The TCEC20 Computer Chess Superfinal: a Perspective

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1 THE TCEC20 PREMIER DIVISION

Just like last year, Season 20 DivP gathered a host of familiar faces and once again, one of those faces had a facelift! The venerable KOMODO engine had been given an NNUE beauty boost and there was a feeling that KOMODO DRAGON might prove a threat to LEELA's and STOCKFISH's customary tickets to the Superfinal. There was also an updated STOOFVLEES to enjoy while ETHEREAL came storming back to DivP after a convincing victory in League 1. ROFCHADE just pipped NNUE-powered IGEL on tie-break for the second DivP spot.

In the end, KOMODO turned out to have indeed received a significant boost from NNUE, pipping ALLIESTEIN for third place. However, both LEELA and STOCKFISH seemed to have made another quantum leap forwards, dominating the field and ending joint first on 38/56, 5.5 points clear of KOMODO DRAGON! Both LEELA and STOCKFISH scored an astonishing 24 wins, with LEELA winning 24 of its 28 White games and STOCKFISH 22! Both winners lost 4 games, all as Black, with LEELA notably tripping up against bottom-marker ROFCHADE and STOCKFISH being beautifully squeezed by STOOFVLEES.

The high winning percentage this time is explained by the new high-bias opening book designed for the Premier Division. I had slightly mixed feelings about it as LEELA and STOCKFISH winning virtually all their White games felt like going a bit too much the other way: you want them to have to work a bit harder for their Superfinal places! However, it was once again a very entertaining tournament with plenty of good games.

2 THE TCEC20 SUPERFINAL

Even though LEELA had pipped STOCKFISH on tiebreak and drawn their 8-game mini-match in DivP, the memory of last season's Superfinal - where STOCKFISH had done a much better job of defending unbalanced openings – made you suspect a STOCKFISH victory. However, influenced by the introduction of a 'magic' patch for LEELA which – if I understand correctly – gave a significant performance boost at the cost of slightly reduced accuracy, I voted with my heart in the Superfinal poll, predicting the narrowest of LEELA victories!

After 70 games, the match was still poised at five wins apiece and chatters were optimistically talking about the first ever Superfinal tiebreak! However, just as in Season 19, STOCKFISH pulled away winning the last 30 games by 9 wins to 3. TCEC book guru Jeroen Noomen had arranged the openings in

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ascending order of opening bias, with the most unbalanced openings arriving at the end and STOCKFISH again proved itself more adept in converting advantageous positions and holding disadvantageous ones. However, a final score of 53-47 was no disgrace for LEELA and it was once again a captivating match in which games 52 and 59 were absolute pinnacles of superhuman play!

Once again huge congratulations to Jeroen Noomen for an excellent book and to the TCEC sponsors, admins, UI developers, mods who make it all possible and the always enthusiastic chatters who make it such a lovely event to watch!

The match started with a bang and an offbeat line of the Latvian Gambit (as someone on my Twitter feed commented, 'offbeat' because it's playable for Black!)

Game 2. 1.e4 e5 2.Nf3 f5 3.Bc4, Fig. 1a. In game 1, STOCKFISH sacrificed a piece for four pawns but LEELA's activity easily compensated for its material disadvantage. In game 2 LEELA bravely grabbed the rook in the corner, Fig. 1b. While waiting for LEELA and STOCKFISH to move, I ran some rapid games between STOCKFISH and STOOFVLEES from the opening and they soon reached the crazy position of Fig. 1c. The TCEC game wasn't quite as wild but did feature a further piece sacrifice from STOCKFISH to force perpetual.
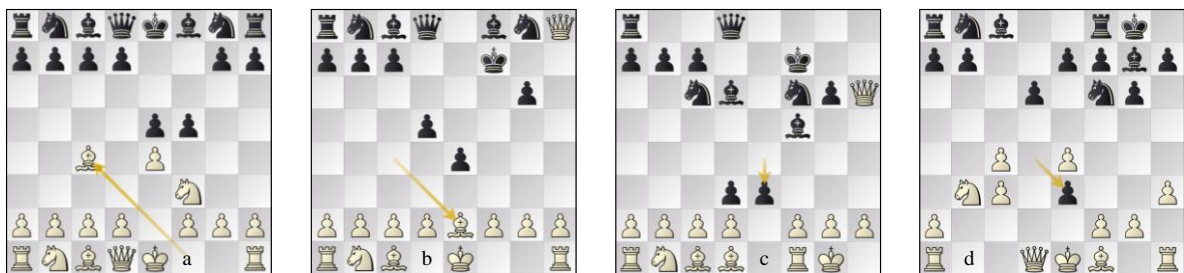

Fig. 1. Game 2, LC–ST (a) position 3b, (b) p8b; (c) 'MS Match' STOCKFISH–STOOFVLEES p15w; (d) game 3 p11w

Games 3 and 4. The next opening was spectacular too, featuring a queen sacrifice that had been played successfully against Firouzja in 2019 and which also featured in the Season 17 Superfinal featuring STOCKFISH CLASSICAL and LEELA, see Fig. 1d (TCEC, 2020a). STOCKFISH CLASSICAL always preferred the queen against the pieces and it struggled on both sides of this opening where the pieces seem objectively stronger! The crazy position of Fig. 2a with White's king on f4 from TCEC Season 17 is etched in my mind! Judging from the way it played its White game, STOCKFISH NNUE saw more possibilities for Black than for White. STOCKFISH played conservatively as White, setting up a static defensive formation which it felt it would hold for ever… and it proceeded to do so!

LEELA played more aggressively as White in game 4 to open the position for its queen but Black was always comfortable. The game was ended just short of a neat perpetual! **36…Nf1+ ½–½**, Fig. 2b. 36...Nf1+ 37.Kg1 Ng3 38.Qxa6 Nce2+ 39.Kf2 Nh1+ (Fig. 2c) 40.Kf1 Nhg3+ is a very pretty line!

Games 5 and 6. The first talking point of the match! Here - when the games should have been at their most balanced - we had a 1-0, 1-0 result! The opening was taken from some analysis in *Game Change* (Sadler and Regan, 2019a/b) of a fascinating ALPHAZERO–STOCKFISH game. **1.d4 Nf6 2.c4 e6 3.Nc3 Bb4 4.e3 0–0 5.Bd3 b6 6.e4 Bb7 7.e5 Bxg2 8.exf6 g6 9.Bg5 d5 10.Qg4 Bxh1 11.0–0–0 dxc4 12.Bc2**, Fig. 2d.

While trying to fathom what was going on, I had analysed 12...Bb7 and let STOCKFISH play the Black side against me! **12...Bb7 13.Nh3 Re8 14.Qh4**. 14.Nf4 was my move when facing STOCKFISH which led to a crazy draw (published in *Game Changer*). When I put the question to ALPHAZERO, it gave the move 14.Qh4 - played by both STOCKFISH and LEELA - with a 77.3% expected score which is closer to a win than a draw! So why was this line chosen for the TCEC book? Apparently - and funnily enough, this was also true when I analysed the position three years ago with STOCKFISH 9 - it took STOCKFISH a high search depth to display a clear advantage for White; until that moment STOCKFISH considers Black's position perfectly defensible.

Back in those days, I noticed that STOCKFISH was extremely slow (by its astonishing standards) to see the power of Bxg6 ideas followed by doubling on the h-file with queen and rook to give mate on h8. I assumed this was why its overall evaluation only rose after a great deal of analysis. I wonder whether this is still the case!

14...Bf3 15.Rg1 e5 16.Bd2. The value of not committing the knight to f4 too early: when the dark-squared bishop withdraws, Ng5 ideas are possible. LEELA struggled on but soon lost material. **16...Nd7 17.Ng5 Nxf6 18.dxe5 Bxc3 19.Bxc3 Nh5 20.Qxc4 Qd5 21.Qh4 Qc6 22.Qh3 Rad8 23.Qxf3 Qxf3 24.Nxf3** and White won in 60 moves.

