

Invisible Participants: How Cultural Capital Relates to Lurking Behavior

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ABSTRACT

The asymmetry of activity in virtual communities is of great interest. While participation in the activities of virtual communities is crucial for a community's survival and development, many people prefer lurking, that is passive attention over active participation. Lurking can be measured and perhaps affected by both dispositional and situational variables. This work investigates the concept of cultural capital as situational antecedent of lurking and de-lurking (the decision to start posting after a certain amount of lurking time). Cultural capital is defined as the knowledge that enables an individual to interpret various cultural codes. The main hypothesis states that a user's cultural capital affects her level of activity in a community and her decision to de-lurk and cease to exist in very active communities because of information overload. This hypothesis is analyzed by mathematically defining a social communication network (SCN) of activities in authenticated discussion forums. We validate this model by examining the SCN using data collected in a sample of 636 online forums in Open University in Israel and 2 work based communities from IBM. The hypotheses verified here make it clear that fostering receptive participation may be as important and constructive as encouraging active contributions in online communities.

Categories and Subject Descriptors

H.5.3 [Group and Organization Interfaces]: Asynchronous interaction, Collaborative computing, Computer-supported cooperative work, Evaluation/methodology, Organizational design, Theory and models, Web-based interaction

General Terms

Measurement, Human Factors

Keywords

Web forums, e-Learning, Cultural Capital, Lurking

1. INTRODUCTION

Computer Mediated Communication (CMC) over the Web goes beyond just reading other people's documents. It is also a unique interpersonal communication channel. One of the more popular

CMC channels is the Web based a-synchronous forum. A forum is a Web site where people can post their opinions, debate politics or just discuss gardening problems. However, it so happens that most of the forum's visitors never post, debate or discuss. They may be there, reading every posting and every discussion, but they keep their opinions to themselves. This kind of behavior is called lurking.

Lurking can be expected in traditional media. These are designed as almost entirely one way communication arenas [34]. It is, however, somewhat disappointing to discover lurking in computer forums, as these ostensibly promise high interactivity. Lurking online brings to mind a similar situation: that of non-participation in real-world political arenas, where all citizens have an equal opportunity for active political participation, but only a few actually exercise it [6].

Lurking has been studied in the past [37, 42, 43, 44, 45, 62]. A variety of methods have been employed. Some researchers conducted interviews with virtual communities' users to understand the reasons for lurking [37, 45]. Others studied the 'virtual debris' [25, 26] – that is, logs of virtual communities usage to try and identify lurkers [42, 62]. Identifying lurkers constitutes a difficult methodological problem: Lurkers do not leave visible traces. Even if lurkers can be identified, it is difficult to approach them directly, because their identity is often disguised. This is why lurking research is interesting and challenging.

The main goal of this research is to study the triggers to active participation. We built a framework for analyzing passive and active Internet behavior based on Social Capital Theory [47] and Cultural Capital Theory [8]. We implemented this framework by defining a social communication network of activities in authenticated discussion forums and measured an online version of social and cultural capital. Authenticated discussion forums provide exact information about every participant's activities and allow us to identify lurkers who become first time posters. A Social Communication Network (SCN) is an extension of the notion of social network (roughly a network connecting people by using different rules), that includes not only human actors but also their discussions and the subjects of the discussions. The Social Capital aspect of our research has been described elsewhere [51]. This paper concentrates on the Cultural Capital and its relation to the lurking phenomenon.

The rest of this paper is organized as follows. First we describe the lurking phenomenon. Then we review the previous work both on the lurking behavior and on Cultural Capital. Next we pose our hypotheses with regards to the relation of the Cultural Capital of

the virtual community participant and their decision to lurk or participate. We describe the methodology of our study and report the results. Finally we discuss the outcomes of the study and propose directions for future work on lurking behavior and the usage of Social Communication network methodology.

2. RELATED WORK

2.1 What is Lurking?

Lurking is a richer concept than may seem on the surface. At first glance, to lurk is simply to visit an Internet forum, bulletin board, chat room, or similar setting and read messages by other people, without posting a message of your own. A somewhat deeper semantic examination reveals that the English verb "to lurk" usually means "lying in wait", often with malicious intent. Interestingly enough, the Merriam-Webster dictionary definition of the verb "lurk" offers an additional unexpected meaning – "to persist in staying" [38]. Thus lurkers can be defined as a persistent but silent audience. Lurking has ambiguous, both positive and negative valence.

