Gardner Mini Chess

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Abstract

We enumerate here the valid openings in Gardner chess game : for each opening there is at least a perfect game where both players play perfectly[1] using the opening (in reality many variations)). All the 5 possible first halfmoves are described as well as the least obvious (to the modified stockfish engine [RCK$^+$10]) possible blunder are described in the pgn available at the website. Note that even though some endings are different from what happens in a regular board (for example rook and knight vs rook is a winning position, king and rook may win against king bishop and pawn) the computer finds a good line quite easily in most of the positions .

The pgn that you can find in website allows to avoid for the computer to be tricked as it provides the moves for which the evaluation is not to be trusted and contains the main justification for the status of the moves (perfect/blunder). By playing the mating line provided and with reasonable hash size the engine finds easily all the other branches. We also provide in the last section some positions (that can be found in the pgn) where the checkmates were hard to find.

To be able to see the pgn we recommand to patch scid (file position.cpp to replace with te one in the website) and recompile it to be able to see all the variations and the blunders and the nonstandard promotions (an already built version for mac (tested for os x 10.6 is also provided in the website)).

It might be possible that with a clever endgame playing or with 5x5 tablebases stockfish5x5 can become perfect and decide in reasonable time on a home computer for any position if it is a draw or a checkmate.

1 Gardner openings

There is 94 valid 4 half moves openings (93 different positions) that can be decomposed into 4 families :

- A openings start with b4 : 2, 8, 14, 36 possible openings after 2, 3, 4 and 5 half moves.
- B openings start with d4 : 4, 14, 38, 77 possible openings after 2, 3, 4 and 5 half moves.
- C openings start with e4 : 2, 8, 19, 40 possible openings after 2, 3, 4 and 5 half moves.
- D openings start with f4 : 3, 10, 23, 61 possible openings after 2, 3, 4 and 5 half moves.

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[1] In game theory, perfect play is the behavior or strategy of a player which leads to the best possible outcome for that player regardless of the response by the opponent

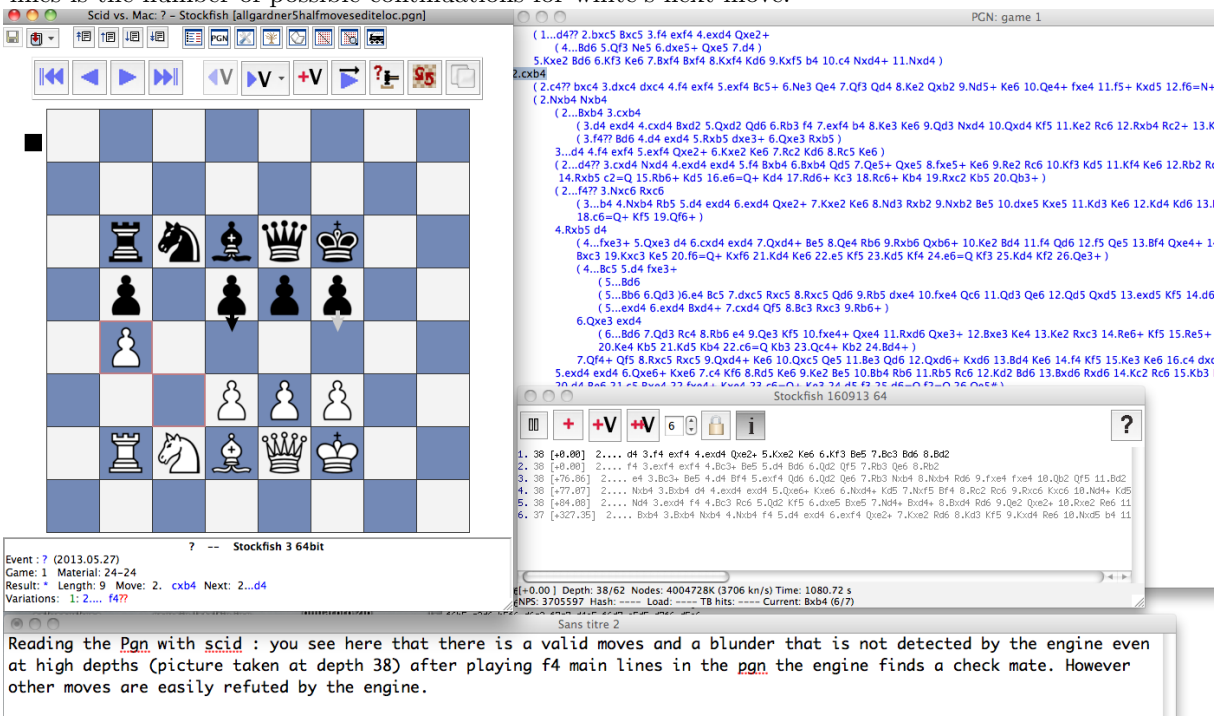
The number of distinct perfect games after 1 half move is 4, after 2 half moves 11, after 3 half moves 40, after 4 half moves 94 (one position appears from two different lines so there is 93 different positions reachable by perfect play afer 4 halfmoves), and 214 after 5 half moves.

