Cumulative improvements in iterated problem solving

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Hello World!

The cultural inheritance of problem solving knowledge

Why are humans effective problem solvers?

- We evolved specialized intelligences (Pinker, 2010).
- We developed systems of cultural inheritance (Boyd, Richerson, & Henrich, 2011).

Lost European explorer experiments[1]

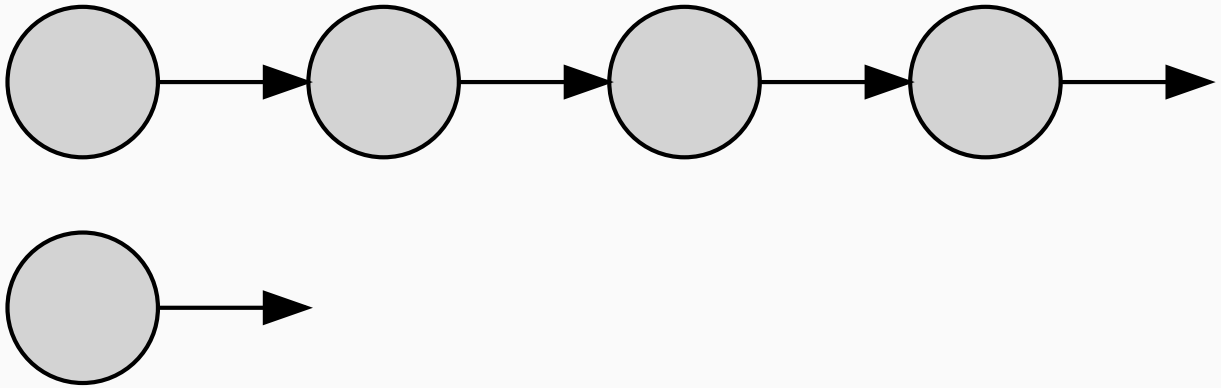
Starvation on nardoo is by no means unpleasant, but for the weakness one feels, and the utter inability to move oneself, for as the appetite is concerned, it gives me the greatest satisfaction.

Figure 1: The nardoo acquatic fern, native to Australia.

[1](Boyd, 2018; Boyd et al., 2011; Henrich, 2015)

The adaptiveness of cultural inheritance[2]

Cultural inheritance is adaptive because **even smart people die.** Cultural inheritance enables problem solving to extend far longer than any lifetime.



[2](Boyd & Richerson, 1985; Richerson & Boyd, 2005)

How does cultural inheritance accumulate?

Transmission fidelity is an important concept in evolution. Cumulative improvements in technological evolution are easy to measure.

