Matzat, U. (2007): A theory of relational signals in online groups.
Forthcoming in: New Media & Society.

A Theory of Relational Signals in Online Groups

ABSTRACT

The outcomes of interaction in online groups depend to a large extent on finding solutions to typical problems of interaction, such as free-rider problems and problems of trust. The paper presents a theory of online interaction which argues that a group member's online behavior sends signals about how he regards his relationship to other members and to the group. Under specific conditions members take the sending of the signals into account when they decide whether to contribute to group discussions and to participate in other, trust-demanding online activities. Administrators of online groups can use the insights to influence members' behavior by using different tools of social control. The theory distinguishes three kinds of tools. Group conditions influence which type of tool is more adequate for diminishing free-rider problems and problems of trust. The predictions of the theory are used to derive a typology of online groups that shows what type of online group is more likely to suffer from problems of interaction and which effects the application of what kind of social control has for what type of online group.

Key words: online community, sociability, trust, free riding, social embeddedness, social control, social networks, cooperation.

words: 8287

ONLINE COMMUNITIES: Lack of knowledge about effects of group characteristics

There is a large number of emailing lists, newsgroups, chat groups, bulletin boards, social networking sites, and other groups on the internet that allow many individuals to interact with each other. Individuals become group members for different purposes, such as the exchange of social support and medical help (Eysenbach et al. 2004), the exchange of business knowledge (Wenger and Snyder 2000), the discussion of academic topics (Matzat 2004a), educational purposes (Kreijns, Kirschner, and Jochems 2003), or finding others who share their leisure and life-style interests (Baym 1993). Researchers argue that more knowledge is needed about factors of influence that have an impact on the development of interaction in online communities (Preece 2000). While usability research is very common, *we know much less about social and group conditions and how they affect interaction in online groups*. Some online groups have clear boundaries, but others do not. Online groups may be stable or ephemeral; the relationships between their members may be characterized by multiplexity or one-sidedness (Lazar and Preece 1998). Most of all, online interaction may be embedded in the members' offline social networks, it may compete with their offline interaction or supplement it (Wellman and Gulia 1998).

Theories of computer mediated communication (Walther 1996; Postmes, Spears, and Lea 1998; Kiesler, Siegel, and McGuire 1984) are difficult to apply to derive predictions about effects of such group conditions outside of the laboratory. What would be useful is a theory that can establish the *link between behavioral mechanisms* that regulate online interaction *and* the *social characteristics* of online groups on the internet easily. This paper presents a sociological theory of online interaction that rests on a general behavioral model and that allows the derivation of

predictions about the effects of group conditions on online interaction. It makes clear through which behavioral mechanisms the social characteristics of online groups show what effects. Its predictions show which conditions make some desired outcomes of online group interaction, such as a fruitful exchange of knowledge or social support, more likely.

The theory evaluates, and sometimes corrects, recommendations of the literature about how to build up online communities. It provides a theoretical underpinning for research on what is called the sociability of online groups (Preece 2000). For instance, Preece (2004, 2000) correctly argues that online communities would benefit from clear 'policies' and rules. However, it is unclear what policies fit with what type of community. Since some of the communities have a potential for business, a consultancy literature emerged that aims at giving advice to organizations and companies to avoid the most common pitfalls of online interaction. For example, Kim (2000) recommends using symbols. However, it is unclear whether all types of communities benefit equally from the use of symbols. The theory of relational signals in online groups can fill these gaps.

The paper is built up as follows. In the next section online groups and their typical problems of interaction that often prevent them from reaching their full potential are presented. The third section describes the behavioral assumptions of the theory which makes use of the idea that humans act goal oriented (Coleman 1990). Ideas of organizational management theories (Lindenberg 1997) are taken up and transferred to the online environment resulting in the presentation of three different kinds of social control that group administrators can apply to stimulate the members' participation in activities of the online group. The fourth section presents new hypotheses about the effects of important group conditions. Three dimensions that

allow distinguishing different types of online groups are introduced. The three dimensions can be used to predict what kind of social control is more useful for diminishing problems of interaction, such as the free-rider problem, in different types of online groups. Section 5 summarizes the basic insights of the theory.

ONLINE GROUPS AND THEIR TYPICAL PROBLEMS OF INTERACTION

The literature handles different definitions of what an online community is (see Matzat 2004b for an overview). Some definitions rest only on the existence of common interests among the members (Hagel III and Armstrong 1997) whereas others include common interests *and* sentiments as the crucial characteristics of an online community (Rheingold 1993). The definition of an online group that is used here only rests on the existence of some common interests, and not on sentiments. So the used definition is broader and refers to both types of online groups. It is an empirical question whether an online group has some additional emotional characteristics which make it to an online community in the sense of Rheingold (1993). An online group is defined as a group of individuals who interact with each other by using the same computer mediated communication tool(s), such as an email list, a chat group, or a bulletin board for the members. Interaction is centered around at least one common topic that reflect(s) the common interest(s) of the group members.

Common goals and individual goals

The starting point for the theory of relational signals is a basic insight from group sociology (Homans 1951), namely that the group members have some common goal(s). At the same time they have their individual goals or interests. The fulfillment

of the common goals sometimes, but *not* always, is in conflict with the fulfillment of the individual goals. In a knowledge sharing online group within a company a member may participate in the online discussion and thereby contributes to the common goal of making the employees' knowledge available to all (Ardichvili, Page, and Wentling 2003). At the same time the individual's contribution may be instrumental for his individual career within the company because he can build up a reputation. At other occasions the fulfillment of the common goals may cost time that cannot be spent on the fulfillment of other individual goals. Here the fulfillment of the common goal is in conflict with the fulfillment of the individual goal.

