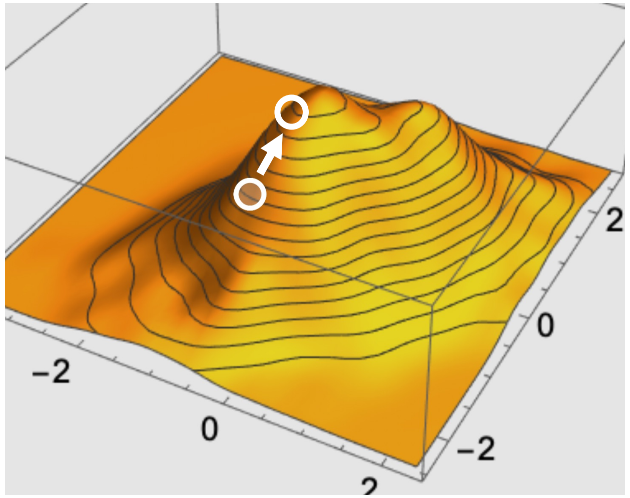
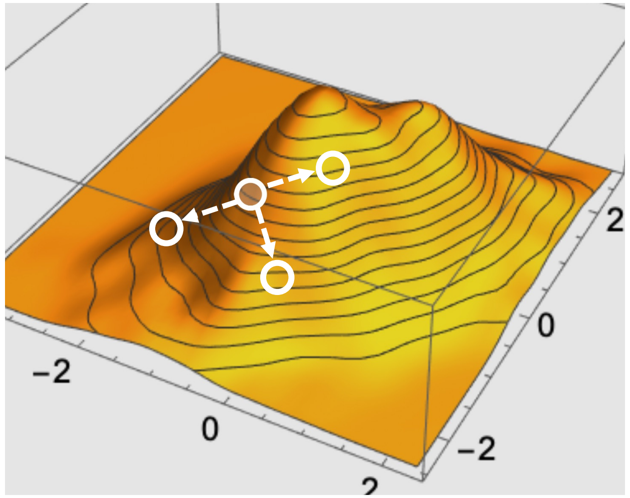
A visual comparison

Last week we discussed how optimization methods can be visualised:

