmer, 1995; Rousseau et al., 1998), and is dependent upon the situation in which it is being considered (Lewis and Weigert, 1985; Luhmann, 1979). Trust in virtual communities can be understood in the context of interpersonal relationships, i.e. trust between people (Rotter, 1971)—what Luhmann (1988) terms personal trust. Because in the virtual community one converses not only with one or two other individuals, and because one is typically posting to a general audience, trust is at the generalized, collective level. Notions of interpersonal trust have been applied to collective entities such as groups (Jarvenpaa et al., 1998). In the virtual community, trust develops between an individual and the group of strangers that is community, eventually providing a positive outcome for the community as a whole.

Some characteristics of virtual communities may hinder trust development, such as the lack of face-to-face contact and visual cues. In addition, identities of fellow community members may be suspect since it is easy to mask one's gender, age, etc. online. On the other hand, the closeness in the community developed because of the strong mutual interest in the community's topic, especially in the cases of health concerns or life events such as the birth of a baby or death of a parent, may foster the development of trust. Repeated interaction with others and the open public reply and debate of messages may also help trust evolve.

Scholarly research on trust has supported the assertion that trust is multidimensional, consisting of three distinct beliefs or factors: ability, benevolence, and integrity (Blau, 1964; Butler, 1991; Giffin, 1967; Mayer et al., 1995), although often these beliefs are intertwined (Crosby et al., 1990; Ganesan, 1994; Gefen, 1997). Each dimension has been shown previously to be relevant in the case of online communication (Jarvenpaa et al., 1998), and each dimension is, as noted below, especially salient due to the nature of virtual communities.

Ability is skills or competencies that enable an individual to have influence in a certain area. This is applicable in the context of virtual communities because they are almost always centered around a specific mutual interest, hobby, life event, or occupation, and concerns about the abilities of others with respect to this mutual concern are important when conversing. Benevolence is the expectation that others (i.e. trusted parties) will have a positive orientation or a desire to do good to the trustee. In this case, the trustee reciprocates with appropriate advice, help, discussion, and so on, such as contributing to the ongoing discussion with the intent to help, support, and care for others. Benevolence is important in virtual communities because without positive reciprocation the community would not exist. Contributing to a virtual community for prosocial reasons and out of a sense of moral duty has been found empirically (Wasko and Faraj, 2000). Integrity is the expectation that another will act in accordance with socially accepted standards of honesty or a set of principles that the trustor accepts, such as not telling a lie and providing reasonably verified information. Integrity applies in the virtual community context because it is the existence of norms of reciprocity, closely linked with benevolence, that allow the community to properly function.

Although prior research has developed three separate dimensions of trust, in the virtual community context it appears that two dimensions seem to apply: ability, on the one hand, and a combined benevolence and integrity dimension, on the other. Certainly the notion of trust in the accuracy, soundness, and reliability of information, as embodied by trust in abilities, is important. The other two dimensions both lead to the same behavior, reciprocity in the form of maintaining the communities conversation, and therefore are combined for this research. Benevolent good citizenship behaviors expected in the community seem closely aligned with the notions of integrity. The desire to do good by reciprocating in the community (responding to others as well as eliciting responses to oneself) is, while benevolent behavior, adhering to the norms of the virtual community, and therefore exhibiting the quality of integrity, as found also by previous research (Gefen, 1997). Integrity and benevolence may be united in the virtual community context because the expected mode of behavior (i.e. integrity) in many of the virtual communities is one of benevolence. Simply put, integrity and benevolence may mean the same thing online.

3. Research model and hypotheses

Fig. 1 presents the research model for this study. Each construct and the associated hypotheses are discussed in the following sections. Trust is positioned as a mediating variable. Given that trust could be essential in the information exchange of virtual

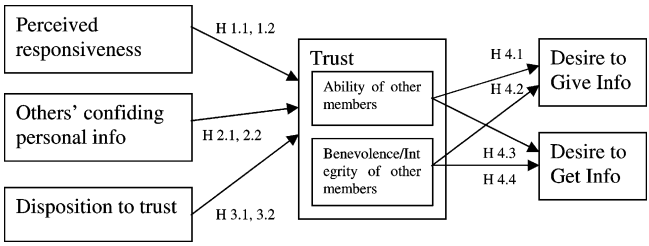

Fig. 1. Research model.

communities, as it is in other communications (Butler and Cantrell, 1994), it is valuable to understand what might build trust and how trust, in turn, is related to the outcome variables of giving and getting information. First, the antecedents of trust are presented and each is, in turn, linked to the two dimensions of trust. Then the relationship that the trust dimensions have with the outcome variables is discussed.

3.1. Perceived responsiveness

Given this centrality of trust, what behaviors on behalf of other community members is it associated with? Rousseau et al. (1998) offer several different forms of trust, including relational trust that comes from repeated interactions over time. Reliability and dependability can be ascertained over time and are usually needed for trust relationships to develop (Blau, 1964; McAllister, 1995; Rousseau et al., 1998). Various studies have shown that reciprocity in exchange relationships builds trust (Kramer, 1999). An individual who posts messages on a community most often expects some type of response. If an individual posts a message and there are no responses, trust in others will not develop.