Two types of interdependency

What makes interaction in online groups often problematic is the fact that the individual's goal fulfillment is not only dependent on his own behavior, but also on other individuals' behavior within the group. Some form of interdependency characterizes the situation. The interdependencies are the stronger the more an individual's goal achievement depends on other actors' behavior (and vice versa). The interdependencies can be characterized as situations with *coordination difficulties* or with *conflicting interests* between the actors (Lindenberg 1997). In the first situation, e.g. in a self-help group, all actors prefer to choose the same alternative, whereas in the second situation, e.g. in an online-auction, different actors prefer different alternatives (ibid.).

Three typical problems in online group interaction

The difference between individual and common goals and between different kinds of interdependencies can be found back in typical problems of interaction that

online groups face. A distinction is made between three problems of interaction that often are mentioned in the literature, namely 1. opportunity problems including free-rider problems (Jones and Rafaeli 2000; Kollock 1999a; Kreijns, Kirschner, and Jochems 2003), 2. problems of trust (McLure Wasko and Faraj 2000; Ardichvili, Page, and Wentling 2003), and 3. problems of loyalty (Ward 1999; Komito 1998; Etzioni 1999; Suler 1999).

Many online groups fail because of insufficient activity of members (Cummings, Butler, and Kraut 2002). The problem often is related to the structure of interdependency during the fulfillment of a group goal resulting in the so-called *opportunity problem* (Lindenberg 1998). A member can hope that others contribute to the fulfillment of the common group goal and he can spend his time only on the fulfillment of his individual goals. Two types of the opportunity problem are the free-rider problem and the volunteers' dilemma. In many cases all members profit of the group activities independent of their own contribution to the activity. Since contributions imply costs (at least time and effort) they can decide that they are better off when they let bear other members the costs and gain the advantages nevertheless. This is called free-riding (Olson 1965). If too many members free ride the common goal will not be reached. The fulfillment of many common goals has the character of a collective good. No member can be excluded from its consumption and its consumption by some members does not reduce the amount available to others (Olson 1965; Kollock 1999a). An example of such a collective good is the building up of a common data base in a knowledge sharing online community of practice (Ardichvili, Page, and Wentling 2003). Another type of the opportunity problem, a volunteers' dilemma, emerges for example in a self-help chat group when someone asks a question about some personal difficulties he has. In this case it is sufficient that one

other member volunteers and provides an answer. This would help to reach the common goal, namely the provision of useful help to members. Empirical research has shown that especially in large groups members can fail to reach this common goal (Markey 2000).

Problems of trust emphasize the potential negative consequences of the member's contributions if they are used in a way that was not anticipated by the contributor. An example is the bilateral exchange of knowledge within a company's online group (Ardichvili, Page, and Wentling 2003). One member, the trustor, has to decide whether he should give away his information to another member, the trustee, who asked for help. If the trustor decides to help and the trustee decides that he in turn will help the trustor if he is in need for help then both members profit. In situations of a strong competition between employees for individual promotion things may turn out differently. The trustee may be even better off if he uses the trustor's information only for his (the trustee's) individual promotion and does not return future requests for help. In this case the trustor would be better off had he decided not to give away his information. In many online groups members anticipate this danger and decide not to give away information so that problems of trust provide barriers to the achievement of the common goals (ibid.).

The last type of problem, the *loyalty problem*, refers to the fact that a member's interests in the online group have to be compatible with many other members' interests so that a large enough number of members is attracted to the group and stays. Since there are very many groups on the internet, some are easily to substitute against other online groups or against other activities that are instrumental for reaching the member's goal. Too much fluctuation in online groups prevents the building up of a successful online group (Komito 1998).

Existing theories on online interaction in groups sometimes realize these and related problems, but their ways of addressing them have deficiencies. Jones and Rafaeli (2000) and Preece (2000) discuss the advantages that specific types of media have. Ridings, Gefen, and Arinze (2002) and Jarvenpaa and Leidner (1998) present communication styles and personality dispositions that might be antecedents of trust. While this is useful, it offers only limited insights on how to influence an online community *actively* on a large scale once it is established. Moreover, the approaches make it difficult to find out which social conditions and group characteristics, apart from characteristics of the used media, may have an impact on the group interaction and its outcomes. The theory of relational signals is a theory of goal-oriented actors (Coleman 1990) that avoids these limitations.

RELATIONAL GOALS, RELATIONAL SIGNALS, AND THE SHAPING OF ONLINE INTERACTION

A distinction can be made between two types of goals or interests that individuals can have in becoming a member of the online group. For the fulfillment of some goals social interaction is necessary. These are called *relational goals*. Examples are the making of new contacts and the maintenance of pleasant relationships. For the fulfillment of other goals social interaction is not necessary, but only one of many possible options. These goals are called *material goals*. An example is the attainment of information.

The theory assumes that members follow a bounded rationality (Kahnemann 2003), their decision making is influenced by processes of cognitive framing (Lindenberg and Frey 1993). Most of the time members cannot take into account at

once all the goals they have when they have to decide whether they should spend their time on group activities, such as sending discussion contributions, or on their personal activities. Rather their attention is focused on *one* situation specific goal. The question is which of the goals will dominate the decision situation. Such a goal that dominates the decision situation is called the *frame* of the decision situation (Lindenberg 1998). If there is a frame and its fulfillment is in conflict with the fulfillment of other goals then these other conflicting goals appear only as background goals and the costs of neglecting them diminish subjectively (Lindenberg 1998). For the avoidance of typical problems of interaction, such as the free-rider problem, it would be useful that the common group goal is the member's frame.

The sending of three kinds of signals during online interaction

From theories within behavioral economics (Frank 1988, Brosig 2002) and organizational sociology (Wittek, van Duijn, and Snijders 2003) the idea is taken that humans perceive signals from other actors' behavior that they use to understand – either correctly or incorrectly- what their decision frame is.