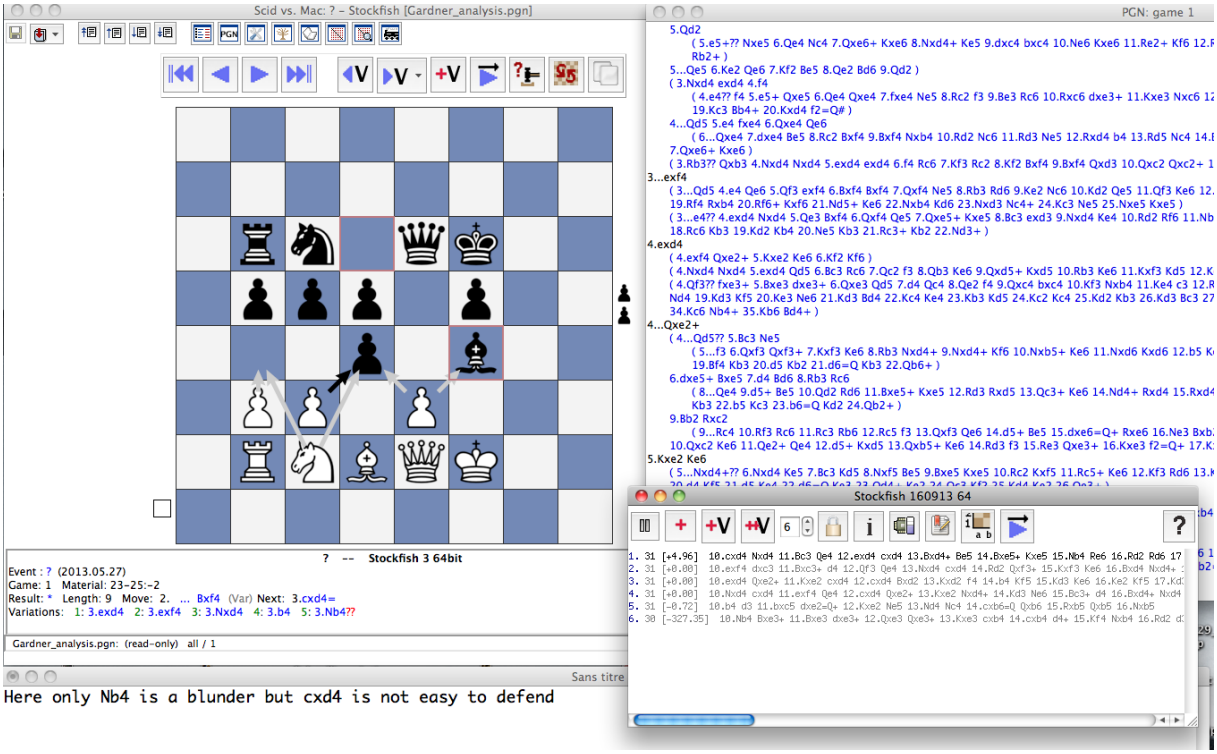
The number of different positions that can be reached by perfect play can be much smaller than the number of valid positions for a game. However we still don't have a good estimation of this number for gardner minischess.

Positions that are evaluated with a positive value (even small) are usually harder to play for black and the ones with a negative evaluation usually requires sharp play from white

There is no theoretical proof that these values are exact : some lines might have a check mate that we weren't able to detect.

The pgn that you can find in the website describe all these variations and gives a possible continuation as a perfect game or a checkmate. For the the moves outisde of these lines they are associated with the comment blunder and usually one killing sequence is given. Only few checkmating plays are detailed the others are usually easy to obtain with the engine after playing the one in the pgn. . The number given after the lines is the number of possible continuations for white's next move.





