

# **Contrasting Time Mode and Sensory Modality in the Performance of Computer Mediated Groups Using Asynchronous Videoconferencing**

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### **Abstract**

This research examined the question of whether perceptions of media as inferior to face to face are socially or technologically determined. It takes advantage of a recently developed asynchronous videoconferencing system to compare the perceptions and outcomes of group projects done in a multi-cue asynchronous media to those of face to face groups. Participants engaged in collaboration over 5 weeks to develop group oral reports. Measures of social presence, conversational involvement, perceived effectiveness, and ratings of group project quality were compared between communication conditions. Results showed significant differences favoring face-to-face communication for several perceptual variables, but not for perceived or actual effectiveness. Results are discussed with respect to their pertinence for several theories, and for their illumination of some historical theoretical and measurement biases in computer-mediated communication research.

### **1. Introduction: Examining Temporal, Spatial, and Modal Effects in Mediated Communication**

What do people need and what do people think they need in order to collaborate? Are the answers to these questions the same or are they different—do perception and reality concur or diverge? Is the way people utilize telecommunication systems governed primarily by socially determined rules, or by limitations in the features of the interface, in other words, are they socially or technologically determined? On the one hand, communication technology has long been able to facilitate coordination among group members and provided the added benefit of breaking the barriers of space and time. In other words, the technology allows it. However, there seems to be a price for utilizing these systems. The price to pay for this spatiotemporal independence has been the availability of communication cues to the identity of others, and cues to the meaning they are trying to convey, the absence of either of which can strain communication effectiveness and frustrate the social relations of those involved. There is also the question of social appropriate use of technology that influences people's perceptions of the interaction.

Nardi [18] argues that face-to-face communication is necessary at least in order to provide a foundation for future distributed work, and that face-to-face cues provide irreplaceable means to signal attention and provide a zone in which collaboration can occur. Yet the thrust of collaboration system development has historically sought the means by which users independent of each in time and space can work together effectively and harmoniously despite the

absence of such cues. In several studies, media success has been judged in terms of its ability to mimic, or to be 'like' face to face. Kayany, Wotring, & Forrest [13] argued that, "The most familiar interactive mode of communication, face-to-face, was the benchmark against which all other media were compared" (p. 401). Following this assumption, researchers have compared media interactions to face to face interactions and media have almost always been shown to be lacking in some way [see for example 3, 22]. The question raised here is whether this bias is technologically or socially determined. Is media technologically unable to provide a sufficient connection between people for task based interactions, or are the differences due to people's socially determined perceptions of medias ability or appropriate uses? Can users effectively deal with media technologies, or do they really need to be together to accomplish satisfactory collaboration? In an effort to address these challenging questions, this report reflects the efforts to develop and compare the impact of a group-based, asynchronous, audio-video computer conferencing system to face to face.

### Benefits of Multiple Cues

Consistent with technological determinism, some researchers have predicted that the number of cues a medium has will influence the interaction. For example, several theories have suggested that communication systems with diminished nonverbal cues may be inadequate for complex and/or interpersonally-involving tasks, most notably social presence theory [23], the social context cues hypothesis [24] and media richness theory [4]. These theories argue that expedient comprehension or interpretive social contexts depend on the transmission of multiple communication cues. While each of these perspectives has received mixed empirical support [see for review 31], the benefits of both time-independence and space-independence has, until very recently, required that information systems that rely on textual communication, easily coded and manipulated by software in order to array and organize. One potential confound with this is that text-only communication may demand significant extra effort by users in order to achieve common understanding and develop perceptions of partners, compared to the simple facility with which communicators achieve this when they are face-to-face. Nevertheless, consistent with

social determinism, there is robust evidence that users *prefer* multimedia/full cue communication despite its questionable necessity [e.g. 7, 21, 26]. Why might this be the case?

In preliminary research we have articulated an *efficiency framework* to explain the ironic relationship among media *preferences* and media-enabled *performances*. [32]. While limited-bandwidth communication may theoretically provide all functions and capabilities that face-to-face interaction provides, multiple-channel communication may do so with less cognitive and behavioral effort, in less time, than text-based systems. Previous theorizing about the relationship of verbal and nonverbal cue systems suggests that human multi-channel communication allows for complementary simultaneous signals to be processed [2]. That is, human evolution has yielded our capability to transmit substantive and affective information simultaneously through the complementary channels of verbal and nonverbal communication, with little conscious effort, as we have done in face-to-face interactions. The question is whether or not this affective information is necessary for task based group work.

