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# Mediated Chat Development Process: Avoiding Chat Confusion on Educational Debates

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**Abstract.** The objective of this research is to reduce confusion in chat conversation, which is the main problem regarding the use of chat tools for holding online course debates. This problem is investigated using a Groupware Engineering approach. A number of successive versions of the Mediated Chat tool have been developed as part of this research. This research aims at producing an enhanced chat tool designed for educational debates through which a chat conversation could be followed more easily.

**Keywords:** Chat Confusion, Education Debates, Online Education

## 1. INTRODUCTION

Textual chat tools have achieved widespread popularity and, increasingly, people want to use these tools in activities that go beyond socialization and recreation. In this research project, a chat tool for running synchronous debates as part of online courses is investigated.

Among the potential educational uses of chats is the establishment of a space to explore new educational models where there is an absence of expository content, a high level of dialogue and the de-characterization of the teacher as a repository of knowledge. It has been identified that informal conversation, which is typical of this tool, makes it possible for learners to better perceive others and to better see themselves as part of the group. This provides a space for emotions that reduce the feeling of something impersonal and isolated. The continued and integrated use of chat tools for educational activities is a way of keeping learners motivated and engaged in order to guarantee the success and continuity of distance learning courses.

However, conversational confusion has been identified as the main limitation of the educational use of chat tools. The participants of the synchronous debates being researched, although usually excited about the activity, frequently complain about the chat confusion: "It is not easy to communicate through such a chaotic tool"; "I liked this debate...however, I couldn't follow what was being discussed very well". In a chat with a number of participants talking at the same time, the result is a tangle of messages where it is sometimes difficult to identify who is talking to whom about what. This problem has been called Chat Confusion (Pimentel, Fuks & Lucena, 2003; Thirunarayanan, 2000).

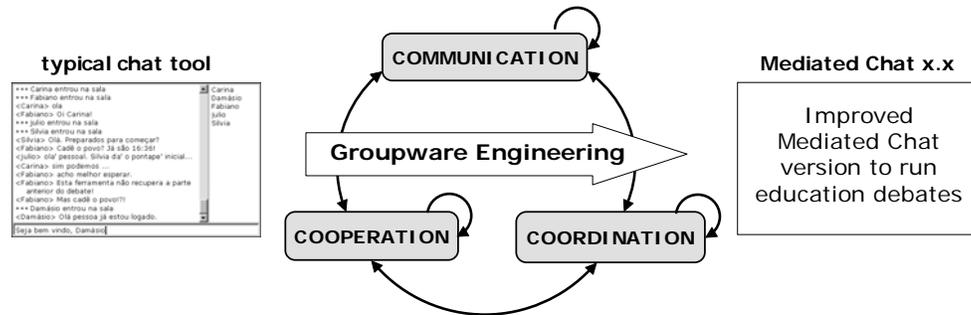
The objective of this research is to discover which problems cause the participants to consider the chat conversation confusing. Using a Groupware Engineering approach, problems have been identified and mechanisms for chat tools that can avoid chat confusion have been developed—this research methodology is presented in section 2. For each problem identified, a new version of the Mediated Chat tool is developed and then experimented within an online course—the versions and their evaluations are presented in section 3. The conclusion of this research is presented in section 4.

