

**Matthew Sadler**

# **The Silicon Road to Chess Improvement**

Chess Engine Training Methods, Opening Strategies  
& Middlegame Techniques

**New In Chess 2021**

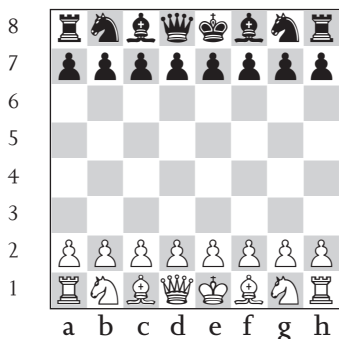
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## Explanation of symbols

### The chessboard with its coordinates:



- ! good move
- !! excellent move
- ? bad move
- ?? blunder
- !?! interesting move
- ?! dubious move
- # mate
- ch championship
- zt zonal tournament
- izt interzonal tournament
- ct candidates tournament
- tt team tournament
- ol olympiad
- m match
- cr correspondence

- White to move
- Black to move
- ♚ King
- ♛ Queen
- ♖ Rook
- ♜ Bishop
- ♞ Knight

# Introduction

This book is both a collection of games and a series of lessons on positional play and aims to amaze, entertain, and instruct! The primary source for the games and positional lessons is a treasure-trove of brilliant games that is largely unknown by the wider chess community: the games of superhuman-strength chess engines from the TCEC (Top Chess Engine Competition). In addition, this book continues the exploration of the games of DeepMind's AlphaZero that Natasha Regan and I started in our book *Game Changer*. Finally, it also makes use of the thousands of chess engine games I have run privately in the past few years to assist me in my preparation and analysis.

What is a chess engine? A chess engine is a piece of computer software that plays chess. Chess engines are available for many different devices – the SmallFish app on my iPhone has been my faithful companion and adversary for many years – and the two strongest engines – Stockfish NNUE and Leela Zero – are open-source projects that are freely available for download and use by all chess players. Chess players use these superhuman-strength engines to assist in preparation for their games, and sites like the TCEC (<https://tcec-chess.com>) and Chess.com run regular competitions between them.

I defined three goals when writing this book:

1. to share my enthusiasm with you for the finest chess on the planet!;
2. to share my insights into how to use engines to analyse and improve your own game;
3. to highlight themes and ideas used by the strongest engines in the opening and middlegame to provide you with a new and powerful set of tools for your own games.

The last point requires additional explanation. After the publication of *Game Changer*, Natasha and I went to many chess clubs around the country giving talks about AlphaZero games. Two common questions were, 'Can I learn from AlphaZero's games? Aren't they too advanced for me?', to which the answers are a resounding 'Yes!' and a resounding 'No!'. It is however important to be clear about what we should learn from engines. We cannot replicate the depth of their calculations nor the breadth of the variations they considered to develop their plans. However, we can summarise the results of their deliberations in words and then reuse these fantastic plans

by analogy in our own games. In this way we let the engines do the heavy lifting of calculating and unearthing ideas, and then apply the unique human skill of abstracting the essentials so that we can exploit these ideas in varied (and sometimes unexpected) ways in our own games!

This book is aimed primarily at a broad audience of chess players who wish to improve their knowledge and practical play and does so by:

1. adding new plans and ideas to their existing opening and middle-game ‘toolboxes’ – many of the games in this book are model games for handling typical middlegame positions arising from openings such as the King’s Indian, Benoni, French, (Semi)-Slav, and Sicilian openings;
2. helping them to use their engines more effectively and to better understand the moves they suggest;
3. providing insight into chess at the highest level in a comprehensible manner.

This book is also aimed at chess lovers who are curious and keen to discover unknown brilliancies from the strongest chess players the planet has ever seen!

This book is designed to be read in any order. Feel free to dip at random into games and themes that take your fancy! The core of the annotations are explanations in words; play through as many variations as you feel is necessary for additional context and detail, but you do not have to play through all of them to grasp the fundamental lessons behind each game or chapter. I have always tried to highlight the most beautiful variations – of which there are many – with diagrams.

For those who are completely new to chess engines, I would however recommend starting with the next chapter – Chess Engine 101 – which will teach you the basic knowledge necessary to be an enthusiastic follower of the chess engine world (like me!). Practical players and coaches should also find the chapter ‘Training with engines’ particularly useful as it distils my experience in working and training with engines into seven different approaches, illustrated with previously unseen examples from my own secret training games.

Next to this book, I will make supplementary material available for download describing how to install and configure engines for the training approaches I describe. The reason for not including this material in the book itself is derived from a basic truth learnt during my career as an IT consultant: such instructions need constant updating (as a website changes or a new version of a program appears with different features and menu

options) and this is easier to achieve via separate additional material than through a new edition of a printed book!

Although I have been enthusiastic about computers and chess since my youth, engine chess truly became a passion after encountering AlphaZero's games and the amazing DeepMind team in 2018 during the writing of *Game Changer*. Most of my chess work since has revolved around analysing engine games. These games have been a constant source of inspiration and wonder and I feel that they have enriched my chess understanding considerably. I hope that this book will have the same effect for you!

### **Acknowledgements**

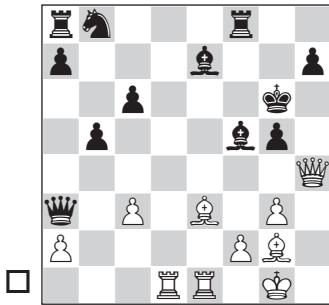
A big thanks to the whole TCEC team for their amazing and unique work. A special thanks to tournament director Anton Mihailov and right-hand man Kanchess, non-stop system admin Aloril (with help from Kari Keronen), book specialists Eduardo Saucedo (League 2), Bastiaan Braams (League 1), Nelson Hernandez (DivP) and Jeroen Noomen (SuperFinal), super GUI designer Octopoulo, and last but certainly not least, the sponsor Bojun Guo (noobpwnftw). I'd also like to mention Guy Haworth with whom I produced many reports on the TCEC SuperFinals – he will be greatly missed. And finally, I also want to thank all the colourful and friendly chatters who have made watching the TCEC such a funny, exciting, and instructive experience!

## AlphaZero

### AlphaZero

#### Stockfish Classical

Computer Match 12.2017



### 26. ♔h1!!

This proof of concept for self-learning algorithms by London-based artificial intelligence research company DeepMind took the chess world by storm when ten games of a match between AlphaZero and Stockfish Classical (version 8) were released in December 2017. Not only had AlphaZero beaten Stockfish Classical by a convincing margin but the manner of its victory was even more astounding. The games showed early pawn and piece sacrifices and an amazing ‘intuition’ for long-term compensation. Additional games were released in December 2018 together with the publication of a scientific paper describing the science behind AlphaZero, followed closely in January 2019 by the book *Game Changer* which I co-authored with Natasha

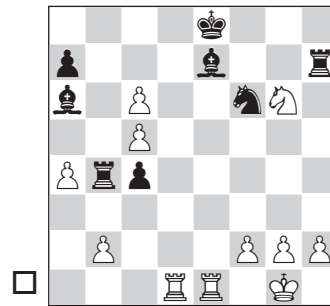
Regan and which described how AlphaZero thinks, trains, and plays. AlphaZero was never released as an engine but the scientific insights published by DeepMind inspired the series of strong neural network engines that were to follow AlphaZero, foremost amongst which is Leela Zero.

## Stockfish Classical

### Stockfish Classical

#### Leela Zero

TCEC Season 18 – 2020 (8.1)



### 26. ♜d6!!

Open-source Stockfish Classical was the eternal nemesis of the neural network engines, the Batman of traditional engines fighting the neural net Jokers and Riddlers! Stockfish Classical is a tactical monster, capable of the most breath-taking attacks and feats of calculation. This calculating power made it an extremely strong endgame player and an astonishing last-gasp defender. It won the TCEC SuperFinal eight times, losing two finals to Leela Zero but also beating

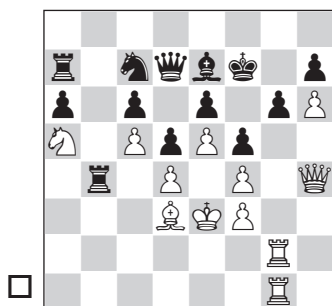
it in two, most recently in Season 18. Its Achilles' heel compared to Leela Zero was its evaluation and its opening play. It struggled notably on the black side of complex strategic openings such as the King's Indian and the French though these weaknesses became better camouflaged as TCEC Seasons progressed. However, Season 19 brought something new to the Stockfish engine: NNUE!

## Stockfish NNUE

### Stockfish NNUE

#### Leela Zero

TCEC Season 19 – 2020 (60.1)



#### 150. ♖h5!!

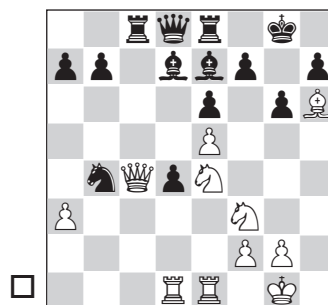
Stockfish NNUE uses all the calculating genius of Stockfish Classical but added a self-learnt evaluation component to its existing hand-crafted evaluation. This proved a mighty combination, and it was still the engine to beat going into Season 20! Although Leela Zero managed to pip it on tiebreak to win Season 20 DivP, the Season 20 SuperFinal was Stockfish NNUE's once more after a late burst of wins.

