

# Texts-In-Interaction: Collaborative Problem-Solving in Quasi-Synchronous Computer-Mediated Communication

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**Abstract.** Quasi-synchronous chat consists of the production and posting of text messages in an online environment. It differs from face-to-face talk-in-interaction in a number of important ways that are significant for participants in the chats and methodologically in terms of the way analysis can be conducted and the kinds of analytical claims that can be made. The perspective adopted in this paper is that chat interaction can be considered the computer-mediated production and reading of texts-in-interaction. However, since the production of a posted text is usually not available to anyone but the author of that text, I am not concerned with the production of posted texts. Rather, I am concerned with the way texts, as produced artifacts, are organized to be read by recipients. In particular, I consider ways in which quasi-synchronous chat postings provide instruction in their design for how they are to be read by recipients of these postings.

Keywords: Quasi-synchronous online chats, reading, interaction, collaboration, conjoint participation.

## INTRODUCTION

In a quasi-synchronous online chat, (Q-SOC), postings are not meant to be ‘heard’. Instead, *they are designed to be read* by those who participate in the chats. Because the composition of posted texts is not witnessable to anyone other than the actor who is typing the text, recipients only read text as presented to make sense of it. In F2F, we witness the false starts, the repairs, and all manner of difficulties in getting things said. There is no particular equivalent in Q-SOC. Recipients do not see the false starts, the erasures or corrections a writer performs because the writer’s actions are unavailable to readers. All recipients see is the completed text as the finished product of the writing process. This difference between Q-SOC and F2F is consequential for how participants make sense of what they are doing when they are reading, writing and posting text messages during chats. The analytical consequence of participants’ inability to use the production of texts as an interactional resource is that only that which is posted as the enduring record of their interaction can be examined.

## Reading’s Work

In their seminal work on online chats as interactional phenomena, Garcia and Jacobs (1998, 1999) have noted that turn-taking, turn-allocation and repair in Q-SOC differs significantly from the way that turn-taking, turn-allocation and repair are performed in F2F (Garcia and Jacobs 1998, 1999). The most important conclusion to be drawn from Garcia and Jacobs (1998, 1999) is that Q-SOC are not, in fact, “speech” exchange systems. Rather they are “text” exchange systems that display, in the online posting of texts, the organization of interaction among participants in these chats. While there are certain similarities to F2F conversational speech exchange systems, the differences between them are significant to the way that interaction is achieved.

The interactional work done during Q-SOC consists of posting and reading text messages. Posted messages are *designed to be read* by recipients. These texts are contingent, situated and produced to be interactional resources in quasi-synchronous online chats. This contrasts with face-to-face interaction in which speakers speak, recipients listen to the production of that speech and collaborate through their talk and other observable resources (gesture, etc.) to collaboratively constitute, make sense of, and participate in the emergent interaction. In computer-mediated quasi-synchronous online chats, *the actors’ work of posting and reading text messages is how they organize, constitute and participate in chats*. Rather than interact through emergent talk, they interact by reading and producing for posting texts and text fragments. 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 Q-SOC, how they are also to make sense of it in relation to previously posted texts.

## DATA

The data I inspect for this analysis consist of time-stamped chat logs of math problem solving sessions sponsored by the Math Forum of Drexel University. The chats were advertised, sponsored and conducted by the Math Forum as part of its participation in the Virtual Math Teams (VMT) research project, an NSF funded project at Drexel University.<sup>1</sup>

Time-stamped logs of the chats were recorded at the Math Forum server that received the posted messages. The text messages as they were posted to the server were available for inspection, the sequence of their posting and the durations between postings in the sequence. For the purposes of this analysis, the use of chat logs alone for analytical inspection is consistent with the assumptions made about the interactional environment of Q-SOC.

These chats usually involved two or more participants and a facilitator. The participants oriented to and understood that the chat had a specifically declared institutional ‘purpose’ and affiliation to which they oriented and by which they managed themselves and were managed by the facilitator. This so-called ‘purpose’ was to collaboratively work together in the chat to produce solutions to posted math problems. This was made evident in the way that participation in the chats was allocated and managed by the participants and the staff at the Math Forum. Access to PoWwows (these online chat sessions) was available only on specific occasions and through the auspices of the Math Forum. The participants had 1) self-selected to visit the Math Forum website and 2) self-selected to register for PoWwows. Participants were screened in advance of their participation with respect to their level of math proficiency and were informed of the purpose and so-called ‘rules’ of the chat.

