BUD ANALYTICS

Saint Louis CHESS CLUB

SAINT LOUIS CHESS CONFERENCE

The Mechanics of Mastery

Quantifying Metrics to Reveal What Elo Cannot

The Two Variables

1

Time Difference (TD)

(Your clock − opponent's clock) ÷ your starting clock

How far ahead or behind you are on the clock, as a share of your own time.

2

Accuracy by Material Remaining

Mean expected score loss per move, by material left on the board

Expected Score Loss per Move: Tracked separately by position

What These Metrics Had to Prove

1

Continuous & Predictable across Elo

A metric must track player skill across a distribution of Elo ratings.

2

Predictive beyond Elo & Engine Evaluation

Must be predictive of winning and/or game decisiveness.

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The Engine Doesn't See the Clock

Scenario A

Engine's Read

28.6% | 71.3%

You ● 35:00

Opponent ● 35:00

Roughly Even

=

Scenario B

Engine's Read

28.6% | 71.3%

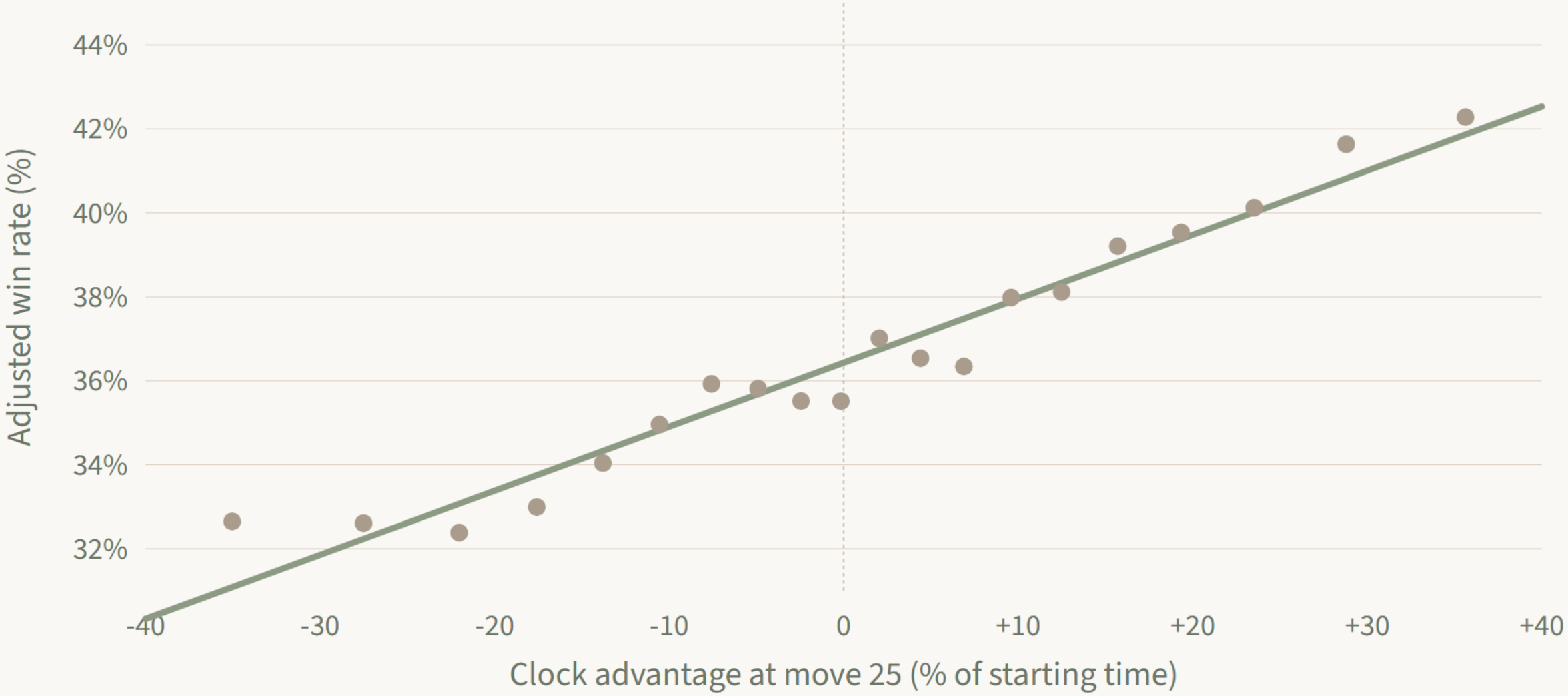
You ● 15:00

Opponent ● 35:00

Large Deficit

Adjusted Win Rate by Clock Advantage at Move 25

Controlling for rating and position, more time predicts more wins (115,815 player-games)



The Value of a Time Edge Grows With Rating

Win-probability gap between a time surplus and deficit, by swing size (move 25, even rating gap)



Reading the Position



GM **Fabiano Caruana**





GM **Wesley So**

28.6% **71.3%**

40:00 **40:00**

WDL from this project's own depth-18 Stockfish pass (n=14,598 positions, eval ≈ +0.8)

