Cases on Online Discussion and Interaction:
Experiences and Outcomes

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Chapter 9
Using Discourse Analysis to Assess Social Co-Presence in the Video Conference Environment

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EXECUTIVE SUMMARY

In this chapter, I analyze computer-mediated communication in the form of online, synchronous, professional discourse in the multimodal video conference environment with the aim of assessing social co-presence (Kang, Watt & Ala., 2008). I argue for the applicability of discourse analysis methodology by presenting extracts of video conference communication which illustrate how talk-in-interaction contributes to or threatens the three elements of social co-presence: co-presence, social richness of the medium, and interactant satisfaction. Examples of interaction illustrate how disruptions in mediation serve to threaten co-presence by isolating interlocutors, how multiple modes of communication are exploited to ground participants in a shared communicative environment thereby establishing social connectedness, and how multimodal communication allows for iconic or paralinguistic support of the discursive expression of emotional stance. The chapter concludes with feature recommendations for video conference software development from the perspective of social co-presence.

BACKGROUND TO THE CASES

Increased globalization and the subsequent dispersion of human resources in the corporate environment have resulted in significant commercial interest in video conference technology (Townsend, DeMarie & Hendrickson, 1998). In answer to the growing needs of a global economy, a number of web-based video conference technologies are currently competing on the market, for example, WebEx, iVideo, Skype, Adobe Connect, and Marratech. In April 2007, Marratech was acquired by Google. That same year, Google announced that there would be no further development of the Marratech client and server software as of July, 2009. Instead, Google is now working with the Marratech team to develop its own web-based video conferencing tools.[1]

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Ultimately, the production or further development of a successful video conference product will depend on designing features that make video conferencing an effective and satisfying form of remote communication and collaboration. The technological aspects of video conferencing, such as bandwidth requirements and audio-visual quality, are the most obvious and tacit issues to consider. However, as technology improves and enables interaction that closely approximates face-to-face communication, it is the social aspects of video conferencing, and of computer-mediated and video-mediated communication in general, which emerge as essential to providing user satisfaction and, consequently, product success.

In this chapter, I consider two cases of video conferencing via the Marratech client with the aim of assessing social co-presence (Kang, Watt & Ala, 2008). First, I review the literature on video-mediated communication, establishing the evolution of VMC as a viable alternative to face-to-face communication, particularly in the virtual workplace. Next, I present the theoretical constructs of social presence, co-presence and social co-presence, and I argue for the applicability of discourse analysis methodology in assessing social co-presence. I then present extracts of video-conference interaction, illustrating how talk-in-interaction can be analyzed to evaluate co-presence, social richness of the medium, and interactant satisfaction. The analysis is followed by a discussion and summary of how research on the ways people actually communicate through online discussion can contribute to a better understanding of social co-presence. Finally, I suggest features of video conference software which can optimize the social co-presence aspects of video-mediated communication.

VIDEO-MEDIATED COMMUNICATION

Video-mediated communication (VMC) such as video-conferencing offers users the widest variety of channels of communication, combining video with voice chat, text chat, whiteboard capabilities, and collaborative document manipulation. Video conferencing thus exemplifies a rich media environment (Daft & Lengel, 1984), allowing for a form of communication that closely approximates face-to-face interaction. For this reason, video-conferencing is increasingly being adopted in workplace settings as a viable solution to the problem of communicating with dispersed colleagues and business partners. The use of video-mediated communication technologies is therefore key to facilitating meaningful teamwork activity remotely (Morgan, 1993; Nguyen & Canny, 2007; Townsend et al., 1998).

Much of the literature on video-mediated communication reveals a tendency among researchers to highlight problematic aspects of remote interaction. Bandwidth issues (Angiolillo, Blanchard, Israelski & Mané, 1997) as well as the related distortion of audio signals or visual images (Benford, Brown, Reynard & Greenhalgh, 1996; Heath & Luff, 1991; Rutter, 1987) have been established as the primary contributing factors to a compromised interaction structure, affecting the sequencing of turns. For example, in video-mediated communication, the practices of holding or relinquishing the floor, interrupting, or other negotiations of turn-taking are impeded, such that there are generally fewer speaker turns, longer lengths of turn, and fewer interruptions than in face-to-face conversations (Cohen, 1982; Cook & Lalljee, 1972; Rutter & Stephenson, 1977). Disruptions in audio or visual transmissions render these deviating features even more salient (Cohen, 1982; Isaacs & Tang, 1994; Kraut, Fussel & Siegel, 2003; O'Conaill, Whittaker & Wilbur, 1993).

Comparisons of video-mediated communication with face-to-face interactions persist as a distinct trend in the research of video-mediated communication (O'Malley, Langton, Anderson, Doherty-Sneddon & Bruce, 1996; Reiserer, Ertl & Mandl, 2002; Sapsed, Gann, Marshall & Salter,

2005; Sellen, 1994), revealing a stance towards video-mediated interaction as an inferior or flawed alternative to 'the real thing' (Clark & Brennan, 1991; Daft & Lengel, 1984; Hauber, Regenbrecht, Hills, Cockburn & Billinghurst, 2005; Inoue, Okade & Matsushita, 1997; Kraut et al., 2003; Meier, 1998; Oviatt & Cohen, 1991; Sellen, 1994; Whittaker, 1995; Whittaker & O'Conaill, 1997). Furthermore, constant advances in information and communication technologies encourage continued comparisons as video-mediated communication becomes more sophisticated (recent examples include Cornelius & Boos, 2003; Fletcher & Major, 2006; Nguyen & Canny, 2004; van der Kleij, Lijkwan, Rasker & De Dreu, in press). The viability of video conferencing is steadily increasing, as studies establish video-mediated communication as being robust enough to accommodate workplace tasks (Fletcher & Major, 2006; McGrath & Hollingshead, 1993), support frequent and complex interactions (Reiserer et al., 2002) and, on the whole, closely approximate face-to-face interaction (O'Malley et al., 1996).

