Evolutionary Thinking 2022
TA session
week 5 – Population Subdivision, Demography Inferring, LD

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Outline

1. Learning outcome of this week

The Wahlund Effect

Fst

Coalescence with migration

Linkage Disequilibrium (LD)

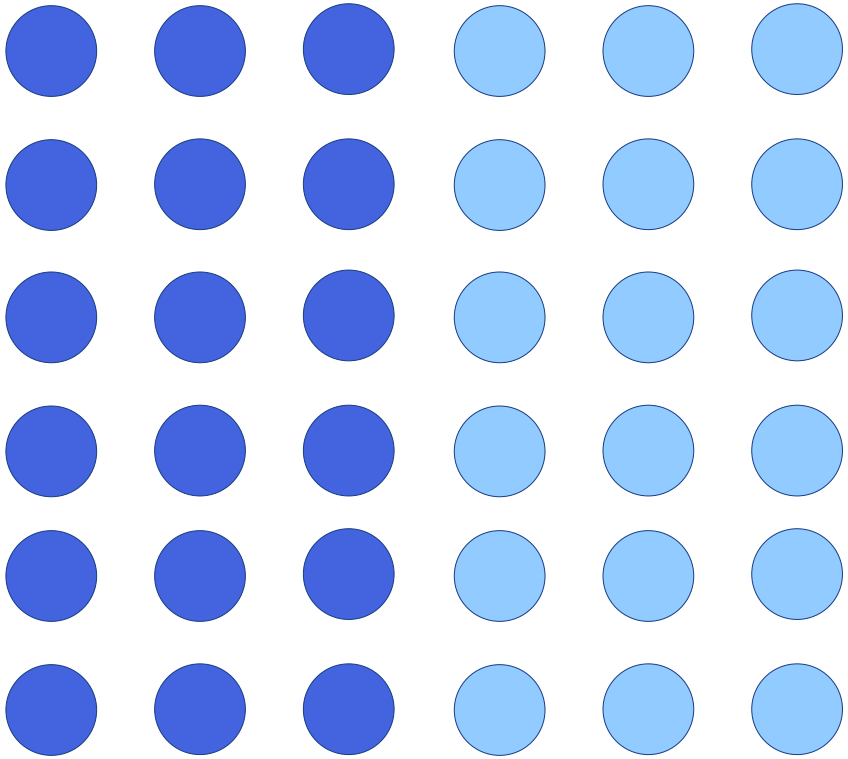
2. Exercises

