REVIEW

INGO ALTHÖFER'S *13 YEARS OF 3-HIRN*

Ingo Althöfer

13 Jahre 3-Hirn
Meine Schach-Experimente mit Mensch-Maschinen-Kombinationen
348 pp., DM 32.80; 16.65 Euro. ISBN 3-00-003100-6

Reviewed by Dap Hartmann[1]

"One morning, in December 1997, I woke up with the feeling that I did not want to play this unremunerative 3-Hirn chess anymore", confesses Ingo Althöfer on page 306 of his book which describes the rise and fall of his brainchild, 3-HIRN[2]. This '3-Brain' concept took various shapes and forms over the years, but the main idea remained that a human chess player decides which of the moves proposed by two chess computers should be played. Between 1985 and 1997, Althöfer played many games with the aid of a wide variety of chess computers. His project started with a surprising win (for himself as well as for his opponent) over a rated chess player (1880 ELO points), followed by a loss against a player with a mere 1720 ELO points. But 13 years later, the three brains triumphed in an 8-game match against Arthur Yusupov, who has an impressive 2640 ELO points to his credit.

In 1994, Althöfer laid out a five-year plan which he hoped would culminate in a match against the human World Champion. The 1997 defeat of Kasparov by DEEP BLUE clearly curtailed these plans. Not only had his hope gone to lead the first computer(s) to beat Kasparov, but it also diminished the chances of finding a sponsor for (another) such event. As one potential sponsor put it: "What is the point of trying to beat the World Champion using *two* computers, where he was already beaten by *one*?" However, the final straw that made him throw in the towel was when Arthur Yusupov admitted that he had lost interest in computer chess. Yusupov lost an 8-game shuffle-chess match against 3-HIRN in 1997, and said afterwards that he now regarded chess as an art, and no longer as a sport.

Because he has retired the 3-HIRN project, Althöfer says that he can now reveal his 'tricks' and strategies. At the end of the book he gives a list of 'rules' and recommendations for aspiring coordinators (referring to the human component in the 3-HIRN team). Some of them are strategic, such as "Avoid locking the center Pawns" and "Avoid an early queen exchange", others are psychological: "Try to understand your opponent's body language", but none of them are revelations. His very first 'rule' states that "You should be able to operate the computer even in your sleep." Yet, he relates about the 1993 AEGON tournament: "Besides my faithful MEPHISTO LYON, there was a brand new TASC R30 that Johan de Koning gave me half an hour before the start of the tournament." The MEPHISTO LYON had not been a loaner, however. "All things considered, the Mephisto 68030 was well worth the investment", writes Althöfer after describing how he laid down DM 11,000 for a second-hand model. Wow! That kind of money buys you a pair of brand new Backes & Müller BM 4 speakers, which will give you a lifetime of unrestricted pleasure, unlike the MEPHISTO LYON which "still works in perfect order even though I hardly ever use it." Do not we all still possess some sadly outdated (chess) computers, which we just cannot part with, mainly (I think), because at one time we paid so much money for them?

Althöfer was clearly impressed by the annual AEGON tournaments, and the book begins: "Every year, in The Hague, the generous AEGON insurance company organizes a very special chess tournament in which humans compete against computers." I think everyone was greatly impressed by the AEGON tournaments, and cannot help wondering why it is no more. Could it be the same reason that robbed Althöfer of his enthusiasm to

[1] Radioastronomisches Institut, Universität Bonn, Auf dem Hügel 71, 53121 Bonn, Germany. Email: dap@astro.uni-bonn.de.

[2] The book is in German. The citations are given in translation (for the readability of this review).

coordinate 3-HIRN? The same reason that made Yusupov lose his interest in computer chess? After Kasparov was defeated by a computer, what else was left to prove? Well, if nothing else, it still needed proof that it was not a fluke. Two weeks after DEEP BLUE won the match, AEGON offered to finance a rematch "during the annual computer-chess tournament edition of 1998", according to a press release. But, of course, IBM did not feel like it, and there was no rematch. But worse than that, there was no regular AEGON tournament either! Maybe AEGON was saving up the money for their recent $10 billion takeover bid of TRANSAMERICA. With a net profit of only $1 billion in the first 9 months of 1998, money must be tight.

