

# Communities in Social Networks: A Case Study of Brazilian Fotologs<sup>1</sup>

Raquel Recuero<sup>2</sup>  
(Universidade Católica de Pelotas)

Summary: Online social networks are groups of actors formed by computer-mediated social interaction. These interactions are capable of establishing new forms of groups and communities. Based on a discussion over several concepts of community and virtual community we propose the virtual community as a specific form of online social network. This theoretical debate is brought to the field studying the system named Fotolog during 2005 and 2006. Fotolog ([www.fotolog.com](http://www.fotolog.com)) is a web service that allows for its users to post photographs or images with an associated text and other users may comment on each other's posts. From the collected data, we propose a typology for communities found in these networks, based on their structure (network) and composition (social ties and social capital). We define three types of communities as associative virtual communities, emergent virtual communities and hybrid virtual communities. We further discuss this proposal according to our theoretical review, pointing out weaknesses and limitations of the study. We finish the paper with our major points in the study and some suggestions for future works.

Key Words: social networks, virtual communities, Fotolog.

## 1. Introduction

Social networks are normally associated with a group of actors (nodes) and their connections (ties) (DEGENNE e FORSÉ, 1999; SCOTT, 2000; WASSERMAN and FAUST, 1994). In cyberspace, these networks are made more complex by the appropriation of a new media through computer mediated interaction (EFIMOVA, 2005, BOYD & HERR, 2006; BOYD, 2006 and 2004), (PRIMO, 2003). This appropriation is capable of generating new uses, new forms of social construction. The intent in this paper is to discuss how this appropriation, realized through interaction, is reflected in the social networks on the Internet and how these social networks can be understood as different types of virtual communities.

Working from this observation, we shall seek to identify types of virtual communities in the social networks formed from the interactions in the comments made on Fotolog.com. The system was chosen due to its simplicity (which facilitated the running of a crawler, for example) and due to the significant number of Brazilian users combined with the rarity of work focused on this system in Brazil. Through the collection of information in the comments, the identification of clusters, observation and analysis of user behaviour, it was possible to analyse these groups from both a structural and compositional perspective, on the basis of which a typology was established.

## 2. Related Works

Various authors explain that the interactions through computers are allowing the appearance of social groups on the Internet, with the characteristics of communities (RHEINGOLD, 1995; LEMOS, 2002; DONATH, 1999; SMITH, 1999; WELLMAN E GULIA, 1999; WELLMAN, 1997, 1999, 1999b, 2002, 2002b; PACCAGNELLA, 1997; CASTELLS, 1999 and 2003; amongst others). These groups

---

<sup>1</sup> Project supported by CNPq, 400500/2007-8 and UOL Research, number 20060519152003<sup>a</sup> and 20060519183737<sup>a</sup>.

<sup>2</sup> Doctor in Communication and Information (UFRGS/2006), researcher and lecturer at ECOS/UCPel.

are to be constructed by a new form of sociability, deriving from computer mediated interaction, that is capable of generating social ties.

Wellman (1997) defends that social ties are being amplified through the development of means of communication and transport. No longer restricted to small villages and groups, the social ties will be more fluid, weaker and wider. In the same manner, Mark Smith (1999) explains that “*cyberspace is changing the social physics of human life broadening the size and power of group interaction*” (p.195).

This perception of change is one that guides a great deal of the discussion concerning the appearance of virtual communities. Wellman and Gulia (1999) explain that, during the last century, those that studied communities studied, basically, how technological changes were influencing communities, transforming them and allowing their use to be changed. Rheingold (1995, p. 20), one of the first authors to effectively use the term ‘virtual community’ defines this:

*Virtual communities are social aggregations that emerge from the Net when enough people carry on those public discussions long enough, with sufficient human feeling, to form webs of personal relationships in cyberspace.*

According to this definition, the constituent elements of a virtual community are: public discussion; the people that meet and meet again, or even, maintain contact through the Internet (to carry the discussion forward); time; and feeling. These elements, combined through cyberspace, can act as creators of networks of social relations, which then constitute communities.

For Smith (1999) virtual communities are symbolic communities, that is, ones whose members “*are linked primarily by symbolic (in this case electronic) exchange, rather than face-to-face interaction.*” (p. 137). Here the focus is on the persistent interaction as one of the elements of the virtual community, beyond the symbolic frontier for the participating groups. Wellman e Gulia (1999, p. 186) explain that people find it easier to show intimacy and are aware of a greater closeness in these relationships. For them, the homogeneous interests of the people participating in the virtual communities can significantly increase the feelings of empathy, understanding, and mutual support in these groups. Computer mediated interaction, therefore, presents changes in the construction of these groupings. However “*the architecture of the Net may encourage significant alterations in the size, composition, and structure of communities*” (WELLMAN e GULIA, p. 186).

Lemos (2002, p. 93) gives another definition of virtual community, highlighting the elements traced out by Maffesoli: “*electronic virtual communities are aggregations around common interests, independent of frontiers or fixed territorial demarcations.*” He emphasises the common interest and the end of spatial locality, as are also emphasized in the concept of Rheingold, but the essence of the work concentrates on the definitions of Maffesoli.

Wellman defends the proposal that social groupings on the Internet (including virtual communities, as seen in WELLMAN E GULIA, 1999), will have various types of connection present. For Wellman (1997), a virtual community will have ties of diverse types, being closer to more centered groups in private social networks and less like small cohesive groups. The ideas of Wellman, in this manner, directly oppose those of Rheingold, who foresees a greater commitment and more interaction in the groups, being closer to Lemos (2002).

It can, thus, be said that the concept of virtual community is an attempt to explain the social groupings that have arisen in cyberspace. It can be treated as an a

way of trying to understand the changes in sociability, characterised by the existence of a social group that interacts through computer mediated communication.

The meeting of social groups with more or less similar characteristics appears to be inherent to cyberspace (RHEINGOLD, 1995; RECUERO, 2002, 2003; SILVA, 2003; WELLMAN, 1999, 1999b, 2001, 2002 and 2002b; LEMOS, 2002c; ACQUISTI and GROSS, 2006; amongst others). Whilst some authors define the social groups in cyberspace as virtual communities on the basis of the definition of strong ties and commitment to the group (RHEINGOLD, 1995; SILVA, 2003), others explain that the relations are more fluid and emotional, despite having weaker interaction, and weaker social (LEMOS, 2003). In this sense the concept of virtual community is wide and simply includes social groups that, as the various studies show, have the single common characteristic of social interaction with the ties deriving from this.

Despite the use of the term 'virtual community' not being very common in work examining social networks, many authors recognise their relevance as one of the element-objects of the subject. Huberman and Adamic (2003), for example, define communities as sets of nodes that are much closer to one another than they are to the rest, forming a **cluster**. This closeness is almost always associated with a **greater density** (that is, a larger number of connections to nodes in the community than to the rest) or even, stronger or more utilized connections. In addition, the existence of such clusters is a general property of networks (Radicci et al, 2004; Girvan & Newman, 2002). However, despite the cited works analysing the structure of the social network, none of them analyse the content of the relationships between the actors in this structure.

