

## WCCC 2018: The 24<sup>th</sup> World Computer Chess Championships

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The 24<sup>th</sup> World Computer Chess Championship started on July 16, 2018. Eight programs as in table 1 participated in a round robin tournament over seven rounds. The tournament took place at the Stockholmsmässan in Stockholm, Sweden and was organized by the ICGA. The venue was part of the international conferences IJCAI, ECAI, AAMAS, ICML, ICCBR and SoCS. The main sponsor was Digital Game Technology (DGT). It was held in conjunction with the 8<sup>th</sup> World Computer Software Championship and the 2018 Computer Speed Chess Championship. The classical tempo of 1h45'+15'' per move for both sides was the one adopted.

This year the tradition of a chess grandmaster explaining the games and entertaining the public was resumed. The difference with the 1986 WCCC in Cologne was large. In 1986 grandmaster Hort gave comments from the point of view of a chess player who knew better than the computer whereas in this tournament the Swedish grandmaster Harry Schussler was given the task to explain the computer moves knowing that almost all programs were stronger than he was. Nevertheless he did a very good task by pointing out which moves were typical for a computer and still very strong moves. He remarked that humans could learn quite a substantial part from the computer manoeuvres.

<<table 1>>

### Round 1

Leela Chess Zero	- Komodo	0-1
Booot	- Jonny	$\frac{1}{2}-\frac{1}{2}$
GridGinkgo	- The Baron	1-0
Chiron	- Shredder	$\frac{1}{2}-\frac{1}{2}$

In the first round Leela Chess Zero and Komodo played an exciting game which ended unexpectedly not in a draw (white lost by time forfeit). In the opening the key feature was the isolated centre pawn on d5. Was it a strong asset in the centre? Yes, it was but taking the pawn by white would give black even more chances. At the first opportunity white preferred to castle to the king side and not to take the pawn (indeed it was impossible). Only a few moves later small combinations played a key role in the game complexities. Black decided to play 15. ... Na2, a very remarkable move. See diagram 1.

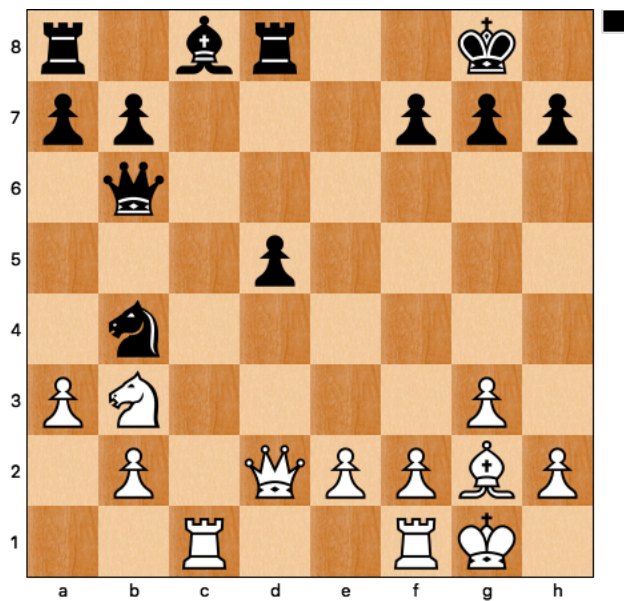


Figure 1 Diagram 1

The continuation was 15... Na2 16. Rcd1, Qxb3 17. Bxb5, Rxd5 18. Qxd5, Qxd5 19. Rxd5, Be6 20. Re2 resulting in an endgame in which black had two pieces for a rook and a pawn. This was move 20, the endgame was sometimes exciting and other times rather boring. It lasted more than 110 moves. At that time the table bases and human chess players with mediocre knowledge of the game all knew the game was drawn. However, black continued to play since white did not have table bases and have to compute all variations. This took a lot of time and on move 134 white overstepped the time limit and lost by time forfeit.

The game Jonny – Booot started as a quiet Semi-Slav. Black had a plan to attack the white king and for the execution of the plan Jonny transferred all its pieces to the king side. Booot reacted adequately and gave black the impression that the square f4 was overloaded since it should be used for the bishop as well as for the knight. For human beings this would be a challenging task to solve. Not for computers of the current playing strength. On move 37 black played 37... Bf4-h2 in order to be able to play 38 ... Nf4. See diagram 2.

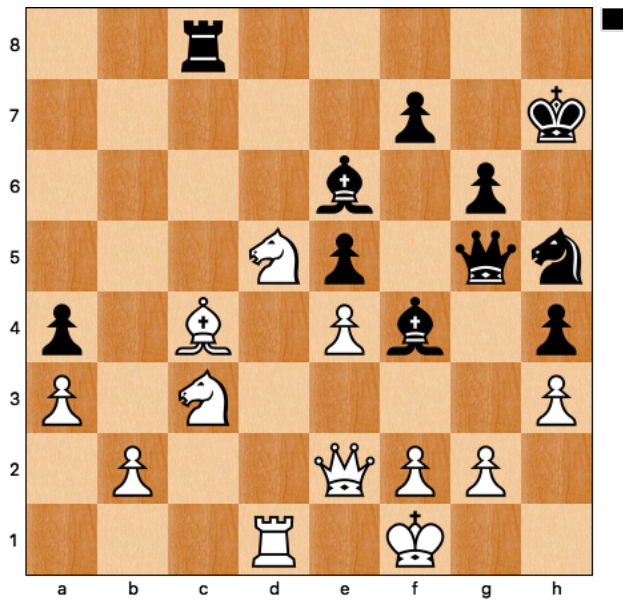


Figure 2 Diagram 2

The black bishop remained up to the end on h2. The black attack was vigorous but white was very alert in its defence, meanwhile creating counterplay in such a way that the game ended in repetition of positions. After a hard fight a well-deserved draw for both sides.

The second program that decided a game in its advantage was GridGinkgo. It won by accurate play with taking very fine decisions. The main point was that it sacrificed the exchange for a passed pawn. It occurred in an attractive series of moves that was started with 34. b4.