## Leela Zero

### Leela Zero

#### Stockfish Classical

TCEC Season 18 – 2020 (65.1)



#### 21. ♕xb4!!

Open-source Leela Zero is the strongest of the neural network engines inspired by the scientific papers on AlphaZero released by DeepMind in December 2018. Leela Zero first reached the TCEC SuperFinal in Season 14 (losing narrowly to Stockfish Classical 50½-49½) and reached five more finals, winning two and losing three.

Leela Zero's strengths have always been its opening play and its positional play with its tactics and endgame play - characterised by an extremely inefficient conversion technique – lagging far behind. Each Season brought improvements and it played magnificently in Season 19... only to run into the juggernaut of the even more improved Stockfish NNUE! However, a 59-41 demolition of



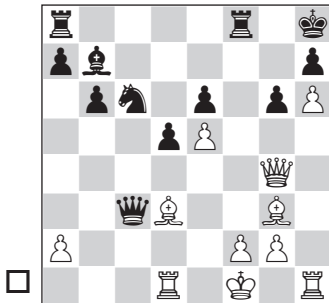
‘old-fashioned’ Stockfish Classical in a bonus event showed just how much it had improved and how ‘fortunate’ it was that the Stockfish developers put so much effort into incorporating NNUE into Stockfish! Leela made giant strides going into Season 20, winning DivP ahead of Stockfish on tiebreak but then just failing in the Season 20 SuperFinal.

## AllieStein

### AllieStein

#### Stockfish Classical

TCEC Season 18 – Top Of The Top 2020 (3.2)



27. ♖h4!!

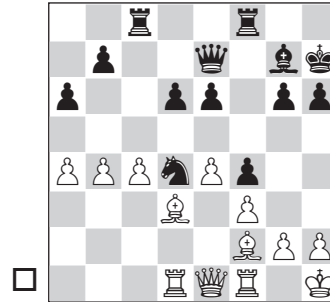
Another strong neural network engine that interrupted Leela Zero’s run in the SuperFinals by pipping it to a qualification spot in Season 16 (AllieStein lost 54½-45½ to Stockfish). It was my tip for greatness in Season 19 after a fantastic run in the end-of-Season-18 bonus events, but my prediction proved – alas, once more – unfounded as it performed in solid but uninspired fashion.

## Stoofvlees

### Stoofvlees

#### Komodo Classical

TCEC Season 19 – Division P 2020 (1.4)



29.e5!!

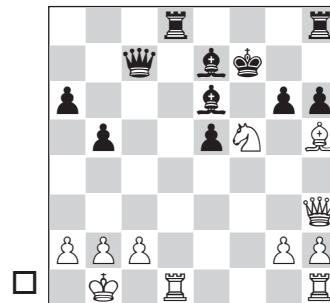
The Morozevich of the engine world, a crazy creative neural network engine capable of uniquely brilliant concepts and equally terrible blunders! You never quite know what you’re going to get with Stoofvlees, but it’s always worth watching!

## Komodo Classical

### Komodo Classical

#### AllieStein

TCEC Season 17 – Division P 2020 (30.1)



21. ♔g4!!

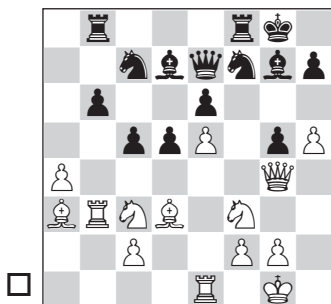
A grand old man of engine chess, having first won the TCEC Super-Final in Season 5 (beating Stockfish 25-23) and winning three more titles before losing heavily to Stockfish in Season 12 (60-40) and Season 13 (55-45). Its best games – mostly played in recent seasons against the unfortunate AllieStein! – are truly excellent but it has recently struggled to keep up with Stockfish and the neural network engines.

## Komodo Dragon

### Komodo Dragon

#### ScorpioNN

TCEC Season 20 – Division P 2021 (19.2)



23. ♖e4!!

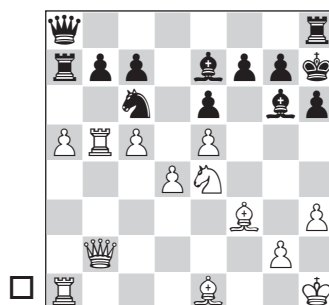
However, there is also the recently released NNUE version of Komodo – called Dragon – which could turn Komodo once again into a contender. For the moment, it still seems weaker than both Stockfish NNUE and Leela Zero, finishing third in the Season 20 Division P, but it has raced past all the other engines!

## Ethereal

### Ethereal

#### AllieStein

TCEC Season 17 – Division P 2020 (27.2)



30. ♘d6!!

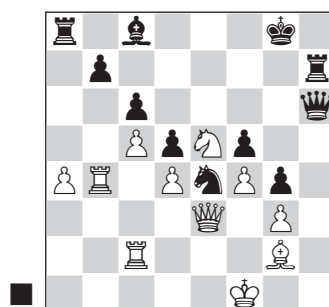
A traditional engine that has been a regular fixture in the TCEC Premier Division for several seasons.

## ScorpioNN

### Stoofvlees

#### ScorpioNN

TCEC Season 19 – Division P 2020 (35.1)



37...b5!!

A neural net that has played several times in the TCEC Premier Division. It survived relegation in

Season 19 by beating the mercurial Stoofvlees twice!

### Other engines

Other engines unfortunately have only a losing role in this book!

rofChade is a new traditional engine that has yo-yoed between League 1 and Division P in recent seasons. SlowChess is a newcomer, a strong League 1 engine and a contender for promotion to Division P.

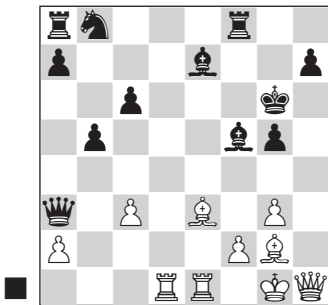
Fire and Houdini are two venerable engines that eventually disappeared from the TCEC competition.

### Illustrative game fragments

#### AlphaZero

#### Stockfish Classical

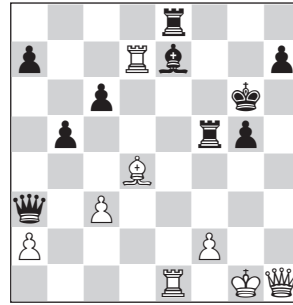
Computer Match, 12.2017



position after 26. ♖h1!!

Featured in *Game Changer*, this astonishing game was one of ten AlphaZero games originally released by DeepMind in December 2017. Having sacrificed a piece and a pawn for a kingside attack,

AlphaZero retreats its queen to the corner of the board. The key point is seen after 26... ♜d7 27.g4 ♙xg4 28. ♙e4+ when 28... ♙f5 (28... ♖g7 29. ♖xh7+) loses to 29. ♙xf5+ ♜xf5 30. ♜xd7 ♜e8 31. ♙d4

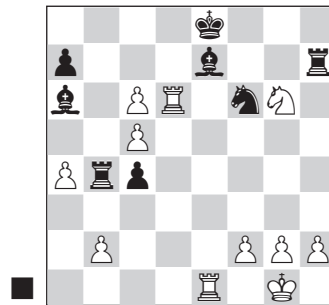


with unstoppable threats of 32. ♖xc6+ and 32. ♜e6+.

#### Stockfish Classical

#### Leela Zero

TCEC Season 18 – SuperFinal (8.1), 20.06.2020



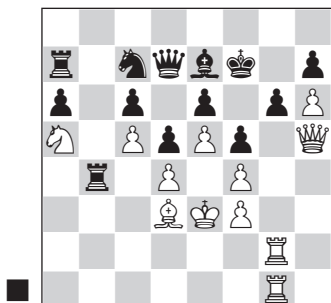
position after 26. ♜d6!!

This Stockfish Classical immortal is featured in this book! After multiple piece sacrifices, White plays 26. ♜d6 threatening both 27. ♜xf6 and 28. ♜f8 mate, and 27.c7 threatening 28. ♜xa6 and 28. ♜d8+.

## Stockfish NNUE

### Leela Zero

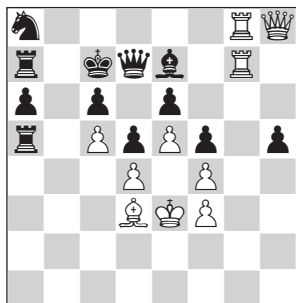
TCEC Season 19 – SuperFinal 2020 (60.1)



position after 150. ♖h5!!

It took 150 moves to get here, and not all of those were exciting but 150. ♖h5 was! White sacrifices its queen for nothing to activate its rooks along the g-file. Black's pieces are so constricted that White has time to capture the h7-pawn and march its own advanced rook's pawn to queen!