According to the theory during online interaction the behavior of a member gives some indication to others about his decision frame. That is, a member's participation in online activities or his lack of participation sends signals about how he regards his relationship to other members and to the group. Three kinds of relational signals are distinguished.

First, in bilateral interaction every member sends signals to the other member how he evaluates the *bilateral relation* (Lindenberg 1997). Imagine a highly cohesive online self-help group. The long-term reciprocal exchange of information and emotional understanding between two members signals to the exchange partner that

the individual does not only take into account his own benefits, but also values the relation and therefore the outcomes for the other. Second, the member's participation in common group activities, such as sending discussion contributions, sends *signals to the whole group* (Lindenberg 1997). If in the example above the reciprocal exchange takes place in front of the group, for example in a common chat room, the member indicates to the whole group that he takes into account the common group goal as his decision frame although this may mean that he sometimes has to bear additional costs (time and effort). Third, the *administration* of the online group gives through its behavior a relational *signal* to the members that indicates what *behavioral standards* it expects from its members. An administrator who appeals to the members' fairness signals to the members that they should evaluate the interaction within the group not only on the basis of their self-interests.

The degree to which members take into account the relational signals of their own behavior when they decide on what activity to spend time depends on some group conditions. Online groups differ remarkably with regard to their members' strength of relational interests. *The higher the degree of relational interests the more members take into account their relational signals.* This insight can be used to reduce the typical problems of online interaction. Online group administrators can make use of two strategies. In the long run they can influence the relational interests by changing the interdependencies between the members. The interdependencies are influenced by some social characteristics of the group (see Section 4). In the short run, the administrators can take the degree of relational interests as given and can make use of three different 'policies' that exert weaker (indirect) or stronger (direct) social control. As usual in studies of social control (Morrill 1995), the theory distinguishes between three types of social control depending on their degree of directness. Here

these are called frame stabilizing tools, indirect monitoring tools, and direct control tools.

Three types of social control: From weak/indirect to strong/direct

Frame stabilizing tools work by increasing the salience of the common group goal. They enhance the individual's attention to the frame of the group; thereby they bring it more in the foreground and diminish the relevance of the maybe conflicting particular interests of the individual member. Through this mechanism the individual's conflicting goals are pushed into the background which reduces their value. The costs that result from neglecting them are somewhat diminished (Lindenberg 1998). Frame stabilizing tools are tools that make the online group easy to identify, that make membership easy to recognize and that thereby stress the salience of the common group goal. Examples are the use of symbols within the group, periodic meetings of the members that stress the common identity, the appeal to norms, and the definition of the group in relation to other groups. The literature proposes some of these tools. For instance, Kim (2000) recommends the use of symbols. The theoretical underpinning of the frame stabilizing tools, however, allows specifying conditions on which the effectiveness of such tools of very indirect social control for overcoming the problems of interaction depends (see below).

Indirect monitoring tools make use of the formal or informal rules that exist in a group (Lindenberg 1998). Indirect monitoring tools work through relational signals that indicate the individual's interest in conformity to the rules and thereby indirectly also his conformity to the group frame. Their effect is that exchanges in the group are evaluated not only with regard to the direct benefit they deliver to the individual but also with regard to the individual's willingness to take into account the frame. The

member sends signals to his exchange partner, but also to the whole group. Indirect monitoring tools are *tools that provide opportunities and incentives for the members to send relational signals* that indicate accordance to the group frame. The indirect monitoring tools have the effect that the member restricts the fulfillment of his individual short-term goals because he takes into account the relational signal of his online behavior and thus takes into account the group frame. After the application of an indirect monitoring tool the member has an incentive to signal to others and to the group his compliance with the frame. Group leaders or administrators can use these insights strategically by giving members opportunities for relational signaling. An example of the application of indirect monitoring is the following. The online community manager of the famous WELL used the difficulties the community had with deviating members for a public discussion about the group frame and its related rules of conduct. It was decided that no direct sanctions should be applied to deviating members if the deviation was not extremely severe. At the same time, the administrators explicitly indicated to the group that informal sanctions applied by the members would be adequate (Hafner 1997). This indication in public is an example of indirect monitoring. It gave the members *low cost opportunities* to signal their willingness to comply with the group norms and the frame by applying informal social sanctions to the offenders in exchange against social approval.

The third kind of management tools, *direct control tools*, work through enhancing the real direct benefits of a group member, and not trough influencing the perceived ones like the frame stabilizing tools do (Lindenberg 1998). Examples of direct control tools are the introduction of direct rewards for active participation in the group. Some commercial online groups give discount rates for some products to stimulate active discussion contributions, others give ‘points’ that can be used during

an online-auction. Elaborate tools that fall into this category are the introduction of reputation systems based on mutual evaluations by members like the eBay online-auction system does it (Kollock 1999b) or a public ranking of members according to their number of postings (Kim 2000).

