

WCCC 2017: The 23rd World Computer Chess Championship

Jan Krabbenbos, Jaap van den Herik and Guy Haworth*

Amersfoort, The Netherlands, Leiden, The Netherlands, Reading, UK

The 23rd World Computer Chess Championship started on July 3rd, 2017. Four programs as in Table 1 (CPW, 2017) participated in a triple round robin tournament of nine rounds. The tournament took place at Leiden University and was organized by the ICGA, LIACS and LCDS. It was sponsored by Oracle, the municipality of Leiden, Leiden University, its Faculty of Science, the ICGA, iSSC, SurfSara and Digital Game Technology. It was held in conjunction with the 7th World Computer Software Championship, the 20th Computer Olympiad and the 15th Advances in Computer Games conference. The classical tempo of 1h45'+15''/move for both sides was the one adopted.

Table 1
The participants in WCCC 2017

Program	Author(s)	State	Operator	Architecture	Cores	GHz	GB	Opening Book	EGTs
CHIRON	Ubaldo Andrea Farina	IT	U A F	2 Opteron 6274	32	2.2	32	'Polyglot' Cerebellum	6m Syzygy
JONNY	Johannes Zwanzger	DE	J Z	AMD Opteron	2,400	2.7	64/node	Private	5m Nalimov
KOMODO	Don Dailey, Larry Kaufman and Mark Lefler	USA	Erdogen Günes	Intel Xeon E7-8890 v2	60	2.8	?	Erdogen Günes	6m Syzygy
SHREDDER	Stefan Meyer-Kahlen	DE	S M-K	Intel Xeon E5-2697A v4	32	2.6	256	Private	6m Syzygy

Round 1: JONNY – KOMODO ½–½, CHIRON – SHREDDER ½–½

In the first round, JONNY and KOMODO played their game at a high level. Up to move 13, it was taken from the opening books: thereafter, the strategic lines were laid down. On move 20, White believed it could gain some space on the king side. However Black was well prepared and replied with well-considered counter action. The sacrifice of a pawn was temporary and was meant to open the long diagonal to the white king. But the balance remained undisturbed and many exchanges led to an endgame draw.

CHIRON played the opening in an original way. Certainly, the program made it clear that SHREDDER should be alert from the beginning. Obviously it was and therefore a lively game was to be seen on the board. Both players are amongst those engines stronger than the human world champion so they know very well what they are doing. For instance **38. ... f5** was a move, see Fig. 1(a), which clearly showed aspirations and at least emphasized SHREDDER's influence in the center of the board. Black's aggressive ideas also gave White opportunities to invade the black position. Both sides had their own attack and even so, they managed to contrive an equal game. At the moment White had a winning attack on the h6 pawn, Black completed the game by repetition of moves.

*Corresponding author. E-mail: g.haworth@reading.ac.uk.

Standings after round 1: 1–4 CHIRON, JONNY, KOMODO, SHREDDER ½.



Fig. 1. (a) R1 CHIRON – SHREDDER, position 39w; R2 KOMODO – SHREDDER (b) 13b and (c) 40b.

Round 2: KOMODO – SHREDDER 1–0, JONNY – CHIRON ½–½

KOMODO played a sharp opening line resulting in essence in a midgame with a queen against three minor pieces. They followed the theory up to **13. Qg4** and at this moment as in Fig. 1(b), Black had two continuations, namely **13. ... Kf8** or **g6**. Some prefer **g6** but SHREDDER chose **13. ... Kf8**. The main task for Black was to develop its pieces and to activate its rooks.

To be precise, Black had three puzzles to solve, namely (a) how to complete an artificial castling, (b) how to develop its rook on h8, and (c) how to develop the white-squared bishop on c8. The first challenge was easily solved. The second challenge was handled by playing **h7-h5-h4** and developing the rook to h5. However on the fifth rank, the rook could not find a stable place but at least it was in the play. That was not the case with the bishop on c8. White played in such way, developing pressure on the queen side and fixing the black pawn on a6, that the black bishop was obstructing the connecting of the rooks. Black did not see any solutions for this challenge except for sacrificing a full piece, see Fig. 1(c). White reacted accurately, took the piece, sacrificed the exchange and transferred the position into an advantageous one. The pawns on the queenside did the work, advancing towards the promotion squares. This was a well-played game by KOMODO. In such a strong field, this victory against an opponent was highly valuable.

