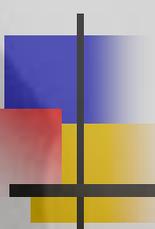


Psychological Research on Chess Experts: Lessons for Teaching and Training

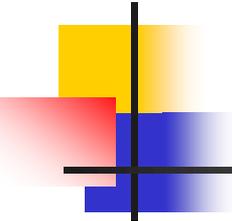


Fernand Gobet

Centre for Philosophy of Natural and Social
Science

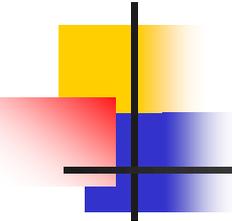
LSE

THE LONDON SCHOOL
OF ECONOMICS AND
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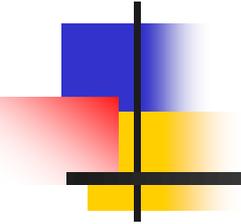
Aims of the Talk

1. To highlight an area of chess research that has been wholly understudied
 - Teaching methods
 - beginners → intermediate players
 - Coaching methods
 - intermediate players → competitive players → GMs
 - Target: improve skill in **chess**
 - Not transfer of skill to other domains (e.g. maths)!
2. To suggest avenues for research

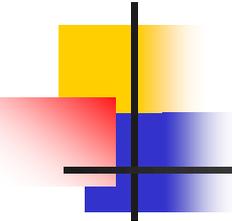


Argument of the Talk

- Much is known about chess experts' cognition
 - Large number of scientific studies
- Huge literature on chess teaching and coaching
- However, this literature almost never uses information from scientific research
- Scientific research allows one to develop better teaching and training methods
 - Pure empirical studies
 - Theoretically based studies
- Such research might benefit education beyond chess

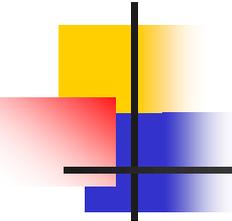


Research on Chess Experts' Cognition



Key Findings of Scientific Research on Chess Cognition

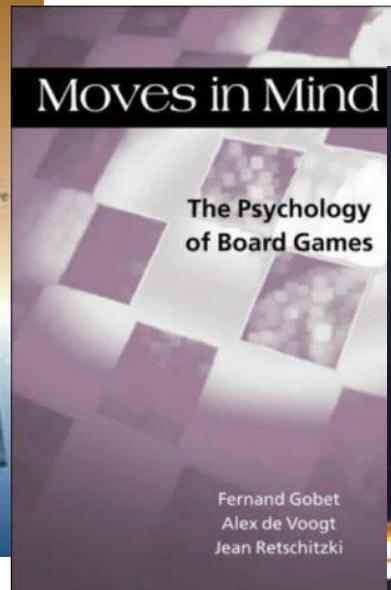
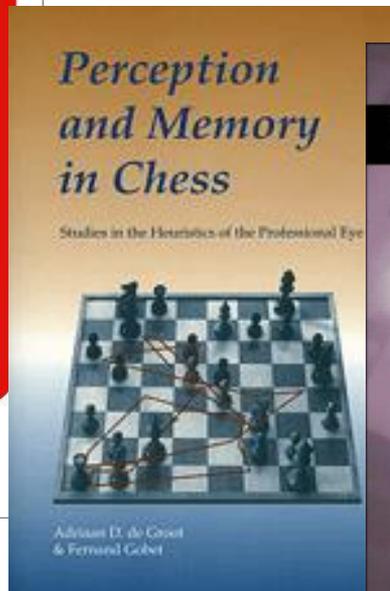
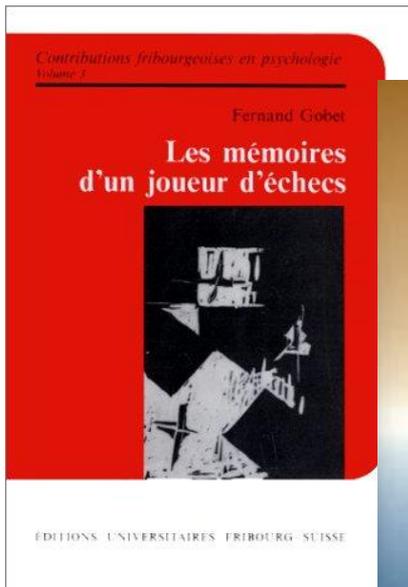
1. Short-term memory is limited
2. Expertise relies in great part on knowledge stored in long-term memory
3. Much knowledge encodes perceptual patterns (*chunks*)
4. This knowledge allows experts to often find good moves rapidly by *pattern recognition*
5. If necessary, chess experts can carry out a fair amount of search
 - Selective
 - Informed by pattern recognition