The reverse was also won uneventfully by LEELA although the fish emotes were numerous in the chat as STOCKFISH 'moobed' to a mere 0.40 evaluation after its 25th move! However, White's 28th move caused a 'boom' to 2.13 and LEELA finished the game off without any problems!
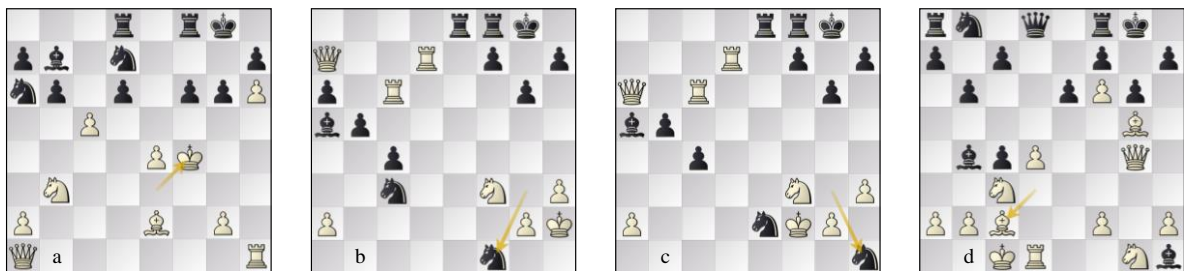

Fig. 2. (a) TCEC17 S'final g50 p21b; (b) TCEC20 S'final Lc–St g4 (b) p37w, (c) sideline p40w; (d) g5 p12b

Games 7 and 8. The solid Norwood/Hodgson variation of the Modern couldn't separate the engines either and led to two draws. **1.e4 g6 2.d4 d6 3.Nc3 c6 4.f4 d5 5.e5 h5**, Fig. 3a. The idea behind the opening is very neat. Black plays …d5 in two moves, playing 2…d6 (instead of developing the dark-squared bishop with 2…Bg7) first and waiting with …d5 until White has played f4. After 5.e5, Black's dark-squared bishop is better on f8 than on g7 as it can support a later …c5 break and cover the dark-squared holes on the Black kingside from e7! The English GM David Norwood remarked that Black effectively gained a move and mentioned that he had played it against England no.1 Michael Adams: "But all it meant was that Mickey took one move longer to beat me!"

Games 9 and 10. These featured a scary-looking version of the Tiger Modern. I thought LEELA might struggle but nothing could be further from the truth! **1.e4 d6 2.d4 g6 3.Nc3 Bg7 4.Be3 a6 5.Qd2 b5 6.f3 Nd7 7.h4 Ngf6 8.g4**, Fig. 3b. LEELA played extremely creatively, ignoring an entombed knight on h7 and striking with pawn breaks on both wings. **8...h5 9.g5 Nh7 10.f4 0–0 11.0–0–0 Nb6 12.Kb1 f5 13.Bg2 Qe8 14.Re1 b4 15.Nd1 a5**, Fig. 3c. The game came to a climax in an extraordinary collection of pins and opposing rooks and queens, Fig. 3d, eventually resolving itself in a roughly balanced double

rook and knight ending! Black's knight was still on h7 when the draw was agreed! LEELA pressed in the return but an exchange sacrifice gave enough perpetual chances for STOCKFISH against LEELA's king.
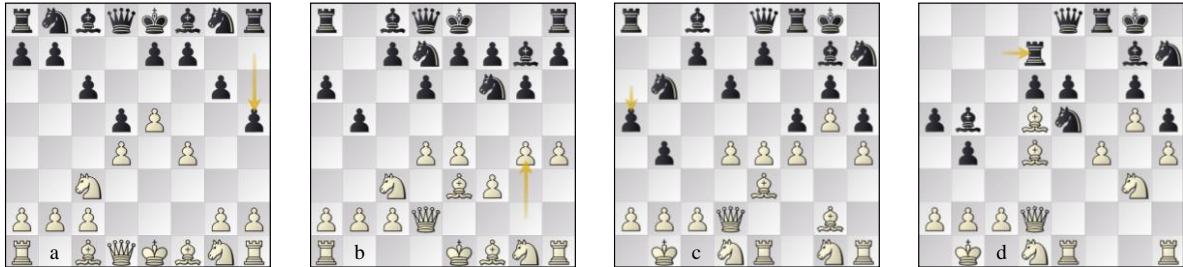

Fig. 3. (a) game 7 p6w; game 9 (b) p8b, (c) p16w, (d) p27w

Games 11 and 12 were Berlin Defences. Stifle that yawn: these featured a topical opening variation that was seen a few days earlier in Giri–Tari at the Tata Steel tournament! **1.e4 e5 2.Nf3 Nc6 3.Bb5 Nf6 4.d3 Bc5 5.Bxc6 dxc6 6.0–0 Bg4 7.h3 Bh5 8.g4 Nxg4 9.hxg4 Bxg4**, Fig. 4a. Giri had won a very impressive game and LEELA played just like him! STOCKFISH however demonstrated a much more convincing defensive setup for Black and held the balance until the 50-move rule intervened. A key theoretical game!

Games 13 to 16. We moved on through a couple of King's Gambit Accepted lines. Once upon a time, this would have struck fear into the heart of every LEELA fan but LEELA is now well-versed in the black art of scoring a King's Gambit moral victory by escaping as White into a slightly worse ending!

Games 17 and 18. These featured a 2-ply book **1.d4 f5** and it was interesting to see the contrast in openings chosen. STOCKFISH went for **2.Bg5** to which LEELA reacted in a very unusual way that is probably worth deeper investigation for Black players! **1.d4 f5 2.Bg5 h6 3.Bh4 g5 4.Bg3 c5**, Fig. 4b.

As White, LEELA played the main line **2.g3** and STOCKFISH reacted with a Stonewall, even hinting at some Richard Rapport-style hacking with an early **6…Ne4**. **1.d4 f5 2.g3 e6 3.c4 Nf6 4.Nf3 Be7 5.Bg2 d5 6.Qc2 Ne4**, Fig. 4c. Rapport has played …Ne4 before castling a number of times looking for a quick …h5-h4! However, STOCKFISH soon went back to normal lines and held a solid draw.
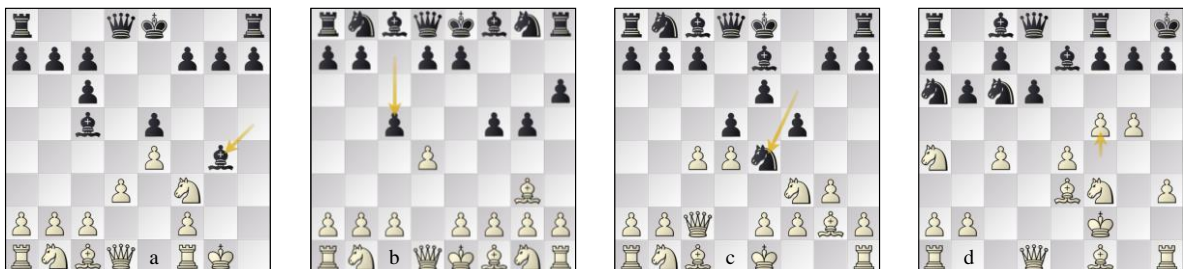

Fig. 4. (a) game 11 p10w; (b) game 17 p5w; (c) game 18 p7w; (d) game 19 p14b

Game 19 featured the Budapest and showed an interesting feature of LEELA's assessment that cropped up a few times during the match: it didn't seem to fear cramped positions at all. **1.d4 Nf6 2.c4 e5 3.dxe5**

Ng4 4.e4 Nxe5 5.f4 Nec6 6.Nc3 Bc5 7.Na4 Bb4+ 8.Kf2 Be7 9.Nf3 d6 10.Be3 Na6 11.h3 0–0 12.g4 b6 13.g5 Kh8 14.f5, Fig. 4d. As STOCKFISH threw its kingside pawns forwards, I was worried that LEELA would just get squashed. However, LEELA's evaluation stayed at an unconcerned 0.28 and indeed it had little trouble drawing!

