This is the draft Chapter 7 of my planned book, *The Chess Memory Palace*. Previous draft chapters can be found here:

- Chapter 1 (*Picture Notation, A Mnemonic System for Chess*) and the Appendix (*Picture Words for all 64 Squares*) at
  https://johnden.org/picturenotation
- Chapter 2 (*Essential Memory Techniques*) at
  https://johnden.org/papers/essentialmemorytechniques.pdf

Please ignore the broken references to earlier chapters. These will be fixed in the final version.

John Holden, July 2022

Feedback welcome at chessmemorypalace [at] gmail [dot] com.

Contents

1

Chapter 7: Miscellanea

My team's chorus cry for me during a World Championship is "revise, revise, revise".

GM Viswanathan Anand

Why memorise theory?

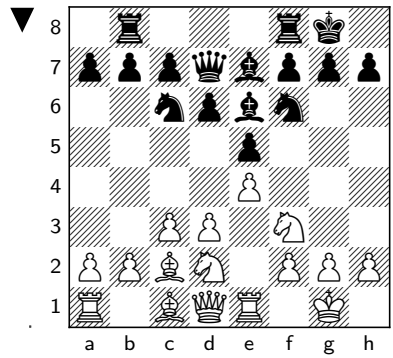
The Chess Memory Palace method raises some funny possibilities. You could examine a repertoire written in picture notation, like Figure **??** or Figure **??**, memorise it completely, and then know the moves without ever having played them at the board. You could even write a computer script to generate the top engine move for all common lines in an opening, convert them automatically into picture notation, then memorise the flowchart. You would carry a complete world class repertoire in your head, yet your moves would be equally surprising to you as to your opponent!

Is this a good idea? Of course not. Opening study is more than memorising moves. We need to know the typical middlegame strategies and tactics, and the typical endgames, so that we can continue to play a good game at the end of our memory palaces. We need to know the purpose behind the opening moves, so that we can exploit our opponents' mistakes if they exit our memory palaces unexpectedly

early. And we need to know similarities to other openings, so that we can create analogous plans when we need to.

To quote GM Garry Kasparov, "Long before a player becomes a master he realises that rote memorization, however prodigious, is a far cry from understanding. He'll reach the end of his memory's rope and be on his own in a position he doesn't really understand."

I am reminded of the game Magnus Carlsen v Bu Xiangzhi, from the 2017 World Cup in Tbilisi.



Here, Bu played *pearl* (...d5), sacrificing his pawn on e5 for a strong – and eventually winning – kingside attack. His plan clearly drew lessons from understanding the Marshall Gambit, despite Bu not being a regular Marshall player.

However, some authors go too far and claim that memory is unnecessary, as long as you understand your openings. The idea seems to be that if you truly, deeply understand a position, the moves will naturally flow out with no memory effort required. This is a mistake. There are two reasons why memory is vital.

First, of course, time pressure. In an exam, a talented student with a strong understanding of mathematics could derive the quadratic formula from scratch. But nobody does this. We memorise the formula instead, which saves time and mistakes when the clock is ticking. The same is true of chess moves.

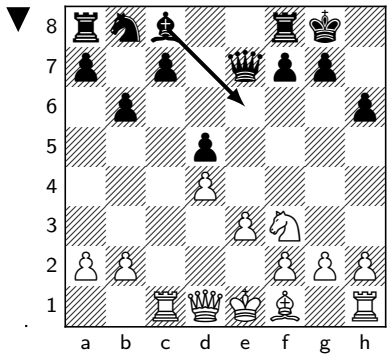
After a year without review, GM Viswanathan Anand remembered only the smallest fragment of his World Championship preparation when he unexpectedly needed it against GM Levon Aronian (to win

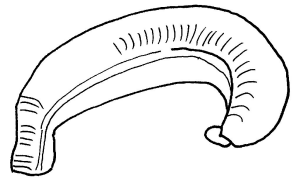
brilliantly at Wijk aan Zee). Despite knowing the evaluation and a hint of his preparation, and doubtless understanding the position better than anyone else could, it still took him half an hour to re-calculate the right moves. For the rest of us it would have been impossible – unless we could recall them from memory.