Wahlund Effect

Discuss Wahlund Effect

Cause of it

Description of the Wahlund effect



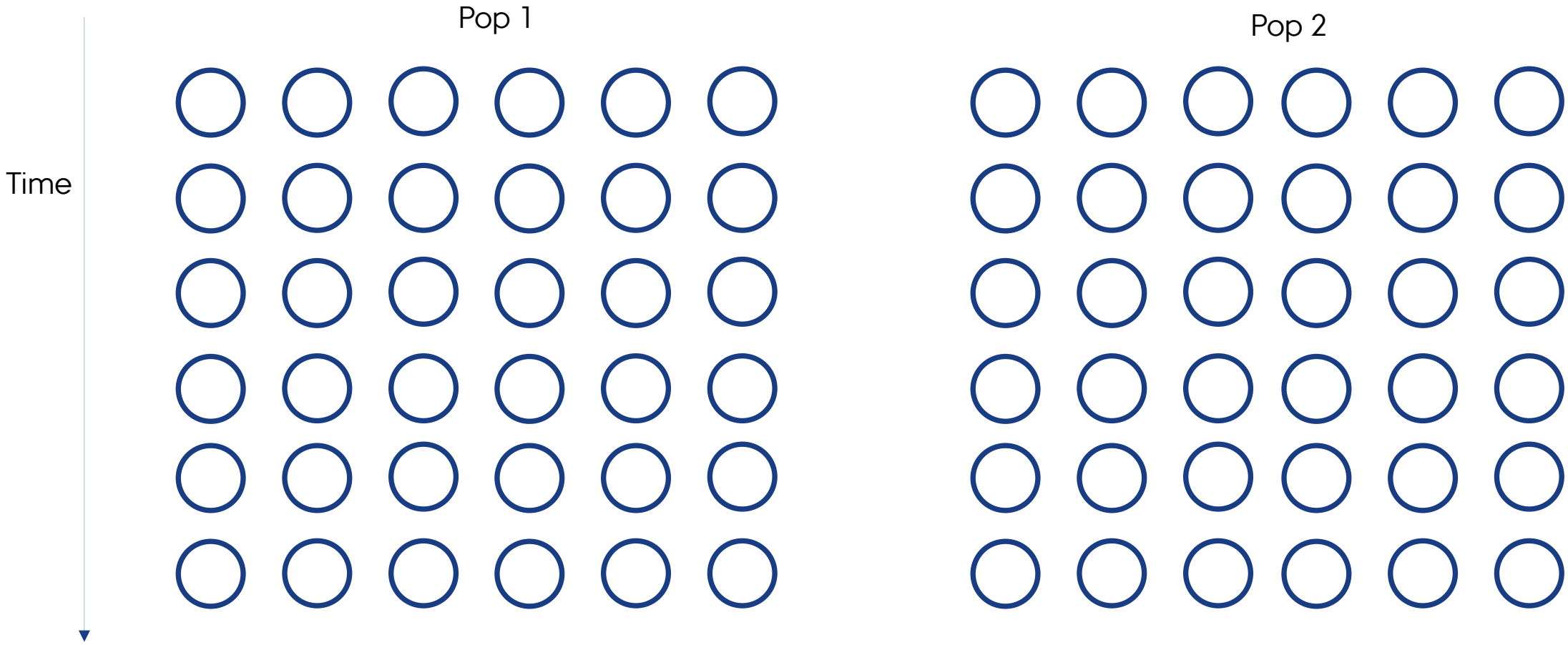
Fst – Quantifying population subdivision

$$F_{st} = \frac{H_T - H_S}{H_T}$$

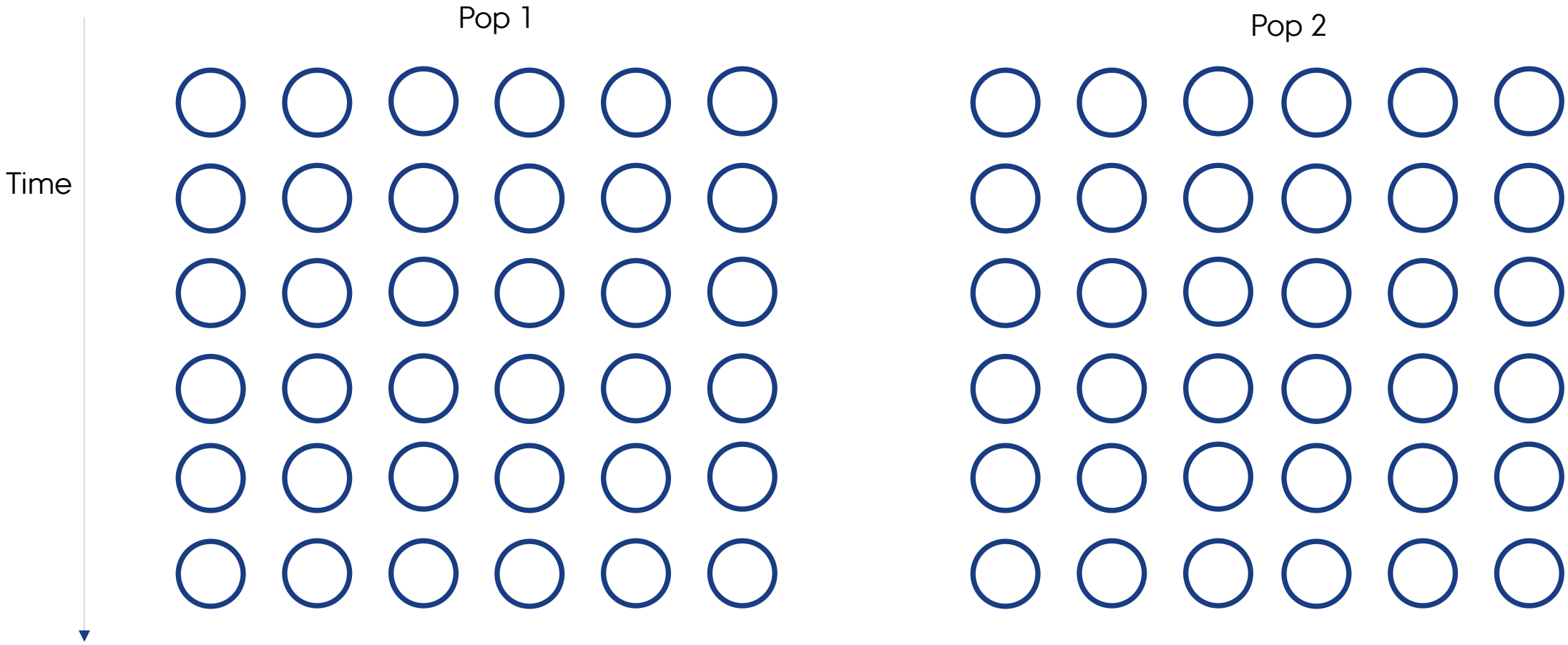
H_T : The heterozygosity proportion after pooling all populations