Here only Nb4 is a blunder but cxd4 is not easy to defend

- **A openings :**

  A13 : 1.b4 cxb4 2.cxb4 d4 (x4)

  A12 : 1.b4 cxb4 2.Nxb4 Nxb4 (x2)

  A11 : 1.b4 cxb4 2.Nxb4 Bxb4 (x2)

  A10 : 1.b4 cxb4 2.d4 f4 (x6)

  A09 : 1.b4 cxb4 2.d4 bxc3 (x1)

  A08 : 1.b4 cxb4 2.f4 bxc3 (x1)

  A07 : 1.b4 cxb4 2.f4 exf4 (x3)

  A06 : 1.b4 c4 2.d4 Nxd4 (x4)

  A05 : 1.b4 c4 2.d4 e4 (x1)

  A04 : 1.b4 c4 2.d4 Nxb4 (x4)

  A03 : 1.b4 c4 2. f4 e4 (x2)

  A02 : 1.b4 c4 2. f4 cxd3 (x1)

  A01 : 1.b4 c4 2. e4 d4 (x4)

  A00 : 1.b4 c4 2. dxc4 bxc4 (x1)

- **B openings :**

  B37 : 1.d4 e4 2.f4 c4 (x3)

  B36 : 1.d4 e4 2.dxc5 Bxc5 (x2)

  B35 : 1.d4 e4 2.c4 bxc4 (x2)

  B34 : 1.d4 e4 2.c4 Ne5 (x3)

B33 : 1.d4 e4 2.b4 exf3 (x4)
B32 : 1.d4 e4 2.b4 cxd4 (x3)
B31 : 1.d4 e4 2.b4 c4 (x1)

B30 : 1.d4 cxd4 2.cxd4 f4 (x4)
B29 : 1.d4 cxd4 2.cxd4 e4 (x2)
B28 : 1.d4 cxd4 2.cxd4 b4 (x1)
B27 : 1.d4 cxd4 2.cxd4 exd4 (x4)
B26 : 1.d4 cxd4 2.exd4 f4 (x3)
B25 : 1.d4 cxd4 2.exd4 exd4 (x5)
B24 : 1.d4 cxd4 2.f4 dxc3 (x1)
B23 : 1.d4 cxd4 2.f4 exf4 (x2)
B22 : 1.d4 cxd4 2.f4 d3 (x1)

B21 : 1.d4 b4 2.f4 bxc3 (x1)
B20 : 1.d4 b4 2.f4 exd4 (x2)
B19 : 1.d4 b4 2.f4 exf4 (x1)
B18 : 1.d4 b4 2.cxb4 exd4 (x3)
B17: 1.d4 b4 2.cxb4 cxd4 (x2)
B16 : 1.d4 b4 2.cxb4 cxb4 (x1)
B15 : 1.d4 b4 2.cxb4 Nxb4 (x6)
B14 : 1.d4 b4 2.dxc5 Bxc5 (x2)

B13 : 1.d4 exd4 2.exd4 Qxe2 (x1)
B12 : 1.d4 exd4 2.exd4 b4 (x5)
B11 : 1.d4 exd4 2.exd4 cxd4 (x5)
B10 : 1.d4 exd4 2.exd4 f4 (x4)
B09 : 1.d4 exd4 2.cxd4 cxd4 (x4)
B08 : 1.d4 exd4 2.cxd4 b4 (x2)
B07 : 1.d4 exd4 2.f4 d3 (x1)
B06 : 1.d4 exd4 2.f4 dxe3 (x1)
B05 : 1.d4 exd4 2.f4 Qe4 (x2)
B04 : 1.d4 exd4 2.f4 dxc3 (x1)
B03 : 1.d4 exd4 2.f4 b4 (x2)
B02 : 1.d4 exd4 2.f4 Bxf4 (x5)
B01 : 1.d4 exd4 2.Nxd4 cxd4 (x1)
B00 : 1.d4 exd4 2.Nxd4 Nxd4 (x2)

- **C openings :**
  - **C18 :** 1.e4 f4 2.Ne3 fxe3+ (x1)
  - **C17 :** 1.e4 f4 2.c4 d4 (x2)
  - **C16 :** 1.e4 f4 2.c4 dxc4 (x1)
  - **C15 :** 1.e4 f4 2.c4 bxc4 (x2)
  - **C14 :** 1.e4 f4 2.Be3 dxe4 (x2)
  - **C13 :** 1.e4 f4 2.Be3 b4 (x1)
  - **C12 :** 1.e4 f4 2.Be3 d4 (x1)
  - **C11 :** 1.e4 f4 2.Be3 Nd4 (x4)
  - **C10 :** 1.e4 f4 2.exd5 Qxd5 (x2)
  - **C09 :** 1.e4 f4 2.b4 d4 (-0.08) (x1)
  - **C08 :** 1.e4 f4 2.b4 cxb4 (x1)

