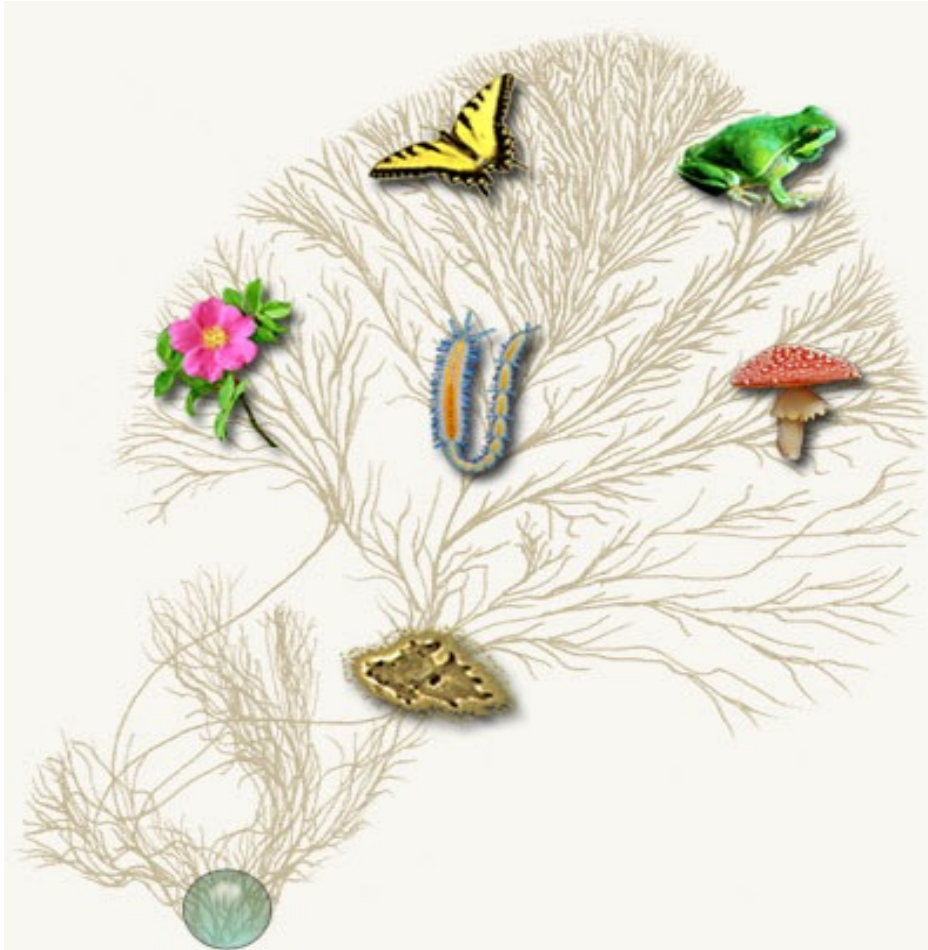
