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Description	

Kairos Chat: A Novel Text-Based Chat System that has Multiple Streams of Time

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Abstract
In this paper we propose a novel chat system named "Kairos Chat" that has multiple streams of time whose velocities are different. A pilot study shows that users spontaneously use the different streams for different types of messages without any concrete instructions on how to use the streams.

Keywords
CMC (Computer-Mediated Communication)

ACM Classification Keywords
H4.3. Communications Applications: Computer conferencing, teleconferencing, and videoconferencing.

General Terms
Human Factors

Introduction
In face-to-face communication, people facilitate a discussion by using digressions and, at the same time, they naturally organize memories of the discussion by quickly forgetting these digressions. We can regard this phenomenon as the communicators handling each

utterance on a different stream of time based on its content.

It is said that there are two types of time: Chronos time and Kairos time. Chronos time is physical time that passes monotonically and constantly, while Kairos time is psychological time that proceeds at variable speeds. Conventional chat systems handle all utterances on a single stream of time, i.e., Chronos time. Therefore, the digressions are mixed into a chat log using a chat system with a single stream of time, which cannot be organized in a "natural" way. We attempt to incorporate Kairos time in a chat system to achieve an automatic refinement function for a discussion's records that derives from the human ability to forget information.

In this paper, we propose a novel text-based chat system named "Kairos Chat" that allows users to handle each utterance on a different stream of time so as to strike a good balance between easy digressing and natural organizing of the chat log. A user submits a digression like a joke on a fast stream of time, while he/she submits an important opinion on a slow one. The utterances on the fast stream quickly leave the chat log's view, while those on the slow stream remain within the view for a while. As a result, users can casually and timely express any incidental question or joke, thus improving at the same time the readability of the log of main topics.

The rest of the paper is organized as follows. Section 2 briefly explains related studies that attempt to tackle the issues we raise. Section 3 describes the implementation of our new system. Section 4 shows the effectiveness of our system through a pilot study.

Section 5 concludes the paper with some final remarks and our plans for future efforts to improve the system.

Related Studies

In this section, we firstly discuss Kairos time and the right-time-ness. Then we explain features of chat systems with dynamic histories of messages and chat systems that enable us to refine histories of messages. We compare these approaches with our new chat system.

Kairos time and the right-time-ness
Hammond et al. [1] explain about Kairos time as follows; *Kairos denoted a time in which something could happen: a fitting opportune time, a "season." In rhetoric, Kairos referred to the right time or occasion for a speech.* For example, we utter a joke when it can be the right time for the joke. However, the joke gradually loses the right-time-ness if it remains on a chat log and it finally becomes an inappropriate message. Although memory can manipulate the barrier between present and past [1], excessive ability of memory like the chat log of the usual chat systems would spoil the right-time-ness of the utterances. Furthermore, a period that an utterance preserves its right-time-ness is different for each utterance. Therefore, we think the multiple streams of time are necessary and some of the streams should flow rapidly.

Chat systems with dynamic histories of messages
Fugue [2] and Alternative Interfaces for Chat [3] are chat systems with dynamic histories. These systems show users' the inputting situations of messages to inform them of what the other participants are doing. This solves the problem of timing in sending messages in chat systems. Both of these systems and Kairos Chat

are equipped with dynamic histories of messages. However, the conventional systems handle all of the utterances in a single stream of time, while Kairos Chat allows the users to handle the utterances in different streams of time.

Chat systems that enable us to refine histories of messages

In the semantic chat function of the remote seminar support system named Remote Wadaman V [4], users are required to intentionally add a tag, e.g., "idea," "question," and "answer," to each message. Using these tags, the history of messages can be arranged after a chat session. On the other hand, Kairos Chat only requires the user to roughly classify the types of messages by intuitively selecting a lane into which he/she drops a message.

System Set Up

We developed Kairos Chat as a web application. This system is processed with Adobe Flash (client) and PHP (server). The user interface is shown in Figure 1.

