The disembodied act: Copresence and indexical symmetry in computer-mediated communication

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Abstract: CSCL has recently begun to consider how shared undersranding is achieved in computer-mediated interactional environments. In this paper, we contribute to this line of investigation by exploring how interactants produce and maintain indexical symmetry and reciprocity of perspectives in online chat by establishing reciprocal fields of copresence. We use ethnomethodologically informed analysis to describe the interactional methods by which actors establish indexical symmetry and reciprocal fields of copresence. We show how this serves as the basis for shared understanding as an interactional achievement in VMT chat. Since only the artifacts on display, rather than the embodied presence of the actors themselves, are all that is available for inspection and use by actors, we demonstrate that it is in the production and use of these artifacts that shared understandings and mutuality of perspective are achieved.

Introduction

With the advent and maturity of web-based technologies that support the fundamental features of interaction, suitable platforms now exist for meaningful interaction that exploit the production of reciprocal perspectives through the performance of disembodied actions. These technologies offer different affordances for the display of actions, the practices of reference and representation, and the achievement and maintenance of presence, copresence and indexical symmetry which account for the significant differences between interactions based on disembodied action and those based on embodied action.

In order to identify the practices associated with the production and maintenance of indexical symmetries in computer-mediated communication, we have made certain assumptions about social action and interaction. These are well articulated by Goodwin (2000), as follows:

> "The accomplishment of social action requires that not only the party producing an action, but also that others present, such as its addressee, be able to systematically recognize the shape and character of what is occurring. Without this it would be impossible for separate parties to recognize in common not only what is happening at the moment, but more crucially, what range of events are being projected as relevant nexts, such that an addressee can build not just another independent action, but instead a relevant coordinated next move to what someone else has just done" (Goodwin, 2000, p. 1491).

Central to Goodwin's description are the practical achievements of presence, copresence and the recognition of "what is occurring" in the scene. In other words, ongoing interaction arises when actors act in coordinated ways through mutual engagement with respect to recognizable and meaningful activities and shared-in-common and mutually recognizable orientations to 1) each other, 2) their actions and 3) features of the scene in which these activities are occurring.

Social interaction requires more than reciprocal contact, it requires a reciprocity of perspectives. According to Hanks (2000, p. 7), reciprocity of perspective is "neither similarity ("sharedness"), nor congruence per se, but the idea that interactants' perspectives are opposite, complimentary parts of a single whole, with each oriented to the other." It provides the basis by which an actor can reliably act as though other actors can, to some degree, see what she sees, know what she knows, feel what she feels, etc. This reciprocity of perspectives establishes a sense of copresence in which the experiences and perceptions of

the actors in a scene become practically available to each other. “The more interactants share, the more congruent, reciprocal, and transposable their perspectives, the more symmetric is the interactive field. The greater the differences that divide them, the more asymmetric the field.” (Hanks, 2000, p. 8).

An important motivation for examining how indexical symmetry is achieved is that, as a phenomenon, it relocates analytical focus away from examining understanding as a state of individual cognition to an examination of the means by which shared perspectives are mutually constituted and maintained as local interactional achievements. CSCL as a discipline has been focused on many related issues including common ground (Clark & Brennan, 1991), maintaining a joint problem space (Roschelle & Teasley, 1995), collaboration (Dillenbourg, 1999), collaborative knowledge building (Bereiter, 2002) meaning making (Koschmann, 2002) shared understanding (Stahl, 2003) and intersubjective meaning making (Suthers, 2006).

In this paper, we contribute to this line of investigation in CSCL by exploring how interactants produce and maintain what Hanks (1996) calls indexical symmetry and reciprocity of perspectives in online chat by establishing reciprocal fields of copresence(1). We show that the interactional methods by which actors establish reciprocal fields of copresence is how they “do” shared understanding in a practical sense in VMT chat. This is especially interesting since embodiment or actual, physical presence is not a requirement for interaction in the VMT chat environments. Thus, only the artifacts on display, rather than the embodied presence of the actors themselves, can provide the ony evidence for how shared understandings and mutuality of perspective are achieved and of what these shared interactional achievements consists.