Second, there are different levels of "understanding", and we can often make more progress by using memorised moves as a reminder of our plans, rather than the other way around. In language, we all understand more words of our mother tongue than we use, or are even able to think of. Our "reading vocabulary" exceeds our "writing vocabulary". And yet, we do understand these words when we hear them. The sound of the word triggers our memory of what it means, even though we could not have generated the word ourselves. In the same way, we can read a move from a book or memory palace and then recall its purpose. ("*Five*? Oh of course, I play ...Kh8 here to make room for the knight on g8, then I can push the f-pawn!") The move itself is a memory aid that triggers our understanding of the position. In other words, understanding and memory are complements, not substitutes.

As we improve, more and more of our moves will be played from a deep understanding of their purpose, without struggling to remember them. But this just pushes the limit of our deep understanding later into the game. There will always be marginal positions, just on the edge of our knowledge, where we don't understand the position deeply enough to reliably generate the best move – and yet, after being told the move, we can remember exactly why it is important and why we should make it. To play a tactical line of the Schliemann purely from "understanding" rather than memory, you would need to know, understand, and evaluate all the variations. At some point the only practical option is just to memorise the moves.

To take this a step further, I could even argue that in practical play you need to understand the plan *going forward*, which is not the same as the purpose of the move *when you made it*. In the position below, from the Tartakower Variation of the Queen's Gambit Declined, Black usually plays *leech* (...Be6). On e6, the bishop still has prospects on the c8-h3 diagonal, while also supporting Black's queenside play.





But why did Black play ...b6 earlier? To make room for the light-squared bishop on b7! At the time, with more pieces on the board and more central tension, this made sense.

Do you need to know this? In one sense, yes. To understand the Queen's Gambit and its variations, especially when White deviates early, you need to understand your moves.

But practically speaking, no. If you can reliably get past this point in your games by memory, the important question is what purpose the pawn serves *now*: does it support c7-c5, or is it just a weakness? If a move creates a threat that never materialises, and your game progresses beyond the possibility of the threat, the existence of the past threat is no longer relevant.

This is particularly clear in tactical openings. Returning to the Schliemann, the Airport repertoire in Chapter **??** navigated past several traps and potential blunders. Part of the purpose of White's moves was to avoid these tactics. Do you need to know what you avoided? Ideally, yes, that would improve your chess understanding. But we have limited time. At the margin, your time may be better spent analysing master games and typical endings, not over-analysing the early opening moves where you already played perfectly. Like following signposts through a swamp, if you can navigate to the end, you don't need to know what pitfalls you avoided. You need to know where to go next.

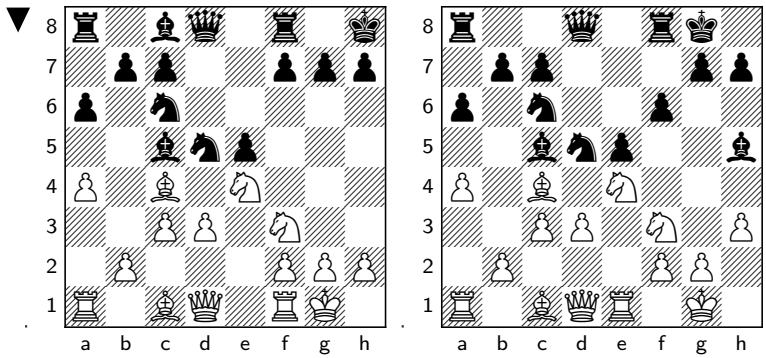
Ultimately, whether you agree with this last point or not, it is clear that players spend a lot of time memorising opening theory, yet

frequently forget old analysis. Although Kasparov (correctly) emphasises understanding, he certainly wouldn't deny the value of a strong opening repertoire. In fact he played the Mieses Opening (*ram*, 1.d3) against the computer Deep Blue just to avoid its opening book.

So you need to memorise theory. The next question is, how? The traditional method is to drill moves from diagrams, perhaps with spaced repetition. Even masters can find this challenging, particularly when trying to learn many similar but different lines at once, when none of them have emotional salience (such as a painful loss). In this book I have advocated picture notation in a memory palace instead.

