# We Can See You:
## A Study of Communities' Invisible People through ReachOut

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**Abstract.** Virtual communities are a great tool, both at home and in the workplace. They help in finding new friends and solving complicated problems by creating a virtual family or a giant group-mind. However, building a virtual community is not a trivial task. Many problems need to be addressed for a new community to be successful. While many of these problems are features of the medium, participants themselves are still the major part of the equation. Understanding the behavioral patterns of virtual community members is crucial for attracting participants and facilitating active participation. In this paper, we describe our findings from analyzing more than a year of activities of a workplace community. Our community used ReachOut, a tool developed in our group to support semi-persistent collaboration and community building. Throughout the year, all users' activities were logged, providing us with very detailed information. Not only do we know of people's postings to the community, but we can also track lurking behavior that is usually hidden. This allows us to check several hypotheses about non-active participants' behavior and propose some directions to increase active participation in virtual communities.

## Introduction

From the early years of the Internet, virtual communities became one of the most widespread and important applications of the new technology (Rheingold 2000). In this era, when our sociability and community involvement are steadily

decreasing (Putnam 2000) it is important to understand how this new medium can help us start collaborating again.

There are many efforts and applications aimed at building strong communities, both for leisure activities (The Well; Rheingold 2000) and in the workplace (Erickson et al. 1999; Hagel and Armstrong 1997). However, this task is far from being trivial or simple. Communities are built with great effort, and die easily (Stone 1994). Critical mass of participants (Markus et al. 1990), reciprocity (Harrison and Dourish 1996), and interactivity (Rafaeli 1988, Rafaeli and Sudweeks 1997) are just some of the factors that influence the "stickiness" of a community. In part, these are features of the medium itself, but some still depend on the people participating in the process. It is therefore crucial to understand people's behavior in computer mediated space.

Most of the current research is dedicated to studying **public** activities of virtual community participants (Whittaker et al. 1998; Rafaeli et al. 1998; Preece 1998). The reason for this is that in most of the community supporting tools – Usenet newsgroups, forums, BBSs – non-public behavior is very hard or even impossible to trace. One can easily define non-active participants (a.k.a. lurkers) in mail distribution lists (Nonnecke and Preece 2000) as those who are registered to receive postings but never post themselves, but this approach supplies limited understanding of lurkers behavior, and personal interviews are required to shed some light on the hidden patterns of this behavior (Nonnecke and Preece 1999).

ReachOut is a semi-persistent collaboration and community building tool that was created in the IBM Haifa Research Lab at the end of 2001 (Ribak et al. 2002). As in Usenet newsgroups, ReachOut allows people to post questions to peers, but provides a semi-persistent chat-based interface, creating a more informal environment to foster collaboration. In addition to traces of active participation in discussions, the ReachOut server also records the activities of those who visit discussions without posting to them (lurkers). This feature gives us a unique opportunity to gather more detailed statistics on non-active participants' behavior and analyze it, verifying hypotheses that were raised in the literature about non-active behavior in virtual communities.

The rest of the paper is organized as follows: We begin by reviewing the related work, identifying previous hypotheses about invisible virtual community participants, and singling out the hypotheses we wish to verify in this study. In the next section, we briefly describe the ReachOut tool and its logging techniques. We go on to describe the methodology of our study and present the results of our analysis. We conclude by proposing some future work directions in studying participation in virtual communities, and some improvements to existing tools.

# Related Work

While it is very difficult to study phenomena that cannot be observed, a body of related work on non-active participation does exist. Putnam, in his book 'Bowling Alone' (2000), notes that the level of participation in community activities in America is declining with the years. An interesting discussion on The Well (Are you a lurker 1992) indicates that people tend to map their real life behavioral patterns to computer mediated communication (CMC) and thus it is expected that the increased number of inactive people in real life will result in an increased number of lurkers in online communities.

