

Grounding = immigration

fresh verified samples from a fixed external source enter the training mix every generation

Recombination = sex

a child inherits from several parents, reassembling variants that arose in different lineages

Epistasis (entangled skills)

a variant's fitness contribution depends on the variants present at the other loci

The composed society

selection, recombination, diversity preservation and grounding on one population

Speciation

reproductive isolation: diverged lineages no longer produce viable (mergeable) offspring

Population genetics (exact)
Wright-Fisher simulator (NumPy)
<i>closed forms · bitwise-reproducible</i>
immigration-drift equilibrium: $g \approx 0.05$ retains $\geq 95\%$ diversity; observation floor $1 - e^{-mp}$
blending conservation law (first-order cancellation); union-operator gain; Fisher-Muller
NK landscapes: outbreeding depression; directed sex restores the gain; mate-pool breadth optimum
four-arm ablation: grounding, sex, diversity each removed → three distinct failures
BDM incompatibility model: isolation cliff; quadratic snowball

Trained networks
RNN · MLP · VAE on a synthetic oracle; convolutional VAE on MNIST <i>sign-level tests · exact oracles</i>
collapse & rescue in every architecture; MNIST: dry 30 → 1 modes, 10% grounding holds 30/30; estimator-bias learning kernel
merge rescues two forgetting specialists ($\approx 0.50 \rightarrow 0.955$)
<i>adds no discriminating test at this tier</i>
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barrier decomposition under permutation+rescaling; conflict sweep 0.97 → 0.03; emergent null

Language models
LoRA specialists on Qwen 0.5B & 7B; exact-match verifier <i>seed-replicated signs</i>
<i>established at LLM scale in prior work (refs. 21, 30); not re-run here</i>
merged specialists beat every parent (5 seeds at 0.5B; 7B); routing vs averaging; the headroom rule
bred-and-screened offspring beat the blind blend in every seed (hard, unsaturated tasks)
<i>open — the stated gap</i>
convention conflict → hybrid breakdown; duration null; pre-merge predictive test (13 cond. × 3 seeds)