H_S: Average heterozygosity proportion in all populations

Coalescence with migration of 2 sequences



Coalescence with migration of 2 sequences



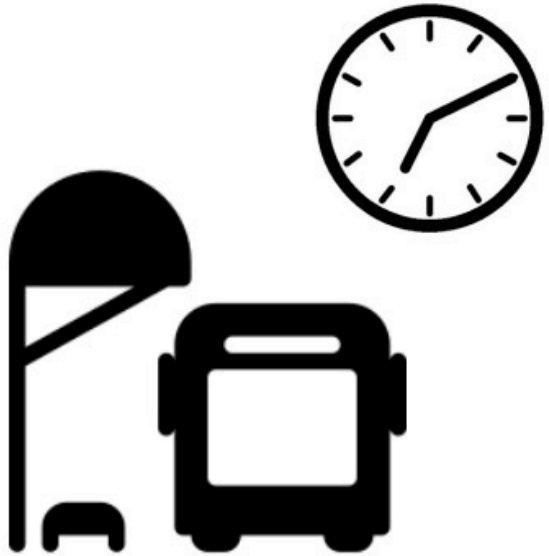
Recap of Waiting for BUS

"Buses arrive at a rate of λ per hour"

$$f(t) = \lambda e^{-\lambda t}$$

"The expected waiting time for the next bus is $1/\lambda$ hours"