Lurking is a common behavior in many communication systems today – mainly in mass media. But unlike traditional media, the Internet was designed to be a two way channel. The power of Computer Mediated Communication (CMC) is in its interactivity. Moreover, evangelists of the new communication medium (the CMC) preached for creation of the virtual community [54] where the community is about interactivity [49, 50, 52]. Thus lurking can be perceived as harmful or strange, getting in the way of community development. Instead of contributing to the sense of community and creating a democratic environment, lurkers adversely impact the participation in a community.

It should be noted, though, that people who do not have any new information to contribute, actually assist the community by being reticent [63]. Without a mass audience the mass media function would be incomplete. In the same manner forums without lurkers would become just opinion exchange places rather than a new communication phenomenon. Indeed, if the community is well developed and is full of participating users, any additional "noise" can be destructive rather than constructive [27, 64].

To summarize, lurking is an integral and normal part of Internet behavior. It may be perceived as negative and harmful or as positive and useful. However, lurkers are present en masse. Some report the level of lurking to be 50-60% [42, 62], while others estimate it at 90% [29, 37]. This fact alone is strong enough to make research on lurkers worthwhile. Accordingly, many researchers have noted that lurkers are a major part of the Web community and should be studied [29, 31, 52, 53, 63, 78].

2.2 Why do people lurk?

While there are not many studies about lurking per se [42, 43, 44, 45, 51, 62, 63] several reasons for lurking behavior can be found in the CMC research tradition. In interviews they conducted, Nonnecke [42] and Nonnecke and Preece [43] found several reported reasons, including personal concerns for privacy and work related issues ("I am paid to lurk"). Other researchers studied the dynamics of online media [31, 78]. Finally, one of the first virtual communities, The Well [67], hosted a discussion back in 1992 where people were asked to state their reasons for lurking [2].

Nonnecke [42], Nonnecke and Preece [43] and Preece et al. [45] interviewed several users and classified different reasons for lurking behavior. Only the most relevant and interesting to this study will be pointed out (selected in bold in the table), not necessarily in order of importance.

One often stated reason for lurking is to learn about the community. Kraut et al. [31] point out that silent observation is an important way for novices to learn about a new topic. This process is parallel to the socialization stage among immigrants [66] or children [60]. Whittaker et al. [78] define lurking-as-surveillance as peripheral participation that continues until a topic of direct interest is spotted. Donath [14] proposes that people often try to find out about other participants from the content of their postings. Nonnecke and Preece [43] define learning about the community culture as a central lurker activity – 70% of the users they interviewed stated they lurked to get to know the group better.

Another reason for lurking that is of special interest to this project is a sense of belonging to a group. Nonnecke [42] describes a large group of users who stated that "...a sense of community was possible while lurking". This means that in the course of the ostensibly passive activities of watching other people talk and getting familiar with the content and style of the community people feel that they belong to the community. The sense of belonging to an online community has also been reported by Beaudouin and Velkovska [5]. It included, for example, telling jokes that newcomers don't understand or posting "Happy Birthday" announcements which become 40-message long threads. In The Well discussion there is also some evidence for this sense of belonging. While talking about personal disagreements online, Gail Williams says: "... oh, I'll name no names: each of us can fill in the blanks on this one!" [2]. In addition, in the ProjectH study using first person plural ("we") has been used as a measure for community [49].

Another frequent explanation of lurking is free-riding. Free-riding is defined as a use of common good without contributing to it [11, 65]. As information is frequently considered a public good [50], lurkers can be perceived as free riders. Kollock and Smith [30], Wellman and Gulia [76] and Morris and Ogan [41] discuss lurkers as free riders, referring to non active participation. The free riding label can be accepted only with a serious reservation. In virtual community tools that have peer support or information exchange as a main goal (such as USENET newsgroups [18], information is indeed a public resource. In some other types of communities, where the main purpose is socializing (such as The WELL), information is much less equivalent to a common good. Nevertheless, free riding connotes negative activity. Some of The Well discussion participants even propose that lurkers pay more for the connection to The Well than active posters [2].

