The Final Rodent

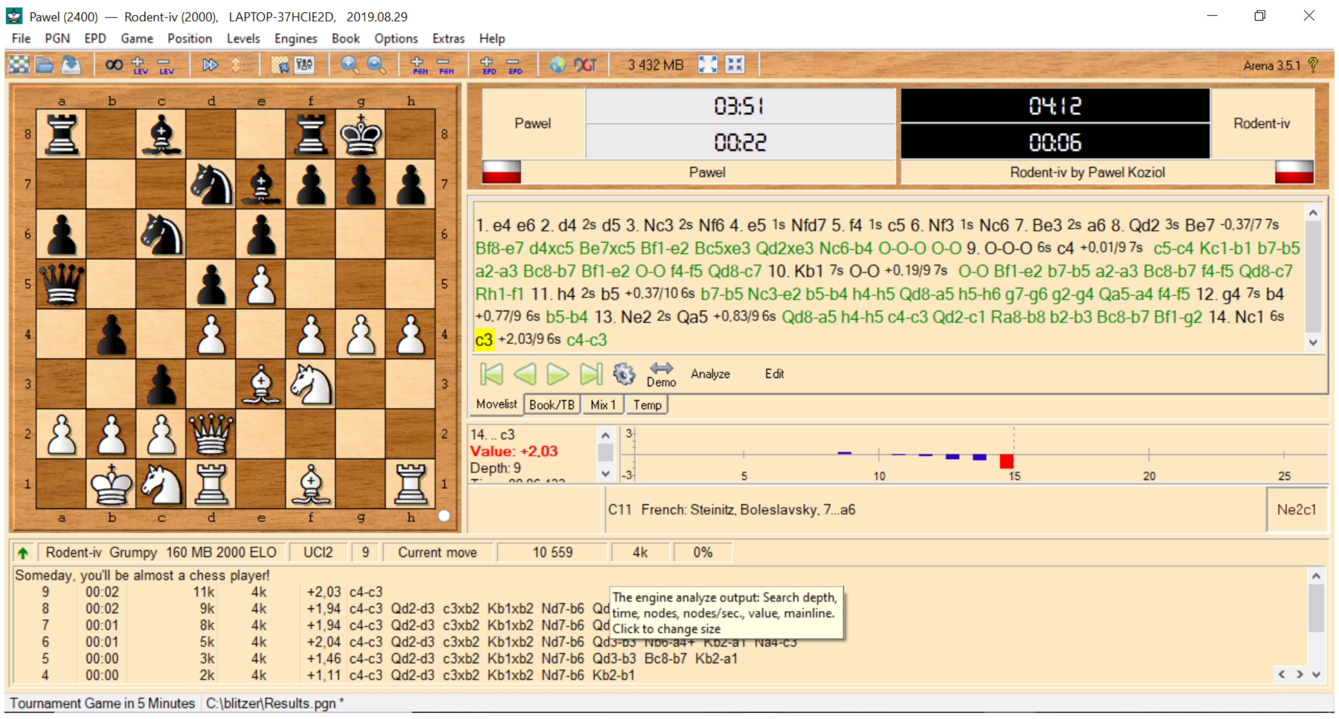
This is the last engine from Rodent line. I write it with a sense of accomplishment, and with a good drink in my hand, so please treat it like a good news. The project is completed, personality system works as intended, most of style-deteriorating effects of Texel tuning have been reverted, UCI options have been simplified and you are guaranteed loads of fun with much less hassle.

Chief reason for that decision is that now I work as a game developer at Chess & Checkers Games. I can say that Rodent landed me that job, but doing the same thing at work and as a hobby has no appeal for me. Also I feel that I am developing rapidly as a programmer, which has a side effect that I came to dislike my pet engine’s source code. It is perfectly possible, even likely, that I will start another chess-related project in the future, but with this one I’m done. Some fixes are still possible, but that’s all.