Within the analysis of social networks, groups are a focus of study that is a little larger than that for the content of the structure. Wasserman and Faust (1994), for example, explain that groups can be considered in terms of: a) the **mutuality** of ties or connections; b) the **closeness** of members of a subgroup; c) the **frequency** of ties amongst members; d) the frequency of ties between members and non members of the group. This proposal takes into consideration elements that are socially relevant to the understanding of communities as mutuality, for example, which is a fundamental idea. A bond needs to have two directions of interaction to become deep. Clearly, this reciprocity does not guarantee strength in the bond, but it helps in revealing it. Closeness is verified by the feelings involved, as well as by the exchange of social capital. While frequency can also be evaluated as the frequency of contacts and interactions.

As can be seen, the intent to study virtual communities on networks is still rare. While studies of networks normally classify community as a structure, those that study social groups classify community as a group on the basis of its content (ties and social interaction). Our proposal here is, therefore, to discuss the ideas deriving from an approach to the concept of 'virtual community' directed more toward the quality of the connections between the network authors (content) with those of the structure of the community in the social network.

We understand that the study of communities, in social networks, passes, of necessity, through the analysis of the social ties constructed between the actors in the network, the interactions that comprise these ties and through the social capital product of these. It is only on the basis of this analysis that it can be seen that the content is constituted as a characteristic of the cluster structure.

## 2.1 Social Ties

The connection presented between two actors in a social network is denominated the **social tie**, according to Wasserman and Faust (1994:18), that is, that which “*establishes a linkage between a pair of actors*”. A tie is composed of social relationships that are, in turn, constituted by social interactions. A social interaction is that action that has a communicative reflection between an actor and his peers. It refers to a manifestation of a communicative character (Watzlavick, Beavin and Jackson, 2000:18), with social reflection. Primo (1998) explains that human interactions on the Internet can be of two types: mutual interaction when there is the construction of a relationship between the actors, when this relationship is transformed by the interaction; and reactive interaction, when the interaction consists merely of an action and a reaction. In principle, we consider that only interactions of the mutual type can be constituents of a social network. However, as we shall see later, interactions of the reactive type can also constitute ties between individuals on the Internet.

Breiger (1974: 183-185), inspired by the work of Goffman (1971), explains that social ties can be constituted in another manner, through **association**. Goffman explained that individuals were connected to other individuals through social relationships. The connection, however, between an individual and an institution or group was a tie of a different order, represented purely by a sense of belonging. This is an **associative tie**. Nevertheless, Breiger (1974:184) affirms that “*I see no reason why individuals cannot be linked to other individuals by bounds of common membership (as in interlocking directorates) or to collectivities through social relationships (as in “love” for one’s country or “fear” of a bureaucracy)*”. For the author, though, the social tie does not depend only on interaction. **Relationship ties**, therefore, are those established through social relationships, which can only arise through **interaction** between the various actors in a social network. **Ties of association**, on the other hand, are independent of this, with the requirement being only for **belonging** to a specific place, institution or group.

Social ties can be **strong** or weak. According to Granovetter (1973:1361), “*the strength of a tie is a (probably linear) combination of the amount of time, the emotional intensity, the intimacy (mutual confiding) and the reciprocal services which characterize the tie*”. Strong ties are those that are characterised by intimacy, by closeness and by the intention to create and maintain a connection between two people. Weak ties, on the other hand are characterised by sparse relationships which do not carry closeness and intimacy. Strong ties constitute the means for wide and concrete social exchange (Wellman, 1997), whilst weak ones carry more diffuse exchanges.

## 2.2 Social Capital

In addition to the tie, social interactions can generate resources that help constitute the social group and in the grounding of the social ties. Such values are understood as social capital. This notion is defended by Bourdieu, who explains that

social capital is the aggregate of the actual and potential resources which are linked to possession of a durable network of more or less institutionalized relationships of mutual acquaintance and recognition - in other words, to membership of a group - which provides each of the members with the backing of the collectivity-owned capital(...) (1983:248-249).

For the author, the social capital is related to a specific group (social network). Social capital for Bourdieu is not found in individuals, but to the contrary, is found

**embedded in the social relations of people.** Gyarmati and Kyte (2004:3) have a similar Idea, and explain that social capital is constituted in the **content of the social relations in a network**. It is in this sense that we too understand this capital: it refers to the content embedded in the interactions that constitute the social ties, which can be accumulated, strengthening a particular tie and increasing the group feeling. Social capital is, in this manner, double faced: **collective** and **individual**. It refers to the individual, from the moment that this is the allocator and user of these resources. It is collective because it is part of the relations of a particular group or social network and only exists therein.

Social capital also depends upon the investment of the individuals. As a social relationship, which constitutes the means of production of capital exists due to the investment of and cost to those involved, the social capital that flows through and is produced by this, also depends on these investments for it to be accumulated in the social ties (Gyarmati e Kyte, 2004:3). Without investment, social ties tend to weaken over time, depreciating the social capital of a particular group.

But what form does social capital take? Bertolini and Bravo (2004:1-5), start from the definition of Coleman (1988), which explains that social capital is **heterogeneous**, and constructs categories that constitute aspects in which social capital can be found. These categories are: a) **relational** – which covers the sum of the relations ties and exchanges that connect individuals in any given network; b) **normative** – which includes the norms of behaviour of a given group and the values of that group; c) **cognitive** – which covers the sum of the knowledge and the information made public in a given group; d) **confidence in the social environment** – which englobes the confidence in the behaviour of individuals in a specific environment; e) **institutional** – which includes both formal and informal institutional, which are constituted in the general structure of the groups, where it is possible to discover the ‘rules’ of social interaction, and where the level of cooperation and coordination is significant

Such aspects of social capital can be divided amongst the aspects of the group (which they also call the **second level** of social capital) that is, those that can only be enjoyed by the collective, such as confidence in the social environment (d) and the presence of institutions (e), and the individual aspects, such as relations (a), the laws and norms (b) and knowledge (c), which vary according to the individual (**first level** of social capital). The existence of social capital of the first level is a prerequisite for the constitution of capital of the second level (which represents a solidification of the first) (Bertolini e Bravo, 2004:5-10). In this manner, a second level of social capital demonstrates a greater maturity of the social network, in addition to a higher density and longer duration of its ties. Second level social capital is most important as it increases the quality and the generation of that of the first level, creating a circle of constant production of resources of the group.

Virtual communities, thus, have elements in common such as interaction, ties and social capital. Thus they constitute a grouping of actors based on social interaction, which possesses a structure of social ties with social capital embedded into it. **Social interaction** (mutual or reactive) (Primo, 1998) is seen as a generator of community structure in both senses as it allows the **social ties** (strong or weak) to arise. This interaction requires a space (or ‘virtual territory’) that is recognised by the individuals, be this a *chat* channel or a group of *weblogs* or *fotologs*, so that it can take place between the actors to form a group. The social ties, for their part, require that the interactions happen within a certain timeframe, so that the reciprocity, intimacy and confidence can emerge through the medium. Social capital is also

necessary for the perception of the grouping, given that as we have already seen, it constitutes the structure of the group. These elements are also associated with **belonging** which can be associative or relational, in line with the proposal of Breiger (1974). The structure is that of a cluster.

