

21st World Computer Chess Championships

The 21st World Computer Chess Championship started on June 29, 2015. Nine programs participate in a round robin tournament of nine rounds. The tournament takes place at the Leiden University and is organized by the ICGA, LIACS and LCDS. The sponsors are Aegon, Museum Boerhaave, the municipality of Leiden, Leiden University, ICGA, iSSC, SurfSara, Digital Game Technology and NWO. It is held in conjunction with the 18th Computer Olympiad, the 14th Advances in Computer Games conference and, a special lecture for the general public on intelligent programs for rowing, football and diplomacy. Additional sponsors are therefore the Faculty of Science, the Royal Dutch Rowing Federation and Dutch Angle.TV.

Round 1

The pairing for the first round and the results were as follows:

Komodo – Maverick 1-0
Protector – Shredder ½-½
Jonny – Fridolin 1-0
Ginkgo – Hiarcs ½-½
The Baron – bye

The game Ginkgo – Hiarcs attracted quite some arousal. It started as a Semi-Slav game following the variation once developed by Botwinnik. After move 17. ... c5 white was out of book. Hiarcs continued to follow his book up to 20. b3. There after it was instructive to see how black managed to obtain the initiative. Black started a kings attack and brought his own king in safety by castling to the queen side. His attack was quite strong so he allowed himself to sacrifice the exchange for continuation of the threats around the white king. When the pressure was increased white did not see other possibility than sacrificing his queen so that we saw a late middle game with rook and bishop against the queen. One will think this is an easy win for black. However on move 40 the diligent program Hiarcs made a move of which the computer did not see the refutation.

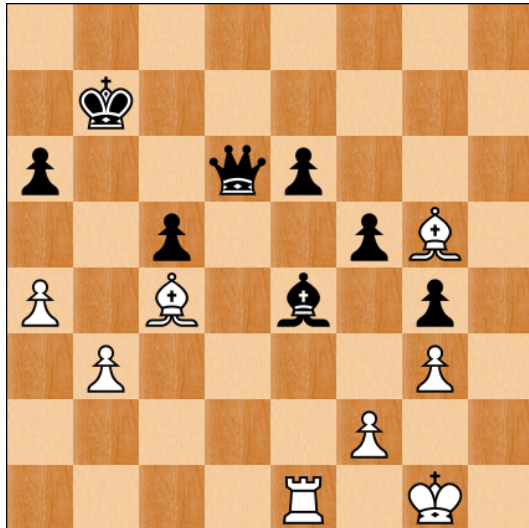


Figure 1 Position after 40. Kg1

The quintessence of the refutation was that after 40. ... e5? white could sacrifice the exchange to arrive in an endgame of a queen against two bishops where black did not have the opportunity to enter the white fortress. Black tried in vain for 43 moves then a draw was agreed upon. Afterwards it agreed that the move 40. ... Bd5 would lead to a win.

The game Jonny – Fridolin showed the benefits of a new approach in computer chess programming. Nowadays the chess engines are so strong that it is questionable whether book knowledge is preferred over computational knowledge. Both programmers adhere the adage of having short lines in the book and then relying on the ingenuity of the program. This game is an excellent example of this strategy. Black left his book after 4. ... Nf6 and white left his book after 7. ... Qb6. Chess players know that the line they followed is a very interesting line including a pawn sacrifice for white for active play. This is what the audience saw. White took the initiative but black found many clever answers to the tactical threats that white posed. Nevertheless a continuous stream of threats was too much for black and he came in disadvantageous position. In the end he was forced to give up the exchange and thereafter he had to resign in a few moves. A nice win by white and important for the competition for the first place.

The game Komodo – Maverick was a game in which both sides tried to trick the other side. That is always a dangerous strategy but for the public it is attractive to weigh the chances of both sides. Black started a kings attack with h7-h5-h4 whereas white was trying to occupy the center squares. The battle around the central squares was supported by black's attempt to make matters complicated at the queenside however black did so with playing his queen too many times so that in the end no real progress has been made. Moreover the king attack came to an end and now we saw a kind of turbulence in which all pieces were involved. White came out as the deserved winner which implies that his calculations were deeper and more to the point. The final line was very easy but we are sure that most human players would have followed other lines instead of the exchange of pieces to arrive at a won pawn endgame. All in all it was a deserved win for

Komodo that announced clearly in this round already to be a major candidate for the title.

The game Protector – Shredder started with a quiet Sicilian opening, following the Scheveningen variation. After 15 moves white was out of book. The continuations by white were promising but not spectacular. On move 25, in a position which was evaluated as equal, white took three minutes for his move.

