# When Mixing Physical Presence with Telepresence: Analysis of a Pilot Study

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**Abstract**

*Current videoconference systems combine face-to-face (F2F) and mediated interactions. We extend the use of a Social Presence measure to a real-world setting combining co-located and remotely located people completing a collaboration activity. Comparisons between physically present and remotely located others did not indicate significant differences in social presence regarding media condition. Post-trial interviews reveal aspects of group member experiences.*

## 1. Introduction

Video conferencing facilitates access to remote places and people through technological mediation. Technology that enables remote and co-located engagement is known as groupware [1]. Numerous approaches attempt to approximate the ideal face-to-face (F2F) quality. For example, Hauber et al. developed an interface with 3-D like interactivity [2]. In another approach to support a realistic telepresence encounter, Yamaashi et al. provide the remote person with two views from the connected site, a foveal (near) and peripheral (far) view [3]. These are just two examples of systems encouraging a natural sampling of visual information of a remote space.

Telepresent encounters have a social component as well as a technological one. Constructs like social presence allow researchers to evaluate the connectedness and interpersonal fluidity of the mediated interaction. A theoretically grounded social presence measure used in telepresence research assesses the extent to which a person feels connected with a remote person (for example, through an interface). The presence field has developed several measures to gauge social presence [4]. Typically compared with F2F, it's commonly theorized that co-located encounters reflect highest ratings of social presence. One standardized measure, The Networked Mind measure of social presence has shown this difference in attributed social presence based on media condition[2;5]. We examine the experiences of a mixed presence group, in which F2F and mediated encounters occur simultaneously, investigating how these findings may be extended.

## 2. Description of Study

We compared two media conditions, co-located and remotely located. It was assumed that co-located participants would report greater ratings of social presence than remotely located participants. We expected standardized half-structured interviews to reflect qualitative data not captured by the questionnaire but relevant to impressions of "connectedness" with remotely located others.

Two participants sat side by side and worked with a single participant in another room. A videoconferencing connection between the two locations used a high quality audio and video link utilising Digital Video (DV) over IP [6]. The remote participant was provided with two views (Figure 1): a zoomed out, wide angle view and a tight, close up view.

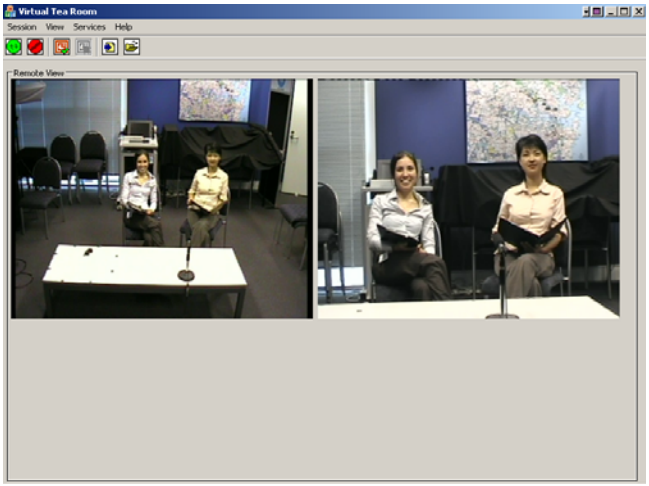


**Figure 1: Remote Interface**

Groups of three completed the scenario "Desert Survival Game"; used in previous studies of social presence [2;5;7]. Verbal tasks involving negotiation benefit from video support and are therefore design appropriate [8]. Two activities characterize the activity: individual rank-ordering of items critical to survival (e.g. compass, sunglasses, overcoat), and a group activity negotiating about items' importance to group survival. The Networked Mind tool was administered to participants in both conditions post-task [9]. Co-located participants rated both the physical present and telepresent participant. The remote participant rated the co-located pair together.

Post-trial interviews and discussions captured recall of task activity and impressions of the mediated encounter. Some remotely located participants regarded the interaction

"like watching TV," which could infer a lower sense of social presence than co-location. The remote participant's visual behaviour is captured with gaze tracking technology (See Stitzlein et al. (submitted) for preliminary results [10]).

## 3. Results of Study

This pilot consisted of 24 participants (10 females and 14 males), between the age of 20 and 44 (mean = 26 years, S.D. = 6.69). Cronbach alpha for the six social presence subscales ranged from 0.83 to 0.94, satisfying reliability requirements [11]. Three groups of questionnaire responses were statistically analysed in one-way ANOVAs, revealing no significant differences between conditions with respect to social presence ratings (See Table 1). In interview responses, participants reported satisfactory physical descriptions of others and recalled task artefacts like first item of consensus and an item of debate. Their impressions of groupware technology and activity context indicate the most salient aspects of the collaboration.

| | **Co-located Pair** | | **Remote Person** |
|---|---|---|---|
| **Social Presence Factor** | **F2F** | **Remotely located** | **Remotely located** |
| **Co-presence** | 6.17 (.71) | 5.71 (.92) | 6.04 (.56) |
| **Attentional Allocation** | 4.90 (1.10) | 4.82 (1.25) | 5.29 (.90) |
| **Perceived Message Understanding** | 5.90 (.85) | 5.56 (1.06) | 5.56 (.62) |
| **Perceived Affective Understanding** | 4.74 (.90) | 4.22 (1.46) | 4.83 (.93) |
| **Perceived Affective Interdependence** | 4.33 (1.03) | 4.18 (1.04) | 4.13 (1.40) |
| **Perceived Behavioural Interdependence** | 4.24 (1.07) | 3.89 (1.23) | 4.60 (.69) |

**Table 1: Mean Scores by Media Condition & Social Presence Factors**
**Reported: mean ratings (standard deviation)**

## 4. Discussion

We administered data capture techniques in a mixed presence setting where individuals engaged in a collaborative scenario. The main objectives were to measure the degree of social presence in this configuration, subjecting the questionnaire to a "reality test" of telepresence [12]. Administering a questionnaire in a mixed presence group contributes to the validity criteria of this particular social presence tool [5]. Results indicate impressions of social presence for someone physically present compared to someone telepresent are statistically indistinguishable in this setting. Additional data forms suggest that use of a multi-method approach more completely captures social presence.

Of course, there are some experimental limitations: small sample size and possible confound of sequential completion of questionnaires on a single experimental event. Null differences could also imply a lack of variance in presence levels between the simultaneous mediated and F2F encounters.

Future work will reflect interest in a multi-measurement approach, blending conventional questionnaires with behavioural observations and quantitative data. Such analyses in real-world videoconference settings benefit the research community as well as designers of telepresence technology.

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