Having discussed the concepts that will guide this work, we present the proposed methodology that constitutes that work and how we chose to analyse these elements on the basis of the object chosen.

### 3. The object: Fotolog.com in Brazil

Fotolog.com<sup>3</sup> is an Internet photograph publishing service that permits its users to receive comments for each photograph and to add friends. Thus the social networks are seen on the basis of personal pages of photograph publications (fotologs) being the nodes and with the interactions between the various individuals represented by their fotologs<sup>4</sup> being the connections. Each fotolog has a simple basic structure. In the centre of the page is the published photograph, followed by a text published by the fotologger. To each of the sides there are thumbnails, a list of friends/favourites to the right and a list of previously published photographs to the left. Below, there is a list of comments received and a space to enter comments (Figure 1).



Figure 1: Fotolog example

Fotologs can be common or *gold camera*. The common ones can only publish one photograph per day and accept 20 comments (at the time of the study, this was limited to only 10). Those that take up the *gold camera* option can publish up to six photographs per day and receive up to 200 comments (at the time of the study this was only 100)<sup>5</sup>.

Although it is constructed in a very straightforward system, fotologs hide great complexity in the way in which they are appropriated. Despite the system being usable to store photographs, it is more used as (1) a way of constructing an individual

---

<sup>3</sup> <http://www.fotolog.com>

<sup>4</sup> The perception of the personal pages as being representative of individuals in cyberspace was constructed and exhaustively discussed by authors such as Donath (1999), Boyd (2004) and Döring (2002). For this reason it will not be reexamined in this work.

<sup>5</sup> As this work refers to data collection undertaken prior to the increase in the number of comments, it is necessary to consider that there were only 10 and 100 comments respectively analysed per fotolog.

identity that can be recognized by others and (2) an interaction space, where it is possible to see the structure of the social networks (Recuero, 2007).

Due to the limitations of the system, Fotolog provides almost no form of personalization. However authors such as Döring (2002) and Donath (1999) demonstrate that personalization is a necessary condition for computer mediated interaction. Thus the appropriation of CMC tools is constantly interlaced with the construction of the self, making cyberspace recognizable as an individual space. This is true of the fotologs which are, within the possibilities of the system, constantly reconstructed to present the latest 'versions of the self' (DÖRING, 2002).

Each fotologger is identified by a unique username, which is the same as that used in the address of their fotolog ([www.fotolog.com/username](http://www.fotolog.com/username)). The username is a registered condition for interaction as only an identified user can comment using their username. Even when the users are not logged in, they habitually type their usernames by which they are known, making this the simplest form of identification in the system. Donath (1999) has already commented on the importance of the username as an element of individual recognition on the Internet, an element that has been verified in other systems by other authors (RECUERO, 2002; Boyd, 2004; Boyd & HERR, 2006). The username, however, is not the only form of identification. Fotolog also allows for a change of the background colour and the text colour, as well as the creation of a title for each page and the use of an image in the title for *gold* users. These are not, however, the only forms of identity construction. The users possess two key appropriations in the sense of the construction of the self: the use of posts (photographs and texts) and the use of the friends/favourites.

The published images are essential to the creation of the identity. Due to this the publication of self images (ego shots) is very frequent. Each photograph can, thus, allow the viewers to see one of the aspects of the personality of the fotologger. Thus a photograph with the dog, with friends or even with the favourite CD can say a lot about each user. The images are constantly accompanied in being posted with a text. The text also relates to the construction of the self, with lyrics from songs, personal information, and even elements of everyday life (in a form similar to that observed by Carvalho, 2003 and Sibilía, 2003 and 2004 in weblogs).

Fotologs, thus, were chosen for this study because, in being widely used by Brazilians, they can provide a space for the construction of ties and social capital, as well as allowing the observation of the social networks through the comments exchanged amongst the actors. As the comments are stored by the fotologgers and indicate, in the majority of cases<sup>6</sup>, their authors, they constitute a single space of observation for these social exchanges made through computer mediated communication.

#### **4. Methodology**

Initially, the option was to analyse only the comments on the fotologs, the tool that the system offered that presented the best chances for studying the social groups. It was observed that the structure of the community was that of a cluster. This implied that it would be necessary to collect the data of their comments, assemble the social network and isolate its cluster for analysis.

---

<sup>6</sup> Despite the occasional anonymous comment being made, it was more common, during this study, to find identified comments.

To collect the data on the commentators and to allow for the assembly of the social network on the basis of their comments, a crawler was built that harvested the ego comments, and those from fotologs with two degrees of separation.

20 ego fotologs (WASSERMAN e FAUST, 1994, DEGENNE and FORSÉ, 1999 and SCOTT, 2000) were chosen at random. These fotologs had to be selected by the researcher as it was necessary that they were maintained by Brazilians (a random selection would, for example, allow the possibility of the inclusion of fotologs where the author was from another country). The quantity was based on the fact that the networks that the crawler covered would have to be examined qualitatively by the researcher and a greater number would make this observation impossible. However, while the work was ongoing, three of the fotologs originally selected were closed, leaving a total of 17.

Thus, the fotologs were chosen and the crawler collected the data for their social exchanges for a period of two months (April and May, 2006) within two degrees of separation of each of the ego fotologs, with the intention of constructing a network on the basis of their triads (Simmel, 1950). This collection of data covered in total 828963 fotologs and 3709004 comments.

The quantity of interactions per fotolog was then analysed, with it being seen that from this point the quantity became significant and the number at which to cut the cluster was arbitrarily determined. Each cluster was delimited on the basis of the principle of reciprocity of comments, where only those nodes with one or more connections with reciprocal comments were maintained (for example, if A commented on B and B commented on A during the period in which the data was collected).

From this point forward the cluster was observed from a qualitative point of view, where the comments exchanged between the actors in the period were observed. This observation served to make it possible to understand what types of values were exchanged by the observed fotologs and the way in which these interactions happened.

The comments were chosen as these characterised the principal means of interaction amongst the fotologgers. Additionally each user has a unique username on the system, which is accessed via a password. This username is also the fotolog URL of the user. For each comment the users have to identify themselves so that the others can recognize with whom they are interacting. This identification is carried out with a unique username. Using these usernames, matrices were created between all of the commentators of the fotologs, thus creating, their networks.<sup>7</sup> Interviews with 56 users amongst all of those observed were also held with respect to the use of fotolog, which added individual perceptions to the research.

On the basis of the data obtained from the qualitative observation and the cluster structure of each fotolog, a network classification was prepared. From this typology a hypothesis was created that fotologs with exceptional appropriations would be capable of generating exceptional virtual communities. Brazilian fotologs appear to be focused on (1) interaction with other users through the comments; (2) construction of a personal identity. Each of these appropriations would be capable of generating a network that would have properties and structures that are also different, as a means of meeting the needs of their users.

---

<sup>7</sup> This approach is relatively new in the sense that, despite Mishne and Glance (2006), Lento et. Al (2006) and Liu, H., Maes, P. and Davenport, G (2006) having analysed social networks through the exchange of comments, this analysis had still not been carried out in conjunction with a qualitative observation of the social exchanges in the space.



