



## TCEC Cup 8

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After an absorbing bonus match between two NN-engines,<sup>2</sup> the knockout TCEC Cup 8 started on Tuesday, Feb. 23<sup>rd</sup>, 2021 (Haworth and Hernandez, 2021a/b; TCEC, 2021). The top 32 engines of TCEC20 all took part, see Fig. 1. Most were trying out new versions in preparation for TCEC21: ‘kudos’ to their ever-active authors: eleven engines were not updated.<sup>3</sup>

The ‘equal distance’ pairing was again used, seed  $s$  playing seed  $s+2^{5-r}$  in round  $r$  (rather than seed  $2^{6-r}-s+1$ ), assuming all matches went with the seeding. Thus, seed  $s_1$  plays  $s_{17}, s_9, \dots, s_2$  if all survive long enough. This pairing also adheres to the Postponement Principle of keeping top seeds apart but stiffens the competition for the top quarter of the seeds and reduces the likelihood of protracting early matches far into a tie-break. This time, the second-named engine ‘B’, initially and usually the lower seed, was given more opportunity to perform, taking White first. Matches were ‘best of four’ and tie-breaks consisted of further ‘same opening’ contests, i.e., mini-matches of two games.

Second author Nelson allocated openings of 4, 8, 12 and 16 ply to the first four rounds: Jeroen Noomen’s openings for the finals came from his Superfinal books for TCEC seasons 9-19. Both chose randomly with some regard for frequency over the board providing the usual variety of play.

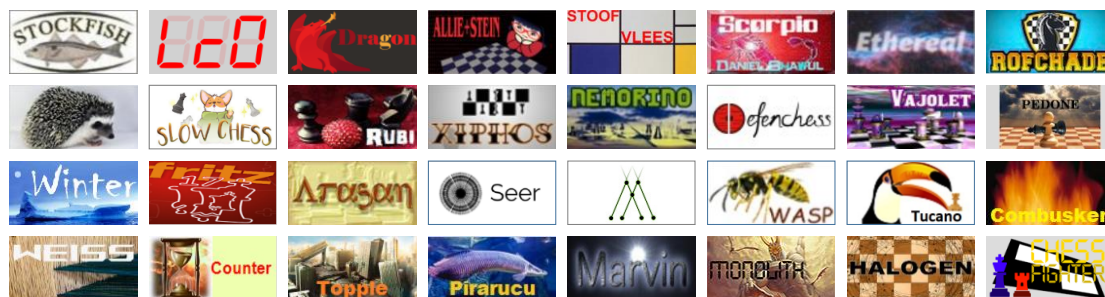


Fig. 1. TCEC Cup 8 engines (CPW, 2021; TCEC, 2021) in seed order (STOCKFISH → ... → CHESS FIGHTER)

As these engines are not subject to injury, loss of form, weather or personal distractions, few upsets were expected in the early rounds but it was at least interesting to see some underdogs putting up a strong fight in this coliseum of computer chess. Several engines are clearly improving rapidly with their adoption of the new NNUE combination of minimax/alpha-beta search and NN-evaluation.

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<sup>2</sup> This was between TCEC20 second and third, LEELA CHESS ZERO and KOMODO DRAGON: 57½-42½ to LEELA.

<sup>3</sup> In seed order, the engines not updated were STOOFFVLEES, ROFCHADE, SLOWCHESS, RUBICHESS, XIPHOS, DEFENCHES, VAJOLET2, FRITZ, TUCANO, COMBUSKEN and PIRARUCU.

## 1 THE MATCHES OF ROUNDS 1 AND 2

WINTER, ARASAN and TUCANO were the first engines to play better than par. MONOLITH had the best chance to overturn the seedings with a nominal Elo deficit of just 81. Notably, SEER later achieved three draws against fourth seed ALLIESTEIN. While resistance was not futile, it was in each of these cases sadly unavailing. However, there was one cupset and what scrap it was – no quarter given. Seeded low down the order at 31, HALOGEN beat VAJOLET2 by three bloody strikes to two. In this stand-out match, there were five wins in six games. HALOGEN newly sported an innovative, ‘incrementally updated’ neural network developed and trained using the OPENBENCH framework from Andrew ‘ETHEREAL’ Grant (2021). In some sort of coincidence, ETHEREAL and HALOGEN were to meet in match four of the next round with NNUE support on both sides.