Another reason for lurking is information overload [25, 26]. Jones et al. [27] observed that as the number of interactive posters in USENET forums increases, the number of interactive messages decreases. This observation is related to the cognitive abilities of people to digest huge amounts of information. This direction is consistent with the limits to sizes of animal and human communities in real life [16]. Dunbar states that the reason for a particular size of primate community is the specific species' cognitive abilities to analyze information about all possible connections in the group. Human community sizes usually average or peak at 150 members. In an online setting people do not have to keep in mind all the connections between community

members, but they do have to deal with all the messages flying around. So it is not surprising that people find it hard to keep up with very busy communities and prefer lurking there and sometimes even dropping off entirely [42].

Finally, the last reason of interest is the reaction of the community to de-lurking. In his SlashDot.com article, Katz [29] observes that after publication of his articles on the SlashDot.com site (SlashDot.com), there were always some (often rude) responses in SlashDot hosted computer forums. However Katz received much more educated and pleasant responses through his mail box. He concludes that the main reason for lurking is a violent atmosphere in computer forums, dominated by young and not so well-behaved people. Soroka et al. [62] found a clear correlation between a positive first posting experience and subsequent active participation in the community. A user does not have to actually post to grasp how newcomers are generally welcomed. If the general atmosphere in the community is bad, the reaction to newcomers is non-welcoming or an attitude to user's subjects of interest is negative, people might choose to stay silent or drop off. Nonnecke [42] also points out that the reaction of the community to de-lurking and flaming (violent Internet behavior, see [23]) are possible reasons for lurking.

2.3 Cultural Capital

Cultural capital was defined by Bourdieu [7] as knowledge that enables an individual to interpret various cultural codes. Bourdieu stated that cultural capital is comparable to economic capital and is unevenly distributed among different society classes. There are three states of cultural capital. The embodied state represents the knowledge and skills an individual possesses, or as Bourdieu puts it "...long-lasting dispositions of the mind and body" (Ibid, p. 243). The objectified state is expressed in a form of cultural goods, such as pictures, books, machines, etc. The institutionalized state is represented by actual documents and other proof of cultural status.

Bourdieu was the first to define the concept of cultural capital. There remains a scholarly debate about the explication of cultural capital. While definitions are close they do differ slightly. Aschaffenburg and Maas [3], for instance, state that the main features of cultural capital are skills and familiarity with cultural codes and practices of the dominant class. Dumais [15] indicates that cultural capital consists of linguistic and cultural competence and higher classes culture proficiency. An issue of "proper" and "educated" language as being an important part of cultural capital definition is also brought up by Sullivan [57]. Finally, cultural capital is also said to involve socialization into high society cultural habits [28]. Some scholars, like Gould [21], state that for them cultural capital is a form of social capital, since when community participants engage in cultural exchange they develop social ties and thus contribute to community's social capital. This is a controversial statement, which does not fully agree with Bourdieu's definition. Finally, Putnam [47] also mentions cultural capital. For Putnam, cultural capital is about individuals. Social capital relates to a group.

This work concentrates on the embodied state of cultural capital. A lurker spending a lot of time in the community can acquire a decent amount of cultural capital in the context of a specific community. She learns and understands cultural values of the community – such as network etiquette (netiquette), special language, behavioral patterns etc. Beadouni and Velkovska [5]

described community activities such as telling jokes that newcomers do not understand. Being able to understand these jokes is an indicator of community oriented cultural capital. The greater cultural capital a user has the more chance she has to benefit from the virtual community. And since most of the information about the community is available for lurkers and posters alike, lurkers have almost an equal chance to acquire cultural capital as posters.

We propose that acquiring cultural capital is a necessary but not sufficient condition for having a high level of social capital. As Bourdieu [7] states all forms of capital are interrelated. For example, social capital can be translated into economic capital as when personal connections help close a business deal. Social capital can be transformed into cultural capital, such as when a person's acquaintance introduces her to the world of theater. In the context of virtual community, assuming that a user did not know any of the other participants prior to joining the community, her only way to acquire social capital is through reading posted messages. This socializing cultural capital [28] will eventually help her to both feel closer to the community and potentially create a personal social network.