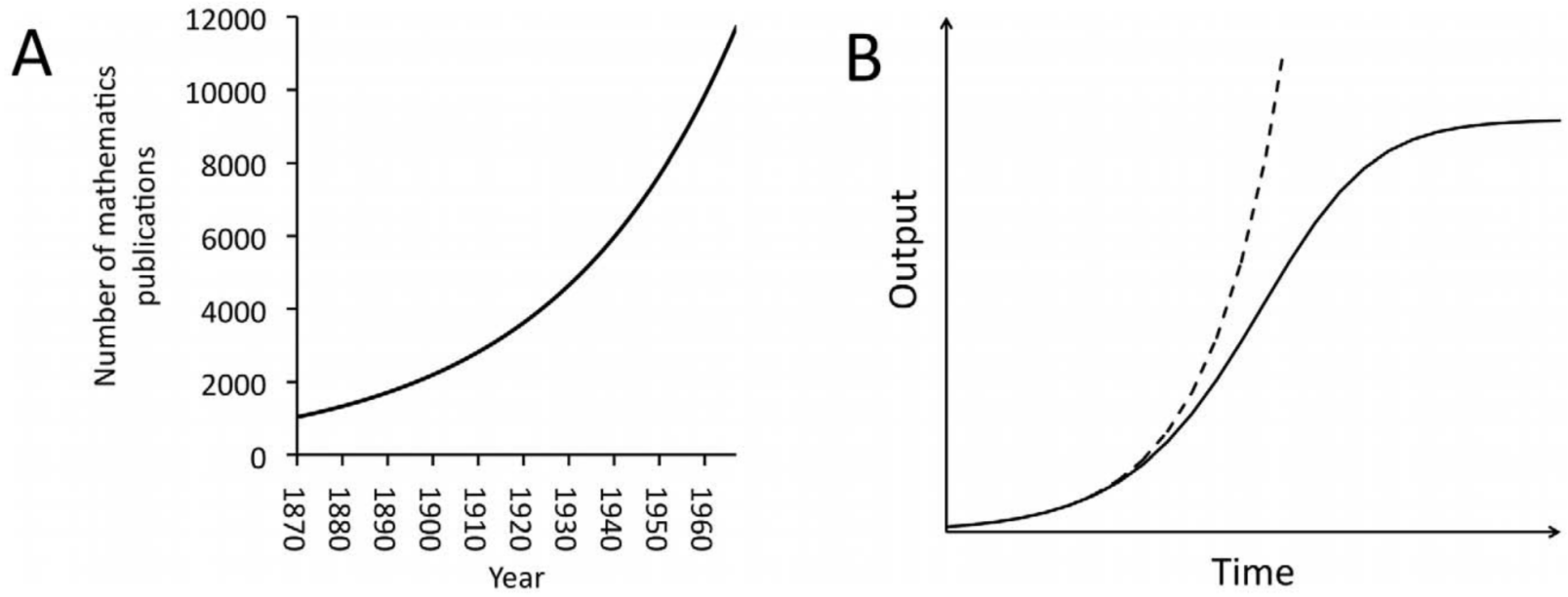


Figure 1. Exponential growth in scientific knowledge. (A) Empirically-derived exponential growth in mathematical knowledge as measured by the number of published abstracts in mathematics from 1868–1965. The curve shown is a best-fit to data reported in May [17], regression equation $n = 1400e^{0.025(t-1880)}$. (B) Price [12] argues that exponential increases in scientific output such as those documented by May (dashed line) are actually the initial part of a logistic growth rate (solid line), eventually reaching a saturation point due to constraints on cumulative cultural evolution.
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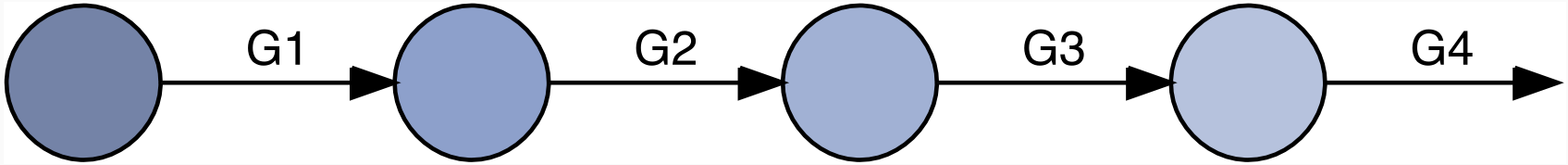
Experimental models of cumulative culture

