Chapter 1.1

Introduction by Philip Hurtado

That Day in the Library

“We must be careful not to believe things, simply because we want them to be true.”

Richard Feynman, Winner of The Nobel Prize in Physics 1965

Let me introduce myself: I am Philip Hurtado. I studied Aeronautical Engineering at the University of Hertfordshire, followed by a Master’s degree in Physics at the University of St. Andrews. Although I had short stints in both aerospace and nuclear fusion research, I ended up developing a career in car manufacturing. Here is the interesting part: whilst working in automotive plants, I discovered a technique for improving construction processes called Six Sigma.

This method uses advanced statistical analysis, to help engineers increase the performance of a production line, by decreasing process variation. This technique leads to a reduction in defects and a dramatic improvement in product quality. You can see an example of how effective the Six Sigma method is, when you look at the beautifully flushed doors of a new Range Rover Velar and compare them to older models.

Anyway, why am I telling you all this?

Having spent the past five years working as a Lean Six Sigma Black Belt consultant, I thought to myself, “Why not apply these same continuous improvement techniques to my chess?” After all, I have access to both the statistical software and the chess engines that would enable me to measure and monitor my progress.

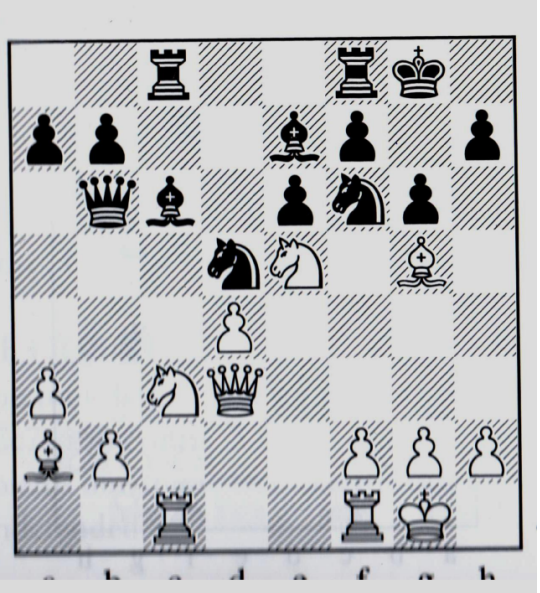
For six months, I designed some experiments to figure out which changes had the biggest effect on improving my chess. I tried all sorts of things: I studied the effect of diet, exercise, time of play, drinking energy drinks, studying openings, studying endgames and so on.

The funny thing I found is that a good night’s sleep, combined with being on holiday, with a happy financial situation and general peace of mind, gave better results than all of the other factors combined. Still, the improvement was only small. Maybe 100 Elo points, from 1900 to 2000, which still fell well within the natural variation of my playing strength.

So a second idea occurred to me: why not devise an experiment that would uncover how a top grandmaster makes decisions? I could then compare it to the way I think about my own moves, and learn from the differences. Again, I would have the aid of a chess engine to help measure the quality of the moves, and I would have the statistical software to determine how significant these differences are. But before we begin, let me share a bit of my personal chess background.

Thirty-two years ago, at the age of nineteen, I came across a fascinating chess book, which I picked up at Hove Library on Church Road, close to where I used to live with my grandmother. That book was called *Thought and Choice in Chess*. It was written by a Dutch psychologist who conducted a spellbinding experiment, where he asked famous chess masters and amateurs to think aloud, whilst trying to solve chess puzzles.

I quickly asked the lady at the library for a piece of paper, so I could cover the solutions and set out trying to find out the best moves myself. Apart from the sheer enjoyment of trying to solve the puzzles, I was completely mesmerized by reading the train of thoughts of some of the masters, in particular by those of former World Champion Alexander Alekhine, my all-time favourite chess player.



Chess master and psychologist Adriaan de Groot gave this position to Alekhine, Keres, Euwe, and other leading players at the 1938 AVRO tournament, as well as to a number of weaker, but still expert, players. With his experiment, de Groot was trying to unravel the mysteries behind thinking and decision-making in chess, and determine the differences between strong masters and weaker players.

You may wish to consider the position yourself, before comparing your thoughts to those of Alekhine, as shown below.

Here are Alexander Alekhine's comments to the puzzle shown to him by de Groot. I am sure you will love them as much I did when I first read them thirty-two years ago, in a quiet library in the south of England.

Alekhine spent nine minutes on the above position, on 28 November 1938. The original commentary has been changed to algebraic notation.