Data

To examine these phenomena, we use recorded logs from student interactions using the VMT Chat System. The data consist of time-stamped chat logs and whiteboard displays of math problem solving sessions among middle school students. The chats were sponsored and conducted by the Math Forum of Drexel University as part of its participation in the Virtual Math Teams (VMT) research project, an NSF funded project at Drexel University(2).

> The VMT Project allows researchers to see how small-group interaction and group cognition take place within a specific set of circumstances – e.g., small groups of K-12 students discussing math – with a particular form of technological mediation – i.e., chat with shared whiteboard and the features of VMT-Chat rooms. Synchronous math chats are different from forms of communication that have been studied more extensively, like asynchronous science threaded discussions or face-to-face social conversation. The VMT Project is able to study and document the distinctive nature of math chats and their specific potentials for fostering group cognition. In this way, it illustrates with one small example a much broader vision of engaged learning in online communities of the future. (Stahl, 2006a, p. 7-8).

In the examples we use from the VMT chat system, we can see that despite the ‘disembodied’ nature of the interaction, actors in VMT chats are capable of engaging in meaningful social interaction. What makes this possible is their ability to use the system to display actions as responses to prior actions and to project possible subsequent actions as responses. Embodiment, in the conventional sense, is not a requirement of interaction but serves to characterize interactions of a certain sort, interactions that are conducted in certain sorts of ways. This analysis clearly aligns with the claim that face-to-face interaction is not the only way for people to successfully interact and demonstrates how the achievement of indexical symmetry in virtual environments can be accomlished.

The VMT Chat also serves as a perspicuous site for exploring how shared understandings and group cognition (Stahl, 2006a, 2006b) are achieved and maintained as interactional phenomena. Most treatments of understanding identify the location of its achievement in the minds of individual actors. If this is the case, then examining understanding becomes especially problematic in environments like VMT Chat because *neither actors nor their minds are present in conventional, embodied ways*. Only the postings and figures displayed to users are available for inspection. Rather than contrive elaborate but possibly suspect

theoretical grounds for making inferences about individual minds given this obvious and massively significant feature of chat interactions, we propose an alternative way of approaching the problem of describing shared understanding. By viewing understanding in terms of indexical symmetry and the degree of achieved reciprocal perspective, analysts can begin to demonstrate how shared understanding and group cognition are achieved through the coordinated exchange of postings and the display of whiteboard objects and the indexical symmetries they both display and achieve.

Analysis

One of the features of computer-mediated communication systems that rely on chat and virtual whiteboards is that actors are never actually present to others in an embodied sense. Their presence is established and inferred from actions originating from their "node" that change the system in ways that are observable to others. For example, the display of a posted message in the chat implies the "presence" of the actor identified by the system as the actor performing a described or displayed action, as in the system generated message in Figure 1,

> *Gerry joins the room 5/9/06 6:17:35 PM EDT.*

In this case, the message was generated or authored by the system and sent to all users, presumably because of the action described by the posted message, i.e. Gerry had logged into the system. In this instance, the action (which is not a posting) causes a posting to be displayed. In other words, the system-generated posting implies an action taken by another and describes that action. The posting also constitutes a change in the state of the system and it is from the displayed description of this changed state that it is possible for recipients of the posting to infer Gerry's presence on the system. Gerry, as an embodied actor, is not present or available to others in the system. The only evidence of Gerry's action is the system-generated display of a system-generated response to Gerry's actions.

The system-generated chat posting is actually an instance of a variety of system-generated displays that are produced when actors engage in certain actions. Another example is evident in the lower left-hand corner of Figure 1,

> *Aznx is typing.*

This system-generated message is displayed outside of the area where chat messages are composed and displayed. It is a system-generated status that indicates certain kinds of keyboard activity occurring at the node affiliated with the user name Aznx. It is a marker of presence and an indicator of ongoing action of a certain sort, though the actual message being typed is not available for inspection by actors, other than Aznx, who are observing the system. These two instances of system generated displays are examples of ways that presence is established by the system.