## 2. GROUPWARE ENGINEERING TO DEVELOP THE MEDIATED CHAT TOOL

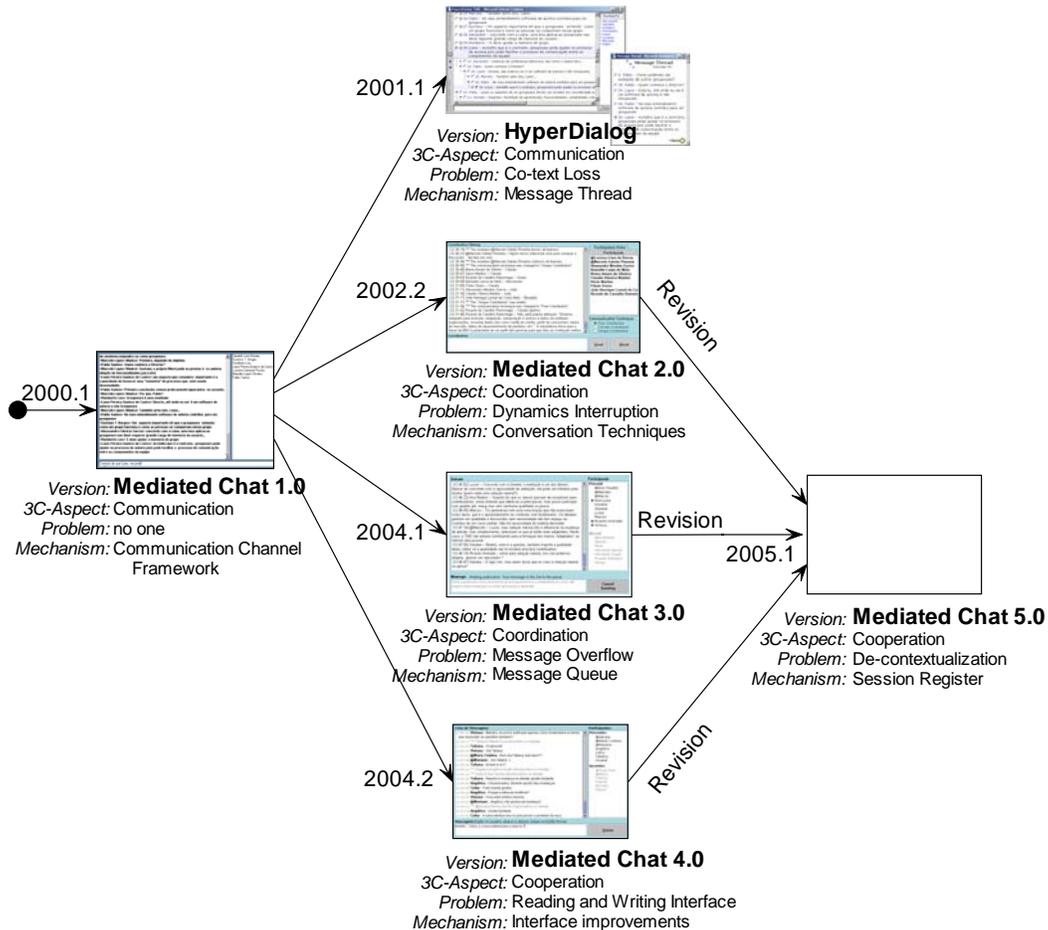
The AulaNet environment is a Learning Management System based on a groupware approach that has been under development since June 1997 by the Software Engineering Laboratory of the Catholic University of Rio (PUC-Rio). The AulaNet is a freeware application available in Portuguese, English and Spanish versions at <http://groupware.les.inf.puc-rio.br> and <http://www.eduweb.com.br>. The group that is developing the AulaNet learningware also teaches the Information Technology Applied to Education course, ITAE (Fuks, Gerosa & Lucena, 2002), in the Computer Science Department at PUC-Rio. This course has been taught entirely online through AulaNet since 1998.2 (the second semester of 1998). This course provides a real environment where the

experiments related to AulaNet are carried out. Among the ITAE course's activities are synchronous debates held through the AulaNet Debate service, which runs the Mediated Chat, the chat tool being researched.

To guide the research of problems related to chat confusion and to systematize the development of Mediated Chat versions, a Groupware Engineering approach has been used (Fuks, Raposo, Gerosa & Lucena, 2004). It is based on a collaboration 3C model: Communication, Coordination and Cooperation. These concepts are used to analyze the ITAE debate sessions in a search for problems related to chat confusion. For each problem identified, a new Mediated Chat version is developed, as in the process shown in Figure 1.a.



(a) Groupware Engineering applied to the development of the Mediated Chat tool



(b) Mediated Chat versions

Figure 1. Mediated Chat Development Process

Each new Mediated Chat version implements a mechanism to solve a problem related to chat confusion that has been identified. The development process is presented in Figure 1 and described on the next section.

### 3. MEDIATED CHAT VERSIONS

This section describes each Mediated Chat version developed focusing on the problem identified, the mechanism implemented, the data collected from its use on an ITAE edition, and its evaluations.

#### 3.1 - Mediated Chat 1.0: the typical chat tool

Despite few features, Mediated Chat 1.0 is a typical chat tool. The development of this version had not been driven by an effort to solve a chat confusion problem. The main objective was to support the synchronous textual message interchange between the participants of an AulaNet course.

When the Mediated Chat 1.0 was first used to run the debates on ITAE 2000.1 edition (first semester of 2001), the participants considered the chat conversation too confusing. This research project started to investigate the causes of chat conversation confusion aiming at developing a Mediated Chat tool through which debates would be better understood.