## ANALYSIS

Garcia and Jacobs (1999) and Schönfeldt and Golato (2003) have prepared discussions of classic conversation analytic concerns with respect to chats. These include turn-taking, turn-allocation and repair. In this analysis, I consider the way that participants managed their participation in the chat to do problem-solving work as a collectively and collaboratively achieved outcome. What makes this analytically interesting is that certain interactional resources by which actors constitute themselves as a collectivity in talk-in-interaction (Lerner 1993) are not available in Q-SOC. The reason for this has to do with differences in the technologies that support and sustain these different systems of interaction. For example, it is impossible to collaborate in the conjoint production of any given text posting, although it is possible to conjointly constitute a sensible sequence of postings. Furthermore, chat participants cannot monitor recipients for how they make sense of that as that post is being produced. The sense they make derives exclusively from the way these texts are designed to be read.

In Q-SOCs, the production, transmission and receipt of posted text messages are separable actions. The most significant consequence of this is, as Garcia and Jacobs (1999) point out, that the monitoring and execution of these actions are more loosely linked to the actions of other chat participants than the monitoring and execution of conversational actions among interlocutors in F2F interaction. Furthermore, where violations of projected next-turn actions are treated as repairable or accountable matters in F2F interaction, they are routinely treated as artifacts of the technology by which Q-SOCs are achieved and thus do not always warrant the production of repairs or accounts. Of course, repair happens in chats, but its organization and achievement are subject to the technical constraints that govern the posting of messages (Schönfeldt and Golato 2003).

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<sup>1</sup> “The VMT Project investigates issues of online collaborative math problem solving by extending the Math Forum’s popular “problem of the week” service for use by small groups of students.” (<http://mathforum.org/wiki/VMT/>). “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” (<http://www.mathforum.org/about.forum.html>).

## COLLABORATION AS READING'S WORK

Written texts in quasi-synchronous online chats are recognizable as utterance-like constructions that make use of textual rather than spoken resources to provide for their intelligibility. The work that these texts do is accessible and made intelligible in the way they are designed to be read and in the way interactants come to read them.

### Extract 1

The second extract from a problem solving chat affords the opportunity to examine in detail certain chat features that emphasize the textual properties of chats and how these properties impact interaction. In this excerpt, we can see how participants in the chat organize themselves through their postings to begin work on the problem of the week (shown in Figure ).

**Ame (8:02:54 PM):** Ok I guess we can start now

**Fir (8:02:57 PM):** just a minute. i'm uploading it

**Azn (8:03:01 PM):** ok

**Lif (8:03:02 PM):** ohk

**Eef (8:03:02 PM):** *alright*

**Ame (8:03:04 PM):** Sure thing

The fragment begins with an invitation from Ame to begin working on the math problem that is presented as an assessment of the readiness of all participants. This assessment is localized as Ame's position and is epistemically downgraded to a possibility that others would be expected to confirm or deny ("I guess we can ..."). Furthermore, it begins with an activity transition marker "Okay" and is addressed to recipients as a collectively through the use of the first person inclusive plural pronoun "we". By including all these elements in a single posting, Ame presumes that recipients can recognize this as both an assessment of recipients readiness to take up the math and as a bid to actually do so. It is only by *reading* this posting in a way that allows it to be interpreted as such an assessment and bid that recipients come to treat it as such. Evidence that they do is provided by the responses produced.

Fir's posted response is designed to be read in two parts: the first part "just a minute," calls for recipients to temporarily refrain from starting and the second part "i'm uploading it" provides a warrant for his request, and serves to 1) challenge Ame's presumption that all are ready to begin and 2) constitute what being ready to "start now" might mean for recipients. The indexical term "it" is not identified and is the activity of "uploading it" is treated as relevant and intelligible to recipients. Even if recipients agree to wait "a minute", there is nothing to prevent them from examining the problem or working on it "offline" at their various locations. This leads us to consider the question, 'What is being regulated by this request?' I would argue that what is being regulated in Fir's post is the activity: 'working on the problem conjointly'.

