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# An Analysis of Tutor Response to Student Initiatives in Keyboard-to-Keyboard Tutorial Sessions

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## Introduction

The necessity for building a sophisticated human-machine interface for our intelligent tutoring system, called CIRCSIM-Tutor, has motivated us to explore natural language text understanding and generation. One complex task for the generator is crafting a response to student initiatives. As a basis for our research we studied human tutors' responses to student initiatives. How does a human tutor decide how to respond in real life? Initiative and response can be viewed as a cause and effect relationship where the initiative is the antecedent or cause and the response is the consequent or effect. A student initiative occurs when a student takes control of the tutoring session temporarily by saying something that forces the tutor to change the course of action and respond to the new situation. A question asked by the student in itself is considered to be one kind of initiative. A cooperative and reasonable response is considered as one that addresses the appropriate part of the question. We have analyzed tutor responses to student initiatives and developed twelve classes of tutor response to be used in CIRCSIM-Tutor.

## Background

CIRCSIM-Tutor uses natural language dialogue to help students learn to solve problems in qualitative causal reasoning. We set forth to find out how human tutors handle this complex cognitive task. We studied twenty-eight transcripts of human keyboard-to-keyboard tutoring sessions. The tutors are two professors of Physiology at Rush Medical College, Joel Michael and Allen Rovick. They are teaching cardiovascular physiology with the goal of helping students learn solve problems involving the negative feedback system triggered by the baroreceptor reflex. The students are first year medical students who already have some background in the subject matter from attending lectures or reading the text book.

## Classes of Initiatives and Responses

Many student initiatives are questions. In other cases the student states a theory and asks for confirmation or shows difficulty in improvement. In order to respond appropriately, the tutor must first understand the initiative and the student plan behind the initiative.

We used the conceptual categories for initiatives developed by (Sanders, 1992), who proposed eight classes containing various categories of the initiatives, viz: 1. The student asks a question about the subject matter or about herself/himself, 2. The student has trouble "seeing" some idea, 3. The student requests repair, 4. The student does repair, 5. The student hedges, 6. The student makes an explicit backward reference, 7. Initiatives specific to the hardware/software environment, 8. Administrative topics.

We analyzed responses to student initiatives in twelve classes based on the goals of the tutors and the tutoring strategies used. They are: 1. Hinting, 2. Directed Line of Reasoning, 3. Acknowledgment, 4. Confirmation, 5. Summary, 6. Instruction in the "Rules of the Game", 7. Teaching the Sublanguage, 8. Teaching the Problem Solving Algorithms, 9. Extending Help, 10. Probing the Student's Inference Process, 11. Brushing Off, 12. Conversational Repair.

The focus of the student initiative can be established by understanding and recognizing the student plan (Carberry, 1990). We have also explored the relationship between the initiative category and the response category and the length of the response.

## References

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