Which method is better? This is an empirical question, and there is only one answer that matters: the one that works best for *you*. Try both and see which creates the stronger memories. To my mind there is no doubt that, for most people, after a bit of practice, a memory palace is better for creating unambiguous memories that last.

I emphasise *unambiguous* because a lot of positions are frankly quite similar, especially when you haven't reviewed them for a long time. The two diagrams below are from different variations of the Italian Game. In one, GM Jan Gustaffson recommends ...Ba7, and in the other ...Bb6. Which is which? Even Gustaffson admits this is confusing!



After being told the move ...Bb6 or ...Ba7, I can recall its purpose, but it is hard to work out and be confident at the board. It is much

easier using picture notation in a memory palace, when there is no similarity and no confusion.

To summarise, *The Chess Memory Palace* method does not replace your need for chess understanding. "After a while, I began to notice something", wrote GM Matthew Sadler after trying to win every game through the sharpest lines, "I was losing lots of games in 'unimportant variations'." Instead, *The Chess Memory Palace* method is like printing out your repertoire *in notation* and reading it at the board. It won't help you understand chess better, but it will let you play your prepared lines with perfect accuracy.

If you had your moves written on a physical sheet of paper, you would be disqualified for cheating. *The Chess Memory Palace* method lets you achieve this in your head.

Memory for the long term with spaced repetition

After some practice, you will be able to build and memorise a memory palace quite fast. This palace will serve you well for the next week or two, and your best images will remain with you effortlessly for a decade. But unless you review, most of the palace will gradually fade. This is okay if you wanted to learn a repertoire for a single game. But it is a problem if you wanted to retain the repertoire for the long term. After all, it's no fun to be halfway through a Najdorf and then discover you can't remember the image in your attic.

The good news is, your memories fade more slowly each time you review. So when you memorise a new image, at first you should review it frequently, but then you can wait for longer and longer intervals. (See Figure 1.1 if you like graphs.) You could review after an hour, then a day, then a week, then a month, then half a year... the precise best time intervals depend on the person, but the principle is the same for everyone. This is called **spaced repetition**.

A review should test **active recall**. For a chess memory palace, this means asking "after passing the *shell* and *mime* in Waterloo Station, what do I find on the concourse?"[1] It is not enough to passively

[1] Answer: a book of *lore*, and a second book of *lore*.

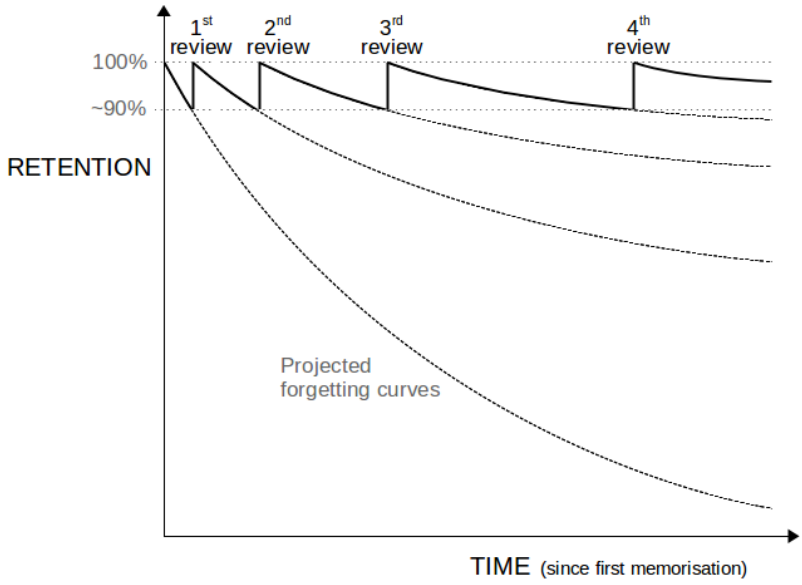


Figure 1.1: Spaced repetition: reviews become less frequent

read your notes. You must ask yourself the question of what comes next, to practice the experience at the board. When you actively recall an image, spend a moment to visualise the scene and refresh all three interactions in the composite image (chapter **??**). This restores the memory to top condition, ready for your games. Like theatre, the image does not need to remain identical every time you review it. You can adjust and further exaggerate the movements or interactions, as long as you keep the core information intact.