This would not be the case if nonverbal communication was redundant to verbally-transmitted information. But the relationship of nonverbal to verbal behavior is often complementary, rather than redundant, with nonverbal behavior adding qualification, uncertainty, or contradiction to the verbal substance [6]. When verbal and nonverbal indicators contradict one another, people have been shown to prioritize the nonverbal [2]. In considering technological determinism, processing both messages is possible in a unitary-symbol system such as text-based communication, but in that mode the transmission of complementary levels of information must be accomplished by conscious and relatively greater efforts to translate these multiple signals into the semiotics of the unitary channel [30]. Thus, full-channel communication represents a less effortful and more highly efficient system for the conveyance of complex information, such as a topic involving both substantive and affective/attitudinal issues. When a topic's complexity is great, it may require additional cognitive demands for deliberation. Further, if communication involving multiple simultaneous cues is less

effortful, it should allow partners to reserve more effort to their information processing task and less to their intentional communication behavior. While this perspective may seem to present an overly-complex rationale for the advantage of face-to-face and video-based communication, it is relatively unique in its recognition of single-cue systems' capacity to afford complex information processing compared to multi-cue systems' greater efficiency and less effort to do so [cf. 14]. From a cognitive perspective, the implication that the expenditure of less communicative effort frees partners' cognitive resources for substantive information processing predicts greater satisfaction and more successful deliberative outcomes [19].

In addition to the intersubjective information processing efficiency advantages that multi-cue communication provides, both synchronous and asynchronous video-based systems provides potential advantages that non-visual communication cannot, even if ideas are effortfully translated into language. As Whittaker [33, 34] has argued, the functions of visual information in communication episodes transcend information emanating from the communication partners themselves. Video provides a shared workspace, allowing communicators to sense environmental cues that contextualize and therefore add meaning to the references they bring up through speech and action. Video furthermore allows for the observation of specific artifacts, which may be the target of discussion and deliberation. This may further contextualize discussion, or allow users to adapt their language to even more efficient referential, rather than descriptive, speech (i.e. referring to an object all can see as "that" or by mentioning its attribute, rather than repetitively describing what it is in order to focus attention; [8].

In many cases video may be more useful than even unmediated face-to-face communication. For example, when a discussion is focused on a "common virtual object" rather than on the users themselves [8]. Videoconferencing thus provides particular communicative advantages to geographically and/or temporally dispersed groups that text-based communication cannot, at least under some circumstances.

So, from the perspective of technological determinism, we can see the benefits of multi-modal, full-channel communication. However, empirical research has yielded mixed results

from the use of synchronous, or real-time videoconferencing. For example, Mühlfelder, Klein, Simon, and Luczak [17] found no differences in interpersonal trust between videoconferencing and face-to-face communication. Hinds [10] found that real-time videoconferencing overloaded the cognitive processing of team partners performing a complex task, and biased their perceptions of one another, compared to those groups using a text-based conferencing system. Matarazzo and Sellen [16] similarly found that a low-grade, synchronous video system provided better support than a high-grade videoconferencing parallel; subjects rated the poor quality video system more favorably than comparable high quality system, and they completed their tasks more quickly using the inferior system, effects which the researchers attribute to the distraction factor that full-quality video provided in distracting from the task at hand. While these effects question the utility of synchronous videoconferencing, the pressure to process all information—relevant and distracting—that real-time interaction demands, may be ameliorated if interactions are spread out over time using asynchronous messaging. There seems to be some benefit to using full cue communication systems, whether these benefits are socially or technologically determined, remains to be seen. The next section examines the importance of synchrony.

### **Temporal Independence**

One way in which computer-mediated communication (CMC) technology liberates users from temporal constraints is through asynchronous communication. Email, group conferencing, and other systems that rely on store-and-forward techniques allow users to send messages independently of the simultaneous availability of message receivers. In terms of the quality of group interaction, asynchronous communication channels allow groups to overcome the problems associated with competing demands for attention and time that make face-to-face meetings difficult by allowing people to write and respond independent of geographic location or time zones [9, 28].

Accompanying a technological deterministic evaluation of asynchronous interaction is the concern about whether delayed feedback (relative to face-to-face or telephone systems) dampens communicators' collaborative attempts to modify messages in order to understand

complex ideas, the way that deliberate questions or subtle nonverbal responses might prompt in co-located interaction [5]. An additional concern is the extent to which communicators can achieve conversational coherence and connect one utterance to another when messages are emitted, stored, and read at independent points in time, potentially out of order [15]. In other words, can asynchronous media allow turn taking and facilitate collaborative work and a sense of connection within groups?

