Population as Distributed Memory System

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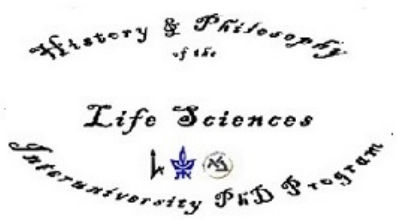
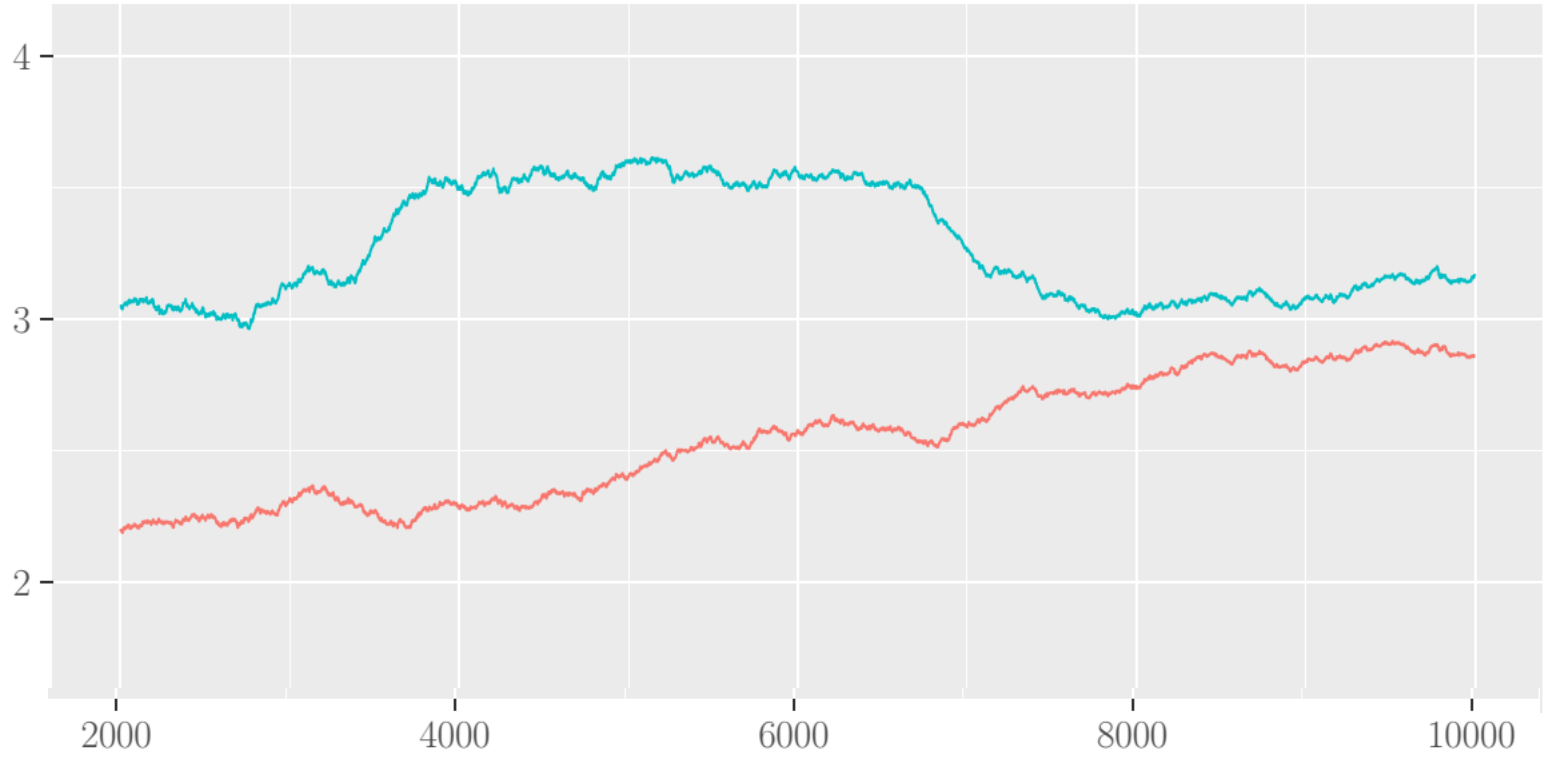


CESC2017, MPI Jena

Where does evolution store information?

Reviewed in: Lamm, Ehud. “Forever united: the co-evolution of language and normativity” (2013)