I expected LEELA to make something of the White side in game 20, but STOCKFISH's unusual and active approach, fighting for kingside space with **…g5**, paid dividends and Black held here also without any particular difficulties, see Fig. 5a.

Games 20 and 21. Gambit enthusiasts couldn't complain about this Superfinal opening book as they were treated to a cheeky Sicilian Wing Gambit! **1.e4 c5 2.b4 cxb4 3.a3**, Fig. 5b. The Wing Gambit has a poor theoretical reputation, so you are always surprised when you switch on your engine and see that it thinks that White has partial compensation for the pawn! LEELA's game as White was fun as STOCKFISH grabbed a second pawn with a smash-and-grab queen raid and then rolled up into a ball to absorb the resulting pressure. LEELA's rooks made grateful use of the ranks and files opened by its pawn sacrifices while STOCKFISH started pulling at the White kingside by marching its rook's pawn forwards, Fig. 5c.

In this position, LEELA broke through but Black's queen was in time to deliver perpetual against the White king. **25.Ne6+ Bxe6 26.Rxc8 Bxc8 27.Rxc8 fxg3 28.fxg3 Kf7 29.Qc7 Rh5 30.Rxd8 Qe4 31.Nh4 Qe3+ 32.Kh1 Qe1 33.Kg1 Rxh4 34.Rxg8 Qe3+ 35.Kh1 Qe4+ 36.Kg1 Qe3+ 37.Kh1 Qe4+ 38.Kg1 Rg4 39.Bxh3 Qe3+ 40.Kg2 Qe2+ 41.Kg1 Qe3+ 42.Kh1 Qe4+ 43.Kg1 Qe3+ ½–½.**
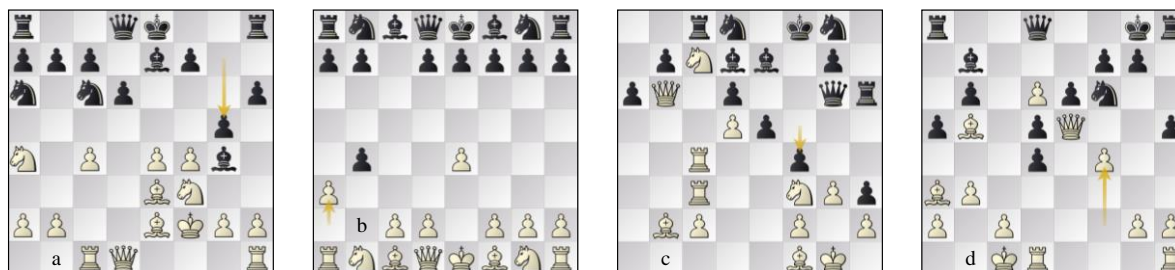

Fig. 5. (a) game 20 p14w; game 22 (b) p3b, (c) p25w; (d) game 28 p19b

After some heavyweight King's Indians, and some short sharp Shirov Meran Semi-Slavs (**1.d4 d5 2.c4 c6 3.Nf3 Nf6 4.Nc3 e6 5.e3 Nbd7 6.Qc2 Bd6 7.g4**) we got our first Frenches in **games 27 and 28**. The opening on which LEELA fans used to pin all their hopes did not turn out to be a fertile hunting ground in this Superfinal. The dodgy **1.e4 e6 2.d4 d5 3.Nc3 Be7 4.e5** line proved remarkably resilient in this first game. LEELA's aggressive plan Nb5-d6, forcing the exchange of Black's dark-squared bishop for a pawn on d6 that looked likely to fall seemed promising to me…

1.e4 e6 2.d4 d5 3.Nc3 Be7 4.e5 c5 5.Qg4 Kf8 6.Nf3 h5 7.Qf4 b6 8.Nb5 a6 9.Nd6 Bxd6 10.exd6 cxd4 11.Ne5 Nf6 12.b3 Nbd7 13.Ba3 Bb7 14.0–0–0 a5 15.Bb2 Nxe5 16.Qxe5 Ne8 17.Ba3 Kg8 18.Bb5 Nf6 19.f4, Fig. 5d. However, STOCKFISH demonstrated unruffled defence, exchanging off White's minor pieces and then holding a slightly worse major piece middlegame.

Games 29 and 30 made me feel old for two reasons! Firstly, given the standard King's Indian opening position of Fig. 6a, both engines opted for a system I played frequently as a young teenage IM: **5.Be2 0-0 6.Be3**. Then, both engines as Black opted to counter it in a bizarre way! **5.Be2 0–0 6.Be3 Nc6 7.d5**

Ne5 8.f4 Neg4 9.Bd2 Nh6, Fig. 6b. While I was expressing my amazement on Twitter, my English colleague GM Gawain Jones (a King's Indian expert) pointed out that this was a well-known line, already played in correspondence chess and recommended in a recent repertoire course on Chessable! And indeed, it easily held two draws here. LEELA's play as Black was particularly convincing, sacrificing a pawn early for pressure along the b-file and then opening the position with …e6 to add some pressure against White's kingside dark squares.

10.Nf3 c6 11.Ng5 cxd5 12.cxd5 b5 13.Bxb5 Rb8, Fig. 6c. **14.h3 e6 15.dxe6 fxe6 16.a4 a6 17.Bd3 Nh5 18.0–0 Rxb2 19.Qc1 Qb6+ 20.Kh2 Nf7 21.Nxf7 Rxf7 22.Be3 Qb8 23.Ne2 Bd7**, Fig. 6d, and a draw was agreed 20 moves later: ½–½.
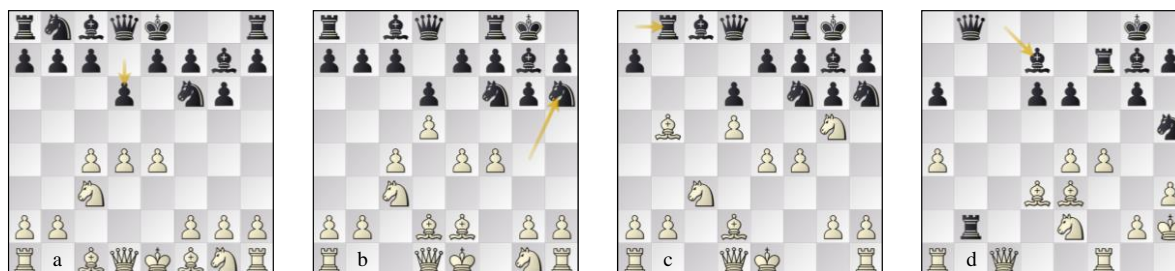

Fig. 6. Game 29 (a) p5w, (b) p10w, (c) p14w, (d) p24w

After 30 games, things were looking well-matched. LEELA had matched STOCKFISH in converting a clear opening advantage and if anything had been the one pressing in a few games. However, it was STOCKFISH that struck the first blow in a dodgy **1…b6** opening in **game 33**.