  - **C07 :** 1.e4 d4 2.c4 bxc4 (x1)
  - **C06 :** 1.e4 d4 2.c4 f4 (x1)
  - **C05 :** 1.e4 d4 2.c4 Nb4 (x5)
  - **C04 :** 1.e4 d4 2.cxd4 cxd4 (x2)
  - **C03 :** 1.e4 d4 2.cxd4 exd4 (x1)
  - **C02 :** 1.e4 d4 2.cxd4 Nxd4 (x3)
  - **C01 :** 1.e4 d4 2.exf5 Qxf5 (x4)
  - **C00 :** 1.e4 d4 2.exf5 Kxf5 (x5)
- **D openings :**
  - **D22 :** 1.f4 exf4 2.exf4 Qxe2 (x1)
  - **D21 :** 1.f4 exf4 2.exf4 d4 (x4)
  - **D20 :** 1.f4 exf4 2.exf4 b4 (x5)
  - **D19 :** 1.f4 exf4 2.d4 f3 (x2)
  - **D18 :** 1.f4 exf4 2.d4 fxe3 (x1)
  - **D17 :** 1.f4 exf4 2.d4 Qe4 (x1)
  - **D16 :** 1.f4 exf4 2.d4 cxd4 (x2)
  - **D15 :** 1.f4 exf4 2.d4 b4 (x1)
  - **D14 :** 1.f4 exf4 2.b4 f3 (x1)
  - **D13 :** 1.f4 exf4 2.b4 fxe3 (x2)
  - **D12 :** 1.f4 exf4 2.b4 cxb4 (x3)
  - **D11 :** 1.f4 exf4 2.b4 d4 (x4)

  - **D10 :** 1.f4 e4 2.d4 c4 (x3)
  - **D09 :** 1.f4 e4 2.c4 d4 (x3)

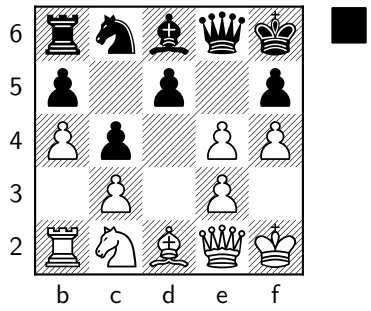
  - **D08 :** 1.f4 e4 2.b4 exd3 (x1)

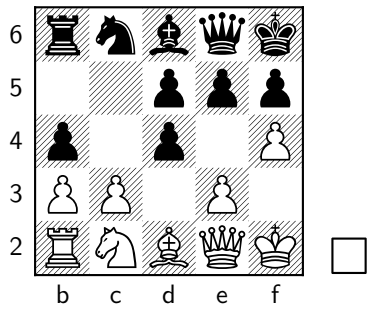
D07=A03 : 1.f4 e4 2.b4 c4 (x2)

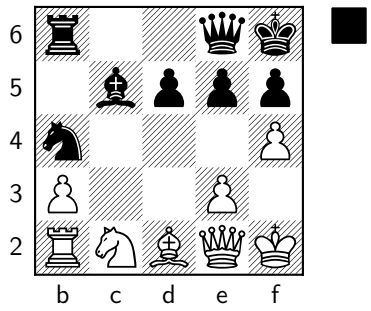
D06 : 1.f4 d4 2.b4 exf4 (x4)
D05 : 1.f4 d4 2. cxd4 exd4 (x6)
D04 : 1.f4 d4 2. cxd4 cxd4 (x4)
D03 : 1.f4 d4 2. exd4 exd4 (x4)
D02 : 1.f4 d4 2. exd4 cxd4 (x2)
D01 : 1.f4 d4 2.fxe5+ Qxe5 (x3)
D00 : 1.f4 d4 2.fxe5+ Bxe5 (x2)

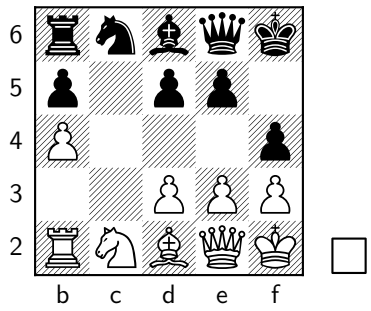
2 Some tricky checkmates

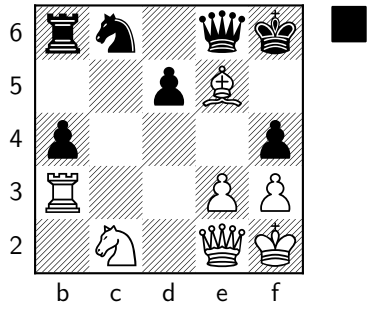
The player who plays wins.