If others respond quickly and often, it may be that they have the skills and competencies to be able to exchange accurate and helpful information, thereby building belief in their ability. Someone who has competency in an area would be able to be more responsive. Likewise, greater responsiveness from others would indicate a willingness to help other community members and also increases the reciprocal nature of the community itself, showing adherence to norms. Finally, responsiveness can indicate integrity/benevolence by behaving according to the accepted social rules. Responsiveness has been associated with, for example, increased perception of cooperative intentions (Gefen and Ridings, 2002), an indication of benevolence and integrity.

A responsive individual is adhering to the most basic of socially accepted principles in the virtual community—sustenance of the community by the creation of its conversation. The whole existence of a virtual community is based on postings and their responses, and therefore contributing to that existence by being responsive shows integrity/benevolence. Previous research has shown that perceived responsiveness affects trust but does not directly affect the outcome variable. For example, responsiveness creates an atmosphere that increases IT usage and a cooperative environment, but does not directly increase IT use (Gefen, 2000a,b; Gefen and Keil, 1998). In addition, responsiveness builds trust and trust determines loyalty to web sites, but, responsiveness directly is an insignificant predictor of loyalty (Gefen, 2002a,b). Thus, it is hypothesized that perceived

responsiveness would increase trust just as it does with in other scenarios (Gefen and Govindarajulu, 2001).

H1.1: Users' perceptions of other members' responsiveness will be positively related to their trust in other members' ability.
H1.2: Users' perceptions of other members' responsiveness will be positively related to their trust in other members' benevolence and integrity.

3.2. Confiding personal information

Another hypothesized antecedent of trust in other community members is the degree to which they confide personal information. People have been found to be very comfortable disclosing personal information via computer interaction (Sproull and Kiesler, 1991). If others post personal information about themselves, they are making themselves appear to be more than just a stranger, and are showing that they trust others with sensitive information. The principle here being that, by behaving in a trusting manner, in this case by posting sensitive information, people can encourage others to trust them. Additionally, the decision to trust others should thus be based also on knowledge of the other people as derived from their confiding personal information (McAllister, 1995). By disclosing their gender, age, or perhaps a personal problem, other people in the virtual community become less of a stranger and more of an acquaintance or friend. Related research on social behavior also indicates that by confiding, and making oneself more vulnerable in the process, people can induce others to trust them more (Blau, 1964; Crosby et al., 1990).

Additionally, since many communities are built around a common interest or topic, confiding personal information about oneself usually reveals some connection to the topic of interest and may increase trust in ability. For example, in a virtual community of mothers discussing health issues of children, revealing that one is the mother of six children or a practicing pediatrician helps build trust in one's ability to converse on the topic at hand. Likewise, the development of integrity/benevolence is also influenced by personal information. Knowing more about a person makes it easier to shape beliefs regarding their standards and principles, which should also contribute to increased trust because trust is built when the trusted party behaves as it is expected to (Luhmann, 1979; Blau, 1964). Thus, it is hypothesized:

H2.1: Users' perceptions of the degree to which others confide personal information will be positively related to their trust in other members' abilities.
H2.2: Users' perceptions of the degree to which others confide personal information will be positively related to their trust in other members' benevolence and integrity.

3.3. Disposition to trust

Another antecedent of trust is disposition to trust. Disposition to trust is defined as a general willingness based on extended socialization to depend on others (Kramer, 1999; McKnight et al., 1998), and has been found to related to trust (Gefen, 2000a; Mayer et al., 1995). If one is willing to trust others in general, then this same willingness should apply to

the abilities and benevolence/integrity of others in the virtual community. Disposition to trust may be especially effective when the parties are still unfamiliar with one another (Mayer et al., 1995; Rotter, 1971), as might be the case in a virtual community where almost anyone at all can reply to a post in a conversation. Therefore, it is hypothesized that:

H3.1: Users' disposition to trust will be positively related to their trust in other members' ability.
H3.2: Users' disposition to trust will be positively related to their trust in other members' benevolence and integrity.

3.4. Desire to exchange information

Trust enables and determines the nature of interpersonal relationships (Blau, 1964; Gefen, 2000a; Jarvenpaa et al., 1998). In a trusting environment, people are more inclined to help others and to request others' help, while in a less trusting environment, people tend to shun away from providing help (Blau, 1964; Luhmann, 1979). When trust exists between individuals, they are more willing to partake in shared activity (Fukuyama, 1995; Gambetta, 1988; Nahapiet and Ghoshal, 1998). In the virtual community environment, this shared activity is in the form of cooperative information exchange. One would expect that increased trust would result in increased information sharing and acceptance between members in the virtual community. It is important to note that information sharing occurs in both directions, notably giving information and getting information. These two are distinctly different behaviors, as getting information is the act of querying the members of the community or searching the community's conversation for items of interest, while giving information involves answering others' queries or volunteering comments or observations to the community. Additionally, giving information generally involves exposing oneself to a greater degree than just inquiring.