1.c4 b6 2.d4 e6 3.e4 Bb7 4.Bd3 Bb4+, Fig. 7a. **5.Kf1 Be7 6.Nf3 d6 7.Nc3 Nd7**, Fig. 7b. The course of the game felt anything but smooth as both engines had some very strange ideas in their PVs: Fig. 7c. STOCKFISH spent some time looking at f5, while LEELA was looking at breaking with b4 and then following up with b5, both of which seemed a sure-fire way not to make any progress! However, whatever doubts you might have about STOCKFISH's thinking process in this phase, it avoided any commitments and kept shuffling! LEELA then took the strange decision to sacrifice a pawn with ...a4 and …Nb3 instead of waiting: Fig. 7d. It was particularly strange since LEELA's evaluation was a cool 0.28 during the previous shuffling so there didn't seem any need for it to take dramatic action. The sacrifice gave White a solid queenside majority with plenty of long-term chances for expansion and things went gradually wrong for LEELA from here on.
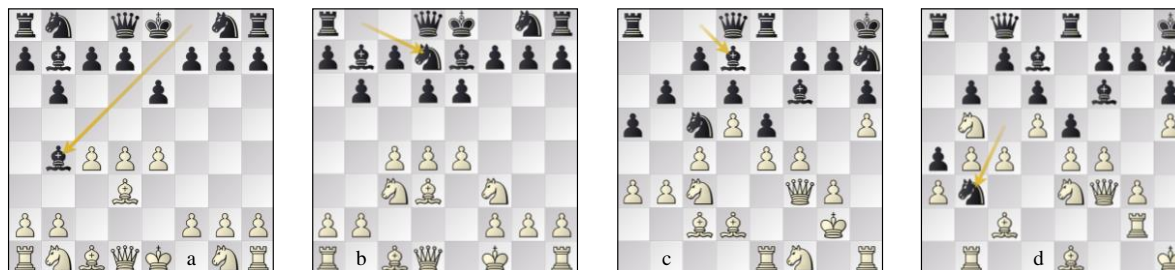

Fig. 7. Game 33 (a) p5w, (b) p8w, (c) p25w, (d) p36w

The reverse game was a disappointment for LEELA fans as STOCKFISH NNUE did a "Classical" and set up a static structure, Fig. 8a, and then prepared to man the barricades for as long as it took! LEELA made little progress in 90 moves of grinding.

Fig. 8. (a) game 34 p19w; (b) game 37 p4w; game 39 (c) p10w, (d) p17w, (e) p32w

A From Gambit in the Bird's in **games 37 and 38** did not sound like what the doctor would order to get LEELA back on an even keel, but LEELA navigated this banana skin easily while the supposedly inferior 3…Qb6 in the Sicilian Rossolimo, **1.e4 c5 2.Nf3 Nc6 3.Bb5 Qb6**, Fig. 8b, was made to look like a decent equalising attempt!

Things hotted up in **games 39 and 40** as a starting position of the main line Mar del Plata King's Indian led to some wild struggles! **1.d4 Nf6 2.c4 g6 3.Nc3 Bg7 4.e4 d6 5.Nf3 0–0 6.Be2 e5 7.0–0 Nc6 8.d5 Ne7 9.Ne1 Nd7**: Fig. 8c. STOCKFISH went all in on the queenside: **10.f3 f5 11.Nd3 f4 12.b4 g5 13.a4 h5 14.c5 Nf6 15.a5 Ng6 16.b5 g4**, Fig. 8d. Both sides took turns in trading blows on both wings, LEELA sacrificing a piece for a pin and an open White kingside, Fig. 8e. This one ended in a draw and the reverse was just as thrilling!

LEELA was extremely ambitious as White, initiating play on both wings, see Fig. 9a, but at the crucial moment, STOCKFISH sacrificed two pawns to get some breathing space for its pieces, Fig. 9b. **30...h3+ 31.Rxh3 Nh4+ 32.Kf1 a4 33.Qxa4 Bg7**, Fig. 9c. In the resulting complexities, STOCKFISH remained two pawns down - even to the R+N vs R+N ending – but its activity was just enough to hold the draw!

34.f4 Nf6 35.Nc3 exf4 36.Qxd7 Nxd7 37.Nb5 Ne5 38.Nxd6 Rd7 39.Nf5 Nxc4 40.Bc1 Bd4 41.Rbb3 Re8 42.Nxd4 cxd4 43.Ke2 Rxd5 44.Bxf4 gxf4 45.Rxh4 d3+ 46.Rxd3 Rb5 47.Rh5 Rb2+ 48.Ke1 Ne3 49.Rd2 Rxd2 50.Kxd2 Ra8 51.Nd3 Ra4 52.e5 Rxa3 53.Nxf4 Nc4+ 54.Kc1 Re3 55.e6 Re4 56.Rg5+ Kh7 57.Rf5 Ne3 58.Rf7+ Kh6 59.e7 Kg5 60.Kd2 Nxg4 61.Nd5 Ne3 62.Kd3 Re6 63.Nf4 Re5 64.Nh3+ Kg6 65.Rf2 Nd1 ½–½.
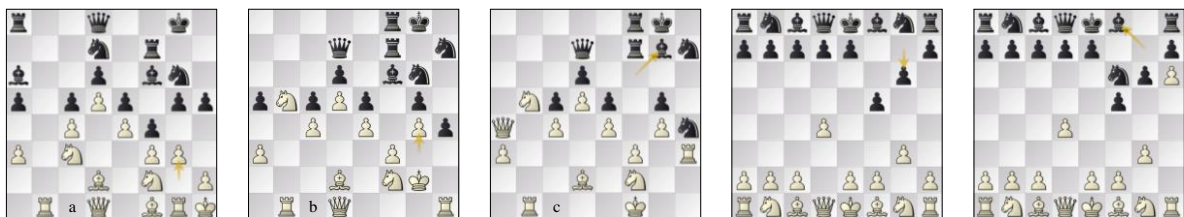

Fig. 9. Game 40 (a) p22b, (b) p30b, (c) p34w; game 43 (d) p3w, (e) p6w

STOCKFISH was still leading by two wins to one and the situation didn't change in the next few games which remained balanced. Once again, it was strange to see how easily the engines held the balance from a known inaccurate Dutch move order in **games 43 and 44**. **1.d4 f5 2.g3 g6**, Fig. 9d. 2...Nf6 is known to be better to avoid quick h4-h5 ideas from White. 2...g6 was however Jeroen's evil choice!

3.h4 Nf6 4.h5 Bg7 5.h6 Bf8, Fig. 9e. This is not supposed to be pleasant for Black but once again both Stockfish and Leela made it look completely respectable!

Games 47 and 48 in the Advance Caro-Kann were real heavyweight encounters. The opening line stems from Tal and also we followed an earlier TCEC Scorpionn–Leela encounter for a few moves. **1.e4 c6 2.d4 d5 3.e5 Bf5 4.h4 h6 5.g4 Bd7 6.h5 e6 7.f4 c5 8.c3 Qb6 9.Nf3 Nc6 10.Be2 f6 11.Nh4**, Fig. 10a. Scorpionn had played 11.Qb3 and after 11…Qc7 12.Nh4, Leela sacrificed a rook after 12…cxd4 13.Ng6 leading to a crazy and dramatic game (TCEC, 2020b) covered in my and Natasha's video-analysis (Sadler and Regan, 2020).

11...Nge7 12.dxc5 Qxc5 13.b4 Qb6 14.b5 Na5 15.Qd4 fxe5 16.fxe5 Rg8 17.Nd2 Qc7 18.0–0 Rc8 19.Qf4 Kd8 20.Ndf3 Nc4 21.Bd3 g5 22.hxg6 Bg7 23.Re1 Qa5, Fig. 10b.