Table 1.  
TCEC Cup 8: the results of the round 1 and 2 matches from engine A’s perspective<sup>4</sup>

Match	Engine A			Engine B			Elo Δ	Score	%perf. for 'A'		
	Seed	Engine	Elo	Seed	Engine	Elo			Exp'ctd	Actual	Par..
R1.01	01	Stockfish 202102202249	3605	v 17	Winter 9.4	3341	264	3-1: ==11	82.2	75.0	-
R1.02	09	Igel 3.0-dev-2_ign-0-9b1937cc	3443	v 25	Weiss 1.3-dev	3232	211	2½-½: 11=	77.0	83.3	=
R1.03	05	Stoofvlees II a16	3511	v 21	Minic 3.04	3300	211	3-1: =1=1	77.0	75.0	=
R1.04	13	Nemorino 6.06_NNUE	3334	v 29	Marvin 5.1.0-a4	3104	230	2½-½: 11=	79.0	83.3	=
R1.05	03	Komodo Dragon 2671.00	3552	v 19	Arasan v22.1.0-31-d9b3e64	3268	284	3-1: ==11	84.0	75.0	-
R1.06	11	RubiChess 2.0.1	3409	v 27	Topple 0.8.0	3186	223	2½-½: 11=	78.2	83.3	=
R1.07	07	Ethereal 12.89A_PRO_Cup_8	3462	v 23	Tucano 9.02_dev	3183	279	3-1: 1==1	83.6	75.0	-
R1.08	15	Vajole2 2.9.0-TCEC-S19	3336	v 31	Halogen 20210217	3231	105	2½-3½: 0101=0	64.3	41.7	--
R1.09	02	LCZero 0.27.0-pr1509_JH.94-100	3589	v 18	Fritz 17_20200830	3333	256	3-1: =1=1	81.5	75.0	=
R1.10	10	SlowChess Blitz 2.5 avx	3430	v 26	Counter 3.7	3136	294	3-0: 111	84.8	100.0	+
R1.11	06	ScorpioNN 3.0.11.3	3477	v 22	Wasp 4.54	3233	244	2½-½: 1=1	80.3	83.3	=
R1.12	14	DefenChess 2.3_dev2	3340	v 30	Monolith 20210221	3256	84	2½-1½: ===1	61.6	62.5	=
R1.13	04	AllieStein v0.8-120f959_PSI.4	3520	v 20	Seer 1.2.1_20201219	3270	250	2½-1½: ===1	80.9	62.5	-
R1.14	12	Xiphos 0.6.1	3399	v 28	Pirarucu 3.3.5	3185	214	2½-½: 11=	77.3	83.3	=
R1.15	08	rofChade 2.309	3404	v 24	Combusken 1.4.0	3276	128	2½-1½: ==1=	67.3	62.5	=
R1.16	16	Pedone 20210217	3317	v 32	ChessFighter 3.7.0	3211	106	3-1: =1=1	64.5	75.0	+
R2.01	01	Stockfish 202102202249	3605	v 09	Igel 3.0-dev-2_ign-0-9b1937cc	3443	162	2½-1½: ===1	71.0	62.5	-
R2.02	05	Stoofvlees II a16	3511	v 13	Nemorino 6.06_NNUE	3334	177	3-1: 1==1	73.0	75.0	=
R2.03	03	Komodo Dragon 2671.00	3552	v 11	RubiChess 2.0.1	3409	143	3-1: =1=1	69.2	75.0	=
R2.04	07	Ethereal 12.89A_PRO_Cup_8	3462	v 31	Halogen 20210217	3231	231	2½-1½: ==1=	79.1	62.5	-
R2.05	02	LCZero 0.27.0-pr1509_JH.94-100	3589	v 10	SlowChess Blitz 2.5 avx	3430	159	2½-1½: =1==	71.1	62.5	-
R2.06	06	ScorpioNN 3.0.11.3	3477	v 14	DefenChess 2.3_dev2	3340	137	4½-3½: =*6,=1	68.4	56.3	--
R2.07	04	AllieStein v0.8-120f959_PSI.4	3520	v 12	Xiphos 0.6.1	3399	121	2½-1½: ===1	66.4	62.5	=
R2.08	08	rofChade 2.309	3404	v 16	Pedone 20210217	3317	87	2½-3½: =*4,1=	62.0	41.7	--

