Chess Endgame News

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This note includes some endgame reflections on the last World Chess Championship, an update on the search for the longest decisive games between computers, and a brief mention of the sets of endgame table (EGT) statistics recently received from Yakov Konoval (2013) and from Victor Zakharov (2013) for the Lomonosov team.

Following hard on the heels of Nunn's (2013) review of instructive errors in the analysis of KRPPKRP, Carlsen-Anand, FCWM 2013 game 5, arrived at this very ending with position 53w, 8/8/8/2p1k3/P6R/1K6/6rP/8 w. The Lomonosov EGTs say 'mate in 33m' starting **53. a5′′′′** (only winning move) **Kd6′** (equi-DTM-optimal) **54. Rh7′′** (unique optimal) **Kd5′′ 55. a6′′′′ c4′′**, all duly played. After **56. Kc3 Ra2′′ 57. a7′′**, Black hastened the end with **57. … Kc5** (-8m; Ra4′′) and resigned after **58. h4′′**. A likely continuation was the DTM-optimal 59. h5′ Ra3′ 60. Kc2′ c3′ 61. h6′ Ra2′′ 62. Kxc3′ with a new Queen coming onboard around move 70.

Anand later defined game 5 as a turning point in the match, and immediately went two down after game 6 where he strayed in a 10-man R-endgame with **60. Ra4?** and resigned with nine men on the board. Game 10 ended in KKN with bare Kings alongside an echo of Carlsen's Knight sacrifice. Needing only a draw, he had untypically ignored a somewhat more promising line at 8/1p2k3/p3pN1p/P1K2pp1/2P2P2/1P2n1PP/8/8 w: 46. Nh5 Kf7 47. Kb6 Kg6 48. Kxb7 Kxh5 49. c5 gxf4 50. gxf4 e5 51. c6 exf4 52. c7 f3 53. c8=Q f2 54. Qe8+ Kh4 55. Qxe3 f1=Q 56. Qxh6+ Kg3° 57. Qxa6 Qxa6+ 58. Kxa6 **{KPPPKP**, **=}** f4 59. Kb6 f3 60. a6 f2 61. a7 f1=Q 62. a8=Q **{KQPPKQ**, **=}** Qf2+ 63. Kb5 Qe2+ 64. Kb4 Kxh3 **{KQPKQ**, =} 65. Qc8+ =.

Carlsen points out that computers and computer databases have made opening theory more widely available, levelling the initial playing field and leading to only marginal advantage in the middlegame by the first time-control. If so, we may look forward to many more games where subtle advantages are accumulated slowly and result in a display of fine endgame technique and a hard-earned victory.

Hernandez (2013) notes some decisive computer games which nudge up the length-records (Haworth, 2013a/c) and/or break the record for games extended by DTM-minimaxing play inferred from available EGTs:

a) STRELKA -v- SCORPIO (2013-04-09, E15): ending at KQPPKQN position 301w, theoretically drawn: the indicated '0-1' result may be an error, another reason to ignore a long game as a record-holder,

b) NAUM_4.2 -v- TORNADO_4.25 (2011-01-08, A84): ending at KPPKPP position 300w (*dtm* = 15m): thus, the extrapolated length (to mate) from p300w is 314m/627p,

c) HOUDINI_3_PRO -v- KOMODO_6 (2013-06-11, D23): ending at KQRKQP p296b (*dtm* = -36m): the extrapolated length (to mate) from p296b is 332m/663p.

It seems clear that there has been and perhaps still is a ceiling imposed by technology, including that of Chessbase, which makes it difficult if not impossible to record games of more than 300 moves. A pity, as they have surely been played between computers and may be classic battles with interesting endgames.

Yakov Konoval (2014) has filed three sets of Depth to Conversion (DTC) statistics with the author:

- a complete set of statistics for the 645 'White win' EGTs of 6-man chess:[2]
  n.b., the maxDTC 6m decisive position is not in KRNKNN but a KRRPKQ loss in 486 plies,
- statistics for 'White win' 7m chess covering all 680 P-less and 460 of the 1,070 P-ful EGTs[3] and
- statistics for a further 285 7m sub-endgames with specific square-colour profiles for the Bishops.

The EGTs themselves are not available via a query-service on the web and his work with Marc Bourzutschky, dating from 2004, deserves to be more available and better known. This journal has frequently reviewed the results they have highlighted in some six articles in *EG*, the endgame studies magazine.

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[2] 295 P-less and 350 P-ful EGTs, with the usual caveat - positions with non-null castling rights not included.

[3] There are 140 5-2, 200 4-3, 210 5-2p and 325 4-3p endgames. The caveat here - P-promotion was restricted to P=Q.

Chess Endgame Records (CER) is an evolving, annotated dataset (Haworth, 2013b) and summarises, for example as in Figure 1, the known and candidate maxDT*x* records to date. It now includes the 6-man maxDTC records established by Konoval and the 7m maxDTM records established by the Lomonosov team (Zakharov, 2013). The Lomonosov DTM data reinforces the author's belief (Haworth, 2013d) that there is a discernable trend in the growth of maxDTM as the number of men on the board grows. There are also confirmed and candidate DTC/Z records for some parts of 7-man chess.