Effects of social control dependent on group conditions

Under which condition is what kind of social control more useful for the stimulation of member activity? Studies of social control suggest that direct control strategies signal a lack of relational interests (Ellickson 1991). The *three kinds of tools of social control constitute a hierarchy of tools that progressively indicate a lack of relational interests* (Lindenberg 1998). Therefore the stimulating impact of a direct control tool is restricted in situations of a large degree of relational interests. Kim (2000) and Preece (2000) propose to control how often every member has actively contributed to group discussions and then to publish the names of the most active ones in a public ranking to give them a reputation in the online community. This would stimulate their active participation. Such a tool makes use of a direct control mechanism. The claim of the theory of relational signals in online groups is that such a procedure is not equally useful for *all* kinds of online groups. The application of direct control may be accepted within a commercial online group without relational interests, but it is less adequate in an online self-help group that intends to develop a climate of mutual understanding. That is, it will be tolerated less in an online group with a high degree of relational interests. Direct control tools imply the signal that the member is expected not to have strong relational interests. However, in online groups with a high degree of relational interests a member would receive the signal that he is in the 'wrong' group that does not fit with his interests. He will leave, reduce his active

participation, or protest. Direct control is more useful the lower the degree of relational interests. The effects of frame stabilizing tools also differ between different online groups. Kim (2000) proposes to use symbols. The presented theory, however, specifies under which conditions the use of symbols is more useful for the stimulation of member activity. In groups with a high degree of relational interests, such as an online self-help group that aims at mutual understanding between members, the use of symbols will increase the salience of the common group goals. Thereby they will increase the member activity. In online groups with a low degree of relational interests, such as an online-auction, the common frame is only to maximize one's own benefits. Therefore the use of symbols will have a much weaker effect in this group. The use of very indirect types of social control, such as the use of symbols, presupposes that members do not exclusively focus on their narrow short-term interests, but take into account the interests of others.

As a summary, the theory leads to predictions about the usefulness of the three management policies for stimulating active membership participation. *Direct control tools are more useful for the stimulation of active member participation under a low degree of relational interests in the group than under a high degree. Frame-stabilizing tools and indirect monitoring tools are more useful for the stimulation of active member participation under a high degree of relational interests in the group than under a low degree.* The different types of social control, if applied under the 'adequate' conditions, diminish free rider problems and problems of trust since they provide direct or indirect selective incentives for the members to become active. The next question is on what social characteristics of the group the relational interests depend.

A THEORY BASED TYPOLOGY OF ONLINE GROUP STRUCTURES

This section introduces three dimensions of online groups that have an impact on the degree of relational interests and therefore on the effects of the tools of social control. The three social characteristics lead to a theory based typology of online groups. The first two dimensions are useful for indicating what kind of social control is more useful for the stimulation of membership participation. The third dimension can be used to make predictions about the long-term plasticity of the online group. Kim (2000) argues that online groups can change their 'character' in the long run and that administrators should prepare themselves for long-term changes. The theory of relational signals argues that the main original function of the online group (the third dimension) influences the extent of plasticity of the group. That is, the degree of relational interests is in some groups more difficult to change than in others.

Dependency leads to interest in the relationship

The main idea underlying the typology is that members are more likely to develop an interest in building up and maintaining a satisfying relationship with each other when they are more dependent on each other for the fulfillment of their goals. That is, under a higher degree of interdependency it is more likely that relational interests develop in the group (Homans 1961).[i] So for distinguishing between important social characteristics of online groups the typology focuses on characteristics that have an impact on the degree and kind of interdependencies between the group members.

Social embeddedness of the online group

The first dimension of the typology that points to an important social characteristic of an online group is its degree of *social embeddedness*. One insight of empirical research is that in some online groups 'net surfers don't ride alone' (Wellman and Gulia 1998), which means that members' online and offline interaction often are related to each other. Members of an online group can have offline relations with each other. Members' offline interaction can either be an effect of online interaction or it can be antecedent to online interaction (Parks and Roberts 1998; Wellman and Haythornthwaite 2002). In this case, there exists a real life structure of relations to which the computer mediated communication facilities are added and online interaction is embedded in larger structures of relationships that exist offline. This dimension leads to the distinction between embedded and pure online groups. Members of an embedded online community have real life relations that can be grounded on bilateral interaction or on interaction in an offline organization or group. Some division of labor with different roles evolved already. That is, there are additional interdependencies. If they do not comprise conflicting elements then the mutual dependencies give incentives to prevent anything that could be interpreted as a lack of relational interest. In other words, the more ego is dependent on other members, the more he has an interest in building up and maintaining a satisfying relationship with them. In such a situation of considerable relational interest members take into account the relational signals that their active participation (or lack of participation) might send. Under a high degree of social embeddedness there is thus some degree of relational interest among the members.

Multifunctionality of the online group

The second social characteristic of an online group is its degree of *multifunctionality*. Whereas some online groups serve only one specific goal of a specialized interest group, others fulfill many different purposes for their members at once (Lazar and Preece 1998). This is called multifunctionality (Lindenberg 1997) of an online group. The multifunctionality is the higher the more different goals the online community fulfills for the members. This leads to the distinction between single and multiple common interests online groups. The distinction is important because of two reasons. First, people are more likely to join and stay in a group when group membership is useful to reach more aims at once. The more goals the group fulfills for the member the more difficult it is to substitute against another. This holds even more if the multifunctionality for the member includes relational interests. The relationships as such then have a value that is hard to replace. Accordingly, *in multifunctional online groups there will be less loyalty problems than in single common interest groups*. Second, in groups that fulfill multiple functions at once there is a higher degree of interdependency than in single common interest groups. As it was explained above, a high degree of interdependency, in turn, raises the degree of relational interests. Again, this argument presupposes that the interdependencies do not comprise too many conflicting interests between the members. The first two dimensions, social embeddedness and multifunctionality, lead to the following typology of online groups.

(here Figure 1)

Social control and the different types of online groups

Section 3 showed that the effects of the three types of social control depend on the degree of relational interests in the online group. Section 4 showed that a high degree of social embeddedness or multifunctionality raises the relational interests. This leads to the following hypotheses. *The effects of frame stabilizing and indirect monitoring tools on the stimulation of active member participation are larger in embedded (or in multiple common interests) than in pure (or in single common interest) online groups. The effects of direct control tools are larger in pure (or in single common interest) than in embedded (or in multiple common interests) online groups.*

The theory supplements other predictions about human resource management in online environments. Verburg et al. (2003) argue that for virtual teams a managerial policy that rests on 'commitment strategies' will be more useful than policies that rest on direct control. A commitment strategy would appeal to rules and norms, which makes it being based on frame stabilization. The theory of relational signals in online groups, however, predicts under which social conditions direct control and other strategies are more useful for the stimulation of member activity in virtual teams. In purely virtual, single common interest teams direct control would be more stimulating than in embedded, multifunctional teams. Further research is needed to find out which predictions are true.