In this section, I have provided a brief review of research on video-mediated communication, highlighting its evolution as a viable alternative to face-to-face communication. In fact, with technological advancements, video-mediated communication can be expected to become increasingly rich and robust. Similarly, it can be expected that video-mediated communication will allow for an increasingly greater degree of social presence. In the next section, I distinguish between various theoretical constructs in social presence research.

SOCIAL PRESENCE, CO-PRESENCE, AND SOCIAL CO-PRESENCE

Social presence, as introduced by Short, Williams and Christie (1976), was originally defined as the "degree of salience of the other person in a mediated communication and the consequent salience of their interpersonal interactions" (p. 65). In other words, social presence represented a theoretical model for examining "the behavioral effects of the physical presence of another human being or the thought that another human being is in position to observe" (Biocca, Harms & Burgoon, 2003, p. 460). Elaborating on the concept of salience, Bull and Rumsey (1988) included in their definition of social presence the impression that develops "when one person feels another person is 'there'" (p. 162). Similarly, Schroeder (2002) describes social presence as a sense of being there with others, de Greef & IJsselsteijn (2000) as a sense of being together, and Hauber et al. (2005) as a sense of togetherness. The juxtaposition of these definitions serves to document the evolution of the concept of social presence: whereas originally social presence featured the salience of the other as central, later interpretations and usages of the term have reflected an emphasis on the salience of the *mutual* presence of interlocutors. This development could suggest a semantically widened use of the term social presence, which has taken on attributes of co-presence. However, as Zhao (2003), for example, claims that "[c]opresence has also been called *social presence*" (p. 445, original italics), supporting this claim with references to Biocca and Harms (2002), Rice (1992), and Short et al. (1976), it may instead be a question of a conflation of terms.

Biocca et al. (2003), Nowak (2001), and Nowak and Biocca (2003) have contributed significantly to differentiating social presence and co-presence. With regards to social presence, each of their interpretations remains faithful to Short et al.'s (1976) original conceptualization, retaining the focus on the other as being perceived as present, and the ability of the medium to convey that presence. Co-presence, on the other hand, is attributed to the work of Goffman (1959, 1963), and concerns mutual awareness. According to Goffman (1959), "copresence renders persons uniquely accessible, available, and subject to one another" (p. 22). In both Nowak's (2001) and Nowak and Biocca's (2003) interpretations of Goffman's construct, the

experience of co-presence among interlocutors occurs when there is mutual and active perceiving of the other; "co-presence in this sense solely refers to a psychological connection to and with another person" (Nowak & Biocca, 2003, p. 482). Biocca et al. (2003) are also explicit about the aspect of mutuality in reviewing definitions of co-presence, which "move into mutual awareness when they emphasize attention to the sensory properties of the other, especially an awareness of both user/observer and mediated other. The user is aware of the mediated other, and the other is aware of the user" (p.14).

There are two significant, fundamental differences between social presence and co-presence, the first of which is direction. The social presence construct is uni-directional, only concerning a single user's perception of the ability of the medium to render another user salient, whereas co-presence is bi-directional, referring to the ability of the users to perceive each other. The second fundamental difference between social presence and co-presence is one of measurement. While both social presence and co-presence are usually measured and subsequently evaluated according to subjective self-report measures such as semantic differentials or Likert scales (Biocca et al., 2003), the focus of measurement differs. Social presence measurements reflect the uni-directional aspect of the mediation, and serve to evaluate the ability of the medium to provide a sense of the other (Nowak, 2001). The "dual nature" of co-presence (Nowak, 2001, p. 10) requires that measurements attend to both the user's perception of the involvement of the other as well as the user's account of his/her own involvement (Goffman, 1963; Nowak, 2001).

Social co-presence was recently introduced into presence literature by Kang et al. (2008) as a response to the need for a definition of social presence which included the aspects of mutual awareness in co-presence (Biocca et al., 2003) as well as the aspect of participants' perceptions of the medium, but also accounted for an assessment of the success of the communication in terms of interactant satisfaction. Social co-presence is therefore defined as the "involvement and engagement through mutual awareness between intelligent beings who have a sense of access to the other being consciously, psychologically and emotionally, within a mediated environment perceived as capable of supporting social communication." Social co-presence is a product of three aspects of mediated communication: co-presence (mutual connectedness), social richness of medium (perceived ability of the medium to support social connectedness), and interactant satisfaction (with regards to the social and emotional accessibility between interactants) (Kang et al., 2008). Like the previous theoretical models on which it is based, social co-presence is measured according to subjective self-report techniques.

In this section, I have reviewed various theoretical constructs in social presence research. The analysis featured in this chapter is guided by the social co-presence construct (Kang et al., 2008), due to the inclusion of both social presence and co-presence measurements, as well as the recognition of the importance of assessing emotional accessibility between interactants. Furthermore, as a nascent theoretical model, social co-presence is in the process of development, and for this reason it is ideally amenable to non-experimental methodology, as proposed in the following section.

