

The Chess Brain

Merim Bilalić

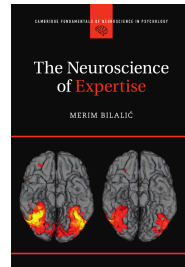
Northumbria University at Newcastle, UK

15. October 2022

Why study chess?

– Expertise Approach:

- Expertise as research vehicle
- Complex yet controllable environment
- Presence of 'experts' and 'novices'

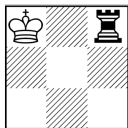


(2017) Cambridge University Press

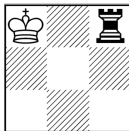


Chess - Object Recognition

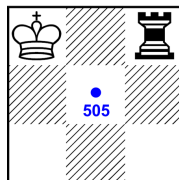
Identity



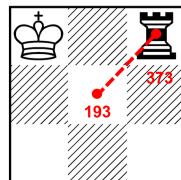
Check



Identity (object)

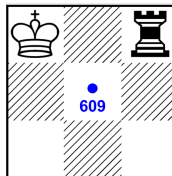


Expert

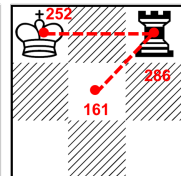


Novice

Check (object + relation)



Expert

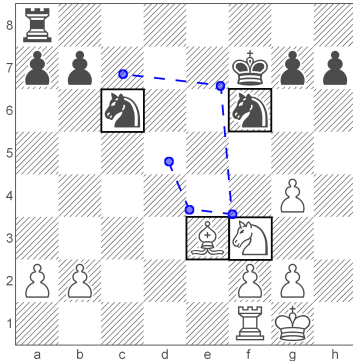


Novice

Bilalić, Langner, Ulrich & Grodd (2011) J Neurosci
 Bilalić (2016) J Cog Neurosci
 Bilalić, Kiesel, Pohl, Erb, & Grodd (2011) PLoS One

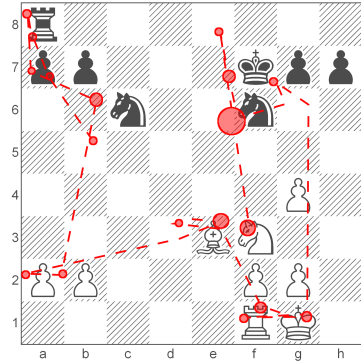
Chess - Pattern Recognition

Expert



Bilalić, Langner, Erb & Grodd (2010) JEP: General
 Bilalić, Turella, Campitelli, Erb, Grodd (2012) HBM

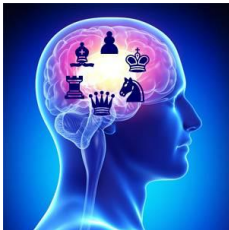
Novice



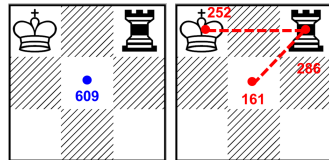
Chess - Object and Pattern Recognition

Summary

- Domain-specific knowledge
- Pattern recognition
- Focus on important aspects
- Qualitative differences
- Different/Better strategies



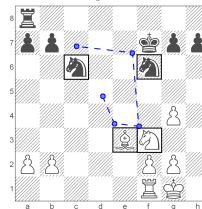
Check (object + relation)



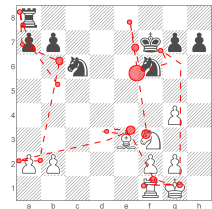
Expert

Novice

Expert

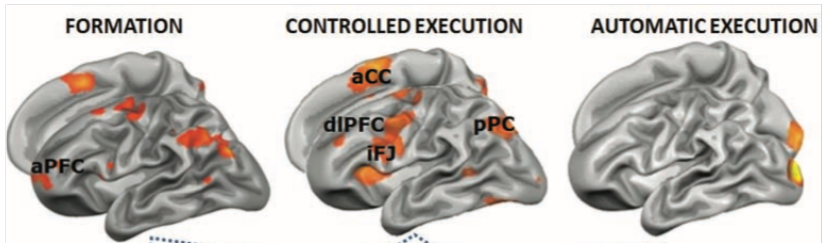


Novice



The Chess Brain

– Neural efficiency (Haier et al, 1992)



– Automatisatisation (Chein & Schneider, 2002)