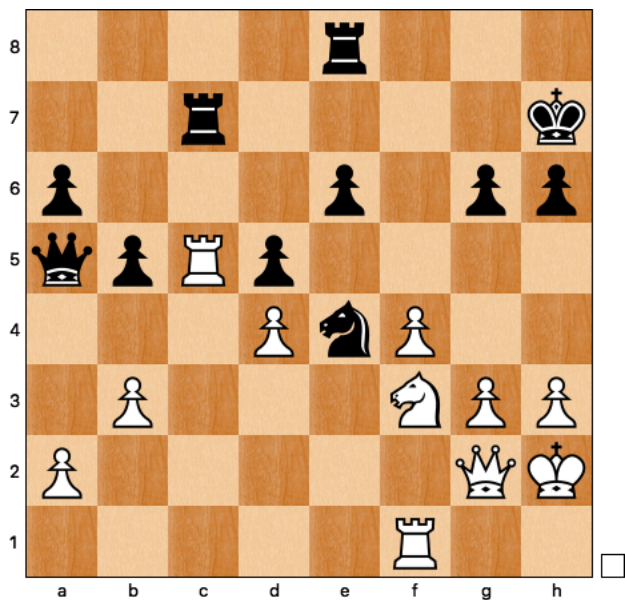


Figure 3 Diagram 3

The continuation was 34. ... Qb6 35. Qc2, Nxc5 36. dxc5. Black then decided to create space with sacrificing the e-pawn by playing 36. ... e5. It was not clear if better mover were available.

In the course of the game GridGinkgo was able to further challenge The Baron on the kingside and succeeded in creating a passed f-pawn. A nice interplay of king and rook and pawns led to an end of the game. A well-deserved win.

The game Chiron – Shredder was a game of high level between opponents who had respect for the playing strength of the other program. After a well-known opening they soon followed their own paths. The strategic lines that were followed were understandable for human beings. There was no explainable artificial intelligence necessary to understand what motives were underlying the moves. The game was clear up to move 32 then black decided to achieve in the most clear way a draw. Although it was reached by some slightly surprising sequence of moves.

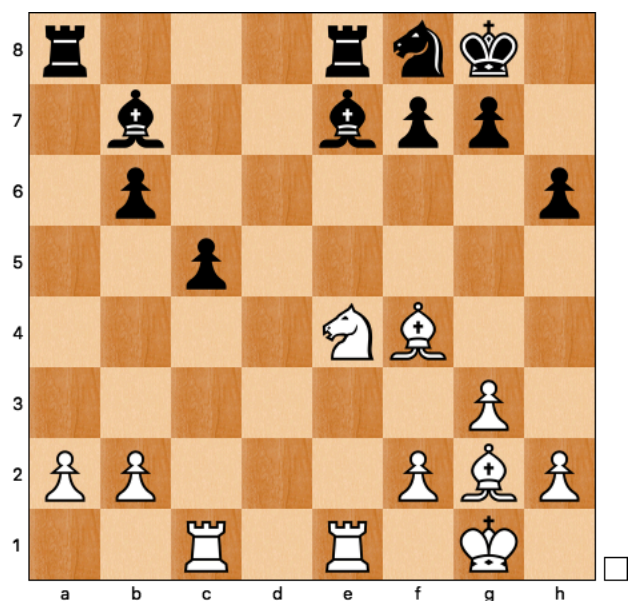
After this round we have two leaders Komodo and GridGinkgo with two out of one.

## Round 2

Komodo	- Shredder	$\frac{1}{2}-\frac{1}{2}$
The Baron	- Chiron	$\frac{1}{2}-\frac{1}{2}$
Jonny	- GridGinkgo	$\frac{1}{2}-\frac{1}{2}$
Leela Chess Zero	- Booot	$\frac{1}{2}-\frac{1}{2}$

The round resulted in four draws. One game was tough and inspiring (Komodo – Shredder), two games were very long and require some perseverance when replaying these games and the game between The Baron and Chiron ended in a draw without much excitement since they quietly exchanged all pieces.

In the game Komodo - Shredder the most interesting point was after move 18. axb6, see diagram 4, when white played 19. Nd6.

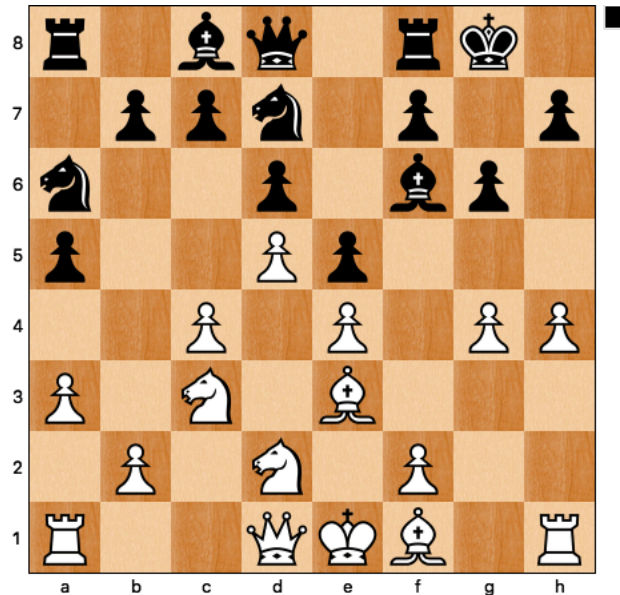


The continuation was 19... Bxd6 20. Bxb7, Rxe1+ 21. Rxe1, Rd8 22. Rd1, Bc7 23. Rxd8, Bxd8. After 24. Kf1 white had two small advantages, namely the bishop pair against bishop and

knight and the far away pawns a and b whereas black had b and c pawns. Nevertheless, the two advantages were insufficient for a win.

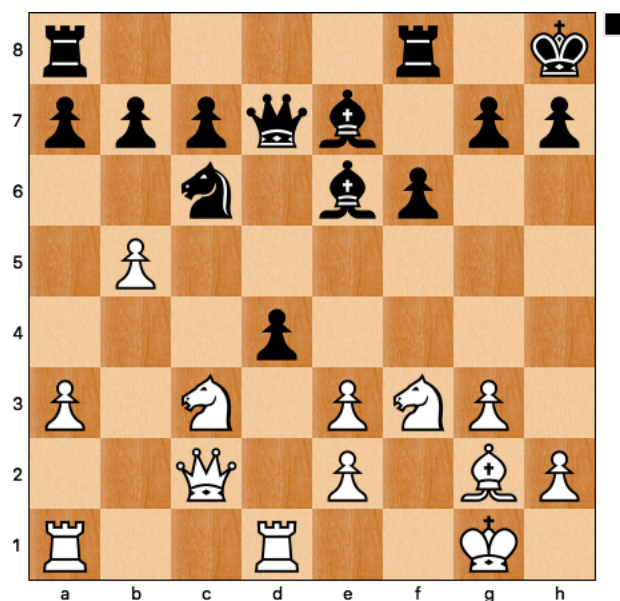
The Baron – Chiron has been discussed above. A straightforward draw.