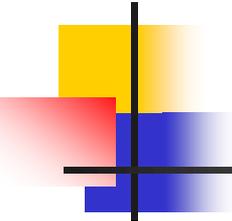


A Theory of Chess Skill

- Template Theory is based on these findings
 - Emphasises the learning and use of chunks
 - Gobet and Simon (1996)
- Implemented as a computer program
 - CHREST (Gobet et al., 2001)
 - Makes precise, quantitative predictions
 - Has been used in other domains of expertise
 - Go
 - Awele
 - Problem solving in physics
 - Acquisition of first language (a type of expertise!)
 - ...

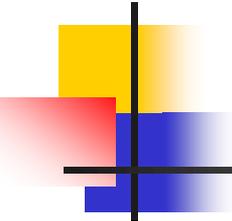
For All the Details...

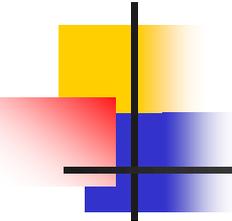




Huge Literature on Teaching and Coaching in Chess

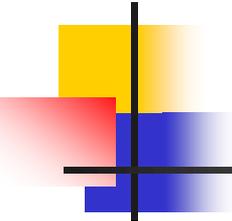
- Many methods have been proposed
 - Including various types of computer software
- However,
 - Information from scientific research rarely used
 - No scientific evaluation
 - Try a Google Scholar search!
- Exception: Deliberate practice
 - But focus on number of hours of practice
 - No detailed evaluation of coaching methods
- Every teacher or coach believes that their method is the best!

- 
-
- Lack of such research is surprising
 - Obvious practical importance
 - Huge market
 - Relatively easy to carry out
 - Certain to provide interesting results
 - By contrast, considerable research on the (putative) cognitive and academic benefits of chess playing
 - But results are disappointing for chess and other cognitive training methods
 - Sala and Gobet (2016), Gobet and Sala (2022)



Teaching Beginners and Intermediate Players

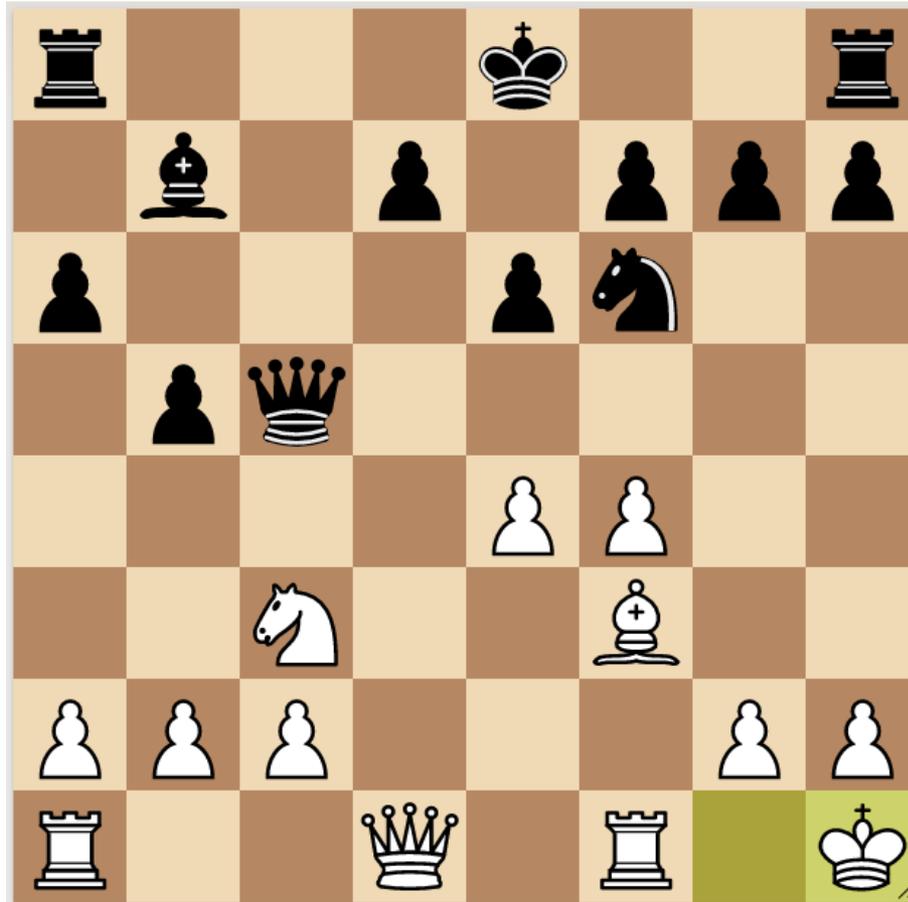
- Many questions could be systematically studied
 - What are the most efficient teaching methods?
 - Is software better than human teachers, or vice-versa?
 - What is the optimal duration of a chess lesson?
 - What is the optimal order of covering the material?
 - Is it better to study endgames or openings?
 - Etc...
- Better methods would help make sure that all children (at least most) acquire good chess skills
 - Non only the smart ones
 - Non only the competitive ones
- Important point: If current teaching methods are sub-optimal, difficult to reach conclusions about transfer