The free rider problem is defined as a situation when people use the common good without contributing to it (Sweeney, 1973). Kollock and Smith (1996) point out that non-active participation in online forums may be viewed as free-riding. There have been studies about patterns of behavior of users in discretionary databases (Thorn and Connoly 1987) that can eliminate or reduce free-riding. It should be noted, though, that people who do not have new information to contribute, actually assist the community by reserving their already stated thoughts to themselves, rather than cluttering the space with repeated ideas.

Rafaeli and Sudweeks (1997) recognize lurkers as an important part of Internet groups, but admit that there is no information on their activity. Whittaker et al. (1998) also acknowledge the fact that while lurking is a prevalent activity, it leaves no public traces, so it cannot be fully studied. One type of electronic medium, in which lurking behavior actually may be observed, is mail distribution lists (DLs). Nonnecke and Preece (1999, 2000) use DLs for their study, by defining lurkers as people who are subscribed to the list but never post anything, or post very few messages. Our peer support and community building tool, called ReachOut (Ribak et al. 2002), has a unique logging system that provides exact information on behavioral patterns of participants in a newsgroup-like medium, so it would be interesting to verify existing findings and hypotheses about lurking behavior based on the data we collected

Examining the behavior of visitors to web sites that host public forums can also give us an indication of lurking behavior. Katz, in his column "Luring the Lurkers" in SlashDot (1998) cites a survey from a computer consulting firm in Chicago, that studied behavioral patterns of large sites visitors. Similarly, Mason studied a football fans site (1999).

One of the most obvious observations about lurkers is their numbers. The survey cited by Katz found that 98% of large sites' visitors are lurkers. Mason reported a lurking level of 90%. While these numbers are impressive, they are quite easily explained, as no active participation is expected of a visitor to a Web site, even if the site has a forum. More relevant numbers are those reported by Nonnecke and Preece (2000), where they report their findings in a study of DLs,

and find that lurking levels vary from 45% in health support distribution lists to 82% in software related DLs, with an average of 55%.

We assume that several factors affect the level of lurking in a medium. Media which utilize a "push" paradigm (such as DLs and ReachOut) are expected to exhibit higher lurking levels than those with a "pull" paradigm, since users do not invest any effort to view postings after their initial subscription. On the other hand, DL users are required to explicitly unsubscribe from the list in order to terminate lurking, while ReachOut users can drop out altogether simply by refraining from logging in to the system. Thus we would predict that ReachOut lurking levels would be lower than lurking levels in DLs. We also anticipate that people will tend to lurk more in highly public places, such as internet forums, where the atmosphere is not always friendly and polite, and a comment on the forum is liable to result in a flame…

The first question we wish to pose is:

**Q1: How do lurker levels in ReachOut compare with prior findings?**

Another prevalent assumption about lurking is that it is an important form of learning about the community. Kraut et al. (1992) point out that background behavior is an important way for novices to learn about a new topic. Whittaker et al. (1998) define it as peripheral participation, until a topic of direct interest is spotted. Donath (1996) proposes that people often try to find out about other participants from their postings' content. Finally Nonnecke and Preece (1999) clearly define learning about the community culture as one of lurkers' activities – 70% of the users interviewed stated they lurked to get to know the group better.

While it is difficult to learn about educational lurking without actually interviewing the users, it is possible to find out the amount of time that passed before people attempt their first posting. This would give us an indication of the time it usually takes people to get comfortable with the community and start active participation. In addition, we can also check whether the educational lurking time in any way affects the consequent posting behavior of the user. Thus our next questions are:

**Q2a: How long do people lurk before they post for the first time?**
**Q2b: What is the correlation between this time and future posting behavior?**

According to Rafaeli (Rafaeli, 1988), interactivity is a very important part of any virtual community. Moreover, it affects performance quality, motivation, sense of fun, cognition, learning, openness, frankness, and sociability. It would be interesting to see how interactive discussions affect people who interact in them for the first time. Our next question is thus:

**Q3: Is there any correlation between the user's first posting experience, and the decision to become an active participant?**

Finally, Nonnecke (2000) pointed out non-fluent English as a reason for lurking. The community we studied with ReachOut had participants all over the globe. We may therefore evaluate this hypothesis:

**Q4: Is there a noticeable difference between lurking behaviors of native English speakers vs. non-native speakers?**

In the next section, we present ReachOut, the tool we used to collect our data, and a community which used ReachOut for a period of slightly more than a year.

