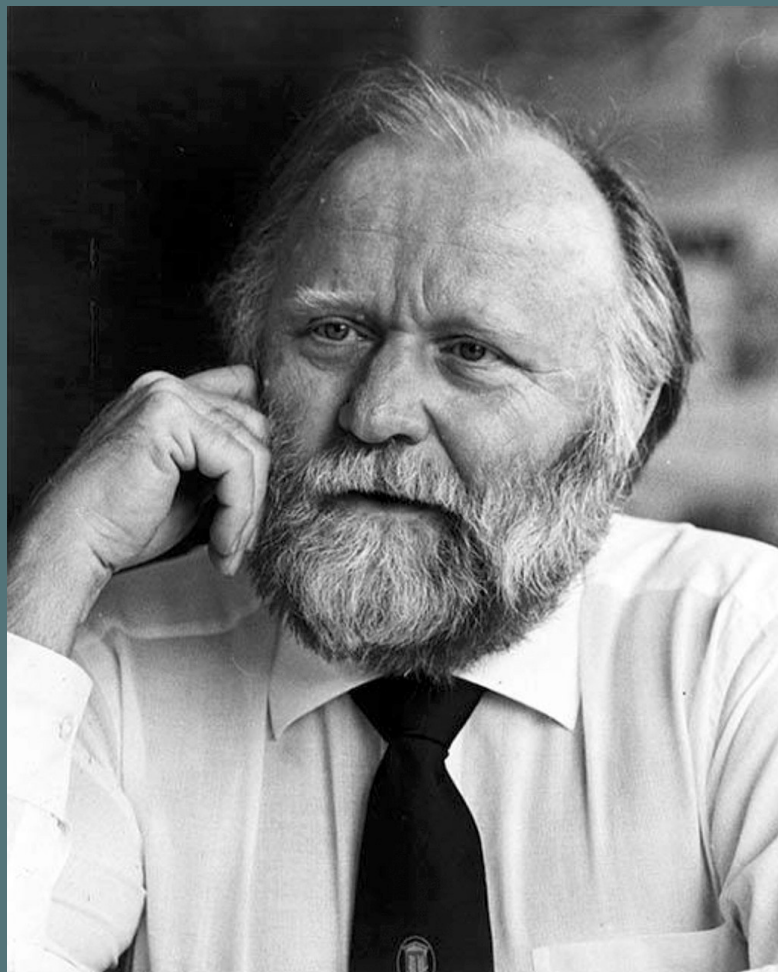


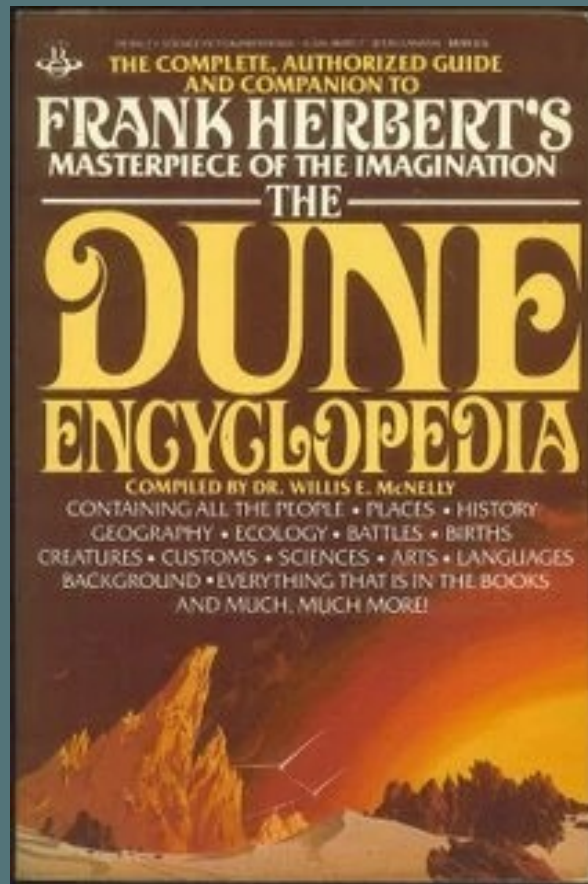
Art by Jim Tierney

What are Muad'Dibs eating?
*Predicting Dune's metaweb
using functional traits*

Dominique Caron* & Laura Pollock



© MOHAI



© Berkley Books

Species on Arrakis (Dune):