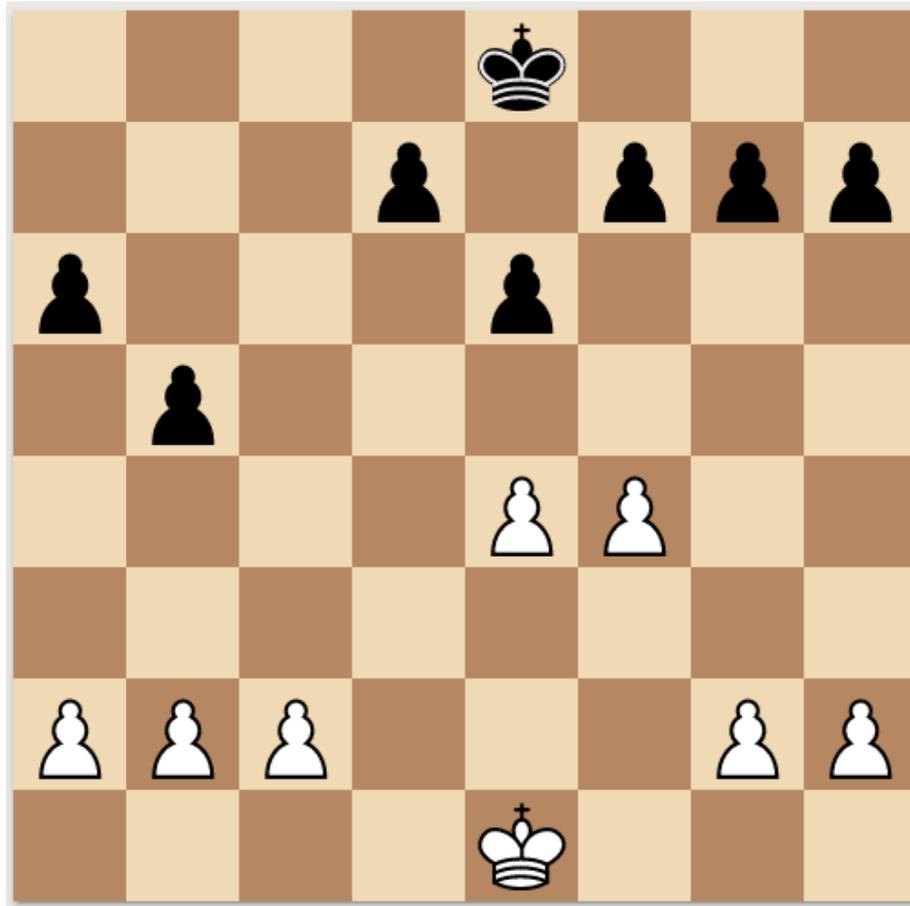
Two Main Approaches

- Empirically based:
 - Use of strong experimental designs to compare different teaching methods
 - Not theory based, but practically oriented
- Theoretically based
 - Broad instructional methods can be compared
 - Discovery learning vs. learning by examples
 - Theories of chess expertise can be used to derive principles
 - E.g. using template theory (Gobet & Jansen, 2006)
 - Example of spiral method to acquire chunks

