Video Contact Affects the Learning of Organizational Routines in Laboratory Studies

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INTRODUCTION

Traditional study of organizational routines has been limited primarily to field observation, however it has been reported that a cooperative card game called "Target the Two" (TTT) provides an effective laboratory analog for the learning of these phenomena [1]. Specifically, in playing a series of hands of TTT, pairs of participants begin to develop strategies and rules of thumb that guide their game play and can be seen to develop patterns of behavior that conform to properties of organizational routines.

This report considers the most recent of a series of studies evaluating the role of copresence and visual contact in the learning of organizational routines. Our approach will be to provide a brief description of TTT, we will then present relevant findings from previous studies and compare them with the data from our most recent study.

THE "TARGET THE TWO" EXPERIMENT

In this study and its predecessors, the TTT card game was employed. Due to space constraints, we refer the reader elsewhere [1], for a full description of the game, we only present a brief overview of the game here (however a full demonstration will be given at the presentation).

Each hand of TTT involves the same six playing cards (a red 2, 3, and 4, and a black 2, 3, and 4), and can be seen as a puzzle that must be solved by the pair of players. The goal of each hand is to move a prespecified "goal card" (the red 2) into an area on the board labeled the "target" as quickly, and in as few moves as possible. Game play progresses with players taking turns, either exchanging their hand card with cards on the board or passing their turn, in a coordinated effort to find the red 2 and move it to the target. However, each player plays with a slightly different constraint on their ability to exchange with the target area. One player, the "Color Keeper" can only replace the target card with one of the same color, while the "Number Keeper" can only make exchanges with the target area when the hand and target cards have the same number. This creates certain asymmetries in capabilities, and requires that players work together in order to efficiently complete each hand. Since the same cards and rules are repeatedly used beginning from different initial conditions, and since they cannot speak to one another, players begin to develop strategies and heuristics that govern their game play, with certain series of moves taking on a special prominence or meaning for each pair. Each pair plays two 40 hand sessions of the game separated by a break. In addition, upon returning for the second session, pairs are told of two rule changes. First, players are informed that the goal card has been changed from the red 2 to the black 2. Subjects are also told that they are to switch roles so that the first round's Number Keeper becomes the Color Keeper and vice versa. These manipulations were designed to see how teams learn to adapt their routines to novel situations.

PREVIOUS STUDIES

Early work on TTT had pairs of players, prohibited from speaking to one another, sitting face-to-face, across a card table playing the game using real playing cards [1]. In an attempt to aid in data collection and session management, a networked-computer version of the game was developed. To test whether the computer version was equivalent to the original face-to-face task, a second study was conducted.

In the second study, half of the pairs played in an "isolated" (ISO) condition in which players were separated, communicating only through the moves made in the game, which were shown via animated playing board graphics on both players' screens. The remaining players were in an "eye-contact" (CON) condition with partners seated at nearby workstations that were slightly angled so that each player's partner was peripherally visible. These two conditions were used because of the ambiguity associated with "replicating" the first study. On one hand, since face-to-face (FTF) players were not permitted to talk, the ISO condition seemed like a naturally analogous treatment. Yet, the FTF subjects could see one another, making the CON condition seem appropriate.

The data from the first two studies indicate that computer-mediated subjects in the CON condition learned to work

together in ways highly similar to FTF subjects. However, ISO pairs did not learn in the same ways. These results were based both on significant differences on outcome measures and characteristic differences in process data (see below).

CURRENT STUDY

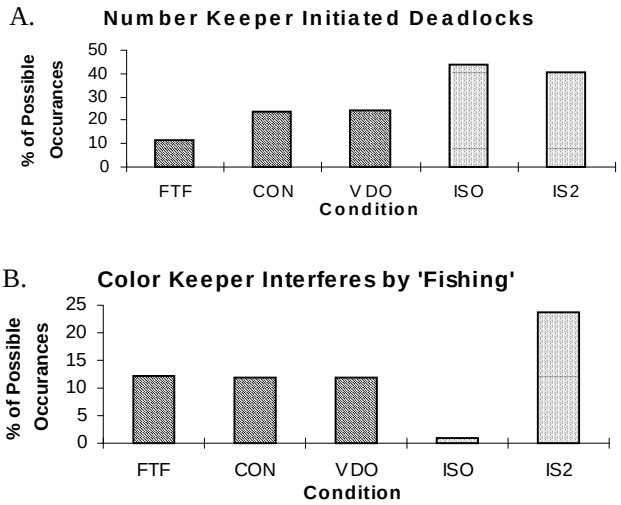
To determine the properties of the FTF and CON conditions that led teams to learn routines differently than when isolated from one another, we ran the third study with two conditions. The first condition (IS2) in this study, similar to the ISO condition in study 2, had players sitting alone in separate rooms communicating with one another only through their computer-mediated moves. Players in the second condition (VDO) were provided with a video-only (i.e. no audio) link in which the face of their partner was shown in an on-screen window over one corner of the board. It is important to note that in these studies, subjects were expressly told not to communicate with one another (e.g. through speech or gesture). The subjects in this experiment were graduate students grouped into pairs at random. There were 16 gender matched pairs assigned to each condition. 36 male and 28 female subjects participated.

RESULTS

A general measure of learning, improvement across sessions, can be calculated by subtracting the number of moves made in the second session from the number in the first session. On this measure, the CON and FTF pairs in the previous studies were found to improve at a significantly greater rate than did the ISO subjects of the second study. In the present study VDO subjects did not differ significantly from IS2 subjects. However, a more detailed, "microgenetic" analysis [2] focusing on players' moves in specific situations reveals that all three conditions that had visual contact (FTF, CON and VDO) appear to follow some characteristic strategies that differ markedly from those in the two isolated conditions (ISO and IS2).

One of the most striking examples of this effect can be seen in situations where the Number Keeper possesses the goal card, but cannot exchange it with the target area. Further, in these instances there is no way the Color Keeper can "set up" the target area for the Number Keeper to resolve the situation. Players in the Number Keeper role who make the move "pass" while holding the goal card have deadlocked the group's work by failing to understand the situation face by their Color Keeper partners. Figure 1A shows the proportion of instances in which the Number Keepers in each condition initiated a deadlock in these situations. Figure 1B shows the proportion of situations in which Color Keepers, who would be better off "staying out of " a particular series of moves by passing, interfere and cause a suboptimal solution. In both instances, the visual contact conditions demonstrate a consistency while the isolated subjects either make consistently more mistakes (figure 1A) or vary wildly (figure 1B).

Figure 1



DISCUSSION

These results are in partial concordance with those in the earlier studies, indicating that visual contact is an integral aspect in the formation of routines by our subjects. Specifically, we found evidence to support the notion that contact via a video link was sufficient to enable players to develop some sophisticated strategies similar to previous contact conditions. A possible explanation for these findings would be that seeing (or being in close proximity to) one's partner provides cues that increase the salience of the partner, thus encouraging the individual to develop routines that take the partner more effectively into account as action unfolds. If this explanation is supported by future studies, it has significant implications for the design of computer support for distributed work. We are currently planning experiments to refine these hypotheses, and to expand our data collection to the World Wide Web.

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