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CHESS ENDGAME NEWS

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'Jonathan B' (2013) has discovered FINALGEN (Romero, 2012) via Baburin's *Chess Today* (2013). He is not an early adopter of FINALGEN and his reaction to a 9-man 'draw' pronouncement is interesting, probably common today and therefore noteworthy. He recalls DEEP THOUGHT in *The Hitch Hiker's Guide to the Galaxy* posing as an oracle about Life, the Universe and Everything – with somewhat anti-climactic results. The position is Carlsen-Kramnik position 41w (Chessgames, 2013d), q.v., Figure 1, line 25.

There is a serious point here about the epistemology of computer simulation. Computer representations of reality's past, present and future are merely models. They tend to produce apparently professional, authoritative and definitive output and are all the more seductive for that. The dot-matrix printer has been replaced by an abundance of fonts, colour and 3D-visualisation. However, computer models and the perception of them are based on their authors' and audiences' respective mindsets and have usually been written in imperative rather than declarative languages whose use has a chequered history (Hurd and Haworth, 2010). Financial, climate and weather forecasts have on occasion been unintentionally misleading with significant, global consequences. Models showing correlation between two random variables may imply causality where none exists. For similar reasons, mathematicians originally looked askance at theorem proofs generated by computers, although here there have been developments since 1977 and particularly recently (Hurd and Haworth, 2013).

Endgame Chess is becoming what FREEZER, FINALGEN, the Nalimov (Bleicher, 2013; ChessOK, 2013), MVL (2013) and other endgame tables and tools say it is, so their respective authors have a responsibility to 'get it right first time', a considerable challenge. Certainly the Nalimov DTM EGTs have been verified with some independence and the Konoval DTC EGTs (Bourzutschky and Konoval, 2006-13) with complete independence between the generator code and the verifier code.

#	Game (ECO, result, year)	Move	men	Endgame	Position	Val.	DTM
01	Nikolić-Arsović (E95, =, 1989)	109w	7	KRBKRPP	8/8/3p4/3k4/7R/4p3/1r2B1K1/8 w	=	---
02	"	110b	6	KRBKRP(d6)	8/8/3p4/2k5/7R/4K3/1r2B3/8 b	=	---
03	"	112w	6	KRBKRP(d5)	8/8/8/2kp4/7R/1r1BK3/8/8 w	=	---
04	"	167b	5	KRBKR	8/8/8/1r1B3R/3K1k2/8/8/8 b	=	---
05	"	200w	5	KRBKR	5k2/7R/3K4/3B4/8/8/8/3r4 w	1-0	13
06	"	255w	5	KRBKR	8/8/8/3B2r1/k2K4/8/7R/8 w	1-0	26
07	"	270w	5	KRBKR	8/6r1/8/8/3K4/3B4/5R2/3k4 w	=	---
08	Kasparov-World (B52, 1-0, 1999)	49b	7	KPPKPPP	8/1p5P/3p2K1/6P1/8/3p4/8/1k6 b	=	---
09	"	54b	7	KQPKQPP	8/8/3p1K2/1p4P1/5Q2/8/8/k2q4 b	=	---
10	"	55w	7	KQPKQPP	8/8/3p1K2/6P1/1p3Q2/8/8/k2q4 w	1-0	83
11	"	55b	6	KQPKQP	8/8/3p1K2/6P1/1Q6/8/8/k2q4 b	1-0	-82
12	Fressinet-Kosteniuk (B51, 0-1, 2007)	78b	7	KRPPKRB	8/8/8/6R1/3bk3/6P1/r4PK1/8 b	=	---
13	"	79w	6	KRPKRB	8/8/8/6R1/3bk3/6P1/5rK1/8 w	=	---
14	"	122w	5	KRKRB	8/5r2/8/8/4K3/1R4b1/6k1/8 w	=	---
15	"	228b	5	KRKRB	1R6/K7/1r1k4/2b5/8/8/8/8 b	0-1	13
16	"	235b	5	KRKRB	2K5/7r/2k5/2b5/8/8/8/3R4 b	0-1	11
17	"	238w	5	KRKRB	1K6/8/2k5/2b5/8/8/7r/2R5 w	0-1	-7
18	Neverov-Bogdanovich (D56, 0-1, 2013)	58b	9	KRNPKRNPP	8/5pk1/4n1p1/8/3r4/4N1P1/2R3K1/8 b	?	?
19	"	167b	8	KRNPKRNP	6R1/8/8/5p2/1kn3N1/6P1/4r3/6K1 b	?	?
20	"	168w	7	KRPKRNP	6R1/8/8/8/1kn3p1/6P1/4r3/6K1 w	=	---
21	"	168b	6	KRPKRN	8/8/8/8/1kn3R1/6P1/4r3/6K1 b	=	---
22	"	173w	5	KRKRN	8/5R2/8/8/8/3kn1r1/8/7K w	=	---
23	"	206w	5	KRKRN	5R2/8/8/5n2/5r2/8/4k3/6K1 w	=	---
24	"	211w	5	KRKRN	8/7R/8/8/3n4/6r1/5k1K/8 w	0-1	-3
25	Carlsen-Kramnik (C65, =, 2013)	39b	9	KRPPPKRPP	5k2/ppR5/5r2/8/7P/8/P5P1/7K w	=	---
26	"	42w	7	KRPPKRP	5k2/pR6/8/8/7P/6P1/r7/7K w	=	---