Comments by Alexander Alekhine

At first sight there is a dark memory of a tournament game between Botvinnik and Vidmar (Nottingham). There is certainly a resemblance: The same queen position on d3. Opening type: Queen's Gambit Accepted.

In half an hour I should be able to logically reconstruct the moves up to this position.

Is the pawn on b2 really attacked?

Let's see what counter possibilities White has. Which moves are worth considering?

1.Bxd5 has to be calculated. **1...Bxd5** is not good; **1...Nxd5** is no good.

So, **1...exd5.** And now the knight on f6 is getting a little weak.

2.Ng4 or **2.Re1** might follow. Or also **2.Nxc6** followed by **3.Re1**. Or possibly **2.Qf3.**

Well, in any case, **1.Bxd5** is one enticing move.

But now let's have a look at other possibilities:

1.Ng4 deserves consideration. But doesn't look so good.

1.Nxd5 maybe. **1...Nxd5 2.Bxd5 Bxg5,** with many recapturing possibilities. But at first sight, none convincing.

1.Nxc6. But after **1...bxc6,** the d5-square is well controlled. That's a pity.

In any case, White has by far the best of it. I would be very happy if I had such a position in a tournament game.

Are there any other moves apart from **1.Bxd5** that are decisive?

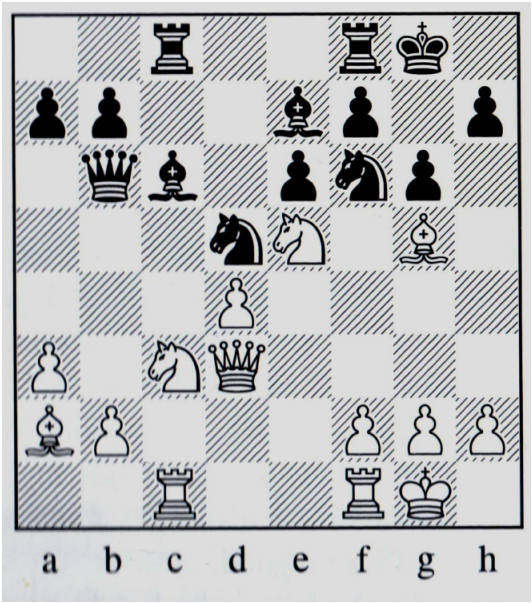
1.Bxd5 is very strong, that much is certain.

1.Nxc6 bxc6, there is pressure on c6, White has the pair of bishops. Also very agreeable. But the position promises more.

Let's check over other sorts of things again...

Well, in case of time pressure, I would play **1.Bxd5.**

Analysis with additional variations added by Michael Adams



Alekhine begins by calculating:

1.Bxd5!

Alekhine describes as inferior three other moves:

1.Ng4? he mentions as "deserves attention, but doesn't look so good." The second part of this statement is more accurate, as **1...Nxg4 2.Nxd5 Bxd5 3.Bxe7 Bxa2** wins for Black.

1.Nxd5? Nxd5 he understandably says is unconvincing.

Alekhine likes White after **1.Nxc6 bxc6.** I would wish him good luck convincing Stockfish of that, who steadfastly gives 0.00, but that was less of a problem in 1938!

1...exd5

Alekhine correctly assesses this position as very good for White, but doesn't actually commit to which move he thinks is best, proposing several possible ideas.

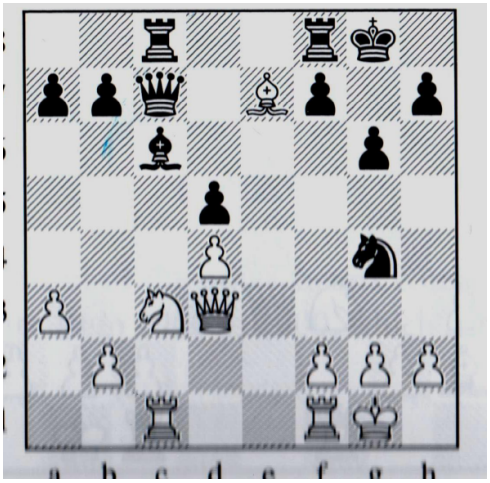
Alekhine mentions **1...Bxd5?** as being "no good", without giving details. No doubt he had seen the simple variation **2.Bxf6 Bxf6 3.Nxd5 exd5 4.Nd7,** winning the exchange.

1...Nxd5? is also accurately described as "no good"; indeed, **2.Nxd5 Bxd5 3.Bxe7** wins a piece for White.