Using Discourse Analysis to Assessing Social Co-Presence

Evaluations of social presence, co-presence, and/or social co-presence allow for a dynamic assessment of a communication system, and each is particularly instrumental in establishing the importance of social aspects of interaction. Indeed, it is via the application of such social presence constructs that the significance of participants' use and perception of mediation to make a connection with other participants as well as to assert their

own involvement can be viably acknowledged. Consequently, a diligent evaluation of a communication system needs to account for the ability of the medium to allow users to meaningfully connect and interact in a way that is communicatively satisfactory and socially satisfying. However, three problems with the traditional approaches to evaluating social presence, co-presence, and social co-presence can thus far be identified. First, nearly all measurements are based on self-report data (Biocca et al., 2003), forcing researchers and analysts to rely on participant introspection as their source of data (Nowak, 2001). Second, elicitation of subjective self-reports requires access to participating interlocutors, which may not always be possible outside of laboratory settings. Studies on social presence, co-presence, and social co-presence are therefore largely experimental, and thus interactions featuring authentic, spontaneous speech in naturalistic settings are rare or non-existent. The inherent non-recognition of the value of naturalistic, non-experimental settings leads to the third problem, namely, that while the aim of presence research is to provide a model for assessing interlocutor connectedness in mediated communication, it is not concerned with the actual communication at hand. Participant interaction is merely a means to an end: once the communicative event is complete, the subjective measurements can be elicited from the participants and evaluated. In effect, the linguistic value of the communication is ignored.

The use of discourse analysis methodology is proposed as an alternative heuristic to social presence methodology for revealing and discovering aspects of social co-presence in mediated interaction. In general, discourse analysis concerns the use of language at the utterance level or beyond. Within discourse analysis, language is viewed as socially embedded and reflects social structures and relationships. Analyses are therefore ideally conducted on authentic and naturally occurring speech or texts so as to capture the mutual influence of social context and language use.

The application of discourse analysis methodology would inject a linguistic perspective in social presence research, resulting in two advantages. First, social presence research would no longer be confined to experimental settings, dependent on access to participants, and evaluations of social presence would not be solely guided by the subjective methodology of participant introspection. Second, the value of naturally occurring, socially embedded communication would be recognized, such that the evaluation of social presence constructs could be grounded in actual language use.

In this section, I have outlined problems with the traditional approach to evaluating social presence. Significantly, I have proposed the use of discourse analysis methodology as an alternative heuristic, serving to complement social presence research by allowing for non-experimental studies which position socially embedded language as central to the evaluation of social co-presence.

CASE DESCRIPTION

This chapter presents two cases of video-mediated communication featuring professional workplace interactions: a conference workshop and a project staff meeting. Each of the interactions was mediated and overtly recorded using the Marratech video-conferencing platform, and each featured professional workplace discourse. Marratech offers multiparty video, voice chat, text chat (i.e., instant messaging), whiteboard capabilities and collaborative document manipulation (see Figure 1). Participants using a web camera appear in thumbnail images; the larger video window automatically features whichever participant is the current speaker. The microphone can be permanently activated or turned on only as needed; an activated microphone is indicated by the participant's name appearing in red under his or her image in the participant window. The text box can be used to send both public and private instant messages. A keyboard icon appears when a

participant composes a public message, but there are no indications when participants write or send private messages. The whiteboard can be used for viewing uploaded documents, or for creating new ones. Additionally, there are a number of tools for document manipulation, such as moving, deleting, or pointing to parts of documents.

The participants in each of the interactions consented to being recorded (by one of the other participants), and no outside observers actively participated in the video conferences. During the video conferences, none of the participants were aware that the recordings would be used for research purposes; final consent was obtained when the recordings were submitted to the researcher/author. Only two personal variables for each of the participants were explicitly provided by the recording participant: country of origin (where each of the interlocutors is located during the video conference; see below), and professional status (see below). However, certain additional social-demographical information can be gleaned from the video conference recordings: each of the workshop participants is male; all but one of the participants in the staff meeting are male; the participants appear to be between 35-50 years old; English is used as the lingua franca (there are five native speakers of English). Finally, it can be assumed that all of the participants are at least minimally familiar with video conferencing or web-based communication technology: each of the workshop participants is involved in the use of web-based tools in higher education, while each of the staff meeting participants are involved in an EU project aimed at developing a web-based platform to facilitate inter-corporate cooperation.

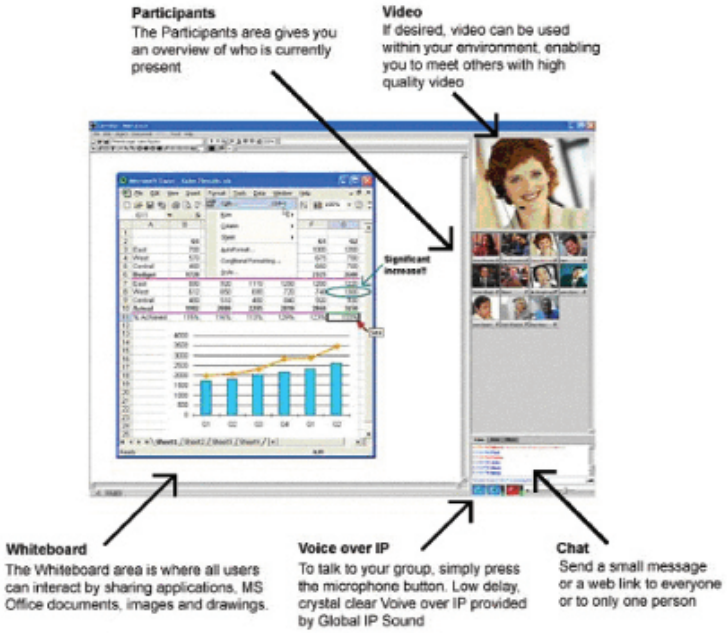
The workshop was part of a seminar series leading up to a conference and was attended by seven participants as well as five audience members[2]. The organizer of the workshop (CW-1, a university faculty member) was located in Portugal, as were three of the six discussants (CW-2, CW-3, and CW-4, all university faculty members); another discussant participated from the Azore Islands (CW-6, a university faculty member). The remaining two discussants participated from the US (CW-5, an IT consultant) and Sweden (CW-7, an IT sales representative). The relationships among the participants is unknown, but it can be concluded from the nature of the interaction that the workshop organizer (CW-1) knows each of the Portuguese participants (CW-2, CW-3, CW-4, CW-6).