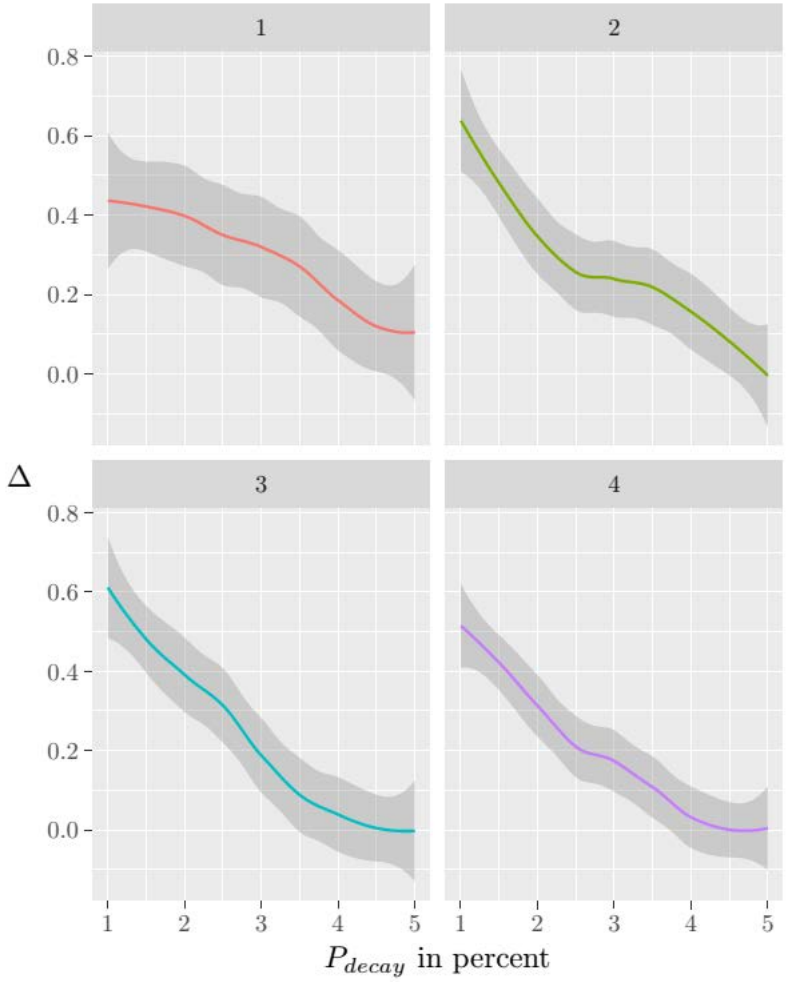
Sequential Social Learning

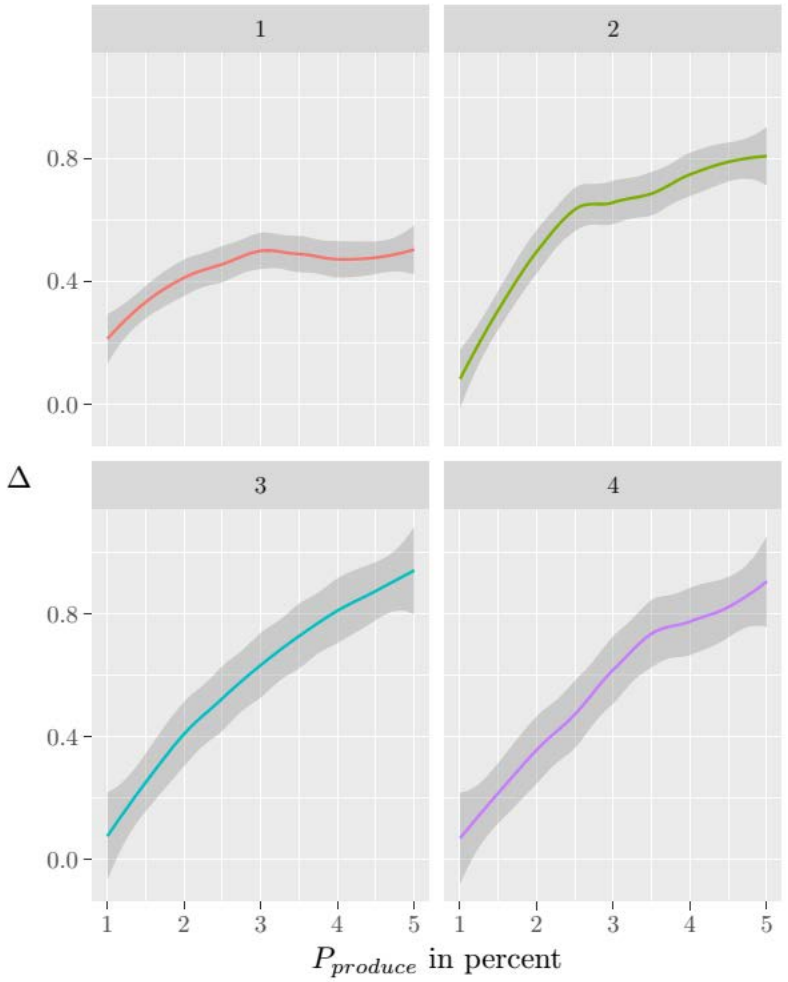


$$P_{\text{produce}} = \begin{cases} 0.03 & 0 \leq t < 3,333 \\ 0.06 & 3,333 \leq t < 6,666 \\ 0.01 & 6,666 \leq t \end{cases}$$

$\text{NEEDED} = 4;\ P_{\text{decay}} = 0.01;$

$P_{\text{innovate}} = 0.03;\ P_{\text{mutate}} = 0.1.$

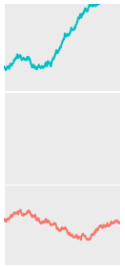




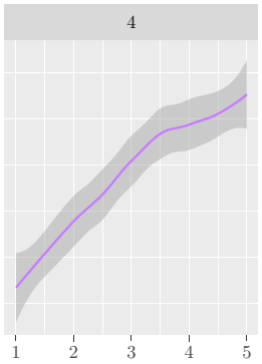
(Reverse) Baldwin Dynamics

Information stored in the population and information stored in the genome use different currencies. The exchange rate depends on: **properties of the population**, **properties of individuals, properties of the learning process.**

- Parameters affecting the Social Learning Environment affect B.D/R.B.D directionality



- The better the external memory system (norm psychology, social institutions, toys, population size; length of learning), the more information stored “externally”.



The more information stored externally, the stronger the selection pressure on traits that support acquisition (coevolution+variation).

See also: Lamm & Kammar. Inferring Coevolution (2014)

Riddle: Why early stage get assimilated first and more strongly?

Answer: Positive feedback.

Stages that are not learned, are not reproduced for OTHERS to learn from.