The appearance of these system-generated displays derives from and thus implies activity performed on the system by actors identified in these displays. While these indicators may be informative and meaningful to others, they are not, in and of themselves displays of coordinated social interaction. These displays are only markers of changes to the system's state, the origin of which is attributed by the system to actions performed at the identified actor's node. As such, they are only markers of disembodied and inferred presence. However, interaction involves more than the display of such reports. Interaction requires copresence. Copresence is a condition of and for social interaction. According to Zhao:

> Copresence as mode of being with others is a form of human colocation in which individuals become "accessible, available, and subject to one another" (Goffman, 1963, p. 22). More specifically, it is a set of spatio-temporal conditions in which instant two-way interactions can take place. *Instant* human interaction refers to real-time or near real-time human communication, which excludes diachronic exchanges like postal correspondence, and *two-way* human interaction refers to reciprocal or feedback-based human communication…. Copresence in this sense is thus a form of human colocation in space-time that allows for instantaneous and reciprocal human contact. (Zhao, 2003, p. 446)

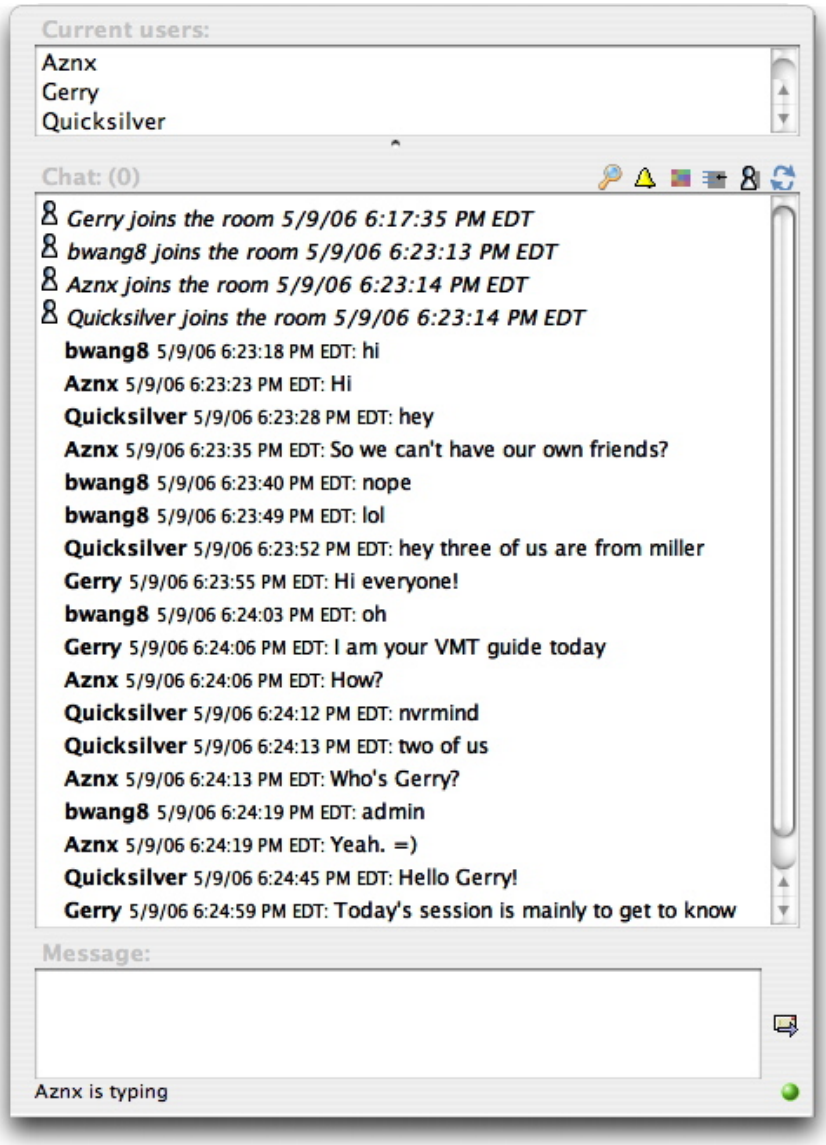

Figure 1. VMT Chat Example 1

As a contrast to the system-generated messages considered above, chat properly consists of a series of labeled, time-stamped text postings that are treated as accountable authored actions and actions that are 1) prospectively implicative with respect to the appearance of possible next authored postings and 2) retrospectively implicative with respect to the intelligibility of prior postings(3). Ultimately, it is the reciprocal nature of these posting that makes them different from system-generated messages. Not only do they demonstrate a perspective, they demonstrate perspective in ways that allow for mutual orientation. There is, built into them, the assumption that a reader will be able to occupy to some degree the perspective of the author of the posted text. Thus, it is one thing for a system to display a marker of its changed state, it is quite another to produce a change in the system in a way that is designed, recognized and treated as social interaction.

