Computational Intelligence

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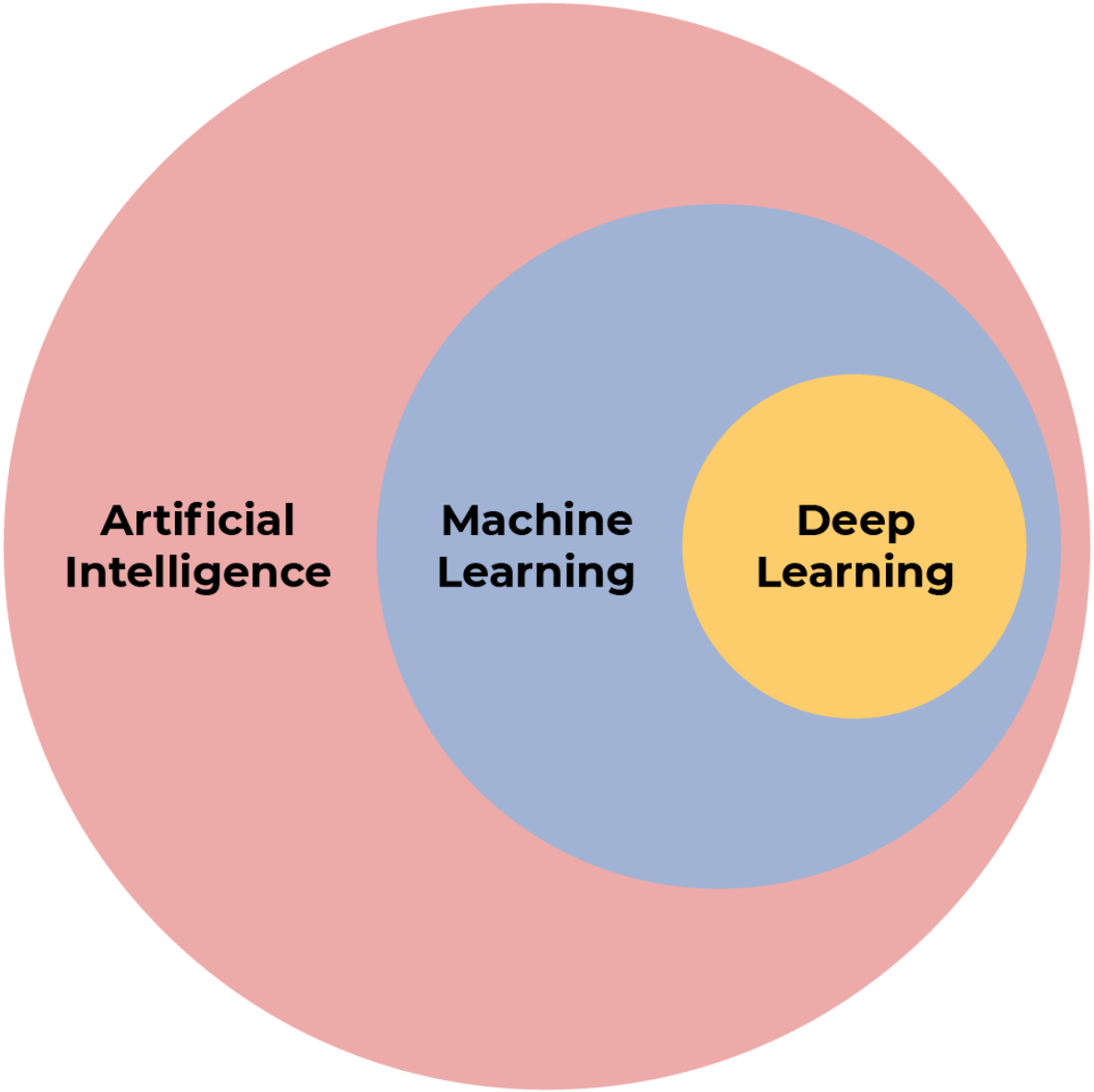
