Three things are needed in order for speciation to occur:

- Disruptive selection on a trait (in this case due to frequency dependence)

- Assortative mating

- A link between partner choice and selected trait (at first this is implied since magic trait)

Look at speciation dynamics if individuals can choose which resource to utilise based on perceived fitness.

Eco-evolutionary dynamics = interplay between ecological and evolutionary processes

Implement ecology and evolution on same time scale

Test robustness of classical ecological speciation models

Model set-up:

1 population of N individuals

2 resources of R1 and R2 size

Individuals have heritable ability X between -1 and 1 to utilise the resources

Initial X favours resource 1 (close to -1, say -0.8)

In random order, individuals choose which resource to utilise based on size of resource, number of other individuals currently present at the resources and their X (Ri/(Ni+1)\*e^-(X±1)^2)

When all individuals have chosen, resources are distributed across individuals present

Individuals utilise the resources and get a fitness (Ri/Ni\*e^-(X±1)^2)

Resources are refilled at the end of the generation

F females and M males in population

Females have a range CI they prefer their partners to be within

Initial CI is large (random mating)

Females are chosen semi-randomly based on fitness (weighted lottery)

Males are chosen semi-randomly based on fitness out of a pool of all males with X within X±CI

They create a female and a male with X the median of their Xs

Chance of mutation of X and CI of offspring

Parents are replaced by offspring at the end of the generation

Resource dynamics:

Van Velzen & Etienne 2014: Fixed total amount of resources. If used, can only become available again through consumer death or waste.

MacArthur 1972 + Abrams et al. 2008 + Abrams & Rueffler 2009: Adaptive dynamics. Change in resource density is equal to the resource growth rate minus the summed products of consumer density, resource density and the utilisation function of the different consumer species.

Potential resource dynamics for the model:

- All individuals choose a resource and then the resources are divided evenly

- Individuals choose a resource and take a fixed amount of the available resource multiplied by their feeding efficiency

- Individuals choose a resource and take a fixed proportion of the available resource multiplied by their feeding efficiency

- First individual chooses a resource and starts feeding, then the next individual does the same and so on until both resources are depleted

- Gillespie algorithm: individuals encounter the different food items at a certain rate and can choose to accept or reject them. Penalty for accepting food items (longer wait time until next encounter or capped maximum number of food items individuals can accept)