# ReachOut and the ROPE Community

## The ReachOut Tool

ReachOut is a tool for peer support and community building, created in IBM Haifa Labs. While the implementation details and the theoretical background of this tool are described elsewhere (Ribak et al. 2002), we provide a short description of the ReachOut components that are relevant to this paper.

ReachOut's main goal is to provide peer support. Just like Usenet Newsgroups, it provides an environment for posting questions to predefined interest groups, but uses a push technology to notify people of new or updated questions.



Figure 1. ReachOut in the system tray.

In its minimized mode, ReachOut appears as a system tray icon, which is overlaid by an exclamation point when a notification arrives (Figure 1). When users decide to open the application, they see a narrow bar where all new and updated discussions' titles fade in and out, decorated with icons that indicate their status (Figure 2). Users may then navigate through discussions in several ways, based on groups of interest, discussion title, name of asker, or status of discussion.

Figure 2. The ReachOut bar.

A ReachOut discussion is very similar to a conference chat, though it is persistent through time; thus new participants can see the full discussion transcript. Users can also see the history of participation; the discussion transcript contains past entries, and the participant list doesn't only show active participants but also people who contributed to the discussion in the past and are not currently there (Figure 3). People who enter the discussion but do not contribute to it (lurkers) are shown in the participants list only as long as they are online. The ReachOut server logs every entry to any discussion in its log file. This provides us with a set of data to be parsed and processed, in order to study users' behavior.
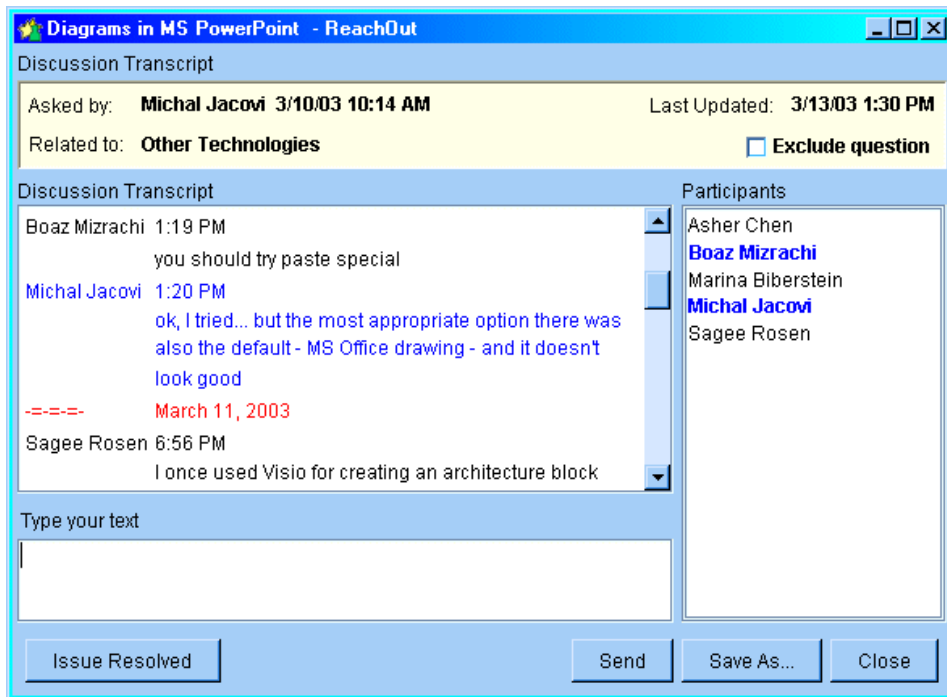


Figure 3. Discussion window.