The content of the workshop was presented via a PowerPoint presentation displayed on the whiteboard, the slides of which each featured a question pertaining to the topic of distance education. The workshop organizer led the discussion by commenting or elaborating on one question at a time, then systematically asking each of the discussants to provide his own answer or comment. To hand over a turn, the organizer called on each of the discussants by name and signalled the end of his turn by thanking him. The goal of the workshop was to present and discuss aspects of web-based/distance learning. The duration of the conference workshop was 47 minutes, 50 seconds.

The project staff meeting was conducted by PM-1, an EU-project leader located in Ireland. Two other project members were also based in Ireland, PM-2, a marketing consultant, and PM-3, language adaptations consultant. The five other project members participated from Scotland (PM-4, applications consultant), Norway, (PM-5, product evaluator), Sweden (PM-6, product developer), Germany (PM-7, female, language adaptations consultant), and Italy (PM-8, language adaptations consultant). The participants all know each other and occasionally meet face-to-face at EU-project events.

Like the workshop, the project staff meeting progressed according to a document posted on the whiteboard –in this case, a meeting agenda– and it was also led by one specific participant, who regularly called on the other participants by name to contribute to the discussion. However, while

Figure 1. Screenshot of the Marratech platform (© 2009. Marratech. Used with permission.)



the workshop format required each discussant to answer each question, the project meeting format reflected rather a one participant per item organization. In other words, only one participant was responsible for commenting on one agenda item at a time. The goal of this particular meeting was to review and continue planning the creation and development of a web-based platform intended to facilitate cooperation between small and medium-sized EU companies. The total running time of the meeting was 57 minutes, 21 seconds.

ASSESSING SOCIAL CO-PRESENCE

In this section, extracts from the discourse of the two video conference cases are presented, illustrating the three elements of social co-presence: co-presence, social richness of the medium, and interactant satisfaction. The examples are analyzed from a perspective of socially situated language in use, and considered in terms of how they contribute to or detract from social co-presence.

Co-Presence

Included in Kang et al.'s (2008) social co-presence construct is co-presence, understood as mutual connectedness. The following examples extracted from the video conference cases illustrate how the discourse can reveal indications of or threats to co-presence, in terms of how co-presence "renders persons uniquely accessible, available, and subject to one another" (Goffman, 1959, p. 22), and whether or not "the user is aware of the mediated other, and the other is aware of the user" (Biocca et al., 2003, p.14).

In the first example, the project staff meeting (PM) has begun with the leader, PM-1, asking the participants if they will be able to attend a scheduled conference. Example 1 begins almost three minutes into the meeting, when PM-1 directs the question to PM-8, and simultaneously a muffled, static-like noise can be heard. This example includes a number of separate extracts from the discourse of the project staff meeting, each revealing how problems with mediation, such

as the transmission of disruptive noises, can affect the participants' sense of co-presence.

In all examples, a time stamp appears in square brackets corresponding to how many minutes and seconds have transpired since the start of the interaction. Text chats have not been edited for spelling or grammar; voice chats (appearing in *italics*) have been transcribed for content only and therefore include no phonetic information or indications of timing. Voice chat, which occurs before or after the featured discourse extracts but is not included in the analysis, is indicated by <VOICE CHAT>.

Example 1: Project Meeting

[02.56] PM-1: *Okay, uh, PM-8, are you coming to that?*
<MUFFLED NOISE>
[02.59] PM-8: *um, I have um-uh*
[03.08]
PM-1: *There's some terrible feedback from somebody, I don't know. PM-3, you're not on twice, are you?*
[03.14]
PM-6: *Con- [.] Please continue. It was PM-2 playing with his microphone.*
[03.16] <LAUGHTER>
<VOICE CHAT>
[08.25] PM-8: *I'm having a very hard time hearing.*
<VOICE CHAT>
[16.10] PM-8: *Could you repeat that? It's very hard for me to understand.*

The discourse extracts featured in Example 1 illustrate how technical aspects of the mediation can threaten the sense of co-presence, understood as mutual awareness, accessibility, and availability, by serving to isolate the participant who experiences difficulties. In particular, PM-8 experiences audio malfunction. The first indication of difficulties, *um, I have um-uh*, seems to be due to another participant (PM-2), and not limited to PM-8, as PM-1 also complains. However, the audio problems persist, and the inability to receive clear audio signals affects PM-8's ability to participate. Throughout the remainder of the meeting, PM-8 contributes only once more, in answer to a direct question. It should be pointed out that this participant is also one of only two participants without a web camera, which may affect the overall sense of involvement and accountability, and almost certainly contributes to a lack of mutual accessibility and, consequently, diminished social co-presence.