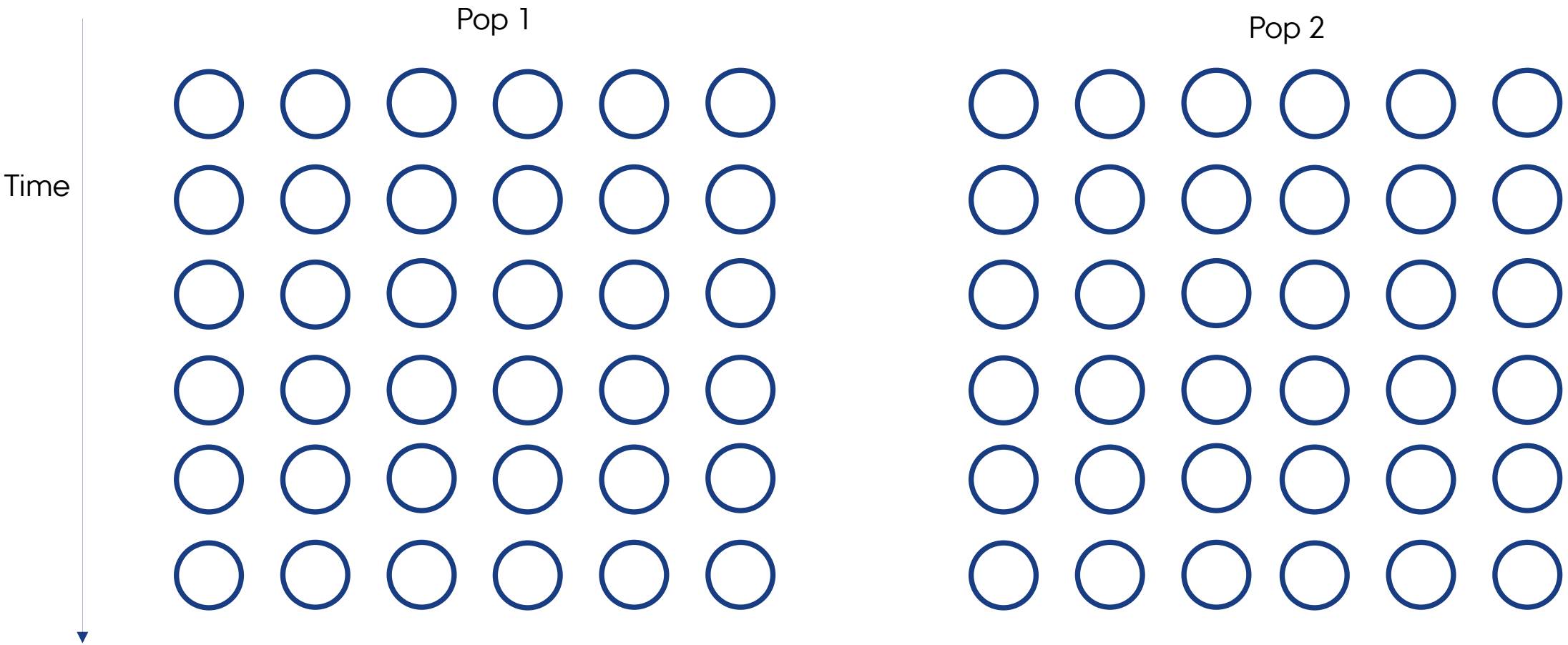
$$E[T] = \frac{1}{\lambda}$$



Slides from Fernando Racimo
"Intro to popgen"

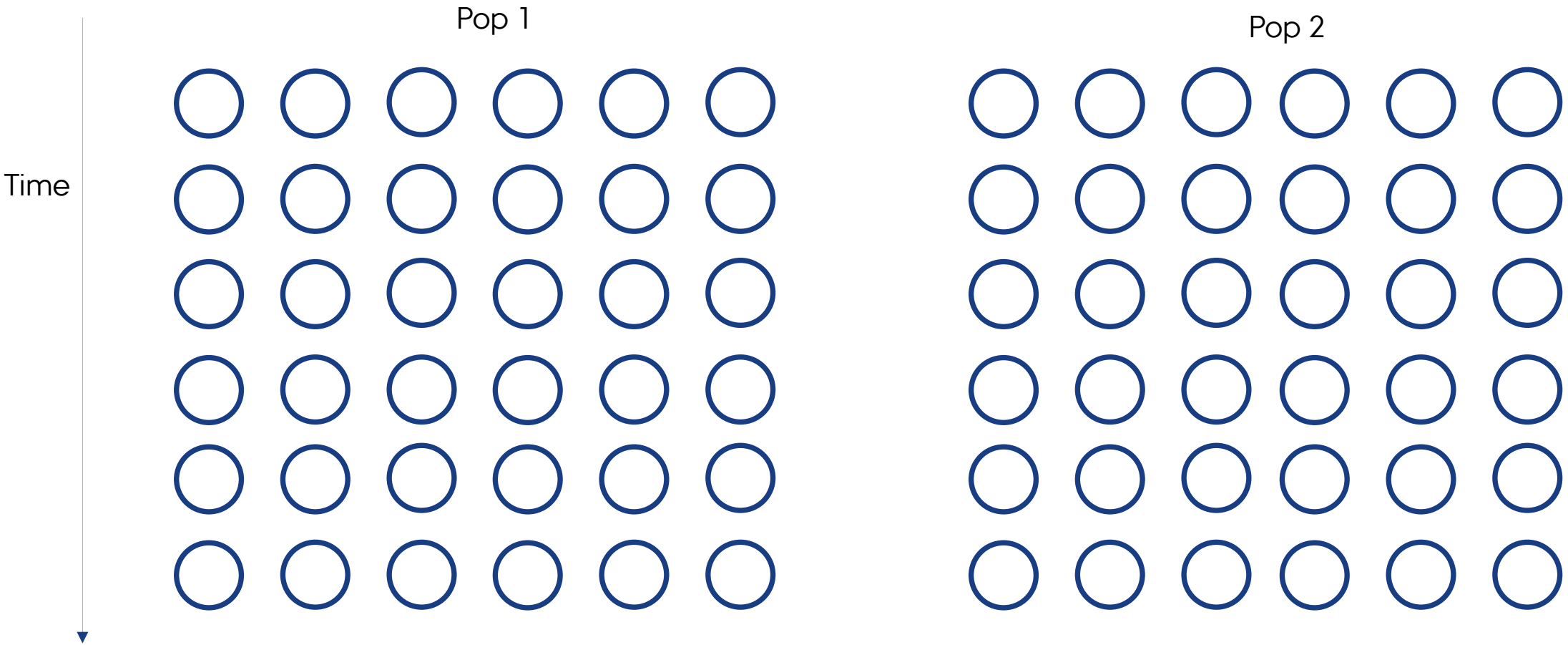
Coalescence with migration of 2 sequences