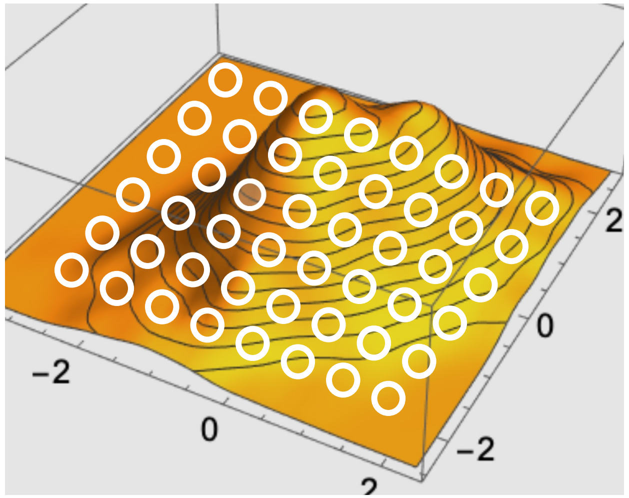
Gradient descent



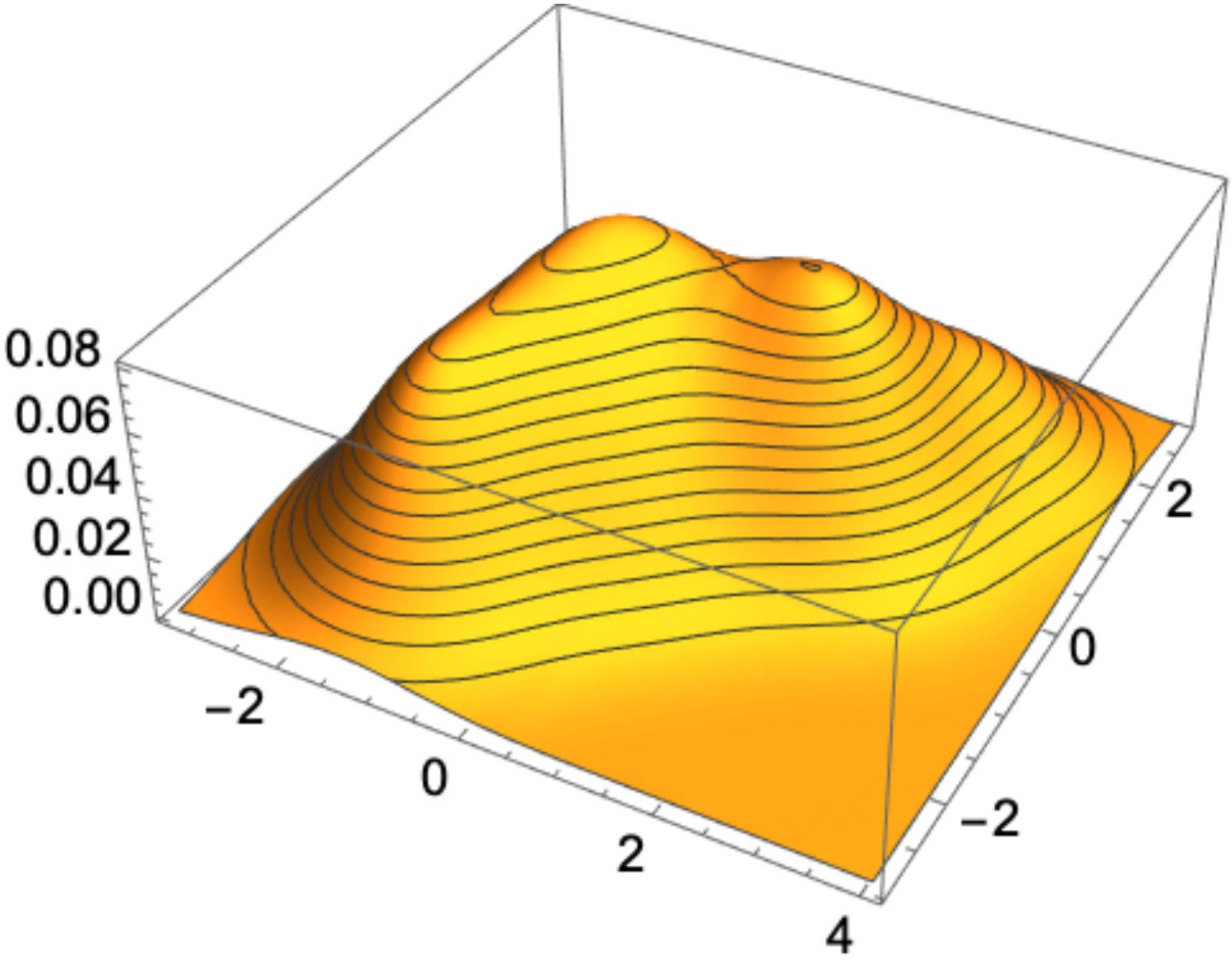
Hill climbing



Exhaustive search



How would an evolutionary algorithm look from this perspective?


0.08
0.06
0.04
0.02
0.00
−2
0
2
4
2
0
−2

Comparing EA with other methods

	At each time point we have…	Each update is…
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Simulated annealing		
Evolutionary algorithm		

