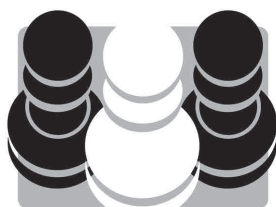


# THINK LIKE A MACHINE

By

# Noam Manella & Zeev Zohar

**Chess Advisor – GM Ram Soffer**



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# Contents

Key to symbols used	4
Personal Notes by the Authors	5
Preface	9
Bibliography	12
Foreword by GM Sam Shankland	13
Introduction by GM Ram Soffer	17
Preview Diagrams	23
1 Against the Instinct	37
2 Total Chess	95
3 Beyond the Horizon	117
4 Spectacular Attacks	135
5 Cold-Blooded Defence	151
6 Endgame Fantasy	177
7 Machine at the Board	203
8 Twist it!	211
Name Index	240
Index of Games	244

# Preface

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The most exciting area in the world of chess right now is the connection between computers and human creativity. AlphaZero lit the imagination of millions by defeating Stockfish, having “taught itself” to play chess over just a few hours, without any built-in human knowledge. Those AlphaZero games looked like chess from another universe.

Human chess has always been based on common premises about right and wrong, on thinking patterns which are the product of experience, on the psychology of risk-taking, aversion to a loss, time management, and taking decisions in circumstances of uncertainty. Computer chess, on the other hand, is free from all these factors. By default, engines always check moves which most chess players, including those belonging to the elite, reject immediately on intuitive grounds. Engines are unaffected by human characteristics and emotions such as concentration (or lack thereof), fatigue, excitement, fear and so on. Therefore, the number of tactical errors in modern computer chess is negligible.

In this book we investigate the kinds of moves which are recommended by chess engines, and yet top players have a hard time finding those moves during a game. Is there any connection between such moves in different positions? Can humans learn to “think” like a machine? Those were the questions with which we started our journey. The upshot of this journey is the book you are holding right now.

In our first book, *Play Unconventional Chess and Win*, which won many accolades, we dealt with breaking the classical chess paradigms as a consequence of the rise of computer chess. Since then, computer calculating ability has risen sharply, engines have become more sophisticated and their level of analysis has reached new heights. In this book we were not interested in moves connected with the apparently infinite calculating depth of engines. Such long analyses are obviously beyond human reach in game conditions. We rather looked for deep unconventional ideas which are contrary to common human assumptions and habits, but totally within human capabilities. We think that **it’s time for another leap in human chess thinking**.

In our adventurous journey we have collected moves, concepts and ideas, recommended by engines but missed by top players during their games, and in the case of games from the pre-computer era, also during their analysis. Once those moves are revealed to us their logic immediately becomes comprehensible (or even obvious). Nevertheless, during a game it’s very easy to miss them. Why does this phenomenon occur time after time? We have tried to answer this question by deciphering the limitations and failings of common human thinking. Our aim is to help human chess players to create a new “engine-wise” intuition. Such an encounter with chess moves which usually remain “behind the scenes” will enrich their analytical powers during a game. In this book, those moves which remained behind the scenes are our “heroes”.

Some people claim that today's top players find it hard to play creatively. Many elite games (at least at the classical time control) end in tepid, boring draws. The very small difference in strength, combined with the fear of losing, apparently leads to bland games, lacking in brilliance. Some critics tend to blame the computer for this situation. Surely the fact that top players (and their helpers) spend huge amounts of time on computer preparation, finding antidotes to everything, contributes to those drawish outcomes. On the other hand, many claim that technological progress combined with the fact that chess software is clearly stronger than top human players, makes a huge amount of knowledge easily available to human chess players, enabling them to have a glimpse at novel ideas, challenging their common chess thinking and helping them to achieve a breakthrough in their game.

The work on this book proceeded around the world, using social networks. As mentioned earlier, it all started with a Facebook post, asking chess players to send us games in which during the engine post-mortem they encountered amazing, unexpected moves and ideas. We were looking for moves which were well within human calculating abilities, yet very hard to find due to conceptual barriers. Happily, grandmasters from all over the world sent us their positions and analyses. The chess community became excited about this project and helped to enrich this book with many inspirational examples.

