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Accepted Version

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Chess Endgame News: The World Chess Championship, 2018

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Computer analyses were very much to the fore in this, Carlsen's most highly contested World Championship Match. They could be found on the web and in support of the various live commentaries on offer. Here, we focus on the endgames of game six and on game thirteen, i.e., game one of the rapid-tempo tiebreak. These were certainly two key moments in the match. This note's e-repository version (Müller and Haworth, 2019) provides further supporting analysis and information.

Game 6: Carlsen–Caruana, Petroff Defense (C42)

Friday, November 16th: the World Chess Championship match between Magnus Carlsen and Fabiano Caruana was reaching its halfway mark, the tension and the cost of a mistake increasing with every draw. Magnus as White was looking for a win but by his own admission made mistakes from move 22 and drifted into a poor position. He had exchanged a Knight for three pawns: they became two pawns and then one, so he found himself on the wrong end of KBPPKBNP.

By dint of remarkable, defensive play, Magnus escaped with a draw and was relieved to do so. He admitted that he now believed in fortresses with 'It's a good thing they exist, right!' Certainly, Fabiano believed Magnus had constructed a fortress and for that reason, he had not been examining every position for 'accidental opportunities'.

Fig. 1. Magnus Carlsen, Daniel King and Fabiano Caruana hear that a computer called 'mate' for Black.

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The leading chess journalist Ian Rogers threw new light on the game in the press conference: 'You were right not to believe in fortresses.' STOCKFISH-FATHOM (Gunderson, 2018), running co-operatively on two platforms[2] and referred to as ST-FM here, had called 'mate' for Black, the strategy being counter-intuitive and unsurprisingly invisible to us humans. We pick up the story after **68. Bc4**, Fig. 2a. Caruana played **68. … Nf3?** and the game was drawn twelve moves later.
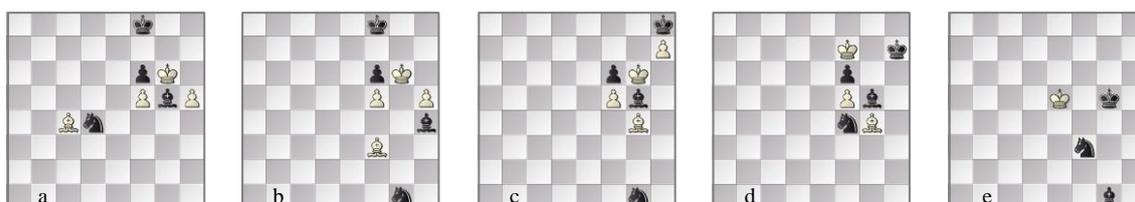

Fig. 2. Game 6 positions: (a) 68b and, in the continuation here, (b) 71w, (c) 82w, (d) 7-man 85w and (e) 98w.

However, off stage, ST-FM was analysing the game, armed with what Gunderson says proved to be a vital strength - the 'WDL' value-only half of the latest 7-man endgame tables (de Man et al, 2018) plus internet access to the Lomonosov (2012) DTM EGTs.[3] In its last line, it found **68. … Bh4!! 69. Bd5 Ne2 70. Bf3 Ng1!!**, Fig 2b. Black is remarkably inviting White to dominate its knight by stationing its bishop on g4 and, indeed, ST-FM chooses **71. Bg4** but this allows **Kg8!** Now, **72. Kh6 Be1 73. Kg6 Bc3 74. Kh6 Bd2+ 75. Kg6 Bg5** forces **76. h6 Kh8** and **77. h7**. Black's bishop repeats its manoeuvre: **77. … Bh4 78. Kh6 Bf2 79. Kg6 Bd4 80. Kh6 Be3+ 81. Kg6 Bg5** zugzwang, Fig. 2c. Now White's bishop must move and the knight is released to go to f4.

82. Bh5 Nh3 83. Bg4 Nf4+ 84. Kf7 Kxh7, Fig. 2d, 0-1. ST-FM had picked up this 'database' win, 33 plies down the track. The rest is in principle straightforward: both pawns are captured, leaving Black with a challenging KBNK mate. Here, we have the luxury of the full 7-man EGTs (de Man et al, 2018; Lomonosov, 2012) to inform a benchmark 'SMZ$^{\pm}$' move-strategy minimaxing 'DTM' Depth to Mate and then 'DTZ', Depth to ply-count Zeroing.

dtm/z = 82/12p.[4] S(MZ & ZM)$^{\pm}$: **85. Bd1′ Kh6′ 86. Kf8′ Bh4″ 87. Kf7′ Kg5″ 88. Bc2″** (ST-FM: 88. Kg7 Kxf5) **88. … Ne2″ 89. Bb1′ Nd4″ 90. Bd3′ Nxf5″** 6-man **91. Ke6″ SMZ$^{\pm}$: Nd4″ 92. Kd5″ Bf2″ 93. Bb1′ f5″ 94. Ke5″ f4″ 95. Be4″ f3″ 96. Bb7″ Bg1″ 97. Bxf3″ Nxf3″″**, KBNK, see Fig. 2e, with mate still 28 moves away. Asked about the counterfactual KBNK mate, Fabiano said, "I haven't had any trouble so far!" Indeed, he has two KBNK mates from two in the database.

What a game, what a fight! It looked like a symmetric draw but was revived by Caruana's **21. … c5** after which Magnus lost ground. Finally, like the first game seven days before, the play was ambitious, dramatic and extended: 6½ hours and 80 moves. As we see above, it could have culminated in a stunning, extraordinary win with an instructive endgame. Magnus could have had his Black Friday a week early in at least two senses. Both players battled hard and certainly deserved the respect and fulsome applause of the media as the press conference ended.