After complicated play, we reached a game rife with non-standard features: an open White king, an uncastled Black king, White a pawn up but with pawn weaknesses everywhere. Leela moved to a negative evaluation and for one moment it looked as if it was making serious progress. However, Stockfish found a precise way to hold the balanced ending in the tactical craziness that would have you open-mouthed in astonishment during a human game, but that barely raises an eyebrow when engines do it! Fig. 10c: **52.Rf6 Qc6 53.Nd1 Bxf6 54.gxf6 Qc1 55.Ne3 a6 56.g7 Bf7 57.Bg6**, Fig. 10d. **57...Bg8 58.Qf3 Qa1 59.Qf4 e5 60.Qf5 Qxa2+ 61.Kg3 d4 62.Qxe5 dxe3 63.Be4+ Kb8 64.Qe8+ Rc8 65.Qe5+ Rc7 66.Qe8+ Rc8 67.Qe5+ Rc7 ½–½.**
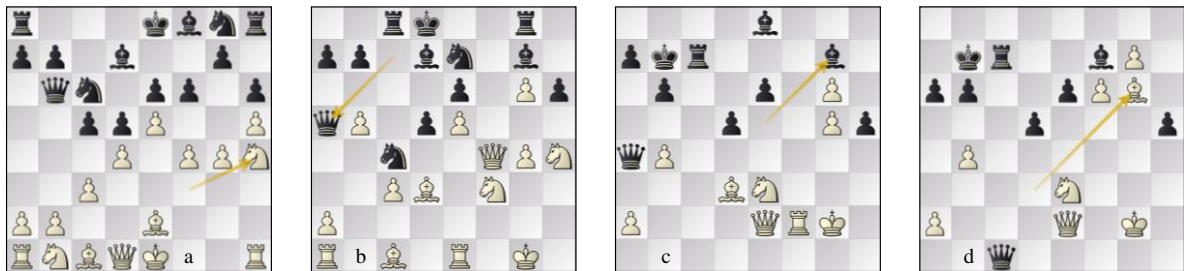

Fig. 10. Game 47 (a) p11b, (b) p24w, (c) p52w, (d) p57b

The return also looked promising for Leela, but while I was wondering how Stockfish was going to get its pieces developed, see Fig. 11a, Stockfish simply didn't bother and just waited for White to come up with a plan! Leela's rook shuffling led to chat comments about the rook polishing the g2 and g1 squares!

Games 49 and 50. Disaster struck for Leela fans as Stockfish took a 3-1 lead with an attractive but not too difficult tactical blow in a position that had seemed headed for a draw. Fig. 11b: 78...Rf4 was Stockfish's expectation when Black is solid despite White's pressure on the h-file. Leela's move 78...Kh8 was a big step in the wrong direction as it gives White the preconditions for a common tactical blow in such positions (albeit based on an unusual tactical point). I took a detailed look at this sequence of moves (Sadler, 2021). It feels as if 78...Kh8 was something of a compulsion for Leela. However deep you let it search, it only wants this move and nothing else. **78...Kh8 79.Bd3 Bb5 80.Bc2 Bd7**. Leela was instamoving at this point and did not correctly analyse White's next sacrifice. **81.Nf5**, see Fig. 11c.

81...gxf5 82.g6 f4 83.Qg2 Rff7. 83...Rfg8 was the move that LEELA had in its analysis initially and indeed it looks as if White's attack has come to a standstill. However, White has the beautiful 84.Qg5, see Fig. 11d, threatening Qxe7 followed by Rxh7+ and mate, and there is no way for Black to maintain its defence of h7. 84...Re8 85.Rxh7+ Rxh7 86.Rxh7+ Qxh7 87.gxh7 is the difference: when the Black rook moves from g8, the White queen is no longer hanging along the g-file. LEELA's line held on for longer but without hope of saving the game. **84.Rh6 Bb5 85.gxf7 Qxf7**. 85...Rxg2 86.Rxh7#.

86.Qd2 Qd7 87.Bd3 Bxd3 88.Qxd3 Nb5 89.Qc4 Nc7 90.Qc3 Kg8 91.Qe1 Nb5 92.Qa5 Nc7 93.Qb6 Ne8 94.Qb8 Re7 95.Ka2 Kf8 96.Rg1 Rf7 97.Re6 Re7 98.Rxe7 Kxe7 99.Rg8 Qd8 100.Qxd8+ Kxd8 101.b3 axb3+ 102.Kxb3 h5 103.Rh8 Kd7 104.a4 Nc7 105.Rxh5 Kc8 106.Rh8+ Kd7 107.a5 Na6 108.Kc4 Nc7 109.Rb8 Na6 110.Rb6 Nb4 111.a6 Nxa6 112.Rxa6 Ke7 113.Kb5 c4 114.Kxc4 Kf6 115.Rxd6+ Ke7 116.Re6+ Kf7 117.Kc5 Kg7 118.d6 Kf7 119.Kd5 Kg7 120.d7 Kf8 121.d8Q+ Kg7 122.Qd7+ Kf8 123.Re8# 1–0.
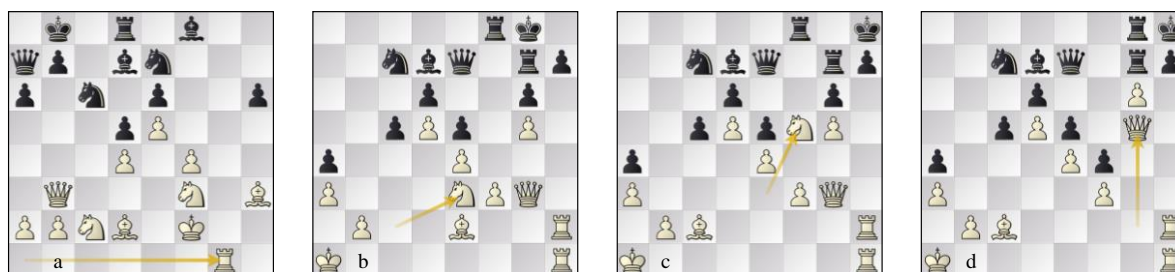
Fig. 11. (a) game 48 p23b; game 49 (b) p78b, (c) p81b, (d) sideline p84b

With LEELA failing to make much impression in the reverse, it was suddenly looking grim for LEELA but now the match started to become more unpredictable as the openings became just a little more unbalanced. And it was LEELA that struck two telling blows, first winning a glorious King's Indian in game 52 and then a more routine Queen's Indian in game 56.

Game 52 was one of the best games of the Superfinal. **1.d4 Nf6 2.c4 g6 3.Nc3 Bg7 4.e4 d6 5.Be2 0–0 6.Be3 e5 7.d5 a5 8.g4 Na6 9.g5 Nd7 10.h4 Ndc5 11.h5 c6 12.Nf3 Bd7 13.Nd2 a4 14.Kf1 f5**, Fig. 12a. The engines had been given an excellent version of the 5.Be2 6.Be3 system in which White manages to drive away the knight on f6 with g4–g5 before Black can organise pressure against e4 with ...Na6–c5. I have played similar positions numerous times in my career with excellent results for White. However, Black doesn't seem to be in such bad shape here. White has gained a great deal of kingside space, but a follow-up isn't obvious while Black seems to have counterplay both on the queenside and the centre. LEELA's solution is truly extraordinary.

15.b4, Fig. 12b. An astonishing sacrifice: the sort of pure strategic idea that only LEELA can come up with, and it was not expected by STOCKFISH. GM Danny Gormally tweeted "I don't think anyone would think of b4". What is the point? Well, let's just see a few more moves! **15...Nxb4 16.h6 Bh8 17.Bxc5 dxc5 18.a3**, Fig. 12c.

LEELA's idea is to create passive Black pieces all over the board. By drawing the Black knight to b4, White is able to play 17.Bxc5 and bring a Black pawn to the c5–square. If Black replies 18...Na6 to 18.a3, then the Black knight no longer has access to the c5–outpost, and indeed has little useful to do in general! On the other side of the board, 16.h6 pushes the dark-squared bishop back to h8. As long as White maintains its blockade of the Black e5–pawn, Black's bishop will never see the light of day again!

The complication lies in the piece sacrifice that Black offers in the game to break the blockade. At first sight Black seems to have plenty of play, but LEELA navigated the tactics confidently. **18...Qxg5 19.axb4 cxb4 20.Nxa4 cxd5 21.Nb6 Rxa1 22.Qxa1 Qxd2 23.Nxd7 Rc8 24.Rh3 dxe4 25.Nb6 b3 26.Rxb3 Qxh6 27.Ke1**, Fig. 12d.

