Digital Mindprints

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University at Buffalo (SUNY)

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- Dores each side need to do *xenospection*—building a model of the other's characteristic behavior?

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- Negative side: "E-Doping" by human players. . .

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- Second key: human-computer cognitive differences.

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- US: “Class A” = 1800–2000, “B” = 1600–1800, “C” = 1400–1600, ...; adult beginner said to be 600; scholastics down to minumum 100 rating.

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Context: Decision-Making Model at Chess

1. Domain: A set T of decision-making situations t.
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6. Derived Outputs:
   - Aggregate statistics: *move-match* **MM**, *equal-top value* **EV**, *average scaled difference* **ASD**, ...
   - Projected confidence intervals: Bernoulli Trials + $|T|$-adjustment.
   - IPRs similarly reflect errors from the regression.

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Qg8	114	114	-037	-037	-014	-014	-022	-068	-008	-056	-042	-004	-032	000	-014	-025	-045	-045	-050
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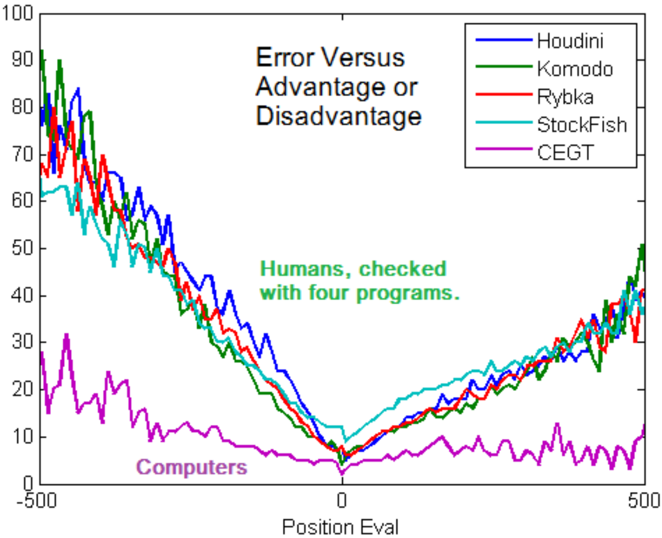
Human Versus Computer Phenomena



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(C) Greater volatility intrinsic to chess as game progresses.

A. Perception Proportional to Benefit

How strongly do you perceive a difference of 500 rupees, if:

- You are buying lunch and a drink in a pub.
- You are buying dinner in a restaurant.
- You are buying an I-pad.
- You are buying a car.

For the car, maybe you don't care. In other cases, would you be equally thrifty?

> *If you spend the way you play chess, you care maybe* $4\times$ *as much in the pub!*

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- Results so far show no shift—

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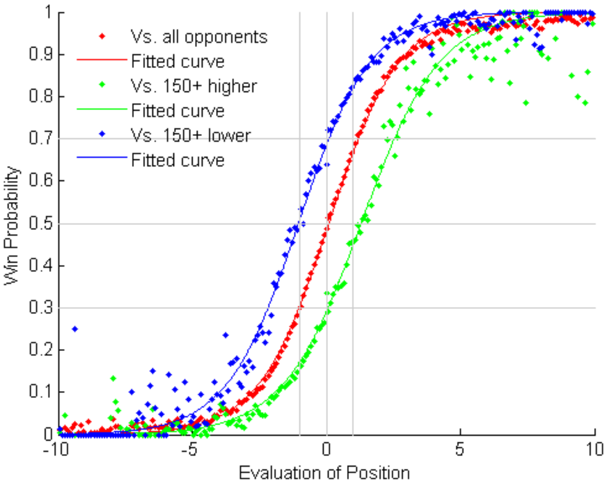
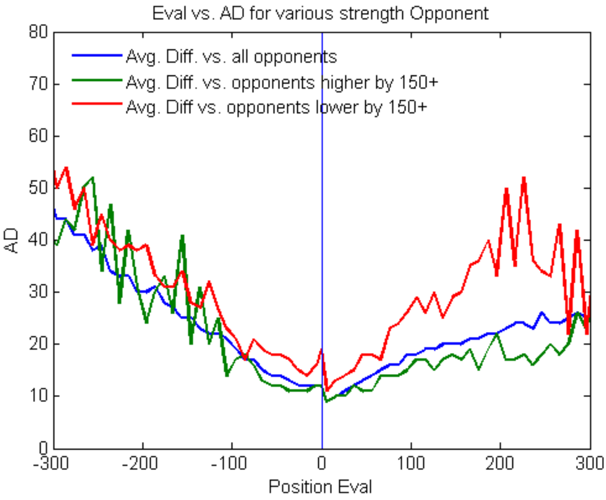


