# Mathematical and computational models of language evolution

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# Programming session: Genetic drift

We assume a simplified model of evolution, ignoring the intricacies of sexual reproduction.

- There is a population of `N` alleles, each being either `A` or `B`.
- At time 0, there is an equal number of A-alleles and B-alleles.
- Population size remains constant.
- Each allele in the offspring generation inherits its type from a randomly selected allele in the parent generation.

# Programming session: Genetic drift

Programming tasks:

- Implement this model, starting with `N <- 10`. How long does it take until the population is monomorphic, i.e. consists only of one type of allele?
- Repeat the simulation 1,000 times. How is the running time till fixation (the first monomorphic generation) distributed? Visualize this distribution.
- What is the mean time till fixation?
- Now let `N` loop from 2 to 50 and estimate the mean time till fixation for each value of `N`. Visualize the mean time till fixation as a function of `N`.
- Give a mathematical expression for this function.

# Programming session: Selection

- Repeat the previous experiment, but let us now assume that each A-allele have on average twice as many offspring than B-alleles.
- How often does the population converge to a monomorphic A-state?
- What is the average time to fixation into a monomorphic A-state and into a monomorphic B-state?
- Repeat this experiment with different fitness ratios.