In addition, the theory can also be used to predict in what type of online groups the emergence of some kinds of interaction problems is less likely. For example, in highly embedded, highly multifunctional groups (Type 4 online groups in Figure 1) the emergence of opportunity and trust problems is less likely than in pure single common interests groups (Type 1 online groups in Figure 1). This is because in Type 4 groups the high degree of interdependency and relational interests provides

incentives to avoid anything that signals a lack of relational interests, such as a disinterest in the common group goal. Moreover, in single interest groups (Type 1 online groups) there is a higher likelihood of the emergence of loyalty problems than in multiple interests groups (Type 3 online groups). This is because single common interest groups have a higher degree of substitutionability than multiple common interests groups.

Theoretical foundation for short-term and long-term design of online communities

The theory points to two types of strategies that administrators of online groups can use. *In the short run* they can apply the three different types of social control. *In the long run* they can try to change the degree of relational interests in the group by increasing the multifunctionality or the social embeddedness. For example, in an e-learning group the administrator could extend the functions of the group by adding some computer mediated communication tools for socializing (Kreijns, Kirschner, and Jochems 2003). He could hope that this would increase the degree of multifunctionality. An administrator of an online self-help group could arrange face-to-face meetings of (parts of) the group. Also, it is an option to connect an online self-help group with an association that exists offline and that represents fellow-sufferers in the public. This would increase the social embeddedness. Figure 2 summarizes the main arguments of the theory.

(Figure 2 here)

Opportunities for and limitations of the social shaping of online communities

According to the literature online groups could change their 'character' in the long run (Kim 2000). The theory of relational interests, however, points to opportunities and to limits for the long-run strategy to change the degree of relational interests. The theory makes use of the third (categorical) dimension of the typology to argue that in some types of online groups the plasticity is restricted. The single interest online groups can be further divided with regard to their main original purpose or function. Four main functions of online groups are distinguished that lead to the following four types of groups: transaction online groups, online groups of interest, online groups of fantasy, and online groups of relationships (see also Armstrong and Hagel 1996).

The interest of members of a *transaction group*, such as an online-auction, lies in the performance of single, economic transactions. Members of an *interest group* interact more regularly and extensively with each other. Their common interest is concentrated on the specific topic that defines the group. They include knowledge exchanging groups, social support groups, and groups of members with a common hobby. *Groups of fantasy* have an entertaining (gaming) purpose. The typical example are adventure MUDs. *Groups of relationship* consist of members who have the strong need to create new contacts with others.[ii] The three-dimensional typology is shown in Figure 3.

(Figure 3 here)

Single interest groups can gradually be transformed into multiple interests groups. However, their original purpose will have a strong impact on the frame and the standards of conduct. Transaction groups and groups of fantasy are very peculiar

with regard to the importance of relational interests and the frame. The interaction in transactional groups, such as online-auctions, is characterized by interdependencies with strongly *conflicting* interests (Kollock 1999b). What the seller gets, the buyer looses. There is hardly any relational interest between its members. The lack of relational interest is difficult to overcome because of the high degree of conflicting interests that are part of the interdependencies. If some degree of multifunctionality or embeddedness is introduced the interdependencies with conflicting interests will be barriers for the development of relational interests. The theory therefore argues that the plasticity of a transactional community is very restricted. Fantasy groups are based on the fulfillment of one goal, namely stimulation. Depending on the concrete mixture of cooperative and conflicting elements in the fantasy environment of the MUD, the interdependencies in some fantasy groups have many elements of conflict whereas in others there are hardly any (Kollock 1998). The more conflicting elements there are the more difficult the development of relational interests.

The theory has the following implications. The more the online group resembles a transaction group the more will direct social control increase the membership participation. The more a fantasy group has conflicting elements in its environment the less will frame stabilizing tools increase the membership participation. In interest groups and in groups of relationships, changes in the degree of embeddedness or in the degree of multifunctionality have a larger impact on the degree of relational interests than in transaction groups.

SUMMARY AND CONCLUSIONS: SHAPING THE SOCIAL IMPACT OF THE INTERNET?

The outcomes of the use of the internet to some extent depend on how individuals succeed in overcoming problems of interaction in online groups or online communities. While the use of online groups for knowledge sharing, exchange of social support, e-learning, and socializing delivers many benefits, online groups often fail because their members can't overcome similar problems that regularly emerge. As such problems were mentioned problems of trust, opportunity problems including the free-rider problem, and loyalty problems. The article presents a theory of relational signaling in online groups that leads to a number of predictions about what types of online groups face more often what types of problems and what kinds of social control are more adequate to diminish them in different types of groups. The theory differentiates between material goals and relational goals that individuals have for becoming a member of an online group. The latter are goals for which social interaction is necessary to fulfill them. According to the theory the member's online behavior in the group sends signals to others about what the member's decision frame is and to what extent he takes into account the common goals of the group, the group frame, when deciding about his participation in group activities. The group administrator's behavior gives information about the behavioral standards that the members are expected to follow during group interaction. In groups with a high degree of relational interests members take into account the relational signals of their behavior when they make decisions about how much time and effort they spend on some group activities. The group, that is the administrator(s) and the members, has three kinds of tools of social control at its disposal for diminishing problems of interaction. These are so-called frame stabilizing tools (e.g., the use of symbols that stress the common group frame), indirect monitoring tools (the creation of opportunities for members to apply informal sanctions), and direct control tools. The