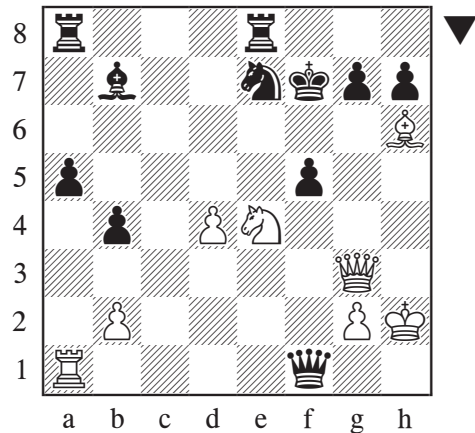
We hope that computer experts and AI researchers will also find interest in those examples, and will be able to export these ideas to other fields, thereby enriching human thinking in this amazing technological era in which we live.

Nowadays chess players have more resources to look for new creative ideas; such ideas are abundant in engine analysis. In this book we collected dozens of examples where engines suggest moves which at first sight look absolutely crazy, but upon careful examination their inherent logic becomes apparent. Those ideas may be tactical or positional, and they even crop up in endgames which otherwise look extremely boring. Some of them are attacking, some defensive.

The following position appeared in Alexei Shirov's celebrated book, *Fire on Board*. Actually, it didn't occur in the game, but Shirov foresaw it during the game (before playing his 22nd move), while planning 25.♙h6!!.

### Alexei Shirov – Oleg Nikolenko

Moscow 1991 (variation)



When the game was played in 1991, Shirov thought that White was winning, but before publishing his book he computer-checked the game. Shirov confesses: "I still believed White's chances were better until Fritz4 found the really astonishing 25...♙f4!! when the position is about equal." As we can see, Fritz4, a "primitive" engine in comparison with, say, Stockfish 10, was already able more than

twenty years ago to find great moves which eluded even the most talented grandmasters.


If instead 25...♙xe4 26.♖xg7† ♕e6 27.♗xf1 then White has a strong initiative, or 25...♖xa1 26.♖xg7† ♕e6 27.♖e5† ♕d7 28.♗f6† ♕c8 29.♙f4 and White wins.

After 25...♖f4!! 26.♙xf4 ♙xe4, material is roughly equal and the black king is safe.

When this position was given as an exercise to some of Israel's most talented junior players, no one found 25...♖f4!!.

We must emphasize that finding 25...♖f4!! does not require the ability to calculate long variations. Once a human player considers this move, he will realize that it's a good one and understand its logic (deflecting a white piece from the attack on g7 and keeping the black king safe). However, even the extremely talented tactician Alexei Shirov didn't consider it without being prompted by an engine, because it is a fantastic, highly unconventional idea, absolutely contrary to human intuition, patterns, habits, etc. In this book we are looking for precisely this kind of move. In chess literature they are often called "computer moves".

The book is divided into chapters called "Twists". First of all, we present the actual human game (or game fragment) with "human" commentary (in the style of the pre-computer era). Then comes the Machine Twist, where the engine's suggestion is accompanied by engine analysis, revealing the "hidden layers" of that game. Most of our analyses were carried out by Stockfish 10 at a depth of about 30. We are aware that, in some cases, future stronger engines and/or deeper analysis may present a different picture.

We have used a special sign , signalling the moment where the human player went in the wrong direction.

We hope that you'll be excited by the engine's revelations, just as we were.

Your feedback is welcome! You may contact the authors via Facebook or email:

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Noam Manella, Zeev Zohar  
May 2020

# Foreword by Sam Shankland

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Working with computers is an intimate part of the life of a modern chess professional. Openings are studied in ChessBase with the assistance of databases and chess-playing engines. Memorization of openings and endgames is achieved with the support of computer programmes too. Like most chess players, professionals will analyse their own games with a computer, in order to understand the game better. All of these activities require a lot of creativity and an understanding of how computers work.