150...gxf5 151. ♖g7+ ♔e8 152. ♖xh7 ♔d8 153. ♖gg7 ♖a8 154. ♖h8+ ♔c7 155. ♖hg8 ♖a4 156. h7 ♖xa5 157. h8♖



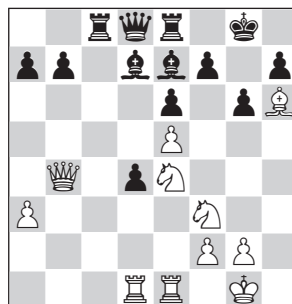
157... ♖b6 158. ♖e8 ♖c8 159. ♖xc8+ ♖xc8 160. ♖xe7+ ♔b8 161. ♖xc8+

♔xc8 162. ♖xa7 ♔d8 163. ♖xa6 ♖xa6 164. ♖xa6 h4 1-0

## Leela Zero

### Stockfish Classical

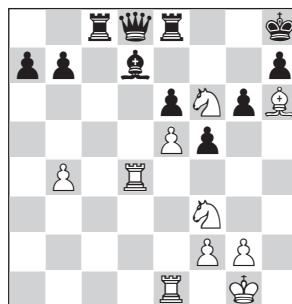
TCEC Season 18 – SuperFinal 2020 (65.1)



position after 21. ♖xb4!!

This Leela Zero immortal is also featured in this book! After the earlier sacrifice of three pawns, Leela sacrifices its queen for hegemony over the dark squares.

21... ♖xb4 22. axb4 f5 23. ♖f6+ ♔h8 24. ♖xd4



and White followed up with ♖ed1 and ♖g5, tying Black up completely before crashing through for the win.

## CHAPTER 3

# Training with engines

I have studied seriously with engines for some years and during that time I have tried out many different training approaches to get the most out of these incredible beasts! This chapter brings together my thoughts on seven different ways of training with engines. Instructions on how to set up your engines for the different training approaches can be found in the downloadable supplementary material.

### **Training approach #1: Playing rapid games (for example 15 minutes + 10 seconds increment) against Stockfish**

#### **Benefits:**

1. trains opening play
2. trains early middlegame play

This was part of my daily routine when I was commuting to work. In the train I would play one game against the excellent SmallFish app (Stockfish for your phone) with white on the way there and one game with black on the way back. In the evening I would go through the games quickly to see where I had gone wrong. I treated these games seriously and played either my best openings or openings I was learning and studying. I must make one thing clear: don't do this to boost your ego! I lost nearly all the hundreds of games I played! My focus in these games was to play the early phase of the game well and emerge with a promising (or at least playable) position. The

rest was in the lap of the gods! If you try this, you will be shocked at the difference between analysing openings with Stockfish running in the background and actually playing them against Stockfish! Playing your openings against a stronger player, you are assailed by doubts! Decisions that seemed obvious with Stockfish helping you suddenly become impossible to evaluate. This training is the best way to clarify what you have understood of your openings and where you still need to work. It is also a really good way to learn new openings by building up proper experience against a strong player before venturing them in proper tournament games.

I use this approach faithfully to prepare my openings for the 4NCL, a British team competition played over several weekends between November and May. I always tried to prepare one new opening per weekend and the last weekend I played in (February 2020, just before the COVID lockdown) was

no exception. I noticed that if I chose 1.d4, I was likely to face the Nimzo-Indian (1.d4 ♘f6 2.c4 e6 3.♗c3 ♙b4). I decided that I quite fancied trying a childhood favourite once more: the Sämisch Variation (4.a3). I'm not quite sure why this popped into my head, but I possibly came across a classic game somewhere that inspired me! In fact, this is the type of opening I normally avoid. I have always tried to design my openings with the following scenario in mind: I am White in the last round of an important tournament. A win would secure everything I want, a draw would be just about respectable, but a loss would leave me nowhere. I must be able to press without burning my bridges from the start. I have to assume that I am tired, and that I will not be able to calculate at maximum intensity throughout the whole game. The Sämisch accepts a severe positional weakness – the doubled c-pawns and the front c4-pawn in particular – from the fourth move so White will have to play energetically to compensate for this. I had some interesting ideas in certain concrete lines, but I needed to gauge whether I would react well to play in the typical Sämisch scenario where Black targets the c4-pawn while White tries to get kingside play going. I had a general concept to sacrifice my d4-pawn in all sorts of lines so... bring on Stockfish (well,

SmallFish)! Here are some of the games I played:

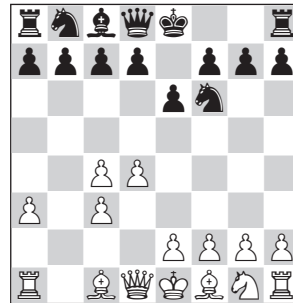
Game 1 Nimzo-Indian Defence

**Matthew Sadler**

**SmallFish**

Matthew 4NCL Training, 2020

**1.d4 ♘f6 2.c4 e6 3.♗c3 ♙b4 4.a3  
♙xc3+ 5.bxc3**



**5...c5**

5...♗c6 was recommended in an interesting recent book on the Nimzo-Indian by Michael Roiz and this was another stimulus for taking up the Sämisch. Roiz's lines for Black were interesting but there was plenty of scope for new ideas, so I was quite looking forward to getting those in a game!

**6.e3**

6.f3 ♗c6 is an awkward line for White. The pressure against d4 prevents White from developing smoothly with e2-e4, ♙d3 and ♗e2.

**6...b6**

Stockfish develops in clever fashion. White will have to waste a tempo on f2-f3 after ...♙b7. However, the light-squared bishop is often developed to a6 to attack

the c4-pawn so I wasn't sure this was so worrying for White.

7.♙d3 ♚b7 8.f3 ♜c6 9.♞h3

I want to sacrifice the d4-pawn to open the a1-h8 diagonal towards Black's king and the knight on h3 is ready to move to g5 in many variations.

9.♞e2 was my first attempt, but I didn't like the results of the Capablanca-inspired plan that Black implements in the game: 9...0-0

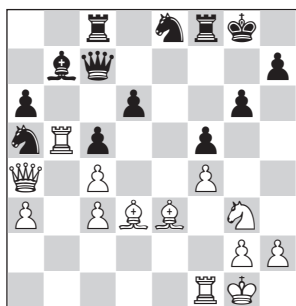
10.e4 ♞e8 (this excellent manoeuvre avoids the pin with ♙g5 and

prepares to meet f3-f4 with ...f7-f5, halting White's kingside expansion)

11.0-0 ♜c8 12.f4 f5 13.♞g3 (13.exf5 exf5 14.dxc5 bxc5 15.♞g3 g6. I have never liked these structures for

White, but after my disheartening experience with 13.♞g3, I thought I should give it a go. I abandoned this game quite quickly as I was totally

crushed! 16.♜b1 ♞c7 17.♙e3 ♞a5 18.♜b5 d6 19.♞a4 a6.

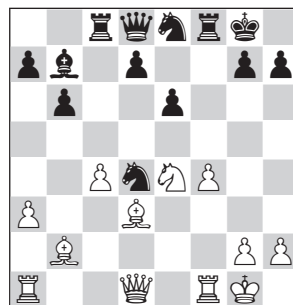


I'd missed this idea which refuted the activity I felt I needed to compensate for my awful structure. 20.♜b2 (if 20.♜xa5, 20...♙c6 wins the rook) 20...♙c6 21.♞d1 ♞f7 22.♜e2 ♞xc4 23.♙f2

♜b8 0-1 Matthew Sadler-SmallFish, Matthew 4NCL Training) 13...fxe4

14.♞xe4 cxd4 15.cxd4 ♞xd4

16.♙b2.



This was the way I wanted to play this system, sacrificing the d4-pawn to open the a1-h8 diagonal for my dark-squared bishop. I expected there to be some play – at least against a human

player. However, playing against Stockfish, I felt that all of its moves were fairly natural human

moves, and I could find no play whatsoever! 16...♞f5 17.♞e2 ♞e7 18.♜ad1 d5 (16...♞f5, 17...♞e7 and 18...d5 are not hard to find and the result is not inspiring for White)

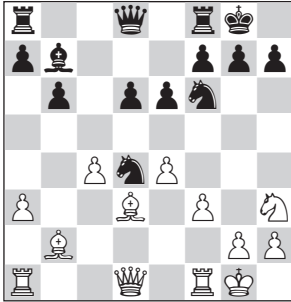
19.♞f2 dxc4 20.♙xc4 ♜xc4 21.♞xc4 ♞e3 22.♞d4 ♞xf1 23.♜xf1 ♞d6.

Black is a pawn up and converted without difficulty: 24.♞g4 ♞xd4+ 25.♙xd4 ♙a6 26.♜f2 ♞d6 27.♞e3 ♞e4 28.♜c2 ♜xf4 29.♜c7 ♜f7

30.♙e5 ♜xc7 31.♙xc7 ♞f7 32.♙b8 ♞f6 33.♙xa7 ♞d7 34.♞f2 ♞e7 35.♞g3 ♞d6 36.a4 e5 37.♞f5+ ♞c6 38.♞xg7 ♞b7 39.♙xb6 ♞xb6

40.♞g4 ♙d3 41.♞f3 ♞f6 0-1 Sadler-SmallFish, Matthew 4NCL Training.