2.4 Cultural Capital and Active Political Participation

Active political participation has been a very popular subject of study [1, 6, 68]. Political participation includes voting, activity in political institutions, agitation and more. There are many antecedents of active political participation. These include micro-level factors such as wealth and status [68], macro-level factors, like state institutions' influence on levels of participation [36] or meso-level factors operating around social networks and communities [46].

Cultural Capital seems to be less related to active participation. However Clague, Gleason and Knack [10] found that levels of democracy in post-war countries were not generally related to economic wealth. Rather they had more to do with cultural aspects affecting country's citizens. In addition, Delli Carpini and Keeter [12] in their study of political knowledge in the US argue that the ability to participate effectively in democratic decision making is dependent upon one's access to accurate information. The authors also link this dependence to Cultural Capital Theory.

Assuming that active political participation in the real community parallels active participation in the virtual community [18, 33], it can be hypothesized that the social capital of the virtual community has an impact on participating in the virtual community.

Note that here the parallel between active political participation and virtual community participation does not imply that individuals participating more in real communities tend to participate more in virtual communities. In fact, studies like Quan-Hasse and Wellman [48] or Kraut et al. [32] might suggest the opposite. The intention is that if higher level of social capital in real communities brings higher levels of active political participation, then the same phenomenon is expected in virtual communities.

As already noted, the virtual cultural capital of an individual increases her awareness of cultural codes in a certain virtual community and thus makes her better equipped to make intelligent decisions about participation. For the same reasons some people decide to never participate. Because of the factors

mentioned above, such as unpleasant atmosphere, lack of time or perception that they have nothing to contribute.

3. Research Questions and Hypotheses

Rafaeli, Ravid and Soroka [51] describe initial results for correlation of Social Capital and de-lurking. This study focuses on exploring how Cultural Capital can be applied to the lurking and de-lurking phenomena. Following the parallels drawn between community and political participation and virtual community activity and participation we pose the following research question:

R1: How does people's cultural capital affect their active participation in virtual communities?

Individual level social capital can be seen as a position of the actor in a social network [75] which can bring control and benefit to the individual [9]. It is hard to expect that lurkers will acquire social capital while being invisible to other members of a community. However, obtaining a shared knowledge, understanding social norms and learning about participant's dispositions (thus acquiring cultural capital) might increase the chances of a user to participate [12]. Thus, it can also be assumed that

H1: Individual level cultural capital positively correlates with the level of user's activity.

We should note though that if people acquire a lot of cultural capital and decide not to participate, it will be indicated by the fact that they have high levels of cultural capital and do not participate for a long time. Thus,

H2: Individual level cultural capital positively correlates with de-lurking. This correlation will become weaker for longer time lurkers.

4. Methodology

4.1 Methodological Challenges

The research question proposed in this study offers several methodological challenges. Surveying actual forum users is not an option for both privacy and social desirability considerations. It is generally difficult to observe lurking behavior on the Internet, as it is a form of inaction and thus leaves behind fewer tracks.

We have chosen to use a network approach to analyze the dynamics of virtual communities, in order to overcome some of these challenges. Networks have proven to be an efficient tool in different areas from molecular biology to social sciences [4, 39]. Social networks (depicting links between people) aid in understanding online interaction dynamics [19]. We employ a combined people/artifacts network to measure cultural capital.

4.2 Defining Variables

4.2.1 Virtual Cultural Capital

The socialization part of the definition of cultural capital is in the focus of this research [28]. One of the aspects of gaining cultural capital is to be socialized into cultural habits and norms of higher classes. In the context of virtual community, "higher classes" can be defined as actively participating users. These users spend a lot of time in the community, create community discourse and thus can be referred to as the "highbrow" or the powerful in the virtual community. For a virtual community's visitors the only way to acquire cultural capital is by being socialized into it by interacting actively or passively (through reading) with active community participants. We define virtual cultural capital as an extent to which a person has a reading-based knowledge about a virtual

community's culture and other participants, thus having much in common with them.