Eval-Error Curve With Unequal Players



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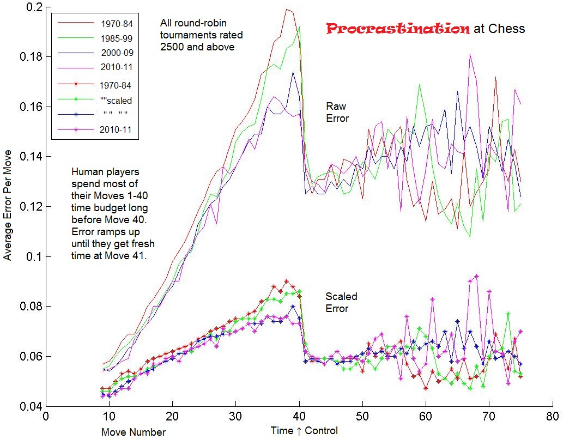
- [show animations from https://rjlipton.wordpress.com/2015/10/06/depth-of-satisficing/]

Procrastination...

Chess players tend to use up most of a ≈ 2-hour time budget early on, leaving little time for moves 30 to 40 when a fresh budget of time comes. Note ramped-up error until turn 41. (Anand was an exception.)



Are We Reliable?

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Computer and Freestyle IPRs

Analyzed Ratings of Computer Engine Grand Tournament (on commodity PCs) and PAL/CSS Freestyle in 2007–08, plus the Thoresen Chess Engines Competition (16-core) Nov–Dec. 2013.

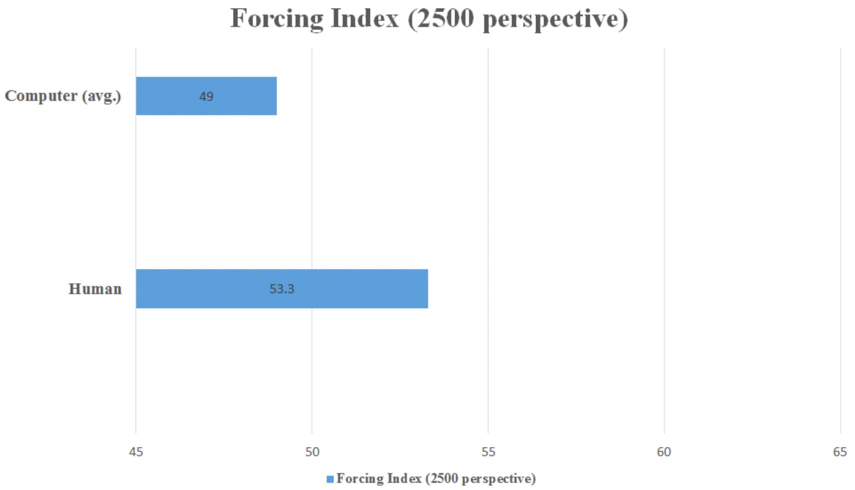
Event	Rating	2σ range	#gm	#moves
CEGT g1,50	3009	2962–3056	42	4,212
CEGT g25,26	2963	2921–3006	42	5,277
PAL/CSS 5ch	3102	3051–3153	45	3,352
PAL/CSS 6ch	3086	3038–3134	45	3,065
PAL/CSS 8ch	3128	3083–3174	39	3,057
TCEC 2013	3083	3062–3105	90	11,024

Computer and Freestyle IPRs—To Move 60

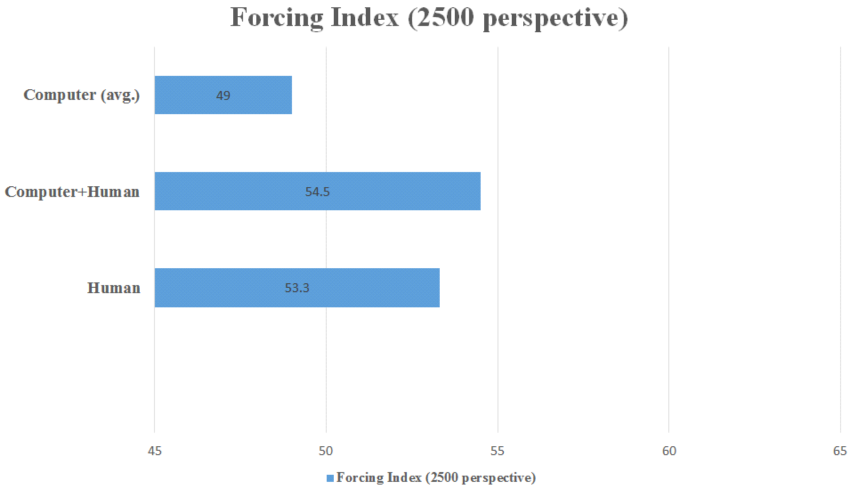
Computer games can go very long in dead drawn positions. TCEC uses a cutoff but CEGT did not. Human-led games tend to climax (well) before Move 60. This comparison halves the difference to CEGT, otherwise similar:

Sample set	Rating	2σ range	#gm	#moves
CEGT all	2985	2954–3016	84	9,489
PAL/CSS all	3106	3078–3133	129	9,474
TCEC 2013	3083	3062–3105	90	11,024
CEGT to60	3056	3023–3088	84	7,010
PAL/CSS to60	3112	3084–3141	129	8,744
TCEC to60	3096	3072–3120	90	8,184

Degrees of Forcing Play



Add Human-Computer Tandems



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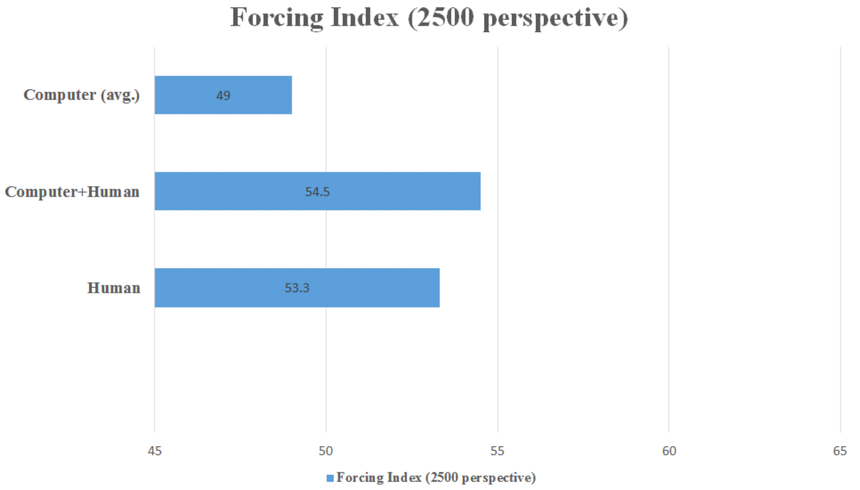

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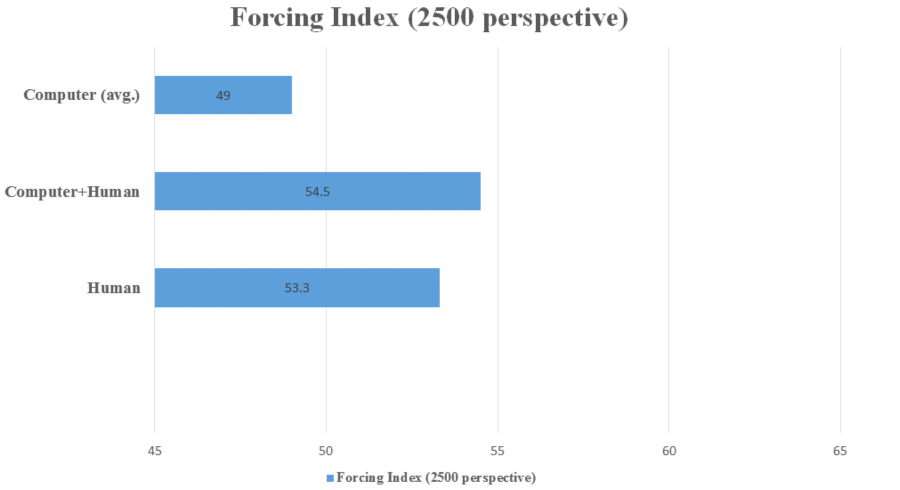
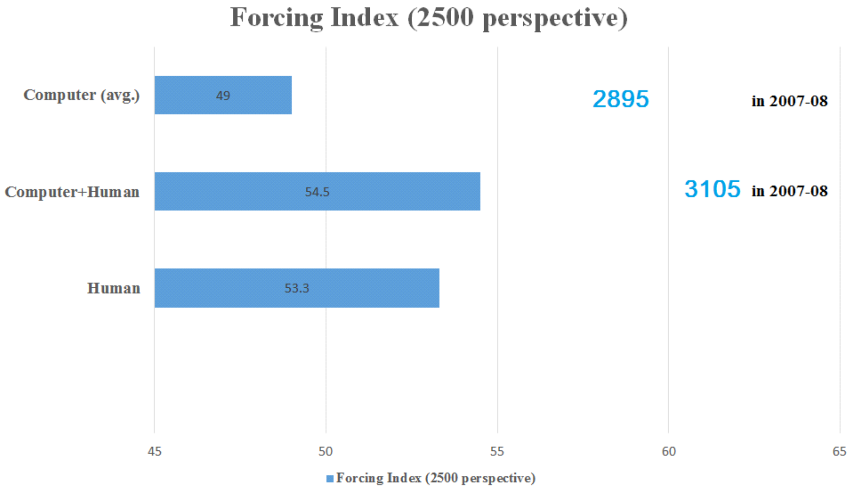