## 5. Data: Fotolog communities in the Social Networks

For the study of the **composition** of the clusters of the 20 networks that were originally selected in this study, their **structure**, as has been described, was examined, that is, the cluster of for each network, with this being considered as the nodes that have reciprocal comments between them . The data obtained was:

| Network            | Whole network   |                                  |                    | Cluster         |   |                            |
|--------------------|-----------------|----------------------------------|--------------------|-----------------|---|----------------------------|
|                    | Number of nodes | Number of connections (comments) | Comments per photo | Number of nodes | Number of reciprocal connections (comments) | Average comments per actor |
| 1 sophia           | 2485            | 15859                            | 8.9                | 63              | 776   | 12.31                      |
| 2 actea            | 2308            | 9972                             | 8.2                | 44              | 211   | 4.79                       |
| 3 juanaloca        | 766             | 3385                             | 4.8                | 20              | 107   | 5.35                       |
| 4 caneta           | 15214           | 53352                            | 8.4                | 84              | 360   | 4.28                       |
| 5 byavantaresca    | 8374            | 33897                            | 10.21              | 70              | 485   | 6.92                       |
| 6 lellidornelles   | 45176           | 187491                           | 8.2                | 361             | 2022  | 5.60                       |
| 7 rebecarecuero    | 2387            | 4943                             | 8.8                | 19              | 97  | 5.10                       |
| 8 beerland         | 262448          | 1066689                          |                    | 1901            | 7215  | 3.79                       |
| 9 coisas_fofinhas  | 103548          | 368039                           | 4.2                | 620             | 2475  | 3.99                       |
| 10 balletdepelotas | 631             | 1774                             | 6.23               | 8               | 31  | 3.87                       |
| 11 cornflake       | 10567           | 34595                            | 10.05              | 56              | 209   | 3.73                       |
| 12 garfield_tiras  | 12837           | 42292                            | 6.13               | 34              | 145   | 4.26                       |
| 13 loyrinha        | 66298           | 278602                           | 33.29              | 208             | 1136  | 5.46                       |
| 14 marianagloor    | 7369            | 28092                            | 16.85              | 82              | 970   | 11.82                      |
| 15 marimoon        | 166642          | 1111145                          | 94.0               | 1793            | 14534                                       | 8.10                       |
| 16 vector_voxel    | 43475           | 178641                           | 3.52               | 127             | 928   | 7.30                       |
| 17 vert            | 78438           | 290236                           | 3.21               | 972             | 1410  | 1.45                       |

From the table above it was seen that there were differences in the networks observed. We noted that there were networks which had a large number of actors and networks with only a few actors, as had been expected. However, that the small networks concentrated a large number of comments with a high average number of comments per user was a surprise. This element was initially unexpected, as it was believed that larger networks would tend to aggregate a larger number of comments (as they have a larger number of actors associated with them) than the smaller ones. But despite the networks with the largest number of users also having a large number of connections, this quantity is not so evident in terms of the average number of comments per actor (which is much lower).

Thus the investigation was initially directed at the fact that the smaller networks in the sample appear to contain a larger number of actors that make comments frequently whilst the larger networks appear to have fewer actors that comment with any frequency.

In addition, when the graphs of each network is plotted their structures are just as different. The smaller networks, with the larger number of comments present a

highly connected cluster, with a large number of interactions concentrated in a few nodes (Table 1: Network (left) and cluster (right) for Sophia. ).

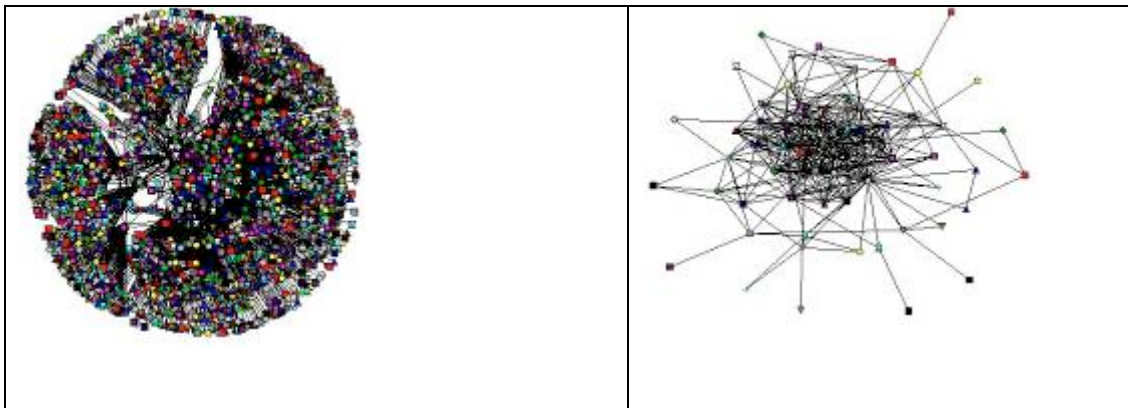


Table 1: Network (left) and cluster (right) for Sophia.

While, in the larger networks it was possible to observe two different cases. Some networks presented an almost complete lack of structure when the network was reduced to its cluster of reciprocal comments (Table 2). Whilst others, to the contrary, presented a much smaller nucleus, with less concentration of interactions than the first case, but whose cluster presents a much more cohesive structure (Table 3).

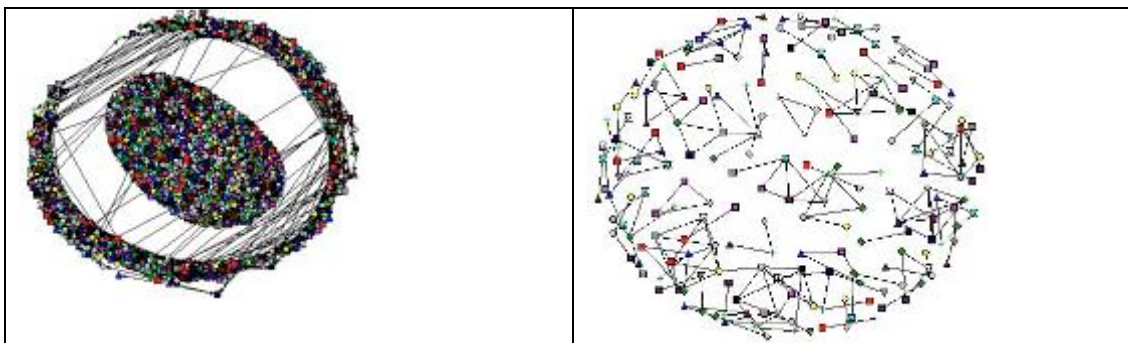


Table 2: Entire network (left) and cluster of reciprocal comments (right) for beerland.