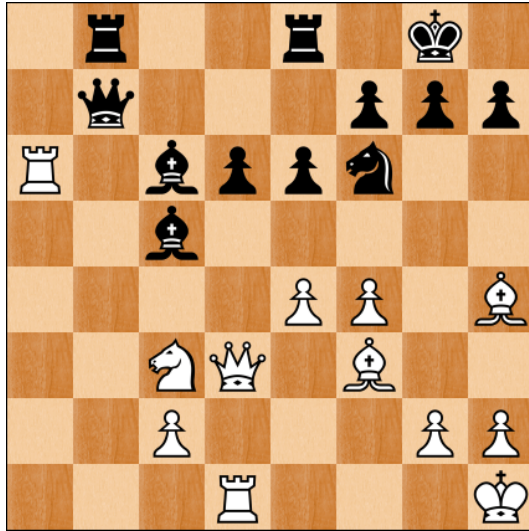


Figure 2 Position after 24. ... Qb7

Almost at the end of the time period it changed its main line to 25. Rxc6. White estimated the position as being 0.5 pawn up. Black believed it was equal. In a complex midgame both sides tried to prove their own truth. White saw his estimated plus value diminishing to zero. Owing to the difference in material it was not clear what the outcome would be. For the genuine spectator it was difficult to understand the strategy that should be followed. It was a game full of tactics. Finally the material balance was recognized by both sides and after a considerable exchange of pieces the game ended in a draw.

Round 2

The pairing and results for the second round:

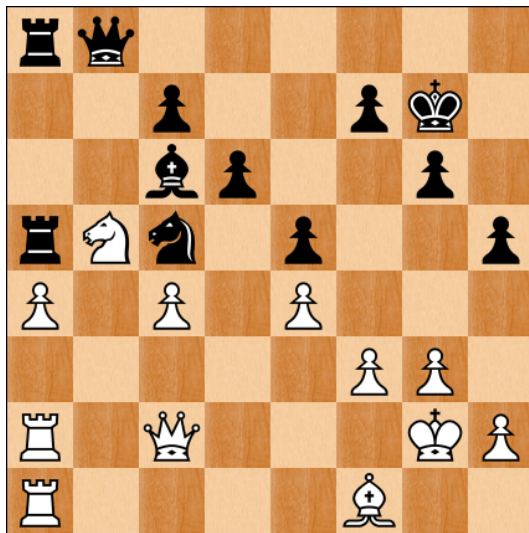
Fridolin – Ginkgo 0-1
Shredder – Jonny ½-½
Maverick – Protector 0-1
The Baron – Komodo 0-1
Hiarcs – bye

The game Shredder – Jonny was a contest between two old rivals. In the beginning of the series of games Shredder was a well-established program and Jonny the newcomer. After the second place of Jonny in the 20th world championship Jonny is now a front ranked program. The game played proved that both programs are of equal strength. In a Ruy Lopez the variation once introduced by Bird the opponents tried to get a small advantage by modest

means but both contenders operated securely. So the draw was agreed after sufficient material had disappeared from the board.

The best review of the game Maverick against Protector is by the remark that white lost the game. After an interesting Catalan opening the midgame was a difficult strategic position. However white's plan was too simple. White played Bd4-e5-d6-c5-d4. By this maneuver it allowed black to have excellent places for its pieces. The outcome of the maneuver was Bd4xf6 with giving black an isolated double f-pawn. However the compensation was a pawn majority of two pawns at the queenside. Black adequately made one passed pawn out of it and succeeded in bringing the pawn to the back rank. This completed the game although white played some additional move to accept the loss.

In the game Fridolin – Ginkgo both sides started to play the English opening quietly. With small means each contestant tried to obtain some advantage. It resulted in a passed a-pawn for white and excellent squares for the black pieces. This was the dominant theme in the whole game. At one moment we saw the a-file occupied by four rooks and a queen protecting the a-pawn diagonally.



Obviously the a-pawn could not be taken. Therefore with so many forces protecting the pawn black changed his strategy to the kingside and started a penetration with queen and knight. It was not successful that it resulted in mate or material gain but positional advantage was sufficient. Black waited for the opportunity to start a final attack. White defended cleverly but could not prohibit that tactical maneuvers resolved the position for black. Up to the very end the a-pawn was white's source of life but when the a-pawn disappeared the game was over. A well deserved win for black.

The Baron – Komodo was an exciting game. In many tournaments The Baron has shown its power by its results against top programs. Komodo played the Caro-Kann was facing the advance of the e-pawn to e5. This always leads to interesting games. Indeed black sacrificed a pawn by 13. ... d4 for positional pressure.



Figure 3 Position after 13. cxd3`

The Baron reacted very actively and the best Komodo could do was to recapture the pawn. In the resulting midgame position the chance were mutually equal. Both sides were eagerly looking for weak points in the opponent's fortifications. For the spectators it looked that both sides were able to reach their aim at the same queenside. That was remarkable and deeper analysis should give us the final verdict. As things went in the game The Baron committed suicide by sacrificing a pawn for unclear chances on a king attack. Black defended adequately and with a pawn up the technique was in good hands. All in all, an exciting fight.

After two rounds Komodo is in lead with 2 points followed by Ginkgo, Jonny and Protector with 1.5 (out of two).

Round 3

The pairing and the results for the third round:

- Protector – The Baron 1-0
- Jonny – Maverick 1-0
- Hiarcs – Fridolin 1-0
- Ginkgo – Shredder ½-½
- Komodo – bye

In the game Jonny – Maverick a closed Sicilian Defense appeared on the board. In this type of positions most games evolve rather quietly. However this game was an exception. Right in the beginning black tried to take the initiative, first at the queenside and then in the center. Jonny was not impressed and reacted adequately. It took over the initiative and soon we saw black searching for good moves. The most important advantage white achieved was that it prohibited black to castle. After the black rook on h8 has moved castling was excluded and seen from grandmaster perspective the game was lost. Jonny showed to be able to act on this level and decided the game soon as a win for white.

