Assignment 2_Q1

Genetic Drift (neutral evolution) without mutation: Take a population of N=500 individuals *half of which* consist of type 0 and the remaining half of type 1, **initially**.
Assume that the fitness of both types are equal and neither type can mutate to the other.

(i) Write a program to obtain the time-evolution of the frequencies of the two types in the population when individuals making up the population in the next generation are chosen randomly from members of the current generation following Moran process.
Run the simulation for as long as it takes for any one of the two types to get fixed in the population.

(ii) Obtaining the Fixation Probability: Repeat the above simulation for **Nt=100** trials and find out the fraction of times each of the two types 0 and 1 get fixed ?
What do you expect the theoretical value of fixation probability for either sub-type to be ?

For any one trial, plot the evolution of frequency of type 0 and type 1 with time.

Submission Deadline: February 8, 2017

Assignment 2_Q2

Moran Process with constant selection but without mutation: Take a population of N=100 individuals ***one*** of which consist of type 0 and the remaining of type 1, **initially**.
Assume that the fitness of type 0 is r and the fitness of type 1 is 1 and neither type can mutate to the other.

(i) Write a program to obtain the time-evolution of the frequencies of the two types in the population when evolution occurs according to the Moran Process i.e. in every generation only **one** individual is picked at random for death and **another** individual is picked for reproduction with a probability proportional to its fitness. **Use r=1.01**
Run the simulation for as long as it takes for any one of the two types to get fixed in the population.

Obtaining the Fixation Probability: Repeat the above simulation for **Nt=1000** trials and find out the fraction of times each of the two types 0 and 1 get fixed ? Check whether the invasion probability you obtain from the simulation matches with the theoretical value of invasion probability.

(ii) If **half** the **initial** population consists of type 0, write a program to obtain the time-evolution of the frequencies of the two types in the population when individuals making up the population in the next generation are chosen from members of the current generation with a **probability proportional to their fitness**. **Use r=0.99**
Run the simulation for as long as it takes for any one of the two types to get fixed in the population.

Obtaining the Fixation Probability: Repeat the above simulation for **Nt=1000** trials and find out the fraction of times each of the two types 0 and 1 get fixed ?

For any one trial, plot the evolution of frequency of type 0 and type 1 with time.

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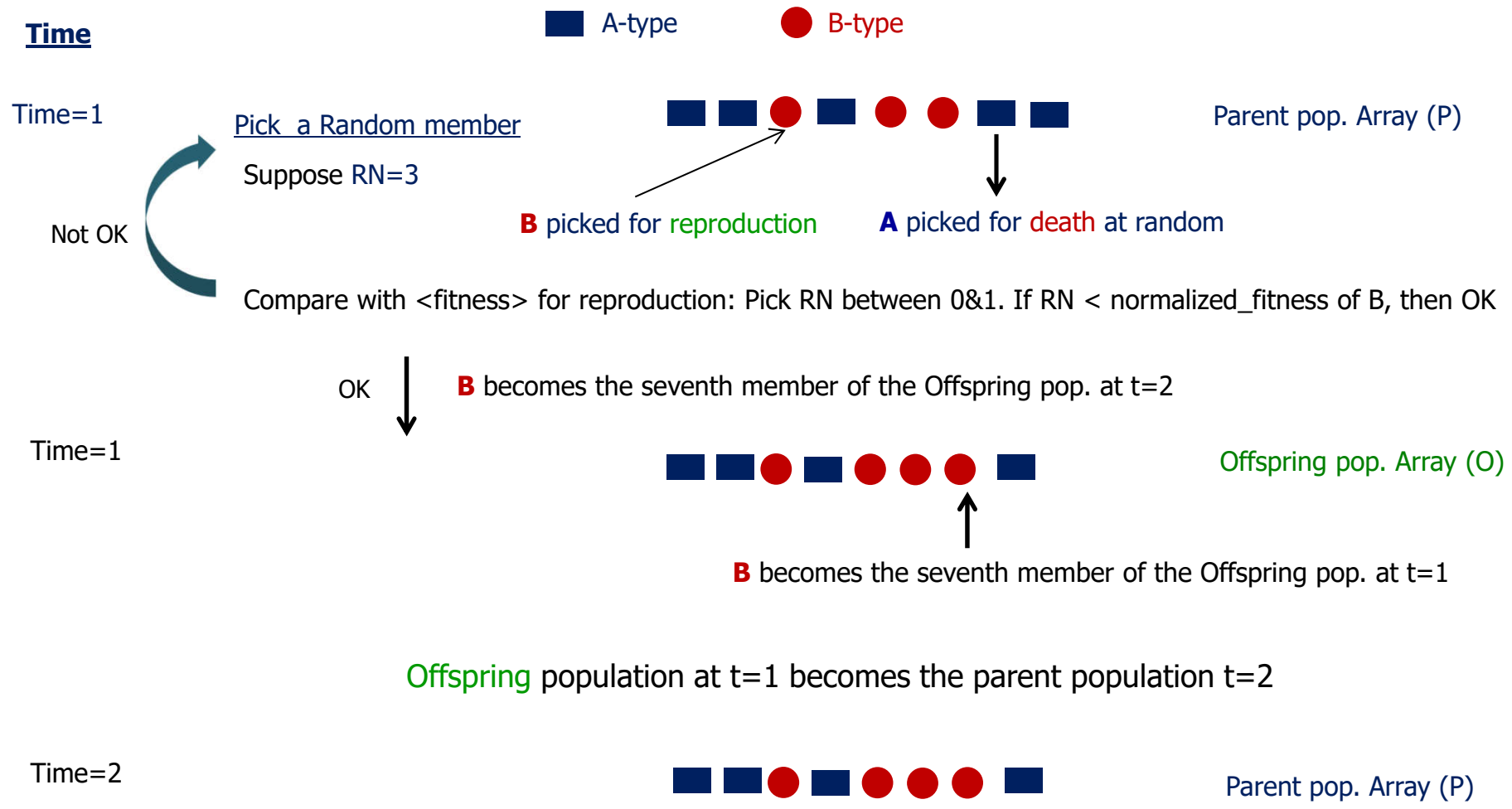
Pictorial representation of selection without mutation: Fixation of an ad/disadvantageous mutant

Evolution by Moran Process



Note: If fitness of A is r1 and fitness of B is r2,

normalized_fitness_of_**A**=r1/(r1+r2); normalized_fitness_of_**B**=r2/(r1+r2)