Our thanks to Steinar Gunderson for his information on the STOCKFISH-FATHOM partnership and reflection on his engines' analysis at position 68b.

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[2] A 40-thread 2.3GHz Xeon® E5-2698 v3 'Haswell-EP' and a 36-thread 2.2GHz Xeon® E5-2630 v4 'Broadwell-EP'.

[3] Matthew Sadler reports that ALPHAZERO, not having EGT assistance, did not see this mate.

[4] Moves are annotated: ″″ ≡ 'only value-retaining move', ° ≡ only move, and the context of the defined move-strategy,
  ″ ≡ uniquely-optimal move and ′ ≡ equi-optimal move. *dtx* is a depth in metric DTX, in moves/plies as indicated.

Game 13, tiebreak 1: Carlsen–Caruana, Sicilian Defence Kramnik Variation (B40)

The classic phase of the match produced twelve draws, a headline which masks the intense struggle that took place in most of them. The first tiebreak game in rapid tempo 25′+15″/m brought the first win. FINALGEN (Romero, 2012) with its DTF depth metric is eventually able to analyse the rook endgame which started at position 28w: we pick up the game at crunch position 37b, Fig. 3a.

Here, Caruana played **37. … Kxe4??** This loses the draw that was still available: 37. … Ra2+ 38. Kh3 Kxe4 39. Rxg7 (FINALGEN, "=") Ra1 40. Rc7 Rf1″″ 41. Rc6 Rxf5 52. Rxa6 =.

The game continued with (SF⩲:) **38. Re7+″″**, the essential *zwischenschach* 'hesitation check' (Nunn, 2010), brilliantly spotted by Carlsen with only 75″ on the clock but apparently missed by Caruana and most commentators. FINALGEN proves that the universally anticipated 38. Rxg7?, Fig. 3b, only draws. 38. … Ra2+″″ 39. Kh3′ Ra1′ 40. Rg5′ Kf3″″ 41. Kh2″″ Rh2+″″ =.
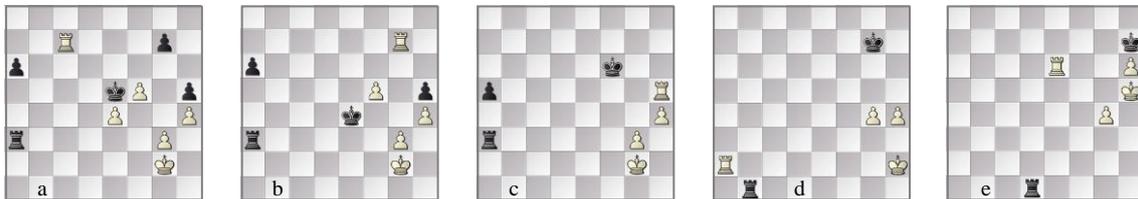

Fig. 3. Game 13 positions (a) 37b, (b) 'not 38b' (drawn), (c) 41b and, in an alternative endgame (d) 49b and (e) 65w.

Over the board, we had **38. … Kxf5″** (*dtf* = 42m) which is best as Kd3/Kd4/Kd5 simply lose with *dtf* = 22/33/33m respectively. **39. Rxg7″″ Kf6′ 40. Rg5″″ a5′ 41. Rxh5″″**, 7-man, *dtf/m/z* = 39/47/4m, see Fig. 3c. Facing two connected passed pawns and an active rook, Caruana resigned on move 55 with *dtf/m/z* = 17/23/1m. The optimal strategy below has White converting a pawn as late as move 80 but there are no points for losing slowly. Play could have continued:

S(FMZ)⩲: 41... Ra2+″ 42. Kh3″ Ra1′ 43. Rc5′ a4″ 44. Rd5′ a3″ 45. Ra5″ a2′ 46. Kh2″ Kg6″ 47. g4″ Kg7′ 48. Ra6″ Rb1″ 49. Rxa2″, Fig. 3d. KRP(g)P(h)KR, a familiar scenario (Müller and Lamprecht, 2001; Nunn, 2010). 49. … Rb4″ 50. Rg2″ Kg6″ 51. Rg3′ Rd4″ 52. Kh3″ Rd1″ 53. Rc3 Rh1+″ 54. Kg3″″ Rg1+″ 55. Kf3″ Rf1+″ 56. Kg2″ Rd1′ 57. Rc6+″ Kg7″ 58. h5″ Rd3″ 59. h6+″ Kh7″ 60. Kf2″ Rd2+′ 61. Kg3″ Rd3+′ 62. Kh4″ Rd1″ 63. Re6″ Rc1′ 64. Kh5″ Rd1′, *dtf/m/z* = 16/24/2m, see Fig. 3e.

REFERENCES

de Man, R., Fiekas, N. and Guo, B. (2018). https://tinyurl.com/icga007. Fiekas' interface to 'Syzygy formatted' de Man sub-7-man and Guo 7-man DTZ$_{50}$″ EGTs.

Gunderson, S. H. (2018). http://analysis.sesse.net/. Live ST-FM analysis of the WCC2018 games.

Lomonosov (2012). http://tb7.chessok.com/. Query interface to sub-8-man DTM EGTs.

Müller, K. and Haworth, G. M^cC. (2019). Chess Endgame News: The World Chess Championship, 2018. This note with extended analysis and pgn file. http://centaur.reading.ac.uk/81045/.

Müller, K. and Lamprecht, F. (2001). *Fundamental Chess Endings*, esp. §1.4 and §6.2.A2a. Gambit.

Nunn, J. (2010). *Nunn's Chess Endings, Volume 2*, esp. §8.2.1 and §8.6.2. Gambit.

Romero, P. P. (2012). http://finalgenchess.ovh/home_ing.php. FINALGEN: tutorial, download, forum.