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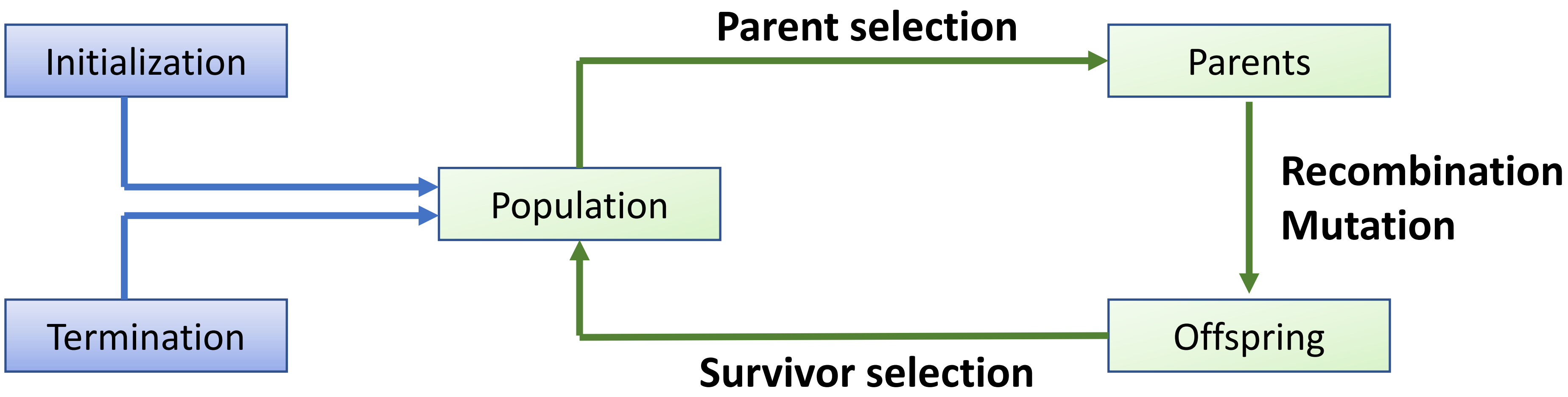
- how fast they are relative to each other?

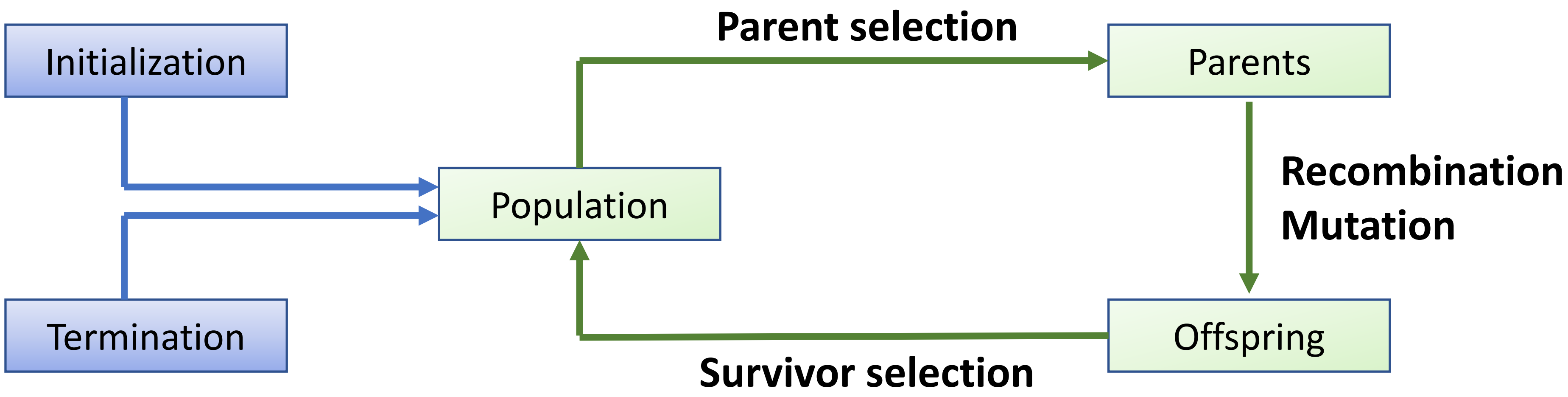
- how hard they are to implement for a given problem?

A single update in an evolutionary algorithm



Recombination and mutation both create variety in the population.