9...d6 10.0-0 0-0 11.e4 cxd4 12.cxd4  
 ♟xd4 13.♙b2

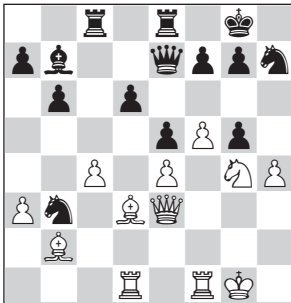


Again, I was hoping to get some interesting play on the kingside with the support of the dark-squared bishop along the a1-h8 diagonal.

13...♟c6 14.f4 e5 15.♚e2 ♜e8  
 16.♞ad1 ♞c8 17.f5 ♞d4 18.♚e3  
 ♟b3

White's c4- and e4-pawns are due to come under heavy pressure via ...♟a5 and ...♙a6 or ...♟c5 so White needs to get his kingside pressure going.

19.♟f2 ♚e7 20.g4 h6 21.h4 ♞h7  
 22.g5 hxg5 23.♟g4



This seemed interesting at the time, but Stockfish refuted it with consummate ease.

23...♟c5 24.♙b1 gxh4 25.f6 ♚e6  
 26.♞f5 ♟xf6 27.♟xf6+ gxf6 28.♟h2  
 ♟f8 29.♞df1 ♞d7 30.a4 ♟e7  
 31.♙a3 ♞g8 32.♞1f2 ♞xc4 33.♞d2  
 ♞g3 0-1

The result wasn't successful, but that was as expected. However, I was concerned by how little I had enjoyed playing these positions as White. I hadn't felt any of the potential of the white position; indeed, I had felt only desperation right from the opening as I sought to justify the concessions I had made.

I hesitated for a while longer, but decided in the end to discard the idea of playing the Sämisch. The more restrained choice I made in the end led to the excellent game Sadler-Horton analysed elsewhere in this book. Those practice games confirmed that the effort I had put into this opening had been wasted, which is never a pleasant feeling, but it also enabled me to select a line better suited to my mood and skills at that moment. Without them, I might have experienced these same feelings of depression during a real game!

It's also worth pointing out that preparation effort is never wasted. A washout for White is a future powerful weapon for Black! And I certainly won't claim that the games above are the refutation of the Sämisch. Maybe I will come back to the opening one day with a better conception of how to



play the opening, building on my mistakes from this session. Having done this work however, I already know a lot of lines that certainly DON'T work!

## **Training approach #2: Playing against Leela Zero restricted to a one-node search.**

### **Benefits:**

1. trains opening play
2. trains positional play
3. trains the ability to keep a position alive to give the opponent a chance to go wrong
4. trains the conversion of winning positions

This is a more enjoyable challenge than the first training approach! It was suggested to me by GM Peter Heine Nielsen and I've really grown to like it! As we discussed earlier, the evaluation of neural networks like Leela Zero is so good that its 'first instinct' is already good enough for a high level of play even before it starts to calculate variations. However, chess is such a tactical game that great evaluation alone is not enough to achieve a consistent level of play. If we restrict Leela's search to just one single node (ply) instead of the millions that it normally searches per move, Leela plays like a positional genius with flawed tactics!

This is a lovely challenge as you can learn from Leela's positional

play while retaining a fighting chance of beating it with tactics! I describe how to set up Leela in this fashion in the supplementary material and also explain how to get a little extra variety into Leela's repertory (which I didn't do here).

Especially for this book, I ran a 101-game match (I miscounted!) against Leela at one node search depth. The conditions were as follows. At this (lack of) search depth, Leela plays instantly; I tended to take between five and fifteen minutes for the game. I tried hard to avoid repeating any games; since Leela plays the same opening moves all the time at this level, I ended up playing quite a few different openings. I played the games at random times of the day and didn't prepare for them, but once I started, I took them seriously as I had promised I would share the result whatever it was!

In the end my score was 73 wins, 17 losses and 11 draws, making 78½-22½ in total. I am still shocked at losing so many games as I had expected a much more convincing score. I was however impressed with Leela's play under these conditions. Its opening and early middlegame play remains strong. I was worse out of the opening in many games, and there were certain openings – for example, the Sicilian Najdorf 6. ♗e3 e5 variation – where I suffered for the whole game without much

chance of more than a draw. Within these structures, I didn't seem able to create enough problems to confuse Leela. Moreover, its middlegame play with the initiative was surprisingly potent: I had not expected to lose so many games in this fashion.

Its main weaknesses are small tactics (obviously), defence and endings (Leela holds endings such as rook and two pawns against rook and one pawn on one side without any difficulty but can struggle in other types of endings). For this reason, playing against Leela in this configuration is an excellent way of training the skill of keeping a position alive to give the opponent a chance to go wrong as well as the determination to keep grinding in equal endings. Knowing that you are playing against a tactically vulnerable opponent develops self-confidence in these important skills.

Let's examine some games from the match. I'll start with a selection of three wins of mine which demonstrate the scenarios I had expected to happen quite often during the match! Then I will show two games in which I was astounded at how well Leela attacked and defended without calculation. Finally, I will end with two of the (many) games that stuck in my mind and which I enjoyed greatly!

## Matthew's expected scenarios: Leela's vulnerability to small tactics

Game 2 Nimzo-Indian Defence

**Matthew Sadler**

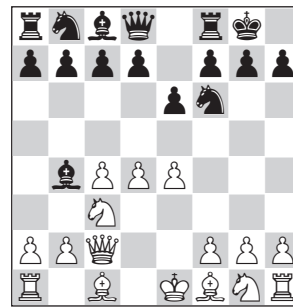
**Leela Zero (1 node)**

Matthew Engine Match 2020

**1.d4 ♖f6 2.c4 e6 3.♗c3 ♘b4 4.♞c2**

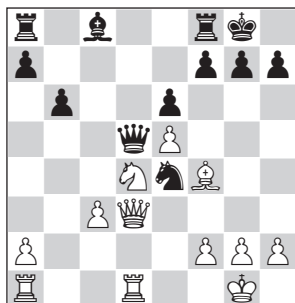
Leela only plays the Nimzo-Indian against 1.d4 so I tried many lines against it during the match!

**4...0-0 5.e4**



An ambitious early attempt to claim the central space that Black has left unoccupied. This sharp variation has been analysed exhaustively and now offers White little against a well-prepared opponent. Leela can be considered a strong opening player even without its calculating ability – it has certainly encountered this position many times in its training and drawn lessons from its games – so I wasn't expecting to get any advantage. I was hoping however for an unbalanced middlegame with plenty of tactics!

5...d5 6.e5 ♘e4 7.♙d3 c5 8.♘ge2  
 cxd4 9.♘xc4 ♘d7 10.♙f4 ♘dc5  
 Leela chooses the old main line.  
 10...♖h4 is automatic nowadays.  
 11.0-0 ♙xc3 12.bxc3 ♘xd3 13.♖xd3  
 b6 14.cxd5 ♖xd5 15.♗fd1

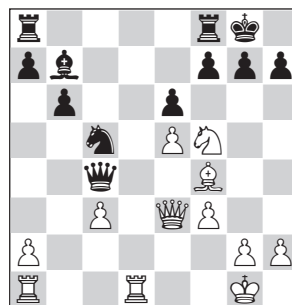


We are still firmly in theoretical territory. The position is a little deceptive. White's queenside structure is broken while the opposite-coloured bishops and the light-square holes in White's position give the visual impression that Black is fine. However, both Black's queen and knight are awkwardly-placed and vulnerable to attack (f2-f3 and c3-c4 as well as a discovered attack along the d-file once the white queen moves from d3) while Black's kingside is short of cover on the dark squares. Leela doesn't find a plan and walks into a simple tactical shot.

15...♘c5 16.♖g3 ♘e4

A poor move, putting the knight back into danger while leaving the black queen exposed on d5. 16...♖e4 has been played in grandmaster games, allowing Black to cover the kingside with ...♖g6.

17.♖e3 ♙b7 18.f3 ♘c5 19.♘f5 ♖c4



20.♘xg7

Decisive. Black's king has no protection.

20...♙xg7 21.♙h6+ ♙h8 22.♖g5  
 ♗g8 23.♖f6+ ♗g7 24.♖xg7# 1-0

### Matthew's expected scenarios: Leela's vulnerability in defence

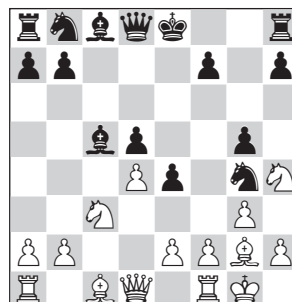
Game 3 English Opening

Matthew Sadler

Leela Zero (1 node)

Matthew Engine Match 2020

1.c4 e5 2.g3 ♘f6 3.♙g2 ♙c5 4.♘c3  
 c6 5.♘f3 e4 6.♘h4 d5 7.cxd5 cxd5  
 8.d3 ♘g4 9.0-0 g5 10.d4



During the match I switched between 1.c4, 1.d4, 1.e4 and 1.♘f3 to broaden the range of openings

## CHAPTER 4

# Introduction to themes

I enjoy engine chess in two different ways. From the perspective of improving my chess, I like to search for typical themes in engine games, to classify them and describe them to be able to reuse these themes in my own games (as Natasha and I did in *Game Changer* for AlphaZero's games). There are also rich games that illustrate many different ideas and I like to play through these and analyse them. The next chapters are a mix of both approaches. Around the many middlegame thematic chapters, I intersperse some fantastic engine games from recent years.