point is that the effects of the tools depend on the degree of relational interests in the group. For example, direct control tools are expected to stimulate active participation in online group activities much more in groups with a low degree of relational interests than in groups with a high degree of relational interests. Since the degree of relational interests depends on the strength and type of interdependencies between members, three dimensions for a theory driven typology of online groups are introduced. These are the degree of social embeddedness of online interaction in offline relations (to what extent is online interaction purely virtual?), the degree of multifunctionality of the group for the members (how many different goals of a member does the group fulfill simultaneously?), and the original main function of the group. The third dimension differentiates between transaction online groups, online groups of interest, online groups of fantasy, and online groups of relationships. The theory predicts, for example, that frame stabilizing tools, such as appeals to norms, encourage active member participation much more in highly embedded and multifunctional groups than in purely virtual and single common interest online groups. Apart from applying the different types of social control to change online behavior in the short run, the group administration also can follow the long-term strategy to change the degree of social embeddedness or multifunctionality of the group and thereby to influence the degree of relational interests. It is argued that in transaction online groups and in fantasy online groups of a special type, namely those with interdependencies that are based on conflicting interests, there are more barriers to increasing the degree of relational interests than in interest online groups and in online groups of relationships.

The theory has a number of interesting implications that justify or correct recommendations of the literature about how to set up online communities (Kim

2000). Also, its hypotheses can be compared with hypotheses of human resource management theories in online settings (Verburg et al 2003). For example, Kim (2000) recommends using symbols in online groups. The theory of relational signals specifies *for what types of online groups* the use of symbols has stronger effects for the stimulation of member activity. It concludes that the use of symbols has stronger effects in multifunctional and highly embedded online groups than in purely virtual and single common interest groups. Sometimes it is recommended to make use of direct control to stimulate active membership participation. The theory of relational signals argues that direct control will have more stimulating effects in purely virtual and single common interests groups, but less in highly embedded and multifunctional groups. Verburg et al. (2003) expect that in virtual teams a human resource policy of commitment will be more useful than a control related managerial policy. The theory of relational signals leads to more detailed predictions. It concludes that direct control will show stronger effects in purely virtual and single common interest teams than in multifunctional and embedded teams. The examples make clear what the main advantage of the theory of relational signals in online groups is. It makes specific predictions about what kinds of 'group policies' or types of social control are more or less beneficial for what type of online group. Existing research comes to the valuable conclusion that some kind of 'policy' would be useful for online groups (Preece 2004, 2000), but leaves open what kind of policy would be useful for what type of group. This gap is filled by the theory of relational signals in online groups.

At the moment there is only evidence for a few hypotheses (Matzat 2006, forthcoming). Nevertheless the theory has important advantages for further research. It points to important structural characteristics of online groups and, contrary to other typologies, it gives clear reasons *why* these characteristics could be of importance. It

specifies behavioral mechanisms that throw light on the reasons *why* some often mentioned recommendations in the literature could work and under which conditions they will not. In short, the theory provides a number of new insights that give clear guidance for further empirical research on structural characteristics of online groups and how they influence the outcomes of online interaction. Should the hypotheses turn out to be true they could contribute to a theoretical foundation for the social shaping of the internet.

References

Ardichvili, Alexander, Vaughn Page, and Tim Wentling (2003) 'Motivation and barriers to participation in virtual knowledge-sharing communities of practice', *Journal of Knowledge Management* 7 (1): 64-77.

Armstrong, A. and J. Hagel (1996), 'The Real Value of ON-LINE Communities', *Harvard Business Review* (may-june): 134-141.

Baym, Nancy K. (1993) 'Interpreting Soap Operas and Creating Community: Inside a Computer-Mediated Fan Culture,' *Journal of Folklore Research* 30 (2/3): 143-176.

Brosig, J. (2002) "Identifiying cooperative behavior: some experimental results in a prisoner's dilemma game", *Journal of Economic Behavior & Organization* 47: 275-290.

Coleman, J. S. (1990) *Foundations of Social Theory.* Cambridge: Harvard University Press.

Cummings, Jonathon, Brian Butler, and Robert Kraut (2002) 'The Quality of online social relationships,' *Communications of the ACM* 45 (7): 103-108.

Ellickson, R. (1991) *Order without law. How neighbors settle disputes* Harvard University Press, Cambridge.

Etzioni, A. (1999) 'Face-to-Face and Computer-Mediated Communities, A Comparative Analysis,' *The Information Society* 15 (4): 241-249.

Eysenbach, Gunther et al. (2004) 'Health related virtual communities and electronic support groups: systematic review of the effects of online peer to peer interactions,' *British Medical Journal* 328 (15 May): 1166-0.

Frank, R. H. (1988) *Passions within reason. The strategic role of the emotions* W.W. Norton & Company, New York, London.

Hafner, K. (1997) 'The Epic Saga of The Well', Wired, Issue 5.05. URL (consulted 15 December 2006): http://www.wired.com/wired/archive/5.05/ff_well_pr.html

Hagel III, J. and A. Armstrong (1997) *Net Gain: Expanding Markets Through Virtual Communities.* Boston: Harvard Business School Press.

Homans, G. C. (1951). *The Human Group*. New York: Hartcourt, Brace & World.

Homans, G. C. (1961) *Social Behavior: Its Elementary Forms.* New York: Hartcourt, Brace & World.

Jarvenpaa, S. L., Knoll, K., & Leidner, D. E. (1998). 'Is Anybody out there? Antecedents of Trust in Global Virtual Teams,'. *Journal of Management Information Systems, 14:* 29-64.

Jones, Quintin and Sheizaf Rafaeli (2000) 'Time to split, virtually:'Discourse Architecture' and 'Community Building' create vibrant virtual publics,' *Electronic Markets* 10 (4): 214-223.

