

Traveling blues: The effect of relocation on partially distributed teams

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ABSTRACT

This experimental study looks at how relocation affected the collaboration patterns of partially-distributed work groups. Partially distributed teams have part of their membership together in one location and part joining at a distance. These teams have some characteristics of collocated teams, some of distributed (virtual) teams, and some dynamics that are unique. Previous experiments have shown that these teams are vulnerable to in-groups forming between the collocated and distributed members. In this study we switched the locations of some of the members about halfway through the experiment to see what effect it would have on these ingroups. People who changed from being isolated ‘telecommuters’ to collocators very quickly formed new collaborative relationships. People who were moved out of a collocated room had more trouble adjusting, and tried unsuccessfully to maintain previous ties. Overall, collocation was a more powerful determiner of collaboration patterns than previous relationships. Implications and future research are discussed.

Author Keywords

Partially-distributed work, virtual teams, collocation, travel, computer mediated communication

ACM Classification Keywords

H.1.2 User/Machine Systems, *human factors*; H.5.3 Group and organizational interfaces, *computer-supported cooperative work*.

INTRODUCTION

This paper will present data from an experimental study of partially distributed work, identifying some of the unique challenges of these configurations. While there is a large and growing body of research on fully-distributed work (virtual teams), there is comparatively little research on partially distributed teams. Partially distributed teams are those that have some proportion of the team collocated, and some proportion joining in at a distance. This team configuration is probably at least as common as configurations with completely collocated or completely distributed (virtual) teams. Partially distributed teams have some similarities to distributed teams, and have some similarities to collocated teams, but also may have dynamics and challenges that are similar to neither.

Collocated teams and Virtual teams tend to form very different work styles. Teasley, et al. [1] found that ‘radically collocated’ software development teams had greatly increased productivity due to their ability to informally consult each other, to easily coordinate work, and use shared resources. In experimental work, face-to-face groups develop also trust more quickly and sustain it longer [2, 3, 4, 5]. These tendencies are in contrast with those of virtual teams. Virtual collaborators must overcome formidable challenges [6] including inhibited trust development, lack of informal social contact, difficulty in coordinating complex work, and forming a coherent sense of group identity [7, 8]. Overcoming the challenges of distance requires teams to do such things as spending time building trust early in a process, specifying how decisions will be made and how quickly email and phone calls will be acknowledged and returned [9]. These recommendations are quite different from the typical patterns of collocated teams, and might inhibit the type of free-flowing, rapidly adapting and responding group work described by Teasley and colleagues [1].

Partially-distributed teams face possible fragmentation and in-group formation due to their hybrid nature . Herbsleb et

al. [10] studied the long-distance collaborations of two groups of a software engineering company and found that modification requests took significantly longer to complete when requestor and requestee were in different groups. Cramton found that teammates made different, more negative attributions of distant coworkers' failures than they did of local teammates. [11]. In an experimental study, Fussell et al [12] found that collaborators had difficulty managing time and attention equitably across projects with different geographic configurations.

Previous work with the 'Shape Factory' simulation replicates and confirms these findings in a controlled experimental setting with partially distributed groups [13, 14]. Players in this game who were collocated with each other very quickly form trading in-groups, preferentially buying and selling from each other using verbal channels unavailable to remote workers. Interestingly, the non-collocated workers in this experiment (isolated 'Telecommuters') also formed a corresponding in-group with similar preferences. Over the course of those experiments, other negative social dynamics, such as gossip and revenge behaviors, were observed along with the trading biases.

How might relocation affect partially distributed collaborations?

Far-flung organizations such as multinational corporations and the American military have long subjected employees to frequent job transfers between divisions, partly as a way to break up in-groups and build large-scale organizational cohesion. Despite its prevalence, though, there seems to be very little research on whether relocation does affect in-group/ out-group behavior, promote cross-site collaboration or build team unity. We explored the effects of relocation using an experimental task, Shape Factory, which was designed to help study partially distributed teams. We contrast two hypotheses:

Hypothesis 1: Existing trade groups will persist even after relocation

In-groups often persist in the face of interventions designed to mitigate them [15]. So, it is reasonable to hypothesize that the trading in-groups will persist despite our attempt to disrupt them with simulated travel.

Hypothesis 2: Relocation will affect in-groups

It is also quite reasonable to hypothesize the opposite: that relocation will disrupt existing trade groups and cause new ones to form. Collocation is a powerful determiner of collaboration patterns in most other settings, and we would expect that the convenience and social dynamics of collocation would prompt formerly isolated players to begin forming new relationships.