### Middlegame thematic chapters

The following middlegame themes are covered:

1. Defend like an engine
  2. Attacking rhythm
  3. Entrenched pieces
  4. Exchanging active pieces to leave the opponent with passive ones
  5. French structures
  6. March of the rook's pawn
  7. Engine sacrifices
  8. The king
  9. Whole board play
  10. Conversion of an advantage by transposing to a position with opposite-coloured bishops
  11. Developing major pieces by giving away the pawn(s) in front of them
  12. Invading through the channel the opponent opened
  13. Queen vs pieces
  14. Rook on the third
  15. The King's Indian Opposite Wing Pawn Storm
  16. Engine evaluations
- Each theme is explained in detail in the respective chapter.

### The annotated games

Each annotated game is introduced briefly and then a summary is made of the themes illustrated in the game. We track two categories of themes in this book:

**1. Specific opening themes.** Many of the games are models for how to play typical scenarios from specific openings (with both colours) such as the queenside pawn storm vs the kingside pawn storm in the King's Indian.

These opening themes are described in a subsequent chapter and an index of opening themes is provided at the back of the book.

**2. General middlegame themes.** This is the primary focus of this section of the book: to extract techniques from these engine games that will be applicable to situations you encounter from any openings. An index of middlegame themes is provided at the back of the book.

### **How the games have been annotated**

Just a brief description of how I have analysed games for this book. I start with an analysis session of a couple of hours during which I don't use an engine but try instead to generate ideas and formulate my thoughts about the course of the game. I divide these analysis sessions into periods of fifteen minutes. I normally analyse for two or three periods and then write up my analysis and then start analysing again. Writing my analysis down helps me greatly to clarify and sharpen my understanding of a position.

Once I've finished my efforts, I check my analysis with a live engine, hoping that not too many of my lines have tactical holes in them! At this stage, I normally have between ten and fifteen points in the game that I would like to investigate further. When selecting these, I try to focus on 'human' points: the moves that a human (like me!) would want to play but that an engine ignored.

I then put these positions into a file (see the supplementary materials for a description of how to do that) and then run a match between two engines from those positions. I normally let the engines play each position two or three times with both colours.

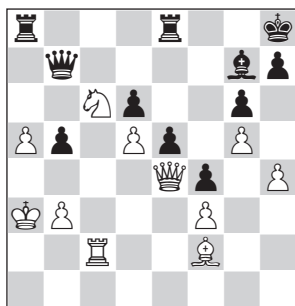
Once the engine match has been completed – it might be anything between 40 and 120 games depending how creative I was! – I play through all the games, picking out key games and adding them to my game annotations. These games are the ones entitled 'Matthew Engine Games' in the notes – simply engine matches I have run privately on my own machines for the purpose of investigating positions that interest me. Normally, a set of games raises more questions, so I repeat the whole process several times until all my questions have been answered.

At the same time, I start reducing and summarising all the information I have gathered. I try and use words as much as possible and limit the

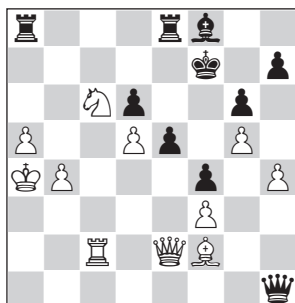
number of variations. I do try to leave the most spectacular games in the notes as such games help me greatly in retaining information.

Occasionally, if I still have doubts about my engines' play, I will play a small match of games myself against an engine. Having to make decisions for yourself is a good way to feel personally what the problems are in a position!

Not a place for the king that I would have thought of, but the king is completely safe there and indeed ready later in the game to advance into Black's queenside: look at these snapshots from later in the game!



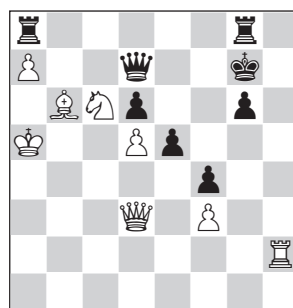
50. ♔b4



56. ♔b5

### Illustrative game

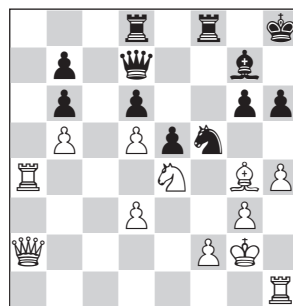
Stockfish wins a smooth King's Indian as Ethereal fails to find a plan in a slightly worse position. Stockfish judges the transposition to an endgame perfectly, its minor pieces keeping the black king away from its passed pawn in magical fashion!



68. ♔a6

### Leela Zero Stockfish Classical

TCEC Season 15 – SuperFinal 2019 (38.1)



34. ♔h3

Again this 'exotic' location for the king!

### Opening themes: King's Indian

- When to block the centre
- Fighting against black queenside counterplay

### Middlegame themes

- Whole board play
- March of the rook's pawn
- The king

Game 72 King's Indian Defence  
**Stockfish NNUE**  
**Ethereal**

TCEC Season 19 – Division P 2020

**1.d4 d6 2.♘f3 ♘f6 3.c4 ♘bd7 4.♗c3  
 g6 5.e4 e5 6.♙e2 ♙g7 7.0-0 0-0  
 8.♞e1 c6**

The TCEC book ended here.

3...♘bd7 is not Black's most critical line against the King's Indian Classical but has been played by many strong players. There are almost three thousand over-the-board games in my database from this position.



**9.d5**

The third most popular choice in this position (9.♙f1, maintaining the central tension a little longer, is by far the most common move) but also the choice of Ethereal and ScorpioNN when they played this position previously. In my youth I maintained the central tension in such positions for as long as I could, reasoning that with extra space to develop – and thus more flexibility – White should profit more from an undecided central situation than Black. The calculation overhead

incurred by both players in evaluating the central options at each move – dxe5, d4-d5, ...exd4 or leaving it as it is – is quite high but this was not something I feared as a fresh young player! As I got older, I became more inclined to release the tension earlier with d4-d5, partly due to reduced energy for calculation, partly as a result of having tried these structures as Black. I noticed that the release of central tension was not the end of Black's challenges!

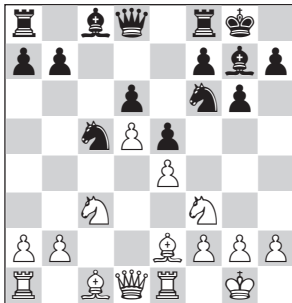
**9...cxd5**

9...c5 is an interesting option, transposing into something resembling 'The Modernized Delayed Benoni', popularized by grandmaster Ivan Ivanisevic. In Ivanisevic's move order (1.d4 ♘f6 2.c4 c5 3.d5 g6 4.♗c3 ♙g7 5. e4 0-0 6.♘f3 d6 7.h3 e6 8.♙d3 ♘bd7 9.0-0 e5 is a typical line) Black loses a tempo with first ...e7-e6 and then ...e6-e5; here Black has done the same with ...c7-c6 and then ...c6-c5. The reasoning behind the tempo loss is that the most dangerous lines against the King's Indian involve kingside pawn storms with g2-g4 and h2-h4-h5 such as the Sämisch Variation. While this threat exists, Black should retain the option of opening the centre to create counterplay. Once White castles kingside, Black is favourite to develop a kingside initiative by throwing forwards the kingside pawns so the centre no longer needs to be open.



**10. cxd5 ♘c5**

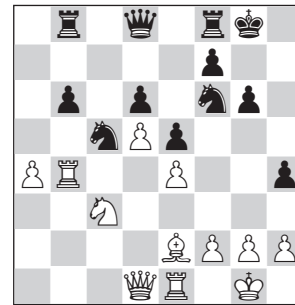
This plan is also logical, placing the knight on an active square attacking the pawn on e4. The challenge however is to keep it there!



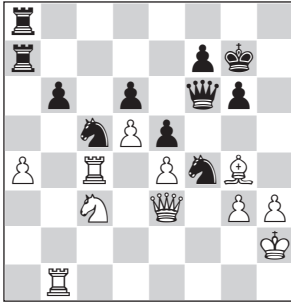
**11. ♕c2**

This move looks odd: why place the queen on an open file – which will soon be occupied by a black rook after ...♙d7 and ...♖c8 – to protect the e4-pawn when simply 11. ♙f1 is possible? The reason lies in White's future development plans. White wishes to place the bishop on e3 and transfer the knight on f3 to c4 via d2, targeting the d6-pawn. ♙e3 is not possible after 11. ♙f1 as the e4-pawn hangs and keeping the bishop on e2 protects the bishop on e3 from harassment from ...♘g4. 11. ♘d2 was tried in one of my engine games between Stockfish Classical and Stockfish NNUE. White aims for the same ideal ♙e3 + ♘c4 structure but via a different move order: the white bishop will drop to f1, the knight will move to c4 and then the bishop can come to e3. Stockfish NNUE played an interesting defensive plan that is well worth seeing in its entirety:

11...♙h6 (Black intends to set up a dark-square blockade on the queenside and thus ensures that White's best piece for challenging this – the dark-squared bishop – is exchanged) 12. ♙f1 a5 13. ♘c4 ♙xc1 14. ♖xc1 ♖b8 (threatening ...b7-b5, chasing the knight from c4) 15. a4 b6 16. ♖b1 ♙a6 (an excellent follow-up, removing the remaining white piece best suited to attacking Black's queenside weaknesses) 17. b4 ♙xc4 18. ♙xc4 axb4 19. ♖xb4 h5 20. ♙e2 h4.