Kahnemann, Daniel (2003) 'Maps of Bounded Rationality: Psychology for Behavioral Economics,' *The American Economic Review* 93 (5): 1449-1475.

Kiesler, S., J. Siegel, and T. W. McGuire (1984) 'Social Psychological Aspects of Computer-Mediated Communication,' *American Psychologist* 39 (10): 1123-1134.

Kim, Amy Jo (2000) *Community Building on the Web.* Berkeley: Peachpit Press.

Kollock, P. (1998) Design Principles for Online Communities. *PC Update, 15,* 58-60.

Kollock, P. (1999a) 'The Economies of Online Cooperation: Gifts and Public goods in Cyberspace', in M. Smith and P. Kollock (eds.) *Communities in Cyberspace,* pp. 220-239. London: Routledge.

Kollock, P. (1999b) 'The production of trust in online markets,' *Advances in Group Processes* 16: 99-123.

Komito, L. (1998) 'The Net as a foraging society: Flexible communities,' *The Information Society* 14 (2): 97-106.

Kreijns, Karel, Paul A. Kirschner, and Wim Jochems (2003) 'Identifying the pitfalls for social interaction in computer-supported collaborative learning environments: a review of the research,' *Computers in Human Behavior* 19: 335-353.

Lazar, J., and Preece, J. (1998) 'Classification Schema for Online Communities', in *Proceedings of the 1998 Association for Information Systems, Americas Conference*, pp.84-86.

Lindenberg, S. & Frey, B. S. 1993, "Alternatives, frames, and relative prices: a broader view of rational choice", *Acta Sociologica* 36: 191-205.

Lindenberg, S. (1997) 'Grounding groups in theory: functional, cognitive, and structural interdependencies,' *Advances in Group Processes* 14: 281-331.

Lindenberg, S. (1998) Solidarity: its foundations and macrodependence. A framing approach. in P. Doreian and T. Fararo (eds.) *The problem of solidarity: theories and models.* Pennsylvania, USA: Gordon and Breach Publishers.: pp. 61-112.

Markey, P. M. (2000) 'Bystander intervention in computer-mediated communication,' *Computers in Human Behavior* 16 (2): 183-188.

Matzat, U. (2004a). Academic Communication and Internet Discussion Groups: Transfer of Information or Creation of Social Contacts?" in: *Social Networks*, 26, 3: 221-255.

Matzat, U. (2004b). Cooperation and Community on the Internet: Past Issues and Present Perspectives for theoretical-empirical Internet Research" in: *Analyse & Kritik*, 26, 1: 63-90.

Matzat, U. (2006). Knowledge Management in a Virtual Organization: Are embedded online communities of practice more successful than exclusively virtual ones? *Report for the Dutch Science Foundation/NWO within the Research Program Society and the Electronic Highway (NWO-MES)*. NWO project number 014-43-618. http://www.nwo.nl.

Matzat, U. (forthcoming) The Acceptance and Effectiveness of Social Control on the Internet: A Comparison between Online Auctions and Knowledge Sharing Groups. in K. S. Cook, C. Snijders, Buskens,V. (eds.) *Trust and Reputation,* New York: Russel Sage Foundation.

McLure Wasko, M. and S. Faraj (2000) 'It is what one does': why people participate and help others in electronic communities of practice', *Journal of Strategic Information Systems* (9): 155-173.

Morrill, C. (1995) *The executive way. Conflict management in corporations* Chicago University Press, Chicago.

Olson, Mancur Jr. (1965) *The Logic of Collective Action: Public Goods and the Theory of Groups.* New York: Schocken Books.

Parks, M. R. and L. D. Roberts (1998) 'Making MOOsic':The development of personal relationships on line and a comparison to their off-line counterparts,' *Journal of Social and Personal Relationships* 15 (4): 517-537.

Postmes, T., R. Spears, and M. Lea (1998) 'Breaching or Building Social Boundaries? SIDE-Effects of Computer-Mediated Communication,' *Communication Research* 25 (6): 689-715.

Preece, Jennifer (2000) *Online Communities: Designing Usability, Supporting Sociability.* Chichester, New York, Weinheim, Brisbane, Singapore, Toronto: John Wiley & Sons, LTD.

Preece, J. (2004) 'Etiquette online: From nice to necessary, ' *Communications of the Association of computing Machinery* 47 (4): 56-61.

Rheingold, H. (1993) *The virtual Community. Homesteading on the Electronic Frontier.* Reading: MA.

Ridings, C. M., Gefen, D., & Arinze, B. (2002. Some antecedents and effects of trust in virtual communities. *Journal of Strategic Information Systems, 11:* 271-295.

Suler, J., (1999)'Making Virtual Communities Work', URL (consulted 15 December 2006): http://www.rider.edu/users/suler/psycyber/commwork.html

Verburg, Robert M. et al. (2003) 'Coordination Mechanisms for a flexible workforce' in Robert M. Verburg and Jan A. De Ridder *(eds.) Knowledge Sharing Under Distributed Circumstances,* Amsterdam.: 89-94.

Walther, Joseph B. (1996) 'Computer-mediated communication: Impersonal, interpersonal, and hyperpersonal interaction,' *Communication Research* 23 (1): 3-44.

Ward, K. J. (1999) "The Cyber-Ethnographic (Re)Construction of Two Feminist Online Communities'," *Sociological Research Online,* 4 (1): 193-212.

Wellman, Barry and M. Gulia (1998) 'Net surfers don't ride alone: virtual communities as communities', in P. Kollock and M. Smith (eds.). *Communities in Cyberspace, pp.* 163-190. Berkeley: University of California Press.

Wellman, B. and C. Haythornthwaite (2002) *The Internet in everyday life.* Oxford: Blackwell Publishers.