In short, Rodent is entirely yours now. If you create interesting personalities for Rodent IV, I will add them tot he package. If you fix bugs, I will add these bugfixes. If you improve engine’s play (especially multithreading on more than 16 cores), I will gladly make another official release.

What you got

Expected user experience should look like this:


Pawel (2400) — Rodent-iv (2000), LAPTOP-37HCIE2D, 2019.08.29
File PGN EPD Game Position Levels Engines Book Options Extras Help
3 432 MB
Arena 3.5.1
Pawel
03:51
00:22
04:12
00:06
Rodent-iv
Rodent-iv by Pawel Koziol
Demo
Analyze
Edit
Movelist
Book/TB
Mix 1
Temp
Ne2c1

1. e4 e6 2. d4 2s d5 3. Nc3 2s Nf6 4. e5 1s Nfd7 5. f4 1s c5 6. Nf3 1s Nc6 7. Be3 2s a6 8. Qd2 3s Be7 -0,37/7 7s Bf8-e7 d4xc5 Be7xc5 Bf1-e2 Bc5xe3 Qd2xe3 Nc6-b4 O-O-O O-O 9. O-O-O 6s c4 +0,01/9 7s c5-c4 Kc1-b1 b7-b5 a2-a3 Bc8-b7 Bf1-e2 O-O f4-f5 Qd8-c7 10. Kb1 7s O-O +0,19/9 7s O-O Bf1-e2 b7-b5 a2-a3 Bc8-b7 f4-f5 Qd8-c7 Rh1-f1 11. h4 2s b5 +0,37/10 6s b7-b5 Nc3-e2 b5-b4 h4-h5 Qd8-a5 h5-h6 g7-g6 g2-g4 Qa5-a4 f4-f5 12. g4 7s b4 +0,77/9 6s b5-b4 13. Ne2 2s Qa5 +0,83/9 6s Qd8-a5 h4-h5 c4-c3 Qd2-c1 Ra8-b8 b2-b3 Bc8-b7 Bf1-g2 14. Nc1 6s c3 +2,03/9 6s c4-c3

14. .. c3
Value: +2,03
Depth: 9

C11 French: Steinitz, Boleslavsky, 7...a6

```
Rodent-iv  Grumpy  160 MB 2000 ELO | UCI2 | 9 | Current move | 10 559 | 4k | 0%
Someday, you'll be almost a chess player!
   9   00:02   11k   4k   +2,03  c4-c3
   8   00:02    9k   4k   +1,94  c4-c3  Qd2-d3  c3xb2  Kb1xb2  Nd7-b6  Qd
   7   00:01    8k   4k   +1,94  c4-c3  Qd2-d3  c3xb2  Kb1xb2  Nd7-b6  Qd
   6   00:01    5k   4k   +2,04  c4-c3  Qd2-d3  c3xb2  Kb1xb2  Nd7-b6  Qd3-b3  Nb6-a4+  Kb2-a1  Na4-c3
   5   00:00    3k   4k   +1,46  c4-c3  Qd2-d3  c3xb2  Kb1xb2  Nd7-b6  Qd3-b3  Bc8-b7  Kb2-a1
   4   00:00    2k   4k   +1,11  c4-c3  Qd2-d3  c3xb2  Kb1xb2  Nd7-b6  Kb2-b1
```

The engine analyze output: Search depth, time, nodes, nodes/sec., value, mainline. Click to change size