In chess strategy and calculations are fighting for priority. Currently finding strategies by deep calculations seems to be the most important point in computer chess. The strongest programmers assume that their brainchids are strong enough to find their own way. Mark Uniake is such a strong programmer. He played in the game against Fridolin 1.b3. Operator Harvey Williamson reported after four moves: "We are out of book". Black played actively in the center and temporarily offered a pawn. However the complications which cam on the board took all his attention and there was no time to recapture the weak pawn in the center. And then all of a sudden the weak pawn turned out to be a strong pawn so Hiarc's had a won position. The program then showed that it was able to play also tactically very strong.



Figure 4 Position after 20. ...Kf8

By 21. Bxg6 it showed that sacrificing some pieces to gain black's queen was a long-term variation, which was evaluated as a win for white. Replaying the game is a simple task. Producing the right moves at the right time is an ability which only strong chess programs nowadays have. A deserved win for Hiarc's.

In the game Protector – The Baron the Semi Slav opening occurred again. Botvinnik should have smiled when he saw this descendant of his thoughts appearing in the tournament. The game went as he has imagined: a very hard fight with chances at both sides. In his time Botvinnik remarked "The more complex the situation the better it is for the stronger player." We are not sure whether this statement holds for the current chess programs. They may see deep variations and evaluate them with a range of criteria. For human beings it is nowadays difficult to estimate who is better. In the game it looked that black was better and white had to do his utmost to keep counterplay. However hidden resources and ripostes turned out to play an important role. In the diagram position it is not even clear whether the two black pawns in the center are stronger than the two white pawns on e5 and f5. The latter two do not show to be really threatening. However their strength is their presence. The game was very turbulent after 24. Bf3.

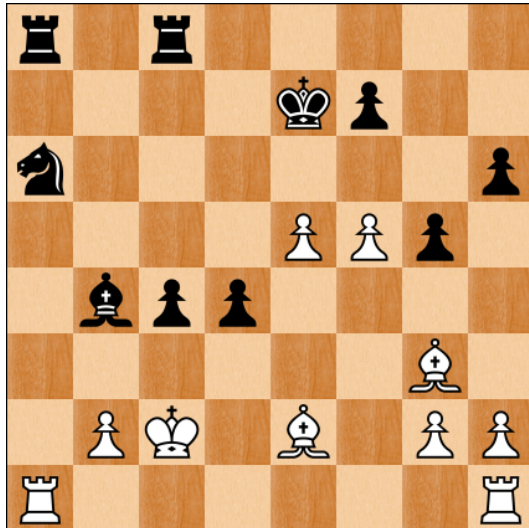


Figure 5 Position after 23... d4

Both programs estimated the general exchange that took place as an equal game. Yet in the position on the board there were new unexpected possibilities. The pair of bishops gave black the upper hand even though black was an exchange up. White played the endgame very well and won deservedly.

The game Ginkgo – Shredder contained a new asset to the collection of rare games in the computer chess world. It started as Queen Indian game following the Nimzowitsch variation. White tried to have advantage from its first move but could not find any tangible objects to aim at. When black started with its first threats white closed the position and black had no opportunities to open that configuration. There was one place where black could employ its pieces and tried to have an open fight, namely at the kingside. However before black could be dangerous white was able to close position there too. Now we had the remarkable configuration with only a few possibilities to enter opponent's fortress. On move 43 black played a6, so the pawns e to f were completely harmonized to one big wall over the board. The g-file with pawns on g3 and g6 was the only opportunity to try some initiative. As a spectator we will not see that both sides did real attempt to make something out of the opportunities given. What they did was moving, moving and moving. 50 moves were played without a pawn move. Experienced chess players know what this means. Established chess programs know that after such a performance it is time for a joke. So with all grace in its move black played 93. ... Qg4: a queen sacrifice and simultaneously claiming a draw.

After three rounds Protector and Jonny lead with 2.5 points. Ginkgo and Komodo follows with 2 points.

Round 4

The pairing and the results for the fourth round:

Shredder – Hiarcs 0-1
 Maverick – Ginkgo 0-1
 The Baron – Jonny 0-1

Komodo – Protector 1-0
Fridolin - bye

In the match Komodo – Protector playing chess looks easy. Komodo relied on the Nimzovich-Larsen opening 1. Nf3, d5 2. b3, Nf6. Both sides placed their pieces on the relevant squares. They exchanged in time pawns and pieces. Still white seemed to play with more knowledge and intuition than black. For instance doubling the rooks on the c-file and creating an isolated d-pawn at the black side. Also the exchange of a knight for a bishop brought in a small advantage. The outcome of the combination of all small advantages was the capture of a pawn. The endgame resulting from this series of moves was difficult but playing with a pawn up gives opportunities and challenges the opponent. Step by step white managed to improve its advantage and won the game straightforwardly.