Reading the Position



GM **Fabiano Caruana**





GM **Wesley So**

22.3%	70.2%	7.5%

20:00

40:00

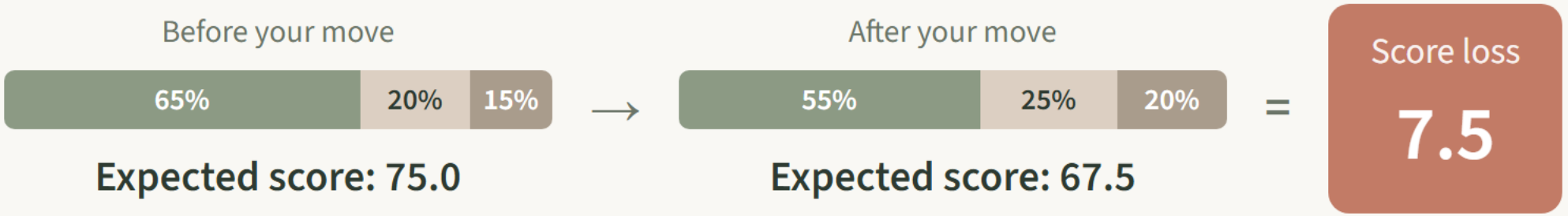
WDL from this project's own depth-18 Stockfish pass (n=14,598 positions, eval ≈ +0.8)

Expected Score Loss

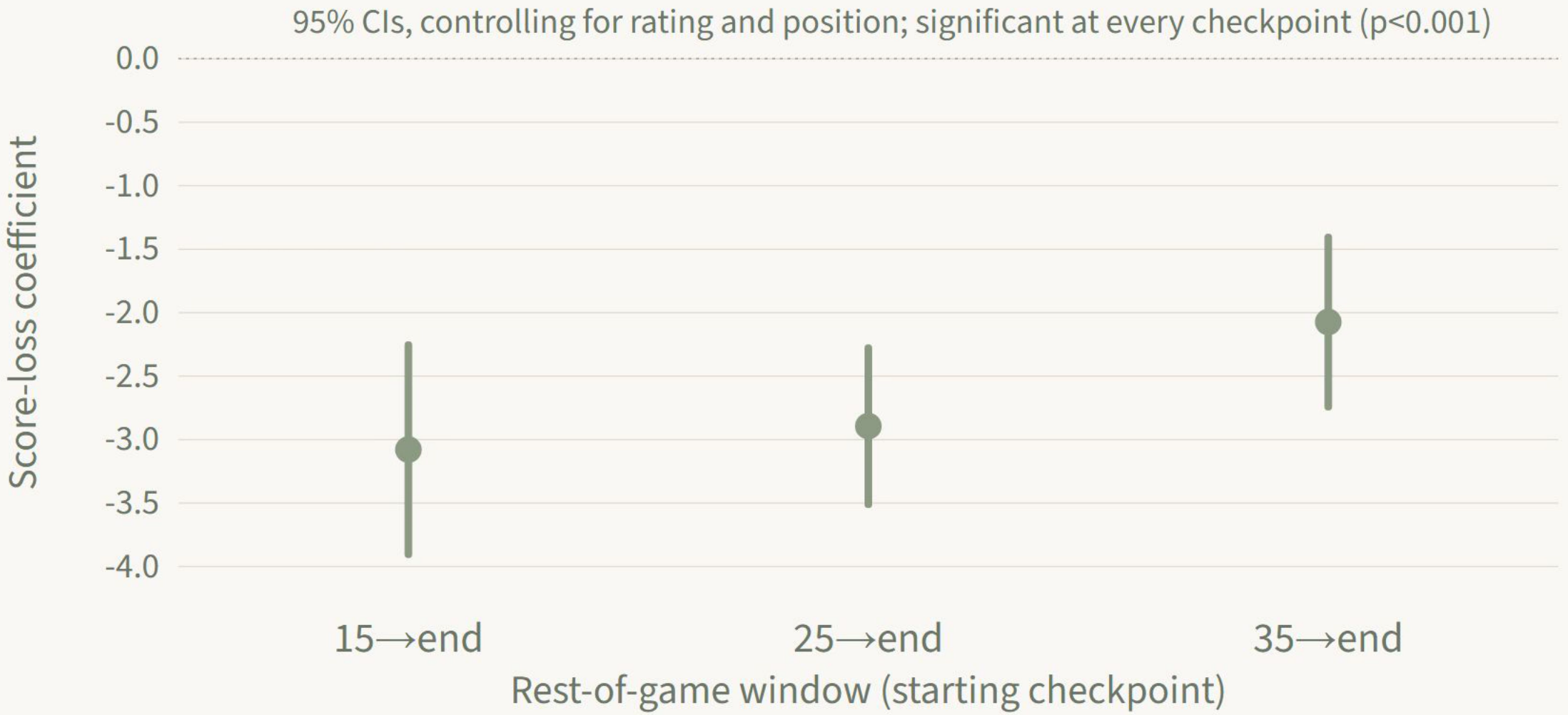
An alternative to centipawn analysis, measured directly from Stockfish