In response to the potential advantages of asynchrony, a variety of message organizing systems have been created that allow users to recreate flow and structure feedback in many CMC environments [see 20, 27]. For instance, the ability to quote back all or portions of a previous message, in one's reply to that message, is one way to restore conversational coherence by recreating the conversational context in which a reply is offered. As far as group collaborations go, the familiar threading systems of bulletin board systems, or Usenet message meta-codes and corresponding client features allow readers to re-organize message flows by date, sender, topic, etc. in order to make sense of conversational or topical discussions ad hoc and at the reader's discretion. As clearly seen in the propagation and institutionalization of these features in many generations of software, some structural features of CMC systems do help users recreate coherence among otherwise temporally independent messages created and stored asynchronously, allowing for the benefits of temporal independence and preventing communication from being unorganized and indecipherable.

### **Spatial Independence**

When group members do not have to be in the same place in order to communicate, a number of affordances become available. Collaborative group systems allow organizations to disperse their members geographically, even across multiple time zones [12] and allows electronic learning communities to expand across multiple campuses—or depart from campus entirely. Benefits may be realized at several levels. Most simply, savings in travel time and costs may be made. More interestingly, dispersion allows members to remain embedded in important sites or clients' spaces while simultaneously enjoined in the group. Many of the systems taking

advantage of asynchrony have not been rich cue systems, so comparisons to face to face have been difficult. The next section considers how an asynchronous audio videoconferencing system, able to provide both multiple cues and asynchrony, in a group based interaction would influence the communication outcomes.

### **Research Questions Enabled By Asynchronous Videoconferencing**

Based on the above rationale, it appears that both videoconferencing and asynchronous communication sometimes offer features that benefit virtual groups' coordination and comprehension, and in so doing, their effectiveness. What is less clear is the effect that asynchronous videoconferencing may yield in terms of users' interpersonal, group, system, and process satisfaction. These latter areas are those that seem to be most sensitive to the amount of cues available via technology. In this respect, videoconferencing of any sort may offer similar levels of satisfaction as those associated with face-to-face interaction. On the other hand, any mediation may be significant mediation, and as Hollan and Stornetta [11] argued, the closer we get to the amount of cues afforded face-to-face and yet are mediated to any extent, the more painfully obvious it will be to users that mediated interactions of any kind do not embody the qualities of unmediated interaction. Perhaps favorable perceptions about asynchronous videoconferencing will obtain in comparison to other forms of mediated group interaction, where bandwidth is even lower than the audio/video combination, but not in comparison to face-to-face interaction, despite the quality of group collaboration and production that asynchronicity and multiple cues may actually provide.

In order to address these research questions, as well as in order to evaluate the practical utility of a new development in communication technology, exploratory research was conducted employing groups in two conditions, synchronous multiple cue (face to face) and asynchronous multiple cue (asynchronous audio video).

### **Methods**

## Participants

Fifty-eight student subjects were recruited from communication courses at a large public university in the eastern United States, who were randomly assigned to groups of 3 or 4 members. These groups, in turn, were assigned to collaborate using one specific communication facility in the completion of a project.

## Procedure

**The task.** All participants did the same task. The task was part of the courses and worth 20% of students overall grade. Students were to research and prepare a 12-15 minute oral report, as if it were to be presented to Congress, regarding, specifically arguing how to balance privacy and national security in an evaluation of the PATRIOT Act. The groups met at assigned times once a week for five weeks and were instructed to discuss their research findings and to organize and prepare a final, smoothly flowing oral presentation summarizing their opinions and recommendations for improvement in U.S. policy. The final oral report required all group members to present a portion of the arguments; thus preventing much social loafing. To motivate students, in addition to the course grade for the project, groups were told that the group that gave the best presentation in their class would receive a \$100 prize. Students in all groups were asked not to discuss the project outside their assigned communication channel. The final oral presentations were videotaped for evaluation by outside raters.