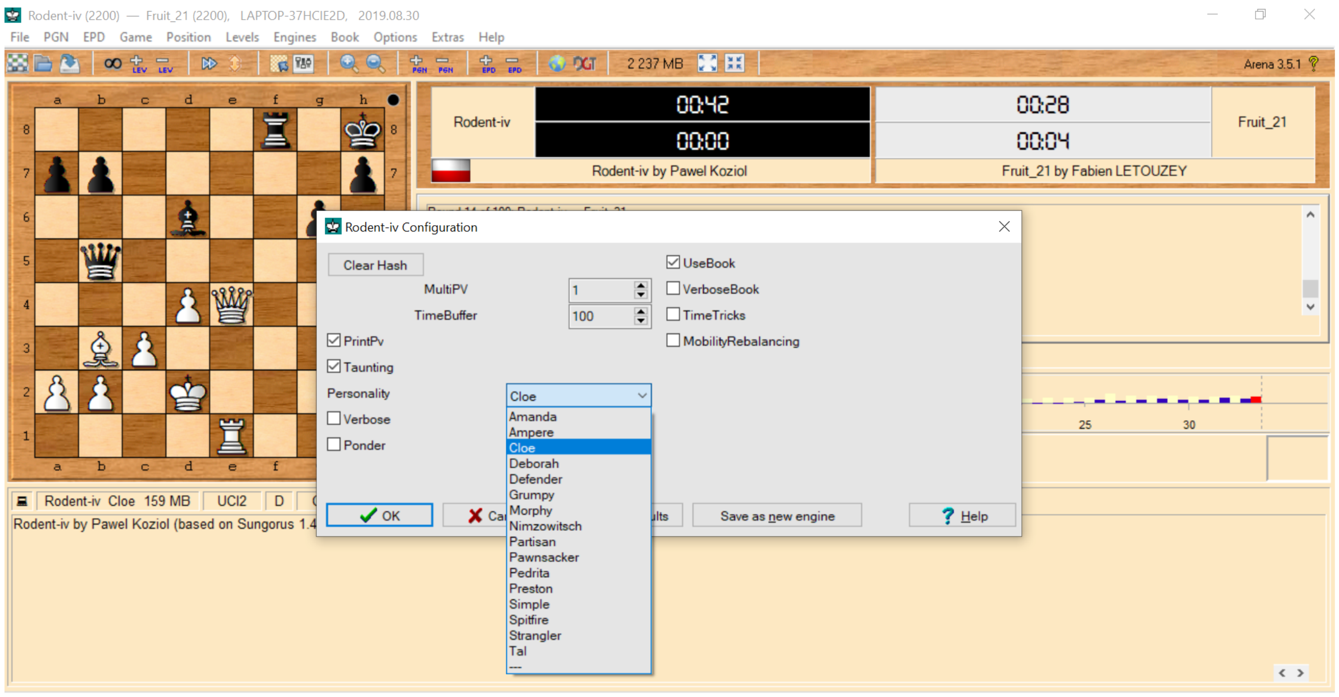
Tournament Game in 5 Minutes | C:\blitzer\Results.pgn *

Figure 1. We play blitz against a personality called “Grumpy” that has been set to 2000 Elo, calculating about 4000 nodes per second. Nevertheless, we misplayed the opening, engine started a vicious pawn storm and taunts us because it believes it has serious advantage.

As you can see, personality system has been changed, and playing style has been decoupled from strength. The former is now defined by loading personality files, the latter – by setting UCI_Elo parameter. This way you can play against weaker equivalents of Nimzowitsch or Tal.

The cost of this decision is that personality files from earlier versions of Rodent do not work anymore. There are also not as many personalities with this release as with previous ones. One reason is that UCI_Elo parameter eliminated the need for weaker personalities. The other is that I favored quality over quantity, looking at games played by each one to be sure that they have distinct playing styles.

Configuration


Rodent-iv (2200) — Fruit_21 (2200), LAPTOP-37HCIE2D, 2019.08.30

Rodent-iv Configuration

- Clear Hash
- MultiPV: 1
- TimeBuffer: 100
- [✓] PrintPv
- [✓] Taunting
- Personality: Cloe
- [ ] Verbose
- [ ] Ponder
- [✓] UseBook
- [ ] VerboseBook
- [ ] TimeTricks
- [ ] MobilityRebalancing

Personality list: Amanda, Ampere, Cloe, Deborah, Defender, Grumpy, Morphy, Nimzowitsch, Partisan, Pawnsacker, Pedrita, Preston, Simple, Spitfire, Strangler, Tal, ---