I know Ingo since 1987, when I first met him at the Advances in Computer Chess 6 conference in Noordwijkerhout. He mentions that conference in his book, and in particular a paper which he presented (*Generalized minimax algorithms are no better error correctors than minimax itself*) of which he says: "Many participants did not understand my highly technical presentation." I remember that talk very well, and especially that I then thought "this is not very relevant to chess programming, as it applies only to trees containing perfect information." I also remember another talk, a few years later. In *that* talk, Althöfer described experiments which he had carried out using commercial chess programs. I was baffled to hear him describe how he had single-handedly played *thousands* of games, occupying all of his spare time for many months. It may have been a precursor to the 3-HIRN idea, as one of his experiments was to have a computer always play the next-best move instead of the best one. Many years later, this idea became part of the so-called LISTEN 3-HIRN configuration, in which he would choose a move from (typically) the three best moves suggested by two chess computers. He was inspired by a posting in rgcc, which claimed that HIARCS in three-best-moves mode 'covered' every move played by DEEP BLUE in the 1997 match against Kasparov.

But back to 1987. My impression of Ingo at the time was that he was clearly very bright, but also slightly eccentric. The "highly technical" contribution was well-received by the experts, and later published in *Artificial Intelligence*. How does that rhyme with the picture of a man playing thousands of mindless computer-against-computer games to test the idea that playing a second-best move might be beneficial? In the 13 years that he conducted the 3-HIRN experiment, Althöfer must have played thousands more games. Despite all his efforts, I am afraid I cannot see any clear evidence that 3-HIRN is significantly stronger than a single chess computer. Clearly, 3-HIRN never lead the pack of (individual) computers in the AEGON tournaments, and the seemingly-impressive match win against Yusupov was over shuffle chess, not regular chess. It is rather unscientific to compare apples and oranges in this fashion. Despite its similarity to regular chess, shuffle chess must be regarded sufficiently different to warrant a direct comparison between the two. I do not think that Althöfer has given any evidence that 3-HIRN is superior to a strong individual chess program such as REBEL, which got consistently better scores in the AEGON tournaments (with TPRs of 2470, 2473, 2530, and 2619 for 1994 to 1997, respectively), beat Yusupov in a match (of speed and rapid games, but at least it was regular chess), and was hugely impressive in its match against Anand, the world's number two.

Please don't get me wrong! The book makes very pleasant reading as it is full of delightful anecdotes. Even if you are not a big fan of the 3-HIRN concept, there is quite a lot to enjoy. Sections with catchy titles such as "Waiting for 0-0-0", "Beer over troubled chips", and "That's about time too", and stories that describe what happened away from the chessboard. For example, how he single-handedly crashed a half dozen computers at the AEGON tournament because he needed an outlet and simply pulled the plug that was occupying it ("an honest mistake, really!"). "Like a row of dominoes, the computer operators jumped up in succession, gesticulating frantically. Their screens had suddenly gone black."

There is an abundance of annotated games, but unfortunately no index to quickly find a particular one. His notes on the games are entertaining, and contain hardly any (as one might well have expected to find) computer analyses and alternative variations. That keeps the story focussed and makes it much more accessible to 'ordinary' chess players in addition to those with a computer-chess background. It is not everyday that you see the opening move in a game annotated as: "1. e4!?". But Althöfer had prepared a little openings book for his game against Ad van den Berg, in which he chose to play 1. ... c5 against any of the anticipated opening moves 1. d3, 1. Nf3, and 1. Nc3. However, Van den Berg must have been on to him, and diverted from his usual anti-computer style by playing 1. e4 d5 2. Nc3 c6 3. Qf3. The endgame appeared to be dead drawn but "Van den Berg rejected my draw offer, saying that 'Computers can still make a lot of mistakes here." I was slightly irritated by this and forced the computer make its next move in just a few seconds." One of Althöfer's guidelines for 3-HIRN coordinators recommends: "Don't get excited. Stay cool." His irritation over Van den Berg's rejection of the draw offer is a bit strange, in the light of "I finally resigned" (against Erik Hoeksema) or

