

Abridged Proceedings of the  
**HCI International '87**  
Second International Conference on  
Human-Computer Interaction

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## PREFACE

This book consists of 312 abstracts of the 752 submitted papers (from 31 countries around the world) presented at the Second International Conference on Human-Computer Interaction held in Honolulu, Hawaii, 10-14 August 1987. The conference was organized under the auspices of the International Commission on Human Aspects in Computing, Geneva, Switzerland, whose aim is to provide international leadership in the subject area of the Commission. Under the auspices of the Commission, the Third International Conference on Human-Computer Interaction will be held in Boston, Massachusetts, 18-22 September 1989.

We wish to thank the International Commission on Human Aspects in Computing for sponsoring this conference and the board of the conference who made it all possible. The conference board members include the following:

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LOGIC PROGRAMS AS A SPECIFICATION AND DESCRIPTION TOOL IN THE DESIGN PROCESS  
OF AN INTELLIGENT TUTORING SYSTEM

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- a) We propose the use of logic programs designing intelligent tutoring systems. With the help of these programs we specified the curriculum, designed the interface, derived instructions and modelled the student knowledge.
- b) Today there is considerable agreement about the strategic aspects in designing an intelligent tutoring system (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).

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.

- c) ANDERSON, J.R., BOYLE, C.F., FARRELL, R. & REISER, B.J., Cognitive Principles in the Design of Computer Tutors, Advanced Computer Tutoring Project, Carnegie-Mellon University, 1984
- DAVIS, R.E., Runnable Specification as a Design Tool, in: K.L.CLARK & S.A.TARNLUND (eds.), Logic Programming, New York: Academic Press, 1982, 141 - 149
- DEDE, C., A Review and Synthesis of Recent Research in Intelligent Computer-Assisted Instruction, International Journal of Man-Machine Studies, 1986, 24, 329 - 353
- WOOLF, B. & McDONALD, D.D., Building a Computer Tutor: Design Issues, Computer, 1984, Vol 17, No 9, 61 - 73
- d) This research was sponsored by the Deutsche Forschungsgemeinschaft (German Science Foundation) in the SPP Wissenspsychologie (Knowledge-psychology) under Contract No. Mo 292/3