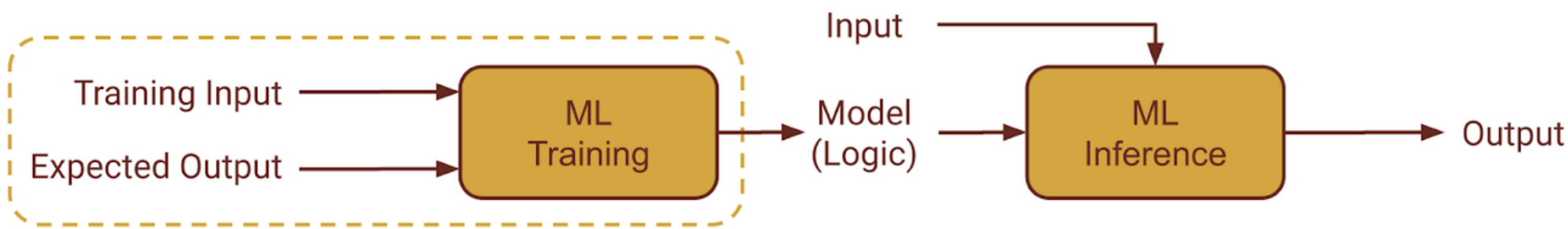
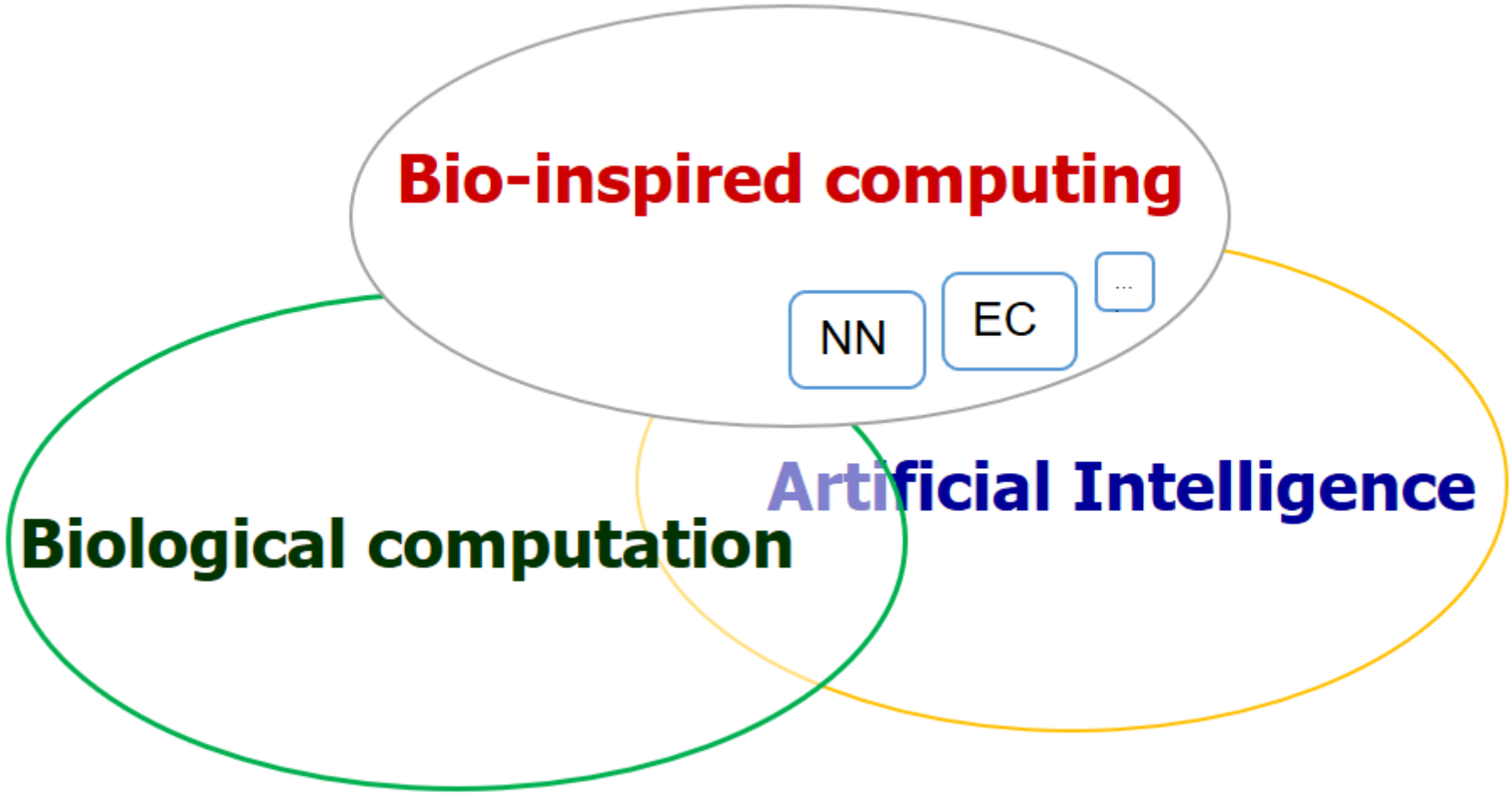
Teaching Assistant: Ali Kohan