Expected Score = Win% + ½ × Draw%

Score Loss = max(0, Before − After) × 100

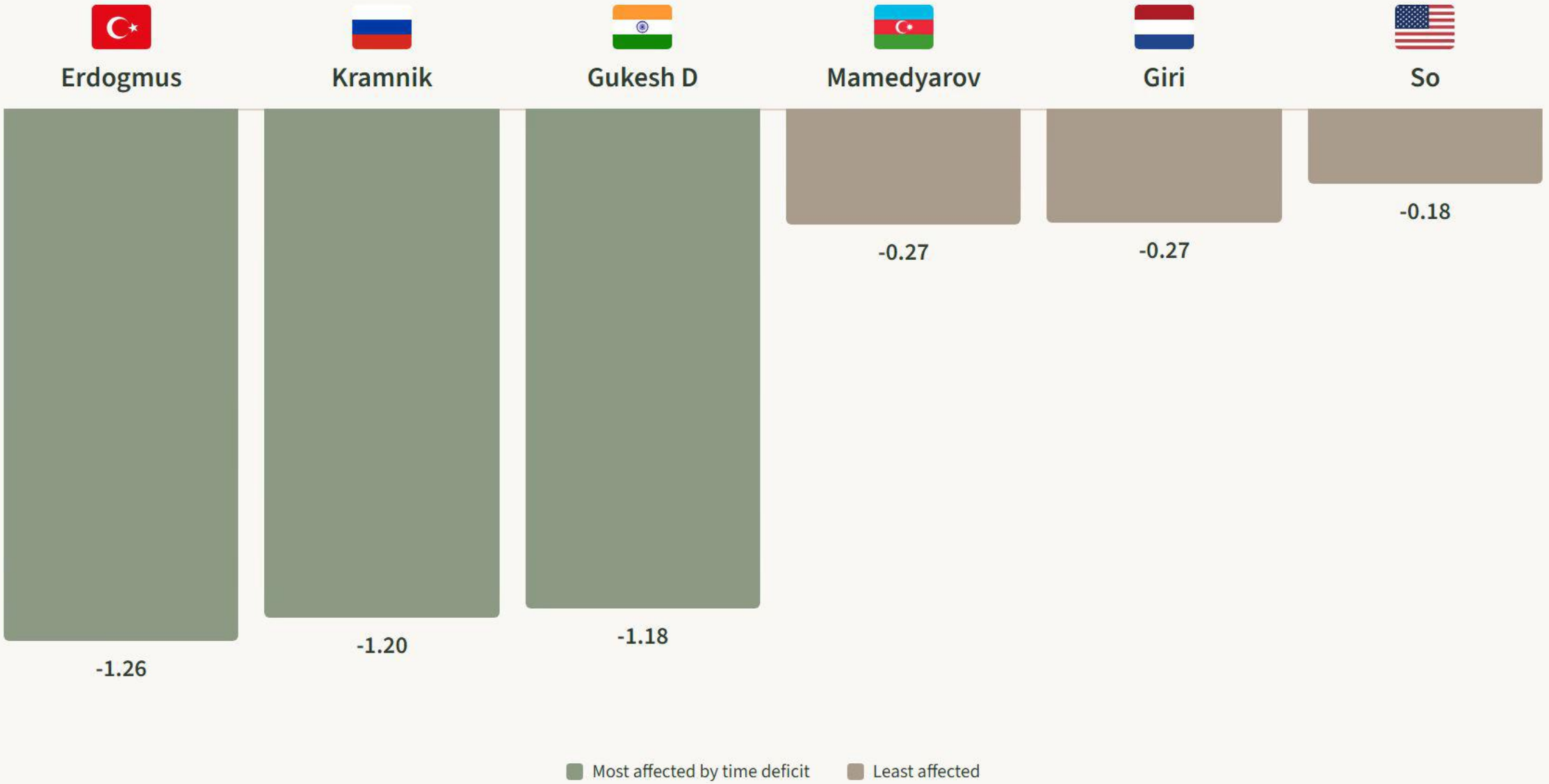


The Clock's Effect on Later Decisions Is Clear When the Engine Evaluation Is Controlled For



Elite Players: TD-Sensitivity Slope

Most affected by time deficit vs. least affected (≥30 games, 2625+ dataset)