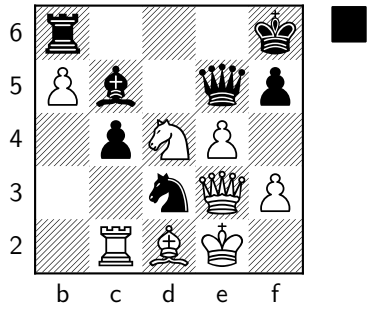


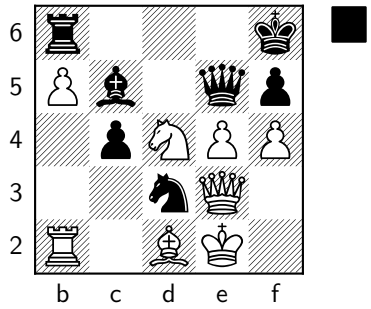


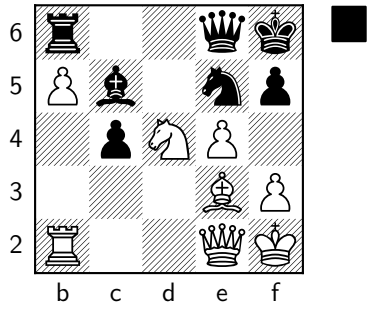


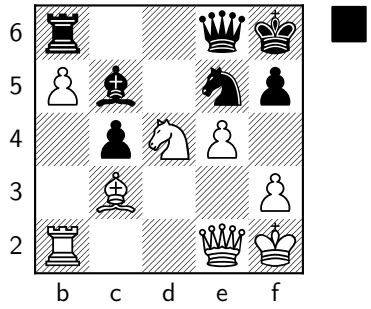


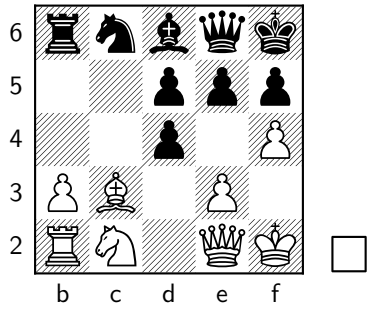


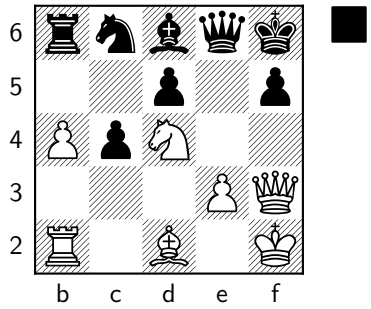


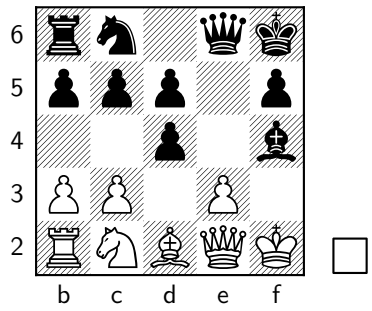


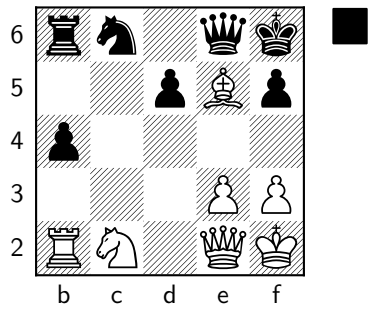


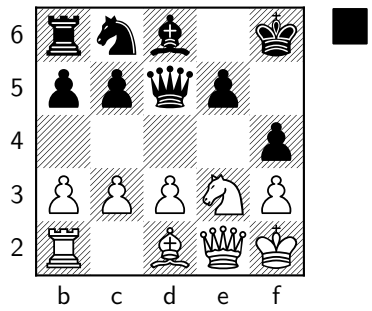












References

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