Rodent-iv by Pawel Koziol (based on Sungorus 1.4
File PGN EPD Game Position Levels Engines Book Options Extras Help
2 237 MB
Arena 3.5.1
Rodent-iv
00:42
00:00
Rodent-iv by Pawel Koziol
00:28
00:04
Fruit_21
Fruit_21 by Fabien LETOUZEY
Rodent-iv Cloe 159 MB UCI2
OK
Save as new engine
Help

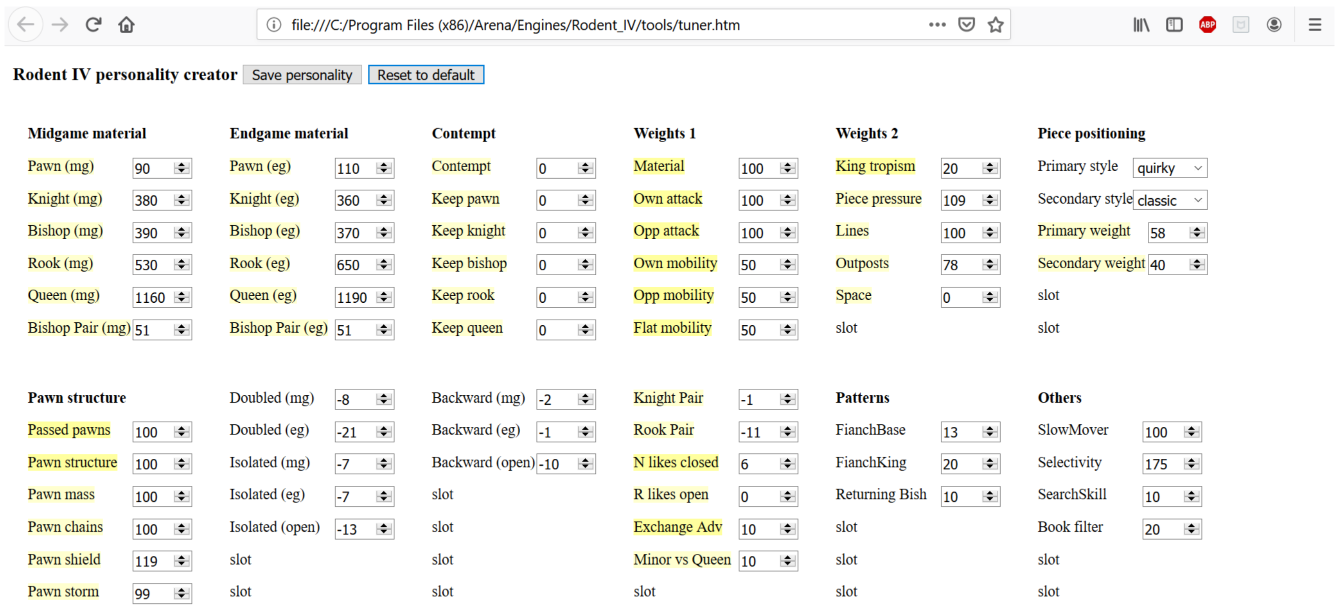
Figure 2. Choosing Rodent personality

As you can see, personalities can be picked from the list. The list is defined in basic.ini file (more on that later), so if you want to add a new one, you have to add its filename there. This is an old idea of a Github user tico tico, who helped me a lot with Rodent III.

As for other options, ClearHash, MultiPv, Ponder, UseBook are self-explanatory. Verbose and VerboseBook mean more engine output. By disabling PrintPv you can play a fair game, without looking at engine evaluations. If you tick Taunting and your GUI prints info string messages, Rodent will give you some gentle verbal abuse, ranging from skulking and squeaking in lost positions, through self-motivating gibberish, mild suggestions of superiority, gloating with every captured piece, calling your blunders and asking you to resign. MobilityRebalancing is an option that does not add strength, but you can turn it on to see if you like engine's play better.