"it became a long and painful ending until I finally threw in the towel on the 94th move" (against Kluge). Clearly, Althöfer is not the first one to acknowledge a loss or a draw either. In a game against Markmann, 3-HIRN was clearly lost but Althöfer played on because his opponent was in time trouble. Only after he had survived the time control on the 50th move Althöfer resigned. However, he did accept a draw offer by Vlastimil Hort who had only one minute left for the rest of the game while 3-HIRN still had ten. But whereas many chess players did not like the concept of 3-HIRN, Hort had told him, that he thought it was an interesting idea, something which surprised another famous participant: "Hans Berliner was speechless. He had not expected this opinion from a grandmaster like Hort."

Highlights in the book are: the two games 3-HIRN played (and lost) against DEEP THOUGHT, in 1993; the AEGON tournaments (in particular the game against David Bronstein); the match against Genadi Timochenko in 1996, which 3-HIRN won by 4½ – 3½; and the shuffle-chess match in which 3-HIRN beat its strongest-ever opponent, Arthur Yusupov. In preparation for the game that 3-HIRN played against David Bronstein, Althöfer played through 150 games "to get a feel for the great grandmaster's style of play." In the game, Althöfer quickly violates another one of his 'rules', as he allows the opponent to lock the center Pawns.

After 3-HIRN won the shuffle-chess match against Yusupov in 1997, Althöfer "was convinced that my man-machine set-up would be capable of defeating the World Champion in 1999. [...] Three years after that, a single PC program will be able to beat the World Champion." A bold statement, as is the following (p. 324): "Probably within the next 20 years, computers will show that even the top professional Go players play nowhere near an optimal game."

Althöfer may have abandoned 3-HIRN *chess*, but not the 3-HIRN principle, which he next wants to apply to the fields of medicine, operations research, and interactive mathematics. He illustrates these future applications with an example of route planning using computers.

It is a pity that the book is in German, as it limits the accessibility to a larger audience. Althöfer praises Hans Berliner for speaking very good German, and Alexander Münninghoff for being fluent in Russian and German, yet he himself could have done more people a favour by writing in English. All in all, it is an interesting and enjoyable book; but do not expect it to be another *One Jump Ahead.*

[The book can be ordered directly from Ingo Althöfer. Inhabitants of Germany can do this by transferring DM 32.80 (or 16.65 Euro) to account # 1348337 of the Sparkasse Jena, BLZ 830 530 30. Other potential readers are encouraged to look at http://www.minet.uni-jena.de/www/fakultaet/jam/personen/althofer.html to find out their way on how to order the book.]

LITERATURE RECEIVED

We have received a copy of Ayumu Nagai's Master Thesis, submitted to the Graduate School of the University of Tokyo (1999) and a copy of the Lecture Notes in Computer Science 1558, titled *Computers and Games*. Below we reproduce the abstract of the M.Sc. thesis and provide an overview of the contents of LNCS 1558.

A NEW DEPTH-FIRST-SEARCH ALGORITHM FOR AND/OR TREES

A. Nagai[1]

Tokyo, Japan

"Using and/or-tree search provides a method for obtaining a solution on the value of a node (a proof or a disproof). The method is exploited when searching adversary-agent game trees or when dealing with theorem proving. Widely-used algorithms, such as Alpha-Beta, can be applied to and/or-tree search, but are never useful for complex problems. Therefore some characteristic algorithms have been developed. Especially, the AO* algorithm is intensively studied as an algorithm for finding an optimal proof solution.

[1] #12 Dai-idi Wago-sou, 6-3-9 Hongo, Bunkyo-ku, Tokyo, 113-0033, Japan. Email: nagai@is.s.u-tokyo.ac.jp.