## The ROPE Community

ReachOut was deployed in a community of IBM General Technical Sales Support division. The community is called ROPE (ReachOut for Practitioners Expertise), it was launched on December 2001, and has been monitored by us ever since. The log file we use for the analysis of this paper was frozen at the beginning of

January 2003, and thus covers 13 months of activity. The ROPE community consists of people with high technical skills who provide support for the IBM sales force. During the study, 822 users from 31 countries used ReachOut at least once, and 370 discussions were conducted. For our research purposes, we removed from the studied population the users we defined as "the core team" – the developers and the champion customers, whose behavior on the tool may have been influenced by their direct connection to the project and this research. This group included 16 users. We also removed all those people who tested ReachOut only once but did not come back to it – there were 300 such users. After this cleanup, we were left with 506 repeating users. These served as the population we studied. We argue that over 500 repeating users is a valid population to verify our hypotheses.

## Methodology

ReachOut logs each and every action performed by users. There are nine types of actions, from which only six are relevant to the present study:

- User logged in
- User logged out
- User entered discussion
- User left discussion
- New discussion created by user
- New posting is appended to discussion

All logged data was processed and accumulated using a custom Java based log analyzer and standard statistics tools.

In the next subsections, we define our main variables.

### Lurkers

A simple definition of lurkers, one that matches the definition in the related work section, would be those people who never posted to discussions in the system. However, as the logged events on ReachOut are much richer, we can actually tell when users enter a discussion, and thus we can offer a more precise definition of lurkers. We see lurkers as those who not only did not post anything, but also actually read other people's discussions – these are the real lurkers.

In order to explore yet another definition, we followed the approach taken by Nonnecke and tried to explore the level of lurking when the definition of lurkers is relaxed to those who posted a minimal number of postings. The average number of postings of the entire population through the period of our experiment, is 30, we may thus choose to relax our definition to those who posted three times or less.

## Educational Lurking

We define educational lurking as the period of time from the first login of the user until the first posting. There are three measures for this behavior – the absolute calendar time from the first login to the first posting, the actual online time in the same period, and the number of times the user visited other discussions before posting for the first time. We will show results for all three measures.

When studying educational lurking, we focus on the people who participated at least once, as the educational lurking period for the real lurker is indefinite – they never posted "for the first time". We examined two different groups of participants – those who became active participants (120 users), and those who qualified as lurkers under our relaxed definition above – namely they posted up to three postings (115 users).

## Interactivity

Rafaeli and Sudweeks (Rafaeli and Sudweeks, 1997) discuss a continuum of interactivity, with declarative (one-way) communication on the one end, followed by reactive (two-way) communication, and full-interactivity at the other end (with messages that directly refer to how previous messages in the same discussion related to others). We chose to focus our measurements on the definition of reactive communication, and define "users' first interactivity experience" as the number of messages that directly referred to their **first** posted message. It is likely to assume that the first experience of users would influence the rest of their interaction with the community. A user that receives a good reaction to a first posting is likely to become a contributor to the community. A user that receives a bad reaction may retreat and refrain from participating. Not getting any reaction at all may be perceived as a bad reaction, though we may assume that user would make a few more attempts to participate. As the community of our study is a workplace community, we do not expect to encounter too many bad reactions that would drive users away. We shall therefore aim at studying the difference between users who were welcome, and those who were ignored. We assign a score to users' first interactive experience, as the number of messages that directly referred to the first posted message, and study the correlation of this number with the users' level of future participation.

We chose a random sample of 15 active participants and a random sample of 15 lurkers under the relaxed definition (a bit over 10% of both populations). We then located the first discussion of each of these users and counted the number of messages that were referred directly to their first message. We then compared these two samples to see if there is any correlation between interactivity of the first discussion and consequent participation behavior.