## The Medium

Seven groups completed their task by meeting face to face once a week for five weeks. Eight groups completed their task by using an asynchronous audio-visual group collaboration system known as the TIC system—Time Independent Collaboration system—development of which is detailed in Watt et al. [32]. The TIC system allows users to record messages for his/her group by using a computer equipped with a microphone and webcam, and by typing a subject describing the content of the message. Messages are stored in a database, and are presented to users via an interface that allows users to detect the date of message creation, author, subject (or reply to subject), and whether messages have been read or not, similar in

presentation to common newsreader client interfaces. By selecting a message, a group member may see and hear messages left by group members in a prior posting; by selecting a range of contiguous message headers, a user may replay a series of messages as if in real time, even though the messages were posted independently in time. A screen shot of the TIC client interface is shown below.

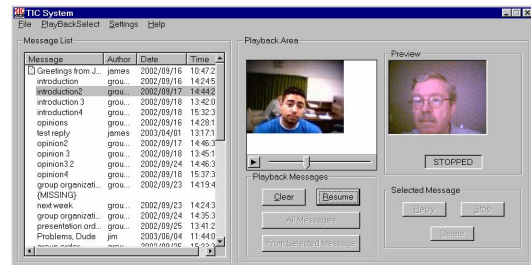


Figure 1. TIC user interface

Groups who used the TIC system created a computer-recorded oral report within TIC, which researchers merged for presentation on videotape to outside raters. Face to face groups had their presentation recorded on videotape for the same outside raters. Additionally, all participants completed a variety of self-report questionnaires.

## Measures

The final 10-12 minute oral presentation for each group was videotaped in a face-to-face session or via the TIC system. Three Ph.D. students in Communication and Rhetoric evaluated each of the presentations. Presentations were evaluated with respect to structure (introduction gains attention, states purpose, provides overview; body covers main points, support, and transitions; conclusion recaps main points, emphasizes ideas, and closes); content (level of detail, audience appropriateness, organization, and evidence); and delivery/style (vocal delivery expressed enthusiasm/energy; eye contact and transitions were apparent) on an original 36-point scale. The mean of the most reliable pair of scores was used as the measure of group performance. Inter-rater reliability achieved a Pearson product-moment correlation of .66.

Self-administered paper and pencil measures assessing participants' perceptions focused on the social presence of the communication systems, conversational involvement, and

perceived meeting effectiveness. Anomalous findings, discussed below, suggest some explication of the contents of these measures.

Social presence is a commonly-discussed construct in CMC research, and one with relatively great measurement history especially with regard to video teleconferencing (the context for which social presence theory was originally conceived; [23]). The measurement scales for social presence were adopted from Short et al.'s seminal work and presented as scaled questions to participants. These items include "To what extent was this like a face-to-face meeting? To what extent was this like you were in the same room with your group? To what extent did you feel the medium facilitated your group's ability to complete the project? How likely is it that you would choose to use this system of interaction for a meeting in which you wanted to persuade others of something? To what extent did you feel you could get to know someone that you met only through this system? To what extent did your group seem real? To what extent did you feel the medium detracted from your group' ability to complete the project?" Reliability analysis yielded an inter-item Cronbach's alpha of .94 for this unidimensional scale.

Conversational involvement was measured using a series of 8 Likert-type items, including "My contribution to the group was effective; I was intensely involved in our interactions; I found the interaction stimulating; I achieved everything I hoped in our group project; I was detached during conversations\*; Another person dominated the group project\*; I let other members talk most of the time\*; I was willing to listen to my group members." These items achieved a unidimensional inter-item alpha reliability of .74.

As the previous measure focuses on personal and interpersonal aspects of group functioning, it does not capture the potential that media differences impact perceptions of task effectiveness, or the notion of social determinism. Because of the potential for dichotomous perceptions with regard to social versus task effects of collaboration technology, scales assessing meeting effectiveness, or task facilitation were also administered. These items included "I found the meetings useful and

helpful; The group meetings were useless\*; I got what I wanted out of the meetings; Our group meetings were very beneficial; I didn't know what was going on during the meetings or the task\*; Our meetings were generally unsuccessful\*; My group did a good job on the task given our constraints." Inter-item reliability was alpha = .82.

Correlations among measures are shown below. These indicate a fairly good discriminant validity among the measures (i.e., they are only moderately correlated, and are thus not likely redundant measures of the same underlying construct).