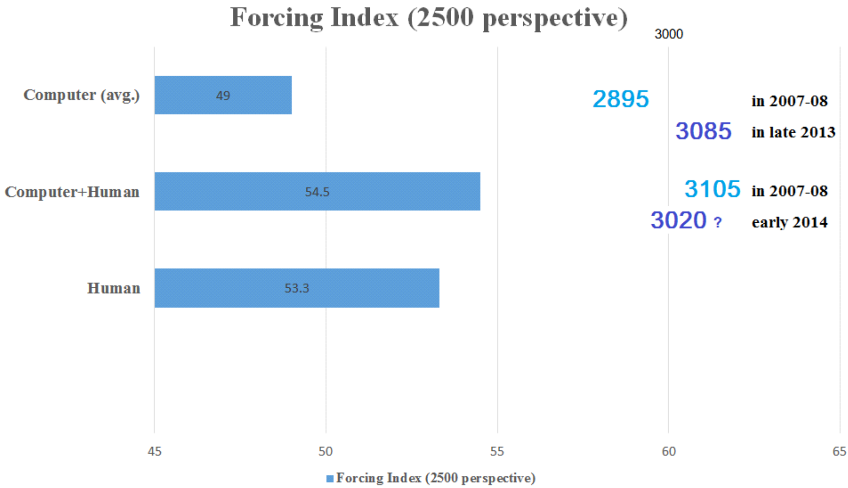
Evidently the humans called the shots. But how did they play?

2007–08 Freestyle Performance



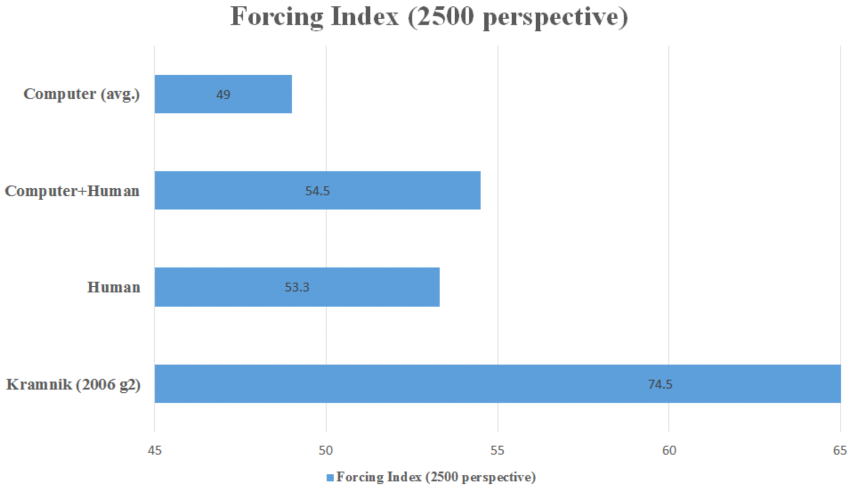
Adding 210 Elo was significant. Forcing but good teamwork.

2014 Freestyle Tournament Performance



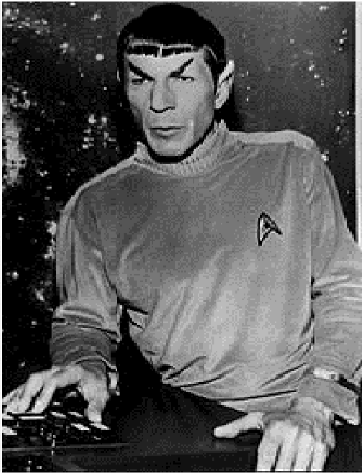
Tandems had marginally better W-L, but quality not clear...

Add Topalov Forcing Kramnik



Last bar goes way off the chart

Like “Spock” to our “Kirk”



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 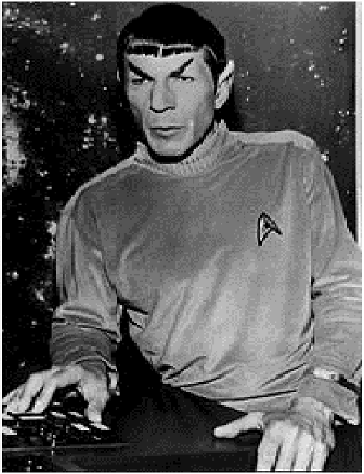

"It is logical to cultivate multiple options."

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5. **Main takeaway:**

> **It should be natural to program digital assistants so they enhance our freedom rather than constrain it.**

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- Learn more about human decision making.
- **Thank you very much for the invitation.**