Jonny – GridGinkgo promised to be a sharp game after 13. h4, Bxh4 14. Qf3, see diagram.



However, black hold to manage himself and around move 30 the pawn positions were so interwoven that both sides took 130 moves to find an opening. It all was in vain, hence on move 164 a draw was agreed since repletion of moves appeared on the board after 5.5 hours of play.

The game Leela Chess Zero versus Booot was a game with one tense moment when white played 16. b5, see diagram.





After 16... Na5 17. Nxd4 the weighing of the pros and cons was a weighing of very different features. Nevertheless, there was no imbalance and hence the game ended in a draw.

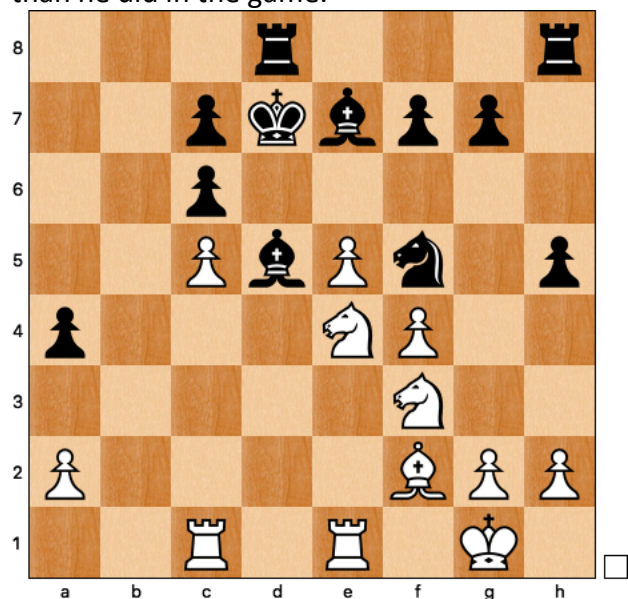
The results imply that Komodo and GridGinkgo are in the lead with 1.5 out of 2.

### Round 3

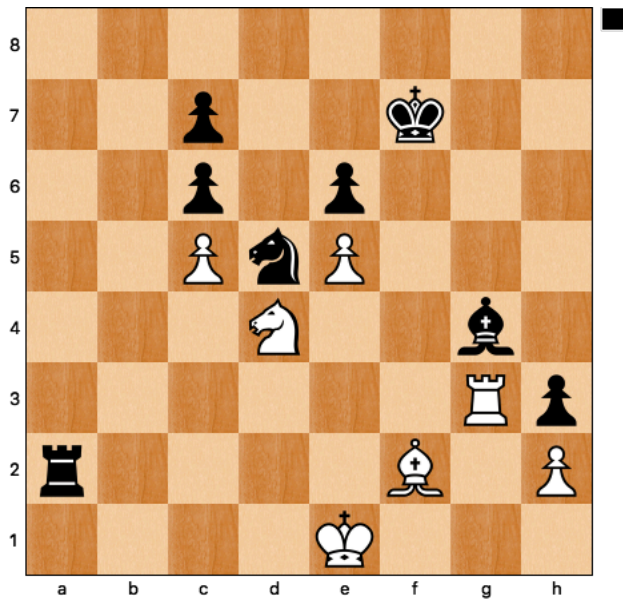
Booot	- Komodo	0-1
GridGinkgo	- Leela Chess Zero	1-0
Chiron	- Jonny	$\frac{1}{2}$ - $\frac{1}{2}$
Shredder	- The Baron	1-0

The third round clarified the position of the potential winners and thus also the position of those who do not belong to them. Komodo, GridGinkgo and Shredder secured their leading positions.

In the third round Komodo played a very interesting game with Booot. It was a Berlin wall opening in which black usually has a solid position but has to wait to the endgame before it is possible to have any advantage from the micro benefits collected during the game. Commentator and grandmaster Schussler made the statement that move 13. f4 is possibly the first benefit which was given to black entrusting the square f5 to the black pieces. What else could white have been played? In his opinion white should have sacrificed the e-pawn earlier than he did in the game.

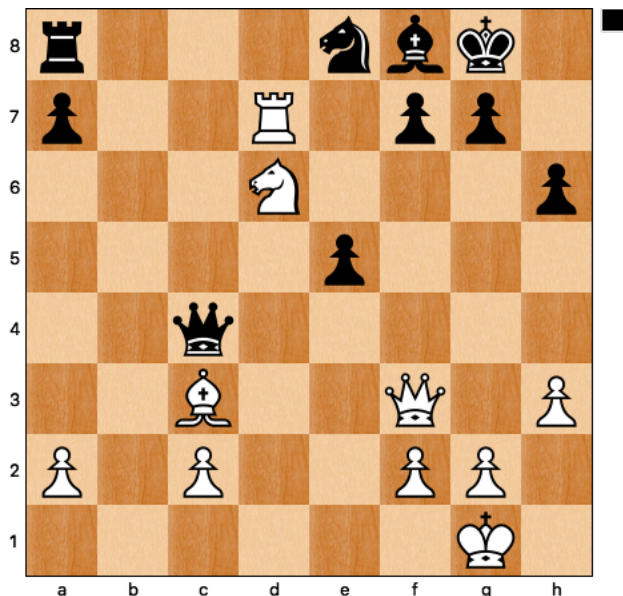


On move 25 white played e6+, see diagram, sacrificing a pawn and obtaining some counterplay. In the sequel of the game white managed to regain the pawn but its position was difficult to defend. On move 78 black played Nf4 and that was the start for a winning end for black.

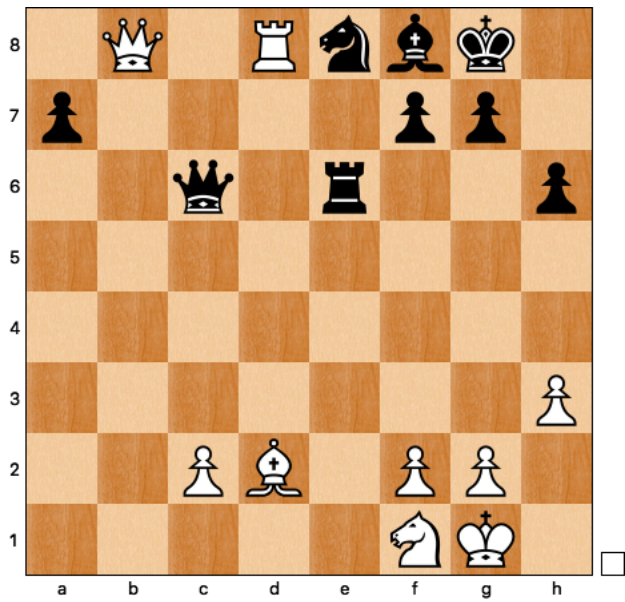


(79. Rxc4, Nd3+ 80. Kf1, Rxf2+ 81. Kg1, Rb2). White resigned a few moves later.