JONNY – CHIRON followed the Catalan opening line: it was a quiet positional fight. Both sides attempted to take the initiative but neither side was able to achieve any advantage. In an equal transition phase to the endgame there was an opportunity to transfer to an endgame with unbalanced material force, see Fig. 2(a). As in KOMODO–SHREDDER above, the queen was exchanged, this time for two rooks. It turned out to be a fair exchange as the power balance was not shifted. Finally, perpetual check ended the game, the point deservedly shared.

Standings after round 2: 1 KOMODO 1½; 2–3 CHIRON, JONNY 1; 4 SHREDDER ½.

Round 3: CHIRON – KOMODO ½–½, SHREDDER – JONNY ½–½

The French opening usually leads to closed positions. However KOMODO was playing sharply and opened the g-file by playing **17. ... gxf4** **18. gxf4**. With the white queen on d4 and the black king on h8, White was able to start a nice combination with **20. Nxd5**, see Fig. 2(b). The sacrificed piece was gained back by the discovered check **22. e6+** and **23. exd7**. The resulting position was still complex and KOMODO tried to complicate matters even further. However CHIRON kept its computer brains cool and managed by sharp play to force Black to give perpetual check.

SHREDDER – JONNY was a tough game that started quietly from a Semi Slav opening. The complications were never very deep and can be characterized as positional fights. Even so, Black tried to seize

the initiative but White replied adequately. Both sides had their active and passive pieces. Looking at the two sides' activities overall, Black seemed to be better. However SHREDDER had positioned its pieces very well and as soon as Black did not have any threat, White was able to reveal its intentions. This stimulated Black to repeat positions.

Standings after round 3: 1 KOMODO 2; 2–3 CHIRON, JONNY 1½; 4 SHREDDER 1.



Fig. 2. (a) R2 JONNY – CHIRON, 29b; (b) R3 CHIRON – KOMODO, 20w; (c) R4 SHREDDER – CHIRON, 47w.

Round 4: KOMODO – JONNY ½–½, SHREDDER – CHIRON ½–½

The game KOMODO – JONNY had everything to be an exciting contest. However KOMODO's hardware was not ready in time for the full game. So instead of playing with 60 cores it had to rely on just 24 cores. There was a similar repercussion for the opening book which was now smaller than the usual opening book. For these reasons, KOMODO followed a simple line in the Italian variation. JONNY playing Black followed the main line of the opening. At move 12 there was an opportunity to repeat positions which both programs recognised and seized. An early draw was the result and the spectators had to accept this.

The game SHREDDER – CHIRON started as a Semi-Slav. It was a pleasure to see how both sides tried to take the initiative. White was active on the queen side, Black in the center and somewhat on the kingside. Both players were mindful of the manoeuvres of the opponent while pursuing their own activities. The game had a climax with move 46. **e5** since that was the start of an indirect exchange of pawns. 46. ... **Re7**, see Fig. 2(c), 47. **Qe4 Qxe5** 48. **Qh7+ Kf8** 49. **Qxh6+ Ke8** 50. **Qc6**. White might have hoped to have some attack on the black king but the only result was check, check, check, repetition – draw.

Standings after round 4: 1 KOMODO 2½; 2–3 CHIRON, JONNY 2; 4 SHREDDER 1½.

Round 5: SHREDDER – KOMODO ½–½, CHIRON – JONNY ½–½

Some games are exciting to play but not so exciting when played through by a spectator. The tournament had four top programs all playing at a very high level. So we regularly saw games showing equality of power and consequently not always complex attacks or inventive defences. SHREDDER – KOMODO saw both players out of book after move 13 in an equal position. This status quo did not change during the next sixty moves. This may make chess look like an easy game but that is certainly not true. Every decision was well computed and evaluated. The draw that resulted after 73 moves was a surprise to nobody.

The game CHIRON – JONNY started with an established opening variation from the past. The Dragon variation of the Sicilian Defense has had a reputation for a long time of being a fighter's opening. Over the years many good schemes for attack on the black position have been developed. In the game White tried to apply such a scheme but Black was well prepared and took the right counter measures

against all White's attempts to obtain some advantage. Although the fight just below the surface might have been intense, the result looked like a cold game with many exchanges and almost no tension at all. The exchanges of many pieces seemed to be in harmony with the characteristics of the opening. Finally, a rook ending was reached in which no side could aim for advantage. The draw was agreed after 62 moves.