Figure 1. Some key positions from the cited games.

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#	BK#	Endgame	GBR code	FEN position	c7 DTC	m7 DTM	Phase-terminating position	mr DTM	m7 - (c7+mr)
01	0.03	KRRBKRR	0810.00	8/1B4r1/8/8/2R1R3/8/3r3k/K7 w	138	152	3R1krR/8/2B5/8/8/8/1K6/8 b	-6	8
02	0.04	KBBBBKQ	3090.00/40_22	8/3B2k1/8/6B1/7B/q6B/8/K7 w	101	105	8/1B1k1K2/2B5/6B1/5B2/7q/8/8 b	-0	4
03	0.06	KBNNNKQ	3019.00/30	5N2/5k1N/7q/8/8/3B4/8/2K2N2 w	224	232	6k1/4NN1N/1qB3K1/8/8/8/8/8 b	-0	8
04	0.11	KNNNKNN	0009.00/32	8/7n/k7/8/7N/1N6/3K4/1N5n w	93	121	8/8/8/8/2NN4/8/4N3/1k1n3K b	-15	13
05	0.14	KQQQKQQ	9000.00/32	4Qq2/5Q2/8/8/8/2q5/Q7/2K4k w	76	85	7Q/8/8/8/8/5q2/1KQ2Q2/6k1 b	-8	1
06	0.15	KRRRKQN	3903.00/30	8/kq6/3R4/8/8/8/2K3RR/n7 w	131	145	k7/8/n7/8/8/1R6/K1R3q1/8 w	7	7
07	0.17	KRRRKQB	3930.00/30	8/4R3/8/1R5b/5R2/8/7k/K6q w	200	212	8/8/5q2/8/8/R1R2Rk1/8/K7 b	-5	7
08	0.18	KRBNKRB	0441.00_20	8/8/1b6/8/4N2r/1k6/7B/R1K5 w	226	239	8/8/8/8/3B4/2N2K2/4R3/r5k1 b	-3	10
09	0.19	KRBNKRB	0441.00_11	8/b2r4/1R4B1/8/8/4k3/8/2K4N w	191	205	5b2/8/8/R7/2BK4/k7/1N6/8 b	-11	3
10	0.31	KRRNKRR	0801.00	r7/5r1N/8/8/8/6R1/6R1/3K1k2 w	290	304	8/3k1K2/1R6/N7/2R5/8/8/3r4 b	-8	6
11	---	KQBNKQN	4014.00	Nqn3k1/8/8/Q7/8/8/8/1K2B3 w	317	335	8/K3B3/8/8/8/3N4/2Qk2q1/8 b	-33	-15
12	---	KQBNKQB	4041.00	1k6/1b5q/N7/8/8/1Q6/8/B1K5 b	-330	-345	8/8/k3QKN1/4B3/8/1q6/8/8 b	-26	-11
13	---	KQNKRBN	1334.00	8/1r6/8/6n1/5k2/1b6/3K3N/7Q b	-517	-545	6b1/1K4k1/8/3n2Q1/8/5N2/8/8 b	-8	20
14	1.01	KQPPKQP~	4000.21	6k1/5p1q/8/P7/2Q5/1K6/P7/8 w	222	297	8/P1K3Qk/P4p2/8/8/8/8/8 b	-6	69