The game GridGinko – Leela Chess Zero had a difficult start. Leela Chess Zero is working with an operator who was plagued by a family disaster (his mother had an accident and landed in the hospital). Therefore, another operator had to be called in which took some time but all participants were happy that the obstacle could be resolved. Both opponents agreed to play the game under the time control GridGinkgo 1:00 and Leela Chess Zero 0:45 (plus 15 seconds per move). The start of the game showed that both players did not intent to make it a quiet game. After a turbulent opening (with black taking the pawn on b2) white started complication with 29. Nd6 with the threat to capture the rook on a8.

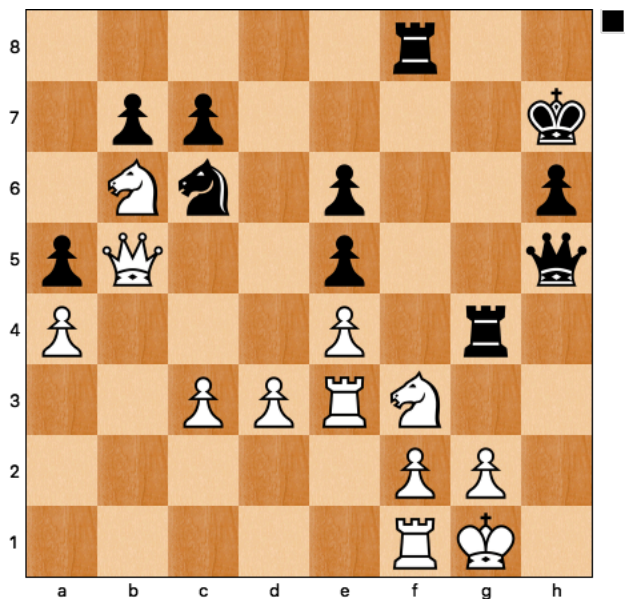


The continuation was 29. ... e4 30. Nxe4, Qe6 31. Rd3. A following moment of action by white was 39. g4, see diagram.



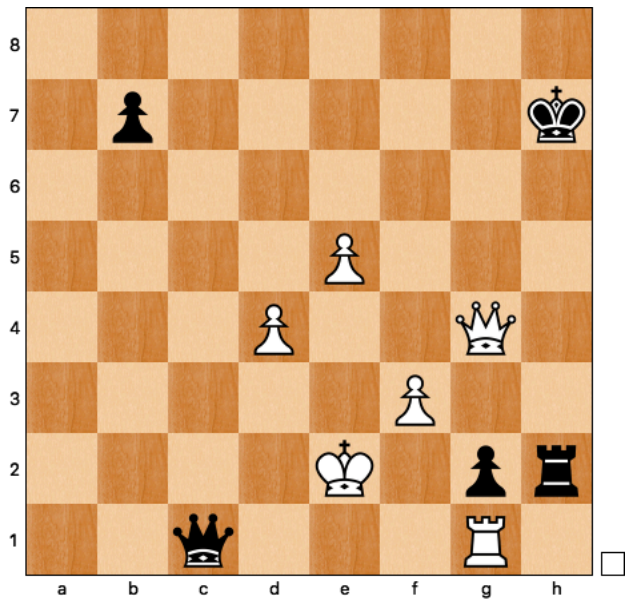
Commentator Harry Schussler mentioned that a human grandmaster would not immediately consider this move as a good move to be played. Whatever the case white succeeded in increasing its advantage and won the game convincingly.

The game Chiron – Jonny was quite exciting although it took a long time before real action made the game attractive. After 44. Nxb6, see diagram,



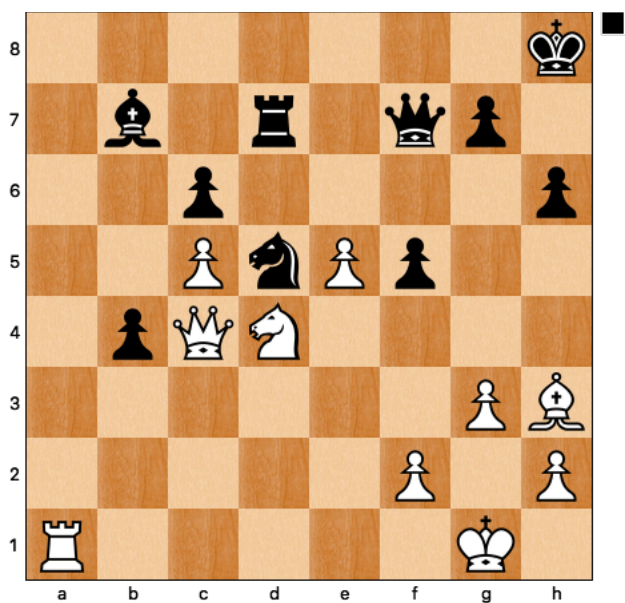
Black played 44. ... Rfg8 followed by 45. Ne1, Rh4 46. f3, cxb6. Another exciting moment was after 69. ... Qg3+ when white played 70. Kf1 h3 71. Ng4 hxg2+ 72 Ke2 Qf4 73 Qb6 Rxd4 74 Qe6 Kh7 75 Qxh4 Qc1, which deserves a diagram.





With such *trouvailles* all chess aficionados agree that such a game should end in a draw which happened on move 84.

In Shredder – The Baron black relied on the well-known Dutch opening. It is a sharp opening in which both programs must know the opportunities of the opponent very well in order to hold their own. After the opening white turned out to have maneuvered better than black although the situation was complex and black had many resources. For a human being they are difficult to find but for a computer it is only a matter of deep look ahead. For instance 38. ... Nf4, see diagram.



39. e6, Nxh3 40. Kh1, Qg8 41. exd7, Qxc4 42. Qd8, Kh7 43. Qd7, Qxc5 44. Qxg7, Kxg7 45. Ne6+, Kf6 46. Nxc5. The Baron did not succeed to reduce the pressure it was under. Shredder handled the position in a really grandmaster way and forced a win although it took 66 moves.

Top positions after three rounds 1-2 GridGinkgo, Komodo 2.5 out of 3, 3 Shredder 2 out of 3.