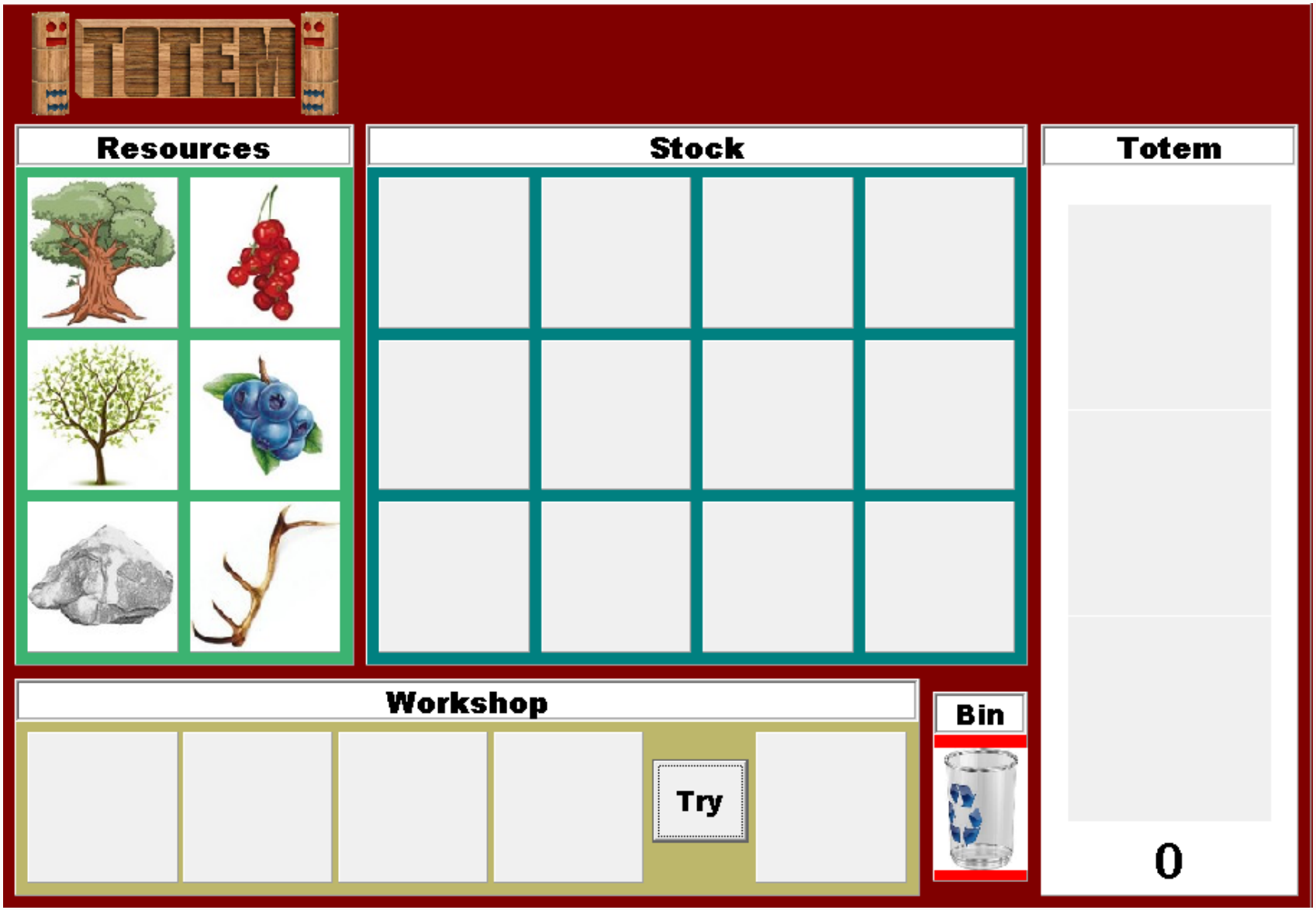
Knapping stone tools, creating baskets, and solving puzzles on a computer.

Many ways in which cultural inheritance can be bad.

How likely are future generations to exceed their ancestors?