15	1.02	KQPKQPP~	4000.12	7q/8/6p1/1P6/1p6/8/Q2K2k1/8 w	105	156	2Q5/1P6/8/8/1p4K1/8/3q3k/8 b	-36	15
16	1.06	KRPPKRP~	0400.21	8/r7/2K3p1/k7/8/8/P4P2/1R6 w	79	114	k7/P7/8/6R1/2r5/5P2/5K2/8 b	-34	1
17	1.07	KRPKRPP~	0400.12	2R5/p7/p7/2P5/8/rk6/8/2K5 w	41	63	1K6/2P5/p7/p7/k7/1R6/8/8 b	-12	10
18	2.01	KBPPKBPs~	0040.21_20	8/8/2p5/4k1b1/8/8/1KP4P/B7 w	78	96	8/6kP/2K5/2B5/2Pb4/8/8/8 b	-29	-11
19	2.02	KBPKBPPs~	0040.12_20	5b2/4p3/4p3/4B3/8/2K5/1P6/2k5 w	38	60	2K5/1P6/3B4/3kp3/8/4p3/8/8 b	-13	9
20	2.09	KBPPKBPo~	0040.21_11	8/2p5/1k6/8/5P2/8/P4b2/K2B4 w	52	71	1k1K4/5P2/P7/2p5/8/8/4B3/8 b	-4	15
21	2.10	KBPPKBPo~	0040.21_11	8/7k/5p2/2B5/8/8/2PP4/K6b w	52	65	8/2kP1b2/2P5/8/7B/5K2/8/8 b	-9	4
22	2.11	KBPPKBPo~	0040.21_11	8/7k/4b3/2B5/1Pp5/8/6P1/K7 w	52	72	3k4/1P4P1/8/3K4/5B2/8/2p5/8 b	-4	16
23	2.12	KBPPKBPo~	0040.21_11	1k6/4p3/2B5/8/8/8/1P4Pb/2K5 w	52	71	4k3/1P6/5KP1/8/2B5/4p3/8/8 b	-4	15
24	2.13	KBPKBPPo~	0040.12_11	8/8/8/2B1k3/8/6p1/4P1p1/K6b w	24	31	4Q3/3K3k/8/8/8/6p1/6p1/6Bb b	-4	3
25	2.21	KBPPKNP~	0013.21	8/3p4/8/8/k7/8/3P2P1/K3B1n1 w	87	103	8/5kPK/8/3pB3/3P4/8/8/8 b	-5	11
26	2.22	KNPKBPP~	0031.12	b4k2/1p5p/1P6/8/5N2/8/K7/8 w	29	56	N7/1p6/1P6/8/8/7k/7p/7K b	-25	2
27	2.23	KNPKBPP~	0031.12	8/3p4/3p4/6P1/2N5/K6b/8/k7 w	27	46	3N2K1/6P1/3p4/3p4/8/8/8/4k3 b	-13	6
28	3.01	KNPPKBP~	0031.21	8/2p5/8/8/6b1/1PP5/K7/1N5k w	102	132	8/8/1k6/8/1PNK4/1bP5/8/8 b	-23	7
29	3.02	KBPKNPP~	0013.12	8/8/B2p4/3p4/8/P6n/1K6/7k w	40	59	K2k4/P7/8/8/6B1/3p4/3p4/8 b	-19	0