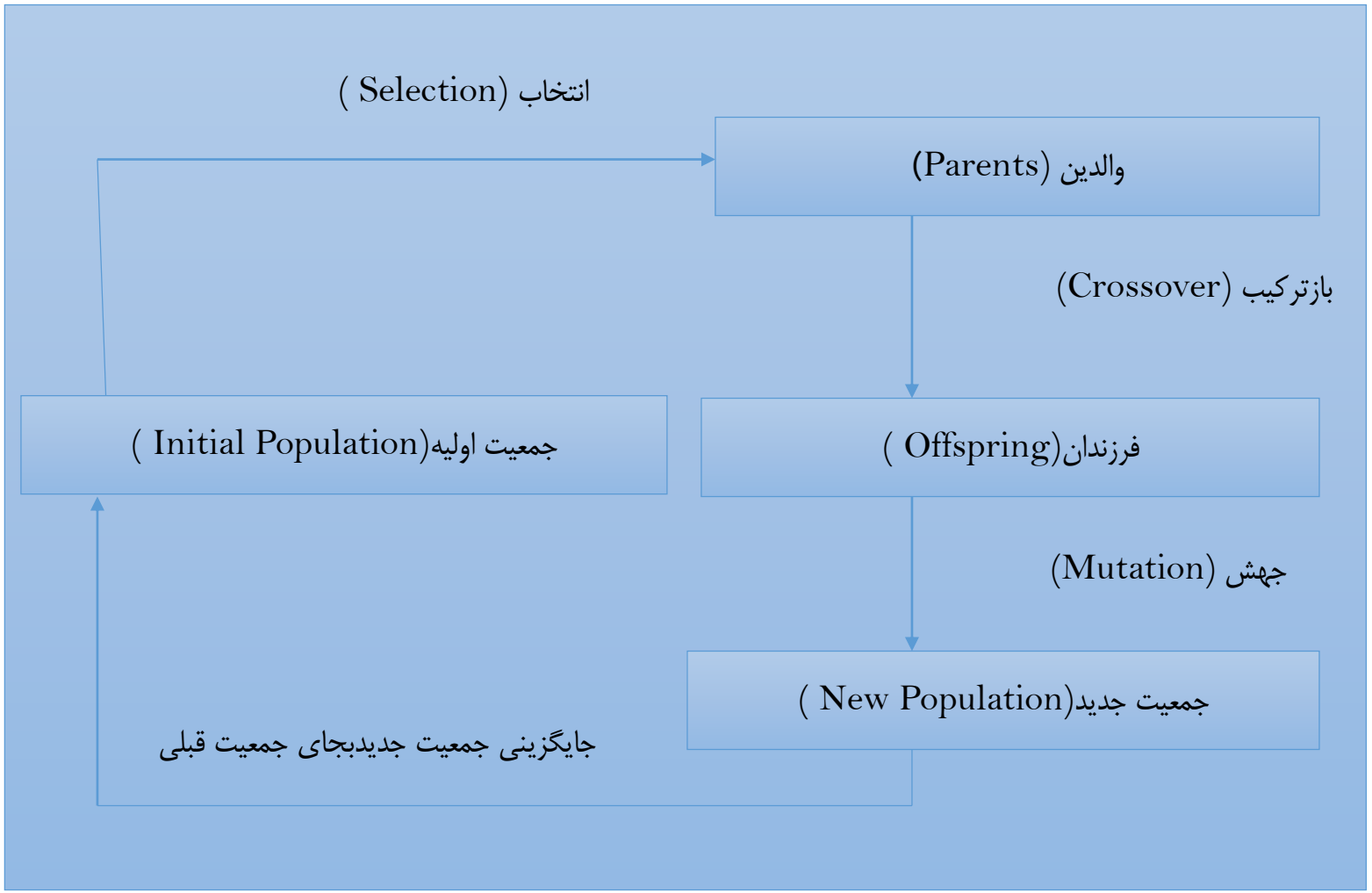

Artificial Intelligence
Machine Learning
Deep Learning

Traditional Programs: Define algo/logic to compute output

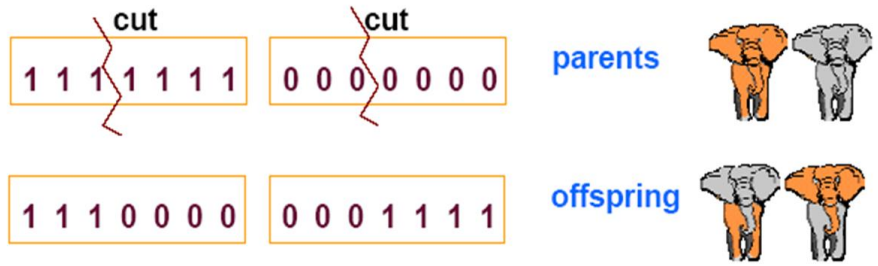
Machine Learning: Learn model/logic from data