Trust in the benevolence and integrity of other members should increase the desire to get information because the value of such information depends on the honesty of the person providing it and their willingness to help. This trust should, it is hypothesized, make an individual more inclined to ask for information in the community because they know the provision of information is likely to be governed by these principles. In the same manner, members should only desire to give information when they trust in others' benevolence and integrity, because otherwise they are exposing themselves to possible opportunistic behavior. Many virtual communities have unwritten rules on the behaviors that reflect the commonly accepted standards in the community, and members are often quick to jump on violators of these standards. Yet, there is no real regulatory agency here, rather it is in the hands of each member to live up to these 'standards'. Belief in the benevolence and integrity of others will also influence information exchange because of the reciprocal nature of communication it implies. The community will not survive if reciprocity does not exist—all must contribute reciprocal rewards and have a desire to do good to others. Individuals will be less inclined to share knowledge in the community if they feel this adherence to benevolence norms is lacking. There are many indications in the literature highlighting the centrality of the reciprocal nature of communication in

virtual communities (Sproull and Faraj, 1997; Wellman, 1996; Wellman and Gulia, 1999a).

Ability should have equivalent effects. In the particular environment of the virtual community, participants will be more willing to share knowledge when they trust in others' ability. It is only natural that they would want to converse with others who have the knowledge and skills regarding the topic at hand since virtual communities almost always center around a common theme.

It is thus hypothesized that when participants trust in these two dimensions, that they will be more inclined to provide and request information:

H4.1: Participants' trust in the ability of others in the virtual community will be positively related to their willingness to give information to others.
H4.2: Participants' trust in the benevolence and integrity of others in the virtual community will be positively related to their willingness to give information to others.
H4.3: Participants' trust in the ability of others in the virtual community will be positively related to their willingness to get information from others.
H4.4: Participants' trust in the benevolence and integrity of others in the virtual community will be positively related to their willingness to get information from others.

4. Methodology

The methodology used to test the research model was a cross-sectional survey of virtual community members. Much of the past scholarly research in CMC has conducted experiments in laboratory settings (Sudweeks and Simoff, 1999). However, external validity in these cases is problematic since participants are a captive audience, sample size is small, and researchers usually contrast CMC with face-to-face interaction (Sudweeks and Simoff, 1999). In addition, creating a virtual community in a laboratory setting for the present research would be difficult. Experiments to study trust also have limitations due to the difficulty in manipulating the experimental conditions (Rotter, 1971). To maximize external validity, this research used field survey methodology as the most appropriate to test actual membership perception regarding trust in real virtual communities.

The population of interest in this research was members of virtual communities on the Internet. It was highly desirable to use the technology of the Internet to both contact a subset of this population and to collect the data from the survey instrument. Therefore, the survey was posted on the Internet and the request to participate in the survey was posted directly on the virtual communities.

4.1. Measures

To construct the survey instrument, existing scales from the literature were reviewed and items were carefully adapted or developed for each construct. Then a pretest was conducted in which four individuals who frequent virtual communities reviewed the survey. Minor revisions were made to the survey as a result of the pretest. Following

the pretest, a pilot study was conducted in order to further test the feasibility of this research. The results of the pilot study ($n = 70$) were reviewed and minor changes were made to the survey instrument. All of the items, except where noted, were measured with seven point Likert-type scales ranging from strongly disagree to strongly agree.

4.2. Trust

Trust is considered in this study as a belief with two dimensions: ability and benevolence/integrity. The measurement of the components of trust was adapted from Jarvenpaa et al. (1998). Jarvenpaa et al. (1998) used the scales to measure trust in the context of teams and, as such, the scales reflect the multiple interdependencies that exist in a group versus measuring trust in a dyad. The notion of trust in a virtual community is trust in the collective entity of others, so the scales were altered slightly to fit the virtual community environment. Since many of the items to measure benevolence correlated more with the notions of socially accepted standards and principles, those items were used together with Jarvenpaa et al.'s integrity items in one scale. The items are presented in Appendix A.

4.3. Responsiveness of others

No existing scale could be found to measure the responsiveness of others in a CMC environment such as a virtual community. Gefen and Keil (1998) developed a scale to measure the responsiveness of developers in the context of expert systems implementation. While not directly applicable to this study, the notion of being responsive to requests (Gefen, 2000b; Lewis and Weigert, 1985) was incorporated into the scale used in this study. A three-item scale was developed to measure this construct. The items in this scale referred to the timeliness and quantity of responses to posts (see Appendix A).

It is important to note that responsiveness is not necessarily time dependent, and it is used in this study as a measure of an individual's perception that he or she is getting responses to their postings in the community. Notions of quickness and quantity of responses are assessed as individual perceptions. In addition, while the outcome variables (desire to give and get information) may indicate some notion of the individual user's responsiveness, this study is concerned with the perceptions of others' responsiveness rather than the responsiveness of the individual user themselves.

4.4. Degree to which others confide personal information

No existing scale could be found to measure the degree to which people confide personal information in a CMC environment such as a virtual community. Thus, a three-item scale was developed specifically for this study. Consistent with the literature reviewed above, the items in the scale ask about the willingness of others to share personal information (see Appendix A). This scale was pretested, as discussed earlier.

4.5. Disposition to trust

The scale to measure disposition to trust was adapted from Gefen (2000a). Gefen used the scale to measure disposition to trust in the environment of the Internet, which is the same environment in the present research (see Appendix A).