Personality creator

If you ask what happened to creating new personalities – now this is done either with JavaScript-based personality editor, located in tools folder, or by manually editing text files. Personality editor can be used offline.


file:///C:/Program Files (x86)/Arena/Engines/Rodent_IV/tools/tuner.htm
Save personality
Reset to default

Rodent IV personality creator

Midgame material		Endgame material		Contempt		Weights 1		Weights 2		Piece positioning	
Pawn (mg)	90	Pawn (eg)	110	Contempt	0	Material	100	King tropism	20	Primary style	quirky
Knight (mg)	380	Knight (eg)	360	Keep pawn	0	Own attack	100	Piece pressure	109	Secondary style	classic
Bishop (mg)	390	Bishop (eg)	370	Keep knight	0	Opp attack	100	Lines	100	Primary weight	58
Rook (mg)	530	Rook (eg)	650	Keep bishop	0	Own mobility	50	Outposts	78	Secondary weight	40
Queen (mg)	1160	Queen (eg)	1190	Keep rook	0	Opp mobility	50	Space	0	slot	
Bishop Pair (mg)	51	Bishop Pair (eg)	51	Keep queen	0	Flat mobility	50	slot		slot	

Pawn structure		Doubled (mg)	-8	Backward (mg)	-2	Knight Pair	-1	**Patterns**		**Others**	
Passed pawns	100	Doubled (eg)	-21	Backward (eg)	-1	Rook Pair	-11	FianchBase	13	SlowMover	100
Pawn structure	100	Isolated (mg)	-7	Backward (open)	-10	N likes closed	6	FianchKing	20	Selectivity	175
Pawn mass	100	Isolated (eg)	-7	slot		R likes open	0	Returning Bish	10	SearchSkill	10
Pawn chains	100	Isolated (open)	-13	slot		Exchange Adv	10	slot		Book filter	20
Pawn shield	119	slot		slot		Minor vs Queen	10	slot		slot	
Pawn storm	99	slot		slot		slot		slot		slot	

Figure 3. Rodent IV personality editor.

Registering personalities

There is basic.ini file in personalities folder. If you create new personality, you should register it there, so that it appears on the list. File looks like that:

```
HIDE_OPTIONS
PERSONALITY_BOOKS
UCI_ELO
HIDE_PERSFILE

Amanda=amanda.txt
Ampere=ampere.txt
Cloe=cloe.txt
Deborah=deborah.txt
Defender=defender.txt
Grumpy=grumpy.txt
Morphy=morphy.txt
Nimzowitsch=nimzowitsch.txt
Partisan=partisan.txt
Pawnsacker=pawnsacker.txt
Pedrita=pedrita.txt
Preston=preston.txt
Simple=simple.txt
Spitfire=spitfire.txt
Strangler=strangler.txt
Tal=tal.txt
```

What’s new

The last version of Rodent is also the most evaluation-heavy one. I have added several new patterns and one outlandish idea that gave a bit less than it promised, but just enough to justify adding it in. I guess I wanted to show it in public before implementing it in a closed cource project some time in the future.

Another addition that I like is space evaluation. It returns rather high scores, but they tend to cancel out, and make the engine’s play in the center more ambitious. Only after adding this feature I dared to create Morphy personality (which, by the way, uses also “forward” piece/square table set).

The engine uses two piece/square sets, primary and secondary, that can be chosen out of five. This alone allows creation of many more unique personalities, but it is not the end of the story. Weights of these tables are adjusted at runtime, depending which set scores better. It means that the engine can adjust its style as it plays. The rough outline of the algorithm – which may well be used for other evaluation parameters such as mobility – will be shown in the appendix.

Predefined personalities

Since its inception, Rodent project has been about creating an engine that allows modification of its playing style – just like ChessMaster series, only better. Code changes in the new version meant that old personalities are no longer usable, so I felt the need for creating a new set. I hope you will find it interesting.