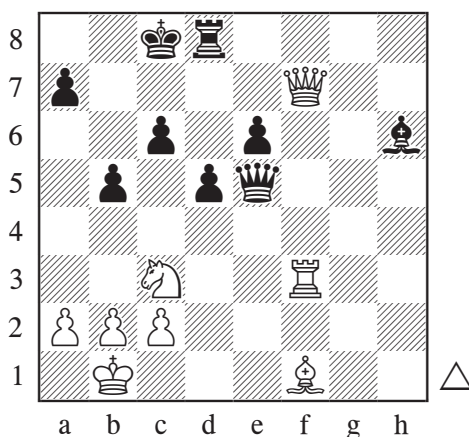
Without this work, it would never have been possible for me to reach my current level, but an additional factor helped me a lot in my development: the solving of difficult positions. My trainer Jacob Aagaard has spent a lot of time collecting positions, at first chiefly for the benefit of Boris Gelfand, and later mainly to help me improve. Jacob's day job is as an editor with Quality Chess. When the draft manuscript of this book landed on his desk, he recognized it as not only an interesting treatise on human thought and how it is influenced by computers, but also as a collection of great positions. Actually, Jacob had already spotted a lot of these positions himself.

During a ten-day training camp in California I was given the chance to solve the positions in this book, which was an excellent chance to work on imagination. We sent new suggestions and variations, as well as a few improvements back to the authors. I am glad to see that Noam Manella and Zeev Zohar have used them to improve the content even further. I wish them a lot of success with the book and hope the reader will enjoy it as much as I did.

As a final word, I want to share a nice position that could easily have made its way into the book – and now has.

## Adam Tukhaev – Stanislav Bogdanovich

Mumbai 2020

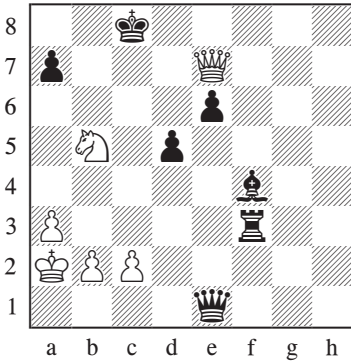


**26.a4!!**

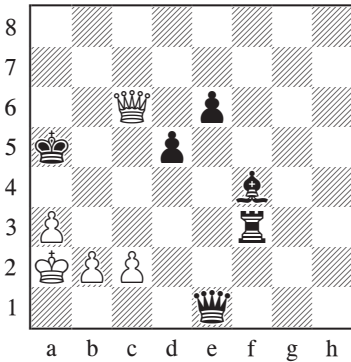
We shall see why this move is so great in good time. First let's see the alternatives:

26.♔e2! gives White a clear advantage, and was a decent choice. It is never wrong to hold on to your extra piece. This would very likely have been my choice, rather than going down the rabbit hole.

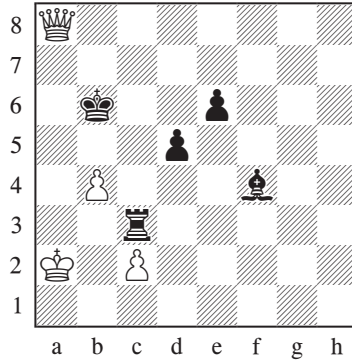
26.a3?! on the other hand, would be a much inferior version of the combination that we shall see below: 26...♖f8 27.♗e7 ♖xf3 28.♙xb5 cxb5 29.♘xb5 ♖e1† 30.♔a2 ♙f4 The only defensive try.



31.♘xa7† ♔b8 32.♘c6† ♔c8 33.♗d8† ♔b7 34.♘a5† ♔a6 35.♗a8† ♔b6 36.♗c6† ♔xa5



37.b4† ♖xb4 38.♗a8† ♔b6 39.axb4 ♖c3!± My feeling is that Black should make a draw with a fortress here, although one cannot be sure.



Most challenging is probably 40.♗a5† ♔b7 41.b5, but after 41...♖xc2† 42.♔b3 ♖e2 it seems that Black holds.

**26...♖f8 27.♗xf8? ❗**

This looks so natural. White gets three pieces for the queen, one of them a rook. But this also ruins the advantage.

27...♙xf8 28.♖xf8† ♔d7 29.axb5 ♔e7 30.♖f3 d4!:

Black in turn missed his chance to equalize with: 30...cxb5! 31.♘xb5 ♖e1† 32.♔a2 ♗d1!

**31.♘e2 cxb5 32.♖f4?!**

A very natural-looking move, but it turns out that stronger was 32.♘c1!±, which would control all the important squares.

