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NEW CHALLENGES

"Looking back I should have played it differently" is the inescapable thought of anyone losing a chess game. It sounds like a chorus for players – and indeed it is when considering CHESS as a musical –, but it is a nightmare for champions in the post-mortem of a lost match. For such a champion the main questions are: how could I play that? and why did not I play the alternative?

In this issue, World Champion Kasparov provides some answers to these questions. Moreover he allows us some insights into his world of thinking, he even gives us a few clues as to why he behaved as he did. It is all contained in a lecture given at the prestigious Oxford University.

Of course, one could argue with him on the relevance of his thoughts, since his conceptions on the inside computer technologies are only rough conceptions and do not always match the "real" truth. Nevertheless, his emotions and compassions are presented with vigour and with persuasion. Having read the arguments, even dedicated computer-chess fans must admit that *et audite alteram partem* is a wise obiter dictum.

So far this Journal would seem to have painted the picture that Kasparov's world has been changed by a mere machine, i.e., by DEEP BLUE, since he lost the six-game match by 3.5 to 2.5. However, as Kasparov states: he did not lose to DEEP BLUE, he lost to IBM. The difference seems small, but reading the relevant part of his lecture will show that the World Champion has a point. And what is more: he publicly challenges the DEEP BLUE researchers in the name of science to publish their new findings and implemented technologies in scientific journals. As our readers know we fully concur with this invitation and have previously shown our willingness to include such publications in our pages.

Indeed, after his defeat the world has changed for Kasparov, but also for the computer-chess researchers. They are looking for new goals and new challenges. Ingo Althöfer believes that changes in the world should be followed by changes to concepts and changes of rules. First he developed his 3-HIRN idea further to perfection by introducing a

LIST-3-HIRN, combining ideas on *k*-best moves with ideas on democratic decisions taken by three brains. Then he challenged Grandmaster Arthur Yusupov to a shuffle-chess match.

Still this is not the end of all changes, especially not since changes of behaviour have not been addressed so far. A few years ago this Journal reported on research into opponent modelling. It was a topic quickly picked up by the computer-chess world. The DEEP BLUE team modelled Kasparov sufficiently well to take advantage of their model in the 1997 match. An important part of it was the opening preparation, which everybody acknowledges as essential; it is especially recognisable as a characteristic of a World Champion. Nevertheless, opponent modelling is now a hot issue and even jeopardises the Swedish Rating List. As a spin-off of persistent research to automate all what is human, we nowadays have computer programs which can play games by auto-play. This is a clear advantage since the programs are not hampered by human intervention.

However, as a direct consequence of this technology, computer programs can play several hundred games against each other in a very short period of time. And is not AI the specific domain where such games are played intelligently, i.e., the programs learn from their experience? Hence, in a subsequent game they avoid the variations where they had lost before. So the concept of learning and of opponent modelling go hand in hand. The current technology enables us to prepare oneself against the opponent's preparation. Is this fair or not? It is clearly a question analogous to the questions of a human chess player as to whether a computer program is a fair opponent when it has much more opening knowledge directly at its disposal than a human can store in and retrieve from his/her mind. In this case we see that the discussion of fair play has been shifted from the question "do humans and computers play the same game?" to the question "what rules should be imposed to fair auto-play of computers?"

The performance of DEEP BLUE has left many traces. Chess players are trying to forget the results as soon as possible. To a large extent they are supported by DEEP BLUE's retirement. Computer-chess researchers are defining new goals. They aim their research at understanding what brute force has brought us, how we can justify the result scientifically, and how to improve tuning and learning.

In a few years, DEEP BLUE will be regarded as a phenomenon, and only those who were eye witnesses will be able to convince the laymen that at the end of the twentieth century there was a program that defeated the World Champion. The new challenge in computer-chess research is the fundamental issue of science in general, viz. the reproducibility of experiments. The computer-chess community is awaiting a repetition of such a match between the human World Champion and a program. Only if the program wins again, will the victory of DEEP BLUE be proven to be reproducible and will it be recognised as real science.

Jaap van den Herik

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It is my sad duty to inform our readers that Bob Herschberg, our emeritus Editor, passed away quietly on March 19, 1998 at the age of 70. It was my privilege to be with him on the day before his death, when I was able to thank him for all his commitment to the ICCA. I am very grateful to him for all that he has taught me and for the warmth of his friendship. An extended obituary will be published in the next issue.

Jaap van den Herik