A single update in an evolutionary algorithm



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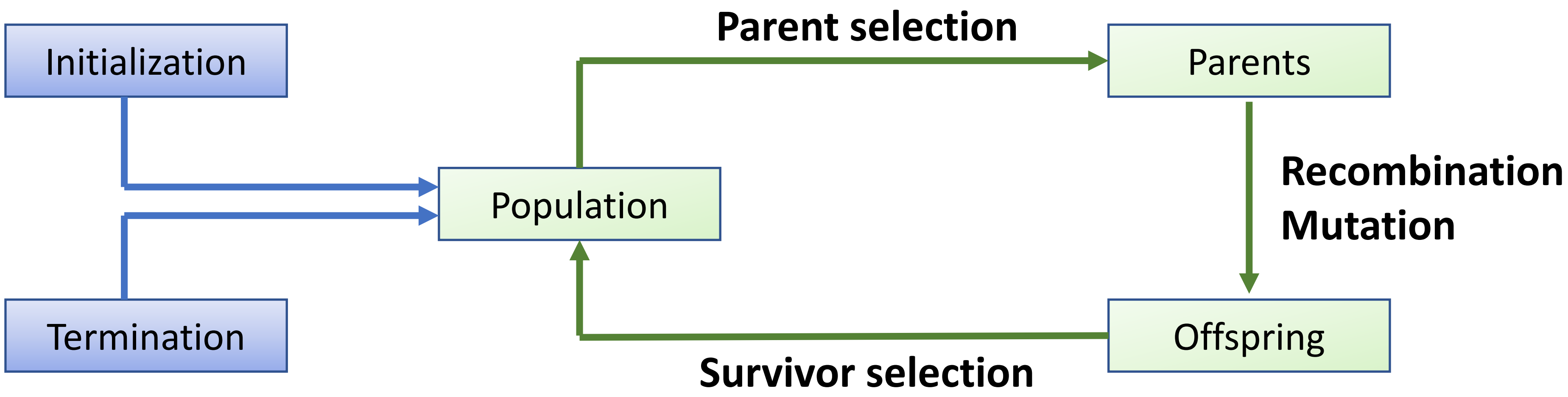

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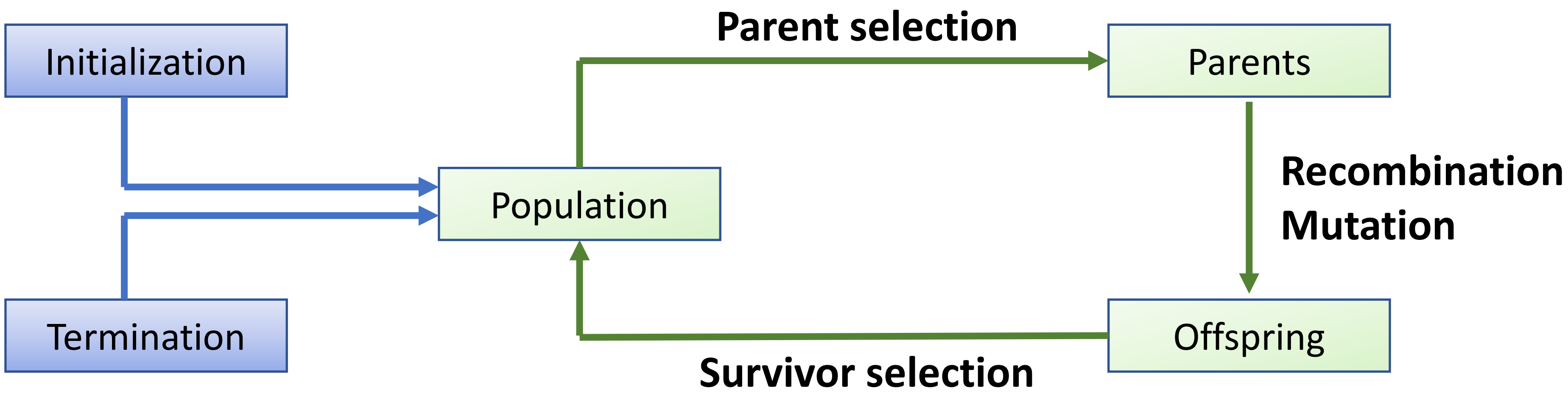

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- What happens if I skip:
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- Are very small or very large population sizes a problem?
- Any specific recommendations regarding population size?

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Mutation

There are multiple ways to perform mutations, for example in the case of floating point representations:

- draw a new value from a uniform distribution
- draw a new value from a normal distribution
- draw a new value from any other continuous distribution

How do I select mutation method in practice? Do I need to argue in favor of the particular solution I choose? Should I always try multiple methods?

Recombination

This is arguably the hardest step to understand, since there are many ways to do it and some are quite intricate:

- Normal crossover
- Intermediate recombination
- Simple arithmetic crossover
- Partially mapped crossover
- Edge recombination
- Order crossover
- Cycle crossover

Why do we need several methods for this? [can I learn just one?]

Any general guidelines concerning choice of method?