4.6. Desire to exchange information

The most often cited reason for joining a virtual community is to exchange information (Hagel and Armstrong, 1997; Wellman and Gulia, 1999b). As noted earlier, this exchange is composed of two distinct desires—the desire to get information and the desire to give information. A scale to measure this desire was created specifically for this study (see Appendix A). Drawing on the reasons from the literature, the items in the scale ask about coming to the community for information, facts, advice on carrying out tasks, and to share their knowledge.

4.7. Sampling procedure

Researchers have developed criteria in order to include or exclude communities, based on minimal traffic volume and number of users posting (Witmer et al., 1999). This is necessary in order to exclude inactive communities and bulletin boards that, while active, do not have the true interaction between people that constitutes a community. Therefore, the following criteria were used to generate a list of possible communities to be sampled:

(1) The bulletin board must have at least 10 postings per day for each of three days chosen at random.
(2) The bulletin board must have at least 15 different individuals posting over a randomly selected 3-day period.
(3) At least 80% of postings must have at least one reply for each of three days chosen at random.

These criteria were chosen to make sure that the bulletin board represented a large group of people who were actively communicating with one another.

In order to collect data from a wide variety of communities and to maintain some randomness in the sample selection, a rigorous procedure was adopted in order to select communities for the study. First, popular Web search engines, such as Yahoo, Excite, and Lycos were used to identify bulletin boards. Generic search terms, such as 'boards', 'communities', 'discussions', and 'forums' were used in the search engines. Very often the search results pointed to a listing of bulletin boards on a host site. For example, the ParentsPlace.com site has a bulletin board listing of over 500 boards. When such a listing was encountered, a random number generator was used in order to pick one or more boards from the listing. When a board was located via the search results, it was compared to the three criteria listed above. If the board met all criteria, it was added to the list of possible boards for the study. Using this method, a list of 79 bulletin boards was established. Again

using random number generation, 40 of these boards were selected for this study, and the message requesting participation was posted on each.

4.8. Data collection and response rate

For each of the 40 boards, responses submitted by the end of the 10th day after the survey request were used for this study. A total of 696 responses were received. On four of the communities, the survey request posting was deemed commercial solicitation by the board administrator and removed. Since this did not afford those communities equal time to respond, the 12 responses from these four communities were dropped. In addition, 21 surveys were missing significant amounts of data, and were also dropped. This resulted in 663 usable responses from 36 communities (see Appendix B).

Self-selection is a limitation of this research, which can be addressed by matching the demographics of the sample with the demographics of known population data of Internet users, a procedure which has been used in similar Web-based survey research (Bellman et al., 1999). The present sample seems to be fairly similar to other surveys of Internet users (see Table 1). The differences may be peculiar to virtual community members. Although self-selection bias may compromise the study's validity, the broad solicitation from real-world virtual communities counters this risk and gives the study external validity.

Response rate calculation is difficult since it is impossible to know how many people viewed the post requesting participation. In addition, people could have seen the title and not opened the post to read the contents. One possible measure of response rate is the number of completed surveys per the number of unique visits to the survey page. The rate of completions per visit was 60.7%, and the rate of usable surveys per visit was 57.7%.

Table 1
Comparison of sample demographics

	Present study	PEW research center[a]	GVU 10th WWW user survey[b]
Gender	62% male	51% male	66.4% male
	38% female	49% female	33.6% female
Age	78% 18–49 years	89% 18–54 years	80.6% 16–50 years
Education	67% some college +	79% some college +	70.8% some college +
Race	91% Caucasian	N/A	89.7% Caucasian
Location	93% in US	N/A	95.4% in US
Sample size	663	1426	5022
Sample population	Virtual community members	Virtual community members	Internet users

[a] Study by the PEW research center, available at: http://www.pewinternet.org/reports/toc.asp?Report = 47.
[b] Study by the Graphic, Visualization & Usability Center at the Georgia Institute of Technology, available at: http://www.gvu.gatech.edu/user_surveys/survey-1998-10/.

4.9. Sample characteristics

Thirty-six respondents (5.4%) did not select a community on the drop down list, and therefore the community that they came from is unknown. The largest response from a single community was 90, which made up 13.6% of the usable sample. There were 14 communities from which there were fewer than 10 respondents. The responses from these 14 communities together made up 11.8% ($n = 78$) of the usable sample.

The majority (62%) of the respondents were male, and 78% were between 18 and 49 years of age. The vast majority (91%) was Caucasian, and most (67%) had an educational background of at least some college. Most respondents were from the US (93%) and were employed full time (70%). These demographics are consistent with most surveys of Internet users (see Table 1) and expected since the survey was in English and posted on communities using English to converse. The average response for the number of hours a week a respondent spends on the boards was between the 3–4 and 5–6 h a week categories. For the number of months using the board, the average was about 9–12 months. The respondents indicated on average they posted a little over three new threads per month (posts that are new topics, not responses to others), and posted about 8–9 responses to others.