(c) ajedelman, Kangaroo Mouse



(c) animalita, Golden Eagle



© Lauren Glevanik, Desert hare

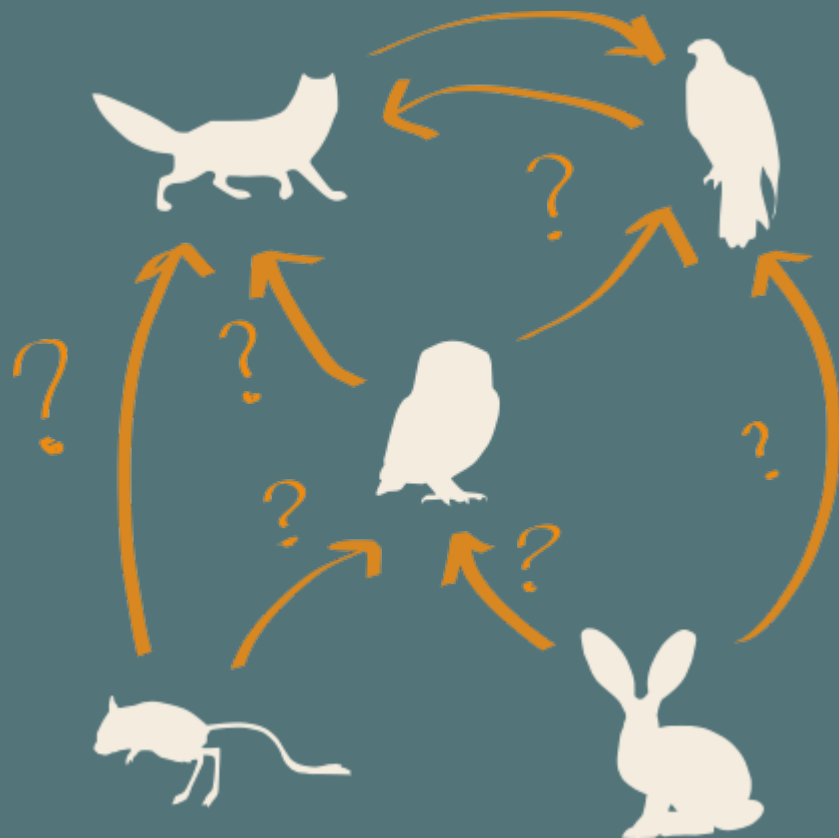


(c) Randy, Kit Fox

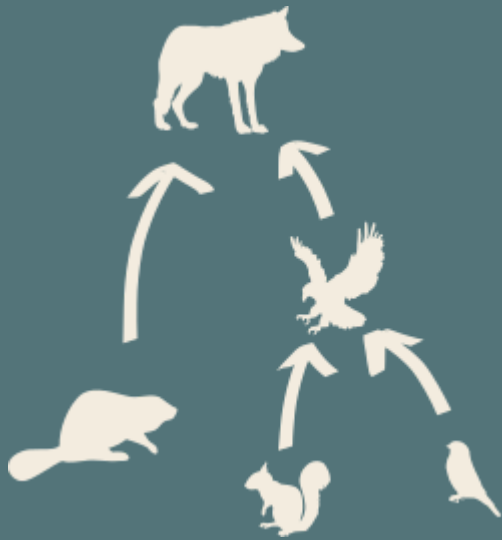


(c) Alan Vernon, Burrowing Owl

Is the food web on Arrakis realistic?