#### 3.2 - HyperDialog: Co-text Loss and the Threaded Messages

Among the symptoms of conversation confusion, the occurrence of Co-text Loss was identified; a problem that occurs when one participant is not capable of establishing the structure of the discourse—that is, s/he cannot identify which message (prior to the given message) is being answered. Analysis of the linguistic aspects of the ITAE2000.1 debates led to the hypothesis that one of the causes of chat confusion was the non-linearity of the chat session messages (Pimentel, Fuks & Lucena, 2003). The HyperDialog tool, where messages are threaded, was developed in order to deal with the Co-text Loss problem. Besides presenting messages chronologically ordered, the tool also presents the tree message associations. In this organization, the text sequences—the way in which the dialogues are linked together—are evident. In an isolated thread, the conversation remains linear: each message is associated with the message that comes immediately before it. The thread mechanism would reduce the occurrence of co-text loss because it organizes the non-linearity of the chat.

Contrary to what was expected, the experiment held in 2001.1 showed that the Co-text Loss problem was not reduced using the HyperDialog. It was noted that co-text losses through the use of the HyperDialog tool were accused regarding the messages where the sender had not specified the association with the message s/he referred to. When the messages are not adequately associated (7.5% of messages were not correctly linked), the threads become useless and can make it even more difficult to identify the co-text. While the message thread mechanism has the potential to prevent the Co-text Loss problem, it nevertheless introduces other problems. The conversation became inappropriately more formal. The message tree structure dispersed the participants who were focused on different branches, making coordination of the debate more difficult. Compared to typical chat tools, HyperDialog used a much more complex interface that introduced a number of problems regarding the use of the shared space.

The thread mechanism implemented in the HyperDialog tool is similar to that implemented in Threaded Chat (Burkhalter, Cadiz & Smith, 2000), and the users who experimented the Threaded Chat tool also indicated that it was significantly worse than a typical chat tool. In future works, a simplified version of the thread mechanism will be researched.

#### 3.3 - Mediated Chat 2.0: Dynamics Interruption and Conversation Techniques

To systematize and facilitate coordination, a better defined sequence of steps for the ITAE debates was established. The dynamics, applied as of the ITAE 2002.2 edition, prescribes a set of activities and expected messages for each debate step. Using this better structured conversation dynamics, the debate session becomes easier to follow. Compared to the preceding editions, there was a reduction of Co-text Loss by half in the ITAE 2002.2 edition—an indication that better conversation flow implies in less chat confusion.

The application of these new dynamics made it clear that some of the messages were not appropriate for the ongoing step, being identified as Interruptions (Pimentel, Fuks & Lucena, 2004). Nevertheless, the Mediated Chat 1.0 tool, as well as the majority of typical chat tools, does not have specific mechanisms to support coordination (Pfister & Mühlpfordt, 2002). For that purpose, the Mediated Chat 2.0 tool implements the following set of conversation techniques: *Free Contribution*, where participants can send messages at any time; *Circular Contribution*, where participants are organized in a circular queue and, one by one, the first one in the queue can send a message; and *Unique Contribution*, where each participant must send a single message at any time. It is also possible to *Block-Unblock* the sending of messages by the learners.

The number of Interruptions characterizes the difficulties in coordinating the debate session (the perfectly coordinated stage is one in which no Interruptions take place). It was expected that the use of the conversation techniques implemented in Mediated Chat 2.0 would reduce the occurrence of Interruptions resulting in a better debate coordination and, thus, in less chat confusion. However, the experiment conducted in the ITAE2002.2

edition showed that the number of Interruptions remained unchanged when the Mediated Chat 2.0 was used. A further analysis of these sessions pointed out that the interruptions took place because the conversation techniques are too rigid to deal with unexpected situations. Improvements on the mechanisms tested were proposed (Pimentel, Fuks & Lucena, 2004) and then implemented on the Mediated Chat 5.0 version (subsection 3.6).

### **3.4 - Mediated Chat 3.0: Message Overload and Message Queue**

Another problem related to chat confusion frequently mentioned by learners is the difficulty in reading all the messages during the debate session. This problem is aggravated when a large number of messages are exchanged within a short period of time, making it impossible for participants to read all of them. In this research this phenomenon is termed Message Overload. A similar problem is known as Flood in the IRC literature (Oikarinen, 1993). However, Flood is the high rate of messages sent by a single participant, whereas Message Overload is the high rate of messages sent in the session by all participants.