In Figure 1, we see the first chat posting as social interaction occurring with "bwang8 5/9/06 6:23:18 PM EDT: hi." This is readable as an authored social action, a greeting that calls for others to

respond. It is a textual artifact the sense of which is determined by the recipients' work of reading (Livingston, 1995) (4). In other words, readers are capable of assuming the perspective that this posting

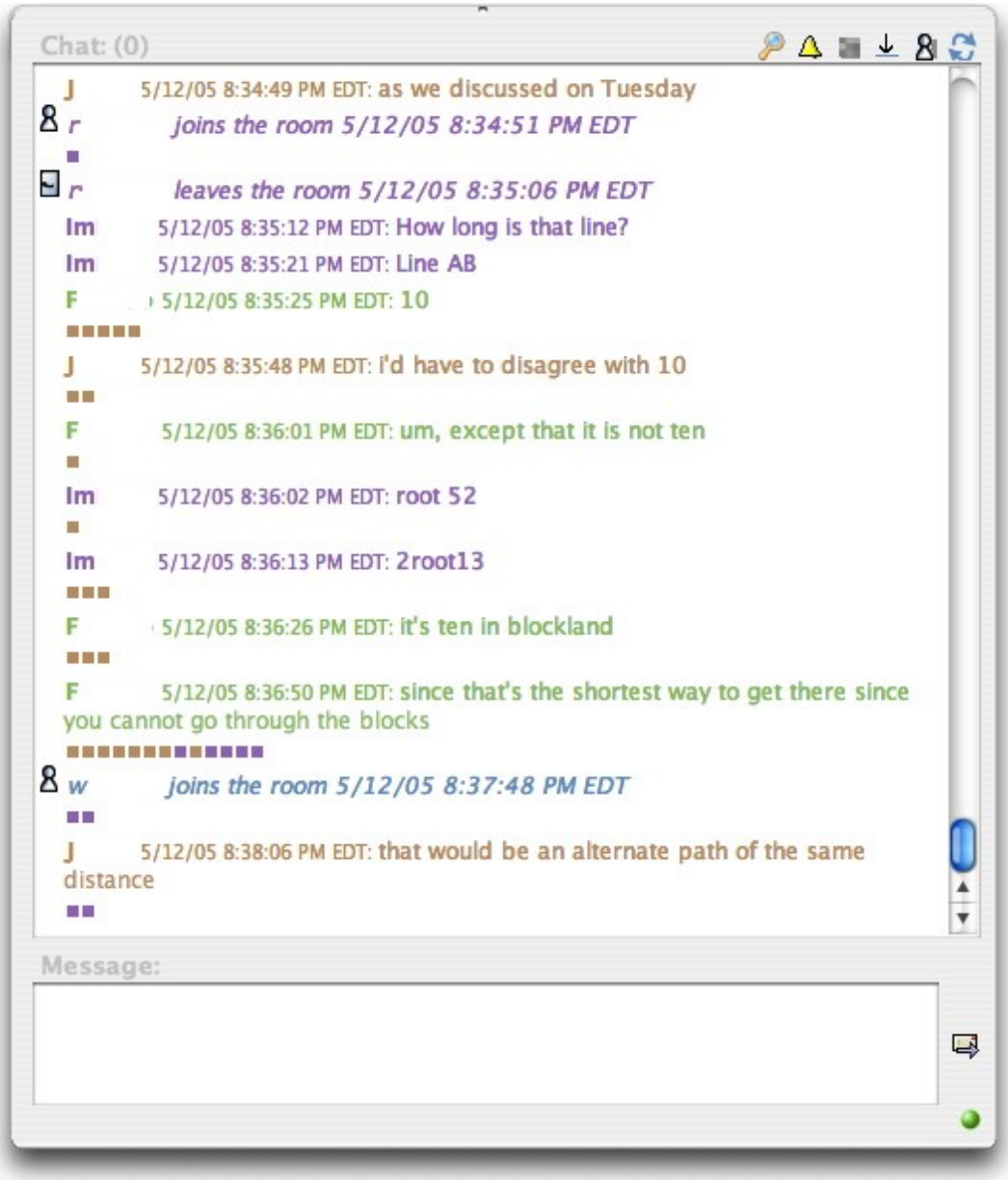

Figure 2. VMT Chat Example 2

represents and thus know how to read it as a greeting. It is the recognizable design of the postings achieved through the work of reading in the chat environment that allows recipients to regard this posting as a social action. That Aznx, Quicksilver and Gerry presumably recognize this posting as a social action is evidenced by subsequent postings that serve as in-kind responses, thus displaying that the initial posting was recognizable and treated as a greeting.

There are certain inferences that both actors and analysts make with respect to the postings depicted in Figure 1 based on features of the postings themselves. One thing to note is that each posting is assigned "authorship" by the system based on login information provided to the system. System-documented authorship is part of the way that the system itself facilitates and organizes the presentation of

postings as the copresence of the author and recipients. Furthermore, each posting is displayed sequentially in a stream of postings with an appropriate time stamp. The appearance of sequential postings allows for recipients to treat the appearance of postings as an orderly affair, making the "readability" of a posting unproblematic(5). Each posting is available as both authored, sequenced and addressed, thus serving as a method of displaying a mutual orientation to other actors, since postings are texts that others are expected to read and to which one, some or any may respond(6).

It becomes evident from an inspection of Figure 2 that the intelligibility of the chat postings requires that readers refer to and inspect the virtual whiteboard (shown in Figure 3). For example, Im posts the following text to the chat at 5/12/05 8:35:12 PM EDT, "How long is that line?" followed by an elaboration or repair "Line AB." No other markers or referential indictors are used. The intelligibility of these posts relies on the presumption that there actually are inspectable referents for recipients to inspect and makes relevant recipients' inspection of the virtual whiteboard for the referent to which these indexical expressions refer. Inspection of the whiteboard makes evident that Im is making reference to the rectangular object posted on the virtual whiteboard and the letters A and B associated with two of its corners (see Figure 3).

In addition to displaying a common orientation to objects in the virtual whiteboard, these postings also display a common orientation to the copresence of J, F and Im as participants in the chat. These postings rely on the assumption that the referential resources that make these postings intelligible are not only available to other viewers of the chat and whiteboard but are available *in the same way and with the same sense* to others. In other words, there is indexical symmetry among the authors of the postings with respect to their participation in the scene, the objects which they post both in the chat and the virtual whiteboard, their references to these posted objects in their chat postings and the properties of those posted objects.

