Typing-Differences in Simultaneous Typed Chat

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Abstract. Full-duplex conversation where everybody can talk and hear at the same time is made possible by typed-chat computer-mediated communication. This experiment examines typing logs from students engaging in overlapping dialogue chat in small-group problem-solving sessions. When students are typing in the presence of overlapping dialogue there are measurable differences in their typing behavior. A difference measured here is text-deletion behavior. Deletions increase in the simultaneous typing regime. The reasons for this difference remain to be explored.

Keywords: Typed-chat, full-duplex dialogue.

1 Background

1.1 Introduction

The COMPS project deploys and studies small-group collaborative problem-solving exercises in college computer science and mathematics classes [3]. A striking feature of the chat environment is it permits everybody to type and see and respond to each other's dialogue all at the same time. Full duplex typed computer chat differs from ordinary computer chat [4]. Effectively there is no such thing as interruption. A second person starting to type contributes to the conversation immediately, but in no way affects the first person's ability to type.

How students utilize this non-natural mode of communication when collaborating in a problem-solving dialogue is still relatively unexplored. The hypothesis considered in this paper is that since the communication medium does not impede simultaneous chatting in the same way that person-to-person talking does, chat behaviors won't differ compared to when a single person has the floor.

This paper shows one measurable difference in editing behavior. Students delete text more often when there are other students typing.

1.2 COMPS Exercises

COMPS small-group problem-solving exercises [3] are designed to address student conceptual knowledge through group cognition. The problems for discussion typically have many parts, often with multiple-choice answers. The exercise protocol discourages social loafing by requiring students to come to agreement at various points in the conversation. There is an answer window where the students construct an answer explanation for the TA, who must check it. The TA then engages with the students via the typed-chat conversation, and assists if they are off track [3].

1.3 Simultaneous chat

Allowing everybody to chat simultaneously could potentiate student engagement, as it isn't necessary to wait for one's fellow students to relinquish the floor before contributing one's own thoughts into the discussion. Allowing everybody to chat simultaneously also should discourage social loafing, one student cannot dominate the conversation by aggressively interrupting others. However the possibility exists that absent enforced turn-taking, full-duplex communication enables students to ignore each other and forego transactive conversation.

Earlier work from the COMPS project has shown that in the simultaneous typing regime students still engage in transactive turn-taking conversational behaviors where they respond to each other [1]. Interactions commonly take several forms [2], viz:

1. Student B responds to something that A just said, while A continues uninterrupted.
2. Students B and C both respond to student A's utterance.
3. Students A and B utter unrelated dialogue turns, each continuing earlier discourse threads by possibly other people.

What these behaviors have in common is a student does not need to respond to the other person's keystrokes in real time. An utterance usually responds to keystrokes that happened before the utterance commenced. The novel medium of communication therefore does not, in this aspect, produce novel discourse behaviors different from the Initiate / Respond / Follow-up structure discovered by Conversation Analysis [5].

2 Experiment and Discussion

The data for this study were 56 small group conversations in a Java class of approximately one hour each. Almost all conversation groups had 3 students, with one TA or professor attending to the conversation part-time. Keystroke log records were separated into those that occur when one person is typing (the “alone” condition) and when several people were typing (the “simultaneous” condition). 2.0 seconds time separation from all other participants was needed to characterize a keystroke as “alone.” Table 1 summarizes the results of tabulating deletion and non-deletion keystrokes in the alone and simultaneous conditions. Considering overall averages among all participants in all conversations, deletions increased from 8.9% to 13.9% of keystrokes

when other people were typing. A two-tailed pairwise Student's t-test showed the difference was significant, with $p < 0.001$. The data were also analyzed as 163 separate pairwise comparisons, each comparison representing the behavior of one person in one conversation who had contributed at least 80 keystrokes in both the alone and simultaneous conditions. Paired t-test also showed deletions were significant with $p < 0.001$.

Table 1. Deletions as a fraction of all keystrokes, typing alone and simultaneously.

N=56 Dialogs	Alone	Simultaneous
Keystrokes total	246274	47890
Mean keys/dialogue	4398	855
Deletion fraction	0.089	0.139
Std. Dev (N=56)	0.034	0.077

We have yet to explore whether one student's increased deletions licenses other student to start simultaneous dialogue, or whether the presence of other students on the conversational floor permits one to spend more time editing. Earlier work showing that pauses are transition-relevance points [5] permitting turn-taking suggests the former is likely [2]. In addition, we have found changes in typing speeds which vary by individuals, so it is quite possible that deletion behaviors vary by individuals also. Correlating full-duplex dialogue behaviors with transactive dialogue moves also remains to be done.

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