Factors influencing optimal skill learning: data from an online game

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Intrinsic motivation and the discovery of novel actions

- where do new skills come from?
- study of intelligent movement to reveal principles of intelligence generally


How to learn: Spaced vs blocked practice

Rats and humans refine their movements over multiple trials

http://axon.wellcomeapps.com/
Example player data for people who played more than 15 times
Practice: amount
The “Ten Thousand Hours Rule”

The “Ten Thousand Hours Rule”


Practice: spacing
average maximum score on plays 11-15

players grouped according to delay between first and tenth play

'goers'

'restes'

*
The diagram illustrates the average score plotted against the practice duration, ranging from 'least/shortest' to 'most/longest'. The trend shows an increasing average score as the practice duration increases.
Skill learning in an online game

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Description: Data from the game Axon and analysis code. See Stafford, T. & Dewar, M. (2014). Tracing the trajectory of skill learning with a very large sample of online game players. Psychological Science, 25(2) 511-518. and Stafford & Haasnoot (in preparation)

https://osf.io/fckq8/
Progress!

Using games: allow large n + all actions taken during learning recorded

We confirm previous findings on skill acquisition:
- power law of practice
- practice spacing

We extend these findings
- qualification of the 10,000 hours “rule”
- weighting factors against each other
- “Parametric analysis” : shows functional form
Score distribution of 26175 players over 765777 games
Chess!

Relation between difference in ranking and game outcome (6723849 games)
Chess!
Chess!
Games as research tools

Not just power...
...Parameterisation
...Whole task analysis
...Intrinsically motivated performance
(in the future)
...Adaptive experiment design

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