For the 627 respondents who selected a community, the average time of response to the survey was 30.55 h with a standard deviation of 41.43 h. 393 responses (62.7%) were received in the first 24 h of the posting, and an additional 119 responses (19.0%) in the second 24 h for a total of 512 responses (81.7%) within the first 48 h.

5. Data analysis

5.1. Measurement of the variables

A factor analysis using the Principal Components method with Varimax rotation was initially performed as a preliminary analysis to the subsequent PLS analysis. This was accompanied with a calculation of the internal consistency reliabilities (ICR) of the scales. Results suggested that several items be dropped from the scales in order to achieve a high level of reliability and validity. Specifically, an item was dropped if (a) it did not meet the threshold loading of 0.40 on any factor, (b) its highest loading on an expected factor was not above 0.60, or (c) it showed a significant variance across multiple factors (Hair et al., 1987).

Descriptive statistics and correlations between the constructs are given in Table 3. Of interest is the low correlation between giving information and getting information (0.369). This may occur because those who seek information do not feel knowledgeable enough to give information. Likewise, those who come to the community to share their knowledge as experts may not be as interesting in getting information from others. Perceived responsiveness, desire to give information, and desire to get information loaded exactly as expected in the factor analysis. Each had acceptable ICR (Gefen et al., 2000; Hair et al., 1998; Segars, 1997): 0.90 for desire to get information, 0.94 for desire to give information, and 0.95 for responsiveness (see Table 2). Confiding personal information and disposition

Table 2
Results of confirmatory factor analysis in PLS

	Ability	Perceived responsiveness	Confiding information	Disposition to trust	Benevolence and integrity	Desire to give information	Desire to get information
Trust-ability1	*0.7360*	0.2478	0.1875	0.1748	0.3977	0.2244	0.3213
Trust-ability2	*0.8835*	0.3122	0.1975	0.2092	0.5107	0.1877	0.3984
Trust-ability3	*0.8374*	0.3326	0.2353	0.2176	0.5168	0.1945	0.3495
Trust-ability4	*0.8617*	0.2926	0.2127	0.1990	0.4638	0.2054	0.3054
Trust-ability5	*0.7665*	0.2916	0.2291	0.2503	0.5351	0.2602	0.3848
Trust-ability6	*0.8334*	0.2750	0.2279	0.2347	0.4846	0.2197	0.3913
Responsiveness1	0.3349	*0.9097*	0.1281	0.1804	0.3670	0.3237	0.2407
Responsiveness2	0.3728	*0.8989*	0.1661	0.2053	0.4141	0.3311	0.3228
Responsiveness3	0.3728	*0.9167*	0.1551	0.1943	0.4296	0.3726	0.3185
Confide1	0.2381	0.1443	*0.9384*	0.1656	0.2057	0.1155	0.1493
Confide2	0.2557	0.1589	*0.9492*	0.1525	0.2356	0.1328	0.1687
Dispos-trust1	0.1783	0.1827	0.1643	*0.8784*	0.2346	0.0602	0.1503
Dispos-trust2	0.2129	0.1925	0.1150	*0.8386*	0.2097	0.0888	0.1419
Dispos-trust3	0.2926	0.2391	0.1444	*0.9264*	0.3037	0.1113	0.2000
Benevol1	0.4124	0.3081	0.1538	0.2285	*0.8261*	0.2494	0.3270
Benevol2	0.4856	0.2564	0.2339	0.2270	*0.7707*	0.2301	0.3042
Benevol3	0.5683	0.4132	0.2728	0.2746	*0.8545*	0.3137	0.4786
Benevol4	0.5240	0.3719	0.2804	0.2947	*0.8724*	0.2815	0.4243
Integrity1	0.5318	0.3470	0.2019	0.2403	*0.8661*	0.2502	0.4170
Integirty2	0.2196	0.1295	0.0695	0.0589	*0.4937*	0.0863	0.1822
Give-info1	0.2356	0.3700	0.1821	0.0760	0.2679	*0.9456*	0.2750
Give-info2	0.2886	0.3602	0.1307	0.0849	0.3069	*0.9381*	0.3188
Get-info1	0.4318	0.3187	0.1679	0.1791	0.4375	0.3346	*0.8892*
Get-info2	0.4385	0.3055	0.1748	0.1430	0.4405	0.3175	*0.9081*
Get-info3	0.2949	0.2291	0.1074	0.1702	0.3206	0.1759	*0.7962*
ICR	0.92	0.95	0.94	0.92	0.90	0.94	0.90

Table 3
Correlations and square root of the AVE (in diagonal)

	Mean	SD	R^2	RE	CF	DIS	AB	BNIN	RpGiv	Rp Get
Responsiveness (RE)	5.23	1.29		*0.925*						
Confiding in other (CF)	4.50	1.63		0.177	*0.945*					
Disposition to trust (DIS)	5.08	1.17		0.222	0.198	*0.889*				
Trust-abilities (AB)	5.44	1.04	0.21	0.386	0.271	0.253	*0.815*			
Trust-benevolence/integrity (BNIN)	5.10	1.27	0.22	0.397	0.254	0.287	0.596	*0.779*		
Desire to give info (RpGiv)	5.29	1.56	0.11	0.461	0.188	0.139	0.287	0.315	*0.944*	
Desire to get info (RpGet)	5.40	1.55	0.26	0.346	0.214	0.231	0.455	0.459	0.369	*0.867*

Note: item responses from 1 = strongly disagree to 7 = strongly agree; square root of the AVE (in diagonal).

to trust also loaded on separate factors as expected after dropping the items, with resulting ICRs of 0.94 and 0.92, respectively.