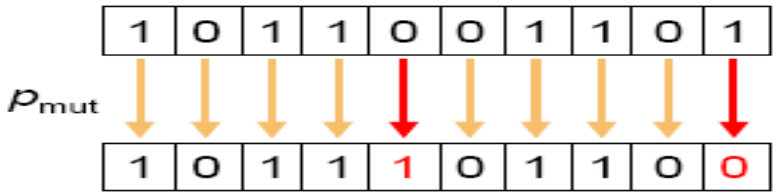

Bio-inspired computing
NN
EC
...
Artificial Intelligence
Biological computation

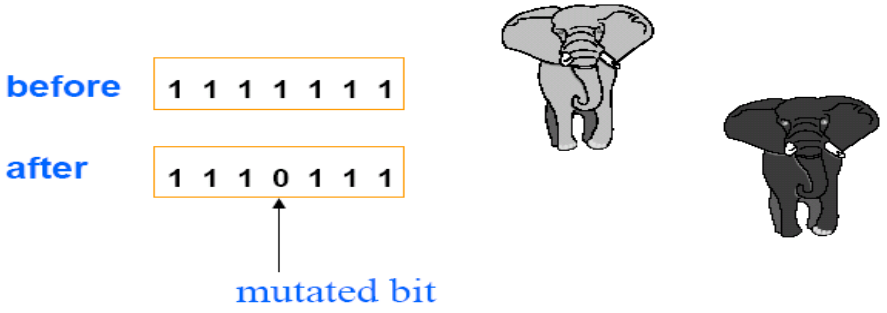


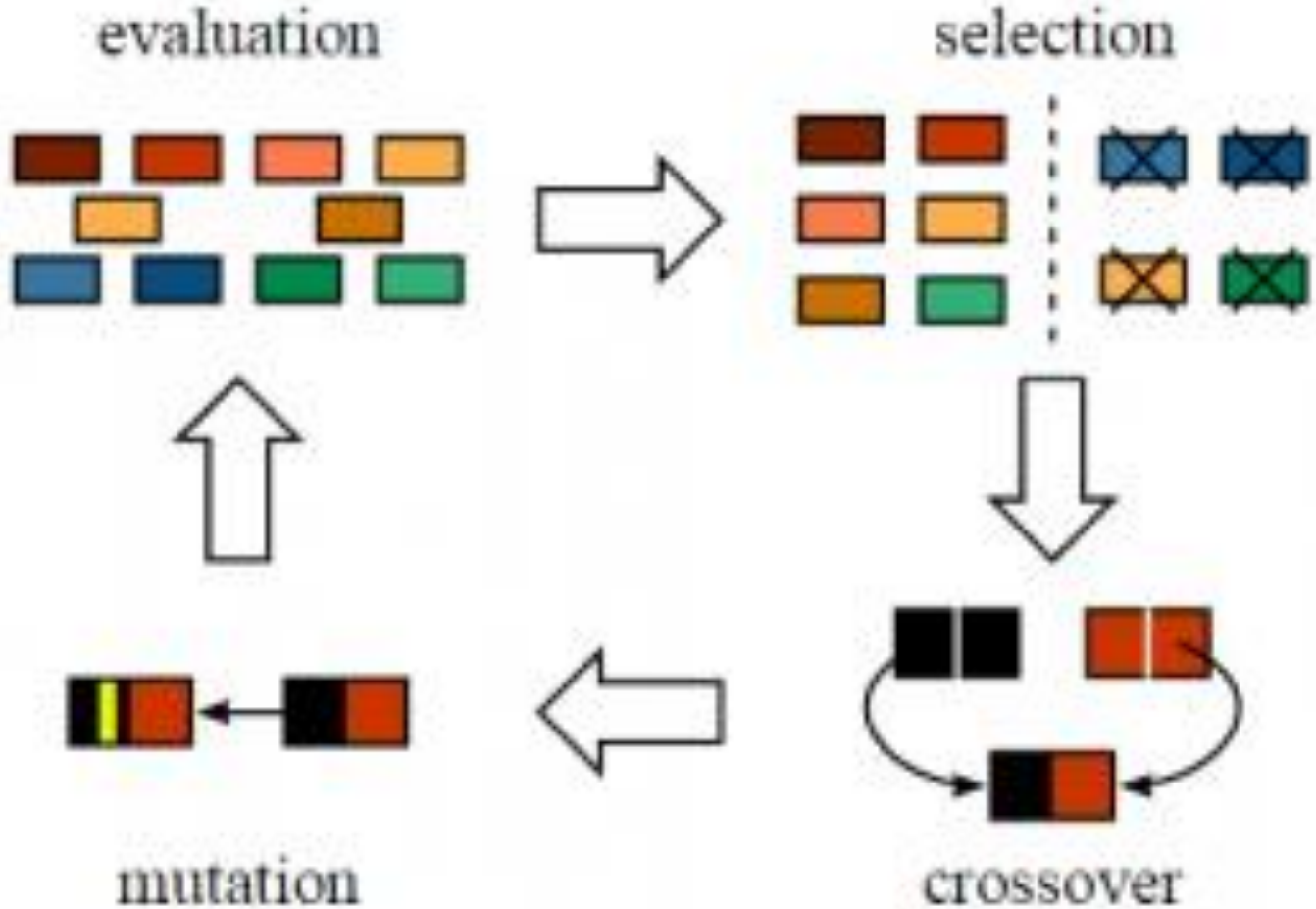
Crossover:



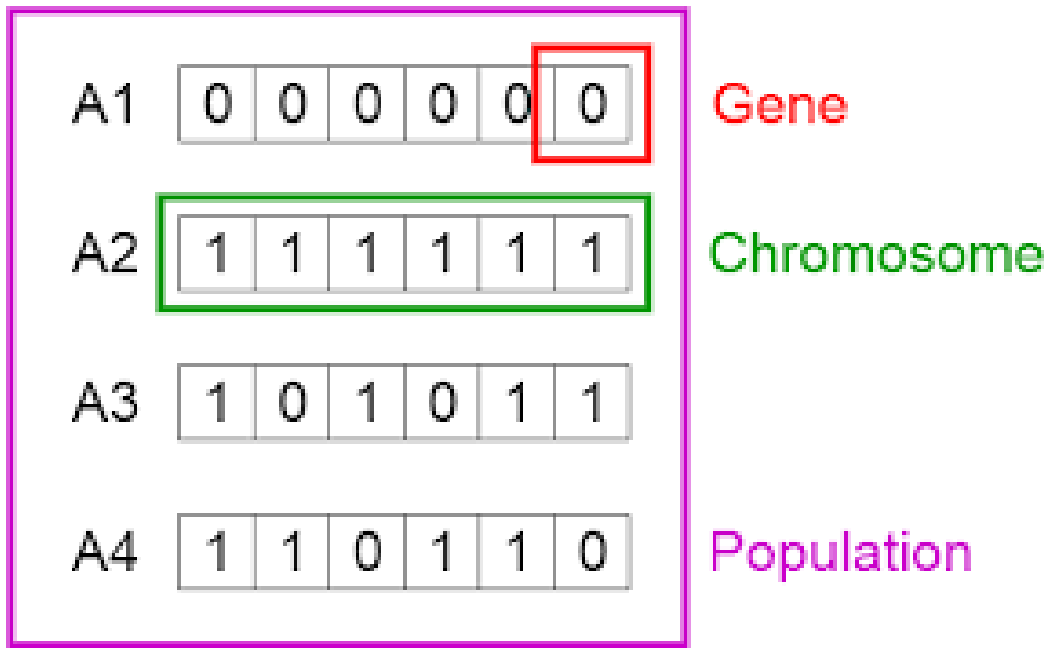
Mutation:





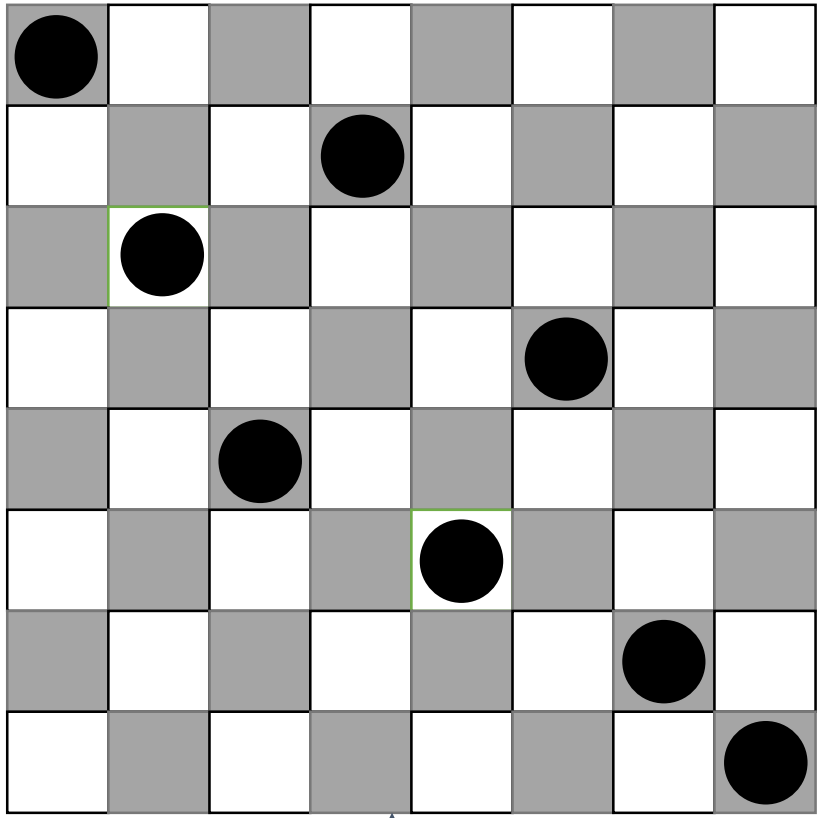

evaluation
selection
mutation
crossover

Evolution		Problem solving
Environment	→	problem
individual	→	Candidate solution
fitness	→	Quality

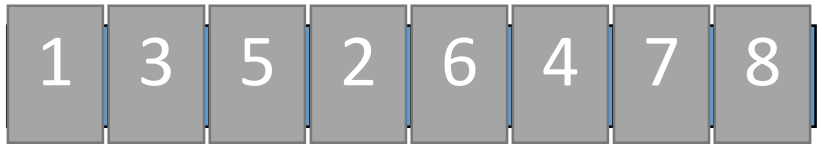

A1
0 0 0 0 0 0
Gene
A2
1 1 1 1 1 1
Chromosome
A3
1 0 1 0 1 1
A4
1 1 0 1 1 0
Population

Phenotype:

a board configuration



Obvious mapping

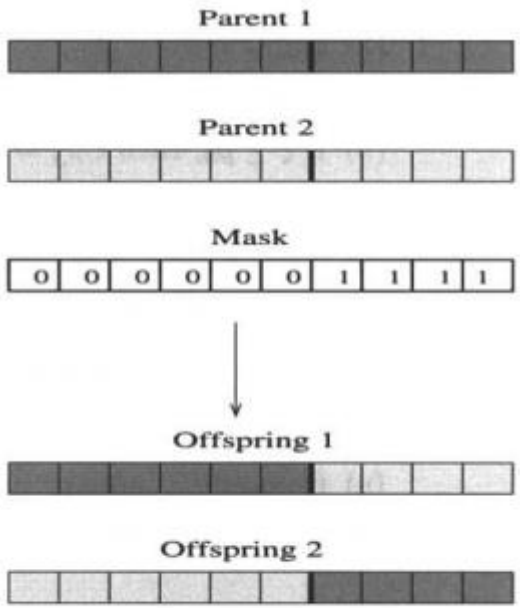


Genotype:

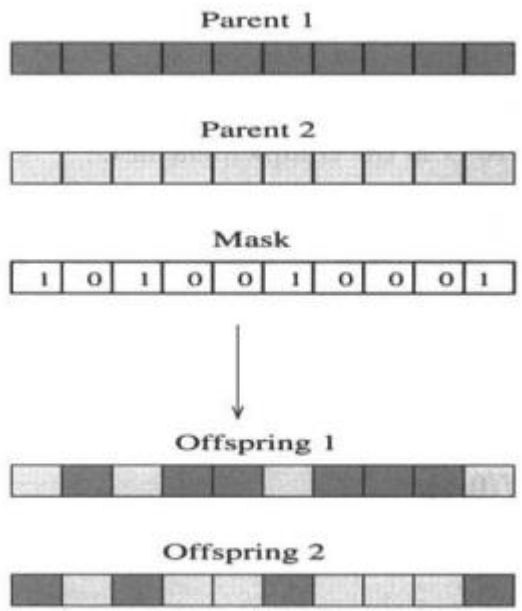
a permutation of the numbers 1 - 8

Again …

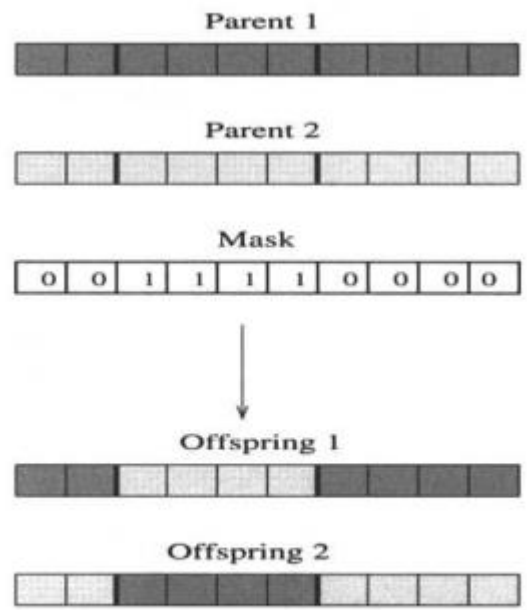
Evolution		Problem solving
Environment	→	problem
individual	→	Candidate solution
fitness	→	Quality



