Chess Endgame News

Article

Published Version

CHESS ENDGAME NEWS

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Since the last *Chess Endgame News* (Haworth, 2014a), it has become clear that Ronald de Man's sophisticated and popular 'syzygy' endgame tables (EGTs) to the DTZ_{50}' metric (CPW, 2013a/b; de Man, 2013a/b) deserve further exposition. These EGTs introduce new data in three ways – the 5-valued scale[2] for evaluating positions in the context of the FIDE 50-move rule (50mr) which constrains the length of phases of play[3], depths for '50mr draw' positions with value ±1, and depths in symmetric, information-preserving ply 'p'. The positions of Table 1 and Figure 1 illustrate the six potential scenarios of the taxonomy in Table 2. Positions have values ±2 or ±1, have dtz_{50}' greater than, equal to or less than *dtz*, and have either attacker or defender ending the phase.

First, as interfaces to these EGTs are still evolving, it is perhaps worth sharing some news about some early software bugs and glitches. Chessbase have fixed the FRITZ_GUI/CHESSBASE bug which misreported DTZ_{50}' depths greater than 50 moves. The depth indicator now correctly decrements by one move for every two ply. Secondly, it is worth reminding EGT users to MD5SUM-check their EGT-integrity: a corrupt EGT may cause a software crash. Thirdly, the author saw some incorrect 'draw/win' evaluations of lost positions. These mysteriously disappeared when the software and EGTs were installed on a second PC, suggesting some infrastructural deficiencies in the first PC and/or FRITZ installation process.