The trust items loaded on two distinct factors as expected. One factor emerged as the trust in abilities dimension (ICR = 0.92), while the other was trust in integrity/benevolence (ICR = 0.90). The data were then analyzed with PLS-graph. PLS is especially suited for exploratory research (Chin, 1998; Gefen et al., 2000). The PLS analysis confirms the convergent and discriminant validity of the scales. The AVE of each construct is larger than its correlation with the other constructs, and each item loads much higher on its respective construct than on the other constructs, see Tables 2 and 3.

5.2. Testing the hypotheses

The research model with the PLS path coefficients is presented in Fig. 2. The *t*-values were generated with the bootstrap method. The PLS analysis shows that the perception of others' responsiveness significantly increased ability ($\beta = 0.32$, *t*-value = 7.54) and the combined benevolence and integrity ($\beta = 0.33$, *t*-value = 8.22), supporting H1.1 and H1.2. Others' confiding information increased both ability ($\beta = 0.19$, *t*-value = 4.91) and benevolence and integrity ($\beta = 0.16$, *t*-value = 3.93), supporting H2.1 and H2.2. Disposition to trust increased ability ($\beta = 0.15$, *t*-value = 2.97) and benevolence and integrity ($\beta = 0.18$, *t*-value = 4.85), supporting both H3.1 and H3.2. Ability increased

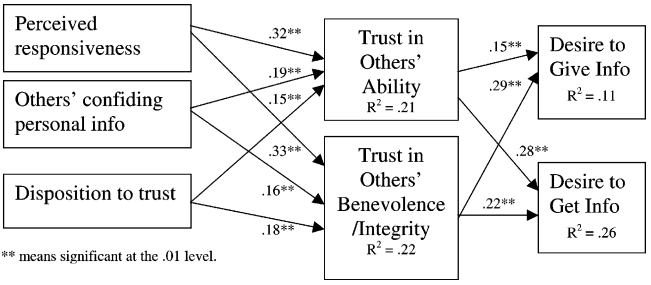

Fig. 2. Research model with PLS coefficients.

both desire to give information ($\beta = 0.15$, t-value $= 2.66$) and to get information ($\beta = 0.28$, t-value $= 6.21$), as did benevolence and integrity increased the desire to get information ($\beta = 0.29$, t-value $= 7.53$) and desire to give information ($\beta = 0.22$, t-value $= 4.66$), supporting H4.1–H4.4. In all, 21% of the variance of ability, 22% of benevolence and integrity, 11% of desire to give information, and 26% of desire to get information were explained.

As an alternative analysis, the standard test for mediation (Baron and Kenny, 1986) was conducted. For perception of responsiveness on giving information, the beta changed from 0.337 ($p < 0.001$) to 0.256 ($p < 0.001$), and on getting information from 0.301 ($p < 0.001$) to 0.132 ($p < 0.01$). For confiding information the betas for giving information ($\beta = 0.095$, $p < 0.05$) and getting information ($\beta = 0.098$, $p < 0.01$) became insignificant in the mediation model. Disposition to trust was not significant in the unmediated model for giving information, but was for getting information ($\beta = 0.086$, $p < 0.05$), and became insignificant in the mediated model ($\beta = 0.007$). The results show that all necessary conditions for mediation hold with the exception of disposition to trust in the case of giving information. Perfect mediation is occurring for both confiding personal information and disposition to trust for getting information. Likewise, perfect mediation is occurring for confiding personal information for giving information. Therefore, trust in abilities and benevolence/integrity mediates the effect of responsiveness, confiding personal information, and disposition to trust on the desires of getting information, and the effect of responsiveness and confiding personal information on the desires of giving information according to Baron and Kenny (1986) standard.

6. Discussion

6.1. Summary of results

The data show that as expected, trust is a significant predictor of virtual community member's desire to exchange information, and especially to get information. This effect was hypothesized based on the need to depend upon other community members given that no enforceable rules exist to guarantee the behavior of other community members. Perhaps not surprisingly, this effect was stronger with regard to getting information than with regard to giving information, presumably because of the increase dependence upon other community members in the former case. This trust, the data suggest, is composed of two dimensions, ability and a combined integrity/benevolence dimension. These beliefs were in turn significantly predicted, as hypothesized, by the behavior of the other community members, in this case, by their responsiveness and confiding behavior. Trust was also increased, as hypothesized, by a general disposition to trust, as also found in other research (Gefen, 2000a).

In applying trust to virtual settings, this study built on Jarvenpaa et al. (1998) who applied the same trust scales in a virtual team setting. In their application, the team members were dispersed by space and time, did not know each other, and did not meet face-to-face—conditions very similar to that of the emergent virtual communities studied here. However, in the Jarvenpaa et al. study, the teams were composed of

students working on a class project for a short period of time. This situation is distinctly different from the case of virtual communities where participants are drawn by a common interest, and from organizational work situations that are more long term. In this study, too, trust was a significant predictor of virtual community activity lending further support to the conclusion that trust is a central aspect also in virtual communities.