So, with one exception, the top half of the seeding remained intact. The average Elo deficit for round 2 was reduced to 152, higher seeds now expected to average a 70% score. STOCKFISH–IGEL also featured NNUE on both sides as did KOMODO DRAGON–RUBICHESS. What now distinguishes one NNUE engine from another: net dimensions, training, ...? We welcome input on this.

The first five matches ended in the regulation four games so none of the three all-NNUE contests was as protracted as expected. IGEL, HALOGEN and SLOWCHESS BLITZ recorded notable but losing performances. Then DEFENCHESS stopped the show, rescuing one apparently lost game after another, and taking the match with ScorpioNN to eight games. Four of these were over 100 moves and one, g21, was over 200 moves long. SCORPIONN may have missed wins in games 1, 2 and 6 but eventually prevailed. Will DEFENCHESS find a permanent home in at least Division 1 in TCEC season 21?

<sup>4</sup> Alongside the ‘Actual’ column, ‘+’ (‘-’) indicates an excess (shortfall) of a ½-point vis-à-vis Engine A’s ‘par’ score.

ALLIESTEIN–XIPHOS finished in an unusual PPP-r draw. PEDONE let a win slip away in game 33 with **52.c4** which kibitzer CRYSTAL also expected. Via Karsten Müller, the redoubtable endgame analysts Petronijevic and Sullivan (2021) independently confirmed that **c4** was a mistake and that **52.Rg4** won with subtle play: it would have been fascinating to watch. The self-stalemate engineered by ROFCHADE came in five moves so it's strange that CRYSTAL, a more tactical version of STOCKFISH by Joseph Ellis, fell into this trap. Unshaken by this missed opportunity, PEDONE finally provided the upset of the round, finding sufficient advantage in the Scandinavian tiebreak opener where ROFCHADE did not.

## 2 THE QUARTER-FINAL, SEMI-FINAL, BRONZE AND FINAL MATCHES

With the departure of ROFCHADE, we were looking at the first all-NN TCEC Cup quarter-final. The Elo delta would have averaged 103 but was up at 125 with PEDONE in the lists. The top four had looked solid if unspectacular so far. STOCKFISH–STOOFVLEES moved into extra time and became the first of three six-game matches, the favourites just prevailing in each case. LEELA-SCORPIONN treated us to an asymmetric RR-q battle from move 20. ALLIESTEIN saw an early opportunity in its second game against PEDONE at move 16 and moved easily to a lead it did not give up. The evaluation graphs of Fig. 2 indicate the nature of the four wins.

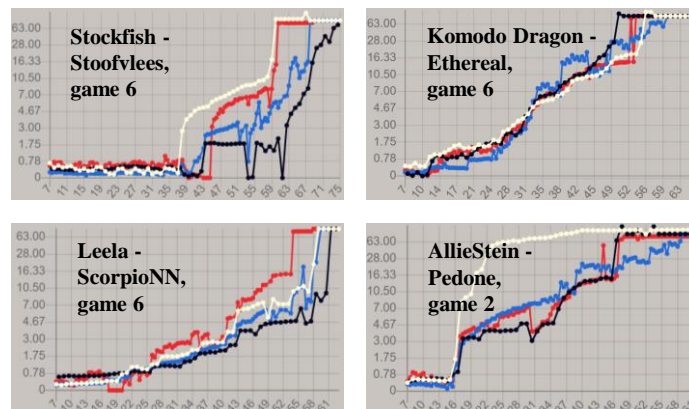


Fig. 2. The evaluation graphs for the four decisive quarter-final games

Another first! STOCKFISH–KOMODO DRAGON was the first all-NNUE TCEC Cup semi-final match. Elo and training-time were both on the side of STOCKFISH. After five draws, it was immediately clear that STOCKFISH was much more positive than The Dragon about White's chances in the mandated Pirc opening. It climbed away without hesitation to an effortless win, see Fig. 3. LEELA CHESS ZERO and ALLIESTEIN were in the trenches for eleven draws before LEELA finally got the advantage of two passed pawns in a QR-qr endgame featuring the heavy pieces. The bias of the last opening was the largest but was still assessed by the engines as less than 0.3 'pawns'.