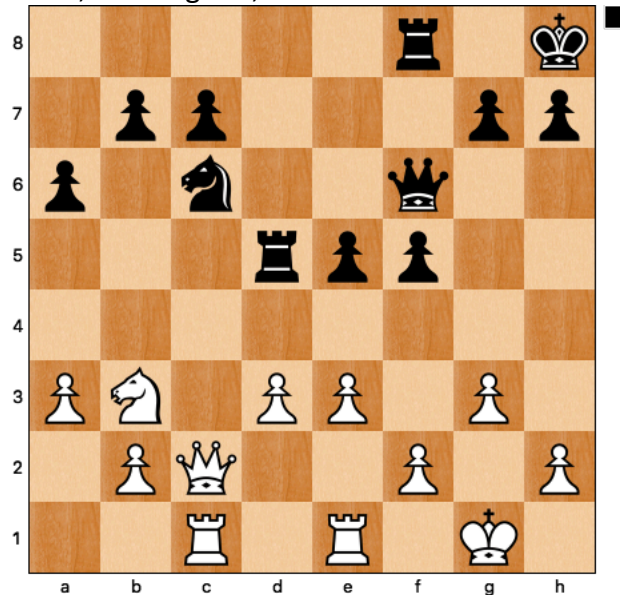
## Round 4

Komodo	- The Baron	1-0
Jonny	- Shredder	$\frac{1}{2}-\frac{1}{2}$
Leela Chess Zero	- Chiron	$\frac{1}{2}-\frac{1}{2}$
Booot	- GridGinkgo	$\frac{1}{2}-\frac{1}{2}$

The game Komodo – The Baron was a typical game in which good preparation turned out to be effective. Komodo had prepared an opening variation in which white offers a pawn for good play. The regain of the pawn was not obvious but the position of freedom of moves and the development of pressure is more than sufficient compensation for the pawn. Although the Baron was ingenious and had many nice defenses the fact that it had not castled to the kingside turned out to be disastrous. White took a long time but was able to materialize the advantage. A win for Komodo.

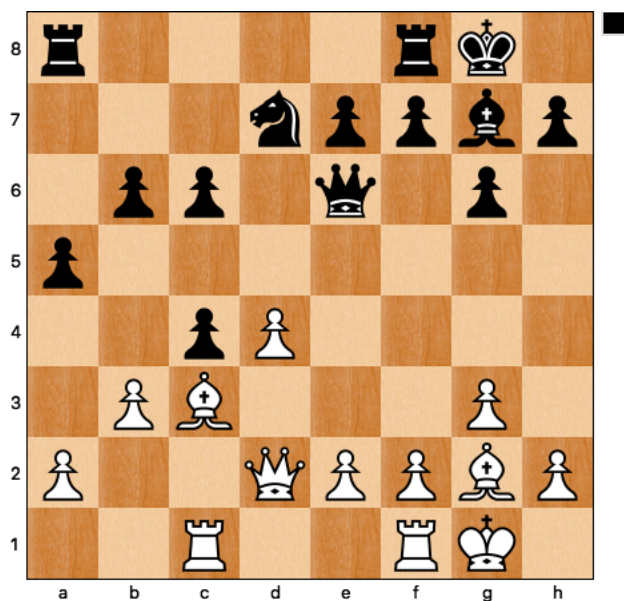
The game Jonny – Shredder was a game between old friends who are also old opponents. The programmers know each other very well and in this time of AI development we may state that the programs also know what the intentions are of the opponent program. In the game this was expressed in a well known opening followed by playing a long trodden path without any excitement which implied that the game ended on move 51 in a draw.

Leela Chess Zero – Chiron also ended in a draw but this happened after a tough fight in which both sides attempted to take the initiative. At the strong level that programs nowadays have it is possible to anticipate on the ideas of the opponent to a large extend. On its 22<sup>nd</sup> move black, see diagram, started a nice small combination which ended in perpetual check.



The moves were as follows: 22... f4 23. Nc5, fxe3 24. fxe3, Rxc5 25. Qxc5 Qf2+ 26. Kh1

The game Booot – GridGinkgo ended also in a draw but here it happened after some small nice combinations which did not change the equilibrium. From the diagram we show the main line which ended in a draw. Still it had some unexpected twists in the variation.



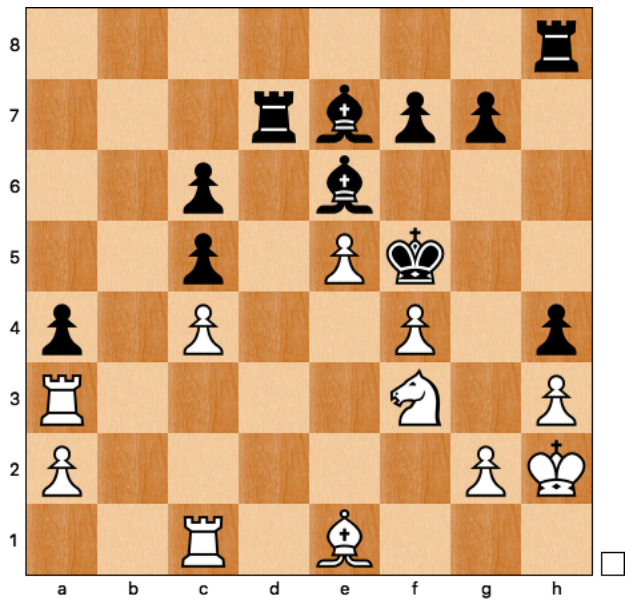
17... cxb3 18. d5, Bxc3 19. Rxc3, Qd6 20. Rxc6, Qb4 21. Qxb4, axb4 22. axb3 with an equal endgame.

Top positions 1. Komodo 3.5 out of 4, 2. GridGinkgo 3, 3. Shredder 2.5.