Standings after round 5: 1 KOMODO 3; 2–3 CHIRON, JONNY 2½; 4 SHREDDER 2.

Round 6: KOMODO – CHIRON ½–½, JONNY – SHREDDER ½–½

Many spectators were surprised by the draw between KOMODO and CHIRON. Not by the fact that the game ended in a draw – CHIRON is a really good program – but by the way in which the draw happened. When Erdogan Günes, operator of KOMODO, was asked what happened, he answered “It happened”, meaning that he accepted the opening line of the program and the repetition of moves as dictated by the opening book. For a reporter it is difficult to add something more since the 19-move draw was a direct result of choices from the opening book.

The game JONNY – SHREDDER was one of a long series between the brainchildren, respectively, of Johannes Zwanzger and Stefan Meyer-Kahlen. This time they opened with the Semi-Slav, Meran variation. They played both quietly and seriously, attempting to obtain some small positional advantage. In the position of Fig. 3(a), both sides have the pair of bishops, Black has three groups of pawns, White two. Usually two is better but Black's third group consisted of a passed pawn. The question is whether the passed pawn is strong or weak. Black saw an opportunity to look for a further endgame in which the passed pawn really could play a part. From the illustrated position, play continued **21. ... Bxf3 22. Qxf3 Bxh2+ 23. Kxh2 Qd6+ 24. g3 Qxd3 25. Rfd1**. In the end the c-pawn was neither an advantage nor a disadvantage. In the continuation both sides tried to find some new resources but adequate defense suppressed real aspirations for a win.

Standings after Round 6: 1 KOMODO 3½; 2–3 CHIRON, JONNY 3; 4 SHREDDER 2½.



Fig. 3. (a) R6 JONNY – SHREDDER, 21b; R7 JONNY – KOMODO (b) 14b and (c) 33w.

Round 7: JONNY – KOMODO ½–½, CHIRON –SHREDDER ½–½

In the game JONNY – KOMODO the issue of static evaluation versus dynamic evaluation came to the surface. After a Closed Catalan opening the players arrived at the position of Fig. 3(b): the difficulty with such positions is their evaluation. The position can be assessed by a static evaluation or by a dynamic evaluation. Although both evaluations might have the same value, the way that value is reached will be completely different. We believe that the dynamic evaluation gives more insight into the intricacies of the game but is not definitively the better evaluation. The following happened in this position: **14. ... cxb4 15. Qb3 Rc3 16. Qa3 bxa3 17. Nb1 Rc8 18. Nxa3**. Black is a pawn up and

even has two passed pawns. Yet there are many difficulties to overcome before Black can think of a win.

In what followed, it looked like Black played well, diligently and accurately to keep the win within reach. However when the position of Fig. 3(c) occurred on the board, JONNY's evaluation function had reached a 6-man endgame table predicting that the game would end in a draw. There was some disbelief amongst the audience. They followed the course of the game with the eyes of an eagle. What actually happened was the following: **33. Qxd7 Rxd7 34. g4 hxg4 35. Nxg4 Rd6 36. f7 Kg7 37. Ne5 Bd7**. Apparently, the programs had looked some twenty plies deep and then touched upon the 6-man database. Playing through the game it is not possible for a human being to understand that this game ends in a clear draw. Disbelievers among the readers of this report are encouraged to replay the game in its entirety. They will see the nice draw which is in accordance with the actual game result.

A new observation in a tournament of highly ranked programs is the tendency for a draw by repetition of position, usually of course by repetition of moves. Apparently the programs are "stubborn" and in their tree search remain committed to the best move found so far. The contempt factor is not always in use in these programs. For CHIRON we can say that it was believed to be the weakest program of the four and therefore had put its contempt factor equal to +0.15 which meant that it did accept repetition of moves even when it was 0.15 ahead. This may have been influential in this game where the moves were repeated from move 26 onward.

Standings after round 7: 1 KOMODO 4; 2–3 CHIRON, JONNY 3½; 4 SHREDDER 3.



Fig. 4. R8 JONNY – CHIRON (a) 27w, (b) 39w and (c) 54w.