It is interesting to note, however, the laughter in response to PM-6's explanation of the source of feedback: *It was PM-2 playing with his microphone.* This type of meta-modal discourse, i.e., the overt attention to a particular mode of communication (in this case, the microphone), is characteristic of video conference discourse, serving to repair breakdowns and allow participants to manage their communication (Beers Fägersten et al., forthcoming). Example 1 shows that meta-modal discourse may also contribute to social co-presence by serving to remind participants of their shared communicative context. Awareness of mediation does not necessarily negatively affect co-presence (Nowak, 2001). The participants' collective laughter reflects a sympathetic recognition of this shared environment, referred to in the meta-modal discourse. Directing attention to the medium in a way that grounds the participants in their common mediated environment can therefore serve to repair or establish co-presence.

In Example 2, PM-1 discusses a case study for which PM-4 will have the responsibility of presenting at an upcoming conference. PM-1 asks PM-3 if he will be able to access certain information needed to prepare the case.

Example 2: Project Meeting

[49.57] PM-3: *No problem, yeah. No problem, will do.*
[50.01] PM-1: *Yeah, good. Okay. So, ah, yeah. Ok, will you get in contact about that?*
[50.07] PM-3: *I will, yeah.*
[50.13] PM-1: *Yeah, PM-4,*<VOICE CHAT, PM1 speaks to PM4>...
[50.14] (at this point, PM-3 can be seen removing his headset, and talking to PM-X, a non-participant sitting next to him)
[50.16-51.14] PM-4 <VOICE CHAT, answering PM1>
[51.15-52.05] PM-1 <VOICE CHAT; PM1 resumes leading the discussion>
[52.06] PM-1:...*this is why I was talking about the case study, PM-3.* (<VOICE CHAT> continues)
[52.08] (PM-3 briefly directs attention to the computer screen, then returns attention to PM-X)
[52.57] PM-1:... *What do you guys think?*
[53.00] PM-3: *PM-1* (inaudible) *say it again? Sorry, I was talking to PM-X here.*

The use of a web camera should contribute to co-presence, by virtue of the mutual awareness achieved via streaming video images of each of the participants. Moreover, the ability to view other participants and the knowledge that one is also being viewed should further establish a sense of co-presence, resulting in behavior that indicates a sense of mutual awareness and availability. However, as Example 2 illustrates, the functionality of streaming video does not reliably compel participants to remain co-present. PM-3's behavior included marked gestures of disconnection, such as turning off the microphone, removing the headset, and engaging in conversation with a non-participant. Furthermore, by suddenly moving closer to and directing attention to his computer screen, PM-3 gave a slight indication of an awareness that PM-1 had referred to him, but no action was taken to rejoin the discussion. Not until PM-1 poses a question –after speaking for nearly two full minutes– does PM-3 mark his return to the discussion by again moving closer to his computer, putting on his headset, and then grabbing the floor by first, rather vaguely, asking what PM-1 had said, and second, apologizing and explaining his request for repetition with "*Sorry, I was talking to PM-X here*."

Much like a non-functioning mode of communication serves to isolate a participant, the deliberate non-use of one can be conceived to do the same and exploited for this purpose. By turning off the microphone and directing attention away from the screen and web camera, PM-3 isolated himself. The fact that he verbalizes what he had been doing as though he were absent and although it was visible to the other participants suggests that PM-3 does not experience a strong sense of co-presence in the video conference environment. Indeed, the mere use of a web camera does not automatically establish co-presence, as Example 2 illustrates.

Such overt disengagement as seen in Example 2 can be attributed to a number of factors, and can of course take place in non-mediated, face-to-face interaction as well. In fact, it cannot be all too uncommon that in any group meeting situation, a sub-group of participants may briefly engage in their own private, side-conversations in parallel with the main discussion. It can therefore not be reliably claimed that computer- or video-mediated interactions are *more* susceptible to such behavior of disengagement. Nevertheless, Example 2 suggests that in video-mediated communication, such deliberate disengagement is uniquely supported by the aspect of mediation. The use of several chan-

nels or modes of communication, for example, a microphone, headphones, and a web camera, raises awareness of mediation and renders the interaction non-immediate. Disengagement from the main discussion can be achieved by simply disengaging a channel or mode of communication. Thus, similar to turning away or averting one's gaze in face-to-face interaction, a video conference participant has recourse to disengagement (or, in the event of malfunction, is vulnerable to disengagement) by the disconnection of a channel. It would therefore seem that the video conference medium is *uniquely* susceptible to behaviors of presence disengagement, due to the various options of channel, or modal, disengagement.

In this section, extracts of the video conference cases were analyzed in order to assess co-presence. Two examples each illustrated how a lack of co-presence can be established according to participants' discourse and communicative behavior. The examples suggest that the greatest threat to co-presence, and ultimately social co-presence, is diminished modal capacity, such as the non-functioning or deliberate non-use of modes of communication, which serves to isolate participants, thereby compromising mutual connectedness and accessibility.

Social Richness of the Medium

In general, media richness affects the dynamics of communication (Yoo & Alavi, 2001). As Examples 1 and 2 illustrate, the deliberate disconnection or accidental malfunctioning of media resources can affect co-presence, and thus it would follow that social co-presence would be compromised as well. In contrast, access to and use of a variety of functioning media resources should contribute to social richness and ultimately social co-presence by supporting social connectedness. This hypothesis is explored in this section, where social co-presence is evaluated according to discursive indications of the social richness of the video conference medium.

The Marratech video-conferencing platform offers multiparty video, voice chat, text chat (i.e., instant messaging), whiteboard capabilities, and collaborative document manipulation. Due to the wide range of multiple and multi-user functionalities, the Marratech platform can be said to represent a high degree of media richness. In the following examples, a variety of communicative modes are exploited to mediate or complement the mediation of verbal discourse. The examples are analyzed with regards to social richness of the medium, and its ability to support interactant connectedness.