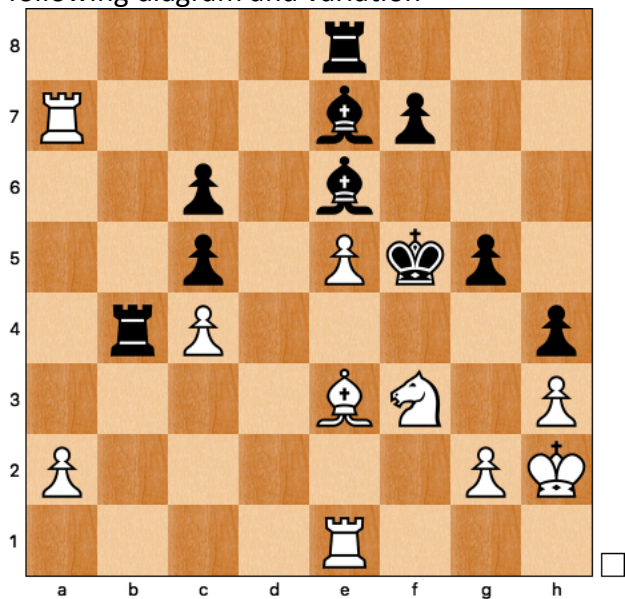
## Round 5

GridGinkgo	- Komodo	½-½
Chiron	- Booot	½-½
Shredder	- Leela Chess Zero	½-½
The Baron	- Jonny	½-½

The game GridGinkgo – Komodo started with a Berlin Defense. Games resulting from this opening are always tough games. They are dominated by small issues and small, very small advantages. It is the opening for world champion caliber games. Even grandmasters have difficulties to evaluate the moves played. After some small challenges given by white to black we saw that both sides were open for a decisive exchange of pawns each on different sides of the board. See the position after 39. Rd7.



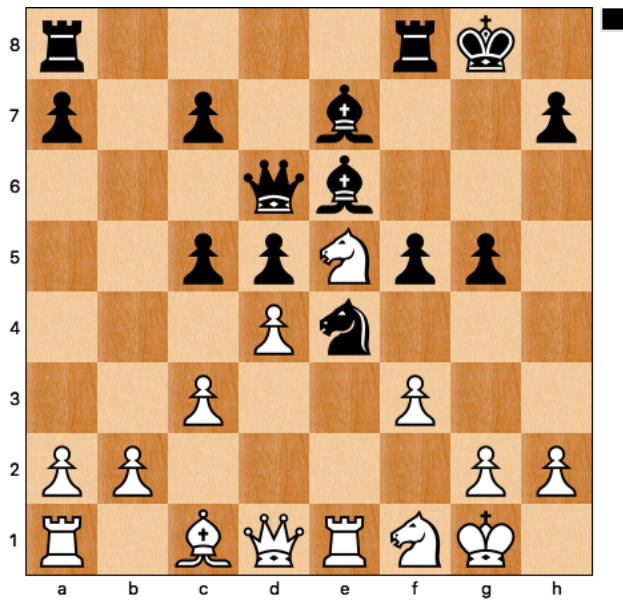
At this moment GridGinkgo it was opportune to take on a4: 40. a4. Black replied by 41. Kxf4. There are many variations to be analyzed why black was unable to take the f4 pawn in an earlier stage. As stated above to both programs this seems to be the right moment. It also implied that both programs maintained the balance and this being so they found a nice variation which made it clear that the game ended in a draw. After 47... Kf5 we saw the following diagram and variation



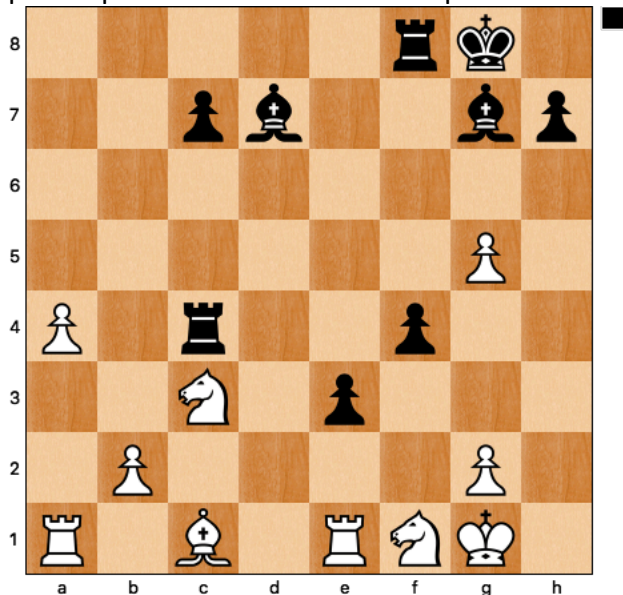
48. Rxe7 Rxe7 49. Bxc5 Reb7 50. Nd4+ Kf4 51. Bxb4 Rxb4 52. Rf1+ Ke4 53. Nxc6 Nxc4 54. Nd8 Rc7 55. Nxf6 fxe6 and after two more moves a draw agreed.

Chiron – Booot ended in draw after a very exciting game. We highlight the excitement by two snapshots. The first one appeared after 19. f3, see diagram.





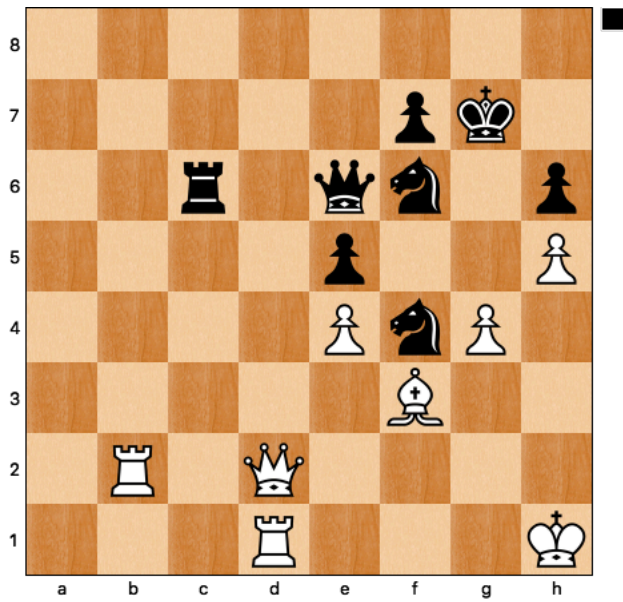
19... cxd4 20. cxd4 Bf6 21. fxe4 dxe4 22. h4 Rad8 23. Qa4 Qxd4 24. Qxd4 Rxd4 with strongly placed pawns in the center and a piece down for black. The second snapshot is after 30. Nc3:



30... Rxc3 31. bxc3 Bxc3 32. Ba3 Ra8 33. Be7 Bxa1 34. Rxa1 rxa4 35. Rxa4 Bxa4 and after seven more moves a draw was agreed.

The game Shredder – Leela Chess Zero was also an exciting game. They played mainly on their own force that means without opening book. The positions on the board required utmost calculations. In the diagram position black took a clear decision, it was the introduction to a smooth end, a draw which was well deserved for both sides.





48... N6xh5 49. Qd8 Nf6 50. Rb8 Ng6 51. Rf1 Rd6 52. Qc8 Qa2 53. Ra8 Qd3 54 Qf5 Qe3 55. Bg2 Re6 56. Rb8 Nh4 and after 57 Qf2 Nxcg2 58 Kxcg2 Qe4+ 59 Qf3 Qxcg4+ 60 Qxcg4+ Nxcg4 a draw was agreed eight moves later.