If you recall both picture words in the right order, then your review is successful and you can wait longer before reviewing again. If your review is unsuccessful, review again tomorrow. This way, you will review the harder images more often than the easier images. For each unsuccessful review, investigate what went wrong using the guide in chapter **??**. You may need to adjust and exaggerate the interactions to make them more memorable.

One of the best things about memory palaces is that you don't need any external help to review them. You can practise your chess repertoire while meditating with your eyes closed. However many of us like to use flashcards to prompt our reviews, as they handle the spaced repetition in a time-efficient way. Ideally you would review each image when you are just about to forget it: any earlier and the review is unnecessary, any later and you will need to spend longer recreating the image. People used to handwrite physical flashcards and use a filing system to manage the scheduling. These days of course, it's much easier with software. My favourite spaced repetition software (SRS) is the free and open source *Anki*. Other SRS programs are available too. The software will manage the scheduling for you, so you just need to create the flashcards and then truthfully answer "correct" or "fail" when you review.

You could review an entire memory palace in one go. This is worth doing before a game if you can predict which opening will be played. But for day-to-day flashcard practice, this is inefficient (not to mention off-putting) because you will be able to recall some images more easily than others. It's better to spend your time on the parts you find difficult, so I recommend creating one flashcard for each composite image.

On the front of each flashcard, I set the scene (Spanish Exchange Transit Line), the location (concourse), and the previous image (*shell*

mime at Waterloo entrance). I "tag" the card with the opening name (Ruy Lopez Exchange) so that I can easily collate every card in the repertoire if I want to. On the back of each flashcard, I write the answer (*lore lore*). I write only the picture words because it takes too long to type out a full description of the composite image story. Save all that for your head.

For best practice, format the front of the card to use three different fonts so that your eye can recognise the different elements quickly. The most important trigger is your current location, so that should be written largest. Don't be tempted to add extra hints: you need to be able to replicate this at the board!

If the architecture of your memory palace is complicated, you may need some additional flashcards to remind yourself of the structure. For example, "What are the options after passing through security at the airport?"[2] Of course, it's better to keep your memory palace simple in the first place.

It can take a while to create your flashcards, but the results are very effective. (Also, be sure to read the software manual for tips on faster data input.) Once you get the hang of it, you can visualise your images and speed through the flashcard reviews rapidly.

Spaced repetition is an effective technique by itself, even without a memory palace. You could use it for chess moves without storing your moves in picture notation: just create a flashcard with a board position on the front and a chess move on the back. But memory palaces are a big improvement, because they use your brain's natural ability to remember places and stories. A good composite image is inherently more memorable than a chess move. This means your memories will last longer, your recall will be more accurate, and you will need to review less frequently. The combination of spaced repetition with a memory palace is incredibly powerful.

Blindfold simultaneous exhibitions

In this book we have practised converting picture notation to chess moves under pressure at the board (chapter **??**), and memorising chess

[2] Answer: read the departure boards, or rush to the moving walkway.

moves as picture notation slowly at home (chapters **??** and **??**). Another possibility is memorising chess moves as picture notation at the board while playing a game. This is harder because you can't refer to the Appendix while playing, so you need to know your list of picture words – although after using picture notation for a while, you might accidentally learn most of them anyway.

Why would anyone want to do this? Because it would help with blindfold simultaneous exhibitions.

One of the key challenges of blindfold simuls is how to keep the games distinct. In other words, how can you remember which game is which? The earliest moves are often the hardest, because the games are still similar – many identical – before they each take a unique flavour in the middlegame.

For this reason, there is an intriguing history of exhibition strategies, as each master plans the simul in advance. Reuben Fine repeated a pattern of openings: 1.d4, 1.e4, 1.Nc3, 1.g3. Harry Pillsbury (who was a practitioner of memory techniques) preferred 1.e4, but used 1.d4 every few boards to create distinct groups of games. He also planned his second and third move replies to each 1.e4 e5 game. Alexander Alekhine had an even more elaborate system of planned openings, and requested his opponents announce their own moves so that he could use their voice as an additional identifying feature. George Koltanowski asked for 14 of the games to be announced in descriptive notation and the other 20 in algebraic notation. Miguel Najdorf took the black pieces in two of each set of 15 boards, in his 45 game exhibition.

