

Chess Master Beats Computer

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"I remain a cautious optimist in the progress of the human brain," Garry Kasparov told reporters during a historic chess match last week. "I still believe that there are some horizons it will be very difficult for a computer to cross." Even so, the world chess champion was clearly caught off guard at times by the tough competitor he faced in Philadelphia - an IBM RS/6000 SP supercomputer called Deep Blue. After six games over eight days, the match ended in resounding victory for Kasparov, who won three games to the computer's single win. There were two ties. Deep Blue proved a stubborn opponent, and one that was glacially indifferent to the psychological intimidation that Kasparov often deploys against human opponents. Moreover, the computer's ability to consider more than 100 million moves a second meant that the Russian grand master could not relax during play - or risk the smallest mistake. "I'm exhausted - I'm dead," Kasparov told reporters after the fourth game ended in a hard-fought draw. Added Murray Campbell, a Canadian member of the IBM team,

following Game 4: "The computer played exceptionally well. But Kasparov played well, too - and found an effective defence."

The match, sponsored by the New York City-based Association for Computing Machinery, which put up \$690,000 in prize money (\$550,000 went to Kasparov), pitted the 32-year-old master against a formidable array of machinery. Deep Blue's brain consists of 32 linked computers, making it the mightiest chess-playing machine ever. British chess master David Levy compared Deep Blue's style with that of the brilliant former world champion, Bobby Fischer of the United States. "That was a fantastic move," said Levy after Deep Blue threatened Kasparov's defence. "It plays like Fischer - it plays very clear, direct moves."

Deep Blue showed its stuff in Game 1 by defeating a disconcerted Kasparov in 37 moves. It was the first computer victory against a world champion in regulation play, and Kasparov "was quite unhappy about it," said Monty Newborn, a professor of computer sciences at Montreal's McGill University, who helped organize the match. "It was quite a shock to his whole physiology." The Russian rebounded the next day, winning Game 2 before the match settled down to a pair of draws. Then in the fifth game, Kasparov struck back with a strong victory - and did it again on Saturday by beating Deep Blue in 43 moves.

With most of the computing hardware housed at an IBM facility in Yorktown Heights, N.Y., members of the design team took turns moving the pieces in response to Deep Blue's instructions. During several games, the person opposite Kasparov was the Edmonton-born Campbell, a onetime student of computer sciences at the University of Alberta. Later, as a doctoral student at Carnegie Mellon University in Pittsburgh, Campbell helped a computer whiz named Feng-Hsiung Hsu develop a chess-playing chip called Deep Thought. In 1989, Hsu and Campbell joined IBM, where their project evolved into Deep Blue. Though Deep Blue is designed to play chess, IBM officials say that the computing skills involved could be applied eventually to complex problems ranging from drug design to traffic and cargo scheduling at busy airports.

Along with Campbell and Newborn, a third Canadian-based computer expert played a background role in the Kasparov-Deep Blue match. Tony Marsland, a computer chess pioneer who teaches at the University of Alberta, was instrumental in whetting Campbell's interest. And Marsland is president of the International Computer Chess Association, which helped to win agreement for the match from Kasparov and IBM. Deep Blue's impressive performance did not surprise him. Already, said Marsland, desktop computers equipped with chess programs can defeat most of the world's chess players. "It is only the world's 20 or so most gifted players who can still compete against computers," said Marsland. "Give it another five or 10 years, and computers will be able to beat any human being."

Does that mean that computers are approaching the point where they can match the human intellect? Probably not. Experts point out that chess playing is an ideal exercise for computers, because it involves a specific number of physical objects governed by simple, clearly defined rules. And despite Deep Blue's brilliant performance, computers and human minds function in very different ways.

"Computers play chess by quantifying everything very minutely," says Marsland. "The human mind can't do that - but it can look at complex situations and quickly penetrate to the essentials. Humans are terrific problem-solvers." Human chess players, adds Campbell, possess "some sort of undefined quality of intuition that enables them to look at the board and recognize good, bad or weak positions. Computers can't do that." Which means that for the foreseeable future, at least, the human mind is likely to retain its ascendancy in most things - perhaps even chess.

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