Text boxes are provided at the top of the screen for inputting a user name and a message. Below them, three lanes are arranged for displaying messages. The left lane is the "Fast Lane," in which messages flow from top (newest) to bottom (older) for eight seconds. The center lane is the "Slow Lane," in which messages flow from top to bottom for forty seconds. The right lane is the "Push Lane," in which the newest message is added to the top of the lane and the exiting messages shift downward: this lane operates similarly to the chat history of the conventional chat systems.
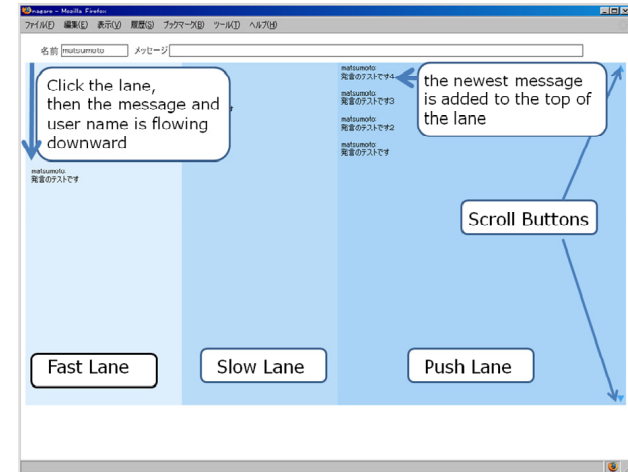
Figure 1. User interface of Kairos Chat
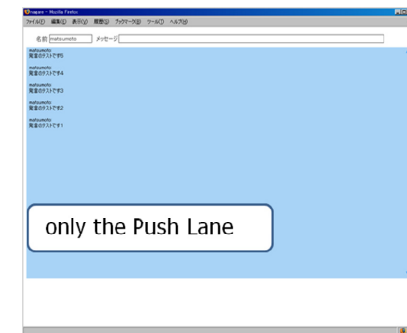
Figure 2. User interface of baseline chat

A user inputs a message in the top-right text box and then clicks one of the lanes in which he/she wants to flow the message. Then, the message is displayed at the top of the selected lane. It then immediately flows downward in the Fast and Slow Lanes. Only the Push Lane has scroll buttons for reading old messages, so

users cannot read disappeared messages in the Slow and Fast Lanes.

Experiments

We employed eight subjects and divided them into two groups. All subjects are graduate students of the authors' institute, and they are computer users at the intermediate level or higher: They have experience in using chat systems and have no problem with typing. All subjects in each group are well acquainted with each other.

We prepared a baseline chat system equipped with only the Push Lane (Fig. 2). The method of sending messages is the same as Kairos Chat. Therefore, the baseline chat is similar to a simple and generic chat system except for the method of sending a message. By comparing Kairos Chat with the baseline chat, we estimated the effectiveness of the former.

In the experiment, we carried out three sessions. A session consists of 30 minutes. Each group used the baseline chat in the first session, Kairos Chat in the second session, and the baseline chat again in the final session. We conducted the third session to investigate the differences in users' feelings about using the baseline chat after they used Kairos Chat.

We prepared the following three initial topics on cooperative decision-making tasks: 1) If you planned a camping trip for your laboratory, where would you go and what would you do? 2) If you planned a blind date party, where would you hold it and what would you do? and 3) If you gave a birthday present to your adviser, what would you select?

Each subject was placed in a separated private room to prevent their communication by voice or eye contact. We instructed all subjects only in how to submit messages and how to read all messages in the Push Lane by using the scroll buttons for both systems; we did not instruct them which lane should be used for what types of messages at all. We asked them not to use any other applications, such as web browsers, in the experiments.

After each session of these experiments, we gave the subjects a questionnaire that asked about usability and their general impressions of each system. After the Kairos Chat session (second session), we showed the printed chat log to the subjects and asked them to list up the messages that they had not read using the system. This was to investigate the messages they missed in the Slow and Fast Lanes. In addition, we asked all subjects to evaluate subjectively by "type" all messages in the Kairos Chat session. We provided the following eight types and had the subjects assign one of the types to each message.

1. A "formal" message that is directly related to the current topic: The formal message is a kind of message that is expressed by raising a hand if someone wants to speak up in a meeting (Type1).

2. An "informal" message that is directly related to the topic: The informal message is a kind of message like a monologue, a quick talk with neighbors or a sudden utterance without gaining the right of speaking (Type2).