The dataset is also a partial reconstruction of the history of EGT generation since the concept was first formulated (Bellman, 1964; Knuth, 1968). It notes record achievements of the past, many of which exploited the available technology of the time to the limit. Given that thirty years have produced computers with a million times more power and memory, it is easy to forget this.

m	w-b	DTC: depth in plies			DTM: depth in plies			DTZ: depth in plies		
		P-less	all	P-ful	P-less	all	P-ful	P-less	all	P-ful
3	2-1	KRK -32	KPK -38	KPK -38	KRK -32	KPK -56	KPK -56	KRK -32	KRK -32	KPK -20
4	2-2	KQKR -62	KQKR -62	KQKP -53	KRKN -80	KPKR 85	KPKR 85	KQKR -62	KQKR -62	KQKP -53
	3-1	KBNK -66	KBNK -66	KNPK -44	KBNK -66	KBNK -66	KPPK -64	KBNK -66	KBNK -66	KNPK -26
	all	KBNK -66	KBNK -66	KQKP -53	KRKN -80	KPKR 85	KPKR 85	KBNK -66	KBNK -66	KQKP -53
5	2-3	KQKBB -142	KQKRP 157	KQKRP 157	KQKBB -162	KQKRP 207	KQKRP 207	KQKBB -142	KQKRP 151	KQKRP 151
	3-2	KBNKN 153	KNNKP 228	KNNKP 228	KBNKN 213	KPPKP -254	KPPKP -254	KBNKN 153	KNNKP 164	KNNKP 164
	4-1	KNNNK -42	KNNNK -42	KBBPK -32	KBNNK -68	KBNNK -68	KPPPK -66	KNNNK -42	KNNNK -42	KBBPK -24
	all	KBNKN 153	KNNKP 228	KNNKP 228	KBNKN 213	KPPKP -254	KPPKP -254	KBNKN 153	KNNKP 164	KNNKP 164
6	2-4	KQKBBN 125	KQKBNP -384	KQKBNP -384	KQKBBN -228	KPKBNP 447	KPKBNP 447	KQKBBN 125		
	3-3	KRNKNN 485	KRNKNN 485	KQPKRB -272	KRNKNN 523	KRNKNN 523	KRPKNN 505	KRNKNN 485	KRNKNN 485	
	4-2	KRRNKQ -202	KRRPKQ -486	KRRPKQ -486	KRBNKQ 241	KRRPKQ -506	KRRPKQ -506	KRRNKQ -202	KRRPKQ 383	KRRPKQ 383
	5-1	KBBBNK -27	KBBBPK -31	KBBBPK -31				KBBBNK -27		
	all	KRNKNN 485	KRRPKQ -486	KRRPKQ -486	KRNKNN 523	KRNKNN 523	KRRPKQ -506	KRNKNN 485	KRNKNN 485	KRRPKQ 383
7	2-5	KQKBBBB 131	? KQKBNPP -202	? KQKBNPP -202	KQKRBBN 239	KQKBBNP -486	KQKBBNP -486	KQKBBBB 131		
	3-4	KQNKRBN -1,034	? KQNKRBN -1,034	? KRBKBNP -412	KQNKRBN -1,090	KQPKRBN 1,097	KQPKRBN 1,097	KQNKRBN -1,034	? KQNKRBN -1,034	
	4-3	KQBNKQB -660	? KQBNKQB -660	? KRNPKRB 529	KQBNKQB -690	KBNPKBP 691	KBNPKBP 691	KQBNKQB -660	? KQBNKQB -660	? KRNPKRB 519
	5-2	KBNNNKQ -448	? KNNNPKQ 461	? KNNNPKQ 461	KBNNNKQ -464	KRBBPKQ 799	KRBBPKQ 799	KBNNNKQ -448		
	all	KQNKRBN -1,034	? KQNKRBN -1,034	? KRNPKRB 529	KQNKRBN -1,090	KQPKRBN 1,097	KQPKRBN 1,097	KQNKRBN -1,034	? KQNKRBN -1,034	? KRNPKRB 519

Figure 1. maxDT*x* wins for White (Haworth, 2013b), '-' indicating 'loser to move'.

References

Bellman, R.E. (1964). Dynamic Programming and Markovian Decision Processes, with particular application to Baseball and Chess. In Applied Combinatorial Mathematics (ed. E.F. Beckenbach), John Wiley, pp. 221-236.

Haworth, G. M^{c}C. (2013a). Chess Endgame News. *ICGA Journal*, Vol. 36, No. 3, pp. 143-145.

Haworth, G. M^{c}C. (2013b). Chess Endgame Records. Dataset at http://centaur.reading.ac.uk/34268/.

Haworth, G. M^{c}C. (2013c). Chess Endgame News. This paper plus datafiles. http://centaur.reading.ac.uk/36275/.

Haworth, G. M^{c}C. (2013d). Haworth's Law. *ICGA Journal*, Vol. 36, No. 4, p. 230.

Hernandez, N. (2013). Private communication of long computer-computer games.

Knuth, D.E. (1968). *The Art of Computer Programming*, Vol. 1, esp. pp. 272-273 in the 3rd edition.

Konoval, Y. (2013). Private communication of 6- and 7-man DTC EGT statistics.

Nunn, J. (2013). Discoveries in R+2P vs R+P endings. *ICGA Journal*, Vol. 36, No. 3, pp. 139-142.

Zakharov, V. (2013). Private communication of 'MVL' Lomonosov 7-man DTM EGT statistics.