## Non-native English Speakers

Since ReachOut has been deployed inside IBM, an American company, we could assume that most of our users are fluent English speakers. However, many of the users come from different countries and therefore are non-native English speakers. The influence of this fact on their lurking behavior is an interesting subject for a study. Not having accurate information on the English level of our users, we based our study on the country in which our users are located. We defined users from the US, UK, Canada, and Australia as native English speakers, and those from the rest of the world, as non-native English speakers. In IBM, the e-mail addresses contain the country code suffix, and so we used this information in order to classify our users.

# Results

## Number of Lurkers

Our log file indicates that 263 of the repeating users match the first definition. This counts for 52% of the population.

It turns out that out of the 263 users who never participated; only 232 entered other people's discussions. These are 45.8% of the population. An interesting fact is that 31 of the non-participants, never even looked in other discussions. Those users are equivalent to DLs subscribers who for various reasons do not unsubscribe from the list, and yet they never bother reading the postings. This kind of behavior cannot be studied in DLs, and only ReachOut's unique logging mechanism reveals it. While such subscribers to DLs are passive users who may simply ignore the notes that are distributed to them, on ReachOut they actively log in. According to our data, they were on ReachOut an average of 491 minutes (with an exceptional case of a user who was online for 2580 minutes). They logged in over three times on average, and yet they never ever bothered looking into any discussion. Why they kept coming back and what benefit they got out of ReachOut is a puzzle.

The relaxed definition of lurkers yields 387 users, which are 76.5% of our population.

## Educational Lurking Levels

The results we discovered for the educational lurking measures imply that there is no statistically significant difference between active participants and lurkers under the relaxed definition, in any educational lurking parameters. The data represent a highly right skewed distribution with mean of around 10 days of

absolute calendar time, around 5 hours of online time and around 6 lurked discussions prior to the first posting and very high p values (p=0.8). Similar results were obtained for both populations, indicating that none of the parameters that we examined influence the users' future participation behavior.

## Interactivity

To analyze the effect of the interactivity of the first experience we selected two random samples of 15 users each – one from the collection of active users and the other from the collection of lurkers under our relaxed definitions (p=0.029 indicated that this relatively small sample was sufficient). For each user in the sample we manually analyzed the first participation and counted the number of messages that directly referred to it. This definition of interactivity is rather objective and well defined, and indeed, there was a very good correlation between results that were counted by two different judges. The results of the analysis are brought in Table 1, where users who later turned out to be active users are marked "heavy", and those who kept a low profile are marked "light".

| Participation Levels | Mean | Std. Deviation |
|---|---|---|
| **Light** | 1.3333 | 1.54303 |
| **Heavy** | 3.5333 | 3.37780 |

(t=-2.294, p=0.029)

Table 1. Interactivity score results

The mean score of first interactivity experience for heavy participants is 3.5, while the same value for light participants is 1.3 (p<0.05). These results clearly show that there is a significant correlation between the users' first interactivity experience and their level of future participation in the community.

## Non-native English Speakers

Table 2 summarizes the results of native English speakers against lurking behavior, when lurking is defined as no posting at all. The table clearly shows that there were many more lurkers (71.7%) among non-native English speakers than among native English speakers (47.9%). Moreover, among English speakers, there were more participants than lurkers.

| English Level | Lurker | Active |
|---|---|---|
| **Native** | 185 / 47.9% | 201 / 52.1% |
| **Non native** | 86 / 71.7% | 34 / 28.3% |

(V = 0.202, P=.000).

Table 2. Native English for regular lurker definition results

When relaxing the definition of lurking to up to three postings, the resulting table is less striking (Table 3).

In this case, the vast majority of non-native English speakers are lurkers (85%) against 73% of English speakers. Under this relaxed definition, the phenomenon of "more posters than lurkers" disappears. A clear correlation is still apparent between the levels of lurking and English as a native language.

| English Level | Lurker | Active |
|---|---|---|
| **Native** | 285 / 73.8% | 101 / 26.2% |
| **Non native** | 102 / 85% | 18 / 15% |

(V = 0.112, P=.012).