3. A message that is related to the current topic peripherally. A simple confirmation of the meaning of a term is a typical example of this type (Type3).

Table 1. Number of messages in each session and each group

	Session 1 (baseline)	Session 2 (Kairos Chat)	Session 3 (base line)
Group A	151	179	126
Group B	168	210	196

Table2. Number of messages in each lane in Kairos Chat

	Push	Slow	Fast
Group A	67	76	36
Group B	67	93	50
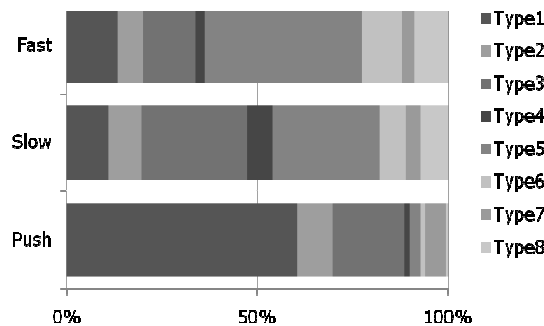
Figure 3. Type of message for all messages

4. A message that is only slightly related to the current topic (Type4).

5. A message that is not related to the current topic at all (Type5).

6. A joke (Type6).

7. A backchannel expression like a supportive response (Type7).

8. Others (Type8).

Results

Table 1 shows the number of messages in each session for each group. Table 2 shows the number of messages in each lane when using Kairos Chat. From Table 1, we can see that the number of messages is the highest when using Kairos Chat. From Table 2, we see that the Slow Lane was used the most while the Fast Lane was used the least.

We counted the number of each type of message for each lane and calculated the ratios of usage of each type for each lane. Figure 3 shows the results. Table 3 shows the results of our questionnaire after session 1 and session 2.

From Fig. 3, we obtain the following findings.

- The Push Lane was mainly used for Type 1 messages (formal messages). It was also used for Type 3 (peripheral messages) but not so frequently.

- The Slow Lane was mainly used for Type 3 (peripheral messages) and Type 5 (not-related messages).

- The Fast Lane was mainly used for Type 5 (not-related messages). It was also used for Type 1 (formal messages), Type 3 (peripheral messages) and Type 6 (jokes) but not so frequently.

Although the experiments and obtained results are still insufficient, we can draw the following conclusions about the usability of three streams of time in Kairos Chat from Table 3:

- Kairos Chat exceeded the median for question no. 1. The users evaluated Kairos Chat as better than the baseline for summarizing the discussions.

- The users evaluated Kairos Chat as better than the baseline when they submitted jokes and messages that are not related to the current topic (questions no. 3 and 4).

- The users evaluated Kairos Chat as better than the baseline for following discussions (question no.5).

- The users attempted to submit different type messages for each lane (question no. 6).

- Although the users did not feel so negatively about submitting messages related to the main topics using Kairos Chat, they felt better doing so using the baseline (question no. 2).

Table 3. Questionnaire Results (5.00:Yes/Good, 3.00: median, 1.00:No/Bad)

No.	Questions	Kairos	Baseline
1	Could you readily summarize the discussion using this system?	3.14	2.63
2	Could you easily submit messages that are related to the main topic?	3.00	3.38
3	Could you easily submit simple questions that are not directly related to the main topic?	3.63	3.38
4	Could you easily submit jokes and messages that are not related to the main topic?	3.88	3.38
5	Could you readily follow the streams of the topic?	3.00	2.75
6	Did you attempt to submit different type messages for each lane?	3.75	---

Conclusions

In this paper, we proposed a novel chat system named Kairos Chat that is equipped with three streams of time whose velocities are different. We conducted a pilot study to evaluate the effectiveness of Kairos Chat and to investigate the usage of this system's three different streams. From the results of the pilot study, we found that the users naturally accepted the multiple streams of time without any concrete instructions on how to use each lane. They submitted digressions on the fast stream but important opinions on the slow streams. As a result, a refined chat log could be obtained as expected. In the near future, we plan to conduct more experiments to investigate the users' behaviors more deeply and to improve the system based on the results.

Acknowledgement

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