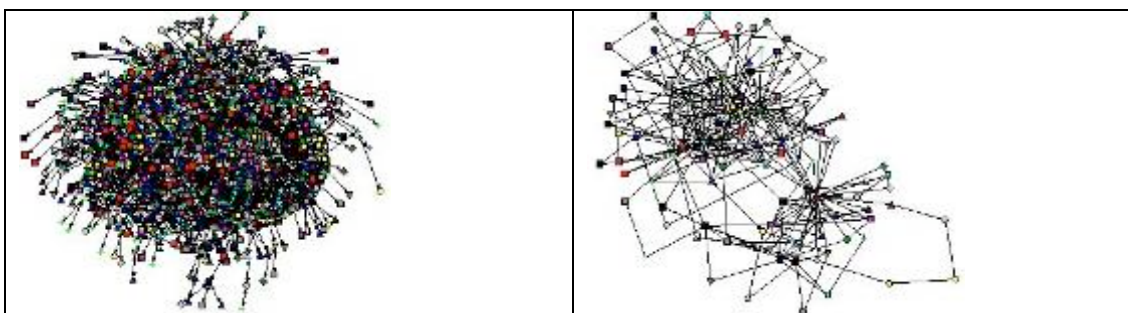


Table 3: Entire network (left) and cluster of reciprocal comments (right) for marimoon.

From these structural differences, the composition of these networks was also examined, and from the interactions, the social ties and social capital. The objective was to understand how these differences in structure manifested in the content of the interactions amongst the actors.

We observed that for some fotologs the groups seemed to constitute themselves through mutual interaction, constructed via mutual interactions, dialogues associated to a belonging relationship. The main link between the actors appears to be

this mutual social interaction, built upon frequent social exchanges and the interactions made through the comments.

michaelweikath @ 2006-05-19 10:25 said:  
 eu tava ali do lado do fabio!! Ueauhoueh  
 tu é o bozo na pizzeria  
 vamos combinar um restaurante qquer dia  
 faz tempo né!!! Beijaaaaao  
 festinha hoje? :D<sup>8</sup>

I was there next to Fabio!! Hehehe  
 U r the fool from the pizza place  
 lets meet in a restaurant some day  
 been a while!! Big Kiss  
 (party today? :D

In these groups the commentators appear to be habitual, always the same actors, always with social exchanges that indicate stronger social ties and more varied social capital, to the degree in which the these interactions include diverse elements. The comments frequently refer to the same commentators and demonstrate a greater intimacy amongst these. From these comments it is possible to observe many conversations that span across the various fotologs of the habitual commentators, as if they all read the same fotologs (as observed with weblogs by Recuero, 2002).

On the other hand there are groups that appear to be principally constituted by reactive social interaction (being associated to the fotologs), making use of the social capital generated by the group and interacting in dialogues with less frequency. In addition to this, these groups seem to contain a larger group of actors and to be based on weaker ties. The interactions in these groups are more sparse, less intimate and the comments are much more sporadic..

otaku\_x @ 2006-05-03 12:16 said:  
 lindo flog!! pasa x el mio cuiidate chauu!!  
 anime x siempre<sup>9</sup>

beautiful flog!! Check out mine care ciao  
 anime for ever

The content of these interactions was equally lacking in intimacy, demonstrating a lesser participation of the actors in this environment. Despite this type of interaction being concentrated on a fotolog, around it it was possible to identify groups of fotologs with frequent commentators.

At the same time, in some other fotologs, where there was a high number of participant actors, it was possible to observe that despite some commentators acting sporadically, others acted frequently. In these cases two types of comments were seen.

Thus we sought to classify the observed fotologs from the interaction and social capital that appears in the comments on them (Table 4).

Table 4: Fotologs: Interaction and social capital

|                              | <b>Interaction</b>                   | <b>Social Ties</b>          | <b>Social Capital</b>              |
|------------------------------|--------------------------------------|-----------------------------|------------------------------------|
| <b>Type 1</b> (126 fotologs) | Mutual social interaction (dialogue) | Dialogues – Strong and weak | Levels 1 and 2 (Bertolini e Bravo) |

<sup>8</sup> Comment taken from <http://www.fotolog.com/bloodline/?pid=14610925> on 03/08/2006.

<sup>9</sup> Comment taken from <http://www.fotolog.com/beerland/?pid=14361515> on 11/10/2006.

|                      |   |  |                                    |
|----------------------|---|--|------------------------------------|
| Type 2 (11 fotologs) | Reactive social interaction (association) | Associative - Weak                           | Levels 1 and 2 (Bertolini e Bravo) |
| Type 3 (13 fotologs) | Both present                              | Dialogues and Associative – Strong and weak. | Levels 1 and 2 (Bertolini e Bravo) |

These differences constitute the core of our proposal. Whilst we examined these with respect to the requirements of the community, we noticed a tendency toward aggregation within the fotologs, a basic element for the presence of clusters in the network.

The first, and most obvious, difference that we observed in the virtual communities was, therefore, the way in which they are constituted. Whilst some communities appear to ‘emerge’ from individual spaces that promote the creation of collective ties, others appear to be fundamentally connected to a delimited virtual space. These groups are formed through **mutual** computer mediated interaction (PRIMO, 1998 e 2003). They are groupings that arise, for example, when people start to comment on one or another fotolog and later pass on to comment on the fotologs of the commentators and thus forge ties in cyberspace through the reciprocity of this interaction (GRANOVETTER, 1973). These groups are emergent as they arise through a bottom-up system (JOHNSON, 2003).

Using these comments, the agents learn to take part in the social network that is being constructed in that space, that includes each one of the interactors as a fotolog that should also be commented. To understand the discussions and follow the debates, the agents rapidly learn that they need to ‘follow’ the dialogue across the different fotologs that constitute the group. Similar observations have been made with respect to the networks of weblogs (RECUERO, 2003 e 2006; PRIMO E RECZEK, 2005).

These groupings can represent frequent interactions, in time, creating social ties. As well, they also presume a certain effort toward sociability, in the sense that it is necessary for the agents to ‘follow’ the conversation in cyberspace, to be able to participate in it. Through these exchanges it is possible that stronger social ties and greater commitment to the group emerge. (RHEINGOLD, 1995).

These groups are easily associated with the concept of community. They are based on interaction, on relationships and social ties. It is possible to verify the social capital through the interaction on the network (RECUERO, 2005; 2005d e 2006), which has a cost for the users, given that it requires an investment of time, searching for conversations on the network and discussions, tends to form, by its repetition, stronger ties (TINDALL E WELLMAN, 2001). These are groups that require action amongst their members to maintain their cohesion. These groups can be constructed around common interests and the emotions involved (as WEBER, 1987 and MAFFESOLI, 1996, 1998 and 2000 affirm), without, however, a defined territory as they occur in cyberspace. Nevertheless, these interactions between actors, by their continuity and frequency, provide a greater density of connections between a determined quantity of nodes, thus constituting the structure of a cluster. We call such a group an **emergent virtual community**.

There is, however, a different type of group. Here we are dealing with formal **association**. Once within the space the agents interact with one another through the subjects of messages and interactional exchanges (RECUERO, 2005). This space thus constitutes, in the territory of the community, the space where primarily the interaction and social exchanges occur. The process of the creation of the group, however, is not emergent (JOHNSON, 2003), but occurs from top-down (someone created the group and invited the other members). Normally the creator of the space

sends invitation messages to their friends and associates, as a means of announcing the new group and so that those that are interested enter the group thus creating associative ties.

