WORKSHOP ON KNOWLEDGE REPRESENTATION AND INFORMATION PROCESSING

in honour of the 60th birthday of Friedhart Klix

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PROGRAMME AND ABSTRACTS

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OBTAINING A KNOWLEDGE SPECIFICATION AND DERIVING INSTRUCTIONS FOR A VISUAL PROGRAMMING LANGUAGE

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a) We propose the use of logic programs designing intelligent tutoring systems. With the help of these programs we specify the curriculum, design the interface and derive instructions.

b) Today there is considerable agreement about the strategic aspects in designing an intelligent tutoring system (ANDERSON, 1987; ANDERSON, BOYLE, FARRELL & REISER, 1984; DEDE, 1986; WOOLF & McDONALD, 1984). However, there is less conformity about tactic aspects, concerning the structure of knowledge bases, the quality of instructions and interfaces. It seems to us that the concentration in developing latent components (e.g. flexible student-models and error-explanation algorithms) has led to a certain neglect concerning manifest components (interface and instructions). A good example for this argument are some shortcomings in ANDERSON's well known LISP-Tutor (ANDERSON, 1987).

In the talk we want to demonstrate first steps towards the realization of our argumentation. The domain of discourse is functional programming with a graphical computer language. The proposed language is adaptive: it possesses complete visibility of all computational steps, if the user is a novice. During the development to an expert, the language becomes more and more abstract. The programming environment is going to be implemented on an INTERLISP/LOOPS-workstation.

Because our programming language existed only as "Gedanken" in informal texts and drawings (BAUER & GOOS, 1982), we decided to make a knowledge-specification. We specified the minimal necessary semantic and syntactic knowledge a student has to master before he is able to follow planning instructions successfully, with rule-sets. The rules were written in PROLOG so that they could be used as a runnable specification (DAVIS, 1982).

From the PROLOG facts, describing static characteristics of our functional programs, we derived graphical elements which are the building-bricks of our graphical programming language. From the PROLOG rules, describing the control and dataflow of the graphical programs, we derived combined natural language and pictorial instructions.

Furthermore, it will be shown in the talk how to model the knowledge-acquisition process of a student with Horn-clause-rules. The development is described as a transition-path through a state-space. Each state is represented by a rule-set containing the knowledge of the student.

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