30	3.03	KBPKNPP~	0013.12	k7/p7/2K5/p7/1n6/7P/8/2B5 w	40	59	4k3/5n1P/5K2/B7/8/p7/8/8 b	-20	-1
31	3.04	KBPKNPP~	0013.12	8/K2n2p1/6p1/8/7B/8/P6k/8 w	40	64	2K5/P1B5/8/1k4p1/6p1/8/8/8 b	-9	15
32	3.13	KNPPKNP~	0004.21	8/3p4/4N3/7n/8/1P6/2P5/k1K5 w	110	127	1k6/1P6/1K1p4/2PN4/8/8/8/8 b	-2	15
33	3.14	KNPKNPP~	0004.12	8/4p3/1K4p1/8/1P6/8/6n1/1N3k2 w	44	68	1K6/NP2p3/4k3/8/6p1/8/8/8 b	-22	2
34	3.23	KPPPKPP~	0000.32	3k4/4p2p/8/8/8/4PP2/5P2/1K6 w	36	72	5Q2/8/7k/4p2p/4P2K/5P2/8/8 b	-5	31
35	3.24	KPPKPPP~	0000.23	8/8/3p4/3p4/3pk3/1K6/1P1P4/8 w	26	45	1Q6/2K5/k7/3p4/3p4/3p4/3P4/8 b	-2	17
36	4.01	KQPKRPP~	1300.12	4r2Q/8/K6p/5k2/8/8/p6P/8 w	78	111	Q7/8/8/7K/7P/6k1/p5r1/8 b	-33	0
37	4.02	KRPPKQP~	3100.21	k1K5/6Pq/3PR3/8/6p1/8/8/8 w	61	73	1k1Q2K1/5RP1/8/8/6p1/2q5/8/8 b	-3	9
38	4.09	KRPKBPP~	0130.12	4b3/2kp2p1/5R2/8/8/2K5/7P/8 w	86	109	4b3/3p4/8/4K3/6R1/8/7P/1k6 b	-18	5
39	4.10	KBPPKRP~	0310.21	8/2B4k/8/K7/P7/1p5r/1P6/8 w	49	70	6k1/PK6/8/B7/8/1p6/1P6/8 b	-7	14
40	4.17	KRPKNPP~	0103.12	8/R2pp3/8/2n5/4k3/2K5/7P/8 w	82	115	5R1Q/8/8/8/8/4p2n/3p2k1/3K4 b	-16	17
41	4.18	KNPPKRP~	0301.21	8/8/1r6/8/1pPK3N/8/1P5k/8 w	38	69	1K2k3/2P5/8/3N4/1p6/1P6/8/8 b	-6	25
42	4.25	KRNPKRB~	0431.10	4r3/1P6/6R1/5k2/1K5b/8/8/1N6 w	260	301	2R1K3/1P6/1N6/8/4k3/6b1/8/8 b	-10	31
43	5.01	KRPKPPP~	0100.13	R7/3p4/8/8/1k6/3p4/3Pp3/K7 w	30	42	8/8/8/k7/3K4/3p4/3Pp3/2R5 b	-13	-1
44	5.02	KPPPKRP~	0300.31	8/8/5p2/PP6/6r1/1P6/4k3/2K5 w	36	49	Q7/P4K2/8/1P3p2/5k2/8/8/8 b	-5	8
45	5.11	KBPKPPP~	0010.13	k7/8/7p/6pp/8/8/2B3P1/K7 w	64	81	8/8/8/1k5K/6p1/6P1/6Bp/8 b	-15	2