All the strategies above can be planned before the exhibition begins. What about techniques to use during the exhibition, to record what the opponent has played? Tony Miles classified each common opening with a letter, then turned each set of five games into a word or sound. But the most advanced system was employed by Timur Garayev in his record 48 game exhibition. His strategy was to prepare an empty memory palace, then store the opening moves of each game as an image.

Compared to picture notation, Garayev's pictures are workable but not systematic. For example, 1.c4 e5 might be a crocodile with a giant ear (*c* and *e* representing the files), while 1.c4 c5 might be a two-headed crocodile (c file, symmetrical). Pictures like this can work for the first move or two, but I believe this technique can be improved with

picture notation. Because picture notation can represent any move, the master would never have to invent new pictures while playing, and the images will never be ambiguous. Rather than storing only the very beginning of each game, a master could use picture notation to store the first four or five moves, and thus keep a huge number of games distinct. In theory, although it would be very slow and require highly skilled image building, you could memorise every move of every game in picture notation, and there would be no limit to the simultaneous exhibition except time!

Other board games

A variant of picture notation should work for other boardgames with predictable branching (unlike go), such as draughts/checkers, mancala, jianggi, shogi, and xiangqi. It is surprising to me that memory techniques have rarely been applied to mind sports, where a strong memory gives a direct competitive edge.

Picture notation in other languages

Picture notation as described in Chapter **??** uses English words to convey information. The same principle will work in other languages, but might require some tweaks.

Each picture word (or phrase) needs to encode three items of information:

1. **File** of the target square (eight options, a-h)
2. **Rank** of the target square (eight options, 1-8)
3. **Candidate piece** that moves to the target square (normally up to three options; sometimes four; and very rarely five, for target squares d2, d7, e2 and e7).

Picture notation in English achieves this using (1) the first consonant sound of a word, (2) the second consonant sound of a word, and (3) the number of syllables of a word. In other languages, it will often be possible to use consonant sounds for the file and rank, just like with

English. Depending on the language, you may need to reassign which consonant sounds identify which ranks and files, to make sure there are enough words available for each square.

For choosing which candidate piece to move to the target square, using the number of syllables in a word will work for some languages, but not all. If necessary, use another property of a word, such as its grammatical gender or tone – but beware using anything that will vary too much in different dialects and accents, such as vowel sounds. If nothing is adequate, then you can transform the picture words into picture phrases. For example *toast* might indicate a1 with piece I, *toast covered in sticky oil* might indicate a1 with piece II, *toast on fire* might indicate a1 with piece III, and so on. You should avoid this if possible because it makes the composite images harder to remember, as each of them must contain four elements (two picture words plus two transformations) instead of two.

After you have created a system where any given picture word encodes the file, rank and candidate piece number, check that you have an available picture word for each of the 64 squares a1-h8, with candidate pieces I-IV. After that, you are ready to start memorising by placing composite images in a memory palace, exactly as before.

Four complete games in picture notation

Finally, it may be helpful to see more examples of picture notation in action. Here are four games, three classic and one modern, with algebraic and picture notation side by side.

Game 1: Paul Morphy v NN, New Orleans 1858, 1-0
In this game note that 33.e8=Q – a beautiful pawn promotion finish in a blindfold simultaneous exhibition – is simply written as *wolf*. The pawn on e7 is candidate piece I, and the promotion to a queen is assumed.

Note also that 29...Qg7 and 30...Qg8 use one-syllable picture words. If we forgot about checks, then the king would be candidate piece I and the queen would be candidate piece II. However, the king cannot legally move to g7 and g8 because that would put himself in check. Therefore the queen is candidate piece I and uses one-syllable picture

words.

