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Kasparov vs. Deep Blue

IBM's silicon powerhouse plays a rematch with the world's chess champ

By Corey S. Powell
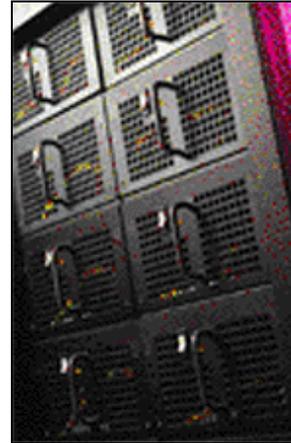
The dream of a chess-playing machine dates back at least to Wolfgang von Kempelen's famed "automaton chess player" built in 1769. That device owed its remarkable success to a craftily hidden human player controlling the action. But with the rise of modern electronic computers, people became acquainted with the humbling experience of losing to true machines. In February 1996 a computer named Deep Blue challenged Gary Kasparov, the World Chess Champion--and startled everyone by winning the first game. Kasparov bounced back to win the match, four games to two, but the initial defeat was enough to prompt some anguished speculation about whether computers were on the verge of surpassing human intelligence.

Now a refined version of Deep Blue--informally dubbed "Deeper Blue"--is preparing for another assault at the crown.

The rematch physically takes place at the Equitable Center in New York City from May 3 to May 11, although a much larger audience will be able to watch on the related World Wide Web site. As in any professional sporting match, there is considerable money at stake: $700,000 for the winner, $400,000 for the loser. But even more, the competition is about pride. "It is chess that once again provides us the ability to compare man versus machine," Kasparov has said, keenly aware of the interest that such a battle arouses. The battle might be more accurately cast, however, as man versus man: the mind of a chess master against a team, led by Chung-Jen Tan of the IBM Thomas J. Watson Research Center, that has labored over the design and programming of Deep Blue.

It has been a long, hard journey. The first incarnation of the machine, named Deep Thought, took shape at Carnegie-Mellon University in 1988, created by a team of graduate students, including Feng-Hsiung Hsu and Murray Campbell. (The machine was named for the pompous supercomputer featured in Douglas Adams's novel *The Hitchhiker's Guide to the Galaxy*.) That version contained two processors and could analyze 750,000 positions per second. From the start, Deep Thought's strategy largely centered on using computing speed to overwhelm intuition. That is, the computer was designed to look as many possible moves ahead as it could and choose what, according to its programming, appeared be the best move. This is not really how humans play chess, of course. Although all good players anticipate upcoming moves, human chess-playing skill seems to derive more from a "feel" for what general board configurations will be most favorable.

Deep Thought's powerhouse approach earned the machine a performance rating of 2450, placing it among the world's lesser Grandmasters. An upgraded model of Deep Thought--now with six processors and a speed of two million moves per second--played against Kasparov in 1989; he handily defeated it in 41 moves. But in 1993 Deep Thought grabbed headlines by beating Judit Polgar, the celebrated youngest Grandmaster in history.

Deep Thought subsequently moved to IBM, received further technology upgrades and acquired a new name, Deep Blue, a nod to the corporate color of its new sponsor (the name "Deep Blue" is now a trademark of IBM). The 1996 match was held in celebration of the 50th anniversary of the Association for Computing Machinery, better known as the ACM. After years of sluggish progress in artificial-intelligence research, Deep Blue's strong showing affirmed that computers were at least making rapid progress in certain intellectual tasks. "Can Machines Think?" blared a headline in *Time* magazine. Many consciousness researchers remained unimpressed. John R. Searle of the University of California at Berkeley, for instance, likened Deep Blue's achievements to fancy versions of the lightning-fast mathematics operations performed by a pocket calculator.

The latest Deep Blue computer is an IBM RS/6000 SP* that incorporates 32 processors effectively functioning as 512; the company claims an evaluation speed of 200 million moves per second. In a further attempt to humanize the computer's chess moves, the Deep

Blue team has brought in Joel Benjamin, a former U.S. champion, as a consultant and mentor. His strategic advice is being folded into the computer's updated software in an attempt to blunt the intuitive skills that enabled Kasparov to defeat the computer last time around.

Computers will surely continue to grow more powerful, and skeptics will question whether what they are doing deserves the designation of thinking. Other human players will also no doubt want to play against the reinvigorated Deep Blue. The ever quotable Kasparov prepared an escape hatch even before the competition began. "The computer will calculate better than any human being in the world," he has said. "But there is something beyond calculation--it's your understanding of the nature of chess."