Figure 2. MVL DTM evaluations of the Bourzutschky-Konoval maxDTC (2006-13) positions.[2,3]

Having said that and now assuming correctness, the endgame tools and data inform and entertain by revealing the treasures of the game on and just off the board, the highs and lows, and the triumphs and disasters which might otherwise lie buried. The longest known games tend to feature complex endgames, e.g., Nikolić-Arsović (Chessgames, 2013a), Fressinet-Kosteniuk (Chessgames, 2013c) and now Neverov-Bogdanovich (Chessbase, 2013), q.v. Figure 1 for some key positions.

Nikolić-Arsović is currently the longest known game, 269 moves ending with 102 moves in KRBKR and a 100-move draw-claim as in force at that time. Fressinet-Kosteniuk is the longest known decisive game, 237 moves also ending in KRBKR with reversed colours, this time for 116 moves.[4] Neverov-Bogdanovich threatened the 237 move record: Neverov had defended valiantly since at least the 9-man position 58b and from KRNPKRNPP to KRKRN but finally missed all the drawing moves at 206w and resigned at 211w. Record length 'CC' computer-

[2] *BKp.r* indicates 'record position *r* in part *p*' with the first part of the MB-YK series being 'part 0'. *s/o* refers to constraints on 'same colour' or 'opposite colour' Bishops. '~' indicates the constraint of P=Q promotion only in the first 7-man phase. The GBR code is *qrbn.(w)p(b)p* with 1 (3) for a White (Black) Queen etc., and 9 for obtrusive force, detailed later together with square-colour distribution for the Bishops in some cases.

[3] Minimaxing DTC(onversion) usually causes one side or the other to concede depth in DTM terms. Therefore *dtc*-7-man plus *dtm*-remainder may only approximate *dtm*-7-man, i.e., *c7+mr ~ m7*. In Figure 2, it is usually the defender (Black) conceding DTM depth while maximising DTC: the seven exceptions are on lines 11, 12, 18, 29, 30, 36 and 43.

[4] This was a Rapid game with neither side keeping score. Fressinet had in an earlier game, appealed against a 50-move draw-claim by Korchnoi, and although unsuccessful in that, for consistency, he did not claim a draw in this game.

computer and Freestyle, man and machine, games are also of interest. The Freestyle Kasparov-World game (Chessgames, 2013b; Karrer, 2000; Marko and Haworth, 1999; Nalimov et al., 1999) reached a drawn KQPKQPP phase with position 49b and a White win at 55w. The MVL EGTs confirm Karrer's (2000) analysis as expected. Moves **51.…b5**, **52…Kb2** and **53…Ka1** retained the draw; Black's first mistake was indeed **54. … b4??**.

Analysis of the Nikolić-Arsović game in the context of the Freestyle mode of play suggests the concept of the *Bionic Game* – whereby a game between two fallible humans is truncated at some point and has infallible endgame play grafted onto it. Following an entirely drawn KRBKRP(d5) phase of 55 moves during which neither side claimed a 50-move draw, Nikolić in fact had wins at moves 200 (*dtm* = 13), 238 (15), 239 (10), 240 (14), 243 (16) and 255 (26). Thus, this game spawns decisive bionic games ranging in length from 213 moves for the earliest graft to 280 moves for the latest or indeed any graft. Readers are invited to beat these figures and use of the MVL 7-man DTM EGTs will surely help. For record draws, while the *n*-move draw-claim is optional for human players, computer agents should be assumed to make any such available claim at the earliest juncture. Bionic game records may be finessed per 'endgame of graft' and by consideration of whether the relevant EGTs existed and were available[5] at the time or not.