Both the Bronze match and the Final were contests between NNUE and NN engines, minimax search with alpha-beta cut off versus Monte Carlo search. In the Bronze match, ALLIESTEIN seemed to have good chances in game 3, a well biased Czech Benoni defence opening. These peaked around move 66 but then dropped suddenly and evaporated: a missed chance perhaps. KOMODO DRAGON in reply moved smoothly away as White while ALLIESTEIN was unaware of what was to come, see Fig. 3.

Table 2  
TCEC Cup 8: the results of the QF, SF, Bronze and Final matches from engine A's perspective

Match	Seed	Engine A		Seed	Engine B		Elo $\Delta$	Score	% perf. for 'A'		
		Engine	Elo		Engine	Elo			Exp'ctd	Actual	Par..
QF.01	01	Stockfish 202102202249	3605	v 05	Stoofvlees II a16	3511	94	3½-2½: =*4,=1	62.9	58.3	-
QF.02	03	Komodo Dragon 2671.00	3552	v 07	Ethereal 12.89A_PRO_Cup_8	3462	90	3½-2½: =*4,=1	62.4	58.3	=
QF.03	02	LCZero 0.27.0-pr1509_JH.94-100	3589	v 06	ScorpioNN 3.0.11.3	3477	112	3½-2½: =*4,=1	65.2	58.3	-
QF.04	04	AllieStein v0.8-120f959_PS1.4	3520	v 16	Pedone 20210217	3317	203	2½-1½: =1==	76.1	62.5	-
SF.01	01	Stockfish 202102202249	3605	v 03	Komodo Dragon 2671.00	3552	53	3½-2½: =*4,=1	57.4	58.3	=
SF.02	02	LCZero 0.27.0-pr1509_JH.94-100	3589	v 04	AllieStein v0.8-120f959_PS1.4	3520	69	6½-5½: =*10,=1	59.5	54.2	-
Bronze	03	Komodo Dragon 2671.00	3552	v 04	AllieStein v0.8-120f959_PS1.4	3520	32	2½-1½: ===1	54.5	62.5	+
Final	01	Stockfish 202102202249	3605	v 02	LCZero 0.27.0-pr1509_JH.94-100	3589	16	4½-3½: =*6,=1	52.2	56.3	=

In the Final, the first three openings seemed to have a bias of less than 0.6 ‘pawns’ but the fourth opening, the Scandinavian Defence, seemed more attractive to STOCKFISH at ‘+0.9’. After six draws, LEELA again failed to score in game seven. In reply, STOCKFISH always felt more than one pawn ahead, moved away from move 20 and hardly took a step backwards. Thus, classic minimax search with alpha-beta cut off triumphed two-nil over Monte-Carlo search. Once again, ‘benchmark’ STOCKFISH picked up the two major TCEC trophies. Our congratulations to all its many connections.

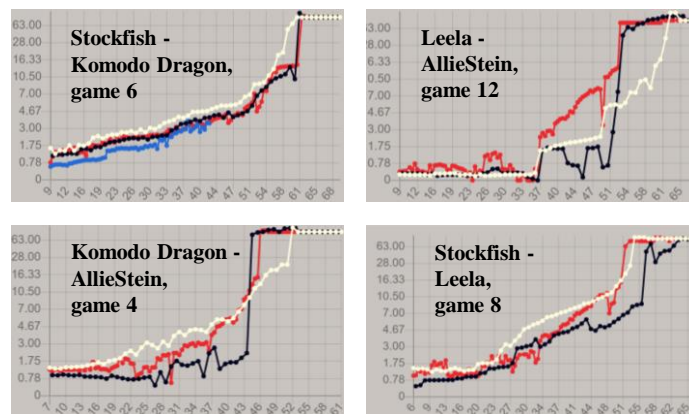


Fig. 3. Evaluation graphs: Semi Final match games 6 and 12, Bronze match game 4 and Final game 8

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