Round 8: KOMODO – SHREDDER ½–½, JONNY – CHIRON 1–0

KOMODO – SHREDDER was a Sicilian variation but different from their earlier contest in round 2. This time SHREDDER played **7. ... Nf6** instead of **7 ... a6**. The game followed the usual themes of the Sicilian variation. White gained some advantage. It turned out not to be sufficient for a winning attempt. The complications were mainly superficial although some deep structures may underlie the patterns perceived by the audience. The game was at a high level as all meetings in this class are nowadays. The resulting draw was acknowledged as such by both sides.

JONNY against CHIRON was a Catalan opening. Black played actively with its rook pawn on the kingside. In a real fight it is always essential to keep the position dynamic: that enables complex lines and combinations. However it is a well-known rule that one should always take into account that the opponent can solve the dynamic elements by unexpectedly capturing a dynamic element and even destroying its own pawn structure. That was a decision JONNY took with **27. gxh4**, see Fig. 4(a). The new h-pawn soon became a problem in Black's position. White regrouped some of its pieces, progressed the h-pawn and started to make some complications around the black king, see Fig. 4(b).

White played an interesting exchange of queens and kept the initiative by promoting to a knight giving check to the black king: **39. hxg7 Nxf4 40. gxf8N+ Rxf8 41. dxe6 Rxd2 42. Rxd2 Bxg2 43. e7 Re8 44. Nxb2 Ng6 45. Rd6.**

The result was a position with JONNY two pawns up: still, this was not an easy win. The difficulty was the disconnected f and h pawns. If other pawns and the two knights disappear from the board, that is considered a draw. Therefore White should (a) solve the position on the queen side and (b) not exchange the knight. In Fig. 4(c) JONNY showed the audience how to handle the position on the queen side. In that position, it played **54. Rxb2 Rxa4 55. Re2 Nd7 56. Re7 Nxc5 57. Rxf7+**. Now JONNY has reached the preferred position which is a win for White provided that the knights remain on the board. In the next 14 moves JONNY showed its superiority and won the game according to the strategic guidelines mentioned above. With this win, JONNY became co-leader in the tournament.

Standings after round 8: 1–2 JONNY, KOMODO 4½; 3–4 CHIRON, SHREDDER 3½.



Fig. 5. R9 CHIRON – KOMODO (a) 16w, (b) 31w and (c) 37w.

Round 9: CHIRON – KOMODO ½–½, SHREDDER – JONNY ½–½

CHIRON – KOMODO started as a quiet Caro-Kann opening. After the players had left their books White was searching for an initiative to take. In the position of Fig. 5(a) it played **16. Ne4**, starting an indirect exchange of pawns and hoping to have an initiative thereafter. This turned out to be not without risk as Black started a dangerous advance of the h-pawn. This initiative heavily damaged White's protection of its king. The white queen was called on to support the defence and was even forced to reside on h1, see Fig. 5(b). Although Black was regrouping all its forces for a vigorous attack on the white king, CHIRON used its invading pawn and rook to balance the chances for the two sides. For human chess players, the situation on the board was unclear. For computers it was almost clear – a draw after perpetual checks by the black rook on a king confined to the f- and g-files, see Fig. 5(c).

After 11 moves SHREDDER and JONNY were out of book. They had played an accepted Semi-Slav Queen's Gambit Declined. In the position of Fig. 6(a), Black decided to exchange the b-pawn for the white d-pawn by **14. ... b4 15. Bxb4 Qb6 16. Ba3 Qxd4.**

Thereafter play continued quickly and correctly, with regular exchanges and no upsets on either side. So we arrived at the position of Fig. 6(b) where White temporarily gained a pawn with **31. Bxc5**. The black position was dynamic and able to develop many threats towards the white king. For the computers the combinations were easy to unravel but human chess players needed many eyes to see all the intricacies of the position. After a number of exchanges the position of Fig. 6(c) appeared. For White everything was under control with the move **53. Rd6**. Thereafter, the draw was unavoidable.

Standings after round 9: 1–2 JONNY, KOMODO 5; 3–4 CHIRON, SHREDDER 4.



Fig. 6. R9 SHREDDER – JONNY (a) 14b, (b) 31w and (c) 53w.

The quality of play had been uniformly high with only two decisive results from eighteen games. With one round to go, three results were possible: a play-off might have been avoided or been between all four engines. The outcome after three rounds of all-play-all was that play-offs were needed for 1st/2nd and 3rd/4th. How, given all that had gone before were these two contests to be resolved?



Fig. 7. RPI CHIRON – SHREDDER (a) 18b, (b) 28w and (c) 32b.