This type of group often does not contain much interaction. Perhaps because the association, as a type of belonging, does not depend on an effort to be sociable, this type of grouping has less commitment amongst its members. Differently to the emergent groups, those based on association do not require interaction to remain being part of the group. It is enough to associate through reactive social interaction and thus, the actor remains part of the group for an undetermined period of time, generally until they decide to leave. We call this group an **associative virtual community**.

But can such groups generate communities? Despite initially considering that the reply to this question was negative, it is indisputable that such groups possess social interaction (both mutual and reactive). After all, the actor, in associating with a group of fotologs, for example, requires **reactive social interaction** and generates an **associative tie**. In addition to this, such association provides access to specific social capital, be it through knowing the other members of the community, be it through reading the prior discussions between other actors, that constitutes part of the value of the group and its own social structure. Such a position also implies a certain contribution to the group, as the fact that the actor is part of the group is of general knowledge and in their profile, the group can be found. Thus, despite the mutual social interaction being small, it exists. Such groups, in the end, represent a grouping of nodes (agents) around a common interest (identification) through connections that can be associative ties and through which ties of dialogue occur via interaction, in the posting of information and even, of comments.

In the end, such groupings are constituted of groups with a large number of associated actors. In this sense they are clusters as they have a higher density of actors when compared to the rest of the network. But they are differentiated clusters as the focus, here, is on the actors that have access to the group, on the interactions and the social capital and not on the connections between the elements.

We also found some communities that appeared to contain both types. These were fotologs where, together with the groups that use the system to maintain more dialogue type social exchanges there were a large number of actors that sought only to be ‘associated’ to the fotolog or the group that emerged from it. These would be types that contained, in this way, the two previous types. We call this type a **hybrid virtual community**.

Thus we propose that the virtual communities, on the Internet, can be recognised on the basis of three types: the **emergent virtual communities** and the **associative virtual communities**, and the **hybrid virtual communities**, found with parts of the two.

The following table summarises the observations made (Table 5).

Table 5: Patterns of interaction connection in the community types

| Type of Community  | Social Tie                                 | Social Interaction  | Structure   | Belonging   |
|--------------------|--|---------------------|---|---|
| <b>Emergent</b>    | Dialogue (strong and weak ties can emerge) | Mutual              | <i>Cluster</i> strong centre                        | Principally territorial, but also symbolic              |
| <b>Associative</b> | Associative                                | Reactive            | <i>Clusters</i> diffuse                             | Symbolic  |
| <b>Hybrid</b>      | Dialogue and associative                   | Mutual and reactive | <i>Cluster</i> central weak and diffuse connections | Territorial in the centre and symbolic at the periphery |

## 6. Final Considerations

In this work, the results of part of the doctoral thesis of the author have been presented. On the basis of a case study of the appropriation of the Fotolog tool in Brazil it was sought to develop how this appropriation is capable of generating social networks and what types of social networks can be confirmed as deriving from this. Working with the elements observed in a qualitative and quantitative study. It was shown that the users of the system used it in such a way as to make it a social network site, more than as a space for the storage of photographs. Thus there were three types of fotologs: centered on identity, on interaction, and a hybrid type. For each type similarities and differences were sought, beyond those of structure and composition of the networks.

A proposition for and a discussion of the forms in which the people in Brazil can use tools and transform them into interactive spaces. Much still remains to be studied and better understood with respect to this phenomenon. This work describes only a case study (despite the quantitative approach. Centered on ego networks, it is still merely an example) and, due to this, contains a deeper and less inclusive approach. Even so, it brings a contribution in the sense of helping with the considerations of the appropriation as an element of the social networks on the Internet and in Fotolog in Brazil as a focus of study.

### Bibliography:

ADAMIC, L.; ADAR, E. Friends and Neighbours on the Web. **Social Networks**, n. 25, vol 3, p. 211-230, July 2003. Available at <<http://www.hpl.hp.com/research/idl>>. Accessed on: 23 mar 2004.

BERTOLINI, S.; BRAVO, G. Social Capital, a Multidimensional Concept. Available at <<http://www.ex.ac.uk/shipss/politics/research/socialcapital/other/bertolini.pdf>> Accessed on 17 Oct 2004.

BOURDIEU, P. The forms of Capital. Originally published in "Ökonomisches Kapital, kulturelles Kapital, soziales Kapital" In: **Soziale Ungleichheiten** (Soziale Welt, Sonderheft 2). Goettingen: Otto Schartz &Co. 1983. (pp 98 -183). English translation by Richard Nice. Available at <<http://www.pontomidia.com.br/raquel/resources/03.html>>. Accessed on 23 Feb 2005.

BOYD, D. Friendster and Publicly Articulated Social Networks. **Conference on Human Factors and Computing Systems (CHI 2004)**. Vienna: ACM, April 24-29, 2004.

\_\_\_\_\_. Identity Production in a Networked Culture: Why Youth Heart MySpace. Talk as **AAAS 2006** (part of panel: "It's 10PM: Do You Know Where Your Children Are ... Online!"). St. Louis, Missouri: February 19, 2006. Available on <<http://www.danah.org/papers/AAAS2006.html>>. Accessed on ago 2006.

BOYD, D.; HERR, J. Profiles as Conversation: Networked Identity Performance on Friendster. In: **Proceedings of the Hawaii International Conference on System Sciences (HICSS-39)**, Persistent Conversation Track. Kauai, HI: IEEE Computer Society. January 4 - 7, 2006.

BREIGER, R. The Duality of Persons and Groups. **Social Forces**, vol 53, n. 2, p. 181- 190, Dec 1974.

CARVALHO, R. M. **Diários Íntimos na Era Digital**. Diários Públicos, Mundos Privados. (Master dissertation.) Universidade Federal da Bahia, 2003. Available on: <<http://www.bocc.ubi.pt/pag/oliveira-rosa-meire-diarior-publicos-mundos-privados.pdf>>. Accessed on 02 Jan 2005.

CASTELLS, M. **A Galáxia da Internet**. Reflexões sobre a Internet, os Negócios e a Sociedade. Rio de Janeiro: Jorge Zahar Editor, 2003.

\_\_\_\_\_. **A Sociedade on Rede**. Rio de Janeiro: Jorge Zahar, 1999.

COLEMAN, J. S. Social Capital and the Creation of Human Capital. **American Journal of Sociology**, n. 94, p. S95-S120, 1988.

DEGENNE, A.; e FORSÉ, M. **Introducing Social Networks**. London: Sage, 1999.

DONATH, J. S. Identity and Deception in the Virtual Community. *In*: KOLLOCK Peter. e Marc Smith. (organizadores) **Communities in Cyberspace**. New York: Routledge, 1999.

DÖRING, N. Personal Home Pages on the Web: A Review of Research. **Journal of Computer-Mediated Communication**, n. 7, vol 3, 2002. Available at: <<http://jcmc.indiana.edu/vol7/issue3/doering.html>>. Acesso on 20 dez 2005.