Amanda

Fist and foremost, an attacker; her second consideration is piece activity. Plays gambit openings.

Cloe

Cloe likes closed positions, pawn storms and sound pawn structure. The only thing she prefers to a closed position is a closed position with a single open file, owned by her rooks. She is a proud practitioner of the French and King's Indian defenses.

Deborah

Picture her as a dark-haired, slender, melancholy woman. She is a defensive player who likes bishops.

Defender

Imagine him in an expensive suit, looking more like a CEO than a chess player. Strong, rational, if mildly pessimistic personality. Plays solid openings. Ready to take draw in dead equal positions.

Grumpy

Imagine him as a player already past his prime, disrespectful towards his opponents and still quite dangerous. Grumpy likes restricting enemy movement and attacking, enjoys closed positions and expects to win. Because of his age, he plays mostly not too modern openings (ro example, he likes Tarrasch defense).

Morphy

Impersonation of Paul Morphy. Emphasizes mobility, then king attack, prefers open positions.

Partisan

He starts slowly, using openings that do not occupy much space in the center, but don't be lulled in a false sense of security. Later he goes for a vicious attacks.

Pawnsacker

Picture him as a young, up-and-coming grandmaster, who has not yet reached his true potential. Thin, energetic, likes flashy moves a bit too much. He tends to part with his pawns from time to time.

Balanced personality, likely to sacrifice modest amount of material, often goes for active defence in the endgame.

Pedrita

Pedrita stands for “pawns, defense, restraint”. She plays solid openings and thinks defense first, but don’t be deceived! She can attack all right if position demands it, and with solid pawn play she is a hard nut to crack.

Preston

Mildly materialistic, but fighting for the initiative and close enough to default to avoid unsound plans. Likes to create pressure against enemy pieces. Plays closed openings as white, Slav and Caro-Kann defenses as black. Perhaps the best setup against the weaker engines.

Simple

Plays without more advanced facets of evaluation function, applying sensible default. Slight preference for exchanging queens, in dead equal positions will go for a draw. Perhaps the most computer-like personality.

Spitfire

Picture him as a tall man in a brown leather jacket. He likes active play but detests being under attack. Likes keeping queens on the board.

Strangler

Based on Rodent III personality by Brendan J. Norman. Plays boa constrictor style, but has strong preference for attack, likely to sacrifice for positional reasons. Much more temperamental version of Grumpy, very human-like play. May be overoptimistic in endgames with queens.

Appedix. Algorithm used for interpolation between competing piece/square scores

1. Two competing parameters describing the same aspect of evaluated chess position are needed. They will be called hypothesis1 and hypothesis2. It helps if these scores are large, therefore in the first experiment piece/square table score has been used.

2. Each of the hypotheses has initial weight associated with it: percentage1 and percentage2. The weights need not to be equal or to sum up to 100.

3. We calculate a difference between both hypotheses, henceforth called delta:

```
delta = std::abs(hypothesis1-hypothesis2);
```

4. Value of delta is used to calculate the shift factor. The first formula that worked has been:

```
shift = std::min(sqrt(delta), 20);
```

Later, maximum percentage shift value has been raised to 25. It is possible that sigmoid or logarithmic function will work better. All that is needed is a reasonable way of using delta to arrive at a value not greater than either of percentages.

5. We apply shift as follows

```
if (hypothesis1 > hypothesis2)
    rebalanced = hypothesis1 * (percentage1-shift)
               + hypothesis2 * (percentage2+shift)
if (hypothesis1 < hypothesis2)
    rebalanced = hypothesis1 * (percentage1+shift)
               + hypothesis2 * (percentage2-shift)
```

Note that in example code hypothesis that proposes higher score is less trusted and its score diminished accordingly. This approach has certain philosophical appeal (evaluation function would be awarded for not trusting itself), but should not be treated as inherent property of the algorithm.