The play-offs

After the excitements of the three-phase all-play-all, it was timely to regroup over lunch. For the title of World Computer Chess Champion, a play-off between KOMODO and JONNY was necessary. Avoiding Black-favoring ‘sudden death’ in favour of colour-neutrality, the first play-off consisted of two games at the tempo of 45'+15''/move, allowing for further play-offs of two games at, respectively, 20'+10''/move seconds and 10'+10''/move if necessary. For the third place, there was a play-off to the same format between SHREDDER and CHIRON. The games were played simultaneously so we were undoubtedly going to see rounds P1 and P2, and as it transpired, we were treated to rounds P3–P6 as well. Drawing of lots determine choice of colour took place before rounds P1, P3 and P5.

Round P1: KOMODO – JONNY ½–½, CHIRON – SHREDDER ½–½

In the contest for the title, KOMODO chose the most quiet opening of the game, the Guico Pianissimo. Pieces found the correct places, peace was reigning. Still, both programs were alert and prepared to sacrifice a pawn for attacking chances. White had the strongest inclination to do so, did so and invaded the black position. However Black was on the alert and invaded the white position with its queen. This manoeuver was sufficient for perpetual check and after 51 moves the draw was agreed.

The battle for the third place started with a Sicilian opening. Both sides manoeuvred their pieces to their favoured places. Then Black took up the idea of opening the g-file for an attack on the white king. Therefore it played, as in Fig. 7(a), 18. ... gxf5 followed by 19. Qxf5 Bc8 20. Qf2 Rg8 21. Bf3 Rg6 22. h3 Reg8 23. Rd2 Rg3.

In summary Black increased its pressure on the white kingside as planned and the spectators were eagerly waiting for the final blows. At first sight Black believed that 27. ... Bxh3, see Fig. 7(b), was the beginning of the attack. The tension in the room rose and was palpable because the complications could only be correctly evaluated by the two computer programs.

During the sequence of hits by the black sledgehammer, White produced a fine counterattack by playing 32. Bxe5+, for human beings a surprise, the more so since 32. ... f6, see Fig. 7(c), was answered by 33. Rxf6. The continuation was as follows: 33. ... Rg1+ 34. Kh2 R4g2 35. Qxg2 Rxg2 36. Rxg2 dxe5 37. Ra6 with the threat 38. Ra8. Black defended accurately by invading the white fortress with its queen while at the same time preventing mate by interrupting the checking line with the bishop. Thereafter Black found a saving tactic by perpetual check.

Standings after round P1: 1st/2nd 1–2 JONNY, KOMODO, ½; 3rd/4th CHIRON, SHREDDER, ½.



Fig. 8. RP2 JONNY – KOMODO (a) 31w; SHREDDER – CHIRON (b) 22b and (c) 34w.

Round P2: JONNY – KOMODO ½–½, SHREDDER – CHIRON ½–½

JONNY – KOMODO was a Queen Gambit Accepted. The sides followed the opening book lines and in the middle game, consequently handled the required strategic lines. Both sides played very well and it seemed that there was almost nothing to report. However on move 31, White played R1xc3 in the position of Fig. 8(a). The point was not deep but surprising for the spectators since after 31. ... bxc3 32. Ne7+ Qxe7 33. Rxd5 the black e-pawn was pinned. Yet it was not sufficient for a win as Black could easily gain equality by 34. ... fxg5 35. hxg5 Rf5 36. Rxc2 Qxg5+. After six more moves the draw was agreed.

SHREDDER was facing the Anti-Meran variation of the QGD Semi-Slav opening. Stefan's program followed the favourite way of play as was performed by Botvinnik. So he sacrificed a piece for pressure and two pawns. Botvinnik loved to play this position with White as well as with Black because it is very interesting. In this game both opponents were well prepared. They knew the tricks and hidden intricacies very well. On move 22 as in Fig. 8(b), Black reimbursed the exchange for a pawn and pressure: 22. ... Rxe4 23. fxex4 Qxe4 24. Qc3 Ne5 25. Kg1 Ng4 26. Bxa7 c5.

Play continued in a sharp way but still within the range of equality. On move 34 as in Fig. 8(c), SHREDDER solved part of its difficulties by playing 34. Rxc4 Be3+, a well-conceived check, 35. Kh2 Bd4. Play was resumed and after a new sacrifice of the exchange, White did not face any dangers and Black did not have any chances. So, a draw was agreed.