**32...b4?!**

32...d3! was stronger, making it more difficult for White to keep everything under control.

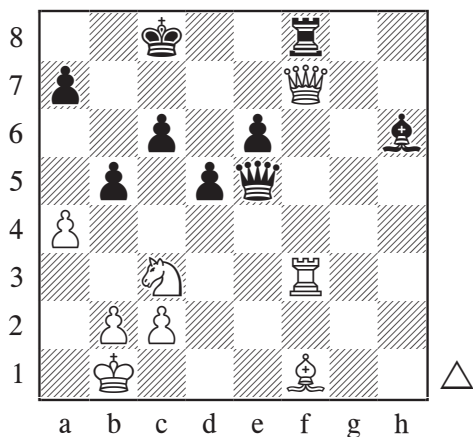
**33.♖xd4±**

Finally, the game entered a more consistent phase and White managed to convert the advantage.

33...b3 34.♖d1 bxc2† 35.♔xc2 ♗f5† 36.♔c1 ♗g5† 37.♖d2 ♗b5 38.♙g2 a5 39.♘c3 ♗c5 40.♔b1 ♗c4 41.♖e2 ♗d3† 42.♔a2 ♔f7 43.♖e4 ♗d6 44.♙f1 e5 45.♙c4† ♔g6

46.♔d5 ♕f5 47.♖c4 ♜b6 48.♖c6 ♜a7  
 49.♔b3 ♜b8 50.♖c5 ♜b6 51.♔c2† ♕e6  
 52.♖b5 ♜d8 53.♕a3 ♖c7 54.♕a4  
 1-0

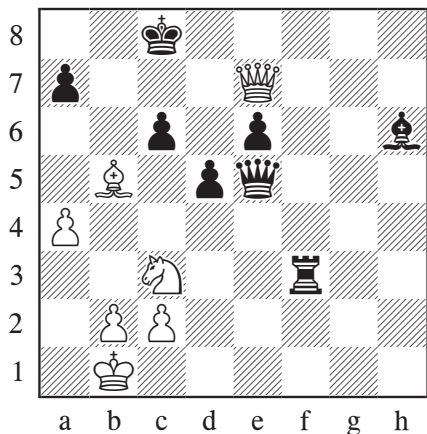
The Machine Twist



The winning combination was spectacular, and once White had played 26.a4!! there is no excuse for not finding it.

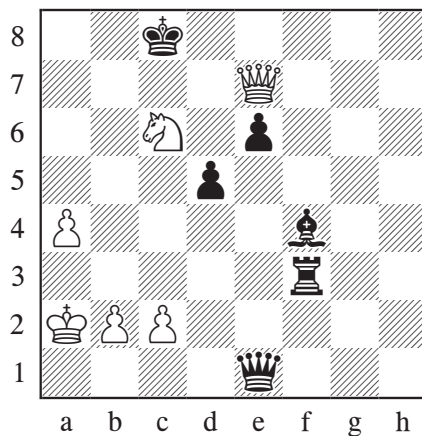
27.♜e7! ♝xf3 28.♔xb5!!

The key point.



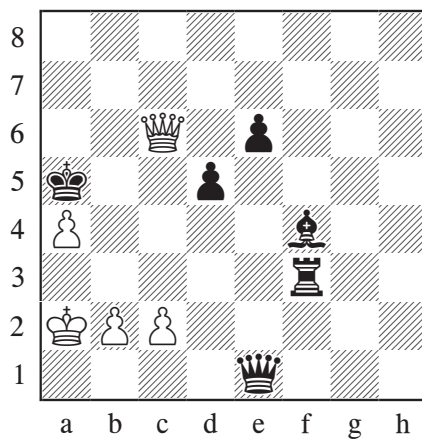
28...cxb5 29.♘xb5 ♜e1† 30.♕a2 ♔f4  
 The only defensive try.

31.♘xa7† ♕b8 32.♘c6† ♕c8



33.♜d8† ♕b7 34.♘a5† ♕a6 35.♜a8† ♕b6  
 36.♜c6† ♕xa5

We now see the clear difference between 26.a3? and 26.a4!!, 11 moves down the line.