From one game it is difficult to assess whether this game is either played by human grandmasters or by computers of grandmaster level. The game Shredder versus Hiarcs provides an excellent example of this question. Hiarcs played the Sicilian opening, in particular the Najdorf variation. Black choose a strategic line in which it sacrificed a pawn for active play on the black squares. This initiative developed well in the position with pressure on the white pieces and pawn structure. Continuous pressure led to the white decision of returning the pawn in the hope to find relief. Black took the pawn and expressed the wish to keep the initiative even though he had to sacrifice the exchange by 37. ... Rxc4.

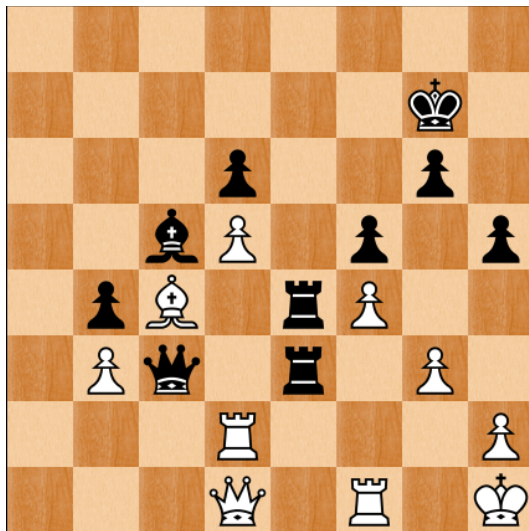


Figure 6 Position after 37. Bc4

With bishop and pawn versus rook black was master of the board. However the question was whether it was sufficient for a win. From a comfortable position black managed to develop play at the kingside with an kingside attack, at the queenside by mobilizing the pawn majority and in the center by using the squares as a hub for support for both sides. White did it utmost but had to return the exchange and allow black to arrive a queen ending with a passed pawn for black. The game was in a technical phase and Hiarcs played indisputable bringing in a full point for black. This game is a very good example for the playing strength of current computer programs.

The game between The Baron and Jonny was a demonstration of power from Jonny's side. After a Queens Indian opening Jonny played some challenging moves. The Baron accepted the challenge and managed to win a full piece against a pawn.



Figure 7 Position after 12. f3.

However black's position was overwhelming and soon another pawn was won. The white pieces were placed in a cramped situation on row 1 and 2. Black developed all its pieces smoothly and gained another two pawns at the queenside. With four pawns for the piece the material balance was now in favor of black. Pieces and pawns penetrated the white position and soon the white king resigned.

The opening in the game Maverick – Ginkgo was a Semi-Slavic opening. Both players seem to know what they had to do. Black reacted quite actively but white's ripostes were adequate. White sacrificed a pawn for a better pawn structure but postponed recapture of the pawn and believed that active play was better. However black made use of the time given to him by small tactics. At one moment that it was clear that the small tactics had given black the best chances and thereafter white had to fight for a draw, which was unreachable in that position. The black win was fully deserved.

After four rounds, Jonny leads with 3,5 points. Komodo and Ginkgo share the second place with 3 points.

Round 5

The pairing and the results for the fifth round:

Jonny – Komodo 1-0
 Ginkgo – The Baron ½-½
 Hiarcs – Maverick 1-0
 Fridolin – Shredder 0-1

Protector - bye

In the fifth round the favorite program for the title Komodo played the “Geheim” favorite Jonny. After a Slav opening both programs showed equal strength. In fact we could argue that the game started after 37. ... Bxh8.



Figure 8 Position after 37. ... Bxh8

The moves played from this position were very subtle. No side was seduced to commit a mistake up to the position after 129. Nf2.

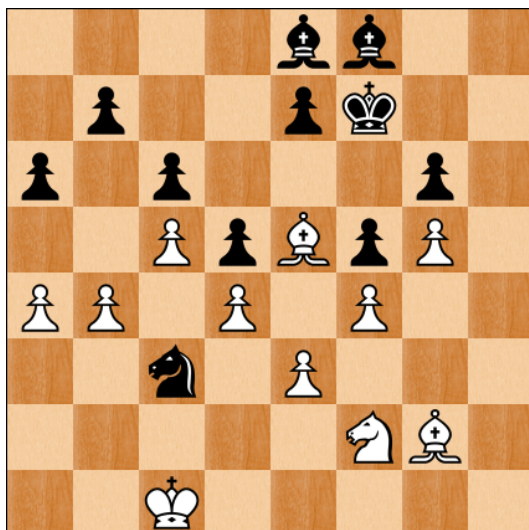


Figure 9 Position after 129. Nf2

In this position black decided to be active and played the double-edged move 129. ... Nxa4. It was the beginning of a disaster, which was very difficult to spot. After move 144. Be6 the quintessence of the winning line appeared on the board. 145. Na8! See the diagram below.