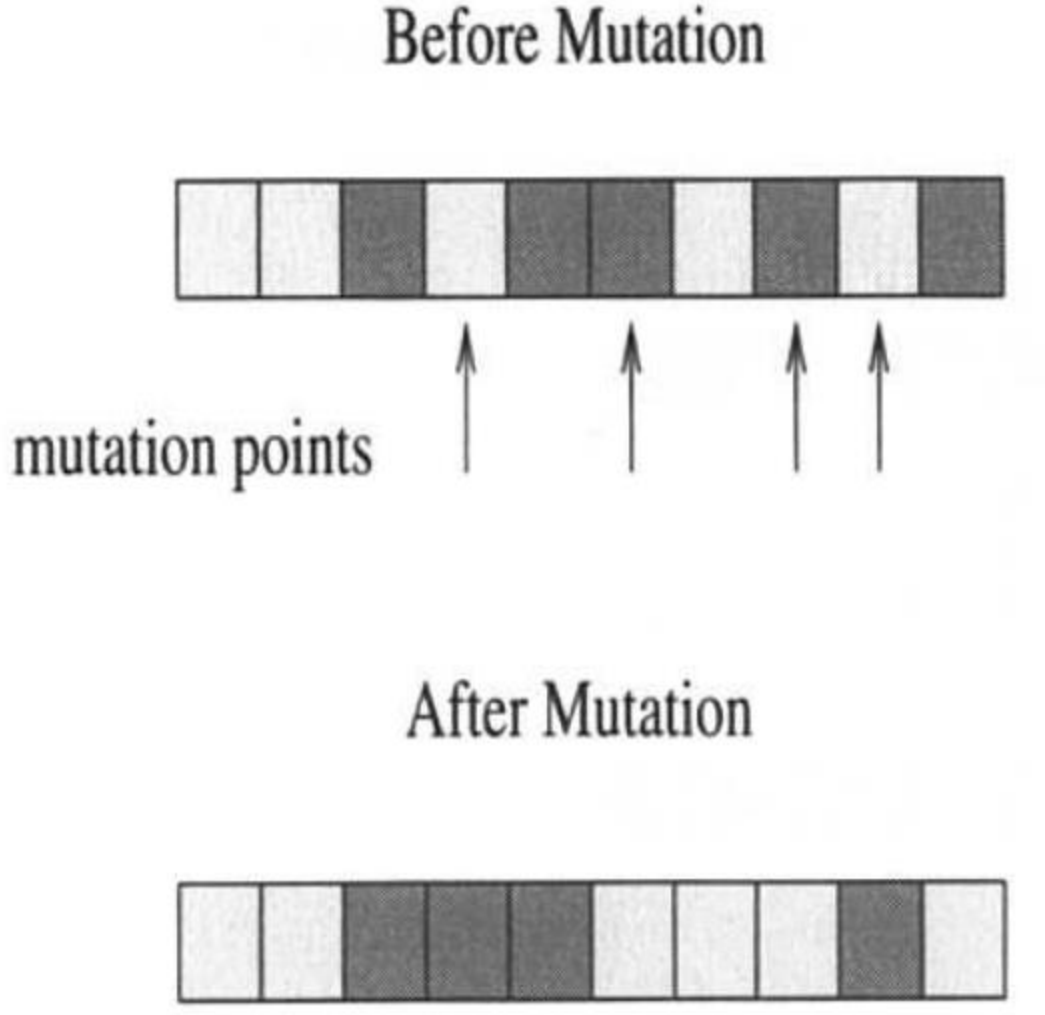
(b) One-point Cross-over



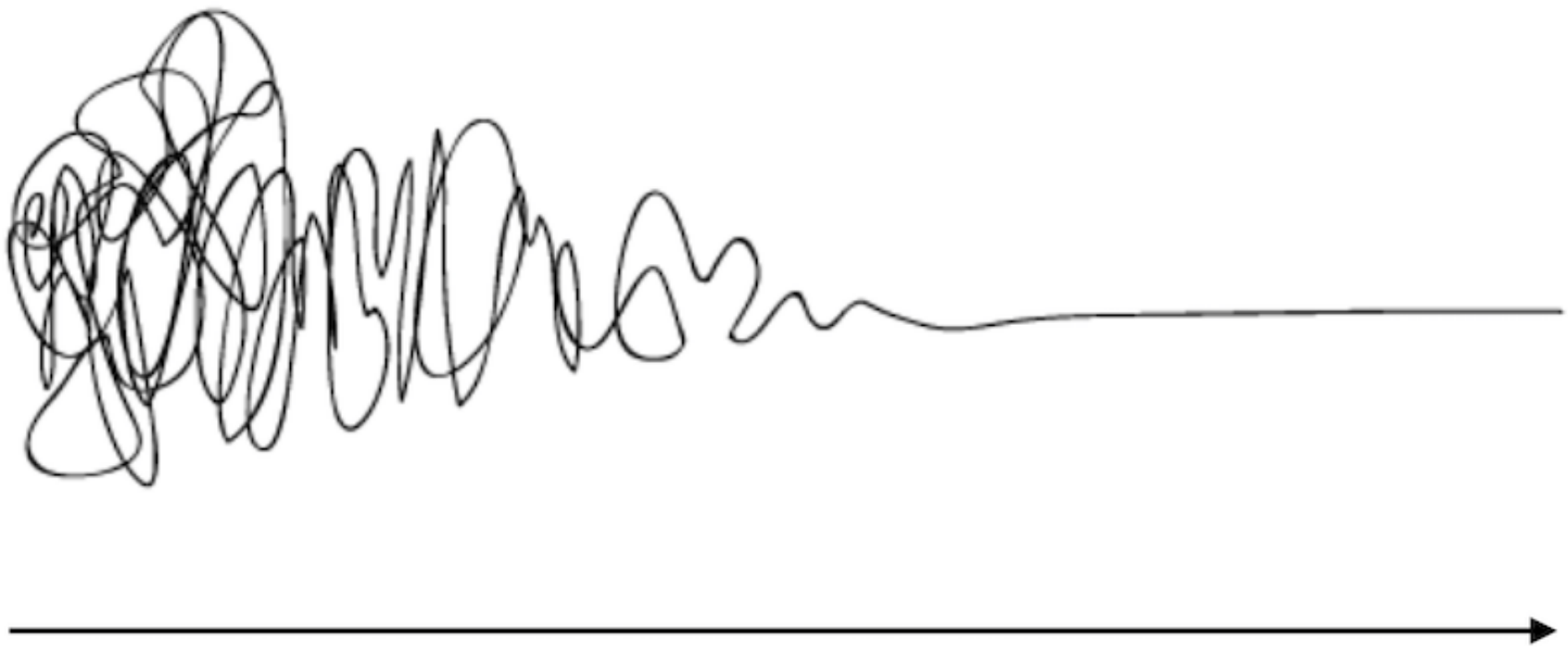
(a) Uniform Cross-over



(c) Two-point Cross-over


Before Mutation
mutation points
After Mutation

Explore **Exploit**



Higher uncertainty Lower uncertainty