1. e4 e5 / *lore lol*
2. Nf3 Nc6 / *shampoo match*
3. Bc4 Bc5 / *Mir milk*
4. b4 Bxb4 / *nurse nurse*
5. c3 Bc5 / *mammoth milk*
6. O-O d6 / *foot brush*
7. d4 exd4 / *roar warrior*
8. cxd4 Bb6 / *robber banjo*
9. Nc3 Na5 / *mime tulip*
10. Ng5 Nxc4 / *eagle Mir*
11. Qa4+ c6 / *tree match*
12. Qxc4 Nh6 / *Mir fish*
13. Kh1 O-O / *foot five*
14. f4 Kh8 / *giraffe five*
15. f5 f6 / *shell shisha*
16. Ne6 Bxe6 / *polish leech*
17. fxe6 Qe7 / *polish hulk*
18. Bxh6 gxh6 / *fish fish*
19. Rf3 Rg8 / *jam gift*
20. Raf1 Rg6 / *jet coach*
21. Ne2 Rf8 / *plane chef*
22. Nf4 Rg5 / *shark skull*
23. d5 c5 / *barrel cymbal*
24. Qc3 Bd8 / *mammoth referee*
25. Ne2 Qg7 / *plane peacock*
26. Ng3 Qc7 / *gum magpie*
27. Rxf6 Bxf6 / *shisha judge*
28. Rxf6 Rxf6 / *judge judge*
29. Qxf6+ Qg7 / *judge cake*
30. Qd8+ Qg8 / *raft gift*
31. e7 Re5 / *hulk lol*
32. Nh5 Rxe4 / *flute lore*
33. e8=Q / *wolf*

Game 2: Adolf Anderssen v Ernst Flechsig, Leipzig 1877, 1-0
This game contains several long picture words, including two five-syllable picture words right at the start (*Brachiosaurus planetarium*) and a four-syllable picture word on move 19 (*Chateaubriand*). The sequence of captures on e5 (*lollipop lollipop lol lily lol*) is good practice for choosing the correct candidate piece.

1. e4 e6 / *lore leech*
2. d4 d5 / *roar pearl*
3. Nc3 Nf6 / *mime shisha*
4. e5 Nfd7 / *lol Brachiosaurus*
5. Nce2 c5 / *planetarium cymbal*
6. c3 Nc6 / *mime match*
7. f4 Qb6 / *chariot sponge*
8. Nf3 Be7 / *jam blackboard*
9. a3 O-O / *thumb hook*
10. Ng3 f6 / *gum jujube*
11. Bd3 cxd4 / *Roman warrior*
12. cxd4 fxe5 / *roar lollipop*
13. fxe5 Ndxe5 / *lollipop lol*
14. dxe5 Nxe5 / *lily lol*
15. Qe2 Ng4 / *plane crab*
16. h3 Bd6 / *foam brush*
17. Bxh7+ Kxh7 / *fox fox*

18. hxg4+ Kg8 / *crab gift*
19. Nf1 Qb3 / *Chateaubriand gnome*
20. Rh3 e5 / *foam lily*
21. Nxe5 Qa4 / *lily tree*
22. b3 / *gnome*

Game 3: Wilhelm Steinitz v Jacob Elson, New York 1883, 1-0

Steinitz made an *en passant* capture on move three in this simultaneous exhibition game.

1. e4 e6 / *lore leech*
2. e5 d5 / *lol barrel*
3. exd6 cxd6 / *brush projector*
4. d4 d5 / *roar pearl*
5. f4 Nf6 / *giraffe shisha*
6. Nf3 Bd6 / *shampoo airship*
7. Bd3 O-O / *Roman five*
8. O-O h6 / *foot fish*
9. Nc3 Bd7 / *mime sparkler*
10. Ne5 Nc6 / *lol match*
11. Ne2 a6 / *balloon dish*
12. c3 Nh7 / *mime fox*
13. Ng3 f5 / *gum shell*
14. Nh5 Nf6 / *waffle jujube*
15. Nxf6+ Rxf6 / *judge shisha*
16. Bd2 Bxe5 / *brain lily*
17. fxe5 Rf7 / *lily hedgehog*
18. g4 g5 / *ogre eagle*
19. gxf5 exf5 / *jellyfish cello*
20. Qh5 Qf8 / *flute chef*
21. e6 / *leech*

Game 4: Peter Svidler v Vladimir Malakhov, Khanty-Mansiysk 2009, 0-1

The final move of this modern game is an underpromotion, with mate in four to follow.