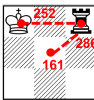
The Chess Brain - Object Recognition



Expert



Novice



Check

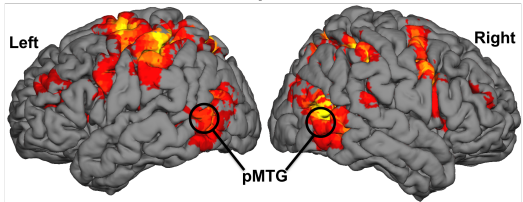


Baseline

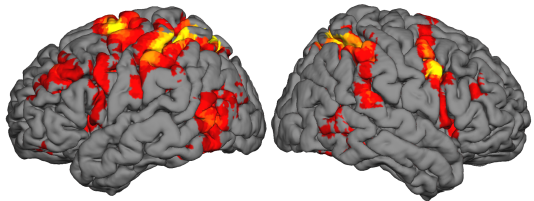
vs.



Expert

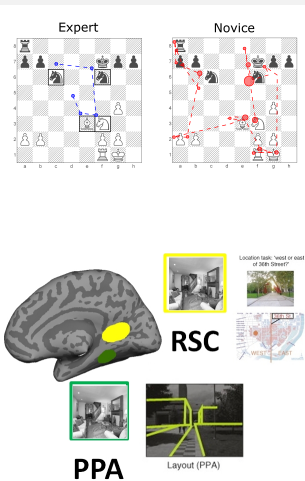


Novice

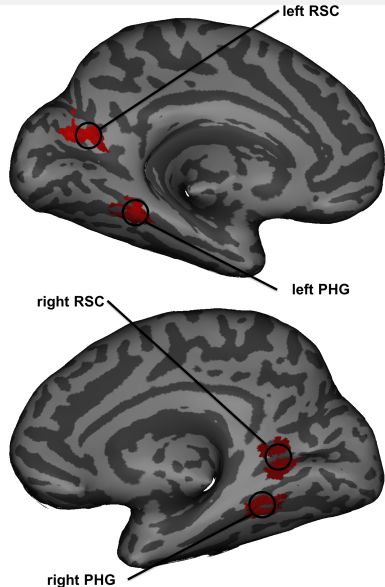


Bilalić, Langner, Erb & Grodd (2010) JEP: General
 Bilalić, Langner, Ulrich & Grodd (2011) Journal of Neuroscience
 Bilalić, Turella, Campitelli, Erb & Grodd (2012) HBM
 Bilalić, Kiesel, Pohl, Erb & Grodd (2011) PLoS: ONE

The Chess Brain - Pattern Recognition



Bilalić et al (2010) JEP: General
Bilalić et al (2012) HBM



The Chess Brain - Summary

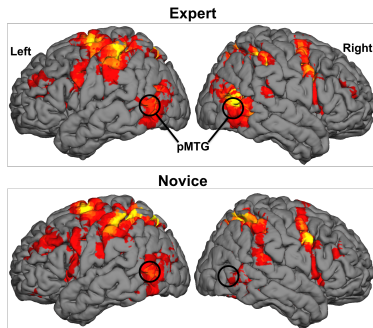
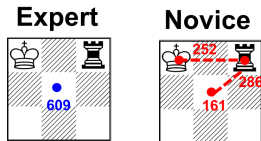
– Expert vs. Novice

- Different strategies
- Different neural implementation
- QUALITATIVE differences

– Double Take of Expertise

Bilalić (2018) Curr Dir Psych Sci

- Neural expansion
- Knowledge-related
- Automatic and parallel processing



The Chess Brain - Press

The New York Times

Harnessing the Brain's Right Hemisphere to Capture Many Kings

By DAVID L. DREIBER
Published: January 11, 2011

When inexperienced chess players sit down to play against experts, they probably wonder what it is that makes the experts so good that it seems they are almost playing a different game. New research suggests that one difference is that the experts use more of their brains.

[Enlarge This Image](#)



Tom Wolfe for The New York Times

In a study in the current issue of the journal *PLoS One*, a team of scientists in Germany showed experts and novices simple geometric objects and simple chess positions and asked the subjects to identify

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Chess grandmasters use twice the brain

14:31 11 January 2011 by [Nora Schultz](#)
Magazine issue 2795. [Subscribe and save](#)
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It may take years of hard work to become a chess grandmaster, but it gives a real boost to the brain – for working out chess problems, at least. It seems expert chess players use both sides of their brain to process chess tasks, rather than just one.

Merim Bilalic at the University of Tübingen in Germany used fMRI to scan the brains of eight international chess players and eight novices while they identified either geometrical shapes or whether the pieces on a chess board were in a check situation. The expert players were quicker at solving the chess problem, activating areas on both sides of their brains as they did so. The novices used just the left side.



Brian booster (Image: Ronnie Kaufman/Getty)