# On the passage of time: Temporal differences in video-mediated and face-to-face interaction

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## Abstract

This paper examines team work over time in video-mediated non-collocated and traditional face-to-face same-room teams. In a longitudinal between-groups design, 22 three-person teams were tested in 4 1-h test sessions at 2-week intervals. A paper-folding task was designed for the experiment that had the potential to induce differences in team work under different communication environments. Results showed that near the end of the experiment, initial differences between groups on cooperative task performance in favour of the face-to-face teams had disappeared. These findings are explained in terms of a technological adaptation effect, which occurs when people learn how to use the technological tools available despite technological limitations. No differences were found between groups on cohesion and satisfaction. Likewise, cohesion did not increase over time as participants gained experience. In comparison, satisfaction did increase over time for both groups as teams gained experience with fellow team members and the task at hand. In contrast to what was expected, mental effort was higher for face-to-face teams than for video-mediated teams. Furthermore, initial differences between groups on mental effort did not disappear as participants gained experience. This paper concludes with a discussion of the results in terms of their implications

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for natural work teams, the design of video-communication technologies and suggestions for future research.

## 1. Introduction

The integration of computers and communication technologies has made new forms of team work possible, other than traditional face-to-face meetings. Electronic communication technologies enable collaboration without regard to temporal and spatial limitations. These technologies make collaboration in dispersed teams more convenient, less expensive and less time consuming than travelling to meet face-to-face (Hollingshead and McGrath, 1995).

While electronic communication technologies, such as electronic mail and internet chat, have proven their worth to organizations, video-communication technologies still appear to offer little more than traditional technologies such as the telephone (Whittaker, 2003). However, a number of recent technological advancements, such as an increase in bandwidth, combined with reduced costs, have made video-communication technologies more attractive as means of supporting dispersed work teams. Nonetheless, to be able to develop and market video-communication technologies, one must understand the effects that such products have on their users.

In this paper, we examine the effects of long-term use of a high-realism video-communication system on cooperative task performance, cohesion, member satisfaction and mental effort. This research is primarily concerned with teams, although we will sometimes draw from the more extensive literature on small groups when relevant for the purpose of this research.

Most definitions of small groups include three attributes: (1) two or more individuals, (2) interaction among group members and (3) interdependence among them in some way (McGrath, 1984). To these three, McGrath adds that a small group exists in some time frame; that is, it has a past, a present and a future. Both the past and anticipation of the future will influence the present behaviours of small-group members.

When compared to small groups, teams share the aforementioned characteristics with small groups, with some additional characteristics: teams have explicit goals and, with a few exceptions, the members of a team have some level of awareness of the team goals (Ilgen et al., 1995). In addition, in teams, each member is assigned a specific role or function to perform (Dyer, 1984). In other words, teams exist for some task-oriented purpose and can be seen as a more resolute version of small groups.

The remainder of this introduction explores prior research on the effects of communication media on team work, examines how temporal aspects shape