Example 3 features more extracts of the project staff meeting (PM). PM-1 has been reading aloud and commenting or eliciting comments on the agenda items, type-written and visible to all participants on the whiteboard. With the exception of the first item on the agenda, PM-1 uses the pointing tool, in conjunction with the voice chat, to direct attention to and progress through the remaining agenda items. An abridged agenda featuring a mock-up of the pointing tool is shown in Figure 2. Example 3 features two examples of this behavior from PM-1, and one example from PM-7. Simultaneous pointing and reading is indicated by underlining.

Example 3: Project Meeting

[05.55] PM-1: *And, so, okay, the next item on the agenda is the dissemination and accreditation. Maybe we can start with accreditation, PM-4, because it's quick and we can get it out of the way?*
<VOICE CHAT>
[11.04] PM-1: *So, basically what, what, what we are saying is that, uh, the content of the public website is to be finalized by the fifteenth of May.*

[14.45] PM-7: *One quest, one question here. Is are everybody, does everyone know what to do for, eh, setting, eh, the translation of the collaboration to 100%?*

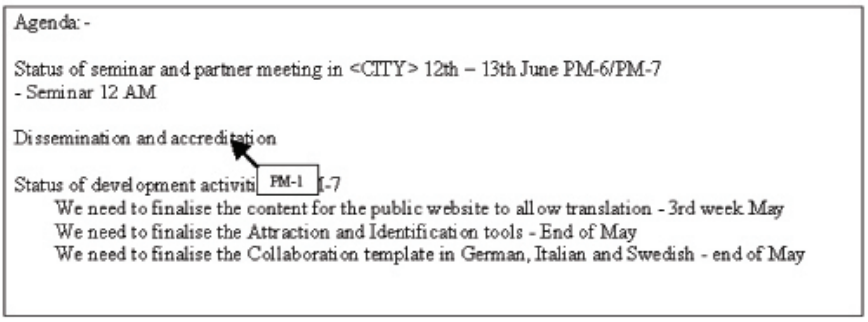
Example 3 illustrates how media richness in terms of the availability of a variety of communicative modes can contribute to social richness. First, by using the pointing tool, PM-1 establishes a visual connection with the other participants, who can see PM-1's pointer and his name on each of their own computer screens. While only two examples of this discourse behavior by PM-1 are presented in Example 3, throughout the course of the meeting, PM-1 continues to point, in underlining or circular motions, to each of the remaining agenda items as he reads or discusses them. The effect is one of repeated progress indicators on each of the participant's screens, further establishing visual connection. According to Luff and Heath (2003), social interaction is "largely accomplished in and through objects and artifacts, tools, and technologies [...]. These material resources not only feature in how people produce actions but also, and critically, in the ways in which they recognize and make sense of the actions of others" (p. 54). Equally significantly, the social richness value of this medium in terms of its ability to support social connectedness is recognized when PM-7 mimics PM-1's pointing behavior. PM-7's appropriation of PM-1's behavior suggests that it has been established as a communicative practice, and serves to reinforce their social connectedness as participants of a shared communicative environment.

Example 4 is extracted from the conference workshop (CW). The workshop organizer, CW-1, led the discussion by commenting or elaborating on one question at a time, presented in a PowerPoint document uploaded to the whiteboard. He then systematically asked one or more of the discussants to provide his own answer or comment. The discussants were called on by name, and CW-1 signaled the end of their turns by thanking them. The early establishment of this pattern of interaction was seemingly effective; as the discussants could be fairly sure of being awarded a turn, there were no overlaps and very few interruptions, each of which was performed by the organizer only. In Example 4, interruption is avoided by the use of text chat mode in parallel with voice chat. CW-5's turn has just ended, and CW-1 is introducing a new discussion point. End-of-turn time stamps are provided to indicate any overlapping between voice chat and text chat.

Example 4: Conference Workshop

[21.27] CW-1: *The next question is, what type of, um, virtual classrooms you need, and what, uh, we can do with it. We can use computer based virtual classrooms and hardware based, uh, class-, uhm, sorry, um, hardware based equipment. Um, my question is, from the mobility and interactivity point of view, can you compare it? CW-6, you have a good experience with both, I know. Uh, can you give me your opinion or can you compare both tools?* [22.10]
[22.06] CW-4: hope we will have time to discuss future of virtual classroom
[22.11] CW-6: <VOICE CHAT> [24.41]
[24.42] CW-1: <VOICE CHAT> [25.50]
[25.30] CW-6: that would be interesting

Figure 2. Project staff meeting agenda



Example 4 illustrates the use of the text chat as a supplementary mode of communication. Text chat can be used in parallel with voice chat, and Example 4 illustrates how this functionality can be exploited, for example, to make a conversational contribution without usurping the main channel of communication. Text chat thus supports social connectedness by providing participants with the possibility of engaging in parallel communication. The use of the text chat mode reflects social richness of the medium in two ways: first, CW-4 avoids threatening CW-1's face with a voiced comment, potentially disrupting CW-1's question-answer structure. Second, the hedged aspect of CW-4's comment reveals his awareness of CW-1's status of workshop leader. The pragmatic sophistication is evident: CW-4 manages to convey a particular desire, but behaviorally and discursively in a way that defers to the structure of the workshop as well as CW-1's status. Finally, CW-4's action is socially and discursively reinforced by CW-6, who not only mimics CW-4's use of text chat, but also comments positively on CW-4's contribution. In so doing, CW-6 establishes social connectedness.