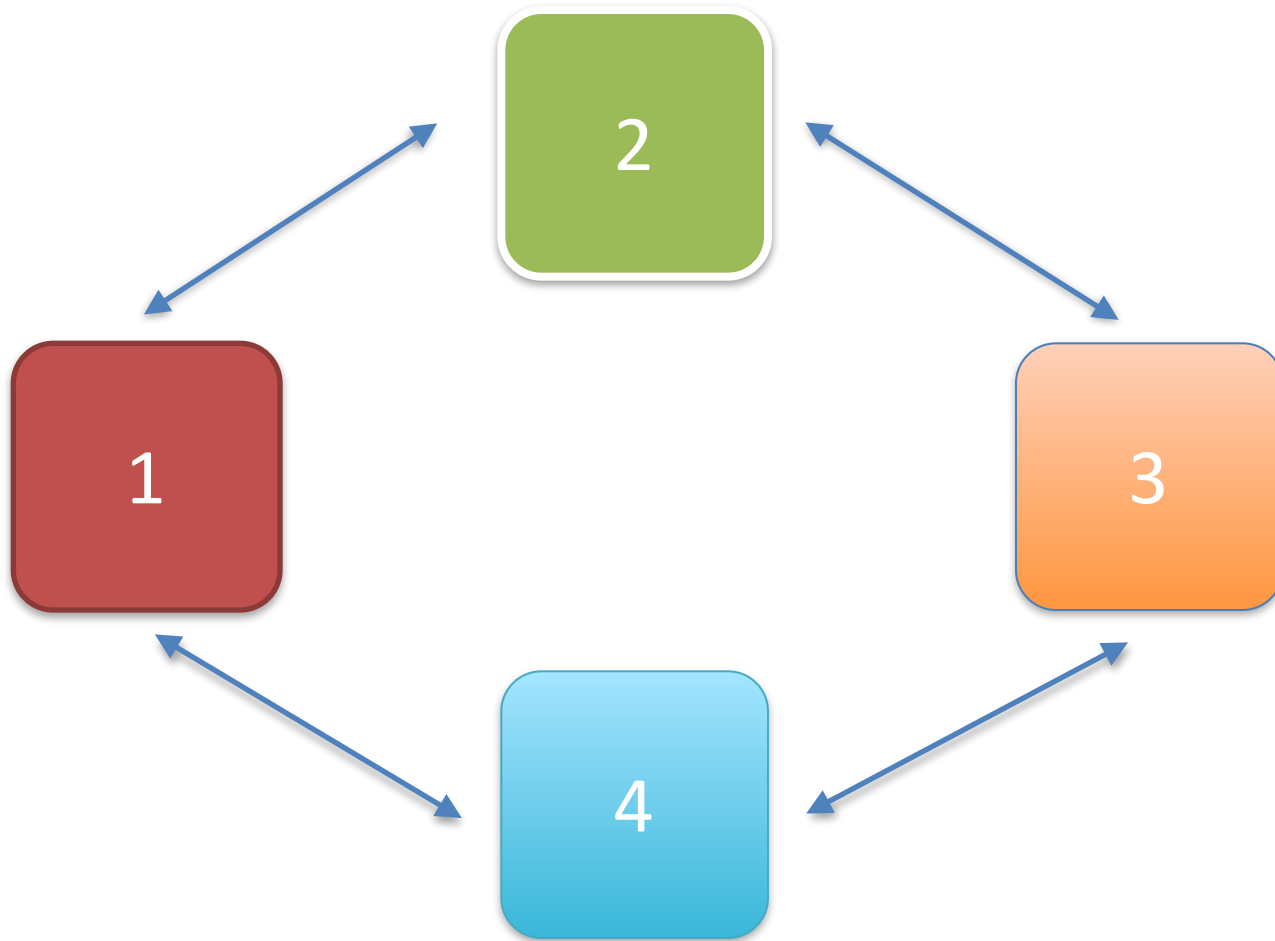