Moreover, this study extends Jarvenpaa et al.'s study by proposing several antecedents of trust in virtual communities. As expected, when others confide personal information, trust in others is higher. This is significant because it shows that even though participants may come to talk about a particular topic (Honda motorcycles or real estate appraisal), they will trust others more if they know something personal about them. Perceived responsiveness also builds trust. When others reply quickly and often to messages, members in the community will have higher levels of trust. Disposition to trust is also positively related to trust in others, indicating that people who are generally trusting exhibit more trust in others.

6.2. Limitations

The results of this study have limitations. There are thousands of virtual communities on the Internet, and identification of the population of interest (virtual community users) is difficult at best. The data was self-reported and thus subject to personal memory, varying scale use among respondents, and social desirability bias. Response rate was virtually impossible to calculate. Finally, the cross-sectional design does not afford the opportunity to infer causality among the constructs and may introduce common method bias. A longitudinal or experimental study could verify, complement, and extend the findings in this research. However, there is reason to believe that while same time correlation may be true, nonetheless theory indicates that, for example, confiding information builds trust (Crosby et al., 1990; Gefen, 1997) while hiding information ruins it (Fukuyama, 1995).

This study focused on the behaviors of others in the community and the internal disposition to trust construct and purposefully did not explore other factors which could affect trust, such as those related to the organization that sponsors the virtual community or technical security concerns. Aspects of the responses from others that were not measured in this study, such as their quality, could impact trust and its relationship with the proposed antecedents. For example, others could be very responsive but with poor quality responses or argumentative, negative responses, which may adversely affect trust. In addition, there may be additional factors, such as the need to solve problems or learn more about an issue, that affect one's desire to get or give information.

6.3. Implications of the study

People come to virtual communities to exchange information—either by providing it to others or by soliciting it from others. This exchange is based upon the trust the members have in each other, and without this trust the virtual community there is no exchange and the virtual community will cease to exist. This research shows elements, which build this

trust—responsiveness, confiding personal information, and a general disposition to trust, as well as its multidimensionality.

Past MIS research has found that people seek advice and exchange useful information from strangers (Constant et al., 1996; Sproull and Faraj, 1997). In another approach, the present research examined this phenomenon, suggesting that trust is important aspect in this information exchange. In this environment, the understanding of trust as a mechanism to guard against opportunistic behavior (Butler and Cantrell, 1994; Luhmann, 1979) is validated in the context of online strangers. Further, this trust was examined in a community where it develops between an individual and a group of strangers, a distinct view of Luhmann's (1988) personal trust. Finally, trust appears to be different in the online setting than in the organizational settings in past research (Blau, 1964; Butler, 1991; Giffin, 1967; Jarvenpaa et al., 1998; Mayer et al., 1995), where trust was composed of three dimensions. Trust here was found to have two dimensions—ability and combined benevolence/integrity.

Within the context of knowledge management, virtual communities provide a place for knowledge exchange (Wasko and Faraj, 2000), and the results of this study can aid in understanding and facilitating this exchange. The generation of knowledge, in this case the generation of conversation in the community, is enhanced by the presence of trust in abilities and benevolence/integrity. Knowledge management researchers can use the results of this study to understand knowledge generation and sharing.

The new digital economy is resulting in many more virtual communities, and businesses are encouraged to establish communities in order to foster relationships with their customers (Barber, 1983). For the communities to be successful trust must be present. Also, new virtual communities using peer-to-peer technologies will increasingly be looking to build in trust mechanisms for greater adoption. Businesses that incorporate enabling trust mechanisms will likely be more successful than those who do not. This translates into improved virtual community site design approaches. Organizational researchers can use the results of this study to understand behavior of employees in virtual community-type environments. In fact, in some communities, where participants include employees of the hosting company, these organizations may be able to build trust more directly than using 'passive' trust-engendering features. Other implications are that companies will increasingly seek to select virtual community sites that elicit greater trust from their participants for advertising purposes.

6.4. Future research

There is a plethora of future research directions that can be investigated in relation to trust and online behavior in virtual communities. Although a commonly accepted categorization scheme for virtual communities does not exist, it may be that trust develops differently in different kinds of communities. Antecedents and effects of trust in sports-oriented communities may be different than in medical communities. Posting behavior for respondents with high trust versus low trust could be studied to investigate the relationship between trust and use of the community. The structure and

length of threads (an initial message in the community and all associated replies) and its relationship to posting behavior and trust could yield more information on the development of trust. Several variables can be examined more in the context of disposition to trust, especially race, ethnicity, and culture. Does one's country location, as a surrogate for culture, have an effect on disposition to trust? Given the many types of information exchanged in virtual communities, the effect of trust on desire to give and get this information may vary by information type. There may be certain types of information for which trust is more important. Finally, a complementary framework in addition to trust could be valuable in explaining motivations to use virtual communities.

