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"Cooperative Efforts in Electronic Contexts: the Relevance of Prior Face-to-Face Interactions"

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Introduction

Turbulent environments, international competition, economic and technological pressures force the modern organization to rapidly adapt to changing conditions. As a consequence, networked, adhocratic, team-based, and dispersed architectures emerge (Keen, 1991; Drucker, 1988, Malone, Yates and Benjamin, 1987). Similarly, uncertain market conditions and the need for high efforts in R&D lead organizations to a variety of inter-organizational relationships, such as alliances, partnerships, joint-ventures and research consortia (Ring and Van de Ven, 1994). Both tendencies emphasize the organizational shift toward horizontal mechanisms of coordination, where communication and cooperation take precedence over predefined vertical lines of authority and discrete market transactions.

Information Technology (IT) is regarded as a critical enabler of new ways of organizing (DeSanctis and Jackson, 1994). In particular communication media supported by electronic networks facilitate the emergence of fluid and flexible patterns of working relations, giving rise to innovative contexts for interactions and collaborative work that span traditional organizational boundaries.

However, despite the potential for communication offered by IT, "*networked organizations are not the same as electronic networks nor*-perhaps-*can they be built entirely on them"* (Nohria and Eccles, 1992). Working relations in the networked organization are intrinsically embedded in a social context made of culture, social norms, practices, habits, and expectations (Zack and McKenney, 1995). These elements are primarily shaped by ongoing face-to-face interactions. Electronic networks might complement existing face-to-face relations. The extent to which networks developed through face-to-face interactions might become synonymous to networks of computer-supported relations is an issue that needs to be explored. This research is an attempt to shed some light on this issue, with a specific focus on the relation between electronic-mail and cooperation.

The following research question has been addressed: *to what extent can computer-mediated communication support spontaneous mechanisms of mutual adjustment and trust building that are essential for the development of stable cooperation?*

The investigation has been conducted using an interpretive approach (Lee, 1991). The relation between cooperation and communication has been observed in a laboratory setting. The exploration focused on how members of different social groups enacted their particular reality and developed values of trust supporting a stable cooperation in face-to-face versus computer-mediated communication contexts. An important characteristic is that every group, composed of six participants, was selected to minimize the existence of prior acquaintances among members of the same groups. This manipulation permitted to control a crucial stage of group life, such as group formation, and analyze how the context of group formation impacts on group cooperation.

Group Formation: the hypothesis of transferability of trust

Social context becomes essential to the success of cooperation from the earlier stages of group formation. The process of socialization that takes place at the individual level through the modeling and learning of roles among group members (Schein, 1978) has profound effects on how the individual sees the world. Once within a role, the person is more likely to see in terms of "us vs. them," with a favored in-group of similar role-holders (us) and an out-group of different roles holders (them). However, attention must be given to the communication context where socialization takes place. As Drexler and Sibbet indicate in their

7-stage model (Johnson, 1991), face-to-face meetings are irreplaceable in the earliest stages of orientation and trust building by IT, while audio and video-conferences, voice-mail and electronic-mail become helpful tools in the following stages of goal/role clarification, commitment, implementation, high performance.

Using this model, the following hypothesis has been investigated: *face-to-face interactions enable group formation, providing elements such as group identity, values, and history, which are essential to the emergence of mutual trust. Once established, trust supports cooperative efforts even if the group meeting place is a purely electronic context.*

Method

Following the interpretive approach (Lee, 1991; 1995) the research analyzed communication and cooperation as context-dependent phenomena, which meanings can mainly be understood from the participants' perspective. The study employed ethnographic techniques, including communication protocols review, observation of experimental groups and structured and semi-structured questionnaires.

The experiment Every experiment consisted of a repetition of a complete information, 6-person game for 28 rounds (Ostrom et al., 1992). During each round of the experiment participants faced a paradigmatic problem of cooperation, called social dilemma (Dawes, 1980). The dilemma referred to the individual choice that participants made whether to cooperate in order to contribute to a common goal or to free ride on the rest of the group's effort to reach the goal. Concretely this individual choice consisted of a number indicating the level of contribution to the common goal. Individuals were rewarded by a fraction of the collective good minus the cost of contribution. Participants knew that cooperation would be more rewarding for everybody if and only if everybody cooperated. However, at the individual level defection always offered the higher payoff. As no superior form of control characterized the game, nobody should sacrifice her or himself to contribute to the common goal. As a consequence the theory predicts the failure of cooperation where nobody can benefit from the common goal because nobody contributes to it. Complete information implied that at the end of each round each participant was given information about: 1. her or his own payoff in the previous rounds of the game, and 2. overall group level of contribution. The second type of information permitted every participant to monitor group cooperation. Participants were rewarded by a monetary function reflecting their individual payoff in the game (detailed exercise description available on request).

Experimental Settings Despite the pessimistic theoretical prediction based upon the perfect rationality of human beings, the broad experimental literature in social dilemma shows that face-to-face (F2F) communication has powerful effects on cooperation (Sally, 1995). One of the main finding is that communication allows participants to develop trust and, ultimately, to enhance a stable cooperation. On the basis of this experimental evidence, the game was interrupted three times. A communication episode was introduced after the 10th, 15th and 20th rounds of the game.

The impact of communication on cooperation was investigated in three different experimental settings. Each setting is distinguished by a specific communication context.

I. F2F communication (3 experiments) Subjects engaged in a 10-minute F2F round table discussion, per communication episode. A hidden camera recorded each communication episode.