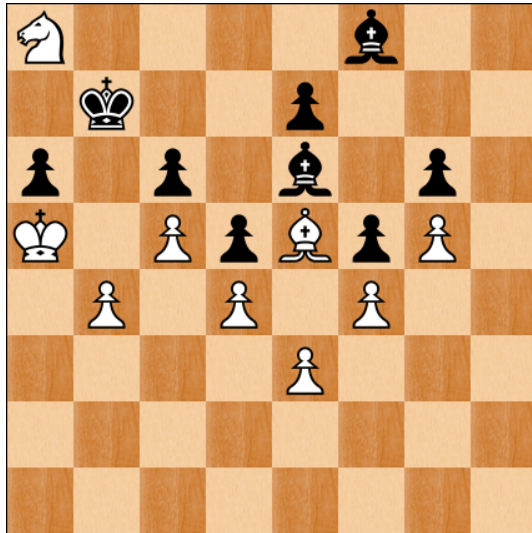


Figure 10 Position after 145. Na8

Both programs had difficulties to believe that this was really the start of a winning line so the motive was repeated and on move 149. Kb6 it was clear to the programs and the public. There was ample admiration among the human spectators. Once the idea is clear the moves played them selves. Nevertheless for the winning side each king step must have given big satisfaction to the operator. Jonny can be proud to have delivered a top performance in this world championship.

The game Ginkgo – The Baron was an equal game in which both players seems to be satisfied which such an outcome. However programs nowadays have their own intention and The Baron showed this by trying to win a pawn. However it was at the cost of a displaced rook. White had the initiative, regained the pawn and has some advantage. Black understood what he should do namely trying to reach a drawn position. With some clever maneuvers he arrived at a tablebase position with a rook at his side and only a rook and a knight at the opponents side. A draw was agreed between the opponents.

Although Fridolin managed to play the opening on equal footing it was no real match for Shredder. Stefan Meyer-Kahlen’s program took the initiative by a simple king attack. The black pawns marched to the white king and were not stopped by any counter action. It resulted in a pawn capturing a rook on e1. At that moment the game was over although the player continued for a few moves. By this win Shredder managed to remain in the middle of the pack.

In the game Hiarcs – Maverick we saw a quiet game in the beginning but soon Hiarcs challenged Maverick to be active. Maverick replied by overactive play, which might impress the layman but not an experienced program like Hiarcs. Both programs had seen that the surprising move 27. ... Qxg4+ led to a lost position for black.



Figure 11 Position after 27. Qxg4+

The continuation of the game was predicted in both principal variations. All in all, a deserved win for Hiarcs.

After five rounds, Jonny leads with 4,5 points. Hiarcs and Ginkgo follow with 3,5 points.

Round 6

The pairing and results for the sixth round:

Maverick – Fridolin 1-0
 The Baron – Hiarcs ½-½
 Komodo – Ginkgo 1-0
 Protector – Jonny ½-½
 Shredder – bye

The game Protector – Jonny was a Catalan opening in which soon after the opening the contest focused on taking the initiative. As is usual the case initiatives are higher ranked than material advantage. So we saw a class of styles. Both programs tried to find the answer. For an objective commentator it is difficult to put more weight to the material feature. While the game progressed the material balance was never properly reset. It is always difficult to give preference to a minor piece with some passed pawns as compared to a rook which is active but cannot find any weak points in the opponents fortress. After a long series of moves both programs decided to share the point.

The Baron showed to be a solid program. Playing against Hiarcs is quiet some task nowadays. However the Baron played a flawless opening. Reached a normal midgame and was able to exchange the most important pieces. Hiarcs tried to bring any music in the position but The Baron did correctly danced in the right pace and with sufficient distance. All in all, Hiarcs was unable to challenge The Baron for any risky move. Finally both programs agreed to a draw.

After the Bird opening Komodo tried to develop smoothly and would like to win from the opening. However Ginkgo was alert and defended well. In difficult positions the best player always find the best alternatives. That happened in this game too. It looked Ginkgo had sufficient counterplay but Komodo build a strong position with hos pawns assisted by a rook. The dynamic position at the end turned out to be a win for white, although black could have provided more resistance.

After a start in an Old Indian variation a tough fight between programs in the lower half of the tournament took place. Their play was understandable and it was not clear whether they were aiming at one specific goal or they were playing acceptable moves, meanwhile seeing which position would be the next station in their fight. The exchange of pieces and pawns finally led to a run of black's e-pawn versus advancing the white pawns at the queenside. Although black was first, it resulted only in gaining the exchange. The white pawns finally decided the game.

After six rounds, Jonny leads with 5 points, followed by Hiarcs and Komodo with 4 points.

Round 7

The pairing and results for the seventh round:

Ginkgo – Protector $\frac{1}{2}$ - $\frac{1}{2}$
Hiarcs – Komodo $\frac{1}{2}$ - $\frac{1}{2}$
Fridolin – The Baron 0-1
Shredder – Maverick 1-0
Jonny – bye

The Ginkgo – Protector was a Queen Gambit Slav variation. They followed the main line of a quiet variation. The game can be characterized by two features. First white had an isolated d-pawn and a knight whereas black had a black squared bishop and a weak c-pawn. Since this characterization dominated the position, i.e. tactically and strategically, both sides placed and replaced their pieces continuously. No progress was seen and after 67 moves which were of interest to the programs but not to the public they agreed on a draw.

Hiarcs – Komodo was an exiting game already from the beginning. They played a Slavic variation of high complexity. Black castled to the kingside but white decide to develop via h4 and Rh3. It looked that white started an overwhelming kings attack which prohibited black to strengthen his majority position on the queenside. However black intelligently found a possibility to weaken the attack by sacrificing the exchange. White took the scrimmage in the center as a basis to resolve the majority of black pawns on the queenside. Here black showed a nice trick by saving one pawn in particular and bringing it even to the square c2. For the general spectator it looked as a pawn who had lost its way.