Introduction to Phylogenetic Comparative Methods



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Discrete trait evolution



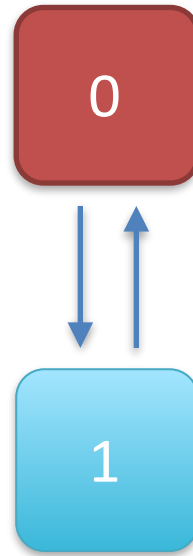
Do discrete traits evolve in a correlated fashion?

- Markov model:
 - Instantaneous rate of change
 - Estimate transition rates between traits

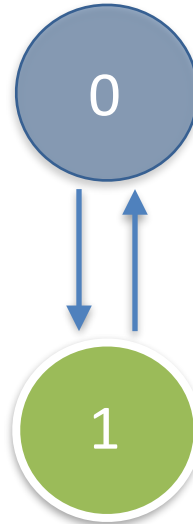
Do discrete traits evolve in a correlated fashion?

- Markov model:
 - Instantaneous rate of change
 - Estimate transition rates between traits
 - Compare 2 models:
 1. Independent model
 2. Dependent model

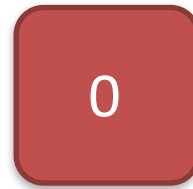
Character 1



Character 2

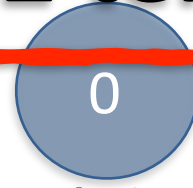


Character 1

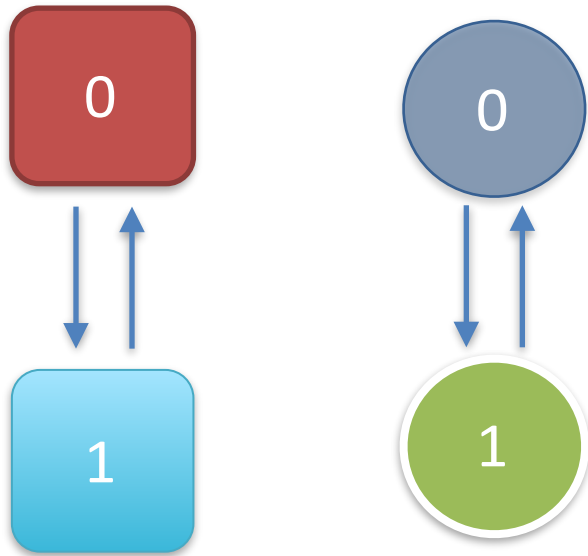


**When Character 1 changes state
does Character 2 tend to follow suit?**

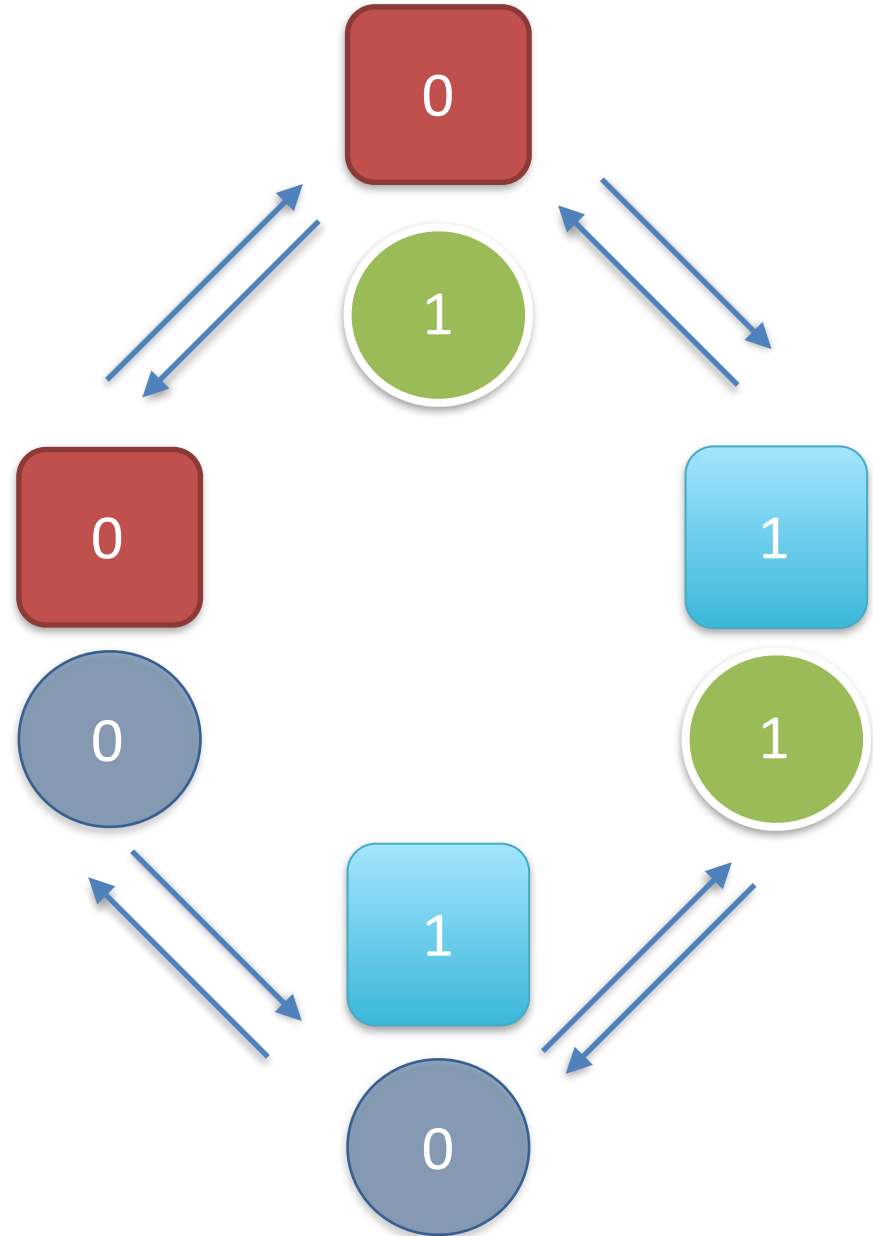
Character 2



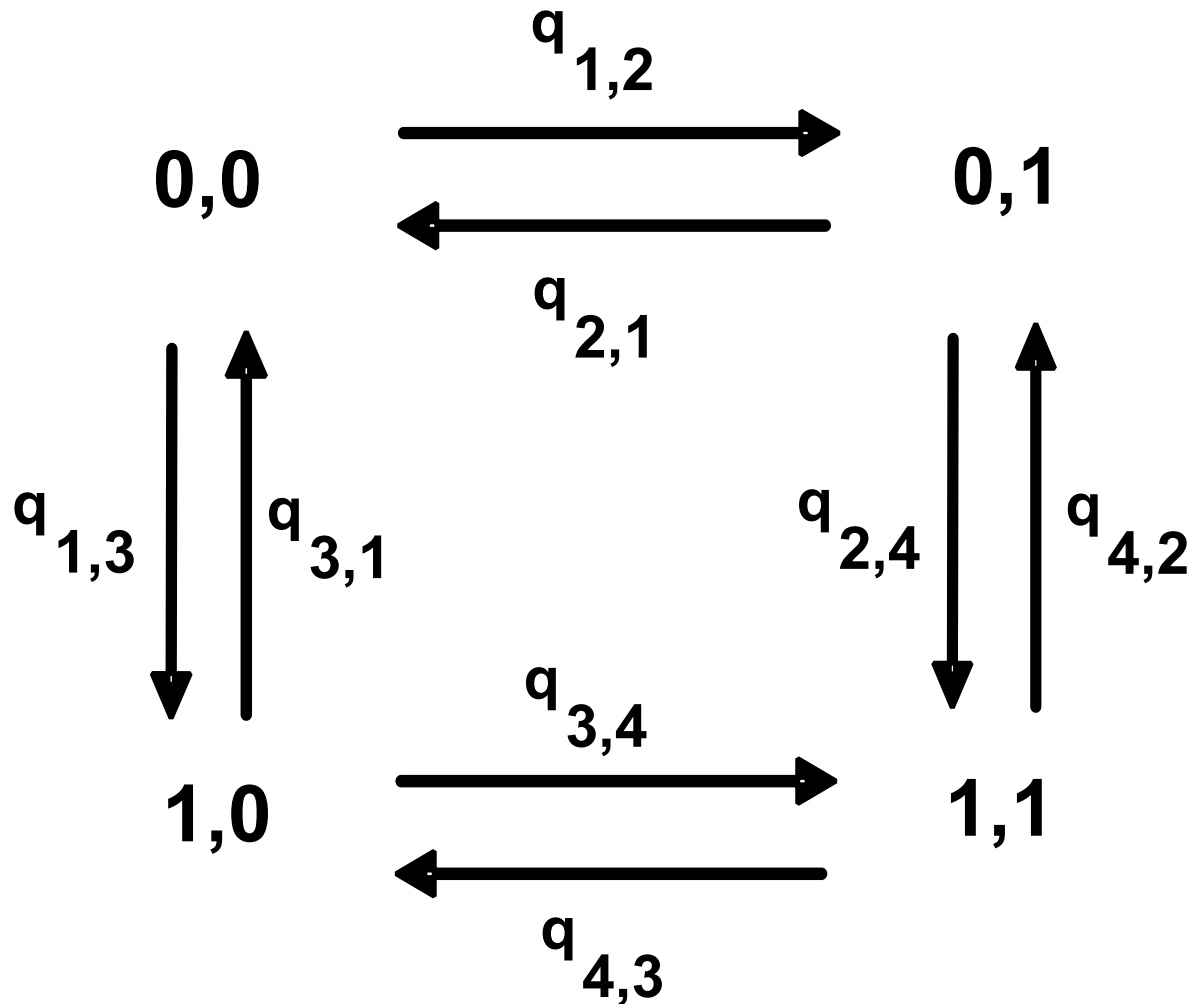
Independent model



Dependent model



Model of correlated evolution



Correlated evolution of discrete traits

- Compare the fit of both models
- Maximum likelihood gives estimate of “goodness of fit”
- Can compare models with a Log-likelihoods ratio test

Model of correlated evolution