The suspension of conjoint consideration of the problem is temporally bounded by what participants take to be an appropriate duration for uploading and inspecting the problem. Such a suspension of conjoint consideration of the problem could be problematic for participants if it extends beyond some appropriate duration. Furthermore, the suspended conjoint consideration is treated as something members are capable of performing, thus implying that it is not problematic for participants. Yet it remains to be seen at this point of what such conjoint participation might consist.

**Eef (8:04:05 PM):** *r we ready yet?*

**Ame (8:04:31 PM):** We should start talking

**Eef (8:04:40 PM):** *yes, i conker*

**Lif (8:04:51 PM):** has anyone come up with an equation or expression to solve for n

After a short time of approximately a minute or so, Eef poses a query to all recipients as a collectivity, asking them "r we ready yet?" (8:04:05 PM). Ame puts forward an affiliative position "We should start talking" which is endorsed by Eef. This sequence of postings is followed by a post at 8:04:51 PM from Lif who formulates the first query regarding the problem. With this move, and without postings indicating any objection from other recipients, participants in this PoWow collaborated to begin conjoint consideration of the problem.

The posting by Lif at 8:04:51 PM also serves to identify for participants what conjoint consideration of the problem might be for them, i.e., coming up with an equation for deriving values for the variable n. This formulation relies on participants' familiarity with the problem in its textual representation and this method of interaction using text messaging. Thus, Lif's posting embodies the presumption that others can interpret "n" appropriately as the variable in the mathematical expressions contained in the problem text.

Eef then produces a post that suggests that he had used the quadratic equation and calls on any recipient, who also used the quadratic equation, to post an acknowledgment.

**Eef (8:05:14 PM):** *did n e 1 else use the quadratic equation?*

**Azn (8:05:28 PM):** i kinda did...

**Eef (8:05:35 PM):** *me 2*

**Ame (8:05:39 PM):** I got a inequality

**Azn (8:05:46 PM):**  $n^2 + 4n + 4...$

The abbreviational forms used by Eef, “n e 1” for “anyone,” are typical of chat abbreviations but also points to the importance of readings work. In particular, “n” and “1” in this post are designed to be read as keystroke-saving abbreviations that rely on similarity of sound when pronounced rather than similarity of form. This reliance on spoken forms for textual representation underscores how speaking can be used as a textual resource in chat.

Azn acknowledges using quadratic equations as a first effort but the modifier “kinda” and the ellipsis combine to suggest the possibly he did not get very far. The ellipsis and other such markers are textual indexical phenomena whose sense is determined by their use in postings. (An alternative sense of the ellipsis emerges only as a result of a subsequent post by Azn, which is discussed below.)

In the next post, Eef explicitly declares that he used the quadratic equation. Doing so served to constitute a sub-association of participants who had pursued this strategy. Ame, on the other hand, indicates that he had taken a different approach, implicated by the reference to an “inequality.” The subsequent posting by Azn describes the quadratic equation he had deployed. This sequence of postings at this point is a fairly typical example of the complexity of sequencing faced by participants who have no access to the work others do to compose their messages. Azn’s post at 8:05:46 PM relevantly can be seen as a continuation of his posting at 8:05:28 PM. This posting in fact modifies the sense of the ellipsis in the 8:05:28 PM posting, shifting its sense from one of marking uncertainty to projecting an subsequent continuation, and providing grounds for suspecting that the ellipsis in the 8:05:46 PM posting also may be projecting a continuation.

Despite the fact that Ame appears to have used a different approach from the others, all three participants at that point are busy describing systematic and mathematically coherent approaches for obtaining a value for n. Fir however used trial and error:

**Fir (8:06:08 PM):** i don't know what ur talking about! i just picked numbers out ofthe air:-[

**Fir (8:06:14 PM):** :-\

Fir’s two postings are a complaint with an account and emoticon, followed by a post consisting solely of an emoticon. Emoticons are textual objects used to convey the emotional valence of a posting. As semiotic resources, they constitute text-based interpretive methods for use by authors and readers. At this point, Fir uses the resources available to an author of text messages and that recipients will recognize to indicate 1) he, Fir, is having a problem with what they are doing and 2) that he is not able to engage with others in what they have begun as conjoint collaboration. This leads to the next post by Ame:

**Ame (8:06:21 PM):** Lets start over

**Fir (8:06:27 PM):** please do

**Ame (8:06:27 PM):** Who thinks they got the farthest

**Eef (8:06:28 PM):** *alright*

**Fir (8:06:39 PM):** i finished it.

**Ame (8:06:43 PM):** Great

**Lif (8:06:46 PM):** wonderful

The suggestion to “start over” leaves implicit what needs to be restarted though Fir, in the next posting, appears to understand clearly what is meant. The proposal appears to call on recipients to stop pursuing their discussion in terms of mathematical strategies and to restart using different mathematical resources that would allow Fir to participate in particular ways. Again, the collective plural pro-term is implicated in the construction, amplifies Ame’s proposal as a way of reasserting the collaborative nature of their association.

