Meet the people shaping the future of science

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Every move you make

He stared in horror, then buried his head in his hands. Garry Kasparov, the world’s top chess player, had lost to a computer, Deep Blue. It was a major insult to human brain power. But six years later, in 2003, he fought back to a fragile draw against another chess program, Deep Junior. So why is he now talking about computers giving chess a new lease of life, or even turning it into a new game? Kasparov explained all to Will Knight

Why are you taking such an interest in playing chess against computers?

From an early age I thought it was my duty to be on the edge of the development of the game, and I realised that chess would be related to computer development. I was even quite excited to see some of the early programs in 1984 and 1985. I encouraged some independent German guys to develop ChessBase. We had some discussions, and I told them it would be a great idea to have a database to utilise computers’ power to help chess players to improve their preparation and help with the analysis. It was very, very primitive. In 1987, the first version of ChessBase ran only on Atari computers. Since then they have made tremendous progress. Many people didn’t really believe it would be that important, but I sensed it would have a tremendous impact on the game. And it has.

Have computers changed the game forever?

Chess today is a brand-new game. It’s not to be compared to the game I played 20 years ago. It requires a different amount of preparation. You can’t just say go there and say: “I’m a great player, I have a great talent, so whatever happens I will be able to solve the problems over the board.” Today an ordinary player knows much more than Fischer knew 35 years ago. ChessBase’s database has more than 2.7 million games played by grandmasters. With this amount of information, you can learn more about openings than any player in the past. When I was a kid I had very few books. It was limited, fragmented information so I had to invent many things. Now you move your mouse and you have all the information on a particular opening, all the statistics, all the best moves made. It doesn’t mean you are a better player than Bobby Fischer or Anatoly Karpov, but the amount of information you can pursue helps you to go much further. It took Fischer or Boris Spassky 10 or 20 hours to recognise this pattern. Now it takes 10 minutes.

Does all this make chess a better game?

It makes it a different game. Some say computer chess is killing creativity, but others say it enhances it because you must be extremely creative to come up with new ideas.
And then you can test those ideas?

Let's say you were the number 1 player and were playing number 200. Unless you made a blunder, you would beat him because number 1 is a genius and number 200 is just a good player. Today it is different. To beat number 200 you have to be far more sophisticated, because number 200 could build up his defence on the information he has collected. To win you have to come up with a lot of exciting stuff. You have to use your genius in the preparation. In looking at all these games, of course, I use my computer. You are guiding the machine and the machine can come up with guarantees that this is right or wrong. If I looked today at the analysis I prepared for the world championship match 15 years ago I would laugh, because we did it without computers.

Would you like to see all players work with computers during matches?

Five years ago I introduced an idea I called Advanced Chess: man plus machine versus man plus machine. It's a totally new form of competition and it would be very exciting because it is a new game. In talking about man and machine, we have to look for this fight, this duel. But we could also try to figure out how to nourish human intuition and brute-force calculation, and how to create a mechanism that could come up with moves of the highest quality. I sensed, and I'm happy I was right, that computers would give chess new life. And it has something to add to scientific research because the way the game is designed we can compare human intuition and computer calculating power. Chess is a mathematically infinite game, but there is a lot of logic. That's why you can try to see how the machine works through this human decision-making process, but using completely different parameters.

Does that mean it's illogical to compare humans and computers in matches?

I think it's important to remember they are very different. If a human can win a game, then they can still compete. The human players are under tremendous pressure. But even with ideal conditions, there are always problems: bad weather, family problems, a headache, whatever. That's why I can hardly imagine a human player being able to play six games with the same strength, while the machine will be the same machine. That's why the long-term experiment will be whether, on his best day, the best human player assisted by a machine to prepare the game could beat the best machine. If it happens, it means we are still superior.

And do you think it will happen?

From a personal perspective, I still think I'm capable of beating machines. When I played Deep Junior in New York I was under very heavy pressure - and I had less than 2 weeks of preparation. I think I was dominating the match before I chose to go for a draw. What was positive was that it was human mistakes that actually helped the machine to tie the match. When I played good moves I was dominating. It was my big mistakes that changed the match. The average quality of my moves was much higher. But the machine doesn't make blunders. That's why I think that overall the Deep Junior match is extremely positive. First, it demonstrated that this experiment has an important scientific value. Second, that the public is still curious, which means the experiment has a social value. And third, that humans still dominate unless they make big mistakes. Our average quality among the top-class players is still superior to the best machine. I think that human versus machine should be taken as a separate contest and be treated as fairly as this independent Deep Junior competition treated it. And human plus machine versus human plus machine should be designed as another independent competition. I don't think machines will kill creativity. If we treat computers properly, they will actually add new flavours to the game of chess.

Do you fear that computer intelligence will come to challenge humans in the long term?
Machines use 95 per cent calculation and 5 per cent so-called "positional understanding", which a machine inherits from its creators. Humans use 99 per cent intuition and 1 per cent calculation, but very often we come to the same conclusion. So does it mean that the machine’s process is an imitation of human intelligence? Here, the game of chess raises an important issue: should we judge artificial intelligence by the machine's performance or by the result? I think it's more about the result. With my knowledge and my experience, I would say that a machine is not threatening. In fact, it helps me to go through preparation. Even with some grandmasters, unless you are really good, the machine will dominate you. Unless you understand how the machine functions, you will not be able to maximise the effect of working with the machine.

Can you tell the programs apart?

I can identify immediately Deep Junior or Deep Fritz. Every machine has its own character, undoubtedly. The machines’ evaluation process is based on the priorities, and each set of priorities is different. If you place emphasis on one particular mode of play in the program as Deep Junior’s program does, the machine gets more adventurous. If you have another style, you have different machine personalities. Today, any professional could tell Deep Fritz from Deep Junior in 10 to 15 moves. It's as easy as differentiating between Kramnik and Kasparov.

Has that changed over the years?

Deep Junior was a revolutionary program because it was the first time the programmers had tried to deal with material [the value of the pieces in play or captured] versus quality [strategic moves]. They tried to teach the machine to use some non-material priorities, which is a fundamental issue with a machine. It was the first program that could play without worrying about material. In game 5 of our match, it sacrificed a piece for attack. Attack is a concept that the machine was able to understand. Maybe it was not 100 per cent correct, but it's very difficult for a human to recognise that the machine is playing for compensation [giving up valued pieces for strategic gain]. Now other programs are trying to catch up because it is clear that unless the machine is capable of speculating, with these material/quality parameters it will be very difficult to make progress.

So different programs have “personalities”?

You could say so, yes. Machines are gaining personalities.