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3 The Blind Spots of the Computer

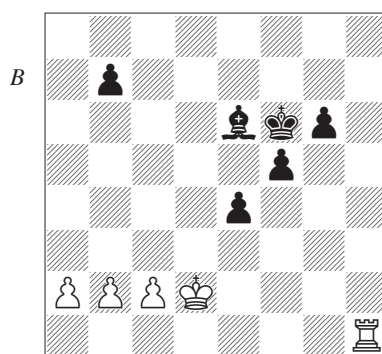
Man is still the most extraordinary computer of all.

JOHN F. KENNEDY (1917-1963),
President of the United States

Having analysed the ‘thought-processes’ of a program in the previous chapter, we have a good basis for understanding the limitations of modern chess programs. Every program has its own ‘personality’ and different weaknesses, and these may change over time. I will mention some of the individual weaknesses in Chapter 5, when discussing the various engines, while this chapter addresses the general weaknesses. Knowledge of computer weaknesses will prove useful later when discussing how to perform computer-assisted analysis.

Formerly, computer scientists used to speak about the 'horizon effect' as one of the most critical weaknesses of chess computers. This problem is still haunting the programs, but in a different way from before. The horizon effect relates to the fact that there are limitations to the depth to which a computer can analyse a position.

In the following diagram it is quite obvious that the black bishop will be



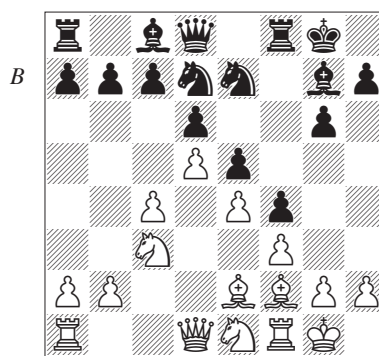
trapped after 1...♙xa2 2 b3. 10-15 years ago, many programs could have taken the a-pawn, not realizing the danger that would arise. The reason for this is that the capture of the bishop can be postponed by checks so that it will occur beyond the computer's horizon. One possible line is 2...f4 3 ♖a1 e3+ 4 ♙e2 f3+ 5 ♙xe3 ♙xb3 6 cxb3, postponing the capture of the bishop until ply 10. This sequence would have caused problems for most programs ten years ago, but with the speed of modern computers and with search extensions, those days are over. Naturally, extending the horizon further has led to an increase in the playing strength of the computer programs.

Positional Problems Deriving from the 'Horizon Effect'

Nowadays the problems with the horizon effect can, of course, still be tactical, but the consequences of not looking deeply enough into the position are more visible in positions of a quiet positional nature, where planning is required. Under tournament time conditions the programs may look ahead 10 to 18 plies in a middlegame position, depending, of course, on the program and the position. Within this horizon they may make moves which actually look like they are part of a plan, even if they are just moves (or numbers) for the computer. If a computer has to use five moves to get a strong knight outpost, it is still within its horizon. But suppose that the program is distracted and has to make some moves to fend off an attack. Then the planned knight manoeuvre is pushed beyond the horizon. Long-term planning is not currently within the reach of the programs, and this is especially felt in quiet and closed positions where there are fewer search extensions because tactical clashes occur less often. If the goal of a certain plan is beyond the horizon, the computer will never play it. The computer is ignorant in the build-up phase of an attack, when the tactical clashes are still far ahead. Let us take an example from a theoretical position of the King's Indian, where

most programs show a lack of 'understanding'.

1 d4 ♘f6 2 c4 g6 3 ♘c3 ♙g7 4 e4 d6 5 ♘f3 0-0 6 ♙e2 e5 7 0-0 ♘c6 8 d5 ♘e7 9 ♘e1 ♘d7 10 f3 f5 11 ♙e3 f4 12 ♙f2 (D)



The most frequently played moves in this position (by humans) are, according to the ChessBase Megabase 2002, 12...g5 (926 times), 12...h5 (74 times) and 12...♘f6 (36 times). All of those are a part of the same plan: pushing the h- and g-pawns to start a kingside attack (though 12...♘f6 is a poor implementation). The plan is quite clear for human beings, yet the consequences of this attack will occur well beyond 20 plies. Unless the program awards a special bonus for pushing the kingside pawns in positions with a closed centre, it will never play this plan. The programs probably do not like the idea of pushing the pawns, as this will destroy the king's pawn shield, and they will penalize such moves due to the reduced king safety.

The answers of the best programs are, after 1 minute of analysis (without opening book):

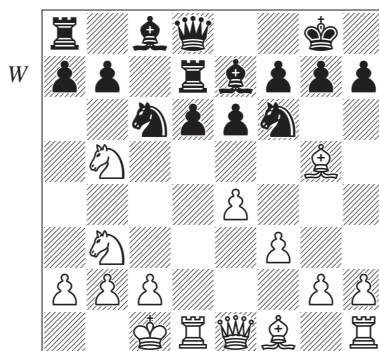
Chessmaster 9000: 12...b6
 Hiarcs 8: 12...b6
 Fritz 8: 12...b6
 Junior 7: 12...b6
 Nimzo 8: 12...a6
 Crafty 19.03: 12...♘f6
 Shredder 7.04: 12...b6
 Gandalf 5 beta: 12...b6
 Chess Tiger 15: 12...b6
 Gambit Tiger 2.0: 12...g5

All of the programs (except Gambit Tiger and Crafty) prefer a move that bolsters the queenside and in their main lines none of them show any intention of pushing the kingside pawns.

In the build-up phase of an attack the programs' suggestions are far from optimal and the reason is that the actual tactical consequences are beyond their horizon. Even in simpler positions where the kings have castled on opposite wings, it is not 'natural' for the programs to push their pawns to attack the opponent's king. Some programs will, however, award an evaluation bonus for pushing these pawns, just to get the attack started.

In the following diagram, there is no reason for White to postpone an attack on the kingside with the g- and h-pawns. The only obstacle for the white attack is his g5-bishop, which has to be moved, and then the kingside pawns can advance.

Anand pushed the g- and h-pawns at once, and the game concluded:



V. Anand – M. Tissir

FIDE World Cup, Shenyang 2000

13 g4 b6 14 h4 ♙b7 15 ♘5d4
 ♘xd4 16 ♘xd4 ♜c8 17 ♚b1 a6 18
 ♙c1 ♜dc7 19 g5 ♘d7 20 ♜h2 d5 21
 e5 ♙c5 22 h5 ♙xd4 23 ♜xd4 ♘f8 24
 ♙d3 ♜d7 25 g6 1-0

A very logical and simple plan, flawlessly executed by Anand. The general idea is not difficult to understand for humans, yet this kind of strategic build-up is still beyond the reach of many modern programs. When we arrive at move 22, most programs will start to notice what is going on, as the opening of the h- or g-files is within their horizon, and at this point they begin to show evaluations that favour White. However, it takes some time to reach this position, and the programs do not possess the planning abilities to do that. There are 25 plies from move 13, when the g-pawn is pushed, to move 25, when White starts to open files on the kingside. It is not that the programs dislike the h- and g-pawn