Black has four pawns for the piece but Black's open king and the weakness of the b7–pawn are what White is banking on. Once the b-pawn is captured, White's passed c-pawn will prove decisive. Some nifty tactics were required to keep STOCKFISH quiet but these were no problem for LEELA.

27...Rf8 28.Nd5 e3 29.Nxe3 e4 30.Qa5 Bg7 31.Rxb7 f4 32.Nd1 Kh8 33.Qc7 f3 34.Bf1 Rg8 35.Qd6 Qg5 36.c5 Qc1 37.Rxg7 Rxg7 38.Qd8+ Rg8 39.Qd4+ Rg7 40.Bc4 h5 41.c6 Qg5 42.Bd5 Kh7 43.Ne3 Re7 44.Qc5 Qe5 45.Kd1 Kh6 46.Kc2 Rc7 47.Nc4 Qf4 48.Kb3 h4 49.Be6 Qf6 50.Bd7 h3 51.Ne3 Kh7 52.Nd5 Qf7 53.Qd6 Ra7 54.Bxh3 Ra8 55.c7 Kh6 56.Kc2 Qg7 57.c8Q Ra2+ 58.Kb3 Qb2+ 59.Kc4 Ra4+ 60.Nb4 Qc2+ 61.Kb5 Qxc8 62.Bxc8 Ra7 63.Qf8+ Kh7 64.Nd5 Rg7 65.Nf6+ Kh6 66.Nxe4 Kh7 67.Ng5+ Kh6 68.Nf7+ Kh5 69.Qh8+ Rh7 70.Qxh7# 1–0.
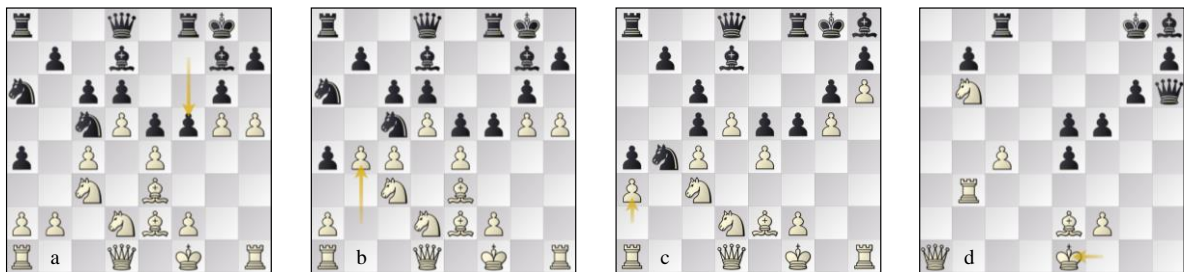

Fig. 12. Game 52 (a) p15w, (b) p15b, (c) p18b, (d) p27b

When I saw LEELA holding a Chigorin as Black with ease in **game 57**, I thought that this Superfinal might be LEELA's but STOCKFISH had other ideas, producing its own 'Season 20 Immortal' in **game 59**! Fig. 14a. The 'flick-knife' variation (7.f4 and 8.Bb5+) against the Benoni is the reason why Benoni players nowadays generally play the Modern Benoni only via the move order 1.d4 Nf6 2.c4 e6 3.Nf3 c5. LEELA had made a pretty good job of drumming up some counterplay at the cost of a pawn and 22...f5 looked to destroy the White centre and create a weak White d5–pawn as extra compensation. STOCKFISH's reply was typical for this line and not unexpected. The power of the subsequent counterplay certainly was however: reasoning back from this moment, it almost looks like a forced win!

Fig. 13. TCEC's headline engine data including their evaluations for game 50, position 28b

23.e5 dxe5 24.d6+ **Kh8 25.Nf3**. Ng5 is threatened followed by Nf7 so Black destroys the support of the pawn on f4 to prevent it. **25...exf4 26.Rfd1 Nd7 27.Nd5 Nxd5 28.Qxd5**, Fig. 14b. Fig. 13 shows the evaluation at this point. Impressively, both engines had seen the same main line but STOCKFISH had drawn some additional conclusions! It doesn't look that bad for Black until you realise that Ra7 is coming followed by Qf7 and Black's second rank collapses. Black tries to cover the invasion square on a7 in a natural way but runs up against something superhuman! **28...Qb6**. 28...Ra8 29.Ng5 is extremely nasty: Nf7+ is threatened, forking the king and queen. 29...Qxg5 30.Rxa8.
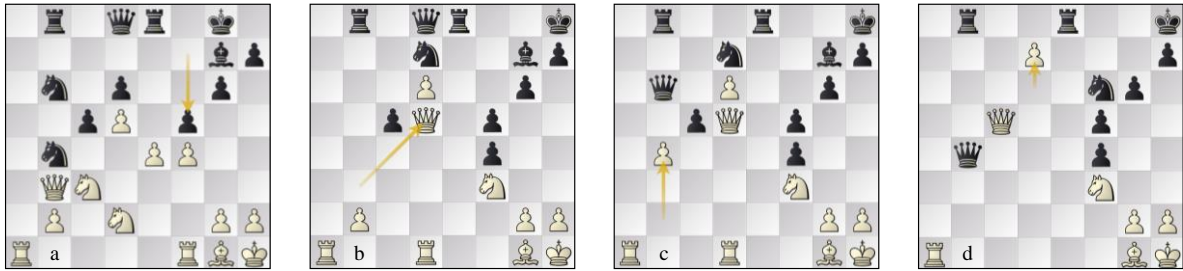

Fig. 14. Game 59 (a) p23w, (b) p28b, (c) p30w, (d) p32b

29.b4, Fig. 14c, a fantastic move! White threatens to create connected passed pawns with bxc5; if Black takes the pawn with the queen then Ra7 comes in all the same. There is however the little matter of the hanging rook on a1! 29.Ng5 Bf6 and White doesn't have a dangerous follow-up. **29...Bxa1 30.Rxa1 Nf6 31.Qxc5 Qxb4 32.d7**, Fig. 14d. Another great move! **32...Rf8**. 32...Nxd7 33.Bd4+ Kg8 34.Qd5+ Kf8 35.Qxd7 **33.Qxb4 Rxb4 34.Bc5 Rbb8 35.Bxf8 Rxf8 36.Rd1 Rd8 37.Ne5**, Fig. 15a.

The key position which STOCKFISH had assessed as a cast-iron win so many moves ahead. And... it's right! The Black king cannot approach the pawn as ...Ke7 allows the fork Nc6+ while both Black pieces have to remain as they are or allow the d-pawn to queen. So with a bit of care, Black just runs out of moves! Phenomenal calculation and insight! **37...Kg7 38.Kg1 Kf8 39.Kf1 g5 40.Rd4 h5 41.h4 g4 42.Ke2 Kg8 43.Kf1 Kf8 44.Rd1 Kg8 45.Rd6 Kg7 46.Ke2 Ne4 47.Nc6 Nxd6 48.Nxd8 Kf6 49.Nc6 Nf7 50.d8Q+ Nxd8 51.Nxd8**, Fig. 15b.
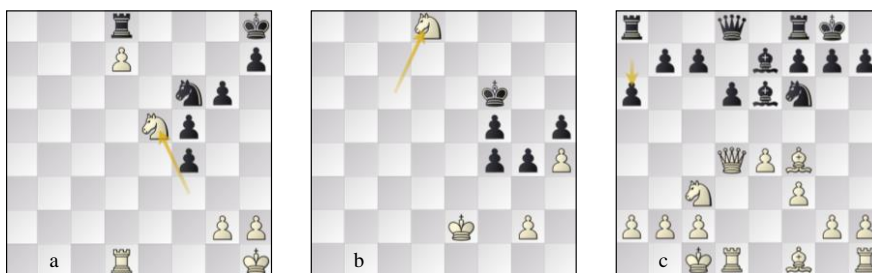