**Table 1. Correlations among user perception variables**

	Social Presence	Conversational Involvement
Social Presence		
Conversational Involvement	.43	
Meeting Effectiveness	.40	.53

**Results**

Data were analyzed using *t*-tests comparing scores between communication conditions on the dependent variables. All the data provided by group members are in a sense influenced by, or nested in, groups and not just individuals. In such cases it is often appropriate to apply particular treatment for the potential interdependence of scores within groups [see 1]. However, given the exploratory nature of this research, no such treatments were adopted. As the analyses show, there are few conclusions offered by the statistical findings that offer affirmative evidence (by way of significant differences) for arguments, above, which one might express as hypotheses. The greater power afforded by between-subjects analysis, indeed, becomes important in allowing some comparisons as much opportunity to differ as possible, and for counter-intuitive findings to emerge. Data representing the outside coders' evaluations of groups' presentations were, of course, recorded and analyzed at the group rather than individual level.

\* Reverse-coded item

RQ1: How will asynchronous video conferencing compare to face to face in terms of people's perceptions of a medium's ability to make team members feel salient to one another?

Despite the availability of audio and video cues in the TIC system, it was face-to-face communication ( $M = 57.68$ ,  $SD = 6.49$ ,  $n = 22$ ) that was rated statistically significantly greater in social presence than the TIC system ( $M = 32.28$ ,  $SD = 8.17$ ,  $n = 29$ ),  $t(49) = 11.99$ ,  $p < .001$ .

RQ2: How will asynchronous video conferencing compare to face to face in terms of people's self reported conversational involvement?

Similarly, conversational involvement was rated higher in face-to-face groups ( $M = 46.95$ ,  $SD = 4.27$ ,  $n = 22$ ) than in the groups using asynchronous videoconferencing ( $M = 41.63$ ,  $SD = 5.93$ ,  $n = 30$ ), and the difference was significant,  $t(50) = 3.58$ ,  $p = .002$ .

These self-reported perceptions both show superiority for face-to-face interaction over asynchronous audio-video, as far as feeling involved and present with one another. Further analyses explore the task-related aspects of the collaborations, through both self-report and objective outside evaluations.

RQ3: How will asynchronous video conferencing compare to face to face in terms of perceived meeting effectiveness?

The analysis of self-reported scores on perceived meeting effectiveness did not distinguish face-to-face ( $M = 37.91$ ,  $SD = 8.01$ ,  $n = 22$ ) from the asynchronous audio-video conferencing system ( $M = 34.83$ ,  $SD = 6.94$ ,  $n = 29$ ),  $t(49) = 1.49$  (n.s.). Thus, while the participants who used face-to-face channels believed that they experienced greater social involvement with one another than did videoconferencing teammates, they did not experience a parallel difference in their perceptions of how well the system worked in supporting their task.

RQ4: How will asynchronous video conferencing compare to face to face in terms of external analyses of the quality of the final presentation?

The external judges' evaluations of the groups' final projects also were not significantly different  $t(12) = .46$  (n.s.), no demonstrable superiority for either the face-to-face ( $M = 18.38$ ) or asynchronous audio-video system ( $M = 17$ ).

While the lack of significant differences is no statistical proof of similarity, and the power of this test is not as great as those of the self-report measures, the potential patterns of perceived differences in closeness, and no differences in performance, resemble other findings on telecommunication systems. Moreover, these results raise questions about the research enterprise in group collaboration with media.

## Discussion

Here we examined the differences between groups that interacted face to face and groups that interacted using an asynchronous videoconferencing system. In a test of whether or not differences between these modes of communication were based on socially determined rules or norms of appropriate uses, we measured the participants' perceptions of the outcomes. Also, in a test of whether or not these differences were technologically determined, the ability of the mode of communication to facilitate the group's ability to reach their goals, we measured both the perception of the outcome of the group meetings as well as impartial raters judgments of the final presentation.

The development of an asynchronous audio-video group conferencing system affords an unparalleled research opportunity to examine these distinctions: In previous research, there has always been an "empty cell" in the experimental grid of synchronous/asynchronous-by-number-of-cue-systems, in that face-to-face communication had no full-cue analogue that was asynchronous (whereas voice may be synchronous like a telephone or asynchronous like voice mail, etc.). In a sense, previous research was able to detect if and when reduced cue systems—whether synchronous or asynchronous—compared favorably or unfavorably to full cues, but the complete range of the asynchronous dimension was untested, given that there was no asynchronous version of full-cue interaction. The present results do not describe every possible combination of cues and synchronicity (although such results are underway); rather, this study chose to focus on what may be the most difficult and most telling test—that where fewest differences were likely to occur—in comparing full-cue synchronous interaction with full-cue asynchronous interaction. Thus in this context it is unsurprising that few differences emerged. Those differences that did emerge, and especially

the contrasts between those that did and those that did not, are illuminating.