Standings after round P2: 1st/2nd 1–2 JONNY, KOMODO, 1; 3rd/4th CHIRON, SHREDDER 1.

Round P3: JONNY – KOMODO ½–½, CHIRON – SHREDDER 0–1

As planned, colours were defined by 'pawns from hand', the tempo quickening to 20'+20"/move.



Fig. 9. RP3 JONNY – KOMODO (a) 15w and (b) 23w; (c) RP3 CHIRON – SHREDDER, 36b.

JONNY – KOMODO started as a Queen Gambit Accepted following the Mannheim variation. JONNY was aiming for a dynamic position and tried to reach it by changing the material balance. It exchanged two of its pieces for a rook and two pawns, see Fig. 9(a), surprising its opponent with **15. Nxf7**. The next moves were more or less forced: **15. ... Rxf7 16. Bxe6 Qf8 17. Rcd1 Re8 18. d5 Kh8**.

In the battle that followed KOMODO had some initiative which was transformed into a king attack, see Fig. 9(b). White had an ingenious manoeuvre to stop the attack by playing **23. Qf3**. It was followed by **23. ... Bxf4 24. Qxg4 h6 25. Qe6**. After the queen exchange, the endgame of two pieces against the rook and extra pawn was a clear draw which was agreed after some moves.

The game CHIRON – SHREDDER had a positional Sicilian start. Both players occupied the best squares for their pieces. It was a real fight for good squares and in retrospect we note that the decisive exchange was on move 36 as in Fig. 9(c) when Black exchanged its bishop for the knight on f5. The remaining black knight was able to outperform the white bishop albeit only in the long run.

The game continued with the weakening of the white queenside pawns and finally their capture at the right time by a fine interplay between knight and queen, see Fig. 10(a).

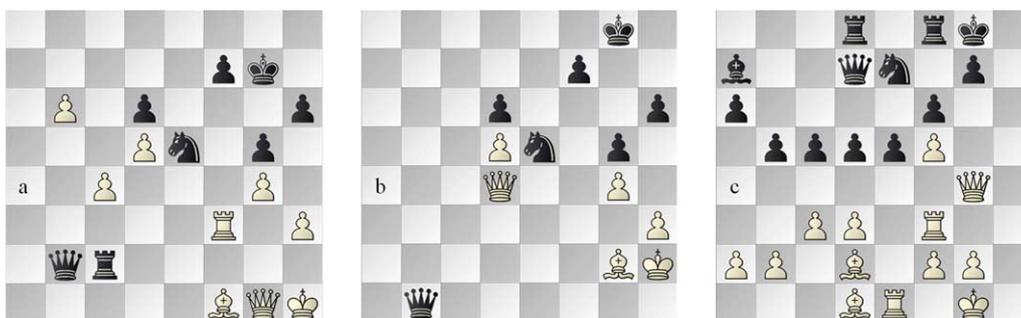


Fig. 10. RP3 CHIRON – SHREDDER (a) 52w and (b) 69b; (c) RP6 KOMODO – JONNY, 28b.

After the rooks were exchanged and Black was happy to be one pawn up, the technical phase had to be precisely executed. This was in good hands with SHREDDER and from Fig. 10(b), you can see how it accurately performed its task. After the loss of the d5-pawn, White resigned the event's longest game.

Standings after round P3: 1st/2nd 1–2 JONNY, KOMODO, 1; 3rd/4th SHREDDER 2, CHIRON 1.

Round P4: KOMODO – JONNY ½–½, SHREDDER – CHIRON ½–½

KOMODO and JONNY played the Italian opening which has been a popular start in this tournament. The game went the usual way and was not really spectacular. At a viewpoint White as well as Black

tried to take the initiative in developing and executing a plan but the opponent always understood what was threatening and took adequate actions. Hence the game ended in a draw which implied that the two engines remained locked together and that their play-off went into its third phase.

CHIRON as Black was facing the task of making an immediate comeback against SHREDDER in order to continue the battle for the bronze. However, it never achieved a position with real winning chances. SHREDDER headed for and reached a drawn position, duly securing third place in the WCCC 2017.

Standings after round P4: 1st/2nd 1–2 JONNY, KOMODO 2; 3rd/4th SHREDDER 2 ½, CHIRON 1½.