Fig. 15. Game 59 (a) p37b, (b) p51b; (c) game 69 p11w

The resulting ending is always winning. Thanks to the excellent move 41.h4, Black can never exchange all of White's kingside pawns and the wrong-coloured rook's pawn doesn't exist for knights! **51...Ke5 52.Kf2 Kd5 53.Nb7 Kc6 54.Na5+ Kd5 55.Nb3 Ke4 56.Nc5+ Ke5 57.Nd3+ Ke4 58.Nc5+ Ke5 59.Nd3+ Ke4 60.Nb4 g3+ 61.Ke2 f3+ 62.gxf3+ Kd4 63.Nc2+ Ke5 64.Ke3 f4+ 65.Ke2 Kd5 66.Ne1 Kd6 67.Kf1 g2+ 68.Kxg2 Ke5 69.Nd3+ Kf5 70.Kf2 Kg6 71.Nxf4+ 1–0.**

LEELA was far from finished however and struck back in **game 62** to level the scores! The Owen's defence (1.e4 b6) in **games 65 and 66** proved to be to neither engine's taste as both engines were demolished as Black!

Games 69 and 70 attracted GM attention with GM Ivan Sokolov expressing astonishment that both engines had managed to draw this line of the Philidor (which has always been thought to lead to disaster for Black!) so comfortably! See Fig. 15c.

The engines were tied at 5-5 going into **game 71**! However, little did we know that the match was going to turn dramatically in STOCKFISH's favour from this point onwards! A powerful demolition of LEELA's slow French (**1.e4 e6 2.d4 d5 3.e5 b6 4.h4 Qd7**) and a somewhat uncomfortable hold as Black was a foretelling of the scenario of the last 15 openings as STOCKFISH scored seven wins without answer!

Game 77 was particularly fine, featuring some stunning play from STOCKFISH on both wings of the board. **1.e4 c5 2.Nf3 d6 3.d4 cxd4 4.Nxd4 Nf6 5.Nc3 a6 6.Be3 e6 7.f3 Nc6 8.Qd2 Be7 9.0–0–0 0–0 10.g4 Nd7 11.h4 Nxd4 12.Bxd4 b5 13.g5 Qc7 14.h5 b4 15.Na4 Qa5 16.b3 Bxg5 17.Be3 h6 18.f4 Be7 19.Rg1 Kh8 20.e5 Rb8 21.exd6 Bf6**, Fig. 16a. LEELA had grabbed a hot pawn on the g-file earlier on. It's always a difficult decision to make: let the g-pawn throw itself at your king or capture it and open a file for a white rook against your king. LEELA was quite optimistic at this stage, expecting to play ...Bb7 and complete its development. STOCKFISH had a beautiful idea prepared! **22.a3**, Fig. 16b.

Completely unexpected! White prevents Black from developing the light-squared bishop to b7 due to axb4 with a powerful queenside majority for White! For that reason, LEELA feels compelled to open lines of attack against its king in order to open the c8–h3 diagonal and secure the e5–square for its knight to be able to complete its development. "Open lines of attack against its king" you hear me say? Well, we can imagine what STOCKFISH will make of those! **22...e5 23.Bc4 exf4 24.Bd4 Qf5 25.Rdf1 Bg5 26.Rxg5 hxg5 27.Re1**. This fantastic sequence is creating more and more holes in Black's position. h6 is White's next move. **27...f6 28.Re7 f3 29.h6 gxh6 30.Kb2**, Fig. 16c.

Another great quiet move, sidestepping any Black attempts to swap off queens with ...Qf4(+). Qh2 is a powerful threat now! The attack continued at a furious pace but LEELA performed defensive miracles to stay afloat, eventually reaching the following unusual ending.
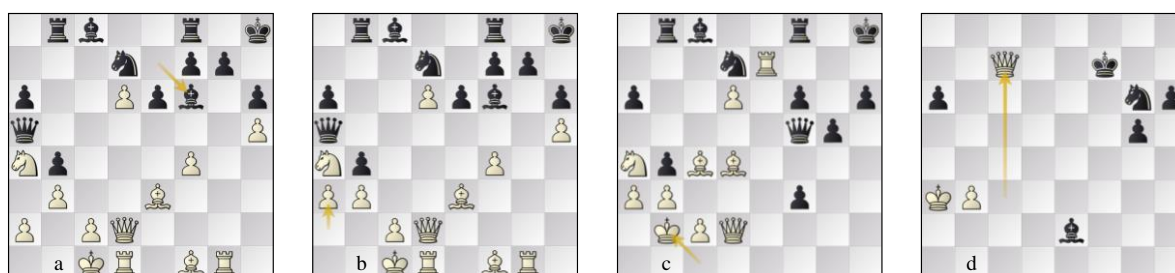

Fig. 16. Game 77 (a) p22w, (b) p22b, (c) p30b, (d) p54b

30...f2 31.Bxf2 Ne5 32.Bd5 Bd7 33.Nc5 Bc6 34.Be6 Qf4 35.Be3 Qg3 36.Qd4 bxa3+ 37.Ka2 Rfe8 38.Rc7 Qg2 39.Qc3 Qf3 40.Bd4 Qxc3 41.Bxc3 Bf3 42.Bf5 Rbd8 43.Bg6 Nxg6 44.Bxf6+ Kg8 45.Rg7+ Kf8 46.d7 Re2 47.Bxd8 Kxg7 48.Ba5 Rxc2+ 49.Kxa3 Rxc5 50.d8Q Rc6 51.Bc3+ Rxc3 52.Qd4+ Kf7 53.Qxc3 Be2 54.Qc7+, Fig. 16d.

Not so simple to win you would have thought - I wouldn't fancy it in a blitz finish! STOCKFISH made it look trivial! **54...Kf6 55.Qh2 Bb5 56.Qxh6 Kf5 57.Qh7 Kf6 58.Kb4 Nf4 59.Kc3 Bd3 60.Qh8+ Kf5 61.Qc8+ Kg6 62.Qe8+ Kf5 63.Kd4 Kg4 64.Qd7+ Kg3 65.Ke5 Bb5 66.Qd8 Nh3 67.Kf5 Be2 68.Qd2 Kf2 69.Qd4+ Kg2 70.Qe3 Bb5 71.Kg4 Bd7+ 72.Kh5 Bb5 73.Qe4+ Kf2 74.Qf5+ Kg3 75.Qg4+ Kh2 76.Qf3 Be8+ 77.Kh6 Bb5 78.Kg6 Be8+ 79.Kf5 Bd7+ 80.Kf6 Bb5 81.Ke5 Ng1 82.Qf2+ Kh1 83.Ke4 Be2 84.Qg3 g4 85.Ke3 Bf3 86.Qe1 Kh2 87.Qf2+ Kh1 88.b4 Nh3 89.Qg3 Ng1 90.Qd6 Nh3 91.Qxa6 Kh2 92.Qd6+ Kg2 93.b5 Ba8 94.Qa6 Bd5 95.b6 g3 96.b7 Nf2 97.b8Q Ng4+ 98.Kd4 Nf2 99.Kxd5 1–0.**

LEELA finally broke STOCKFISH's winning streak with a fine endgame win in **game 92** but the match was already lost. The last few games of the match ended in a flurry of wins, two apiece.

Firstly, LEELA once again showed excellent positional insight in **game 96** to set up a good win in a Ruy Lopez Zaitsev. Fig. 17a: STOCKFISH had gone for some sharp kingside play with Nh2–g4 but allowed Black to get its offside knight on b4 back into play. LEELA - just like STOOFVLEES did in some test games I ran against STOCKFISH at rapid time controls - finds a lovely plan to stymie Black's queenside play. **19.a5**, preventing the possibility of ...bxa4 opening the b-file.