Wenger, E. C. and W. M. Snyder (2000) 'Communities of Practice: The Organizational Frontier,' *Harvard Business Review* 78 (1): 139-145.

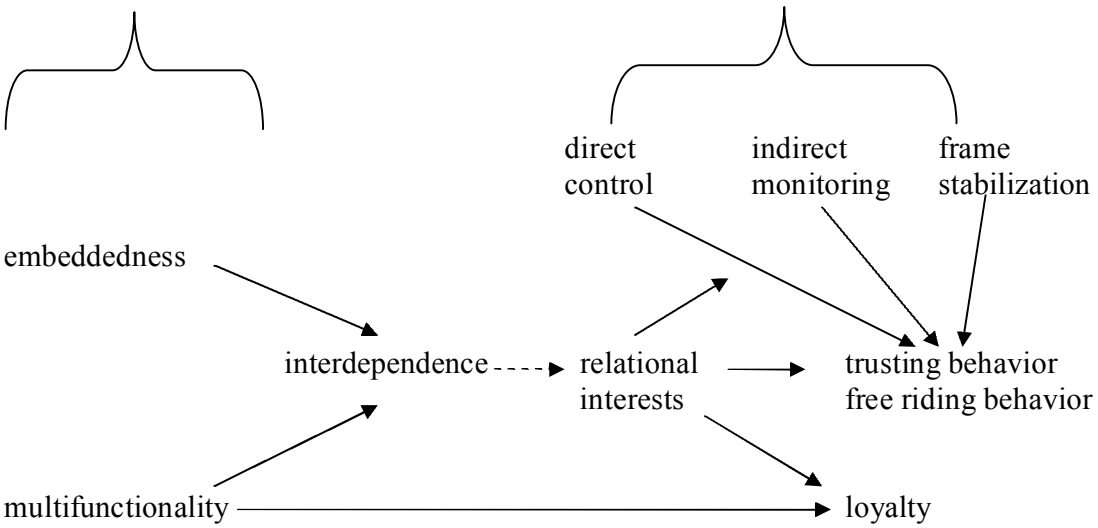
Wittek, R., van Duijn, M., & Snijders, T. A. B. (2003) 'Frame Decay, Informal Power, and the Escalation of Social Control in a Management Team: A Relational Signaling Perspective', *Research in the Sociology of Organizations*, vol. 20, pp. 355-380.

Matzat, U. (2007): A theory of relational signals in online groups.
Forthcoming in: New Media & Society.

Figure 1: Typology of Online Groups (first two dimensions only)

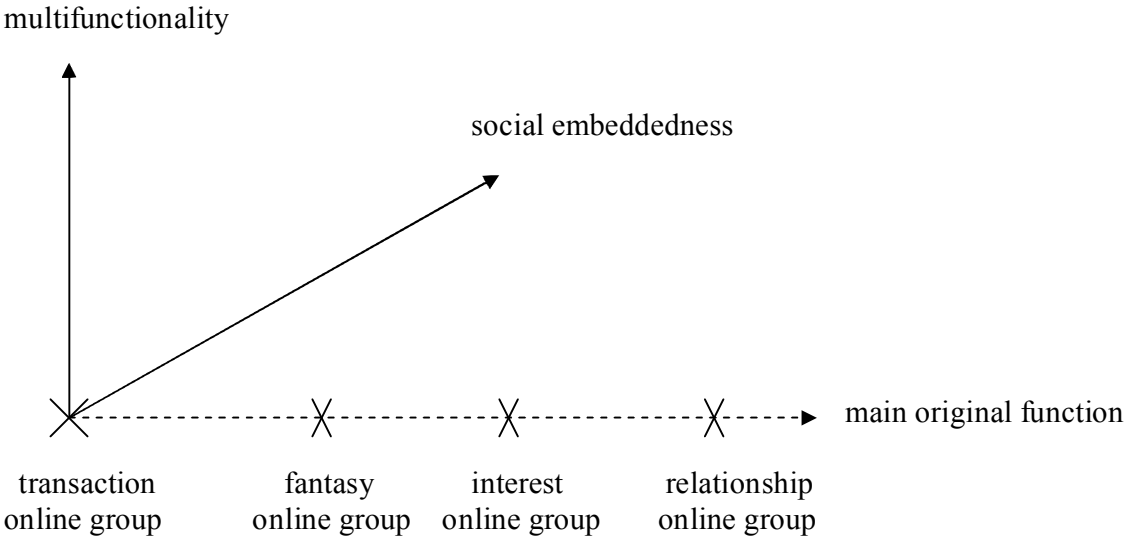
1st dimension Social Embeddedness / 2nd dimension Multifunctionality	Pure Online Groups	Embedded Online Groups
Single Common Interest	Example of Type 1: *worldwide* online forum for people interested in exchanging *information* about health questions, created by a commercial company	Example of Type 2: a *company*'s online group for *employees* with different mailing lists and bulletin boards for the exchange of *information*
Multiple Common Interests	Example of Type 3: a *world-wide* online self-help group built up by and for handicapped people, including a chat-group for provision of *social support and information*	Example of Type 4: same as Type 3; additionally, some users are members of an *organized pressure group* for representing their interests in the public

Figure 2: The main arguments*



*note: The positive effect of interdependence on relational interests is expected only under the condition of membership interdependencies without strongly conflicting interests.

Figure 3: The three dimensions of Online Groups*



*note: The main original function is a nominal variable which is indicated by the dotted line.

[i] However, this is only true for interdependencies with coordination difficulties and not for interdependencies with strongly conflicting interests.

[ii] This distinction differs slightly from the four types of Armstrong & Hagel (1996). They define the community of relationships much more encompassing, which makes it rather multifunctional.