ملخص النص

The peppered moth (Biston betularia) changed color from light to dark due to soot from the Industrial Revolution, illustrating natural selection. A self-learning genetic algorithm improves search efficiency by using a memory vector that evolves to favor successful search directions. Self-learning algorithms modify probabilistic search by introducing a memory vector that evolves with each iteration, favoring successful directions and improving search efficiency. Hebbian learning models neural plasticity through local neuron interactions, but its role in overall learning behavior is unclear. The Lamarckian approach focuses on inheriting learned information. Lamarckian evolution, using acquired traits, accelerates genetic algorithms but risks premature convergence due to its complex inverse mapping from phenotype to genotype. The Baldwin effect enhances fitness through local search without genetic changes; improved fitness increases survival, indirectly speeding genetic adaptation. Genetic traits are inherited, unlike learned traits. Improved fitness aids survival and accelerates genetic adaptation (Baldwin effect). Self-adaptation in evolutionary strategies adjusts mutation strength during optimization. This mutation strength, controlling population spread, is self-adjusted by the algorithm, becoming part of an individual's genome and subject to recombination and mutation. A portion of an individual's genome undergoes replication and mutation.