In game 95, we had had 19.Nh2 Qe7 20.Ng4 Nxd5 exploiting the undefended rook on e1 to activate the Black knight. 21.Nxh6+ Kh8 22.axb5 axb5 23.Rxa8 Bxa8 24.Ne2 Ndf6 25.Qxd6 Nf8 26.e5 Nd5 27.Be4 Bxh6 28.Bxh6 Qxd6 29.exd6 Rxe4 30.Bxf8 Bc6 31.d7 Bxd7 32.Bxc5 and despite STOCKFISH NNUE's now legendary optimism in opposite-coloured bishop positions, this was an easy draw for Black.

19...Rc8 20.Ra3 Rc7 21.Rb3, Fig. 17b. A great idea, defending the b2–pawn (thus freeing the c1–bishop to move) and preventing ...c4 by attacking the knight on b4. A really unusual idea! White doesn't care about the a5–pawn: let Black take it and take its queen away from the defence of the kingside! **21...Rce7 22.Bd2 h5.** 22...Qxa5 fails to a lightning kingside attack! 23.Nh4 looking for Ngf5! 23...Bc8 24.Nh5 gxh5 25.Rg3 Ng5 26.Bc3 Be5 27.Ree3, Fig. 17c, followed by Qxh5 is the amazing engine line!
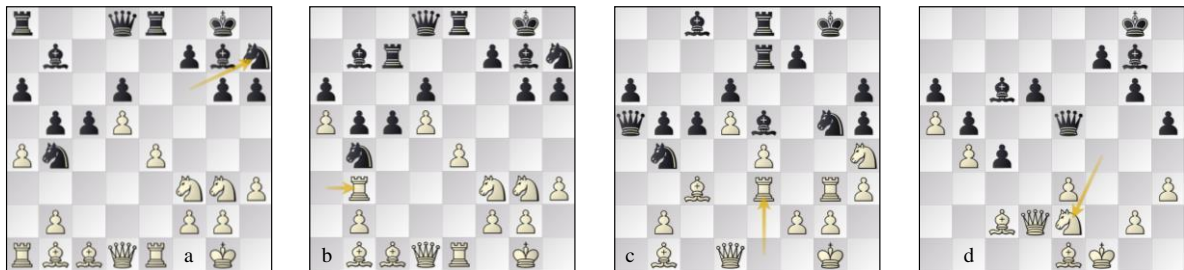

Fig. 17. Game 96 (a) p19w, (b) p21b, (c) sideline p27b, (d) p38b

23.Qc1 Nxd5. STOCKFISH decides to sacrifice a piece to break White's attacking potential and hang on for dear life, but LEELA's win was never in doubt. 23...Qxa5 24.Nxh5 gxh5 25.Nh4 is again a powerful attack for White.

24.exd5 Rxe1+ 25.Nxe1 Nf6 26.Re3 Rxe3 27.fxe3 Bxd5 28.b4 Qe7 29.Ne2 Bc6 30.Nf4 Bh6 31.Kf1 Nd5 32.Ned3 Qg5 33.Nxd5 Bxd5 34.Nf4 Bc6 35.Be1 Bg7 36.Bc2 Qe5 37.Qd2 c4 38.Ne2, Fig. 17d, and LEELA gradually reeled in the point.

The last real fireworks were in game 97 as STOCKFISH once again showed that optimism in defence is not a guarantee for success!

Game 97, Fig. 18a. LEELA had been outplayed on the Black side of a dodgy Najdorf. STOCKFISH's evaluation was already stratospheric at 4.21 whereas LEELA was only moderately concerned at 0.86. LEELA had planned a very risky method of defence involving bringing its king to the centre to halt White's passed d-pawn. LEELA thought it had all the angles covered; STOCKFISH didn't. **39...Rch8 40.Nxf7 Kxf7 41.Rfd2 Qf8 42.Bc4 Qc5 43.b3 Ke7 44.d6+ Kd7 45.Nc7 Nc6 46.Ka2**, Fig. 18b.

LEELA had focused on 46.Kb2 and although it isn't particularly happy with Black's position at a high node count, it still felt there were some survival chances. The difference between the two moves is subtle but crucial! STOCKFISH's evaluation after 46.Ka2 was 6.15, LEELA's just 0.88! **46...Nd4 47.Ne6 Qxd6 48.Nxd4 Rxd1 49.Bb5+ Kc8 50.Rxd1 exd4 51.Qb2**, Fig. 18c.

This is the key move! With the king on b2, this would be impossible! **51...Rd8**. The d-pawn has to be defended so the Black rook is forced into passivity - no more of the ...Rh2 tricks that LEELA was so keen on!

52.Rc1+ Kb7 53.Rc6 Qe5. 53...Qxc6 54.Bxc6+ Kxc6 doesn't look obviously lost for Black with a rook and knight for the queen and a big passed d-pawn but again it's all tactics! 55.b4 d3 56.b5+ Kb7 57.Qg7+ Kb8 58.Qf6 hitting the rook on d8, the pawn on b6 and the pawn on f4! Too many threats! **54.Rxg6**, Fig. 18d.
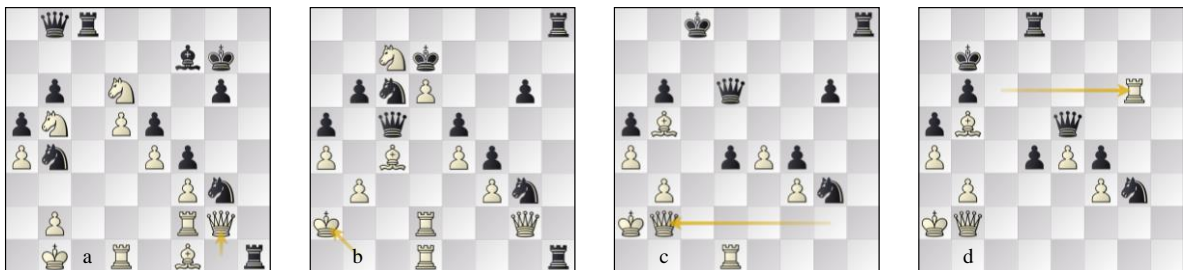

Fig. 18. Game 97 (a) p39b, (b) p46b, (c) p51b, (d) p54b

Black's knight is offside and unable to join in the defence of Black's king, Black cannot advance the d4–pawn easily and the light squares around the black king are terribly weak. A clear advantage for a human player, +8.03 for STOCKFISH!

54...Rd6 55.Rg8 Nh5 56.Qc2 Qc5 57.Kb2 Rh6 58.Rd8 Ng3 59.Rd7+ Kb8 60.Qd2 Rd6 61.Rf7 Qe5 62.Rf8+ Kb7 63.Ka2 d3 64.Bxd3 Qd4 65.Rf7+ Kb8 66.Qc1 Qc5 67.Qb2 Qd4 68.Qxd4 Rxd4 69.Bb5 Rd2+ 70.Ka3 Rf2 71.Rxf4 Nxe4 72.Rxe4 Rxf3 73.Re7 Kc8 74.Kb2 Rh3 75.Bd7+ Kc7 76.Bxh3+ Kd6 77.Re6+ Kc7 78.Kc3 Kc8 79.Kc4 Kd7 80.Kb5 Kc7 81.Bg4 Kc8 82.Kc6 Kb8 83.Kxb6 Kc8 84.Re8# 1–0.

The match ended with wins being traded in the Schmid Benoni (1.d4 c5 2.d5 e5).

Hard luck LEELA and well done STOCKFISH! Season 21 promises to be just as thrilling with a Ceres-powered LEELA and I'm sure plenty of new Elo-gaining patches for STOCKFISH too! Can't wait!

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