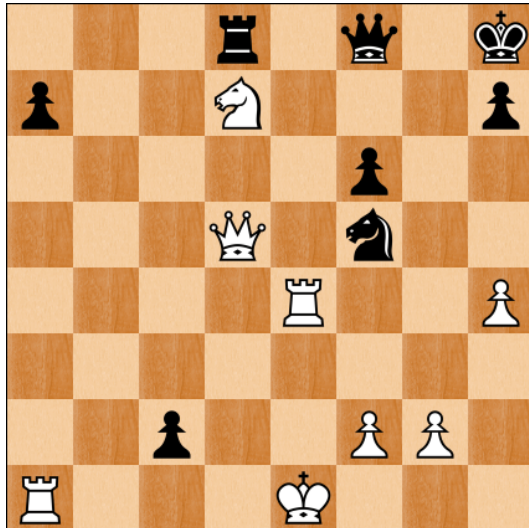


Figure 12 Position after 26. Nxd7

Yet black showed to have in mind a deep plan with this pawn. In the diagram position black played 26. ... Qa3. Clearly pawn c2 is pivotal in the whole development after this move. The situation remained unclear since white picked up in the series of exchanges a knight but it turned out he could not save its own life. Remarkably the complexities did not lead to a win for either side but turned out to result in a rook ending of three against two pawns. This was a draw although black had to play precisely.

The game Fridolin – The Baron is a nice example how an experienced program as the Baron addresses the normal moves as played by Fridolin. To play a game well programs should be active and inventive. Good moves are most of the time not sufficient for a good position since the programs are in a competition for subtleties. With this few on the position we see that The Baron succeeded in steadily obtaining small advantages which finally resulted in a tangible advantage. Still some technical decisions had to be taken in the right order before a win could be written down on the score sheet. In this game The Baron did what the public expected. It won the game convincingly.

The game Shredder – Maverick was more exciting than could be expected of their experience. Shredder is a program which has seen all ins-and-outs of the computer chess world and Maverick is a newcomer. In the Sicilian opening both sides played well. Still Shredder managed to collect some small advantages, which could be at value in a later phase in the game. Some touchable items were a passed a-pawn, nice square on d5 for the knight and a weak pawn on the b-file. The relation between this three items was combined harmoniously by Shredder and was in fact the basis for his win. For Maverick here is a possibility to learn from this connection of elements in this data science collection. The way to the top is long and winding but deserves to be pursuit.

After 7 rounds, Jonny leads with 5 points, followed by Komodo and Hiarcs with 4.5 points.

Round 8

The pairing and results for the eight round:

The Baron – Shredder 0-1
Komodo – Fridolin 1-0
Protector – Hiarcs ½-½
Jonny – Ginkgo 1-0
Maverick – bye

At the beginning of this round three programs may have some hope for the title. For all three it was therefore important to win their game against one of the programs which are not a candidate for the title. Jonny and Komodo fulfilled the expectations. However Hiarcs had to allow Protector a draw in a game in which Hiarcs had never a chance for a better result. In fact the game Protector – Hiarcs is a demonstration of the level of playing strength computer programs nowadays have reached. Strategically it was an interesting game but there were no moments of excitement and a draw was the logical outcome.

Chess is a game of decisions. Playing a strong game is taking the right decisions on the right moment. In many games it is possible to attain some advantage by positional play but then it is difficult to get more advantage. Therefore a well-planned decision is necessary and should be taken on the right moment. Jonny played an interesting Stonewall opening against Ginkgo. Both programs are well aware of the strategic requirements the position imposes and both took the right small decisions. Jonny was able to achieve some small positional advantage. The power of Jonny is in its calculation engines. Jonny playing with 2400 cores is a master in distributing smaller tasks to these cores for computing particular configurations.

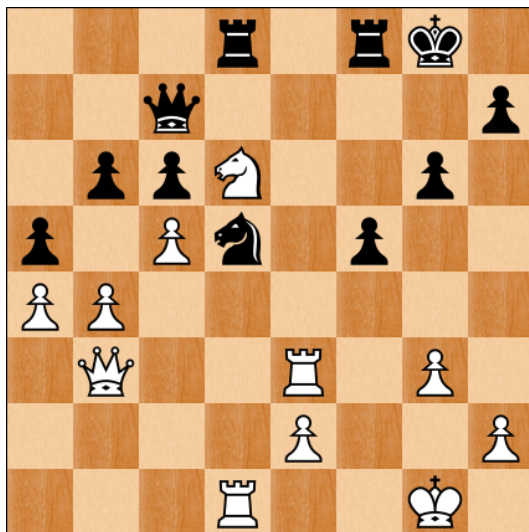


Figure 13 Position after 25. ... a5

After 25. ... a5 Jonny decided to sacrifice the exchange to reach an endgame in which white was compensated for the exchange by one point only. Jonny had

calculated that this endgame was very favorable for white. Progress was slow but definitive however it relied heavily on computation. A nice example of the deep thinking by Jonny is given in the position 49. ... Re7.