Line	m	w-b	Endgame	GBR	Positions		Position FEN	Value '5v'	Value 1-0?	Ply dtz	Ply dtz_{50}'	Δ	SZ_{50}'-line notes
A	5	2-3	KPKBB	0060.10	a-d	a	3k4/P7/5b2/5K2/8/8/2b5/8 w - - 0 1	2	1-0	7	19	12	1. Kf4′′′ Bg5+′ 2. Ke5′′′ (SZ 2. Kf3??′′) … 10. a8=Q+′′′ (*dtz* = 6p)
	"	"	"	"		b	3k4/P7/3K1b2/8/b7/8/8/8 b - - 9 5	-2	1-0	8	10	2	
	"	"	"	"		c	3k4/P3b3/8/3K4/b7/8/8/8 b - - 11 6	-2	1-0	6	8	2	
	"	"	"	"		d	3k4/P3b3/8/8/4K3/1b6/8/8 b - - 13 7	-2	1-0	6	6	0	
E	5	3-2	KRPKP	1000.11	e	e	6R1/P7/1k6/8/8/8/p2K4/8 b - - 0 1	-1	'1-0'	2	1	-1	1... a1=Q′′′ (SZ 1…K~′′??)
F	5	3-2	KQPKQ	4000.10	f	f	8/8/1P5Q/1K6/3q4/8/5k2/8 w - - 0 1	2	1-0	1	99	98	1. Qg5′′′ (SZ 1. b7′′??)
G	6	3-3	KBBKQN	3023.00	g	g	1n2K3/7q/6B1/8/8/B7/3k4/8 w - - 0 1	2	1-0	1	7	6	1. Bb4+′′′ (SZ 1. Bxh7′′??)
H	6	3-3	KBBKNN	0026.00	h-j	h	8/8/6n1/8/4B3/k7/n1K4B/8 b - - 0 1	-2	1-0	14	56	42	1... Nh8′′ 2. Bd6+′′′ Ka4′′ 3. Bc6+′′′ Ka5°
	"	"	"	"		i	7n/8/3B4/8/4B3/k7/n1K5/8 b - - 2 2	-2	1-0	10	54	44	
	"	"	"	"		j	7n/8/2BB4/k7/8/8/n1K5/8 w - - 5 4	2	1-0	7	51	44	
K	6	3-3	KBBKNN	0026.00	k	k	8/8/7B/5B2/3K4/8/2k5/n6n b - - 0 1	-1	'1-0'	76	76	0	a maxDTZ_{50}' KBBKNN pos.
M	6	4-2	KRRPKQ	3200.10	m	m	7q/7k/8/6R1/8/8/K1P2R2/8 b - - 0 1	-1	'1-0'	383-5	387	2-4	No SZ line available
N	6	2-4	KQKBBN	1063.00	n-u	n	b7/b7/5Q2/8/8/3k4/8/1K1n4 b - - 0 1	-1	'1-0'	102	90	-12	1... Bb7′′ 2. Qf1+′′′ Kd2′′ 3. Qf4+′′′ Kd3′′ 4. Qc7′′ Nc3+′′′ 5. Kb2′′′ Na4+′′′ 6. Ka3′′′ Nc5′′′ 7. Qa5′′′ Ba6′′′ 8. Kb4′′ Ke4′′′ … 46. Qxc5′′ (*dtz* = 122p)
	"	"	"	"		o	8/bb6/8/8/8/3k4/8/1K1n1Q2 b - - 2 2	-1	'1-0'	100	88	-12	
	"	"	"	"		p	8/bb2K3/8/2n5/4k3/8/8/1Q6 b - - 66 34	-1	'1-0'	36	24	-12	
	"	"	"	"		q	4Q3/bb6/7K/2n5/5k2/8/8/8 b - - 80 41	-1	'1-0'	24	10	-14	
	"	"	"	"		r	8/bb6/5Q1K/2n5/6k1/8/8/8 b - - 84 43	-1	'1-0'	14	6	-8	
	"	"	"	"		s	8/bb6/7K/2n5/8/6k1/8/Q7 b - - 86 44	-1	'1-0'	6	4	-2	
	"	"	"	"		t	1b6/1b6/7K/2n5/8/6k1/8/Q7 w - - 87 45	1	'1-0'	3	3	0	
	"	"	"	"		u	1b6/1b6/7K/2n5/8/5k2/8/6Q1 w - - 89 46	1	'1-0'	1	1	0	