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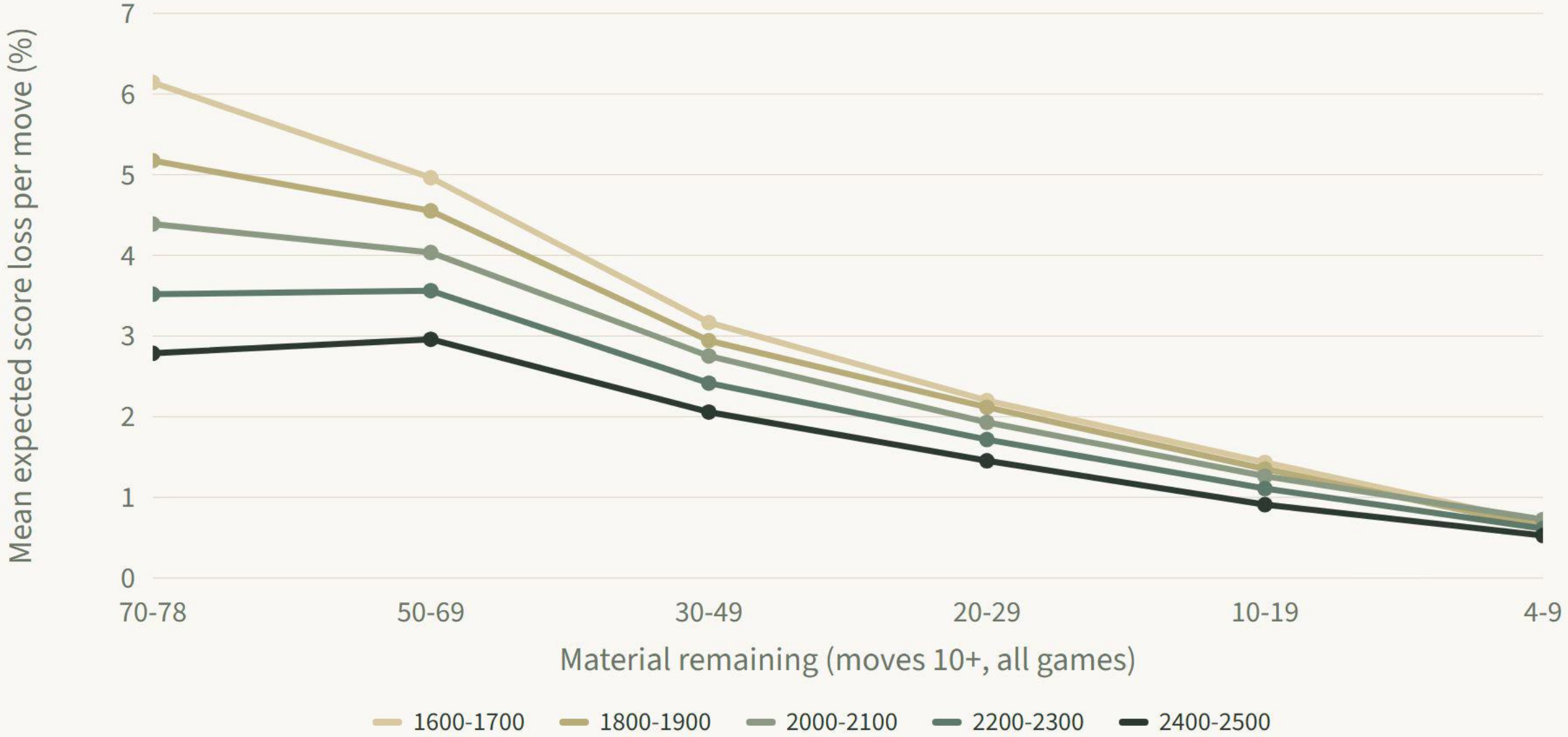
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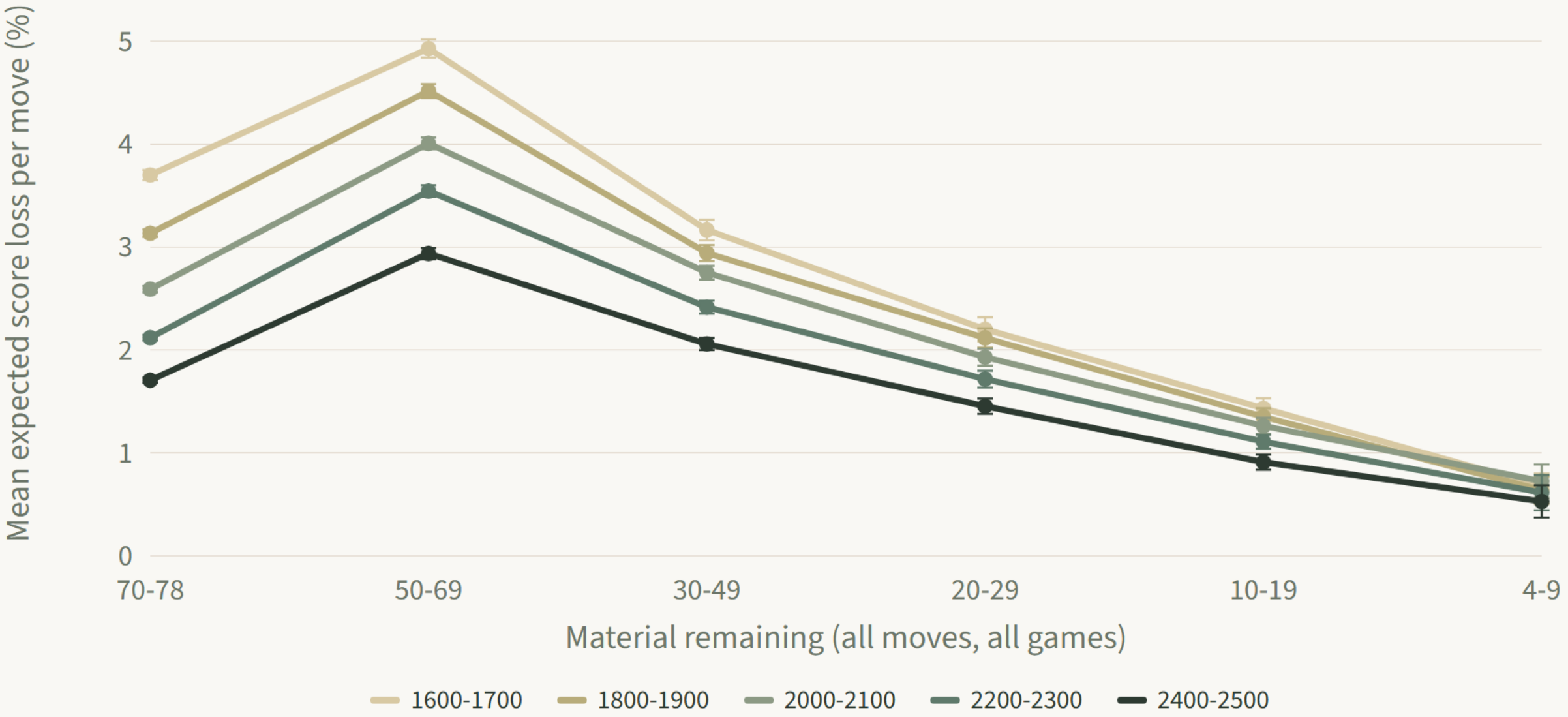
Decision Quality by Total Material Value Remaining