2.Rfe1!

This natural move is the most convincing path to a decisive advantage.

2.Ng4? is a mistake due to: **2...Nxg4! 3.Bxe7 Qc7!**



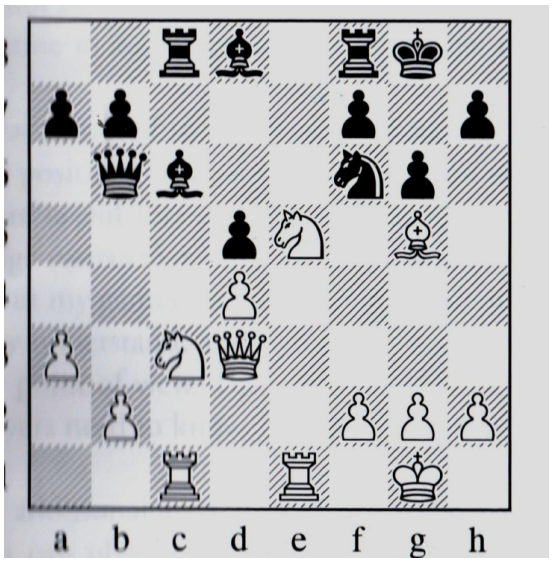
White can avoid the loss of a piece with **4.Qh3,** but **4...Qxe7 5.Qxg4 Rce8** is only equal.

2.Qf3 Qd8 3.Rfe1 is an alternative winning continuation though, one important point being that **3...Ne4 4.Bh6** wins the exchange.

Alekhine also mentioned **2.Nxc6 bxc6 3.Rfe1** but this seems less impressive. True, White retains some initiative, but it feels too early to trade off Black's passive bishop.

2...Bd8

2...Qxb2 3.Qf3 Kg7 4.Nd1 Qxd4 5.Nxc6 Rxc6 6.Bxe7 wins a piece.



3.b4!

White keeps increasing the pressure.

3...a6

3...Kg7 4.b5 Be8 5.Qh3 threatens **Bh6+** in addition to the rook on c8.

After the text move White has several promising options, but one good way to force matters is:

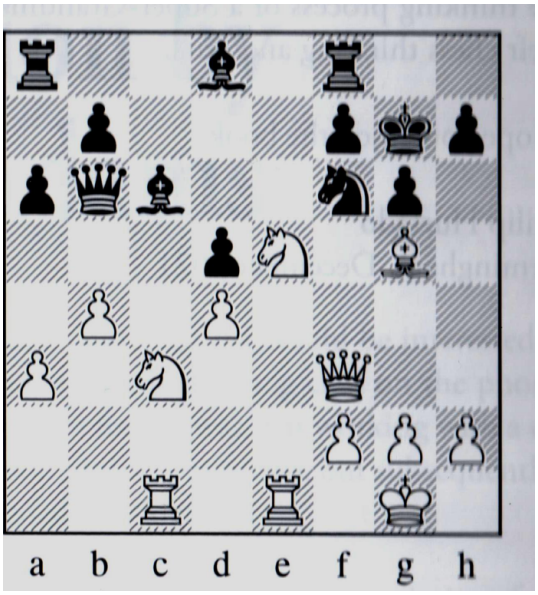
4.Qh3 Ra8

The rook has to give ground, as the natural **4...Rc7** runs into **5.Qh4!,** creating serious problems due to the fact that the bishop on d8 is undefended.

4...Qc7 5.Bxf6 Bxf6 6.Nxd5 also wins.

5.Qf3 Kg7

Now there is a rather flashy combination available:



6.Bxf6+ Bxf6 7.Qxf6+! Kxf6 8.Nd7+

8.Nxd5+ Bxd5 9.Nd7+ Kg7 10.Nxb6 Rad8 is less impressive.

8...Bxd7 9.Nxd5+ Kg7 10.Nxb6 Rad8 11.d5

White should win the endgame.

When de Groot conducted his famous research back in the 1940s, chess engines did not exist and the Elo rating system had not yet been developed. Thus it was impossible for de Groot to derive any mathematical relationship between a player's strength and many of the other variables he measured during the puzzle-solving experiments.

More than eighty years after de Groot's first experiments, I have revisited his methodology, aided by Stockfish, a chess engine of superhuman ability, and Minitab, an advanced statistical software tool. Using new, previously unpublished chess puzzles, I have tried to finally uncover the exact differences between players of varying strengths.