In this section, social co-presence was examined from the perspective of social richness in terms of the medium's support of social connectedness. Social richness was exemplified by the use of different modes of communication in the video conference environment. The examples illustrate the dynamic social aspects of video-mediated communication, as well as how their common use serves to ground the participants in shared social behavior. Social co-presence in the video conference medium is thus proposed to be a function of social connectedness via shared behaviors which in turn suggest mutual awareness among the participants.

Interactant Satisfaction

The third element of Kang et al.'s (2008) construct of social co-presence is interactant satisfaction, which they define as "the presence of social attraction and emotional credibility between interactants." Interactant satisfaction thus refers to participants' willingness to engage in social activity and their sense of access to and evaluation of another's emotions. In the following examples, interactant satisfaction is represented by aspects of a combination of discourse and communicative behaviors which together indicate emotional credibility.

In Example 5, three participants of the conference workshop are engaged in a parallel text chat, following up on a question comparing face-to-face learning with virtual learning. CW-5 has just answered, and while CW-1 is presenting the next discussion point, CW-2 and CW-7 continue CW-5's thread.

Example 5: Conference Workshop

```
[44:41] CW-2: I agree with your
point of view. But I think that
human contact among students can
happen in the same way
[44:41] CW-2: And onn the other
end, I think it's *doable* but
not necessary immediatly
[44:42] CW-7: ☺
[44:42] CW-2: yeah
[44:42] CW-2: ☺
[44:43] CW-5: thanks
```

CW-2's contributions are directed at CW-5, who has just answered in voice chat. Although CW-2 begins his contributions with "I agree with your point of view", he in essence disagrees with CW-5, as indicated by his use of "but" twice. It is not certain at whom CW-7's smiley emoticon is directed, but it is most likely for CW-5's contribution, representing a positive attitude towards or appreciation for the comments. CW-2 is quick to appropriate its use, first acknowledging the appropriateness ("yeah"). CW-2's imitative use of the smiley emoticon is also in recognition of the positive emotive effect it can have on the potentially negative force of his contributions. Interactant satisfaction is thus clearly illustrated in this text chat both in terms of social attraction and emotional credibility, as CW-2's contributions show a willingness to engage in social activity with another (CW-5 and CW-7) and perceived/expressed appropriateness of another's emotions (CW-7's) via the use of the smiley emoticon. Finally, CW-5's acknowledgement of the positive evaluation, "thanks," represents reciprocated social attraction and emotional credibility.

The final slide of the conference workshop includes a large picture of a character from the television show "The Simpsons," Mr. Burns, with his characteristically tented hands, fingertips touching. An oval shape near his open mouth contains the words "Excelente" and "Excellent". Another oval shape in the lower left corner of the slide contains the words "Aplauso" and "Applause." Example 6 features an extract of CW-1's closing remarks, delivered as this slide was revealed, as well as the parallel text chat.

Example 6: Conference Workshop

```
[46.35] CW-1: Okay, finally
I would like an applause for
our invited and our colleagues
in there. Thank you very much
for being with us and it was
a pleasure. Uh, we overpassed
a little bit our time, but I
think it will be, it was, to to
be there.... <VOICE CHAT until
[47.50]>
[47.40] CW-4: thanks
[47.40] CW-4: a pleasure
[47.40] CW-6: nice to be here
[47.40] CW-4: nice speaking with
you
[47.41] CW-7: Bye
[47:41] CW-6: bye
[47:41] Audience1: thank you
[47:41] Audience1: very inter-
esting
[47:41] Audience2: thank you
[47:41] Audience1: thank you
CW-7
```

Significantly, as CW-1 thanks the discussants as well as the viewing audience, he repeatedly points at the words in each of the ovals, such that his pointer seems to be blinking on and off, first at 'Excelente/Excellent', and then at 'Aplauso/Applause'. This visually striking behavior in turn encourages the discussants and audience members to do the same, and for several seconds there is an intense amount of activity on the screen, as almost simultaneously a string of messages appears in the text chat box, and a frenzy of point-

ing activity occurs on the whiteboard. The effect is one of a silent but spontaneous and palpably enthusiastic echoing of CW-1's acknowledgements. This behavior thus reflects both access to another's emotions (appreciation, gratitude) and their evaluation as appropriate.

In this section, I have presented two examples of how interactant satisfaction in terms of the sense of social attraction and emotional credibility can be identified in the discourse and communicative behavior of the video conference participants. Alternative modes of communication were shown to enable participants to access each other's emotions and lend emotional credibility to their communication.

SUMMARY AND DISCUSSION OF THE ANALYSIS

Social presence theory has been associated with media richness theory (Daft & Lengel, 1984), exploring the idea that presence varies directly with the richness of a medium (Delfino & Manca, 2007; Hauber et al., 2006; Rice, 1993; Straub, 1994; Straub & Karahanna, 1998). Similarly, the evaluation of social co-presence includes the aspect of the social richness of a medium and its ability to "connect interactants socially" (Kang et al., 2008). In general, the more communicative cues a medium enables, the greater the degree of social presence (Yoo & Alavi, 2001) or, by extension, co-presence and social co-presence. Social co-presence would thus be a function of the richness of a medium in terms of "the communication channels it provides but also additional cues that an interface affords" (Hauber et al., 2005). The widely-held belief is that, ideally, the richness of a medium would enable communication in which interlocutors would fail to notice the medium or the mediated aspects of communication (Lombard & Ditton, 1997).