Move 10+, clustered 95% confidence intervals



Decision Quality by Total Material Value Remaining

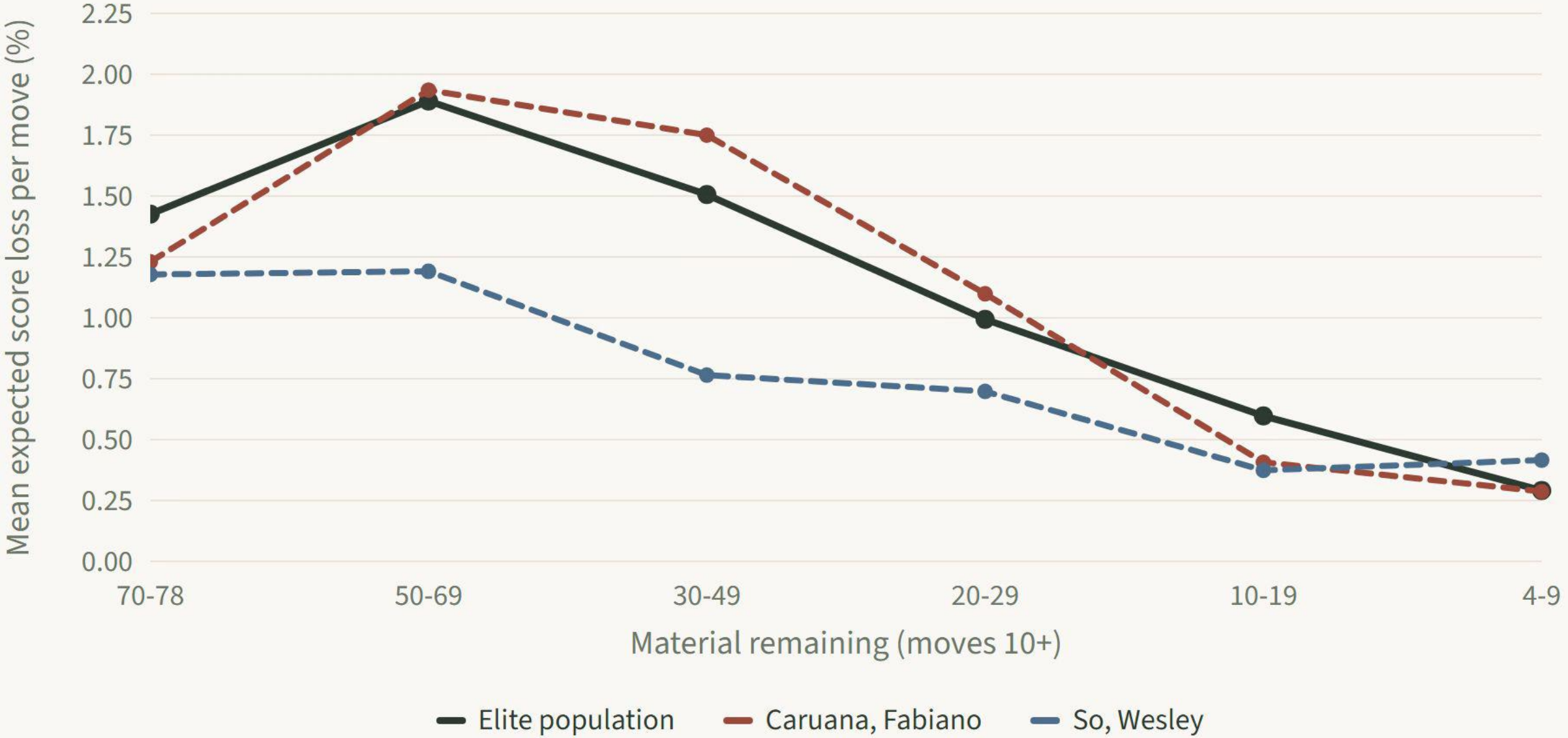
Clustered 95% confidence intervals




GRAND CHESS TOUR
FINALS 2026

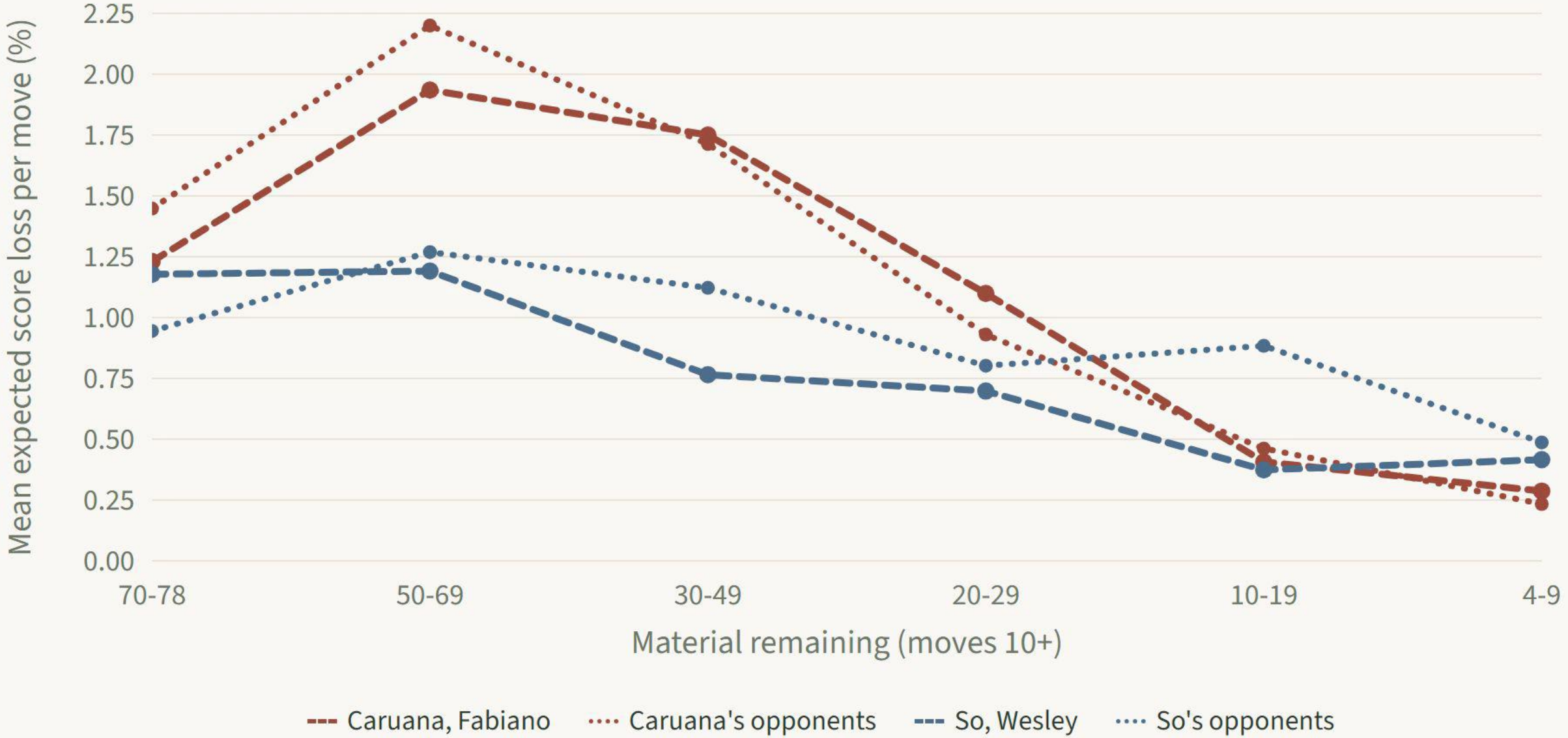
Elite (2625+): Caruana and So vs. the Population