Table 3. Native English for relaxed lurker definition results

# Discussion

Our results are consistent with previous findings with slight changes, derived from the additional information ReachOut logging mechanism can provide. The average lurking level is 52%, compared to the overall of 55% in Nonnecke and Preece's study (Nonnecke and Preece, 2000).

We also identified a completely new population. This population may be defined as users who are absolutely passive, who log on to the community, but do not take any part in the community life, neither by posting nor by reading. While in other mediums these users were not distinguished from other lurkers, here they are not the audience – these users are not important for the community to function, since they do not even free-ride – they do not ride at all. As we stated before, it would be interesting to study those users, who, while not participating or reading, spent a relatively long time in the tool.

By eliminating the passive users' data, we achieve a lurking level of 45.8%, which strikingly resembles the 45.5% result reported by Nonnecke and Preece (2000) in healthcare-related DLs. This phenomenon may be easily explained by the similarity between the environments. The atmosphere in the healthcare lists is generally pleasant and supportive, just like the atmosphere in the workplace-

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based ROPE community, and contrary to the rough-and-tumble of public forums. Furthermore, DLs use a "push" paradigm, just as ReachOut does, in contrast to forums, which employ a "pull" paradigm.

While it was impossible to fully explore the educational lurking patterns, it was very interesting to find out that there is no statistically significant difference between heavy and light participants in educational lurking levels. It can point to the fact that people tend to learn about the community and then decide whether or not they want to participate. As Katz pointed out (Katz, 2000) the educational lurking can lead to the decision not to post (for example, because of the bad atmosphere in the group). However, if users decide to post, their first experience of interactivity may strongly affect their decision to persist in posting.

Our next finding supports this assumption. The first experience of active posters was on average much more successful. In fact, there were several people in our sample that received up to 12 posts that directly referenced their first discussion posting; this phenomenon was not observed for the light posters. It clearly comes in agreement with the fact that the postulated outcome of interactivity is engagement (Rafaeli and Sudweeks, 1997). When it is very important to foster active participation (in work related forums for example), forum moderators should monitor discussions and make sure that the first experience of people using the system is as interactive and pleasant as possible. This includes posting welcome messages and in the case of topic-based forums, even trying to locate relevant people to help the first time poster solve a problem or discuss an issue.

In this study, we were also able to check the postulate that non-native English speakers have a higher chance of lurking. While our methodology has its limitations (since the correlation between native language and country of residence is not absolute), it is a close approximation to the level of English skills. Our results show that there is a clear correlation between English skills and participation in CMC. This means that local computer mediated forums should aim to use the native language of the country rather than English. Various tools for automatic translation could also benefit the online community, though this technology is still immature.

## Conclusions and Future Work

Lurkers are a very important part of any online community. However, it is sometimes, especially when a community is just emerging, very important to make sure users persist in staying and also in contributing to a community. That is why it is very important to study not only the lurking behavior per se, but also the dynamics that lead people to post.

This study confirmed previous assumptions about lurkers' demographics in computer mediated forums, but also highlighted some interesting features of

community participants. For example, there are people who persist in staying but do not participate (even silently) in any community activity. It will be interesting to find out why they do that and how to encourage them to become more active. Interactivity of the first experience affects users' decisions to stick with the community, so it is very important to continue and study the phenomenon of interactivity and its catalysts. Of course a pleasant atmosphere in the community can contribute to its success. Finally, it is important to let people lurk as they like to learn about the community. Because the period of educational lurking does not affect users' participation, pushing users might not be a good idea.

Finally, the significant difference in participation levels based on native language may be masking other, cultural differences. Different cultures may exhibit diverse norms of participation in discussions, and some of the discussion material itself may be specific to the US, where the majority of users were based. Further research is needed to explore the effects of these factors on participation level.

There is a lot of information that can be extracted from ReachOut logs. Since there are now several new communities of ReachOut, we hope to continue studying the behavioral patterns of users in computer mediated environments. We will pursue questions such as public vs. private lurking (are lurkers visible or hidden to other participants), social networks established inside a community, and various aspects of information sharing.

## Acknowledgments

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