The march of the rook's pawn! To compensate for its queenside weaknesses, Black stakes a claim to some kingside dark squares and prevents White from gaining any space there. This is defence over the whole board! 21. h3 ♘g7 22. ♖c2 ♖e7 23. ♘h2 ♖b7 24. ♖d2 ♖a7 25. ♖e3 ♖fa8 (reminding White that it too has a queenside weakness) 26. ♙b5 ♘h5 (since the bishop has moved from e2, the knight can occupy a strong kingside outpost) 27. ♖eb1 ♖b8 28. ♙e2 ♘f4 29. ♙g4 ♖f6 30. ♖c4 ♖ba8 31. g3 (principled, to drive away the strong black knight, but weakening White's kingside) 31...hxg3+ 32. fxg3



32...b5 (tactics!) 33.♖xb5 (33.axb5 ♟fd3 34.♙e2 ♜a1 35.b6 ♜xb1 36.♟xb1 ♜a2 37.♟c3 ♜b2 38.♟d1 ♜a2 is an engine draw by repetition; 33.♟xb5 ♜xa4 34.♜xa4 ♜xa4 35.gxf4 ♟xe4 is another engine line in which Black's counterplay against White's open king compensates for the sacrificed piece) 33...♟xa4 34.♜xa4 ♜xa4 35.♟xa4 ♜xa4 36.gxf4 ♜a2+ 37.♙g1 ♜a1+ 38.♙f2 ♜a2+ ½-½ Stockfish Classical-Stockfish NNUE, Matthew Engine Games 2020.

### 11...♚c7

Black disrupts White's set-up with ♙e3 by threatening ...♟cxe4, exploiting the pin on the c-file due to the unprotected queen on c2.

### 12.♟d2

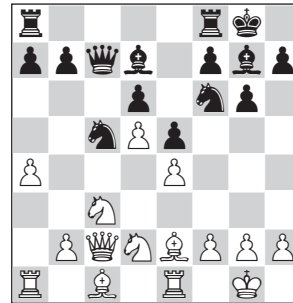
A new move for the TCEC. ScorpioNN played 12.♙f1 and Ethereal played 12.♟b5 (also played in the single correspondence game I found in this line). Stockfish's move is more consistent, aiming for ♟c4 followed by ♙e3.

### 12...♙d7

Covering the b5-square against ♟b5, ready to meet ♟c4 with ...b7-b5 and also introducing the

idea of ...♟a4 to swap off a pair of knights. 12...♙h6 is less successful in this position due to the tactical vulnerability of the queen on c7: 12...♙h6 13.♟c4 ♙xc1 14.♜axc1 threatens both ♟b5, winning the d6-pawn, and b2-b4, driving away the knight from c5.

### 13.a4



White takes control of queenside light squares in preparation of establishing a knight on c4.

### 13...♜fc8

13...♙h6 is again worthy of attention. The drawback to Black's development however is that the light-squared bishop has already been placed on d7 and is unable to challenge a knight on c4. It was uncomfortable for Black but quite a few of my engine games in this line were held: 14.♟c4 ♙xc1 15.♜exc1 a5 16.♜ab1 ♜fb8 17.b3 b6 18.♟d2 ♜d8 19.♜f1 ♟e8 20.f4 ♜e7 21.f5 ♟c7 22.♜f2 b5 23.fxg6 fxg6 24.♜bf1 bxa4 25.bxa4 ♜f8 26.♜xf8+ ♜xf8 27.♟c4 ♜a8 28.♜c1 ♟e8 29.♜e3 ♟f6 30.h3 ♟g7 31.♟h2 ♙e8 32.♜c1 ♜c8 33.♟xa5 ♟xa4 34.♟c6 ♙xc6 35.dxc6 ♟xc3 36.♜xc3 ♜c7 and Black held the draw in Stockfish Classical-

Stockfish NNUE, Matthew Engine Games 2020, ½-½ (149).

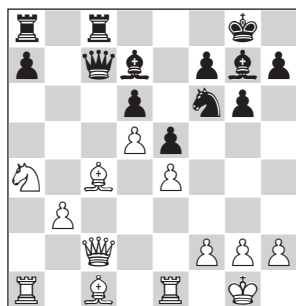
**14. ♖c4**

White's next move will be to entrench its strong knight on c4 by supporting it with b2-b3. Black seizes the moment to disrupt the white queenside set-up.

**14... ♗xa4 15. ♗xa4**

This is a novelty from Stockfish. 15. ♗xa4 b5 16. ♗b4 bxc4 17. ♗xc4 ♖b7 gave White a small edge in Porat-Nalbandian, Cappelle-la-Grande 2006, ½-½ (52).

**15...b5 16.b3 bxc4 17. ♗xc4**



White has emerged from the opening with a slight advantage. The dream of an entrenched white knight on c4 has faded for now (although the knight on a4 is but two moves away!) but White remains with some plusses:

1. The white pieces have a little more scope than the black pieces;
2. The a7-pawn is slightly easier to attack and slightly harder to defend than White's b3-pawn;
3. The play is confined to the queenside which is more White's natural territory than Black's. There

seems little chance for Black to generate kingside counterplay.

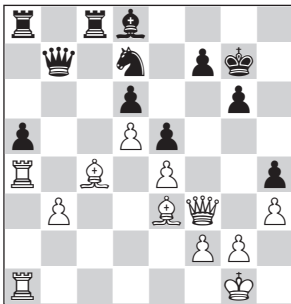
**17... ♗b5**

For the moment Black has some leeway in its choice of plans so there is no point in criticising moves yet. I was impressed however with Stockfish NNUE's method of defence in the engine games I ran against Stockfish Classical. This can be summarised as:

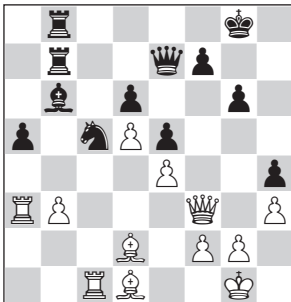
1. Place the a-pawn on a5;
2. Transfer the dark-squared bishop to d8, defending the a5-pawn and within reach of the active b6-square;
3. Gain kingside space with a march of the rook's pawn: ...h7-h5 and ...h5-h4. With many of White's pieces having been diverted to the queenside, it makes sense to exploit this by securing a gain on the kingside;
4. Exchange off the light-squared bishop for White's knight and entrench the remaining minor pieces on the queenside with ...♗c5 and ...♗b6. If ...h7-h5-h4 has been achieved, f4 may also be a good outpost for the black knight. I particularly like Black's attention to detail in gaining kingside space with ...h7-h5-h4 to ensure that White does not get a completely free hand on any side of the board. Ideally White would exploit the loosening of Black's kingside (absence of the dark-squared bishop and march of the rook's pawn) with a pawn break like f2-f4 but

Stockfish Classical never managed to achieve this:

17...a5 18.♔d2 ♕f8 19.♖ec1 ♖e7  
20.♟b2 ♖d8 21.♗d3 ♗b8 22.♞a4  
♔g7 23.♞a2 h5 24.h3 h4 25.♗f3 ♗a7  
26.♖e3 ♗b7 27.♞ca1 ♖xa4 28.♞xa4  
♞d7



29.♞a3 ♞ab8 30.♖d2 ♞c5 31.♗e3  
♗e7 32.♞c1 ♔g8 33.♖e2 ♖b6  
34.♗f3 ♞c7 35.♖d1 ♞cb7



and Black had few problems in Stockfish Classical-Stockfish NNUE, Matthew Engine Games 2020, ½-½ (52).

**18.♞b2**

Defending c4 and bringing the knight closer to the desired c4-square.

**18...a6 19.h3**

Safeguarding a square on e3 for the dark-squared bishop from ...♞g4.

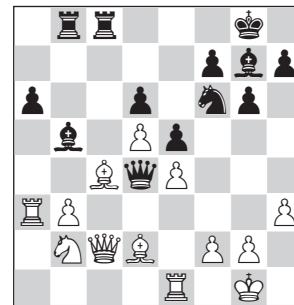
**19...♞ab8**

19...h5 20.♗e2 ♖f8 21.♖d2 ♗b6  
22.♗f3 ♖e7 23.♞a2 ♗b7 24.♞ea1  
♖d8 25.♖f1 ♔g7 26.♞c4 ♖xc4  
27.♖xc4 a5 28.♞a3 ♖b6 29.♗e2  
♞a7 30.g3 h4 31.g4 ♞h7 32.♞a4  
♗e7 was another Stockfish NNUE implementation of its favourite defensive plan, Stockfish Classical-Stockfish NNUE, Matthew Engine Games 2020, ½-½ (70).