Rather than wait for others to display agreement, Ame queries any recipient to take a position as having gone “the farthest”, presumably toward solving the problem. Ame’s query constitutes another framework for conjoint collaboration that is organized around the solution rather than the strategy used to produce the solution to the problem. Interestingly, Fir, for whom participation had been problematic, then declares that he “finished it” (8:06:39 PM) implying that he is now in a position to participate.

Eef at 8:06:28 PM appears to be responding to Ame's previous suggestion at 8:06:21 PM that they "start over". Because sequencing of postings is not under the control of participants but is determined by the server (Schönfeldt, and Golato 2003) and because participants cannot witness the production of text messages by others (Garcia and Jacobs 1999), dislocations of text messages occur. Where this would be treated as a candidate for repair in a face to face interaction, it is deemed to be part of reading's work to sort out the threading of postings as they arrive on the computer screen.

## DISCUSSION

In Q-SOC, posted texts are written to be read. They emerge as part of a sequence of postings and are produced to be read in a certain order. As such, they are a means of engaging in interaction with other posters of text messages. Chats are similar to talk in that they both involve the production and organization of sequences of meaningful actions. Where they differ is in the kinds of actions performed and the sequential organization of that performance.

In chat, participants cannot examine or experience the production of each other's postings. Therefore, a strict sense of the sequentiality of posted texts is often suspended and the coherent threading of posted text messages is achieved by participants as postings are posted and read (O'Neil & Martin, 2003). Because many chat systems retain posted messages for recipient review at any time, reading's work need not rely on a strict sense of sequentiality since prior texts can be recovered. One consequence of this is that the nature of turn taking and the work required to determine the threading of postings is a normal part of reading's work in Q-SOC.

Finally, the way reading's work is accomplished is part of the way participation is organized in chats. Collaboration and conjoint participation in Q-SOC are achieved primarily by posting messages to which others respond. Collectivities emerge through and are implicated by the use of collective inclusive pro-terms in the texts and in the way that participants display their alignments by posting messages of their own. It is only through postings and the way that these postings are organized to be read that collaborative and conjoint work is achieved.

Deictic and indexical work is achieved differently in text messages than in face to face interaction. One of the features of indexical work in face to face interaction is the way that deictic and indexical utterances rely on embodied action to give specific and local sense to spoken utterances. Embodied action is not available as a resource in text messages. One way that such activity is approximated in textual terms is the use of emoticons and other such textual devices. Other ways that we have seen in this paper include reliance on shared documentation, labeling of diagrams and reference to these labels, etc.

This work represents a first step in CSCL to understand chat as text-exchange system. In considering how to design text exchange systems to promote collaborative learning, it is important that we begin to understand the way such text exchange systems are currently used. This way we can see how participants organize and manage their interactions in textual terms. In so doing, we will be in a better position to consider the requirements of such a system based on how systems are actually used, rather than on how we think they should be use.

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## REFERENCES

- Garcia, A. and Jacobs, J. B. (1998) The Interactional Organization of Computer Mediated Communication in the College Classroom. *Qualitative Sociology*, **21**, 3, 299-317.
- Garcia, A. and Jacobs, J. B. (1999) The Eyes of the Beholder: Understanding the Turn-Taking System in Quasi-Synchronous Computer-Mediated Communication. *Research on Language and Social Interaction*, **32**, 4, 337-367.
- Livingston, E. (1995). *An Anthropology of Reading*. Bloomington: Indiana University Press.
- O'Neil, J. & Martin, D. (2003). "Text chat in action." In *Proceedings of the 2003 international ACM SIGGROUP Conference on Supporting Group Work*, pp. 40-49.
- Schönfeldt, J. and Golato, A. (2003) Repair in Chats: A Conversation Analytic Approach. *Research on Language and Social Interaction*, **36**, 3, 241-284.