

## INTRODUCTION

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The eighth volume completes a ten-year span of the *Machine Intelligence* series. It is appropriate, therefore, to take stock of the main events, and to note certain solid steps and occasional forward leaps.

Leaps are normally preceded by some preparatory back-tracking. The uniform procedures of heuristic search and resolution theorem-proving which dominated the scene in 1965 cannot of themselves, as we now see, be developed into "the answer" to automatic problem-solving. This realisation has paved the way for machine-aided forays into non-trivial mathematics, as indicated in Bledsoe and Tyson's contribution to this volume. On the other side of the coin we have the startling and unexpected discovery by Kowalski, developed further here by van Emden, that first-order predicate calculus can be fashioned into a workmanlike programming language and a resolution strategy into an interpreter capable of processing the language with reasonable efficiency.

In the same ten years computer vision and computer understanding of natural language have been rescued from Cinderella status to become cynosures around which the brightest talents have gravitated. In vision the work of Huffman, Waltz and Clowes comes to mind; this volume contains two new contributions from Huffman of characteristic originality and precision. In language-understanding, the semantics-first approach first broke the log-jam of the "machine translation" epoch with Winograd's and Woods' studies. It is dynamically represented and extended here by Charniak and Schank.

This decade has also seen long-predicted successes by that school of Computer-Aided Instruction which would prefer to interpret the initials as standing for Children's Artificial Intelligence. A section of this book is devoted to reports from this expanding sector of the front.

Finally we must recognise that ten years ago machine intelligence was still a precocious foundling, with little going for it but energy and aspiration to compensate for a bad name and a disputed nature. Now all has been clarified. Not a single AI professional can be found who will not say that whatever this Protean field's name should be its nature has at least been firmly established: the use of machines and machine-oriented formalisms to study how knowledge may be represented, measured, transferred, and acquired *de novo*. This book constitutes the first integrated collection devoted to a theme which we now perceive to have been our sole proper business all along.

The outstanding enabler of the scientific event here recorded was Dr. Tilo Kester and the Scientific Affairs Division of NATO. Funds were granted for a two-week NATO Advanced Study Institute at Santa Cruz, where the University of California provided material and moral support, and a gracious setting. In this connexion Dr. David Huffman's distinguished inspiration deserves special mention. His good offices were, in particular, instrumental in attracting a supplementary grant from the Office of Naval Research to enable the proceedings to be broadened beyond the confines of the strict NATO ASI frame, thus re-creating, in total effect, something closer to the traditional Workshop style. Its overall success was assured by Dr. Sharon Sickel's tireless work as organiser and treasurer.

After a number of publishing vicissitudes Scott and Laurie Preece of Urbana, Illinois, undertook to typeset the book and to convert edited typescripts into completed paste-ups in three months. The reader can judge for himself the dedication and exemplary standards of craftsmanship with which this was done. Our thanks are due to Mr. Ellis Horwood, the U.K. publisher, for completing the process to the printing, binding, distribution and promotion of the finished book.

The beneficent genie of the *Machine Intelligence* series, Mr. Archibald Turnbull, once more hovered over events, not this time as publisher but as adviser and, at certain critical junctures, as a generous and resourceful enabler.

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