In terms of the test of social determinism, measured in terms of social presence and involvement, despite the presentation of audio and visual cues, the participants rated the asynchronous system as lesser than those who used face-to-face communication. There appear to be three possible reasons for this finding, and there is support for the idea that there are limitations to mediated interactions that are influenced by socially determined rules of appropriateness in media use. One possible explanation is consistent with technological determinism. It is possible that, asynchronous interaction is not as involving as synchronous interaction. Despite the convenience that asynchrony provides—which may allow it to be a useful alternative to traditional meetings—it is not as dynamic as traditional interaction because the people are not there to be engaged in real time. In this sense full-cue asynchronous communication may be little better than asynchronous interaction of any kind, full-cue or reduced-cue (although this is an empirical question that additional data will address). This possibility is in line with suggestions by McGrath (1991) that it is more difficult to coordinate conversations that are asynchronous, despite the capabilities of the interface that keyed conversational episodes and their content to one another. Similarly, Storck and Sproull found that real-time videoconferencing is not as satisfactory as face-to-face interaction; we may now infer that the capabilities of asynchrony do not change this state of affairs.

Perhaps the most compelling, but previously untested, opinion on the matter is that of Hollan and Stornetta (1992) who suggested that the closer we get to interfaces that make the appearance of mediation go away, the more clear it is that it will never be the same as face-to-face, in terms of its phenomenological nature. However, Hollan and Stornetta argue that mediated systems can do things that go “beyond being there,” i.e. be better than face-to-face, such as allow for dispersion and asynchronous interaction. This position seems to be supported by the present data, since the asynchronous audio-video system would allow for such arrangements, and did so no less successfully (from an instrumental perspective) than did face-to-face. Yet any medium is media enough from the perspective of presence.

The second explanation is that presence is overrated and may never have been a good benchmark in the first place. We are reminded of the interesting findings of Gale [7] who found that users of a audio/video/whiteboard system rated their tool high in social presence, yet rarely used the video aspect of the system. Moreover, these subjects’ instrumental design outcomes were less successful and took more time than other subjects’ who used audio and whiteboard with no video. Ironically, we have never found that collaboration teams do not explicitly and overtly advocate an opinion that presence is not highly desirable and useful—and the history of media preference research would seem to bear this out at the level of opinions about technology. Yet the history of media effects research suggests, as would be predicted by social determinists, that the preferences are not always isomorphic with what works. Just as users accommodate to the challenges of reduced-cue systems, so they accommodate to asynchronous systems, the present data suggest. This contention flies in the face of several technologically deterministic theories of media effects—social presence theory and media richness theories in particular. The findings seem most consistent with Korzenny’s [14] theory of electronic propinquity which suggests, among other things, that users adapt to the medium they have, and as long as they do not have better choices, users make the medium they use just as good as face-to-face interaction. As our data also show, despite users’ perceived preference for togetherness, they do just as well with some mediation. Perhaps users are responding in what they perceive to be socially appropriate ways when they rate the media as less appropriate, even though the medium was sufficient to complete the task. Or perhaps people are just not very good at knowing what they need. At the same time, it is important to illustrate that, “Perceived effectiveness might well be more important than objective effectiveness” [23, p. 164]. People’s perception of the medium will greatly affect their likelihood of utilizing it, so this may well be an important measure for evaluating interfaces.

Alternatively, the third explanation might be that researchers have been asking the wrong questions. In research we have equated social presence and conversational involvement as important goals because such states are important for collaboration. Perhaps they are not

essential after all. Our research participants are, in this sense, much smarter than we. We give our participants many cues through mediation and then ask our participants whether being mediated is the same as being unmediated (i.e. as being in the same room as their colleagues), and they answer us that it is different. In re-examining the measures of social presence and involvement, we note that these items are rational but their being asked in the first place seems biased. We have assumed that it is important to the communication process for users to feel as though they are with each other physically. Perhaps it is not. Our participants tell us, in these results, that being mediated does not feel the same as being face-to-face, and that this does not matter. They do fine. They do not report being less effective without co-presence as they do when they are co-present, and indeed, they do not seem to be less effective one way or another. We all know that face-to-face physical contact matters at times in our lives. However, for some tasks and groups, it seems that presence does not matter at all. Our subjects get over it, and there is a lesson to be learned from them that perhaps we should as well.

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