How many type of bus/events are we waiting ?



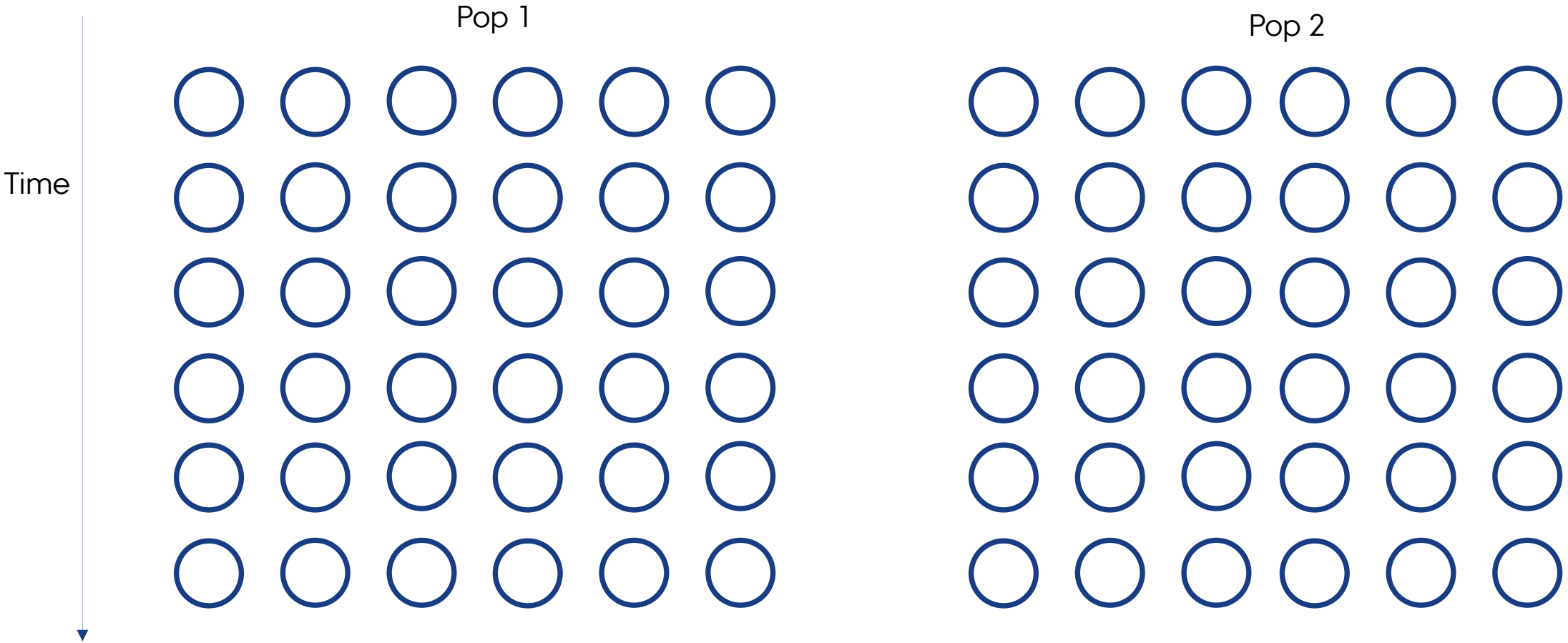
Coalescence with migration of 2 sequences

How many type of bus/events are we waiting ?
What is the rate of them?