1. d4 d5 / *roar pearl*
2. c4 c6 / *Mir match*
3. Nc3 Nf6 / *mime judge*
4. Nf3 a6 / *jam dish*
5. e3 b5 / *lemur snail*
6. c5 g6 / *milk coach*
7. Bd3 Bg4 / *Roman crab*
8. h3 Bxf3 / *foam jam*
9. Qxf3 Bg7 / *jam cake*
10. g4 e5 / *crab lol*
11. Qg3 Nfd7 / *gum orangutan*
12. Ne2 Qe7 / *balloon hulk*
13. O-O h5 / *foot flute*
14. f3 Nf8 / *jam shoveler*
15. a4 b4 / *tree nurse*
16. Bd2 a5 / *brain doll*
17. e4 dxe4 / *sailor lore*
18. Bxe4 Ne6 / *lore leech*
19. Rae1 h4 / *sloth fairy*
20. Qf2 O-O / *chinchilla five*

21. f4 exd4 / *chariot robber*
22. f5 Nxc5 / *cello cymbal*
23. Bb1 d3 / *Santa Roman*
24. Nc1 Qd6 / *scimitar brush*
25. Ba2 Bd4 / *tent robber*
26. Be3 Ne4 / *lemur lore*
27. Qxh4 g5 / *frog skull*
28. Qh5 d2 / *flute heron*
29. f6 Qxf6 / *judge judge*
30. Bxd4 Qxd4+ / *roar roar*
31. Kg2 dxe1=N+ / *gown, sloth with a war horse*

Notes

Chapter ??

1. "*My team's chorus cry*": Viswanathan Anand (2000) Mind Master. Hachette India, chapter 3. The context is: "If I haven't revised my notes, the chances of me forgetting my preparation runs high. It's why my team's chorus cry [...]"

2. "*Long before a player*": Garry Kasparov (2007) How Life Imitates Chess. William Heinemann, page 143

   Kasparov does also say that "opening sequences [...] are indeed memorised", and that he plays by "relying on memory to select the opening lines I prefer until I run out of book and am on my own". Garry Kasparov (2017) Deep Thinking. PublicAffairs. This does not contradict his comments on understanding; instead it reinforces the point that understanding and memory are complements. Kasparov plays a move from memory – but he understands its purpose.

3. *Magnus Carlsen v Bu Xiangzhi*: Magnus Carlsen v Bu Xiangzhi, 9 September 2017, World Cup, Tbilisi

4. *win brilliantly*: Levon Aronian v Viswanathan Anand, Tata Steel Group A, 15 January 2013, Wijk aan Zee. Anand's account of this moment cam be found in Viswanathan Anand (2000) Mind Master. Hachette India, chapter 3

5. *many lines at once*: There is an interesting account of this in,

again, Viswanathan Anand (2000) Mind Master. Hachette India, chapter 3

6. *hard to work out*: Although he was writing in a different context (imaginative endgame moves), I think this quote from GM John Nunn applies: "Since it is the best move, there must be logic behind it, but logic often doesn't help in finding such moves over the board." John Nunn (2009) Understanding Chess Endgames. Gambit Publications Ltd, page 226

7. *On e6*: John Cox (2011) Declining the Queen's Gambit. Everyman Chess, page 13

8. *played the Mieses Opening*: Garry Kasparov v Deep Blue, 6 May 1997, IBM Man-Machine, New York

9. *against the computer Deep Blue*: Similarly, Kasparov played 7.g4 against the computer Deep Junior's Semi Slav Defence, because he knew it was not in Deep Junior's opening book. (Garry Kasparov v Deep Junior, FIDE Man-Machine WC, 26 January 2003, New York; according to David Shenk (2006) The Immortal Game. Doubleday, chapter 11.) Kasparov preferred to leave Deep Junior's preparation early, which demonstrates both the value of memorised moves (Kasparov wanted to avoid the book moves) and the importance of understanding the subsequent middlegame plans (now the computer needed to find moves for itself).