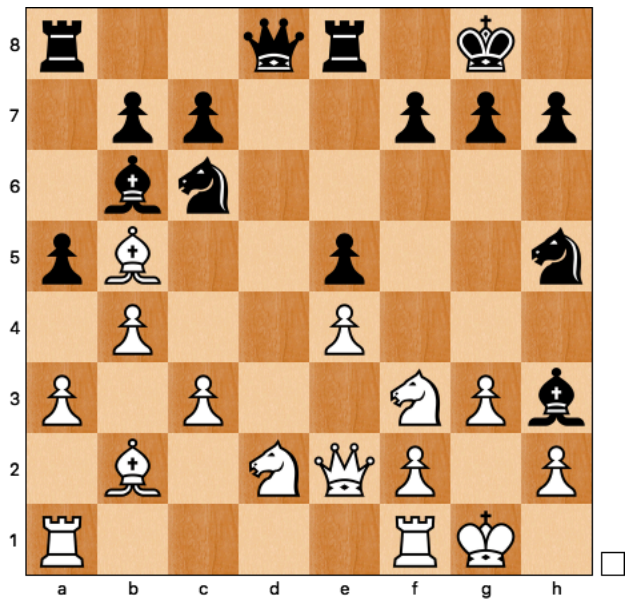
The Baron – Jonny was a quiet game in which the opponents may have had good intentions for an exciting game but this idea came to fruition. The game was a game in which pieces harmoniously disappeared from the board and in the end on move 45 the material was reduced in such a way that a draw was the natural outcome.

The top positions are taken by 1. Komodo 4 out of 5, 2. GridGinkgo 3.5, 3. Shredder 3.

## Round 6

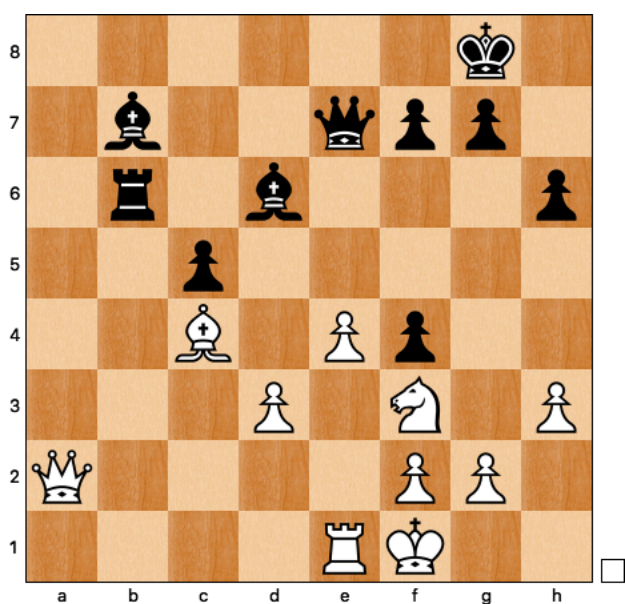
Komodo	- Jonny	½-½
Leela Chess Zero	- The Baron	½-½
Booot	- Shredder	½-½
GridGinkgo	- Chiron	½-½

In the sixth round all four games ended in a draw. Two were normal draws and two were exciting draws although the degree of excitement differed. It all implied that there is no change in the ranking of the top positions. In the game Komodo – Jonny the opening was the Berlin defense of the Ruy Lopez opening. It was the closed variation and the programs followed their own ideas. After 13 moves the following position appeared.



Here Komodo came up with a fascinating idea which clearly shows that current programs excel in estimating the intrinsic value of a position and thus also of a move that leads to this position. In this situation it played c4 (with the idea to exchange the bishop for the knight on c6 and then to lock in the black bishop with c4-c5). In practice that implied that white has two pieces for the rook instead of being the exchange down. Of course, black understood the threat and countered adequately with an exchange sacrifice. See diagram above. The continuation was as follows 14. c4 bxf1 15. Nxf1 axb4 16. axb4 Rxa1 17. Bxa1 Nxb4 (black's adequate answer) 18. Bxe8 Qxe8 19. Bxe5 Qd7. The two combinations eventually led to a balanced position. Although both sides tried to improve their stronger points it never passes the level of draw. On move 69 it was thus agreed.

The game Leela Chess Zero against The Baron was very special. Not by the opening, not by the combination on move 37 but by its endgame. To start at the exiting point we give as point of departure 36... Rb6.



The continuation was 39. e5 Bxf3 38. gxf3 Bc7 39. e6 f5 40. Qc2 g6 41. Ra1 Bb8 42. Ra8 Kh7 43. Qh4 Rb1+. This rook is predestined to play a pivotal role in the endgame. It will be active up to move 138. Many times moves were repeated but never three times the same position occurred on the board. Therefore, no draw could be claimed. The Baron was aiming for the draw, Leela Chess Zero was hoping on a win. Finally the Baron won and ended in a draw.

The game Booot – Shredder was a correct game from both sides. First they did know the opening very well then they applied the appropriate rules for handling the midgame positions well and finally they exchanged in a computer way a large amount of material and both saw the end by perpetual check. Draw agreed.

In the game GridGinkgo – Chiron black played the well known Marshall variation from the Ruy Lopez opening. They followed the main ideas of this opening and white handled the position of a pawn up with care. This means that it limited the black activities up to was necessary to allow but no further activities were given to black. Which implied that the game ended in a draw.

The top positions are taken by 1. Komodo 4.5 out of 6, 2. GridGinkgo 4, 3. Shredder 3.5.

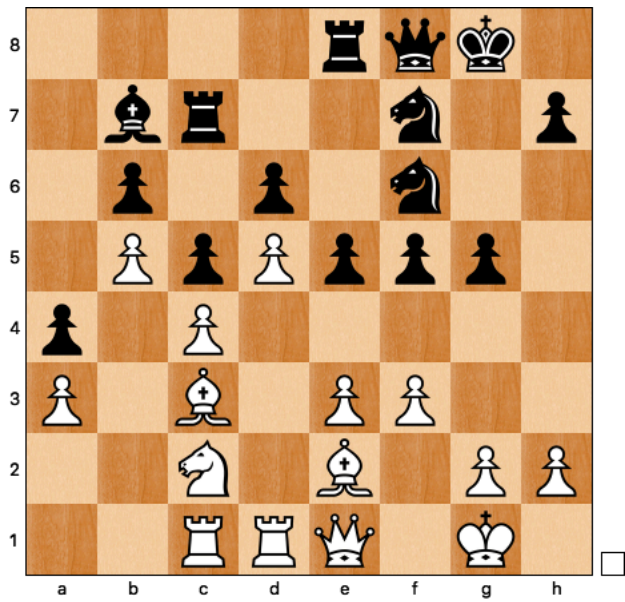
## Round 7

Chiron	- Komodo	½-½
Shredder	- GridGinkgo	0-1
The Baron	- Booot	0-1
Jonny	- Leela Chess Zero	1-0

In the last round the pairing led to maximal excitement since number two and three were direct competitors.