4.2.2 Lurking and de-lurking

Lurking is a participation in a computer based forum without posting to it. Therefore a lurker is a participant who reads postings persistently but never posts. This definition specifically excludes users who just visit the community once and then never show up again. De-lurker is a user who has been a lurker for some period of time and then started posting to the community. This specifically implies that a user who immediately started posting to the community is not a de-lurker.

4.3 Social Communication Network Approach (SCNA)

Just as cables connecting computers create a computer network, connections and relationships between people create a social network [22, 70, 77]. Network analysis can assist, for example, in identifying the average distance between people in a given community [40, 71, 73] or in analyzing the information flow in communities [72]. These connections and relationships can be based on online activity, thus allowing social network analysis to be applied to the study of online communities [19].

The usual notion of connection between people in the virtual community is related to direct social interaction [19, 75]. Examples could be a one-on-one chat or a newsgroups discussion. However lurkers do not engage in direct communication, thus seemingly "fall off" the social network, and do not get counted in traditional measures. Why not include lurkers in the picture? Such an accounting can be done providing the lurkers' activities can be traced. Additional actors in the virtual social network can and should be introduced by building a slightly more complex network, the Social Communication Network (SCN).

SCN is an adaptation of affiliation networks, as discussed by Wasserman and Faust [70]. This network will be based on the postings and participants, following suggestions by Schoberth, Heinzl & Rafaeli [59], Schoberth, Preece and Heinzl [58] and Gordon, Fan, Rafaeli, Wu and Farag [20]. For the purposes of this new network we include the posting (an individual posting to the community), the topic (a collection of posting, such as newsgroups thread) and even the subject (a collection of topics under the same subject, like a subject-oriented forum). While active participants publish a posting and thus participate in a topic and a subject, lurkers read postings and participate in topics and subjects in their own way. It is often suggested that lurkers are passive. However, following insights from Active Audience theory [17, 35], SCNA suggests that lurking is just another form of activity.

In the approach described here, links are not direct associations between human actors. Instead, people have connections to specific postings, topics or subjects. It is the overlapping of these connections between people and content items that we wish to map as meaningful links. Different levels of participation are manifested through extent of reading, not just posting. Human actors can both READ and POST. This new definition for a network allows it to depict more fully the actual communication activity of people in the forum and not only direct connections between people. We term the result a Social Communication Network (SCN).

In this research we use a simplified version of SCN. POST and READ links are considered the same. If a user posted a message

she is also considered its first reader. So the poster of each message has links to all readers of this message.

4.4 Measurement

4.4.1 Cultural Capital

Previous research [51] proposed to measure social capital by identifying the density of ties between users in the community, also following Mesch and Talmud [39].

The operationalization of cultural capital is a more difficult task. Previously, cultural capital has been measured as an assessment of cultural activity or knowledge of either respondents or their parents [56]. This measurement was done mainly by using the self-report technique. Among the values measured, there were television viewing [57], cultural involvement [13] and future expectations [15]. It is not possible to use this research technique in the virtual community context, since approaching users directly is either inappropriate or infeasible. The contribution of the technique used in this study and its power is in its unobtrusive use of forum logs data rather than self report. The amount of cultural capital is estimated by measuring cultural socialization through Social Communication Network. Our measure of the virtual Cultural Capital is the proportion of links the user has out of a maximum of $(N-1)*P$ possible links to other users (LU is the number of actual user links):

Cultural Capital is oriented to the individual, and is measured on a per user basis. The Cultural Capital metric indicates a person's level of community oriented knowledge. People with the higher Cultural Capital values will know more about topics and active users in the community. Note that to measure personal social capital one would have to calculate the percentage of user's POST-POST links - that is how many direct and active interactions she had with other users.

4.4.2 Other variables

In this section we briefly describe non-obvious variables measurements.

De-lurkers – A de-lurker is identified as a user who posted for the first time after a period of being inactive, but persistently reading community postings. This minimal threshold period calculation can be varied across a range between 10% of the users' actual visits to the community to 50% of actual visits. The reason for this definition is as follows. The frequency of the users' visits defines their communication behavior. Someone who tends to visit the community very often has different communication patterns than one who visits only a few times. For someone who visits frequently the amount of time that we consider sufficient to define him as a lurker before the first post is greater than for someone who pays only occasional visits. The level of de-lurking will be measured as the percentage of de-lurkers in the community.