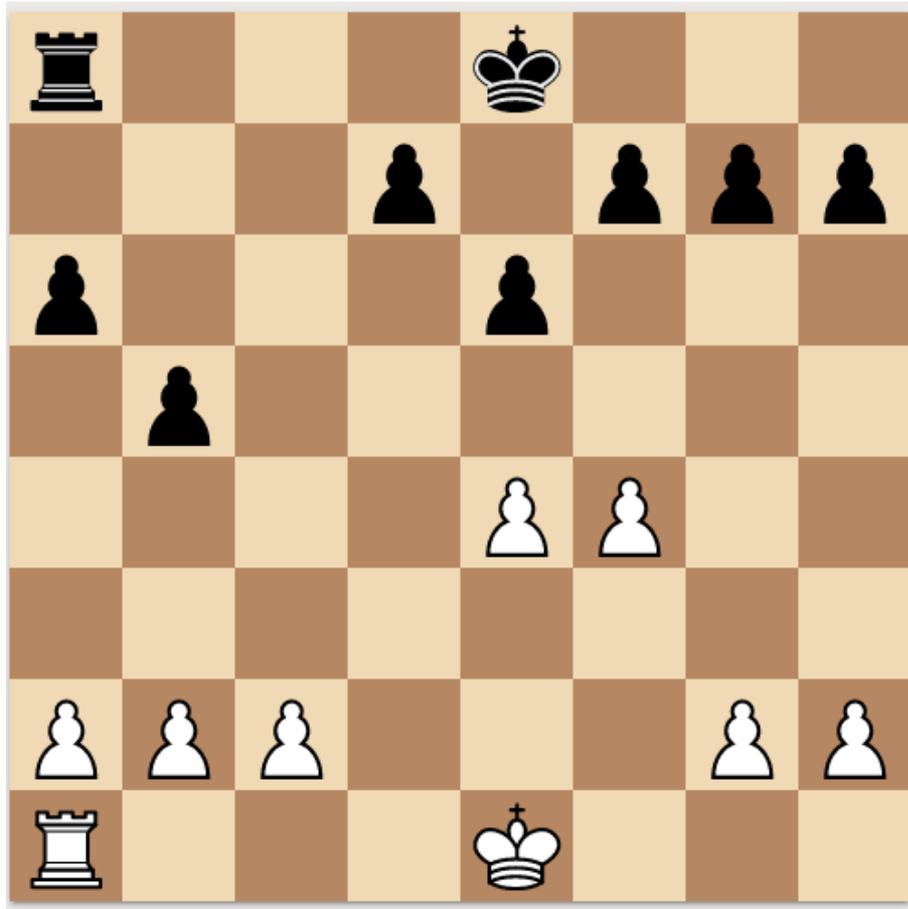
The Spiral Method

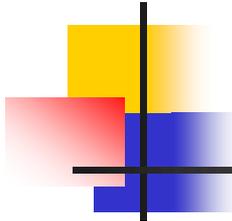


The Spiral Method



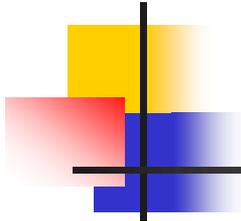
The Spiral Method





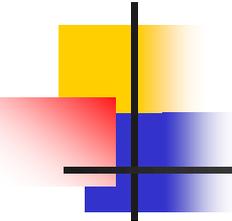
The Spiral Method

- Originally proposed by Chéron (1942)
- In line with Template Theory:
 - It optimises the acquisition of chunks for a given type of position
- Interesting method
- But is it really working?
- Is it better than
 - Memorising opening lines?
 - Scanning hundreds of games in a chess database?
- We don't know. No research has ever been done on this.



Coaching Advanced Players

- Same general two approaches
 - Empirically based
 - Theoretically based
- Research harder to carry out as higher levels of skill are used
 - Fewer players
 - Concepts more complex
 - Role of previous experience acts as a kind of confound
- On the other hand, links directly to research on chess expertise



Conclusions

- This talk has highlighted a huge gap in chess research
- Research on chess teaching and coaching
 - Is interesting scientifically
 - Is likely to provide clear-cut results
 - Is likely to lead to applications
 - Should interest chess companies, as it could give them a competitive hedge
- Such research might benefit education beyond chess

Questions?