37.♜b5#

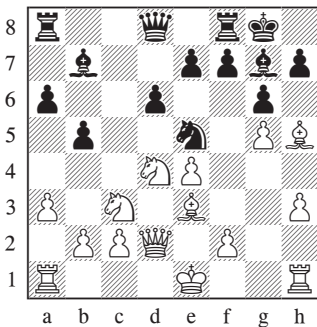
GM Sam Shankland  
 Walnut Creek, April 2020



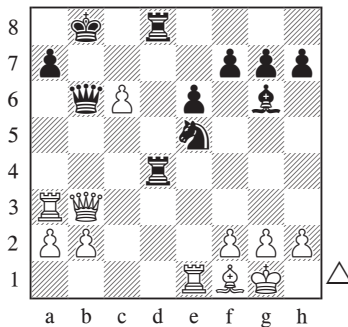
# Preview Diagrams

With this book we put forward an argument for a next step in the evolution of human thinking. We are certain that some people will like our ideas and some will be sceptical. It is the nature of debate. But a chess book, to be successful in its own right (we are not talking about commercially, which is a different and to us much less important matter), has to be about chess as well, not just ideas about chess. We thoroughly hope that the readers will find this book entertaining and the chess positions we have found fascinating. Improvement in chess requires an active mental engagement with the material. Therefore we have made it possible for you to use this book as an exercise book. We have collected the machine twists here in a diagram preview. Happy solving!

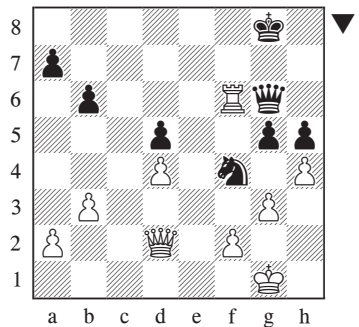
## Preview of Chapter 1 – Against the Instinct



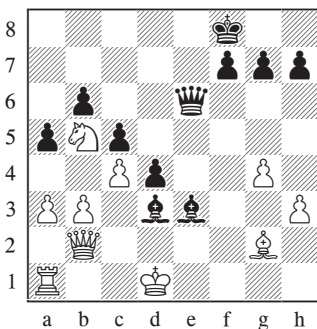
*Black to play*  
(see page 39)



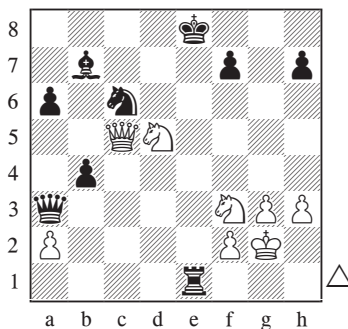
*White to play*  
(see page 42)



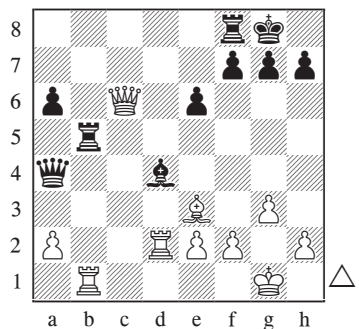
*Black to play*  
(see page 45)



*Black to play*  
(see page 41)



*White to play*  
(see page 43)



*White to play*  
(see page 46)

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# Chapter 4

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## Spectacular Attacks

In the nineteenth century, it seems that everyone was attacking most of the time. Then, following Steinitz, many players began to prefer positional play, though good attacks were regularly seen throughout the twentieth century.

With the emergence of computer chess, the awareness of defensive possibilities grew considerably. Many famous attacks, which attracted universal praise at the time, have now been refuted by engines. This includes the elite attackers, such as Alekhine, Tal, Kasparov, Stein, Nezhmetdinov, etc.

The defensive ability of top human players has in turn developed, and nowadays would-be attackers have lost the confidence that their intuitive attack will actually succeed; they suspect a good defence will somehow always be found. Having already seen many computer refutations, the self-confidence of today's attackers is reduced. In the following examples we will try to rebuild the faith in speculative, attacking play.

