

## REPORT ON THE SYMPOSIUM MAN VS. MACHINE: THE EXPERIMENT

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The symposium *Man versus Machine: The Experiment* was held at the Caesarea Rothschild Institute for Interdisciplinary Applications of Computer Science at the University of Haifa, Israel, on October 15 to 16, 2002. Researchers from different countries and various disciplines gathered together to form a truly interdisciplinary symposium discussing the many-sided aspects of computer games. Besides the talks and the discussion panel, an advanced chess match was held between Grandmasters Boris Alterman and Alon Greenfeld, each assisted by the reigning World Computer-Chess Champion, DEEP JUNIOR.

### Day One

The first speaker was Shaul Markovitch, who gave a talk on *How computers play chess*. This presentation was an introduction to the way computers play chess and particularly an explanation of the simple search methods used to find the best move. This talk was mainly addressed to the participants from fields other than computer science.

In the next talk, *The games computers (and people) play*, Jonathan Schaeffer reviewed the history of computer games in the last 40 years, and previewed into the future. In this lecture, which was one of the highlights of the event, almost all the computer games were discussed, starting from chess and checkers, to games like poker and Scrabble. The speaker also presented his view of intelligence, and why the game-playing machines which use methods different from humans in order to play, can be considered intelligent. An update on the latest research at the University of Alberta's GAMES group was also given, emphasis was on the latest state of the efforts for solving the game of checkers.

The next presentation was one of the several talks delivered by researchers not from the computer-science discipline, examining other aspects of computer games. In his talk, *Does the game of chess provide a good benchmark for intelligence?*, Oron Shagrir lectured on the reasons for the changes of approach towards machine intelligence in the last 50 years, and why machines are still not considered intelligent, despite the fact that a world-champion-level chess program has been created.

Fernand Gobet delivered the next talk on a video-conference from Nottingham. In his lecture, titled *The psychology of chess*, he compared the difference between human and machine chess players from a psychological perspective. He further discussed the use of chunks for pattern detection in chess, and presented some empirical results to demonstrate this idea.

Continuing with the subject of move patterns, Lev Finkelstein lectured on *Learning to play chess by acquiring move patterns*. He presented a methodology for representing move patterns. These move patterns enable pruning parts of the search tree which do not seem promising, and thus, result in a narrower and therefore deeper search. The move patterns are stored in a hierarchical structure to enable fast retrieval.

The next talk, *How to model a grandmaster's intuition*, was presented by Jaap van den Herik. The lecture commenced by discussing the different aspects of opponent modelling. In the speaker's words: "sometimes the best move objectively is not the best move in a particular game, if you know your opponent's weaknesses". He went on to describe the problems and difficulties in trying to follow the opponent's strategy. He then broadened the scope of the talk, discussing the use of such schemes in other areas. Talking on artificial intelligence in general, he ultimately posed the question: "can the computers learn to believe?!"

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Next, Martin Charles Golumbic, Director of the Caesarea Rothschild Institute for Interdisciplinary Applications of Computer Science which hosted the event, greeted the participants and described the different aspects of the event. He mentioned, in accordance with the Institutes mission, that the interdisciplinary aspect of the symposium was of utmost importance, gathering researchers from various disciplines.

In the last talk of the day, *Writing the rules: tournament play between machine and man*, David Levy presented the problems on the way of creating a fair set of rules for a human vs. computer contest. After a brief discussion of the less problematic aspects, he went on to present the more tricky issues which can pose serious problems. Among these issues were the operator errors and how to handle them, an elaborate presentation of the problems involving the clocks and especially the adjustment of the program's internal clock, the technical problems that arise from time to time, and the possible options for dealing with the issue of draw offers.

Finally, an advanced chess match was held between Grandmasters Boris Alterman and Alon Greenfeld. During the game, both players were assisted by DEEP JUNIOR running on a dual AMD 2200+, and a large database of games. The time control was 30 minutes per player for the game, and 30 seconds increment per move. The game was transmitted on a large screen and was accompanied by commentary of Jaap van den Herik, and DEEP JUNIOR's authors, Shay Bushinsky and Amir Ban. The game which lasted 46 moves, ended in a draw (see moves below). After the game, a discussion was held on the different thought processes within man and machine. Participants in the discussion included the two Grandmasters and DEEP JUNIOR's authors.

**Boris Alterman - Alon Greenfeld**, Advanced chess match

1. e4 e5 2. Nf3 Nf6 3. Nxe5 d6 4. Nf3 Nxe4 5. d4 d5 6. Bd3 Bd6 7. O-O O-O 8. c4 c6 9. cxd5 cxd5 10. Nc3 Nxc3 11. bxc3 Bg4 12. Rb1 Nd7 13. h3 Bh5 14. Rb5 Nb6 15. c4 Bxf3 16. Qxf3 dxc4 17. Bc2 Qd7 18. a4 g6 19. Be3 Rac8 20. Rfb1 c3 21. a5 Nc4 22. Bh6 Rfe8 23. Rxb7 Qe6 24. Rf1 Re7 25. Rxe7 Bxe7 26. Rd1 Nd2 27. Qd3 Bd6 28. a6 Qc4 29. Bxd2 cxd2 30. Qxc4 Rxc4 31. Rxd2 Bb4 32. Bb3 Rc1+ 33. Rd1 Rxd1+ 34. Bxd1 Kf8 35. Kf1 Bc3 36. d5 Ke7 37. Ke2 Kd6 38. Bb3 Bd4 39. f4 h5 40. h4 Bb6 41. g3 Bc5 42. Kf3 Bb4 43. Bc2 f5 44. Ke2 Bc5 45. Ba4 Ke7 46. Bb5 Bb4 1/2-1/2

## Day Two

In the first talk of the day, Sivan Toledo talked about his joint work with Yaron Shoham, *A new game-search algorithm for both chess and other games*. He described a new, parallel, randomized search algorithm for two-player games. The algorithm, which is a randomized version of Korf and Chickering's best-first search, fixes a defect in the original algorithm, and introduces significant parallelism. Empirical data were also presented, demonstrating the algorithms efficiency.

*What is the difference between diplomacy and chess?* was the title of the next talk presented by Sarit Kraus. She described *Diplomacy*, a game played by seven players, each representing a power in the pre-WWI era in Europe. The goal of the game is to dominate Europe, by occupying the majority of supply centers on the map. The outcome is largely dependent on the negotiations which form alliances, and backstabs in the course of the game. In the lecture, the results of a computer Diplomacy player (DIPLOMAT) were presented. Some other games involving negotiation were also discussed in the lecture.

The panel session that followed next, discussed the artificial intelligence in general, and the implication of game playing computers as intelligent machines in particular. The following topics were discussed during the session: *From computer chess to artificial and human intelligence*, by Zeev Giora; *Should computers mimic humans?*, by Shaul Markovitch; *The embodiment of knowledge: Propositional knowledge as machine knowledge*, by Giora Hon; *Why my 3-year-old son is (far) more intelligent than Deep Junior*, by Morris Goldsmith; *Human intelligence, machine intelligence, Checkmate*, by Baruch Nevo; and *What makes it difficult for a computer to understand Chinese?*, by David Navon.

In the final talk, Jean Louis Lassez lectured on *Asymptotic behavior of machine learning algorithms*.

In summary, it was an interesting interdisciplinary symposium, containing many interesting discussions on computer games, and broader issues in artificial intelligence. This, plus the excellent organization of the event by the Rothschild Institute, turned it into a most interesting and enjoyable experience.