Title	
Author(s)	,
Citation	
Issue Date	2004-03
Type	Thesis or Dissertation
Text version	author
URL	http://hdl.handle.net/10119/498
Rights	
Description	Supervisor: , ,

An observational study of Q&A dialogue during text reading

Shigetaka Tango

School of Knowledge Science,
Japan Advanced Institute of Science and Technology
March 2004

Many of the studies on computer support of text comprehension have focused on how to reduce the users' cognitive burdens at the time of reading. However, an ideal way to understand the contents of a difficult text is to directly ask questions to the text author or a person who is very familiar with the text. This suggests that question-answering dialogues with text "experts" are effective also as the method of computer support for text comprehension. With this prospect, we conducted an observational research on the processes in which text readers and text experts collaboratively resolve comprehension problems through face-to-face question-answering dialogues,

We expect our study will provide guidelines for the implementation of dialogue-based computer support of text comprehension.

The following is the procedure of our experiment.

1. We ask two people to be engaged in a question-answering dialogue over the content of a text. The participant who is familiar with the text is assigned the role of answerer, and the participant not familiar is assigned the role of questioner.
2. The questioner reads the text to herself, and asks questions to the answerer as needed.
3. The answerer replies each of the questioner's questions.
4. When the answerer finishes reading, we start another reading session, employing a new text and switching the questioner-answerer roles.

We video-taped reading sessions and transcribed the dialogues.

We analyzed the data from the following two perspectives.

First, we found that a significant portion of question-answering exchanges involve more than one questions or answers, rather than being one-question/one-answer exchanges. So we classified the patterns of such multi-type exchanges, focusing on (a) their turn-exchange types, (b) the contents of inserted utterances, and (c) the inter-relationship of the multiple utterances.

We found that those multi-type exchanges can be classified into three categories: (a) exchanges where speakers resumed their utterances after temporal stops (self-initiated complementary multiplication), (b) exchanges where speakers add utterances after completing others (self-initiated additive multiplication), and (c) exchanges where hearers request additional utterances (other-initiated multiplication).

We also found a greater number of other-initiated cases in the multiplication of questions, while finding a greater number of self-initiated cases in the multiplication of answers.

Secondly, we analyzed question-parts in more detail.

The analysis was based on the following three kinds of tags assigned to question utterances: (a) objects of question (what questions are about), (b) stages of comprehension (what questions ask for), and (c) strategies of question (how questions are asked).

We also take up a question-answering sequence delimited by a halt of reading and the resumption of reading (we call it a *segment*) and analyzed whether and how questions change their types in the course of a segment.

Concerning (a) objects of question, we found that the subjects were dividable into two groups, where one group tended to more questions about text elements and the other tended to ask more questions about the partners' utterances. We also found that questions tend to change their objects from text elements to partner utterances in the course of a segment.

Concerning (b) stages of question, the subjects were dividable into two groups, where one group tended to more questions about the pronunciation or meaning of text elements or partner utterances and the other tended to ask more questions about the correctness of assertions in text or by partners or to ask for background knowledge for them. We also found that questions tend to change their stages from meaning questions to correctness questions in the course of a segment, and that each segment contains at least one background question.

As for (c) strategies of question, all subjects tended to ask more questions with candidates,

namely, questions that ask the partners to check the correctness of the questioners' candidate answers. Also, questions tend to change their strategies from the without-candidates type to the with-candidates type as more and more questions are asked in the course of a segment.

Thus, the characteristics of question-answering dialogues during text reading can be summarized in the following way:

First, questions are not confined to text elements, but extended to partner utterances and background knowledge. This suggests that text comprehension is not just the matter of understanding text contents, but a more comprehensive understanding process that demands the supply of background knowledge too.

Secondly, people ask many questions with candidates. This type of questions has the function of letting dialogue participants to check the correct conveyance of knowledge.

On the other hand, answers tend not to be completed with a single utterance. This indicates that answerers convey information while monitoring questioners' feedback.

But they are not sensitive to questioners' positive signals of understanding, as indicated by their tendency for redundant explanation in the face of questioners' signals of understanding.

The significance of this study (to the design of computer-aided text comprehension) is the following.

Our analysis of questions shows that there were a significant number of questions concerning partner utterances. The occurrence of this type of questions presupposes the presence of dialogue partners. This indicates that dialogues are an effective method to facilitate text comprehension.

Given the current state of agent technology, however, it is difficult to build a computational dialogue environment that is comparable to human spontaneous dialogues. For implementation, therefore, it is more realistic to consider the presentation of characters (or figures) in response the user's request (mouse-clicking) as is found in Windows Help. So, we will discuss the results of our study in view of this framework of implementation.

Our analysis of dialogue structures has implications on the amount of information to present. For example, we found many examples of answers that take more than one utterances. This suggests that it is not necessarily desirable to present all information at once to the reader.

Also, we found answers tend to be redundant in explanation. This shows that a certain extent of redundancy in presented information is permissible and even suitable.

The classification of questions leads to the prediction of the information contents to be requested by text readers. For example, we identified many questions that ask about the correctness of assertions in text or by partners. This means that the meaning of words and phrases are not the only information that readers would request.

Furthermore, characterizations of questions contents lead to selections of information to be presented. For example, describing word meaning is not an appropriate presentation of information as a response to a question about the correctness of an assertion; readers would understand more easily if the reasons for the assertion were described instead.

Thus, classifications of questions are useful for the prediction of question contents and the selection of presentation contents.

In summary, the present study consisted of recordings of question-answering dialogues during text comprehension, an analysis of the structures of the observed dialogues, and a classification of the observed questions.

It provides suggestions about the appropriate amounts and contents of information to be presented in dialogue-based support systems for text comprehension.

Verifications of these suggestions, however, require additional cognitive experimentation under operational environments.