### **4a: Storm the Barricades**

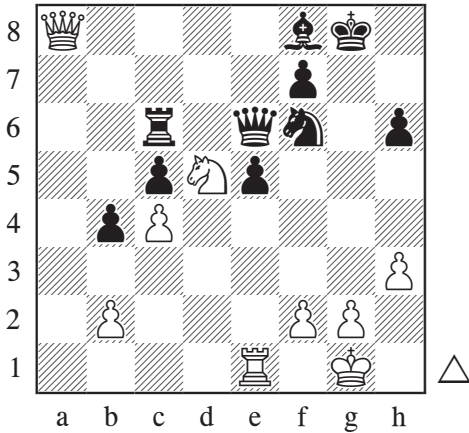
Statistically, most chess sacrifices also involve the capture of enemy units, which is quite understandable (it limits the material cost of the sacrifice and eliminates defensive resources). This section deals with non-capturing sacrifices on well-defended squares, usually deep within enemy territory. This is a known subject in chess literature, but such moves always light up the imagination, as they usually involve many variations which are quite tough to calculate. This makes them inaccessible to players who don't trust their creative ability.

**GAME 57**

Sometimes this kind of move is missed by two elite players. Is this a fluke? Not in rapid chess.

**Wesley So – Magnus Carlsen**

Paris (rapid) 2017



Earlier White had committed a serious tactical error. Here So tried his last chance.

**35.♞e3!**

He correctly assessed that attacking the black king was a better practical chance than 35.♖e7+ ♗xe7 36.♛xc6.

**35...♖e8?**

A serious oversight. However, White's next move is a very tricky one to spot in a rapid game.

Meanwhile, any other normal knight moves, namely 35...♖h7, 35...♖d7 and even 35...♖h5, were all winning.

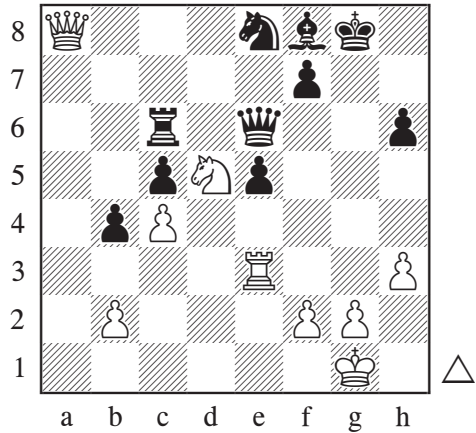
**36.♞g3? ❗**

White failed to spot his opportunity and went down without a fight.

36...♖h7 37.♞f3 e4 38.♞f4 ♗a6 39.♞xf7+ ♗xf7 40.♗xa6 ♚g7 41.♗c6 ♜d4 42.♖h2 ♞g7

43.♖e3 ♗f4+  
0-1

**The Machine Twist**



**36.♖f6+!!**

This brilliant sacrifice not only saves the game, but even gains the upper hand.

Why is it so hard to find?

In addition to the calculation requirements under the constraints of a rapid game, there exists a significant psychological barrier. A securely planted knight on a central outpost is highly valued by good chess players. Note that on the previous move Wesley refused to trade this knight for the black rook. Now he had to consider giving it up seemingly for free!

**36...♗xf6**

Probably the best option.

36...♖h8 37.♞g3 ♚g7 38.♖xe8 ♞c8 39.♖xg7 ♞xa8 40.♖xc6 fxe6 41.♞g6 leaves Black struggling in an endgame.

36...♖xf6 37.♞g3+ ♖g4 (37...♖h7 38.♗xf8 wins for White) 38.♞xg4+ ♗xg4 39.hxg4 is similar to the main line, but with a better pawn structure for White.

37. ♖xe8

Now it is Black's turn to find a sophisticated defence.

37... ♖g6!

37... ♖d6?! 38. ♖g3† ♔h7 39. ♖xf8 ♖d8 40. ♖xc5 and White is a healthy pawn up.

37... ♖d6?? even loses after 38. ♖g3† followed by ♖xf7.

38. ♖g3 ♖xg3 39. fxg3 ♖e6

White is clearly better, though it is not easy to demonstrate a win.

25. ♖ac1! ♖c4?

At this point 25... ♔h2? allows a purposeful response: 26. ♔xg5† fxg5 27. ♖xh8 ♖xh8 28. ♖c7 with strong counterplay.

26. ♖d4 b5 27. ♖a5?