II. CMC (6 experiments) Subjects engaged in a 30-minute CMC conversation, per communication episode. A mailing list supported the CMC round table. No message anonymity was permitted and every message was made public through the list. Each message was recorded in a file.

III. CMC with prior F2F interaction (3 experiments) Three groups were exposed to a separate treatment the day before facing the social dilemma in a CMC context. The treatment consisted of a classic group formation exercise used in training sessions (description available upon request). Multiple questionnaires and communication protocol analysis assessed and confirmed the success of the group formation treatment.

Results

Homogeneous and interesting results emerged within every experimental setting. In the I and III settings participants were able to enhance a stable cooperation, respectively from the first and the second communication episodes, to the end of the game. In both settings communication supported group convergence toward a cooperative agreement and development of trust necessary to implement such agreements. The slight delay in cooperation enhancement in the III setting was mainly due to lack of experience in the use of electronic-mail, rather than to lack of trust. In general, this result confirmed the hypothesis on transferability of trust from a F2F to a CMC context. Conversely, in the II experimental setting cooperation collapsed. Participants were able to define agreements but communication did not support the development of trust. Therefore, after each communication episode one or two participants started to defect and their behavior triggered increasing "waves of defection" as the game moved far from the latest communication episode. In some cases frustration deriving from the impossibility to trust each other led to the explicit agreement not to cooperate.

In order to understand these results the interpretive analysis focused on those phenomena that more likely reflected which meanings, beliefs and intentions participants enacted in every experimental setting and that, ultimately, marked the success or the failure of cooperation. The following interpretation is mainly based on the analysis of communication protocols recorded during every communication episode. The analysis identified three communication activities: *brainstorming* (generation of individual ideas), *consensus convergence* (idea clarification, negotiation on alternatives and final definition of the agreement), and *social enforcement* (definition of and respect for collective norms). Brainstorming is measured by the number of generated solutions, level of participation, speed in problem solving. Consensus converge is analyzed through the number and content of threads of communication, leadership (variance of interventions), and number of subscribers to the agreement. Social enforcement is observed through the type of collective norms of behavior, number of threats, flames, and bluffs. Communication activity outcomes for each experimental setting are summarized in figure 1.

	experimental settings		
	I	**II**	**III**
brainstorming	*low*	*high*	*high*
consensus convergence	*high*	*low*	*high*
social enforcement	*high*	*low*	*high*

fig. 1. Communication activity outcomes in the three experimental settings.

In general, brainstorming was better in the CMC context (II and III setting), in terms of more homogeneous participation to the discussion, higher number of generated and compared solutions, speed in the individuation of the best group solution. In the I setting brainstorming was poorer because the discussion was dominated by a few participants and the groups converged on the first proposed solution. As a consequence only groups in the CMC context could optimally solve the problem during the first communication phase.

On the other hand, consensus convergence and social enforcement were weaker in the II setting and this seems to explain why cooperation did not hold. Communication structure was characterized by many and chaotic threads, implying lack of organization and coherence in the group conversation. Moreover, the absence of a leader and the existence of many alternatives for agreement forced participants to vote in a messy way. Participants did not define any collective rule of behavior. They threatened defection in

response to defection. Frustration for the disorganized communication activity and for the failure of cooperation fed a vicious circle of threats, flaming and bluffs.

The I and III settings show many similarities regarding the consensus convergence and social enforcement dimensions. In the I setting, cues such as leadership, organized communication and unanimity about the agreement supported the convergence to the consensus. Trust was enacted from the beginning of the game, when participants stated the need to cooperate also if eventual defection emerges, as main behavioral rules. Similarly, in the III setting, despite problems of coordination during the first communication episode, subjects learned how to communicate effectively by electronic mail. A cooperation-supportive social context was enacted by statements of cooperation, absence of complaints about the initial chaotic message flow, and absence of threats and flaming.

The overall results lead to the following interpretation. Cooperation held only in those cases in which participants saw themselves as members of a group and were, therefore, prone to sacrifice a pure rational behavior for the sake of group trust. Participants' responses to questionnaires and the content analysis of communication protocols show that this phenomenon happened in the I and III settings. In particular, in the III setting cues, such as answering each others' questions, frequent use of the pronoun "us" rather than "anyone" or "you", and emphasis on the concept of "our interest" characterized the flow of messages. It seems that participants imported their social identity as a group from the previous F2F interaction. In the II setting communication itself as a collaborative task failed. As a consequence communication did not support the process of socialization necessary to develop group formation and trust, and participants ended up competing like independent market agents rather than cooperating like members of a group.

Conclusion

Despite the limited number of experiments, the research provides theoretical and practical insights. On the theoretical side, the research offered experimental support to the argument that richness is not an invariant property of the communication medium, but its effectiveness depends on components of the social context, like trust, shared values and pre-existing group identity. The finding that trust can be transferred from a face-to-face to a computer-mediated context confirmed the hypothesis on transferability of trust. It implies that face-to-face communication might acquire a necessary and symbolic role in the emerging virtual organization, sustaining important elements to elicit and enhance cooperation, such as history, routine, norms, social relationships, and shared behavioral and interpretive contexts (McKenney et al, 1992). The implication for practice is that CMC technologies can not be optimally used without complementing them with face-to-face meetings. The experiments showed that activities such as brainstorming can be more effective using CMC technologies. However the integration of face-to-face and CMC interactions might optimize group performance along the entire process of decision making and cooperation. Face-to-face episodes should be introduced to support critical stages of group life, including group formation and renewal, before performing cooperative tasks in electronic contexts.

References available upon request.