Activity Level – Activity Level is measured for each forum by calculating a relation between actual posters in the community and all users in the community. This way a more standardized measure of activity is introduced.

Number of User Links – This variable is the same LU variable from the above formula for cultural capital. If a user read or created a posting P, then for this posting her number of links is increased by the number of other users who read the same posting P.

Number of Forum Links – the number of forum links is the sum of all forum's users links divided by 2. Indeed, while calculating the entire forum's users' links, every link is calculated twice. For example, if user U1 read posting P and user U2 read the same posting, then this particular link between them is counted both as U1-> P -> U2 and U2 -> P -> U1.

4.5 Research Population

This project used log files of the authenticated forums in Open University in Israel [51] and log files of a peer support tool, called ReachOut [24, 55, 61, 62].

4.5.1 Open University Forums

The 636 most active online forums that accompany asynchronous, e-learning undergraduate courses in the Open University were selected. Logs of these communities for a period of 8 months (September 2002 to April 2003) were analyzed.

While the forum interface allowed users to view individual postings, very few users actually used this option. The major reading activity was performed by reading the content tables of the forum, with batches of messages aggregated on the same page. Thus, visits allowed an opportunity to read every posting published on the forum page. This interface precludes exact information about which individual postings any user actually read.

To overcome this problem we defined a model for measuring the actual per-message reading activity. Any posting appended to the forum was recorded, starting from an initial, empty state. Each time a user visited the forum's page her probable reading activity was calculated using the following algorithm:

The postings were divided into 3 groups – old postings, regular postings and recent postings. Old postings contained the oldest 20% of messages, regular postings contained the next 50% of messages and finally recent postings contained the remaining 30%. We assigned a probability of 0.2 that a user, while visiting a forum, will read an old posting, a 50% probability that she will read a regular posting and an 80% probability that a recent posting will be read. For every visit we calculated the probability of reading all currently present postings, so the more often the user visited the forum page the more postings she was likely to read. We construct a Social Communication Network from these scores. A probabilistic model of the actual reading activity then feeds into a description of users who read messages.

4.5.2 ReachOut

ReachOut is a tool for peer support and community building, created in IBM Haifa Labs. The implementation details and the theoretical background of this tool are described elsewhere [55].

For this study we used the logs of ReachOut deployment in two IBM internal communities – inside Haifa Research Lab (Haifa) and in IBM Global Services sub-division (IGS). The IGS was launched on December 2001, and has been monitored ever since. This community consists of people with high technical skills who provide support for the IBM sales force. Participants are not collocated. Rather, they are dispersed all over the globe. During the study, 403 users used ReachOut at least once, and 598 discussions were conducted. The Haifa community consists of around 500 researchers in IBM Haifa Research Lab. Their offices are in the same 7 floor building and they work on different

research technologies. During the study 307 users visited ReachOut at least once and 847 discussions were conducted.

5. RESULTS AND DISCUSSION

In the interest of space we do not provide the full tables for all results, but only some parts interesting for the proposed hypotheses. It was hypothesized that personal Cultural Capital is positively correlated with the level of user's activity in the forum (H1) and also with de-lurking. The correlation with de-lurking was assumed to disappear for the longer time lurkers (H2).

The Haifa and the IGS communities have very similar results. The Cultural Capital metric is positively correlated with the number of user's postings (see Table 1).

Table 1. Pearson correlations for the Cultural Capital metric

Community	# Users	#. Posts	De-lurk (10%)	De-lurk (30%)	De-lurk (50%)
IBM Haifa	157	.516**	-.510**	-.309**	-.268**
IBM IGS	128	.330**	-.327**	-.226*	-.080
Open Univer.	9609	.230**	.463**	.241**	.018

* - $p < 0.05$, ** - $p < 0.001$

The regression model for correlation between the Cultural Capital Metric and de-lurking time also shows that for the Haifa community the explained variance is 26%, which is a relatively high result (see Table 2).