White goes pawn-grabbing while his house is burning.

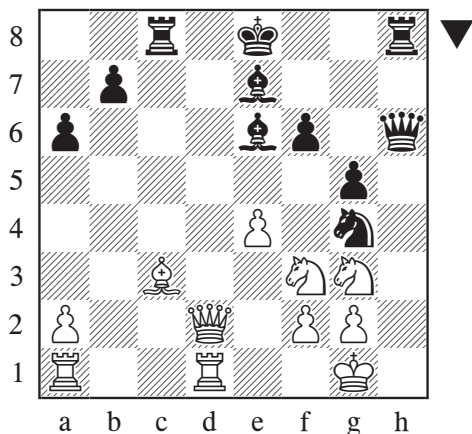
He should have played 27. ♖xc4! ♖xc4 28. ♖c1 ♔h2, and now the counter-strike 29. ♔xg5† ♔g6 30. f4 leads to extreme complications, for example 30... fxg5 31. f5† ♔h7 32. ♖xh8 ♔g4 33. ♖xc4 bxc4 34. ♖d4 ♖f8! and so on.

### GAME 58

The deeper you penetrate into enemy territory, the harder it becomes to calculate and see your tactical options from afar.

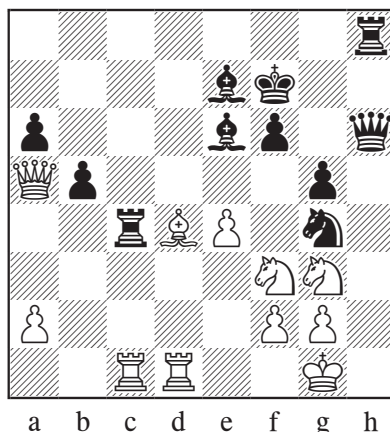
Georg Meier – Fabiano Caruana

Baden-Baden 2018



24... ♔f7? ♚

A slow and logical move, but this position required a more creative approach. Black missed a tactical blow deep within the enemy camp.



27... ♔h2!?

Finally, though a bit late. See the Machine Twist.

28. ♖xa6?

He should have kept his knight alive with 28. ♔e1! when Black might repeat the position by 28... ♔g4 29. ♔f3 and then try 29... ♖d6, but 30. e5! ♔xe5 31. ♖xe5 ♖xe5 32. ♔xe5 fxe5 33. ♔f1 keeps White in the game.

28... ♔xf3† 29. gxf3 g4?

Black could have won instantly by 29... ♖h2† 30. ♔f1 ♖hc8!, when 31. ♖b1 is met by 31... ♖xd4! 32. ♖xd4 ♖c2. In the game he eventually won after further mutual errors.

### The Machine Twist

*Initial position*

#### 24... ♖h2!!

This knight move does not make sense unless you have already envisioned its next move, even deeper into enemy territory.

#### 25. ♖d4?!

25. ♖xg5?! succumbs to the fatal blow 25... ♖f1!!, with similar variations to our main line.

#### 25. ♖e1

This is a much tougher defence. The machine demonstrates a forced win, but in an actual game White could ask Black some tough questions:

25... ♖g4 26. f3 ♖h4 27. ♖f5 ♖xf5 28. exf5 ♖c4

With a strong double threat.

29. ♖d7† ♖f8 30. ♖d3!?

The first challenge.

30... ♖xc3?!

30... ♖d8! is a clear win.

31. ♖ac1!?

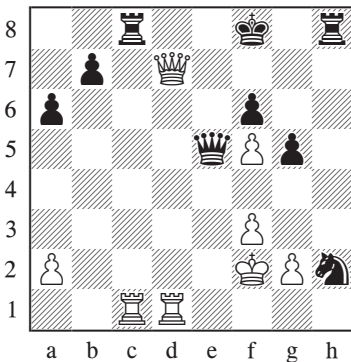
The second challenge.

31... ♖c5†!

31... ♖xc1? 32. ♖xc1 ♖c5† 33. ♖d4! ♖xd4† 34. ♖xd4 ♖xc1† 35. ♖f2 and Black cannot escape from the perpetual.