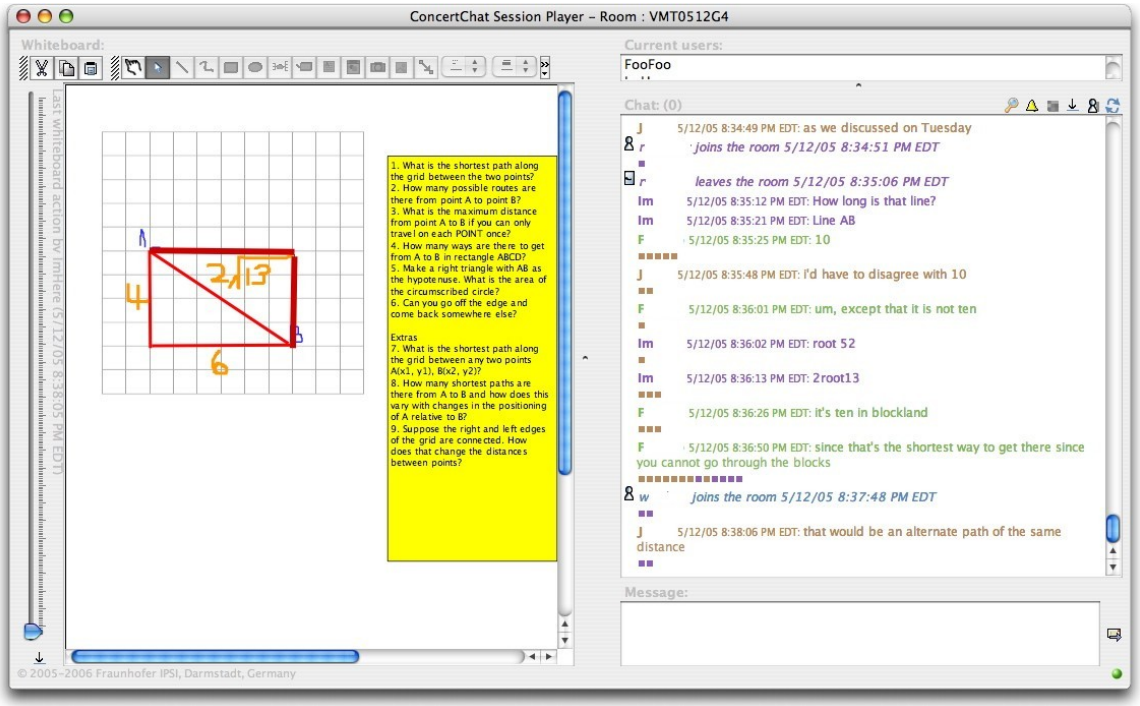

Figure 3. VMT Chat and Whiteboard

The achievement and management of indexical symmetry includes matters conventionally considered conceptual or cognitive in nature. This is in evidence in Figures 2 and 3 as well. Various conceptual objects are represented in the chat and on the virtual whiteboard as relevant matters about which inquiry can be made, for which there are shared-in-common practices by which reference can be made and

about which mutually relevant responses can be produced. For example, Im posts a query at 8:35:12 about the length of the line ("How long is that line?" "Line AB"). This invokes an organization of conceptual features, such as the various properties (length, "How long…") of recognizable and identifiable geometric objects ("that line," "Line AB"). F's response, "10," is produced without embellishment or elaboration, affirming that the referenced feature (length) of the conceptual object (the line) is both intelligible and practically describable, and that such a description can properly consist of a numerical representation. Thus F's response, "10," is presented as and is seen to be a candidate value for the line's length.

J's response to F's candidate length indicates there is no problem with its intelligibility though the correctness of the response is questioned(7). There then ensues a sequence of postings in which F initially backs down from the initial proposed length implying that there may be an alternative way to 'do' line length and thus produce a different value. This allows Im to propose an alternative candidate response, "root52" (and what is produced to be recognizable as a 'reduced form' of the initial alternative, "2root13") which implies a Pythagorean calculation. This 'length' is then displayed in the whiteboard along with the other lengths (the numerical objects "4" and "6") already displayed. The adequacy of these descriptions of length in these postings is reinforced by the complimentary depiction of length in the whiteboard figure to which the participants were referring (see Figure 3).

The production and maintenance of indexical symmetry in VMT chat with respect to conceptual objects and their features thus involves:

- displaying authored text postings for other participants to read,
- displaying conceptual objects using textual references, graphical displays, deictic references, etc., for others to inspect
- providing participants with ways of locating and identifying displayed conceptual objects, and
- using these text postings and object displays according to recognized and proper practices of use that demonstrate that actors are copresent and share a mutual and symmetric orientation to each other and the referential objects and resources of their interaction.

Discussion

In this paper, we have identified in a preliminary manner various ways that actors, in online chat interactions with a shared whiteboard, orient to each other and to their tasks in working collaboratively to explore problems of mathematical interest. We have described certain ways that the system itself works to make present actors in the system and the ways that actors use chat and whiteboard postings to establish and maintain copresence and indexical symmetries with respect to who they are to each other and the various other objects and representations of mathematical relevance to their problem solving activities.

In doing things together, people are faced with the problem of assuring themselves that they are all more or less "on the same page" with respect to the activities in which they are engaged. This loose description identifies a sense of indexical symmetry (Hanks 1996) among actors with respect to the relevant features of their interaction. Such symmetries are managed achievements, not pre-existent features of the interactional space (Garfinkel, 1967; Sacks, 1992; Goodwin, 2000; Hanks, 1996, 2000). As such, it takes work on the part of interactants to demonstrate and display symmetrical orientations to the referential relevancies of the interaction. When actors have achieved indexical symmetry in a scene, they are said to be "copresent" (Hanks, 1996). According to Hanks, the "reciprocal field of copresence is what provides the background information needed to fill in the unstated in speech" (1996, p.148).