Appendix A. Survey items

Directions: each response in the following sections is a seven-point scale ranging from 1 (strongly disagree) to 7 (strongly agree). Choose the option that reflects your level of agreement with each statement (Table A1).

Table A1

Trust: ability component
I feel very confident about the skills that the other participants on this bulletin board have in relation to the topics we discuss
The other participants on this bulletin board have much knowledge about the subject we discuss
The other participants on this bulletin board have specialized capabilities that can add to the conversation on this bulletin board
The other participants on this bulletin board are well qualified in the topics we discuss
The other participants on this bulletin board are very capable of performing tasks in the topics we discuss
The other participants on this bulletin board seem to be successful in the activities they undertake
Trust: integrity/benevolence component
The other participants on this bulletin board are very concerned about the ability of people to get along
The other participants on this bulletin board would not knowingly do anything to disrupt the conversation
The participants on this bulletin board are concerned about what is important to others
The participants on this bulletin board will do everything within their capacity to help others
The participants on this bulletin board try hard to be fair in dealing with one another
The other participants on this bulletin board do not behave in a consistent manner (reverse coded)
Responsiveness of others
The people on this bulletin board are very responsive to my posts
I can always count on getting a lot of responses to my posts
I can always count on getting responses to my posts fairly quickly
Confiding personal information
The posts on this bulletin board often contain personal information
People seem very willing to divulge private information about themselves to other participants

Disposition to trust
I generally have faith in humanity
I feel that people are generally reliable
I generally trust other people unless they give me reason not to

Desire to get information
I come to this bulletin board to get information on a particular topic
I use this bulletin board when I want advice on how to carry out some task
I come to this bulletin board when I need facts about a particular subject

Desire to give information
I come to this bulletin board to give other participants information I know about a particular subject
I come to this bulletin board to share my skills and abilities with other participants

Appendix B. Number of responses from each community

See Table B1.

Table B1

Community code		Frequency	Percent	Cumulative percent
SHADOW	Discussion forum for owners, riders, and admirers of the various models of the Honda shadow motorcycle	90	13.57	13.57
PICKUP	Discussion among pickup truck enthusiasts	57	8.60	22.17
Tacoma	Discussion forum for Toyota Tacoma enthusiasts	51	7.69	29.86
UNKNOWN	(Note: respondent did not pick a community)	36	5.43	35.29
FISH	Discussion about Steelhead and Salmon fishing	35	5.28	40.57
GUITAR	For any discussion by musicians who play or like the guitar	32	4.83	45.40
BRONX	For people who used to live in the Bronx (New York) to communicate about any topics	30	4.52	49.92
APPRAISE	Discussion of any aspect of real estate appraisal	25	3.77	53.70
BREAST	For debate about formula feeding or breastfeeding babies	24	3.62	57.32
TEACH	Discussion among teachers	22	3.32	60.63
CAT	To talk about cat health issues	21	3.17	63.80
GUNS	To discuss gun control efforts	18	2.71	66.52
EXPECT	For discussion about expecting a baby that is not your first child	17	2.56	69.08
Mets	To talk about the Mets baseball team	17	2.56	71.64
CATHELP	Discussion about anything to do with cats	15	2.26	73.91
HIGHTEC	For discussion of high tech methods for getting pregnant	15	2.26	76.17
CYCLE	For women who got pregnant at the same time as other women (on the same cycle)—called ‘cycle buddies’ to share experiences and keep in touch	13	1.96	78.13
ENTMOOT	Discussion among fans of the author J.R.R. Tolkien	13	1.96	80.09
VEGAS	General talk about Las Vegas	13	1.96	82.05
DOGHSE	Anyone who wants to talk about dogs	11	1.66	83.71
AUSWINE	Talk about Australian wines	10	1.51	85.22
NURSE	General discussion for anything related to nursing	10	1.51	86.73

(*continued on next page*)

Table B1 (*continued*)

Community code		Frequency	Percent	Cumulative percent
SPRTCAR	Discussion among coupe, convertible, and sports car enthusiasts	10	1.51	88.24
MUSIC	For discussion about music, from the viewpoint of the listener as well as the performer	9	1.36	89.59
CRUISE	Discussion on vacation cruises through the world	8	1.21	90.80
HOMESCH	Practical advice, scholastic/academic discussions and support for home educators of children	8	1.21	92.01
Sopranos	To discuss the television show 'Sopranos'	8	1.21	93.21
SPACE	For news and discussion about space and the universe	8	1.21	94.42
AIRTRAN	Discussion about investing in AAIR (AirTran Holdings, Inc.)	7	1.06	95.48
ALLERGY	Discussion about children's allergies	7	1.06	96.53
Catholic	Debate and talk about Catholicism	7	1.06	97.59
Abortion	To discuss opinions on abortion and the tactics being used by both sides of the issue to promote their stance	5	0.75	98.34
HSBB	To discuss high school girls basketball in New Jersey	3	0.45	98.79
NBA	Discussions on NBA basketball	3	0.45	99.25
ESPN	To discuss fantasy baseball strategy	2	0.30	99.55
SPANK	For debate on whether or not children should be spanked	2	0.30	99.85
MILIT	For discussion of any topics related to the US Military	1	0.15	100.00
Total		663	100.00	

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