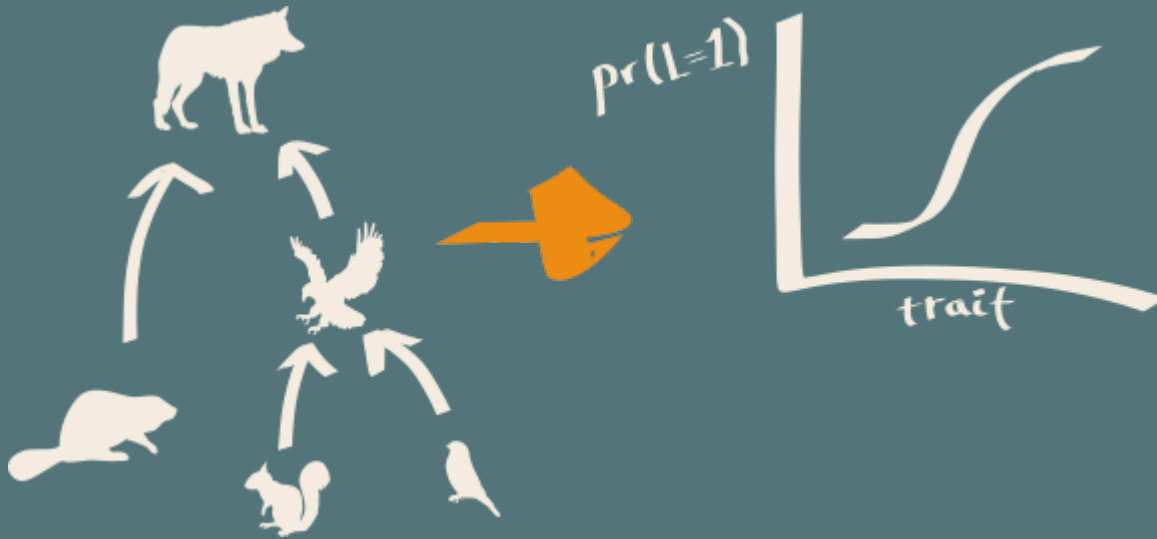


Europe food web

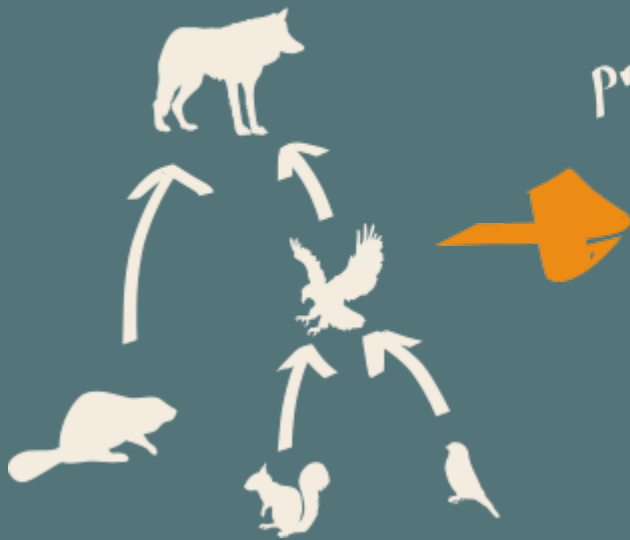


Europe food web

Trait-based model