10. *Which is which*: The answer is ...Ba7 on the left diagram, ...Bb6 on the right diagram, according to GM Jan Gustaffson's Grandmaster Repertoire against the Italian Game, on chess24

11. "*After a while*": Matthew Sadler (2000) Queen's Gambit Declined. Everyman Chess, page 113

12. *disqualified for cheating*: This seems a good place to discuss the boundary between mnemonics and cheating. Using a memory palace in your mind is clearly permissible. But what if you used the tournament hall itself as a setting for a memory palace, and then gazed around the room to help recall your images? And

Figure **??** takes a shape that would match a palm and four fingers – what if you used your hand as a memory aid, and looked down at it to help win an endgame? (Hands have been used as mnemonics for over a millennium, see Karol Berger's chapter on *The Guidonian Hand* in Mary Carruthers & Jan Ziolkowski (2002) The Medieval Craft of Memory. University of Pennsylvania Press, chapter 3.) I think both of these ideas are not permissible as they would involve a form of external assistance. FIDE Laws of Chess Article 12.3(a) forbids a player to "make use of any notes, sources of information or advice". Using the room, or even your own body, as a mnemonic device would be a source of information. It would be impossible to prove what was going on inside your head, so this can be enforced only through honour.

What about rotations? It is permissible to stand up and view the board from a different angle, as long as you don't distract your opponent. But what about using a reflection? In theory, if you were playing next to reflective glass (like the first Anand-Carlsen World Championship Match!) you could look at the reflection instead of the board itself, which might occasionally help with an endgame. In my opinion the glass would then be a source of information, so this is not permissible.

Happily these considerations are theoretical, as these possibilities would be helpful in only a rare and limited way. We are unlikely to see accusations of cheating for people absentmindedly scanning the room, even if it is possible in theory.

13. *reading vocabulary*: Gwern Branwen. Spaced Repetition for Efficient Learning. https://www.gwern.net/Spaced-repetition

14. *fade more slowly*: As discovered by Hermann Ebbinghaus, who ran self-experiments and published the results in 1885. The "forgetting curves" in Figure 1.1 are sometimes called "Ebbinghaus forgetting curves". There are many versions of this spaced repetition graph online.

15. *remain identical*: Antony Metivier makes the same point in The Victorious Mind (2020). Chapter 10

16. *takes too long*: Also Joe Reddington in Advanced Memory Palaces (2021) points out that some of your images will be too grotesque or otherwise embarrassing to commit to writing.

17. *flashcard with a board position*: Anand used to review photographs of board positions during plane journeys. Viswanathan Anand (2000) Mind Master. Hachette India, chapter 3

18. *transform*: Inspired by Tony Buzan (2010) The Memory Book. Pearson Education, pages 89-90, 116

19. *exhibition strategies*: More detail for all these examples from Fine to Miles can be found in Eliot Hearst & John Knott (2009) Blindfold Chess. McFarland & Company, pages 193-196

20. *Harry Pillsbury*: The evidence that Pillsbury knew memory techniques is that he could memorise long lists of obscure words (on the same day as his blindfold simul). He did not publicly reveal his methods. Eliot Hearst & John Knott (2009) Blindfold Chess. McFarland & Company, page 171

21. *strategies above*: Although it didn't fit the flow of the paragraph, one should also not forget FM Marc Lang's 46 game record in 2011. He used a strategy of themed groups of five games, divided by games played as Black. Leonard Barden (2011, December 30) Marc Lang catches the eye by breaking world blindfold record. https://www.theguardian.com/sport/2011/dec/30/chess-marc-lang-blindfold

22. *Timur Gareyev*: GM Timur Gareyev scored over 80% in his 48 board blindfold simultaneous exhibition. He used his opponent's voice as well as his memory palace to distinguish the games. He plans most of his pictures in advance, but presumably would need to improvise a new picture if his opponent plays something unusual, or else just abandon the technique for the unusual game. Timur Gareyev & Albert Silver (2016, March 12) Memory Palace – Timur's World Record preparation. ChessBase India. https://chessbase.in/news/timur-gareyev-blindfold-record

23. *rarely been applied*: A intriguing exception can be found in "An Artificial Memory, Or An easy Method of assisting the Memory

of those that play at the Game of Whist", at the back of Edmond Hoyle (1745) The Polite Gamester. Hoyle suggests methods of rearranging the remaining cards in your hand to remind yourself of cards played; for example "to remember your partner's first lead, place a small card of that suit led in the middle of your trumps". Techniques like this are still known, but not considered useful, in bridge today. With the exception of Timur Garayev's blindfold preparation, I don't know of any example of preparing a memory palace beforehand and carrying it into the game.