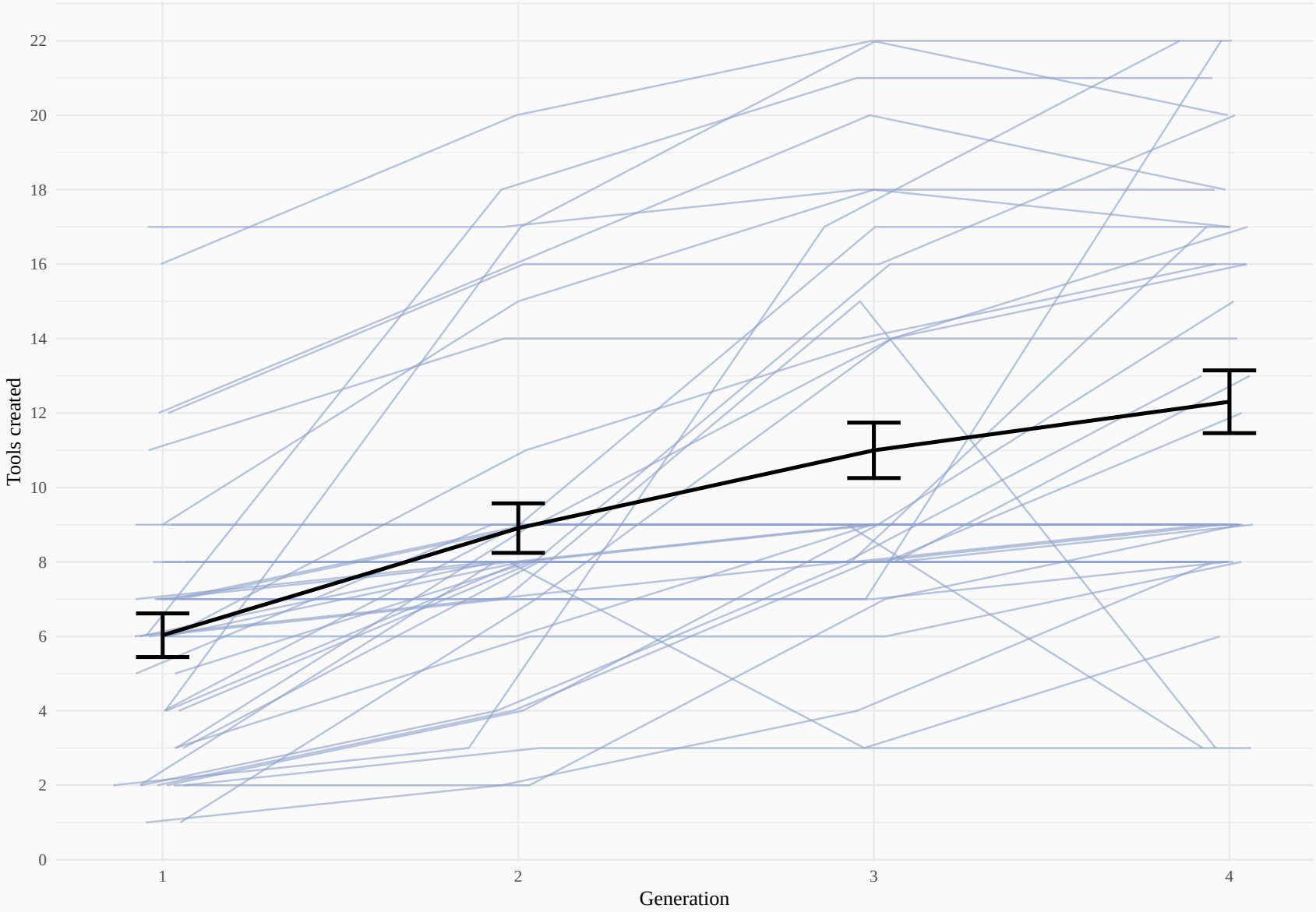


The Totem Game (Derex & Boyd, 2015)