V	7	3-4	KQNKRBN	1334.00	v-z	v	8/1r6/8/6n1/5k2/1b6/3K3N/7Q b - - 0 1	-1	'1-0'	1034	1034	0	dtz = dtz_{50}' because no 1-0 wins have successor endgames with dtz > 100 ply.
	"	"	"	"		w	1K6/8/8/8/4nk2/2r2b2/8/5NQ1 b - - 34 18	-1	'1-0'	1000	1000	0	
	"	"	"	"		x	8/2K5/8/5N2/4n1r1/8/6bk/2Q5 b - - 934 468	-2	1-0	100	100	0	
	"	"	"	"		y	8/8/1K2b2k/4N1rn/8/4Q3/8/8 b - - 1024 513	-2	1-0	10	10	0	
	"	"	"	"		z	6b1/1K4k1/8/3n2r1/8/5N2/3Q4/8 w - - 1033 518	2	1-0	1	1	0	
ZA	6	3-3	KBNKBN	0044.00	za	za	2n5/8/8/4N3/4B1b1/2K5/8/1k6 b - - 0 1	-1	'1-0'	10	8	-2	1. … Ka2′′ 2. Bd5+′′′
ZB	5	3-2	KBNKP	0011.01	zb-zc	zb	8/8/2K5/2N4B/8/1k6/1p6/8 b - - 0 1	-1	'1-0'	18	7	-11	1. ... Ka2′′ 2. Bf7+′′′ Ka3′′′ 3. Bg6′′′ Ka2′′′
	"	"	"	"		zc	8/8/2K3B1/8/N7/8/kp6/8 b - - 6 4	-1	'1-0'	11	1	-10	
ZD	6	3-3	KNNKNP	0005.01	zd-ze	zd	n7/3p1K2/8/3N4/8/8/8/6Nk w - - 0 1	1	'1-0'	115+	115	< 0	1. … Nc7′ 2. Nxc7′′′
	"	"	"	"		ze	n7/3p1N2/8/3N4/8/8/4K1k1/8 b - - 113 57	-1	'1-0'	38	2	-36	
ZF	5	3-2	KNNKP	0002.01	zf-zg	zf	8/8/1N6/p7/8/4N3/8/K1k5 w - - 0 1	2	1-0	2	86	84	1. Na4′′′ (1. N(b/e)c4?? a4′′′) … 43. Kf7′′ a4° (*dtm* = 7p)
	"	"	"	"		zg	4K3/7k/6N1/p4N2/8/8/8/8 w - - 84 43	2	1-0	2	2	0	
ZH	5	3-2	KNNKP	0002.01	zh	zh	K7/N7/k7/8/3p4/8/N7/8 w - - 0 1	1	'1-0'	164	164	0	a max$DTZ_{(50}'$) KNNKP pos.
ZI	6	4-2	KBBNKN	0024.00	zi	zi	8/8/6n1/8/8/2kB4/8/NB1K4 b - - 0 1	-1	'1-0'	52	15	-37	greatest *dtz*-dtz_{50}' in this table
ZJ	5	3-2	KNNKP	0002.01	zj-zn	zj	8/8/4N3/8/7p/5k1N/8/K7 w - - 0 1	1	'1-0'	108	120	12	1. Nef4′ Ke3′ 2. Kb2′′ Kf3′ 3. Kc3′′ Ke4′ 4. Kc4′′ Kf5′′ 5. Nd3′′ … 56. Nd3+′′ Kd1′′ 57. Nf4′′ Kc1′′ 58. Ne2+′′ Kb1′′ 59. Kb3′′ Ka1′′ 60. Nd2′ h3°
	"	"	"	"		zk	8/8/8/8/4kN1p/2K4N/8/8 w - - 2 4	1	'1-0'	100	114	14	
	"	"	"	"		zl	8/4k3/8/3K4/4N2p/7N/8/8 w - - 18 10	1	'1-0'	98	102	4	
	"	"	"	"		zm	8/8/2K1k3/8/4N2p/7N/8/8 w - - 20 11	2	1-0	96	100	4	
	"	"	"	"		zn	8/8/8/1K6/3N3p/7N/k7/8 w - - 56 29	2	1-0	44	64	20	
	"	"	"	"		zo	8/8/8/8/K2N3p/7N/k7/8 b - - 57 29	-2	1-0	63	63	0	