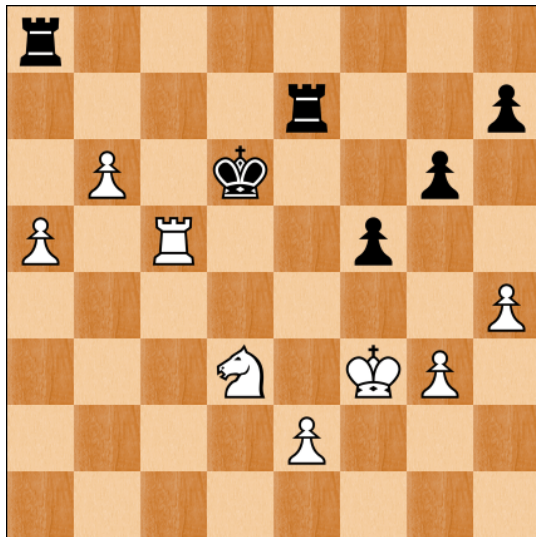


Figure 14 Position after 49. ... Re7

Such moves are a jewel in the crown. The remainder is played on the same level. A very much deserved win for Jonny. It gave him a comfortable position for his aspiration to become World Champion in the last round.

The similarity between a weaker program and a very strong program is that they are both played unexpected moves. The difference between the two programs is that the unexpected move by the stronger player is a strong move with a clear meaning. The unexpected move by the weaker player is a surprising move of which the spectator is guessing to its meaning. With this guideline in mind it is a pleasure to replay the game between Komodo and Fridolin. For human players many moves are surprising moves. The line of thought followed by Komodo resulted in a win, which in fact showed it out-classed Fridolin.

The Baron versus Shredder is again a game between the sub top and the world top. The Baron played the opening well ,but the transition from opening to middle game was played better by Shredder. It is remarkable how modern top-programs understand when to sacrifice a pawn for active play and when to go for gaining a pawn. Shredder developed very active play and was clearly the first in its attack to the white king. The attack by white to the black king did not start at all. Under pressure of the black pieces white had to give up an exchange for a pawn but the pressure continued and soon the surrender was inescapable. For Shredder it was a last chance to reach the top four.

By the pairing of the last round it is clear that the tournament will have an exciting finish. With one round to go, Jonny leads with 6 points. Komodo is second with 5.5 points and Hiarcs follows with 5 points. Shredder is fourth with 4.5 point

Round 9

The pairing and result for the ninth round:

Hiarcs – Jonny 0-1
Fridolin – Protector 0-1
Shredder – Komodo 0-1
Maverick – The Baron 0-1
Ginkgo – bye

In the final round two games were of importance since the two top programs were involved. Jonny had black against Hiarcs and Komodo black against Shredder. To become world champion the program should be a master in the details of chess complexity. Jonny distributes the complexity over 2400 cores and Komodo relies on the grandmaster knowledge, which is meticulously implemented in the program. Below we will see no difference in the outcome since both programs won. But the thoughts along the lines with this result was achieved differs quiet considerably.

The game Hiarcs – Jonny started as an Italian game following the Giuoco Piano variation, which means in translation quiet, quiet, quiet. Under the service both programs had their own ambitions. On move 9 black exchange the black squared bishops giving white the half open f-file. It was an important decision since the half open f-file could be basis for a king attack by white. Black believes to have a position, which could defend all possible threats. However, after 16. Kh7 he must have been surprised by white sacrificing the exchange, 17. Rxf6.



Figure 15 Position after 17. ... Kh7

After the exchange sacrifice white had to decide how to continue his positional attacking ideas. He did so by Qf3 and Nf1. In the mean time black positioned his rook on g5. That position was very interesting. White started a deep search, which should decide between the moves 20. g4 and 20. Ng3. Afterwards we may say that this is the critical position of the game. It is believed that g4 is the better

move and potentially would lead to a win. However Ng3 was also very attractive, as the game will show in particular because black has some hidden ripostes, which could not be computed at the time that white had to decide upon his move.



Figure 16 Position after 19. ... Rg5

After 20. Ng3 black played the rather surprising move 20. ... Bxh3. It is impossible to say that this move is a refutation of Ng3 but it led to very sharp play (21.gxh3 Rxg3 22. Qxg3 Rg8).



Figure 17 Position after 20. ... Bxh3

White continued with 21. Nh5, Be6 22. d5 and now black had to take a difficult position since securing the bishop leads to a disadvantaged position since the kingside cannot be protected adequately.



Figure 18 Position 22. d5

Therefore black decided to play 22. ... Rf8. In complex situation white recaptured a piece and tried to continue his attack. Black was alerted and defended the materially unbalanced position as good as possible. From human point of view he did so without any view.