Mediated Chat 3.0 tool was developed to deal with the Message Overload problem. In typical chat systems, each message that the server receives is immediately dispatched to the clients. In the Mediated Chat 3.0 tool, the server waits after publishing a message and before publishing the next one, allowing the participants to read all the published messages successfully. This mechanism was based on the Chat Circles tool (Viegas & Donath, 1999), where the message remains visible for a limited period of time. However, in the Chat Circles tool there is nothing that prevents other messages from being simultaneously presented, thus Message Overload may still occur. In addition, in both tools there is the indication of a typing-participant represented by a pulsating circle.

The Mediated Chat 3.0 tool was used in the ITAE 2004.1 edition. The interviews that were conducted with the participants demonstrate that nobody complained about message overload. However, a lot of the participants did not become aware of the message queuing mechanism. Some of them thought that the chat tool was too slow because some of their messages had their publication delayed (their message was in the queue but they did not notice it) and were unsatisfied with the new version. To deal with this collateral problem, the Mediated Chat 5.0 version (subsection 3.6) implements the queuing representation in the Participant List in such a way that it is more visible and easier to understand, similar to the one implemented in the PalTalk tool. The typing indication was quickly and well understood by the participants and aided the chat coordination. This mechanism also reduces the occurrence of a specific type of interruption caused by the lack of visibility of turn in progress (Vronay, Smith & Drucker, 1999).

Although not conclusive yet, the results show that the queuing mechanism used in this version prevents Message Overload, and the typing indication prevents the interruption caused by lack of turn in progress. Both mechanisms help chat coordination reducing chat confusion.

### **3.5 - Mediated Chat 4.0: Interface to a better Reading and Writing process**

Some problems concerning the reading and writing process causing chat confusion have been identified. Then, Mediated Chat 4.0 was developed. To improve the reading process, the debate session text is formatted to increase the visual distinction between different types of information: date published, sender and the content of her/his message; messages of participants and messages automatically sent by the system (to inform who entered or left the debate session). Only the nickname of the participant is presented, not his/her full name, to decrease the amount of text identifying the sender. The scrollbar stops scrolling automatically when the reader scrolls it up to read the messages no longer visible on the screen, and resumes scrolling automatically when the reader scrolls it down to the last published message. To improve the writing process, the typing area increased to 3 visible lines of text (instead of just one).

The versions Mediated Chat 1.0 and 4.0 were used to hold the ITAE 2004.2 debates. The participants were interviewed and they all stated that the new interface helps reading the published messages and to writing new ones. New interface improvements were suggested by the participants during the debate sessions and interviews. They were analyzed and then implemented on Mediated Chat 5.0.

### **3.6 - Mediated Chat 5.0: Session Register to avoid De-contextualization**

All mechanisms tested in previous Mediated Chat versions were revised and implemented in Mediated Chat 5.0. The latest version is going to be experimented in the ITAE 2005.1 debates. The objective is to find out the degree of chat confusion that occurs when using all these mechanisms together.

A new mechanism developed to avoid the de-contextualization problem (Hedestig & Kaptelinin, 2002) will also be investigated. This problem happens when a participant enters an ongoing debate session. The other participants will be already engaged in the discussion and the new participant will find herself de-contextualized having difficulty to follow what is being discussed and delaying her participation in the session. Sometimes, the debate dynamics is interrupted to contextualize the participant that just entered.

To avoid the de-contextualization problem, the session control mechanism was implemented in Mediated Chat 5.0. The mediator is the one responsible to start and finish a chat session. All messages sent during a session are archived by the chat server. All messages produced during the ongoing session are presented to the incoming participant, enabling her to find out the context of the ongoing discussion.

#### **4. CONCLUSION**

This paper addresses chat confusion. This phenomenon is investigated within the educational debates setting. Evidence comes in the form of: co-text loss, dynamics interruption, reading and writing interface features, and de-contextualization. Using a Groupware Engineering approach, a chat tool has been developed seeking to prevent this phenomenon. The newest Mediated Chat version derives from the systematic investigation of the influences of communication, coordination and cooperation aspects of educational debates through chat sessions. Although the experiment with this latest version has not been conducted yet, the results obtained with the use of intermediate versions indicate that debate sessions will be less confusing and more understandable.

#### **ACKNOWLEDGMENTS**

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