METHOD

The Shape Factory simulation

Shape factory simulates an interdependent workplace where each individual worker has specialized skills to offer, but must also draw on the skills of others in order to complete projects. Each player in this game has a particular color-shape combination, e.g. Blue Square. The shape is their 'skill', i.e. the commodity they can make cheaply; they can make the other parts at a high cost. It is to each player's advantage to buy parts that others can make cheaply and to sell their parts to others for whom the cost is high. Players make money in this game in two ways: 1) by selling parts to other players, and 2) by assembling purchased parts into specific orders. Orders are strings of shapes, e.g. circle-square-diamond-triangle would be a typical four-part order. Color was not important when buying shapes. Each shape had two players assigned to it, so no player had a monopoly on selling their shape. Players are given unique sets of orders to try to fill each round and can communicate with other players in various constrained ways to try to purchase the necessary parts.

Each Shape Factory session involves ten players. In this run of 13 sessions, they were initially arranged as five 'collocators' working in a single room, and five 'telecommuters' working in individual rooms 1, which is the baseline configuration used in previous research [13, 14]. After three rounds of this game two collocators switched places with their counterpart telecommuter to simulate the effects of relocation. Every player worked on an identical laptop, and played the game through its Web interface. All players could send offers for parts, deliveries of parts, and text messages through the game. For 'Telecommuters', text messaging provided the only available communication media. 'Collocators' meanwhile sat around a table in the same room, and had the option to communicate with text messages through the game or verbally across the table. There were five rounds, the first lasting 20 minutes and the rest 15 minutes each. Collocators and Telecommuters were arranged as shown in Figure 1. (Boxes indicate collocation.)

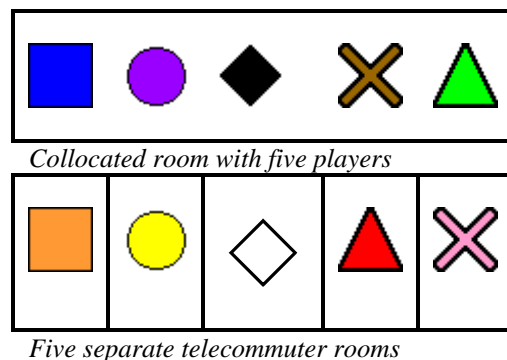


Figure 1. Arrangement of players in Shape Factory

The Travel Intervention

Between rounds 3 and 4 there was a short break, and experimenters 'relocated' two collocators and two telecommuters. Players changed places with their

counterpart shape (i.e. square for square) maintaining balance in the groups. We will refer to the four types of players as ‘Collocators’ (stayed put throughout) ‘Telecommuters’ (isolated throughout) ‘Traveling Collocators’ (changed from collocation to telecommuting) and ‘Traveling Telecommuters’ (changed from telecommuting to collocation.) The participants were not informed beforehand that travel would take place, and did not know which players would be traveling.

Participants

One hundred and thirty participants were recruited using a recruiting email list, an ad in a university newspaper, and signs posted throughout a large university campus. Participants were paid \$15 for completing the session plus a chance to win up to \$10 based on performance. Among the participants 48% were female, 92% were students. All participants stated that they had used computers, the Internet and email regularly for over three years.

RESULTS

We examine shape-trading patterns and several other outcome measures to see how the group as a whole, and the two traveling subgroups responded to the travel intervention.

What happens before traveling occurs?

Before the travel intervention, in rounds 1-3 of the Shape Factory game, events unfolded very much like other runs of the game. [13] The collocated players and the telecommuter players formed two strong trading in-groups, preferentially buying and selling from each other.

A Tale of two travelers

After traveling, the performance of the Travelling Telecommuters and Travelling Collocators took opposite directions. Figure 2 shows the average parts purchased per round by the four groups after the intervention. (Parts purchased is the best measure of game effectiveness.)