**20.♖d2 ♗b6 21.♞a3**

Defending b3 and allowing the other rook to come to a1 to pressure the a6-pawn.

**21...♗d4**



Disruptive play from Black, attacking the pawn on e4 to prevent ♖e3 and the knight on b2 to stop the white queen from moving. The danger to Black's play is that these queen moves are not realising any structural improvement to Black's position. If White neutralises the pressure against e4 and b2, the queen will have to retreat, and Black will have nothing to show for these queen moves.

**22.♖c1**

A neat two-move regrouping to counter the black queen's pressure.

**22... ♖f8 23. ♜h2**

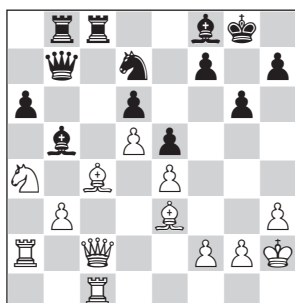
22. ♖c1 protected the f2-pawn, allowing the white king to move to h2. f2-f3 will be next, protecting the e4-pawn and introducing the threat of ♖e3, trapping the queen.

**23... ♛c5 24. ♜a2 ♘d7 25. ♖e3 ♛c7**

The queen has been forced to retreat without having achieved anything significant. However, the contours of the position have not changed, and Black's position is still completely defensible.

**26. ♜c1 ♛b7 27. ♘d3 ♘b6 28. ♘b2 ♘d7 29. ♘a4**

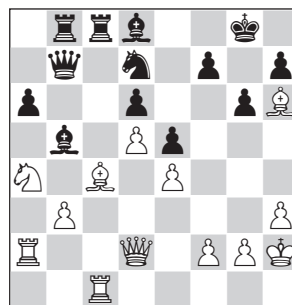
White decides that the knight is required on a4 to prevent ...♘b6 for any subsequent regrouping.



**29... ♖e7**

29...h5 – Stockfish NNUE still managed to implement its favourite defensive plan even in this position: 30. ♛d2 ♜h7 31. ♜cc2 ♖e7 32. ♛e2 ♜g7 33. f3 ♖d8 34. ♖d2 ♜h7 35. ♛e1 ♜g7 36. ♛c1 ♖xa4 37. ♜xa4 ♘c5 38. ♜a3 a5 39. ♛e1 ♛d7 40. ♜c1 ♜b7 41. ♖e3 ♜bb8 42. ♛e2 ♜b7 with balanced play in Stockfish Classical-Stockfish NNUE, Matthew Engine Games 2020, 1/2-1/2 (246).

**30. ♛d2 ♖d8 31. ♖h6**

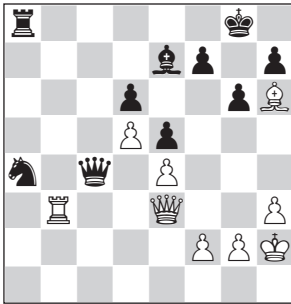


One of the lovely effects of running multiple engine games from various positions within a game is that it gives you a wonderful sense of when the game turned. Playing positions up to 27. ♘d3, Stockfish Classical and Stockfish NNUE produced 43 draws and one win... for Black! (Stockfish NNUE). Playing positions after 31. ♖h6 produces 28 wins and 6 draws! 31. ♖h6 is an annoying move, restricting the movement of the black king. The restriction of the king is inconvenient in this position as there are open files on the queenside which increase the risk of back-rank tactics. Note that Stockfish NNUE's ...h7-h5 avoided any such problem! In this position both Stockfish NNUE and Stockfish Classical rush their dark-squared bishop back to f8 in order to eject the bishop from h6 and restore order although the lost time begins to take its toll. Strangely, 31. ♖h6 provokes a committal decision from Ethereal. From that point of view, 31. ♖h6 is almost a winning move!

**31... ♖xc4**

31... ♘f6 32. ♛e2 ♘d7 33. ♘b2 ♘c5 34. ♜a3 a5 35. ♖xb5 ♛xb5 36. ♛f3 a4

37.♘c4 ♖e7 38.bxa4 ♘xa4 39.♙e2  
 ♘c5 40.♙f3 ♘a4 41.♙e3 ♖a8 42.♖c2  
 ♗xc4 43.♗b3 ♙c5 44.♗xc4 ♙xc4



45.♙a7 was a nice example of the value of 31. ♖h6 ! 45...♙c8 46.♙xe7 ♙d8 47.♗b7 ♙xe7 48.♗xe7 ♘c3 49.f3 when White had excellent chances due to the weakness of Black's back rank in Stockfish NNUE-Stockfish Classical, Matthew Engine Games 2020, 1-0 (112).  
**32.bxc4 a5 33.♗b2 ♙a7 34.♖e3 ♗xb2 35.♙xb2 ♙b8**



**36.♙b5**

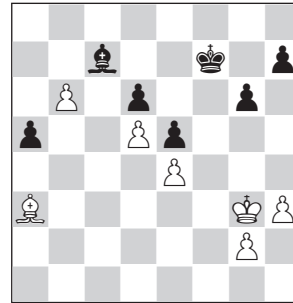
A strong idea in which Stockfish has evaluated the resulting endgames beautifully.

**36...♙xb5**

Also 36...♘f6 37.f3 followed by a later c4-c5 break is unpleasant for Black.

**37.cxb5 ♗xc1 38.♖xc1 f5**

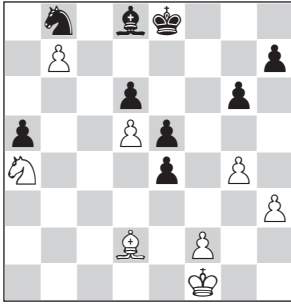
38...♘b6 39.♘xb6 ♖xb6 40.♖a3  
 ♖c7 41.♙g3 ♙f8 (41...f6 42.f4 ♙f7  
 43.fxe5 fxe5 44.b6 is a win that just works!



44...♖xb6 (44...♖b8 45.♙f3 ♙e7 46.♙e2 ♙d7 47.♙d3 ♙c8 48.♙c4 ♙b7 49.♙b5 and the white king just gets there in time!) 45.♖xd6 ♖d4 46.♙f3 a4 47.♙e2 ♖b2 48.♙d3 a3 49.♙c2 and White is again perfectly in time to capture the a-pawn!) 42.b6 ♖xb6 43.♖xd6+ ♙e8 44.♖xe5 ♙e7 45.♖b2 ♙d6 46.♖f6 a4 47.♙f3 ♙c5 48.♙e2 ♙c4 49.♙d2 ♖c5 50.f3 h5 51.♙c2 ♖a3 52.♖e5 ♙b5 53.g4 ♖e7 54.gxh5 gxh5 55.♙c3 f6 56.♖d4 ♖d8 57.f4 ♖a5+ 58.♙d3 ♖d8 59.e5 and White soon won in Stockfish Classical-Stockfish NNUE, Matthew Engine Games 2020.

**39.♖e3 fxe4 40.b6 ♙f8 41.♙g1 ♙e8 42.g4 ♘b8 43.♖d2 ♘d7 44.b7 ♘b8 45.♙f1**

The wonderful point of the ending is that Black is unable to approach the b7-pawn. If the black king moves to c7 with the bishop on d8 then ♖xa5+; if the black bishop moves away from d8 then ♖xa5 covers c7!



45...♔e7

45...♗d7 46.♕e2 ♖c7 47.♙xa5+ ♗d7  
48.♘b6+.

46.♕e2 ♗d7 47.♙e1 ♘a6 48.♗d1

♘b8 49.♕c2 ♘a6 50.♕b3 ♙h4

51.♙xa5 ♙xf2 52.♕c4 ♙c5 53.♘c3  
e3 54.♗d3

Even a passed e-pawn is not going to help Black!

54...♙a7 55.♕e2 h6 56.♕f3 ♙b8

56...♘c5 57.♙b6 ♙b8 58.♙xc5 dxc5

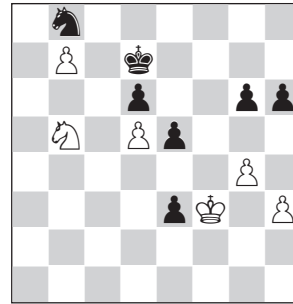
59.♘b5 is the same theme as the

game: the pawns on b7, d5 and knight on b5 combine to stop the black king from destroying White's passed pawns.

## Illustrative game

A masterclass on the fashionable Anti-Moscow Gambit against the Semi-Slav in three AlphaZero games! The main game was replicated by a correspondence game in 2019... but agreed drawn at move 32! AlphaZero finds some amazing resources to keep the attacking flame alive, powering through for a deserved win.

57.♙b6 ♙c7 58.♙a7 ♙b8 59.♙xb8  
♘xb8 60.♘b5



A wonderful picture! The black king is held at bay by the white knight! I wondered whether the protected passed pawn on e5 might prove a problem, but Stockfish has seen it all!