EFIMOVA, L. What is "beneath your current threshold"? Social visibility in persistent conversations? <<https://doc.telin.nl/dscgi/ds.py/ViewProps/File-47362>>. **Persistent Conversations Workshop, HICSS TUTORIAL DAY**, on 03 de Janeiro de 2005. Accessed on 05 out 2005.

EFIMOVA, L.; MOOR, A. An Argumentation Analysis of Weblog Conversations. Available at < <https://doc.telin.nl/dscgi/ds.py/Get/File-40067> >. Accessed on 5 ago 2005.

ÉRDOS, P.; RÉNYI, A. On the evolution of Random Graphs. *In* :**A Matematikai Kutató Intézet Közleményei**. v. A/1-2, p. 17-61, 1960.

ESMAILI, K. S. et al. Experiment on Persian Weblogs. **Third Annual Workshop on the Weblogging Ecosystem: Aggregation, Analysis and Dynaics**. WWW 2006, Edinburg, Scotland, 2006.

FLORA, J. L. Social Capital and Communities of Place. **Rural Sociology**, n. 63, p. 481-506, 1998. Available at <[http://poverty.worldbank.org/files/4183\\_flora1.pdf](http://poverty.worldbank.org/files/4183_flora1.pdf)>. Accessed on 05 abr 2004.

FREEMAN, L. C. **The Development of Social Network Analysis**. Vancouver: Empirical Press, 2004.

GARTON, L.; HAYTHORNTHWAITE, C. e WELLMAN, B. Studying Online Social Networks. **Journal of Computer Mediated Communication**, n. 3, vol 1, 1997. Available at <<http://www.ascusc.org/jcmc/vol3/issue1/garton.html>>. Accessed on 05 mai 2004.

GIRVAN, M.; NEWMAN, M. E. J. Community structure in social and biological networks. **Proceedings of the National Academy of Science**, vol. 99, n. 12, p. 7821-7826, junho de 2002.

GRANOVETTER, M. The Strengh of Weak Ties. **The American Journal of Sociology**, vol. 78, n. 6, p. 1360-1380, maio de 1973.

\_\_\_\_\_. The Strength of Weak Ties: Network Theory Revisited. **Sociological Theory**, vol 1, p 203-233, 1983.

GYARMATI, D. e KYTE, D. Social Capital, Network Formation and the Community Employment Innovation Project. *In: Policy Research Initiative*, vol 6, n.3. Available at <[http://policyresearch.gc.ca/page.asp?pagenm=v6n3\\_art\\_05](http://policyresearch.gc.ca/page.asp?pagenm=v6n3_art_05)>. Accessed on 04 mai de 2005.

HUBERMAN, B.; ADAMIC, L. Information Dynamics in the Networked World. In: n: BEN-NAIM, E.; FRAUENFELDER, H.; TOROCZKAI, Z. (eds.). **Complex Networks**. Lecture Notes in Physics, Springer, 2003. Available at: <<http://www.hpl.hp.com/research/idl/papers/infodynamics/infodynamics.pdf>>. Accessed on abril de 2004.

\_\_\_\_\_. Growth Dynamics of World Wide Web. **Nature**, vol 401, p. 131, 1999.

JOHNSON, S. **Emergência**: A dinâmica de rede on formigas, cérebros, cidades e softwares. Rio de Janeiro: Jorge Zahar editores, 2003.

LEMOS, A. Agregações Eletrônicas ou Comunidades Virtuais? Análise das listas FACOM e Cibercultura. **404nOtF0und**, ano 2, vol 1, n. 14. março, 2002. Available at <[http://www.facom.ufba.br/ciberpesquisa/404nOtF0und/404\\_14.htm](http://www.facom.ufba.br/ciberpesquisa/404nOtF0und/404_14.htm)>. Accessed on outubro de 2004.

LENTO, T. et al. The Ties that Blog: Examining the Relationship between Social Ties and Continued Participation in the Wallop Weblogging System. **Third Annual Workshop on the Weblogging Ecosystem: Aggregation, Analysis and Dynamics**. WWW 2006, Edinburg, Scotland, 2006.

MAFFESOLI, M. **O Tempo das Tribos**. Rio de Janeiro: Forense Universitária, 1998.

\_\_\_\_\_. **A Contemplação do Mundo**. Porto Alegre: Artes e Ofícios, 1995.

\_\_\_\_\_. **No fundo das aparências**. Petrópolis: Vozes, 1996.

\_\_\_\_\_. Mediações simbólicas: a imagem como vínculo social. *In: MARTINS, F. M; SILVA, J. M. da. Para navegar no século XXI*. 2a edição. Porto Alegre: Sulina/ Edipucrs, 2000.

MARLOW, C. Audience, Structure and Authority in Weblog Community. **Communication Association Conference**, maio de 2004. Available at <<http://overstated.com/media/ICA2004.pdf>>. Accessed on maio de 2004.

MATHEWS et al. Association of indicators and predictors of tie-strength. **Psychological Reports**, n. 83, p. 1459-1469, 1998.

MILGRAM, S. The Small-World Problem. **Psychology Today**, n. 1, p. 62-67, maio de 1956.

MISHNE, G.; GLANCE, N. Leave a Reply: Analysis of Weblog Comments. **Third Annual Workshop on the Weblogging Ecosystem: Aggregation, Analysis and Dynamics**. WWW 2006, Edinburg, Scotland, 2006.

PRIMO, A. Interação Mútua e Interação Reativa: Uma proposta de Estudo. Trabalho apresentado no **XXI Congresso da Intercom** on setembro de 1998. Recife, PE. Available at <<http://usr.psyco.ufrgs.br/~aprimo/pb/intera.htm>>. Accessed on 06 jan 2005.



PRIMO, A; RECZECK, A. Blogs como espaços de conversação: Interações conversacionais na comunidade de blogs insanus. Trabalho apresentado na **XVIII Intercom**, UERJ: Rio de Janeiro, 2005.

PUTNAM, R. D. **Bowling Alone**: The collapse and Revival of American Community. New York: Simon e Schuster, 2000.

QUAN-HAASE, A. e WELLMAN, B. How does the Internet Affect Social Capital. *In*: HUYSMAN, Marleen e WULF, Volker (org.) **IT and Social Capital**. Novembro de 2002.

RADICCHI, F. et al. Defining and Identifying Communities in Networks. **Proceedings of the National Academy of Science**, vol. 101, n. 9, p. 2658-2663. Março de 2004.

RECUERO, R. C. **Comunidades Virtuais no IRC: o caso do #Pelotas. Um estudo sobre a Comunicação Mediada por Computador e a estruturação de comunidades virtuais.** (Dissertação de Mestrado) Universidade Federal do Rio Grande do Sul. (janeiro de 2002).

\_\_\_\_\_. **Weblogs, Webrings e Comunidades Virtuais.** Trabalho apresentado no **GT de Comunicação e Cultura do VII Seminário Internacional de Comunicação**, on Setembro de 2002. Trabalho publicado na revista 404notFound, v1. número 31, 2003.

\_\_\_\_\_. Um estudo do capital social gerado a partir de redes sociais no Orkut e nos Weblogs. Trabalho apresentado no **GT de Tecnologias Informacionais da Comunicação da Compós.** Niterói, RJ, 2005.