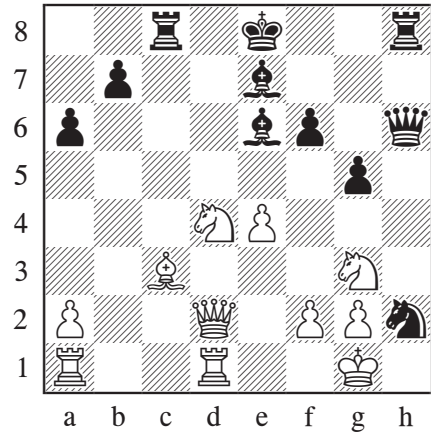
32. ♖f2 ♖xf2† 33. ♖xf2 ♖b2† 34. ♖g3 ♖e5† 35. ♖f2

The third challenge:



35... ♖g4†!! 36. fxg4 ♖f4† 37. ♖e2 ♖xg4† 38. ♖f2 ♖f4† 39. ♖e2 ♖e8† 40. ♖xe8† ♖xe8 41. ♖c8† ♖e7 42. ♖xh8 ♖e4† 43. ♖f2 ♖xf5†

And Black should win.



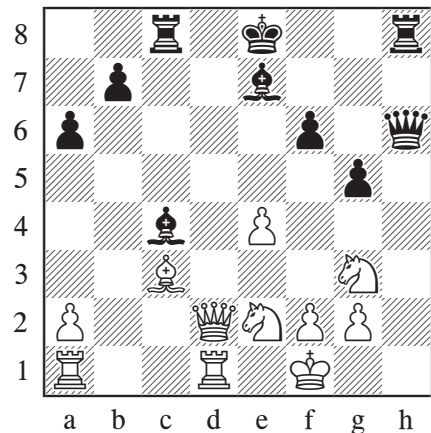
#### 25... ♖f1!!

The deeper you penetrate into enemy territory, the harder it becomes to calculate and see your tactical options from afar.

#### 26. ♖xf1

White has nothing else, as 26. ♖d3? ♖c4 wins for Black.

#### 26... ♖c4† 27. ♖de2



#### 27... ♖h1†!

The final blow. Of course, Black must spot this before playing 24...♖h2!!.

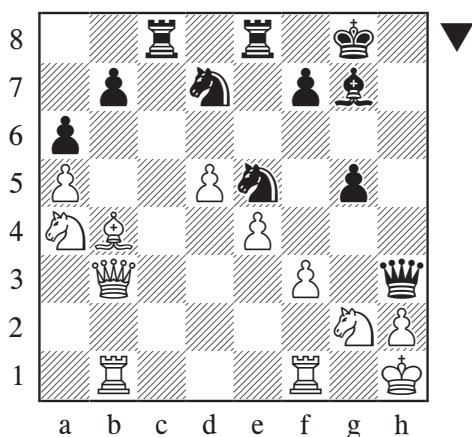
28.♖xh1 ♜xh1#

### GAME 59

Can you spot the brilliant move missed by one of the world's most exciting young talents?

#### Fabrizio Bellia – Alireza Firouzja

Tegernsee 2018



30...♖g6? ♜

A routine move, although Black later won the game anyway.

#### The Machine Twist

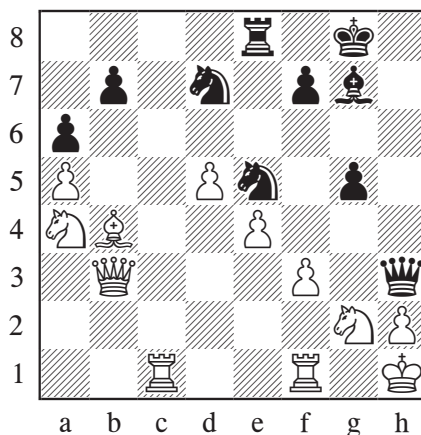
*Initial position*

30...♜c1!!

A non-capturing sacrifice on a doubly guarded square. It works because each of the white rooks is fulfilling a vital role on its current square. Once the intruder is captured, White's position collapses.

31.♜bxc1

31.♜fxc1 ♖xf3 32.♜xf3 ♜xf3 and White's position is torn apart.



31...♖g4 32.♜d6 ♜e5 33.♜xe5 ♖dxe5

White must give up his queen in order to prevent mate.