In the game Chiron – Komodo the black player defended itself by the Dutch opening, Leningrad variation. They played according to well-known examples in the text book and midgame followed the strategic lines which are well known since the match Botvinnik – Bronstein 1951. In the endgame they managed to evoke some excitement in the evaluation function of human beings who replay the game. For the computers all was clear, they remained within the bandwidth of a draw. And after 69 moves the games ended in a draw.

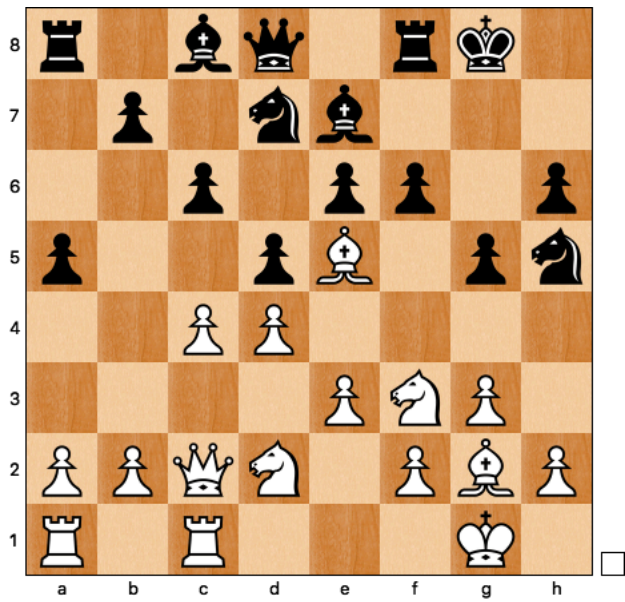
Shredder had a last chance for a good qualification when winning the game against GridGinkgo. They started both ambitious as seen from their maneuvers immediately following the opening phase. The resetting of the pieces was fascinating, and spectators were awaiting on which of the two programs followed the best strategy. When the clash finally came, by 25... g5 it turned out that black had its pieces well positioned. And therefore 26. h4 was a mistake. From that moment black had the initiative.



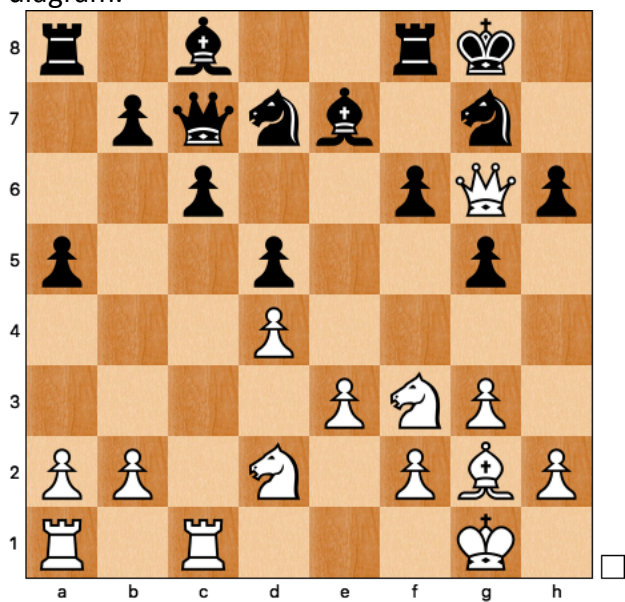
And after some time, Shredder's king found himself reunited with the white queen directly beside him on h1. A superficial look at that position led by all spectators the evaluation 'this is a list game'. And so it happened. White had no chance, in the final position where Stefan Meyer-Kahlen resigned deserves some explanation. The obvious move 35. e4 is refuted by 35. ... Rxe4 36. fxe4 Nxf4 37. Re1 Nxc3 38. Bg4 Ne5.

The Baron against Booot played a Queens Gambit Accepted and followed the opening book up to move 13. For most players it will be a special line for the opponents it looked they knew the area of fight. Although the Baron many difficult questions well it was repeatedly face with new challenges. After two or three decisions which we could call of second class the upper hand of Booot was large and lead them to winning the game. This implied that The Baron in this strong tournament had the last position with this loss. Still an enormous performance if you take into account that its playing strength is assumed better than that of the best human being.

The game Jonny – Leela Chess Zero was a game that attracted many spectators. It looked like a festival of sacrifices. The master of ceremony was Johannes Zwanzger who had the honorable task to execute the moves that were suggested by his program Jonny. It started by giving black the opportunity to trap the black bishop. With a stop in between on e5 were black played the mistake move f6, it landed on c7 were it was apparently taken for free by the black queen. But white had investigated this variation accurately (nowadays computers look quite deep). It is fascinating how powerful modern clusters are. From the diagram position we follow the ideas presented above expressed in moves: 16. cxd5 exd5 17. Lc7 Qxc7.



Now Jonny decided to penetrate the black position on the kingside with its queen: 18. Qg6 Ng7. The question is how to proceed. For Jonny the answer was clear, see the following diagram.



The threat on d5 was the point of this move 19. Nxg5 fxg5 20. Bxd5+. Now black was forced to give up his queen. 20... cxd5 21. Rc7 Bd8 22. Rac1 Bxc7 23. Rxc7. In this position black has a rook and two pieces for the white queen. Materially it seems roughly equal but positionally the black fortress is no longer a fortress, it is a Swiss cheese with many holes. Jonny maneuvered very well in the hectic position and brought in a full point, securing him the third place.

The final score is:

1.	GridGinkgo	5.0
	Komodo	5.0
3.	Jonny	4.0
4.	Chiron	3.5
	Booot	3.5
	Shredder	3.5



7.	Leela Chess Zero	2.0
8.	The Baron	1.5

So a play-off between GridGinko and Komodo was necessary.

First play-off GridGinkgo – Komodo	0-1
Second play-off Komodo – GridGinkgo	½-½

Komodo is the World Computer Chess Champion 2018. Congratulations to the Komodo team.