RHEINGOLD, H. **La Comunidad Virtual**: Una Sociedad sin Fronteras. Barcelona: Gedisa Editorial, 1995.

SIBILIA, P. Os diários íntimos na internet e a crise da interioridade psicológica. do sujeito. Grupo de Tecnologias Informacionais da Comunicação e Sociedade, **XII Congresso da Associação Nacional de Programas de Pós-Graduação on Comunicação COMPOS**, Niterói/RJ, 2003.

\_\_\_\_\_. A vida como relato na era do fast-forward e do real time: algumas reflexões sobre o fenômeno dos blogs. Grupo de Tecnologias Informacionais da Comunicação e Sociedade. **COMPÓS 2004 - XIII Congresso da Associação Nacional de Programas de Pós-Graduação on Comunicação**, São Bernardo do Campo, 2004.

SCOTT, J. **Social Network Analysis**. A Handbook. 2<sup>nd</sup> ed. London, UK: Sage Publications, 2000.

SIMMEL, G. **The Sociology of Geog Simmel**. New York: The Free Press, 1950.

STUTZMAN, F. An Evaluation of Identity-Sharing Behavior in Social Network Communities. **Proceedings of the 2006 iDMAa and IMS Code Conference**, Oxford, 2006.

TINDALL, D. B; WELLMAN, B. Canada as Social Structure: Social Network Analysis and Canadian Sociology. **Journal of Canadian Sociology**, 2001. Available at <[http://www.chass.utoronto.ca/~wellman/publications/cansocstr/Can\\_Net-Final-30Ap01.htm](http://www.chass.utoronto.ca/~wellman/publications/cansocstr/Can_Net-Final-30Ap01.htm)>. Accessed on 22 mar 2004.

TRIVERS, J. e MILGRAM, S. An Experimental Study of the Small World Problem. *In*: **Sociometry**, (pp. 425- 443)

WALKER, Jill. Links and Power: The Political Economy of Linking on the Web. *In*:

**Hypertext 2002**, Baltimore: ACM Press, 2002. Available at: <http://huminf.uib.no/~jill/txt/linksandpower.html>.

WASSERMAN, S. e FAUST, K. **Social Network Analysis**. Methods and Applications. Cambridge, UK: Cambridge University Press, 1994.

WATZLAWICK, P.; BEAVIN, J. H.; JACKSON, D. D. **Pragmática da Comunicação Humana**. 11ª ed. São Paulo: Cultrix, 2000.

WELLMAN, B. Structural Analysis: From Method and Metaphor to Theory and Substance. *In*: WELLMAN, B.; BERKOWITZ, S. D. **Social Structures a Network Approach**. (p. 19-61) Cambridge: Cambridge University Press, 1988.

\_\_\_\_\_. An Electronic Group is Virtually a Social Network. *In*: KIESLER, S. (org.) *Culture of Internet*. (p. 179-205) Hillsdale, NJ: Lawrence Erlbaum, 1997.

\_\_\_\_\_. The Network Community: An Introduction to Networks in the Global Villag. *In*: WELLMAN, B. **Networks in the Global Village**. (p. 1-47) Boulder, CO: Westview Press, 1999.

\_\_\_\_\_.b From Little Boxes to Loosely-Bounded Networks: The Privatization and Domestication of Community? *In*: ABU-LUGHOD, J. **Sociology for the Twenty-first Century: Continuities and Cutting Edges**. (p. 94-114 ) Chicago: University of Chicago Press, 1999.

\_\_\_\_\_. Physical Place and CyberPlace: The Rise of Personalized Networking. Fevereiro de 2001. **International Journal of Urban and Regional Research**, n. 25, vol 2 (2001). Available at: <http://www.chass.utoronto.ca/~wellman/publications/individualism/ijurr3a1.htm>. Accessed on abril de 2004.

\_\_\_\_\_. The Persistence and Transformation of Community: From Neighbourhood Groups to Social Networks. Report to the Law Commission of Canada, 2001. Available at <http://www.chass.utoronto.ca/~wellman/publications/lawcomm/lawcomm7.PDF> >. Accessed on 02 fev 2002.

\_\_\_\_\_. b Little Boxes, Glocalization, and Networked Individualism? *In*: TANABE, M.; BESSELAAR, P. van den; ISHIDA, T. **Digital Cities II: Computational and Sociological Approaches**. (p. 10-25), Berlin: Springer, 2002. Available at <http://www.chass.utoronto.ca/~wellman/publications/littleboxes/littlebox.PDF>>. Accessed on maio de 2004.

WELLMAN, B. et al. The Social Affordances of Internet for Networked Individualism. *In*: **Journal of computer Mediated Communication**, vol. 8 n. 3, 2003. Available at <http://www.ascusc.org/jcmc/vol8/issue3/wellman.html>>. Accessed on 23 mar 2004.

\_\_\_\_\_. Computer Networks as Social Networks: Collaborative Work, Telework, and Virtual Community. **Annual Review of Sociology**, Vol. 22, p. 213-238, 1996.

WELLMAN, B.; GULIA, M. Net Surfers don't Ride Alone: Virtual Communities as Communities. Publicado on 1999. Available at <http://www.acm.org/~ccp/references/wellman/wellman.html>>. Accessed on 05/05/2005.

WELLMAN, B.; CHEN, W.; WEIZHEN, D. Networking Guanxi. *In*: GOLD, T.; GUTHRIE, D.; WANK, D. **Social Connections in China: Institutions, Culture and the Changing**

**Nature of Guanxi**, (p. 221-41). Cambridge University Press, 2002. Available at <<http://www.chass.utoronto.ca/~wellman/publications/guanxi/guanxi3a1.PDF>>. Accessed on 20/06/2004.

WELLMAN, B.; BOASE, J.; CHEN, W. The Global Villagers: Comparing Internet Users and Uses Around the World. *In*: WELLMAN, b.; HAYTHORNTHWAITE, C. **The Internet in Everyday Life**. (p. 74-113). Oxford: Blackwell, 2002.

\_\_\_\_\_. b The Networked Nature of Community Online and Offline. **IT & Society** n.1, vol 1, p.151-165. Summer, 2002.

WORTLEY, Scott e WELLMAN, Barry. Different Strokes from Different Folks: Community Ties and Social Support. **American Journal of Sociology**, n.96, Nov., 1990 (p. 558-88).

WU, F.; HUBERMAN, B. Finding communities in linear time: a physics approach. **Eur. Phys. J. B**, n. 38, p. 331-338, 2004.

THACKER, Eugene. Networks, Swarms and Multitudes. Available at: <[http://www.ctheory.com/text\\_file.asp?pick=422](http://www.ctheory.com/text_file.asp?pick=422)> (a) (parte 1) e <[http://www.ctheory.com/text\\_file.asp?pick=423](http://www.ctheory.com/text_file.asp?pick=423)> (b) (parte 2). Publicado on 18/5/2004. Accessed on 06/04/2005.

TINDALL, D. e WELLMAN, B. Canada as Social Structure: Social Network Analysis and Canadian Sociology. **Canadian Journal of Sociology**, n. 26, vol 3, p.265-308, 2001.