Table 2. Regression model for the correlation of the Cultural Capital metric and de-lurking time with the number of postings

Comm	Adj. R ²	CC (B/Beta)	CC (SE)	De-lurk. Time (B/Beta)	De-lurk. Time (SE)
Haifa	.267	5985.42 0/.518**	806.195	9.443E-07/.012	.000
IGS	.095	36047.8 00/.322**	9499.82 7	-1.607E-05/-.032	.000
O.Uni	.057	27.776/ 250**	1.154	-5.757E-07 / -.067**	.000

** - $p < 0.001$

This correlation means that as the level of cultural capital of a posting user increases, her activity level also increases. It is interesting to see that there is a negative correlation between the Cultural Capital and the de-lurking variables with different thresholds. At first, it seems like higher Cultural Capital prevents people from de-lurking. But remember that the data in question contains information about posters only. The de-lurking variable simply indicates that the user did not become a poster right away, but stayed as a passive participant for some time (when the time is dependant on the overall time spent in the community). Thus this negative correlation explains that users with higher level of Cultural Capital in the IBM communities tended either to start posting earlier or stayed in the community much longer overall, so

their first posting time was not considered de-lurking. Thus for the ReachOut communities hypothesis H1 is supported.

Table 3. Regression model for the correlation of the Cultural Capital metric, forum postings and forum links with being a lurker

Comm	Adj. R ²	CC (B/Beta)	CC (SE)	De-lurk. Time (B/Beta)	De-lurk. Time (SE)
Haifa	.317	-12.450/ -.496**	1.196	1.821E-08 / .217	.000
IGS	.209	-20.192/ -.471**	1.940	-2.275E-08/ .092	.000
O.Uni	.058	-.227**/ -.144	0.006	2.528E-10 / 0.010**	.000

* - $p < 0.05$, ** - $p < 0.001$

As for hypothesis H2, the regression models in Table 3 show that there is a greater and negative correlation between being a lurker and Cultural Capital, meaning that controlling for the lurking time makes the correlation stronger. This finding along with the fact that lurking time is positively correlated with being a lurker suggests that for longer time lurkers (those who have been lurking for more time) the chance of becoming an active poster decreases regardless of the Cultural Capital. Thus H2 hypothesis is also verified for the IBM communities.

Analysis of the raw data in the Open University community also supports the hypotheses. There is a correlation between the Cultural Capital metric and the number of user postings. In addition, there is a positive and statistically significant correlation between the Cultural Capital metric and the de-lurking time. This correlation can be explained in a straightforward manner. People who take more time to learn about the community before posting have greater levels of cultural capital. A different finding here is a positive correlation between the Cultural Capital and the different metrics of de-lurking. It suggests that the greater a person's cultural capital is - the more chances she had to become a de-lurker. This finding is consistent with the previous finding. If people with a higher level of social capital tend to read more before becoming a poster, they have a greater chance of becoming a de-lurker by the 10-30-50% definition.

A multiple regression model for the correlation between the Cultural Capital metric and the number of postings for active posters shows that about 6% of the variance is explained by the Cultural Capital, which is the main positive effect. Thus we can claim that hypothesis H1 is weakly supported.

There is a moderate and significant Pearson correlation between the Cultural Capital metric and the Is User a Lurker variable (Haifa: -0.453; IGS: -0.525; Open University: -0.279 – in all cases $p < 0.01$). However, a regression model for the relation between the Cultural Capital, the number of postings and the number of links in the forum and the Is User a Lurker metric for the whole data shows that the explained variance is very low and the Cultural Capital metric is not statistically significant. The same model including user's lurking time shows a great improvement in the results. The Cultural Capital metric is the main effect and the

model explains around 6% of the variance. Thus, hypothesis H2 is also fully supported. There is a correlation between the Cultural Capital and the decision to de-lurk and it is significant when controlling for the lurking time, meaning that longer time lurkers also tend to stay lurkers regardless of the level of cultural capital they gain.

When controlling for the level of activity in the forum, the correlation disappears and is recreated only when most active forums are filtered. This fact again supports the H2 hypothesis – that is in very active forums there is no correlation between the Cultural Capital and the lurking behavior.