Table 1. Cited positions demonstrating various dtz_{50}'/dtz differences.

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[2] +2 ≡ unconditional win for the side to move, +1 ≡ 'win' which can be frustrated by best play and a 50mr draw-claim, 0 ≡ unconditional draw, -1 ≡ 'loss' saved by a 50mr draw-claim, and -2 ≡ unconditional loss.

[3] A phase of play ends with a capture and/or Pawn-push. The next phase starts with the next move.

Haworth (2014b) supports the text of this note with two ancillary datasets, namely a pgn file of chess lines and sidelines, and the annotation of those lines as to the uniqueness of the best moves. Lines are played to the SZ_{50}' strategy minimaxing DTZ_{50}' and SZ-sidelines are also included to show where they first diverge. Table 1's positions are clearly indicated. Following the Chess Study's convention, White has the attacking role.

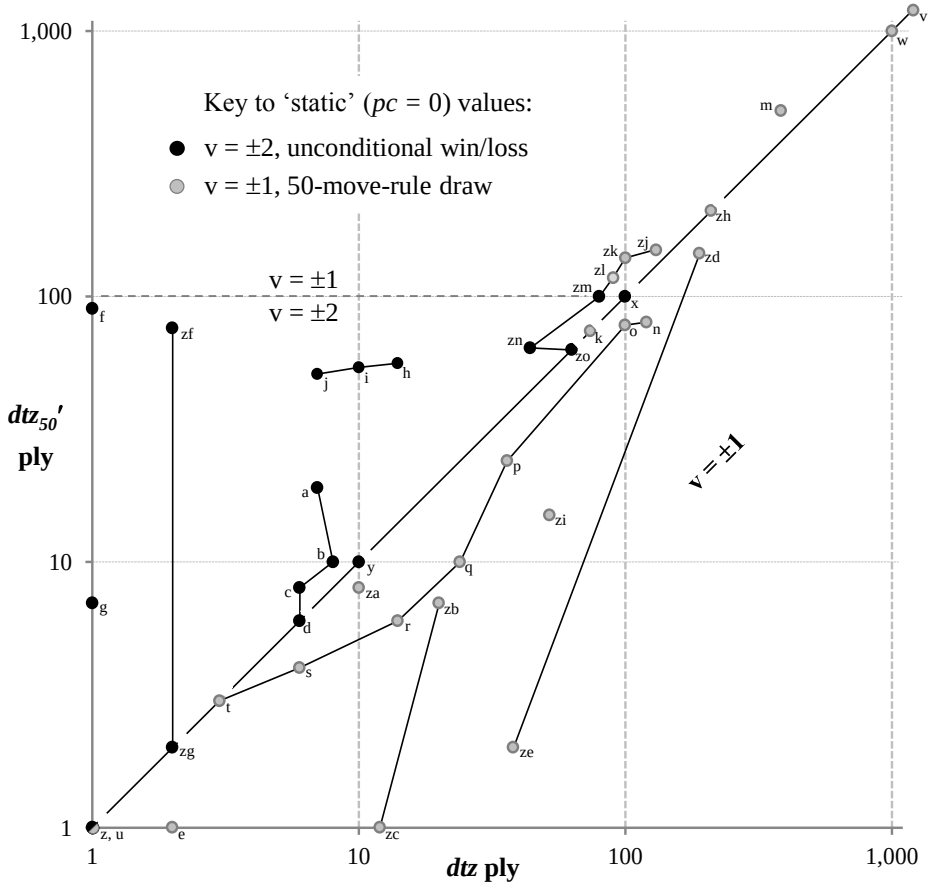

Figure 1. Schematic, not to scale, of cited positions connected as to their DTZ_{50}'-minimaxing lines.

Result	Value, v		$dtz_{50}' > dtz$	$dtz_{50}' = dtz$	$dtz_{50}' < dtz$
Decisive, even with 50mr	**±2**	Comment …	given the 50mr, the phase needs more moves	most common situation: the 50mr has no effect	defender, with no value to defend, maximises DTZ
		winner ends phase	A(a-c), F(f), G(g), H(h-j)	A(d), V(x-z)	there are no positions
		loser ends phase	ZF(zf), ZJ(zm-zn)	ZF(zg), ZJ(zo)	
50mr draw	**±1**	Comment …	precedes the harder win; $dtz_{50}' > 100p$	unavoidable, overlong (current or later) phase	The defender's priority is the '-1' value, not DTZ
		attacker ends phase	?	K(k), N(t-u), V(v-w)	N(n-s), ZA(za), ZD(zd-ze)
		defender ends phase	M(m), ZJ(zj-zl)	ZH(zh)	E(e), ZB(zb-zc), ZI(zi)

Table 2. Taxonomy of endgame positions by value and sgn(dtz_{50}'-dtz).