60...g5

60...♕e7 61.♕xe3 ♗d7 62.h4 ♕e7

63.h5 gxh5 64.gxh5 ♗d7 65.♕e4

♕e7 66.♕f5 ♗d7 67.♕g6 e4

68.♕xh6 e3 69.♘d4 is an easy win

for White: Black cannot stop the white h-pawn from queening!

61.♕xe3 ♘a6 62.♕f3 ♘b8 63.♕e4

♘a6 64.♕f5 e4 1-0

## Opening themes: Semi-Slav (Anti-Moscow Gambit)

- Generating play after sacrificing the c4-pawn
- How to play the Anti-Moscow Gambit

## Middlegame themes

- Engine sacrifices
- The king

Game 73 Semi-Slav Defence

**AlphaZero****Stockfish Classical**

Computer Match London 2018

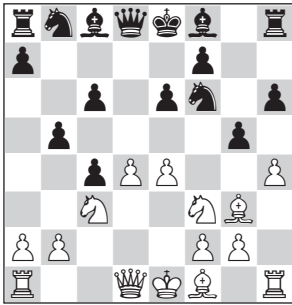
**1.d4 d5 2.c4 e6 3.♘f3 ♘f6 4.♘c3 c6  
5.♙g5 h6**

The Moscow Variation of the Semi-Slav.

**6.♙h4**

The highly theoretical Anti-Moscow Gambit was AlphaZero's most frequent choice in this position.

**6...dxc4 7.e4 g5 8.♙g3 b5 9.h4**



A move we always expect from AlphaZero! AlphaZero challenges Black's advanced g-pawn and forces further weaknesses on the kingside. After 9...g4, White can count two gains:

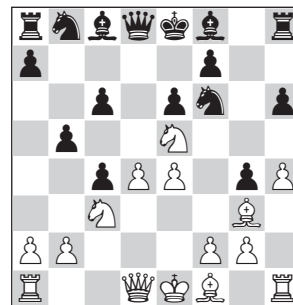
1. The g-pawn moves closer to the white position and is thus easier to attack. Black's pawn cover on the kingside is loosened further, making kingside castling unappealing;
2. Black's dark squares are weakened: another pawn moves to a light square and Black loses control of f4.

9.h4 is only the fourth most popular move in human play after 9.♙e2, 9. e5 and 9.♘e5. However, transpositions to lines beginning with 9.♙e2 and 9.♘e5 are frequent.

**9...g4**

9...♙g8 is not a popular move, with good reason. White secures an additional attacking channel by opening the h-file. I played the following training game against 1-node Leela (see the chapter on 'Training with Engines' for more details about this training method) 10.hxg5 hxg5 11.♘e5 ♙b7 12.♘xf7 (a typical sacrifice in this line which gains in strength due to White's access to the h-file!) 12...♘xf7 13.e5 c5 14.exf6 cxd4 15.♙e5 (threatening 16.♖h7+ and 16.♗h5+) 15...g4 (blocking the queen's access to h5 but Black is already completely lost) 16.♖h7+ ♘g6 17.♖xb7 ♘f5 18.♙xd4 ♘c6 19.♗c2+ ♘g5 20.♘e4+ ♘g6 21.♘d6+ ♘h5 22.♖h7+ ♙h6 23.♖xh6+ ♘xh6 24.♘f7+ ♘h5 25.♗h7#.

**10.♘e5**



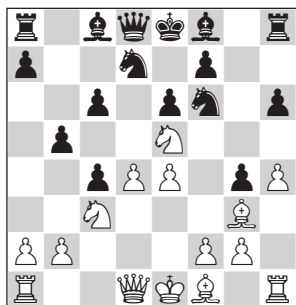
Stockfish tried two moves against AlphaZero: 10...♙b7, protecting the c6-pawn in preparation of ...♘bd7, and the immediate 10...♘bd7,



challenging the knight on e5 and offering White the c6-pawn.

**10...♖b7**

10...♗bd7.

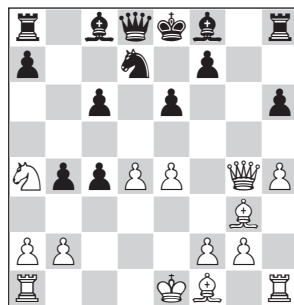


Back in January 2018, this move of Stockfish's was a novelty in my over-the-board database. It is however the move order recommended by Lars Schandorff in his excellent 2015 book on the Semi-Slav as a way of transposing back to 9.♖e2 lines and it was well-known in correspondence chess.

A) 11.♗xc6 is the first move to examine, but it gives White no more than a draw: 11...♖b6 12.d5 ♖b7 13.a4 a6 14.♖e2 ♖xc6 15.dxc6 ♖xc6 16.axb5 axb5 17.♖xa8+ ♖xa8 18.0-0 ♖c6 (the move preferred by my engines though 18... ♗xe4 also looks fine for Black) 19.e5 ♗e4 (19...♗h5 has also scored well for Black) 20.♗xe4 ♖xe4 21.♖xg4 ♗xe5 22.♖xe6 ♗d3 (the 'octopus' knight takes e1 from the white rook, giving Black time to castle) 23.♖h3 ♖g7 24.♖h5 0-0 25.♖xb5 f5 26.♖d6 ♖f7 27.♗h2 ♖e6 28.♖b8 ♖xb2. Black's position feels loose but it is also tremendously active, Stoofvlees-Stockfish Classical,

Matthew Engine Games 2020, ½-½ (90);

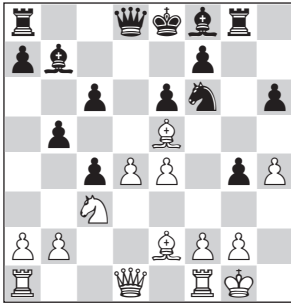
B) 11.♗xg4 – it is a common opening dilemma for White: spend time recapturing the g4-pawn, or continue with rapid development? AlphaZero prefers rapid development against the 10...♗bd7 move order. 11...♗xg4 12.♖xg4 b4 13.♗a4.



The value of Black's move order with 10...♗bd7 (instead of 10...♖b7) is that the bishop can still come to a6 in one go: 13...♖a6. This position scored well for Black in my engine games; the offside knight on a4 and the loose d4-pawn give Black tactical chances, e.g. 14.♖e2 ♖b5 15.♗c5 ♗f6 16.♖f3 ♖xd4 17.♗b7 c3 18.bxc3 bxc3 19.♖xb5 cxb5 20.0-0 c2 (stopping a white rook from reaching d1!) 21.♖ac1 ♖c8 22.♖xc2 ♖xc2 23.♖d1 ♖d2 24.♖xd2 ♖xd2 25.♖xf6 ♖h7 26.♖e5 ♖c1+ 27.♗h2 ♖c8 28.♖xb5+ ♖d7 with a clear advantage for Black in Stoofvlees-Stockfish Classical, Matthew Engine Games 2020, 0-1 (77);

C) 11.♖e2 ♗xe5 (11...♖b7 would transpose back into the known 9.♖e2 ♖b7 10.h4 g4 11.♗e5 ♗bd7

line. Stockfish perhaps wants to avoid the possibility of White taking on g4 – or wants to make use of the opportunity given by 10...♘bd7 to take on e5 early) 12.♙xe5 ♖g8 13.0-0 ♙b7.



This position – typical of the Anti-Moscow Gambit – has several unusual features which we will examine one-by-one:

### A. The g4-pawn and ♖g8

This is an aggressive tactical set-up from Black. Having moved the pawn cover in front of its king and then the rook from h8, Black's king is unlikely to find safety on the kingside.

1. The combination of g4-pawn and ♖g8 introduces the wrecking idea ...g4-g3, ♙xg3 ...♗xg3, fxg3, sacrificing the exchange and a pawn to open up White's kingside and weaken White's dark squares. Note however that this sacrifice also opens the f-file which can be used to target the f7-pawn next to Black's king;
2. The g4-pawn restricts White's light-squared bishop and gains space on the kingside;

3. ...♖g8 also allows ...♘d7 to chase away the bishop from e5 – which weakens White's protection of d4 – and uncovers an attack on the loose h4-pawn.

The key downside has already been mentioned: where is Black going to put its king? Staying on e8 is risky as White has the lever d4-d5 to prise open the centre. The queenside is the obvious choice but is not without risk with White's dark-squared bishop cutting across the h2-b8 diagonal (preventing the black king from moving) and the advanced queenside pawns open to (sacrificial) attack.

### B. The black queenside pawn structure c4/b5/c6

This structure confers a queenside space advantage to Black, restricts White's light-squared bishop and contains threats such as ...b5-b4, undermining the support of the e4-pawn. However, it is also fragile as White can undermine it with a2-a4 and b2-b3. If the c4-pawn disappears, Black loses its space advantage on the queenside and the queenside becomes still more dangerous for the black king.

### C. The white centre

1. Black finds it difficult to challenge the white centre. The natural break ...c6-c5 loosens Black's queenside structure and requires careful calculation;
2. White has two promising ways of developing its centre: