

## TABLE OF CONTENTS

Table of Contents	181
The Five Powers (I.S. Herschberg and H.J. van den Herik)	181
Replacement Schemes for Transposition Tables (D.M. Breuker, J.W.H.M. Uiterwijk and H.J. van den Herik)	183
Distributed Searches: a Basis for Comparison (C.P. Ciancarini)	194
Solution Trees as a Basis for Game-Tree Search (A. de Bruin, W. Pijls and A. Plaat)	207
Acknowledgement of our 1994 Referees	219
ICCA Programmers' Contacts (D. Beal)	219
Literature Received:	220
Heuristic Theories on Game-Tree Search (H. Iida)	220
Methods for the Improvement of Search Algorithms (A. Junghanns)	220
Processing of Knowledge from Databases (G. Lachmann)	221
Communication Received:	221
Transactions of the Japan Computer Chess Association (T. Baba)	221
Articles Published Elsewhere:	222
Agent Searching in a Tree and the Optimality of Iterative Deepening (P. Dasgupta, P.P. Chakrabarti and S.C. DeSarkar)	222
A Bibliography on Minimax Trees (C.G. Diderich)	222
A Survey on Minimax Trees and Associated Algorithms (C.G. Diderich and M. Gengler)	222
Information for Contributors	223
News, Information, Tournaments and Reports:	224
Report on the Fifth Harvard Cup Human versus Computer Intel Chess Challenge (C. Chabris and D. Kopec)	224
Report on the 4 <sup>th</sup> International Paderborn Computer-Chess Championship (U. Lorenz and V. Rottmann)	233
Report on the 14 <sup>th</sup> Dutch Computer-Chess Championship (P. Kouwenhoven)	237
ICCA Board Elections	239
The Swedish Rating List (T. Karlsson and G. Grotting)	240
Calendar of Computer-Games Events 1995	241
International Colloquium: Board Games in Academia	241
The 8 <sup>th</sup> ICCA World Computer-Chess Championship (D.N.L. Levy)	242
Correspondence:	245
'Twixt Cup and lip ...' (C. Chabris and D. Edelman)	245
... Cape May be a slip (T.A. Marsland)	246
Intuition – is it there? (A.D de Groot)	246
In tuition – hi-fi and high fee? (H.J. van den Herik and I.S. Herschberg)	247
Make Sure the Journal Reaches You	248
Lost and Found	249

## THE FIVE POWERS

It is difficult not to grow smug: no more than about five powers separate computer chess from its ultimate goal. The powers, of course, are powers of two and are all that is needed, even on a conservative estimate, to make the best program consistently victorious over whichever human World Champion rises to defy it.

Consistently, meaning that Kasparov was in peril at five minutes' speed, then defeated at 25 minutes and will, given those five powers, bite the dust in a twenty-four round match or any reasonable variation. What is more, the additional powers seem to come free, just for the price of patience. Consider the chippiest of all human creations and come back the next year. You will find it is nearly twice as roomy, nearly twice as fast and, incidentally, nearly twice as cheap. So, by a very coarse but lively reckoning, in about five years from now, our machines will have achieved what it takes: the ultimate goal of computer chess. It is then a mere quibble who will have won the bets: those rooting for the year 2000, or those who, in caution, have tipped for the third millennium, giving them an extra year.

Paradoxically, the nearness of victory gives rise to some despondency. At least some researchers feel that an algorithmic improvement of ten percent or so is hardly a matter of great pride when forty percent or better per annum is automatic. Others, more fundamentally, believe that the victory is specious. They see two problems unsolved by the victory and not even addressed at their deserved depth. Crudely, they are the question of how it is possible for a human being to play masterly chess at all and, even more roughly phrased, what is the degree of sound mathematical structure inherent in the game?

As to the first problem, there has been no lack of effort in trying to let a program mimic human reasoning or, more modestly, to let it mimic the outcome of that reasoning. In our view, all such efforts fall short of their goal. Some seem specifically tailored to suit a very limited number of cases, some are algorithmically unclear, while for some others the mechanics are clear enough but seem to have been revealed rather than reasoned out.

As an instance of the second problem, let it suffice to cite the well-known databases for which Ken Thompson has earned enduring fame. In spite of considerable effort, they remain as mysterious as they are infallible. True enough, for some class of cases, rational rules may be derived for the endgame in question for many cases, which, however, have many exceptions, to which exceptions yet more exceptions will be found, and so on recursively.

Again, chess being a finite game and computers fortunately being finite machines, the recursion does not stretch to infinity, but the integers involved are large enough to force us to conclude that the full complexity of simple endgames is beyond human ken.

If our analysis is anywhere near right, the nature of computer-chess research is bound to change and so is its reporting in this Journal, which hopes to continue to be a faithful mirror of the computer-chess scene. The questions treated will perhaps be less exciting to some and more abstract to all. Your Editors are not disheartened: many of our readers will find more spice in their chess-playing sugar: more mathematics for some, more cognitive science for others. Who dares doubt they are appetizing?

Bob Herschberg  
Jaap van den Herik

Dap Hartmann, well-known to our readers as co-author of the DAPPET chess program, author of the greatly appreciated DAP TAP analyses of grandmaster moves, and our trusted and constant reviewer of computer-chess literature, has recently established yet one more claim to fame: on October 26, 1994, he was awarded a Ph.D. at Leiden University for a thesis entitled *The Leiden/Dwingeloo Survey of Galactic Neutral Hydrogen*, universally praised by his examiners as an authoritative study of the subject. We congratulate him on his achievement and are happy to report that soon he will take up a post as an astronomer at the Center for Astrophysics, Cambridge, Ma. He has undertaken not to let this detract him from contributing to this Journal.

Circumstances made explicit by Don Beal on the occasion of his financial report as our Treasurer (Vol. 17, No. 1, pp. 46-47) have made it unavoidable to raise our subscription fees. Instead of contributing Dfl. 50.- annually (or its equivalent), we are now forced to ask you for Dfl. 60.- annually, a modest increase, you will agree and the first in 8 years. In US and UK currencies the new annual fee is US \$ 36 and UK £ 24. Subscribers in other countries will find their new dues on page 244. (Make Sure the Journal Reaches You).

Readers of this Journal have a natural affinity with the triennial Volumes of *Advances in Computer Chess*. Of the latest volume in this series, as reviewed by Dap Hartmann (Vol. 17, No. 3, pp. 149-151), copies are still available. Should you wish to order a copy of your own, you will reduce our overhead and banking fees as well as the price to yourself by transferring an additional Dfl. 115.- (official price is Dfl. 125.-), US \$ 69.--, or UK £ 46.--, with your renewal of your subscription.