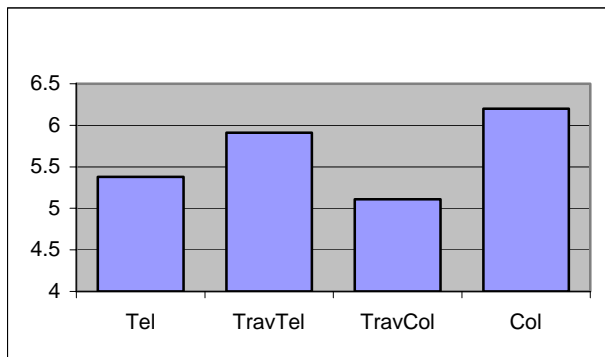


Figure 2. Average number of parts bought per round, for four subgroups in rounds 4-5 (after travel intervention)

Figure 2 shows that the Traveling Telecommuters began to score higher after traveling, while the Traveling Collocators scored worse than before. There is an Overall ANOVA

difference in these scores ($F(3, 254)=3.4, p<.05$). Standard deviation= 2.1, so there was considerable variance in scores. Nevertheless an LSD post-hoc test indicated that the Traveling Collocators scored significantly worse than both the Collocators and the Travelling Telecommuters in the two rounds after the relocation. The Traveling Telecommuters performance was also higher than the other Telecommuters, although the difference was not significant ($P<.12$). (The degrees of freedom are 254 because N in this analysis are round average scores, and since there were two rounds after traveling, N is twice the number of players—280—minus 25 rounds where players obtained no parts, giving an N of 255 and $df=254$.)

Traveling Collocators benefited the most from the relocation. Did they achieve this efficiency by continuing with their ‘old’ trading group, the telecommuters, or by forming new relationships? The findings here are also striking: the newly-collocated players immediately begin trading at a higher rate with their new officemates than with their old collaborators. Before relocation these players bought only 37% of their parts from collocators (typical for telecommuters), but after traveling this rose to 51%. The Collocators seemed to have quickly shifted their allegiance from their ‘old’ officemates to their new ones. They sold more parts to the Traveling Telecommuters than to the Traveling Collocators, responded to their requests more quickly, and fulfilled their requests at a higher rate.

Meanwhile, the Traveling Collocators’ scores plummeted immediately after leaving the collocated group, as was shown in Figure 2, and they did significantly worse than the other Collocators and also worse than the Traveling Telecommuters. Why? The Traveling Collocators tried to maintain their old ties with poor results. Analysis of the first four requests made by Traveling Collocators after the travel intervention show that just over half of their requests are being directed back into the collocated room, where their former trade group was located. Unfortunately, this group’s interest in maintaining relations is not reciprocated. Only after failing to continue with the collocated group did the Traveling Collocators reach out and try to form a new trading group with the telecommuters. When they did, they found this group fairly responsive and welcoming, although this took time and they made this transition too late to rescue their overall performance.

The newly-isolated players also started taking on other behaviors that were more similar to telecommuters. They started writing more text in their messages, which collocators seldom did, preferring to rely on verbal communication. They also started sending more requests overall, a ‘broadcast’ strategy more typical of telecommuters than collocators.

DISCUSSION

What have we learned about travel and partially distributed work groups from these experiments?

The first take-away lesson is to respect the power of collocation! This experiment was in some ways a contest between two powerful groupwork forces, that of collocation versus that of in-group biases. Inasmuch as this was a contest, collocation clearly won. Even though some players, notably the traveling collocators, attempted to maintain trading groups after the intervention they were not successful. Collocation prompted new groups to form very quickly as Traveling Telecommuters immediately began requesting parts from Collocators, and the Collocators responded favorably with fast response times, favorable response ratios, and high trade volumes. (Table 4)

Returning to the stated hypotheses, we found that Hypothesis 2 (new trading groups would form) held, while Hypothesis 1 (old trading groups would persist) did not.

These experiments also show that relocation can effectively 'mix up' partially distributed groups. The trading in-groups shown early in the experiment were effectively disrupted by the end (although new ones had formed.) So, relocation should be considered an effective tool to help partially distributed teams form and re-form collaborative relationships.

What might have happened if the experiment had continued longer? We did not find that in-groups would persist in the face of relocation. We can hypothesize that repeated traveling and relocation might have created a much higher-functioning group than would have otherwise resulted. The common practice of corporations that frequently transfer high-level executives around may have some valid folk wisdom behind it. Traveling forced all players to make new relationships. The intervention also forced the Traveling Collocators to develop new strategies and skills that they might have never developed if they had stayed in a collocated situation.

One reason the Traveling Collocators initially did poorly after traveling is because they were unprepared. So, two real-world recommendations we might make from this research would be to give all workers the experience of working from different settings; and to have good strategic advice available from experienced travelers to ease the transitions.

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