Mean expected score loss per move, by material remaining (47 players, ≥30 games)



Elite (2625+): Caruana and So, Own Moves vs. Opponents

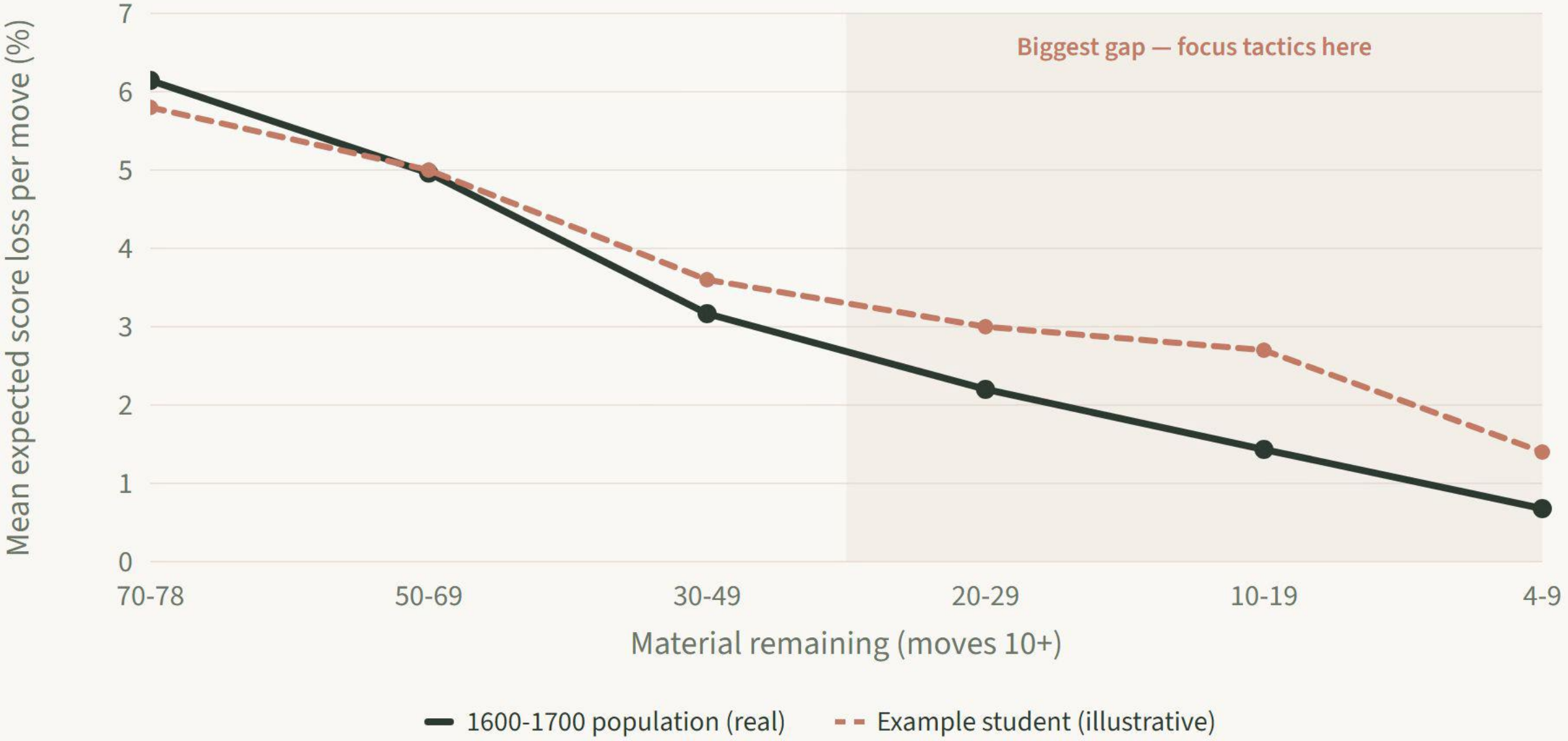
Dashed = the player's own moves; dotted = moves by whoever faced them