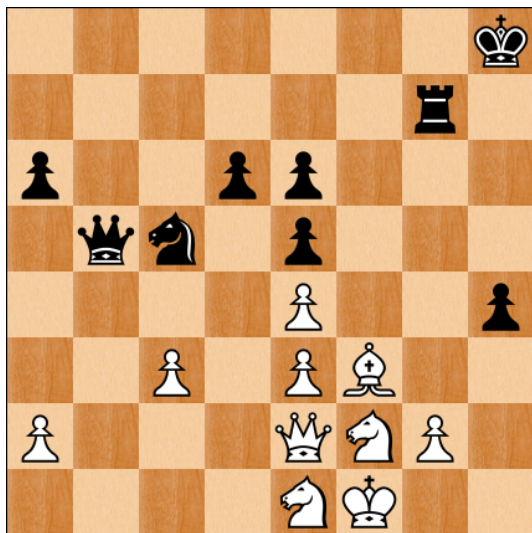
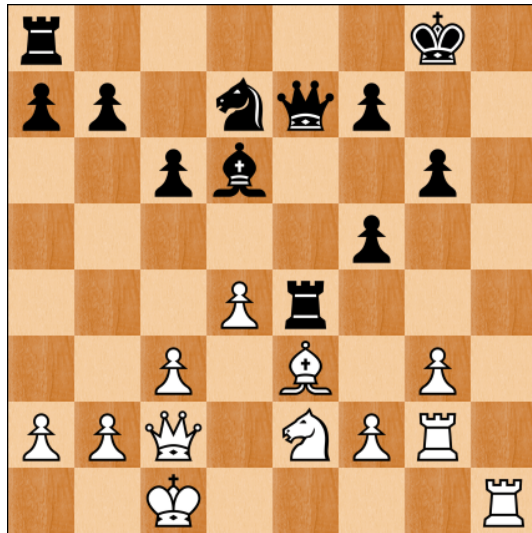


Figure 19 Position after 44. Qe2

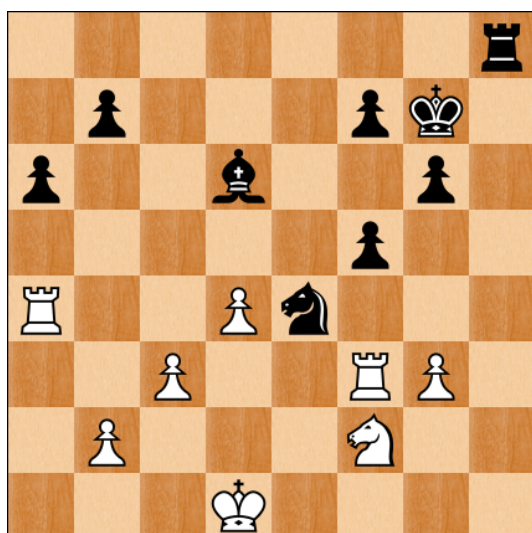
At move 44 the queens were exchanged and an endgame of three pieces against a rook and a piece appeared on the board. The general opinion was that the result would be a draw. In that case Komodo would have a chance to come along. However Jonny was on his best and particular by partitioning the calculation tasks over 2400 cores. In the endgame Jonny found almost incredible maneuvers and fully outplayed Hiarc. Almost every five moves deserve a diagram to understand the fine details of play as performed by Jonny. On move 92 Hiarc decided to resign. Jonny is the new World Champion, he won convincingly and deservedly the 21st WCCC. Congratulations!

Shredder is a many times world champion program. It played in the last round against Komodo, the brainchild of Don Dailey. The program is so strong by the efforts of grandmaster Larry Kaufman. He scrupulously analyzed the details of

strong pawn formations, promising pawn formation and interesting pawn formations. In fact he did some data science *avant la lettre*, this means arriving at the statistical correct conclusions from many examples. The game against Shredder is a fantastic demonstration of the power of the implemented knowledge. The game started with quiet Caro-Kann. At the moment that white threatened to double its rook on the h-file by playing 18. Rg2 black played his deep riposte.



In some sense 18. ... Rxe3 is a forced move since it takes the power from the white attack. Moreover after the queen exchange there is an interesting endgame in which white seems to be material up (a rook versus a piece and pawn) however Kaufman has included in the evaluation also the promising power of the three versus one difference in pawns at the kingside. The white compensation at the queenside 4 against 3 has a lesser weight. The continuation of the game is a brilliant proof of these simple thoughts. After 41. Ra4 it is clear what Komodo had in mind when it sacrificed the exchange at move 18.



From the diagram position Komodo reached its preferred configuration and was able to win the game by technical means. A performance of high quality has been delivered giving Komodo the second place in this championship behind Jonny. Fridolin – Protector was a game that showed the difference in decisions. Both players were confident their position after the opening phase. In the midgame is a matter of building up a structure, which has consequence to the far endgame. Such decisions require a large amount of experience in combination with the possibility to articulate the findings in a computer program. Apparently Protector had performed his homework better than Fridolin. It is true that Fridolin is a rather strong program but the other programs are definitively stronger. And that is what makes the difference. In the game it turned out that the white kingside was weakened and the d-pawn was not a strong passed pawn, but a weak pawn. Moreover the black pawns on the queenside were more threatening than the combinatorial forces by the white pieces. Consequently black combined all this assets and won the game rather easily.

Maverick – The Baron was a game between partners with a considerable difference in playing strength. Maverick started to play quietly but decided in the start of the middle game to become active. That was a difficult decision and the way it employed the activities was definitely not the best one. White's position worsened by every move and finally black reigned over the whole board. White was eager to learn from black and played on to a position where white was almost empty-handed.

Jonny is the new World Computer Chess Champion (7 out of 8). Komodo came second (6.5/8). Hiarcs and Protector share the third place with 5/8.