Video-mediated communication (VMC) quite possibly represents, as yet, the richest form of meditated communication and thus, by virtue of the many channels of communication available to its users, it should allow for a high degree of social co-presence. But just as the many modes of communication made available to users in the video conference environment, such as audio, visual, and text chat modes, can facilitate meaningful and dynamic interaction, they can also have the effect of emphasizing the aspect of mediation, serving as subtle –or, in the event of malfunction, obvious– reminders of the lack of shared physical space. This potentially heightened awareness raises the questions of how aspects of mediation affect interaction and, significantly, how channels of communication are exploited to overcome dispersion and achieve social co-presence. One of the fundamental properties of language and communication is creativity: people "adapt the essential features of interpersonal relationships to the changing features of available media technologies" (Palmer, 1995, p. 277). In other words, interlocutors in mediated communication will use, adapt, and adapt to the tools and modes of communication available to them in order to fulfil their communicative goals and connect with each other (Nowak, 2001). VMC is therefore fertile ground for social presence research, encouraging further investigations of the relationship between media richness and social presence, and continued examination of the unique discursive practices born of socially-embedded language use.

It is unlikely that social presence research that is based solely on experimental design and subjective self-reports can provide a reliable evaluation of social presence. In this chapter, I therefore argue that traditional social presence methodology could benefit from discourse analysis methodology, which would allow for the study of social presence constructs in non-experimental settings. The analysis of naturally occurring language in a socially embedded context is proposed as vital to a robust investigation of social co-presence. Ultimately, the application of discourse analysis methodology releases social co-presence research

from experimental settings and its dependence on participant introspection. The naturally occurring language and communicative behavior of mediated interaction are positioned as central to the assessment of social co-presence as a product of linguistic indicators of the presence or absence of the defining features of social co-presence. With this chapter, I hope to encourage additional cross-disciplinary approaches to video-mediated communication and social presence research.

SOLUTIONS AND RECOMMENDATIONS

In this section, I return to the original background of the cases, namely, the imminent phasing out of the Marratech client and server software and the on-going development of a Google-brand video conference platform. Based on the interaction of the video conference cases presented in this chapter, several recommendations for software features can be offered, particularly for use in the virtual workplace environment. The Marratech platform includes a wide variety of modes of communication, such as video, voice chat, and public and private text chat. It also includes whiteboard tools and document sharing capabilities. In each of the video conference cases, it can be seen that interaction is conducted primarily via the combination of two modes of communication: voice chat (requiring microphone and speakers) and whiteboard tools, and thus the specific features of these two modes of communication are first considered.

The use of voice chat allows for interaction that closely resembles face-to-face communication by virtue of its immediacy and intimacy. In fact, it is somewhat inconceivable to conduct a virtual meeting or engage in video-mediated communication without voice chat, especially in conjunction with streaming video. Oral or textual interaction without video, in the form of traditional telecommunication or computer-mediated communication, reflect asymmetries that are less socially unsettling (Sellen, 1994) than video without oral communication. The project staff meeting case featured in this chapter included several examples of such asymmetric interaction due to non-functioning modes, suggesting that oral functionality is more important to social co-presence than video or text. Video conference software should therefore prioritize alternate oral functionalities. For example, the Marratech software features dial-up capability, allowing for participation in the video conference via a telephone.

The whiteboard and whiteboard tools were used extensively throughout the video conference interactions. According to Kraut et al. (2003), "video communication systems that provide a view of the work area are likely to be more useful in supporting situational assessment and conversational grounding" (p. 22). The data presented in this chapter support this claim, as both of the cases featured conversation that centered around documents uploaded to the whiteboard. Furthermore, on several occasions, whiteboard tools such as the pointer were used in parallel with the interaction, which was argued to contribute to co-presence by establishing visual connectedness. As participants repeat or copy such paralinguistic behavior, conversational grounding is further established. It is therefore recommended that video conference software provide shared whiteboard tools.

Finally, text chat is seen to be particularly exploited in the video conference environment, and in clearly systematic ways. Each of the interactions was quite strictly structured in terms of turn-taking, in that one participant led the interactions and designated turns by calling on participants by name. This interactional structure is not unusual in the virtual environment (see Cohen, 1982; Cook & Lalljee, 1972; Isaacs & Tang,

1994; Kraut et al., 2002; O'Conaill et al., 1993; Rutter & Stephenson, 1977; Sellen, 1994), and thus features which allow for alternative modes of communication that are not disruptive to the main channel are desirable in video conference software. The examples presented in this chapter show that the text-chat functionality is used to gain access to other participants, establishing social connectedness.

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KEY TERMS AND DEFINITIONS

Video-mediated communication (VMC): Interpersonal interaction via the use of computers or other digital media featuring video and audio signals.

Video-Conference: Synchronous, video-mediated interaction featuring two-way video and audio signals between two or more interlocutors at different locations.

Social Presence: Attributed to Short et al (1976); refers to the salience of another in mediated communication.

Co-Presence: Attributed to Goffman (1959); refers to the mutual salience, availability, and accessibility of interlocutors.

Social Co-Presence: Attributed to Kang, et al. (2008), social co-presence refers to co-presence, social richness of the medium, and interactant satisfaction.

Social Richness of the Medium: An element of social co-presence; refers to the ability of the medium to connect interactants socially.

Interactant Satisfaction: An element of social co-presence; refers to participant satisfaction with regards to the social attraction of the medium.

ENDNOTES

1 Information sources: http://www.marketingpilgrim.com/2007/04/google-video-conferencing.html, http://www.marketingpilgrim.com/2007/08/google-has-no-plans-to-develop-old-marratech.html, http://www.marratech.com/forum/index.php?showtopic=2106, all accessed 04 June 2009.

2 None of the audience members actively participated or appeared on video; furthermore, their profiles and locations are unknown.