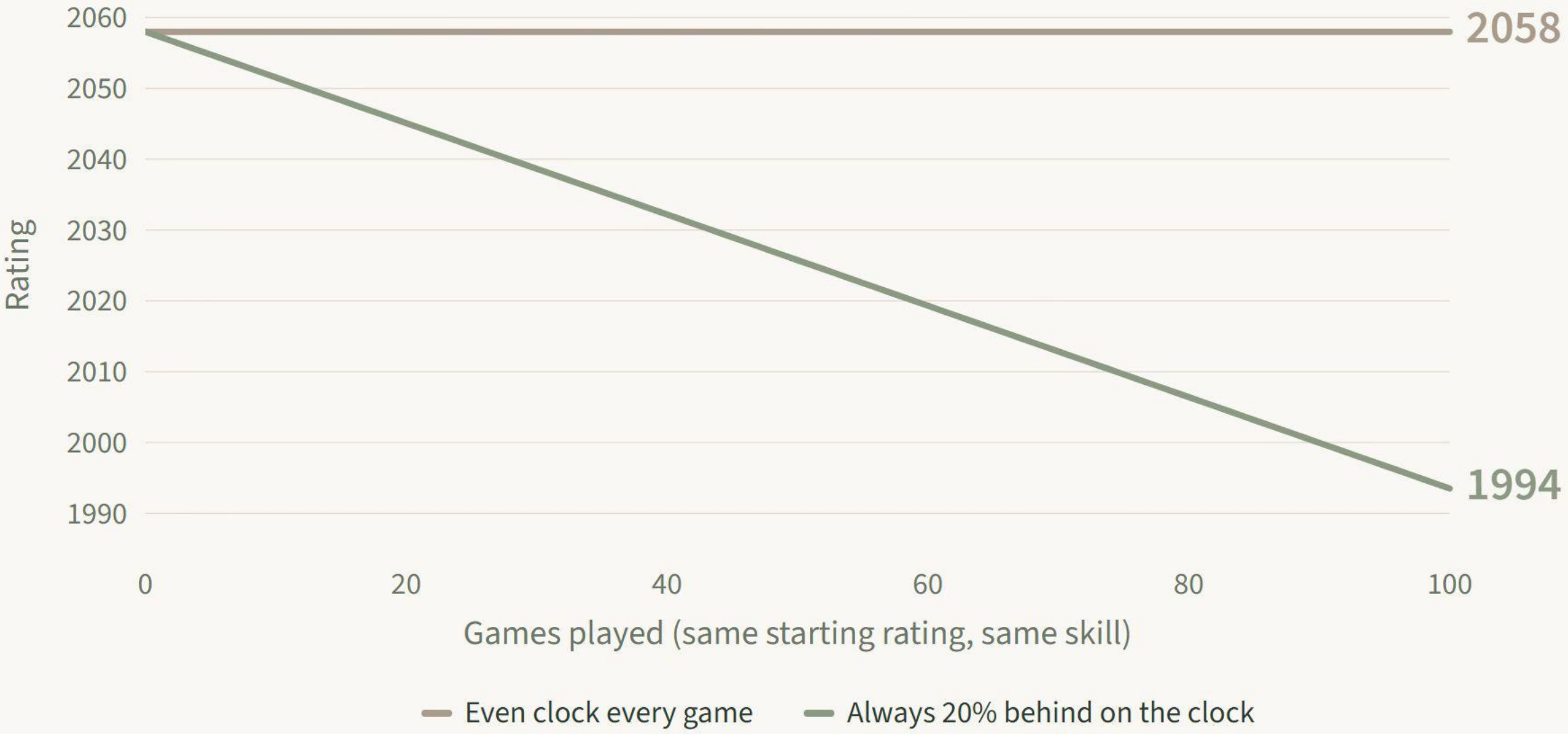
Where Does This Student Need Work?

Illustrative student vs. the real 1600-1700 population (mean ESL by material remaining)



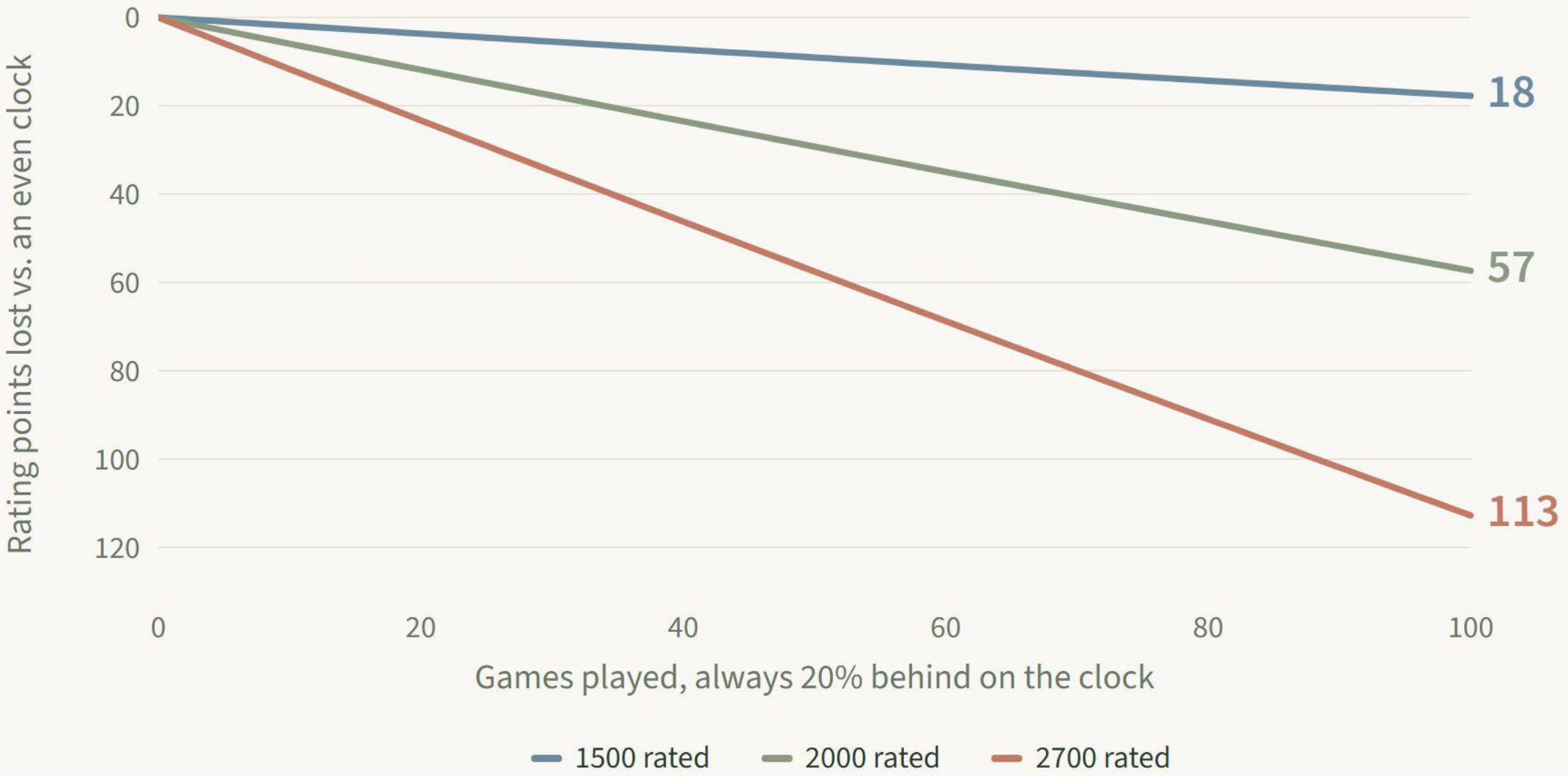
A Persistent Clock Deficit Costs About 64.5 Rating Points