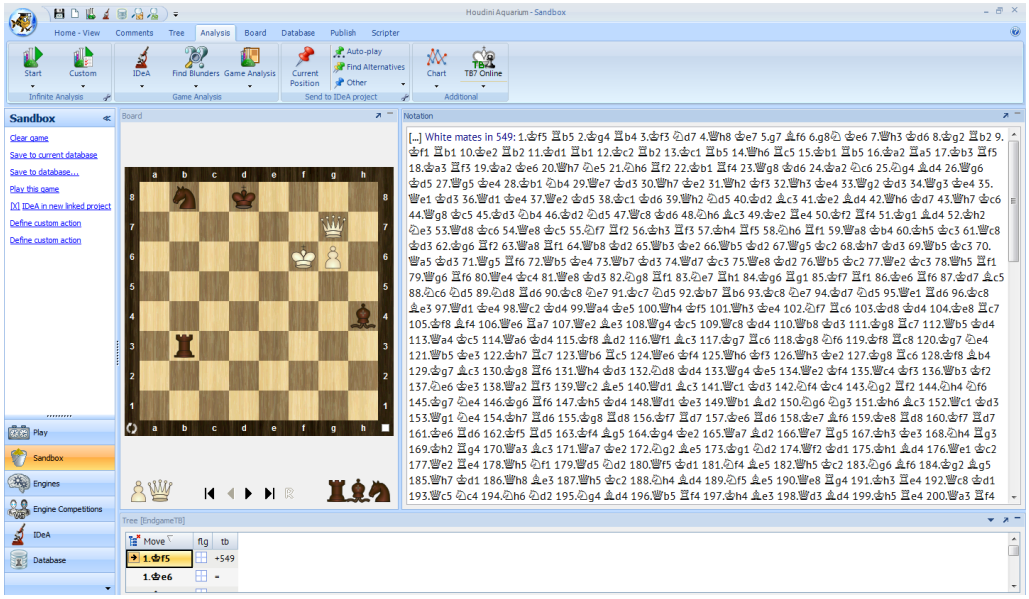

Figure 3. A candidate for the maxDTM 7-man position, KQPKRBN (*dtm* = 549): AQUARIUM user interface.

A generous subset of the Lomonosov 'MVL' 7-man DTM EGTs, including those most likely to be required, are now available via ChessOK's AQUARIUM, the web, a server and a 100TB disc-array. The appendix gives instructions on how to use the service which is free at the point of use until end-2013. Vlasák (2013) has described his early explorations of various games and studies: other endgame authorities are using or are aware of the MVL service and we may look forward to revised analysis of some high-profile games and didactic positions. Figure 2 gives MVL's DTM for all the maxDTC positions reported by Bourzutschky and Konoval (2006-13).

It is not yet clear whether any of these positions are also maxDTM positions. The line from Figure 3's KQPKRBN 1n1k4/6Q2/5KP1/8/7b/1r6/8/8 w begins with ten absolutely unique moves by White: **1. Kf5'''' Rb5'' 2. Kg4'''' Rb4'' 3. Kf3'''' Nd7'' 4. Qh8'''' Ke7'' 5. g7'''' Bf6'' 6. g8=N+'''** (KQNKRBN, *dtm* = 543; not maxDTM, see #13 in Figure 2) **Ke6'' 7. Qh3'''' Kd6'' 8. Kg2'''' Rb2+'' 9. Kf1''' Rb1'' 10. Ke2''' Rb2''.**

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[5] The concept of *availability* requires more precise definition but will initially be judged liberally.

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Appendix: the MVL EGT Service instructions

The instructions here assume that AQUARIUM is installed and registered in the usual way:

01) Download the Aquarium update file and install, q.v., http://217.112.41.81/download/Aquarium_2012_Update_2.exe.

02) After starting Aquarium, select *Database* mode, q.v., http://217.112.41.81/IMAGES/1_SwitchToDatabase.png.

03) In Database mode select the *Database* tab and click the *New* button to create a new database,
q.v. http://217.112.41.81/IMAGES/2_NewDatabase.png.

04) Select *pgn* or *cdp* database type, the last one perhaps being better as it can be converted to pgn at any time.

05) provide a name for the database, for example *endgame_records*.

06) click *Create and edit new game* (or later, *Add a game*) to start a new game,
q.v., http://217.112.41.81/IMAGES/3_NewGame.png.

07) either paste a game/position using *Cntrl/V* or *Shift/Insert* hotkeys, e.g., for 8/1kp5/8/1p6/6q1/8/5P2/4QK2 w - -,
or set up position using the *S* hotkey. Depth and best moves then appear below the board.
n.b., the '- -' is required to complete the FEN: MVL EGTs recognise 'e.p.' but include no castling rights.

08) click the *Analysis* tab and select black triangle under the *TB7 Online* button,
q.v., http://217.112.41.81/IMAGES/4_TB7_Online.png.

09) Select *Complete Line* menu item. In a few seconds, a DTM-minimaxing line will appear in the *Notation* window.

10) Select *EndgameTB* tree, q.v., http://217.112.41.81/IMAGES/5_EndgameTB_Tree.png.

11) Under the *TB7 Online* button select *[x] Tree Auto*: information about the top moves in the position will appear.
Without waiting for the answers, browse the line using arrow keys to send requests for tree moves to the server;
return to the start position and research the game.

12) Use *Cntrl/S* to save the game. It is highly recommended to type in some information in the header later.

13) Return to step '06' to evaluate further positions and DTM-minimaxing lines from them.

If a database is not required then *Sandbox* mode, *Cntrl/V*, *Analysis*, *TB7 Online* and *Complete Line* suffice.