Round P5: JONNY – KOMODO ½

In this game, the audience saw a Queen’s Gambit Accepted with safe play from both sides. The sequence of exchanges led to an endgame with opposite bishops and a closed pawn structure. No wonder the game ended quickly in a draw.

Standings after round P5: 1st/2nd 1–2 JONNY, KOMODO 2½.

Round P6: KOMODO – JONNY 1–0

JONNY played the opening rather passively and gave KOMODO every opportunity to place its pieces in strong positions for an attack against the black king. In the position which was already troublesome, JONNY could not find an adequate way to defend itself against the fate which hovered over its head. In the position of Fig. 10(c), it played the very weak move **28. ... a5**. Thereafter, its position was no longer playable. With some straightforward thrusts, KOMODO put an end to the hopes which JONNY surely entertained at the beginning of the game.

Standings after round P6: 1st/2nd 1 KOMODO 3½; 2 JONNY 2½.

So ended the ICGA’s World Computer Chess Championship of 2017, a tournament exhibiting the highest quality of play throughout. KOMODO survived the temporary loss of most of its platform’s cores, and all the challenges of its opponents, to remain unbeaten this year and to retain its ICGA title as the world champion. Heartiest congratulations from the ICGA, the organisers, fellow competitors and the audiences in Leiden and on the web.

A complete pgn file of the games is available (Krabbenbos et al., 2017). Endgame enthusiasts may like to note that three of the four contestants chose the relatively new and more compact SYZGY endgame

Table 2
The WCCC 2017 results

id	Program	r1	r2	r3	r4	r5	r6	r7	r8	r9	P1	P2	P3	P4	P5	P6
K	KOMODO	Jb½	Sw1	Cb½	Jw½	Sb½	Cw½	Jb½	Sw½	Cb½	Jw½	Jb½	Jb½	Jw½	Jb½	Jw1
J	JONNY	Kw½	Cw½	Sb½	Kb½	Cb½	Sw½	Kw½	Cw1	Sb½	Kb½	Kw½	Kw½	Kb½	Kw½	Kb0
S	SHREDDER	Cb½	Kb0	Jw½	Cw½	Kw½	Jb½	Cb½	Kb½	Jw½	Cb½	Cw½	Cb1	Cw½	–	–
C	CHIRON	Sw½	Jb½	Kw½	Sb½	Jw½	Kb½	Sw½	Jb0	Kw½	Sw½	Sb½	Sw0	Sb½	–	–

Table 3
The WCCC 2017 cross-table

id	Program	K	J	S	C	W	D	L	Score
K	KOMODO		½,½,½	1,½,½	½,½,½	1	8	0	5
J	JONNY	½,½,½		½,½,½	½,½,1	1	8	0	5
S	SHREDDER	0,½,½	½,½,½		½,½,½	0	8	1	4
C	CHIRON	½,½,½	½,½,0	½,½,½		0	8	1	4

Table 4
The WCCC 2017 progress round by round

Program	r1	r2	r3	r4	r5	r6	r7	r8	r9
KOMODO	½	1½	2	2½	3	3½	4	4½	5
JONNY	½	1	1½	2	2½	3	3½	4½	5
SHREDDER	½	½	1	1½	2	2½	3	3½	4
CHIRON	½	1	1½	2	2½	3	3½	3½	4



Fig. 11. The WCCC 2017 podium: JONNY's author and operator, Johannes Zwanzger, KOMODO's opening-book author, operator and Champion, Erdogan Günes, and SHREDDER's author and WCCC 2017 Champion, Stephan Mayer-Kahlen.

tables (de Man, 2017) which provide checks against FIDE's 50-move rule. It would be interesting to know how many references were made to these tables but only three games reached the 6-man zone and were clearly drawn by that time.

REFERENCES

- CPW (2017). <https://tinyurl.com/icga001>. Biographies of Programs, Authors and Operators.
- de Man, R. (2017). Site providing 5- and 6-man DTZ₅₀'' EGTs. Available at: <http://tablebase.sesse.net/syzygy/>.
- Krabbenbos, J., van den Herik, H.J. & Haworth, G.M. (2017). WCCC 2017: the 23rd World Computer Chess Championship. *ICGA Journal*, 39(3,4), 210–221. Pgn file available from: <http://centaur.reading.ac.uk/70937/>.



Fig. 12. Erdogen Günes receives the Shannon Trophy from Prof. Jaap v.d. Herik on behalf of the KOMODO team.