Coalescence with migration of 2 sequences

How many types of buses/events are we waiting?
What is the rate of them?
Does the order of events matter?



Coalescence with migration of 2 sequences

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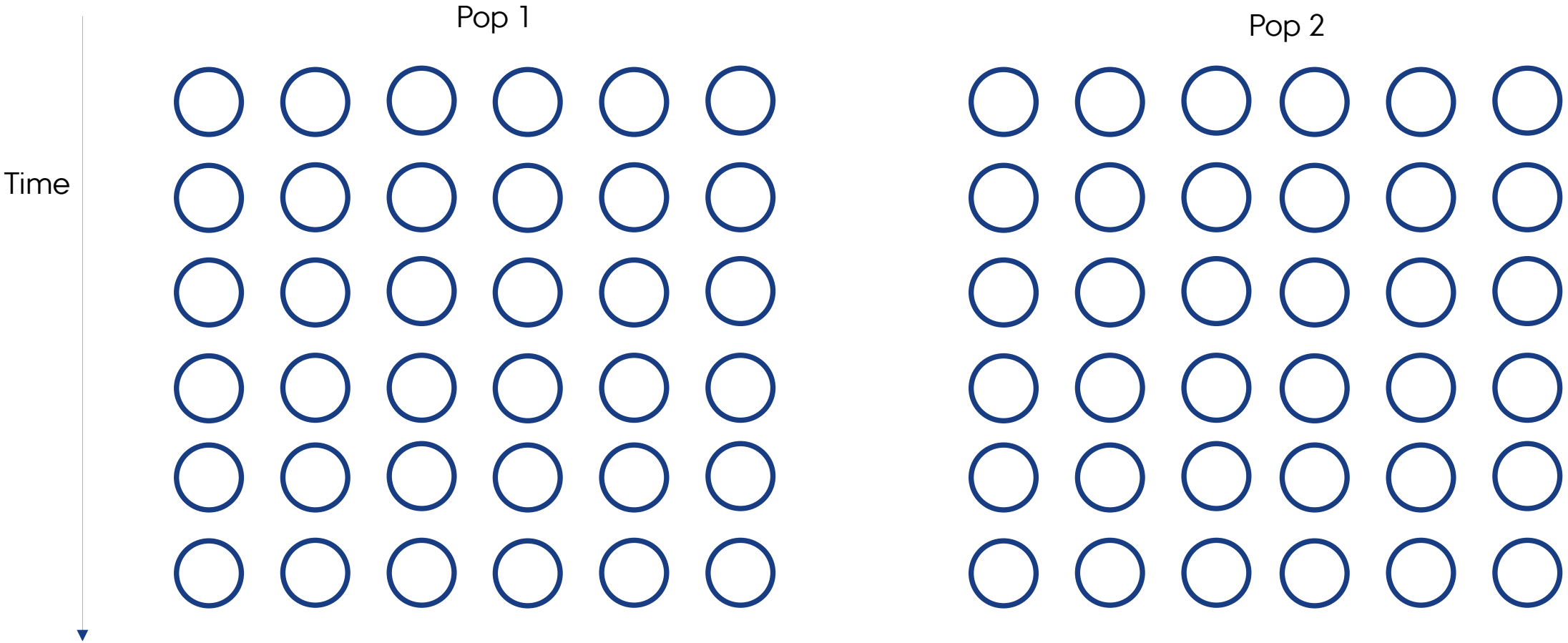

Coalescence with migration of 2 sequences

Rate of Coalescent if in the same population

1

Rate of Coalescent if in different populations

0

Rate of Migration

2M

$$E_D[t] = \frac{1}{2M} + E_S[t]$$

$$E_S[t] = \frac{1}{2M+1} \times 1 + \frac{2M}{2M+1} E_D[t]$$

Linkage Disequilibrium

Discuss on

What is it ?

$$D_{AB} = f_{AB} - f_A f_B$$

How would we expect it to change? (What can change LD through time ?)

Exercises

Chapter 1:
1.1-1.4
Chapter 2:
2.1-2.3
2.6-2.9
Chapter 3:
3.1-3.8

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