Two identical 2058-rated players, 100 games, equal opponents each time



The Clock Costs Stronger Players More, Not Less

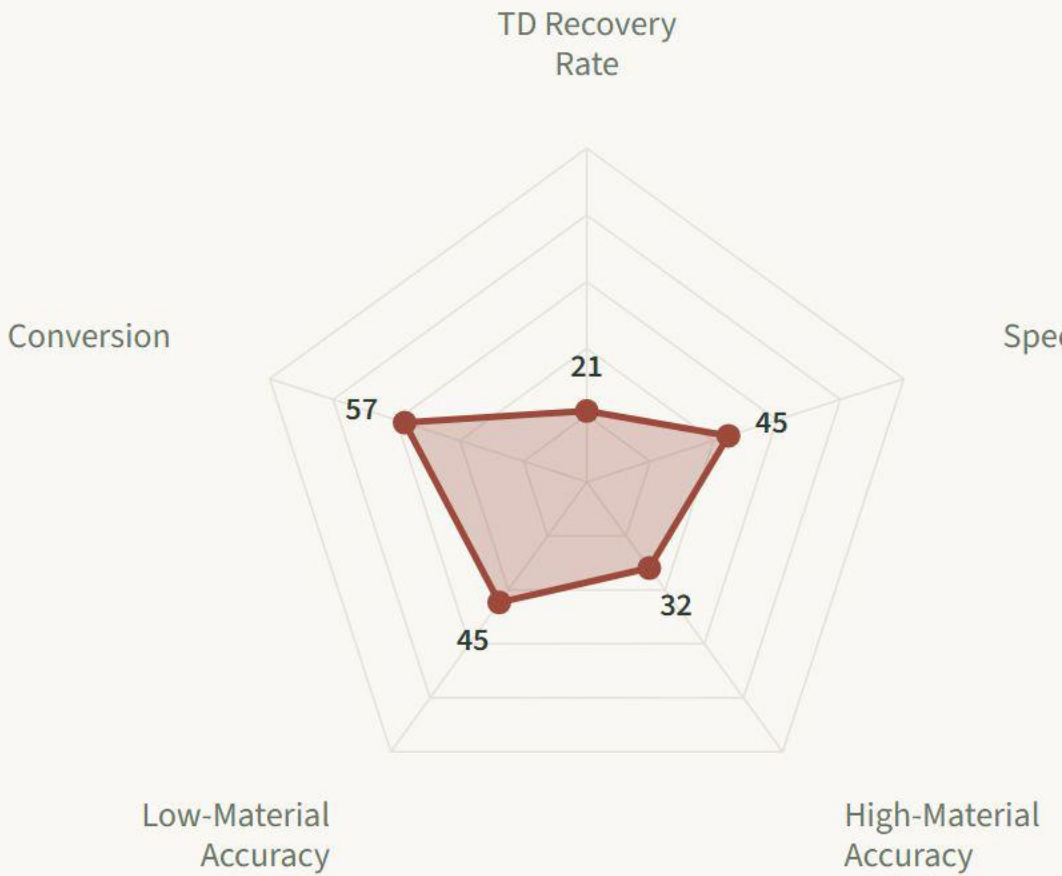
Same 20% clock deficit every game, incl. clock-by-rating interaction (p<0.001)



Contrasting Profiles: Caruana vs. So

Percentile rank vs. the 2625+ elite population (≥30 games, n=47)

Caruana, Fabiano



So, Wesley



These are narrow, situational metrics — not an overall strength ranking. Caruana remains the higher-rated player overall.

What This Unlocks

Coaching

Show a student exactly which material range or clock situation to drill.

Player Analysis

Profile any player's performance on a variety of metrics.

Broadcasting

Give commentators a real projection of the game result, not solely based on engine evaluation.

Scouting

Compare prospects on what Elo can't separate: pressure resilience, endgame technique, recovery.

Let's Stay in Touch

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