A brief commentary now follows for each of the six sections of the above taxonomy.

a) v = ±2, $dtz_{50}' > dtz$: the attacker has a win despite the 50mr so $dtz_{50}' \leq 100$ ply. However, they have to avoid a subsequent phase of more than 100p and need to use more than *dtz* moves to do so. For the KQPKQ position *f*, dtz_{50}'-dtz = 98p but this record would be broken by a phase continued for 100p rather than immediately ended. The defender only ends the phase if this is unavoidable as in KNNKP line ZF where the forced P-push is characteristic of this endgame.

b) v = ±1, $dtz_{50}' > dtz$: the attacker incurs a 50mr-draw in this phase where they invest to avoid one in a later phase. In creating the DTZ_{50}' EGT, positions in the above section with v = ±2 and dtz < dtz_{50}' = 100p, already doubly rare, may perhaps be backed up again to 'prior' positions with $dtz_{50}' > 100$p and therefore v = ±1. As

KNNKP line ZJ proceeds, the dtz and dtz_{50}' depths, both initially greater than 100 ply, fall in turn to and below 100 ply before $dtz_{50}' = dtz$. Bourzutschky and Konoval (2012) mention a maxDTZ 6m P-ful position as having dtz = 192 moves, 384±1p. Position *m* has $dtz_{50}' = 387p$ (de Man, 2013b) and therefore has $dtz_{50}' > dtz$.

c) v = ±2, $dtz_{50}' = dtz$: $dtz_{50}' \leq 100p$. This is the most common type of position: the 50mr is no longer relevant in the phase. All lines in section 'a', such as A, F, G, H and ZF eventually lead to positions here. Again, as in scenario 'a', the defender has nothing to gain by terminating the phase voluntarily.

d) v = ±1, $dtz_{50}' = dtz$: there are two cases here. First, $dtz_{50}' > 100p$ immediately implies that v = ±1 as in scenario 'b'. Where $dtz_{50}' \leq 100p$, v = ±1 because the attacker cannot avoid a subsequent overlong phase. Therefore they have no subsequent need to diverge from a DTZ-minimizing strategy, even had the ply-count been zero. Their aim should in fact be to minimise the maximum length of all possible phases of play with a more subtle strategy as allowed by the ply budget. However, the 'Depth by the Rule' information (Haworth, 2000, 2001) which helps here is not available from EGTs focussed only on DTZ-related metrics which say nothing about future phases. Positions *v*, *w* and *zh* have $dtz_{50}' > 100p$ while positions *k* (dtz = 76p), *t* and *u* force the attacker into a subsequent phase of more than 100 ply.

e) v = ±2, $dtz_{50}' < dtz$: there are in fact no positions of this type. Given that v = ±2, the defender cannot aspire to a 50mr draw and therefore has no reason to do other than maximise DTZ. Thus, v = ±2 implies $dtz_{50}' \geq dtz$.

f) v = ±1, $dtz_{50}' < dtz$: here, the defender's priority is to defend the 50mr draw value of '1'. Therefore, the length of the phase, *dtz*, is a secondary consideration, ignored at least once. The first phase of DTZ_{50}'-minimaxing play may therefore be ended optionally by the defender as in lines E, ZB and ZI. In positions *n* and *zd*, the defender has a 50mr-draw in the current phase because dtz > 100p. However, the DTZ_{50}' EGT does not incorporate this fact. Instead, it ultimately leads to a 50mr-draw in a later phase, the next in line N and the fourth in line ZD. The KBBNKN line ZI starts with the greatest known value of $dtz - dtz_{50}' = 37p$, another record to be broken.

When annotating the uniqueness of moves in the historical context of an SZ_{50}' line of play (Haworth, 2013), it is necessary to consider the ply-count as well as the DTZ_{50}' EGT data which stores 'static' position-values, assuming ply count *pc* = 0. In the extreme, 100 ply might have been played already when the EGT indicates that there is only one move which retains a 50mr draw. However, in the context of past play, any move (other than one allowing immediate termination of the phase) will retain the possibility of a later draw-claim.

Those interested in the evolution of EGTs owe a debt of gratitude to Ronald de Man for his fascinating and extremely practical DTZ_{50}' tables. My thanks also to Oswaldo Cadenas, Harold van der Heijden, John Nunn and Emil Vlasák who helped me identify and overcome the software problems mentioned. Thanks as ever to Eiko Bleicher (2014) and John Tamplin (2014) for their long running depth-evaluation services.

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