While all the hypotheses were supported to varying extents, there is a question of measurement validity. Does the proposed metric for cultural capital really measure cultural capital?

The embodied state of cultural capital should be measured by what the user actually knows and how much she understands of what is going on in a specific virtual community. Measuring cultural capital via density of personal social network is not appropriate. However, our measure of cultural capital is a density of personal Social Communication Network. This density expresses how much a user has in common with others, based on cultural artifacts – namely, the community discourse. It is not an ideal measure, but the ideal measure for cultural capital will require examining the users' knowledge and talking to the user [56] – which is impossible in the case of lurkers. Thus, a central tenet of this work is that for the virtual community users, the proposed definition of cultural capital is the best approximation available for assessing the user's acquisition of cultural capital through socialization.

What do results of this study mean for virtual community scholars and designers? The Cultural Capital metric was found to be correlated with the number of user's posting and her decision to become an active poster. The first correlation suggests that users who spend time reading the community's discourse and familiarizing themselves with the community's culture, have greater chances to become active community participants. This means that community creators should foster receptive participation by making the reading experience as compelling as a posting experience. However, chances for de-lurking decrease with time. This finding implies that to become an active participant of the virtual community one has to invest time into reading and learning about the community over a relatively short period of time. Participants who invest this time early are the most probable candidates to become active posters. Virtual community designers should do everything in their power to make the learning about the community and the first experiences in the community as pleasant, unobtrusive and immediate as possible.

This study does not resolve the classical debate about social capital's causes and features [69]. It can be argued that active participation in virtual communities is the main factor influencing higher levels of social capital, rather than vice versa. Testing directionality will require gathering additional data, such as the initial timeline of the community. The truth is probably somewhere in the middle. An initial amount of postings and high quality content is required before a community can acquire social capital. This amount of postings can be created by many users, but also by only a few. Quality messages will then foster the creation of social capital, which will encourage additional postings. One of the problems with collaboration technologies diffusion is a critical mass of users [50, 61]. This study's findings suggest that a critical

mass of quality content rather than of users can also contribute to the successful diffusion of a virtual community.

Will virtual communities increase or decrease social and cultural capital in real life [48, 32, 33]? The similarity between the two correlations, that of the interaction of social and cultural capital and active participation in virtual communities and that of interaction between social and cultural capital and active political participation suggests that people can use the computer mediated channels to create or supplement their real life capitals [48]. The findings of this research suggest that the creators of virtual communities should understand the principles of active participation and community building in the real life and use them to make sure their community is successful.

6. Conclusion and Future Work

Studying lurking behavior on the Internet is very challenging. There are a multitude of methodological problems that have to do with privacy, difficulties to collect the data and the inability to approach actual users. However, as the Internet becomes a commodity and Internet technology evolves, there are increasing opportunities to collect data about hidden participants. These recent developments herald a new revolution – an age of almost complete records of information technology use. There are different sides to this story – from privacy protection to database management. From the point of view of this work, there are two important directions for future work.

It is very important not only to record the information about users' activity, but also to be able to use it for improving business processes on one hand and community dynamics on the other hand. The methodology proposed here is one approach to deal with information about a user's activity and to come up with useful conclusions. Then there is another important direction for usage of recorded information without violating a user's privacy. Tools like social networks in general and Social Communication Network in particular can empower users in analyzing their own patterns of behavior and finding the invisible connections to other people.

In the current research each link in the Social Communication Network was considered a regular link – regardless of whether it was a POST or a READ link. Future research should explore the value for SCN analysis of adding weights to the links. For example, users who posted together to the same forum can be considered to have much stronger relationship than users who just read the same posting together.

As for the lurking phenomenon, the current work's findings sound promising enough to continue working on this phenomenon. Lurkers are important to virtual communities. Lurkers are the audience in forums, blogs and other computer mediated channels of communication. Just as television and other mass media channels attract serious audience research (mainly for commercial motivations), computer mediated channels deserve their own audience research. We need to understand lurking behavior not only to make people start participating or de-lurk, but also to be able to create virtual spaces that are pleasant and interesting to be in even for silent participants. If the Internet becomes a leading popular medium, research on lurkers will proliferate.

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