Indexical symmetry is the ground upon which shared understandings are established and maintained. In face-to-face interaction, indexical symmetry is achieved, demonstrated and maintained through the embodied actions of indexical reference. These actions, which are the observable and reportable organization of actors' participation in their interaction, constitute their shared understanding. Shared understanding thus is an interactional matter. In chat-based computer-mediated communication, the procedures by which users "use" the system, and the ways that the chat system responds to that use, is treated by users as interaction. This kind of interaction is distinguished from other forms of interaction by virtue of the fact that actors are not actually present to each other, at least not in any embodied sense. The

disembodied nature of chat interaction presents challenges and opportunities to users (Garcia and Jacobs 1998, 1999). In this paper, we explore how copresence and indexical symmetry are established in chat.

Part of the practical achievement of interaction therefore involves establishing and maintaining presence, copresence and mutually sustainable recognition of features of their interactional space. In other words, actors must be recognizable as actors in the scene. They must be recognized as actors in the ways they participate, in ways that are intelligible to themselves, other actors in the scene, in ways that display that they are participants. While Hanks (1992, 1996, 2000), Goodwin (2000, 2003), Hindmarsh and Heath (2000) and others have explored these issues in face-to-face interactions, we propose to examine these issues in an online environment in which actors interact by posting text messages to a chat system and posting objects and text documents to a linked virtual whiteboard.

In computer-mediated communication, the achievement and maintenance of indexical symmetries can be particularly problematic, especially in circumstances where actors exhibit no actual, embodied presence in the scene, but where their presence and copresence is inferred from the production and display of artifacts in the scene, artifacts and objects that are the outcomes of 'invisible' practices, practices performed but not observable in their accomplishment by other participants. Examples of such practices are posting a text message in a chat environment or posting a shape on a virtual whiteboard. Texts and shapes are authored objects but are not themselves their own authors. In virtual, computer-mediated environments, these objects are "traces"(8) of their authors where the authors of these texts and shapes are disembodied presences, available by practical inference from the displayed evidences of their unobservable actions: from the texts they post, from the objects they draw, from the system notifications of actions being performed, etc.

Endnotes

(1) According to Hanks (1996, p. 148), the "reciprocal field of copresence is what provides the background information needed to fill in the unstated in speech."

(2) "The Math Forum is a leading center for mathematics and mathematics education on the Internet. The Math Forum's mission is to provide resources, materials, activities, person-to-person interactions, and educational products and services that enrich and support teaching and learning in an increasingly technological world" (The Math Forum@Drexel, 2006).

(3) In this regard, chat postings are similar to "utterances" produced in face-to-face interaction. One massively consequential difference is that an utterance is an embodied action whereas a chat posting is not.

(4) Rather than interact through emergent talk, chat participants interact by reading and producing texts and text fragments. In online chats, *the actors' work of posting and reading text messages is how they organize, constitute and participate in chats.* According to Livingston (1995), "The work of reading is the work of finding the organization of that work that a text describes. The contextual clues in a text offer the grounds, from within the active participatory work of reading, for finding how those clues provide an adequate account of how the text should be read." (p. 14). Thus a text is organized to inform and instruct readers with regard to how it is to be read. Each text provides clues for how readers are to make sense of it and, in the case of online chat, how they are also to make sense of it in relation to previously posted texts.

(5) Readability is different from intelligibility. In conventional face-to-face conversation, overlap presents problems with intelligibility because it is hard to "hear" what people are saying when they are talking at the same time. While postings may have identical time stamps, there is no possibility of "overlap" in any conventional face-to-face conversational sense since the system automatically assures the sequential display of all postings. Of course, recipients may have to work out how postings are threaded, but the problems of intelligibility from overlap in face-to-face conversational interactions do not arise and the associated repair procedures do not apply.

(6) Though a given posting is presented so as to be read, there is no guarantee that any subsequent postings will be produced as a response to the given posting. Actions are always contingent and in chat environments, postings need not produce responses, even when responses would be appropriate.

(7) See Macbeth (2004) for an interesting discussion of correction and repair in educational settings.

(8) We borrow the concept of a trace from the literature of critical theory and deconstructionist philosophy, most notably from Derrida (1976).

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