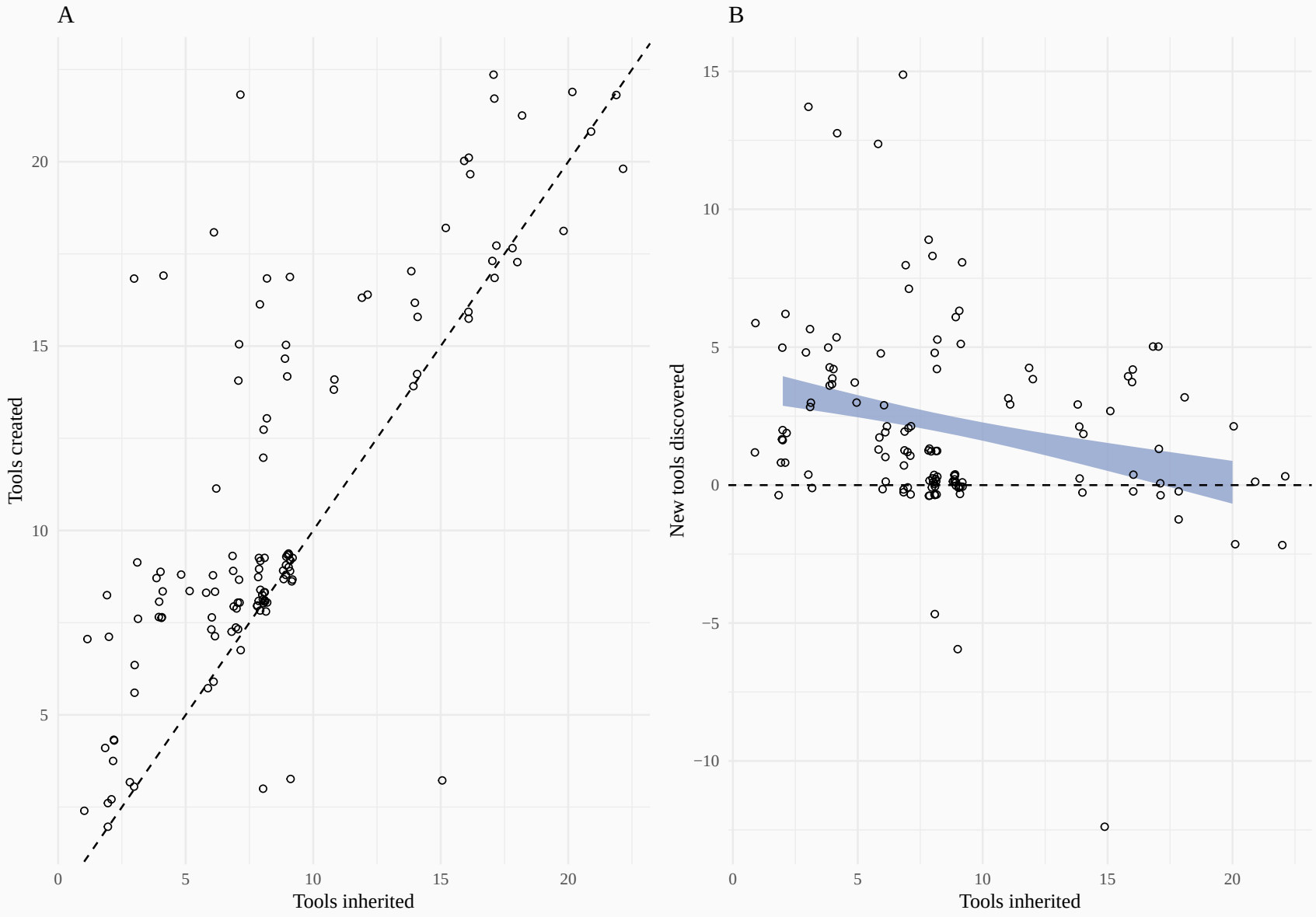


Solution landscape

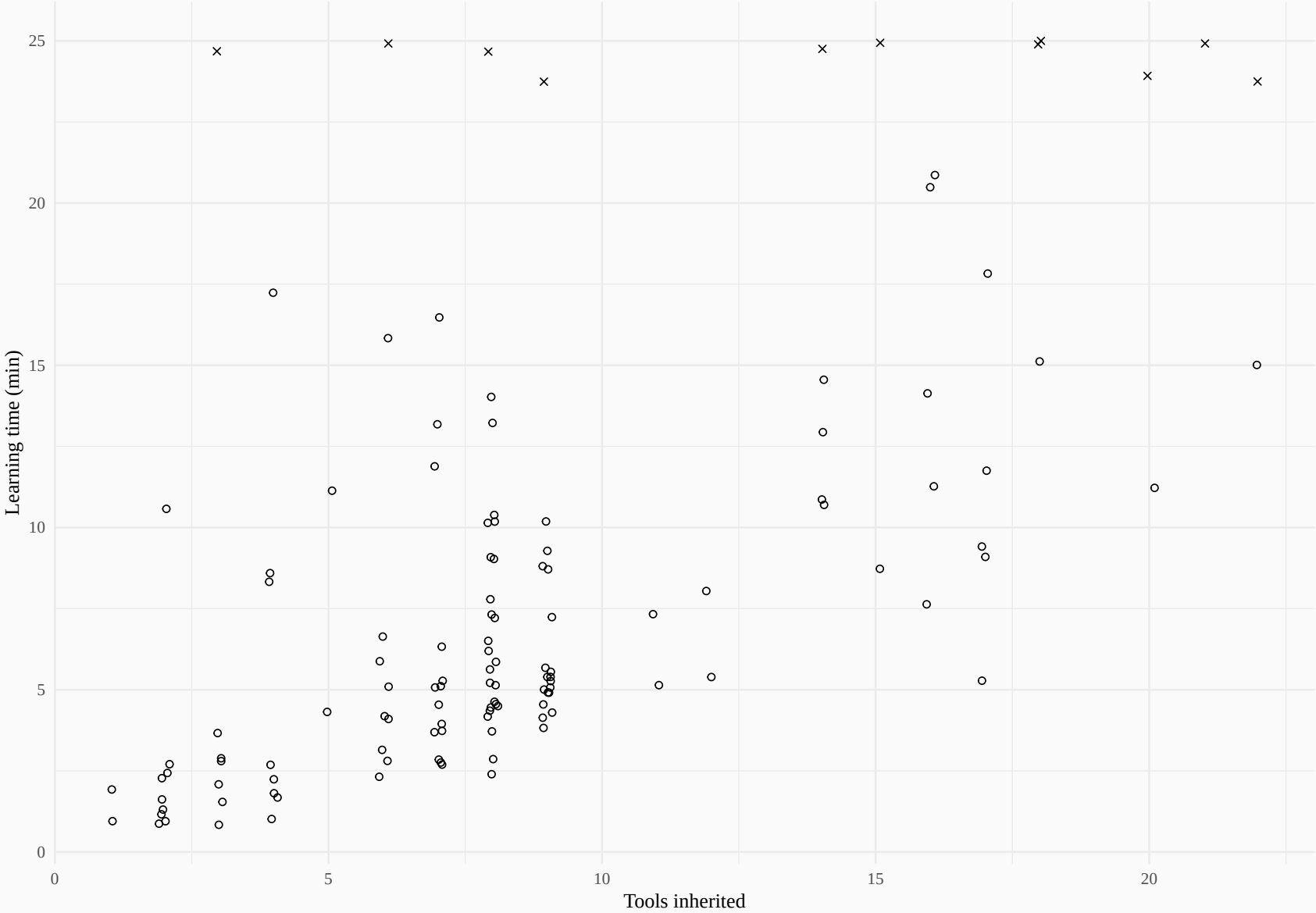
Tools by generation



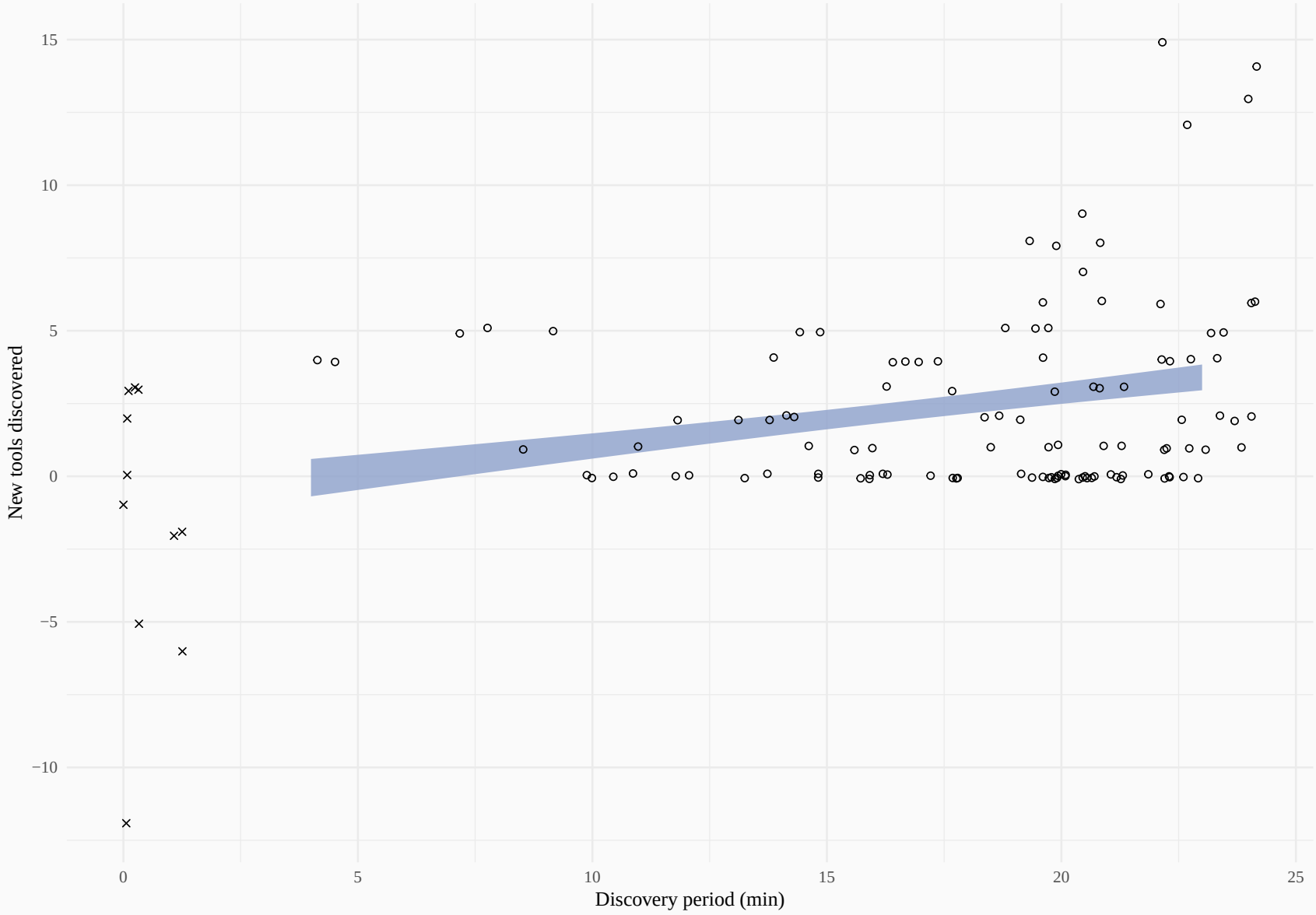
Tools by inheritance size



Learning times



Discovery rates



Guesses per tool

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References ii

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