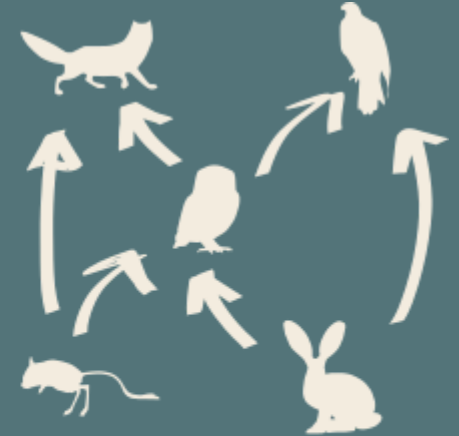
Europe food web



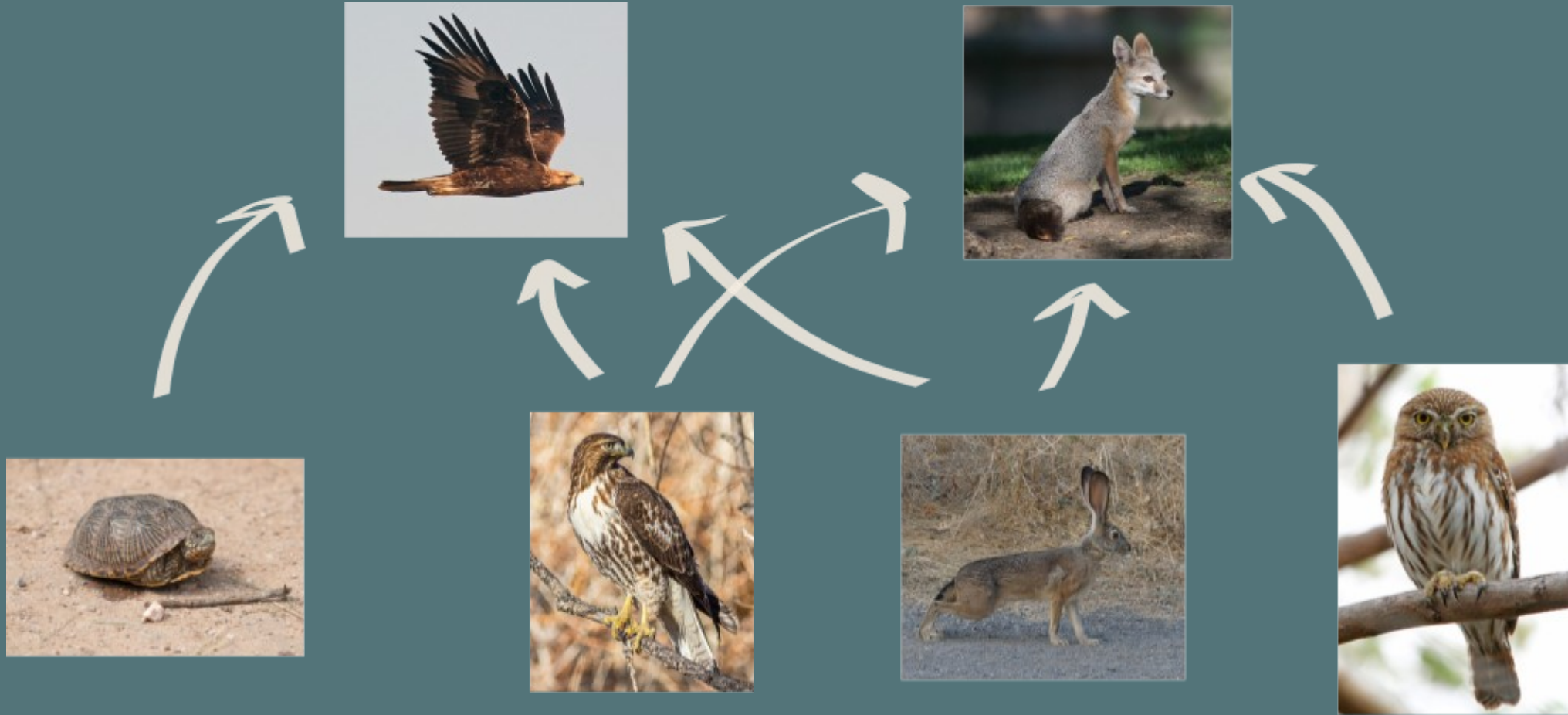
Trait-based model



Arrakis food web

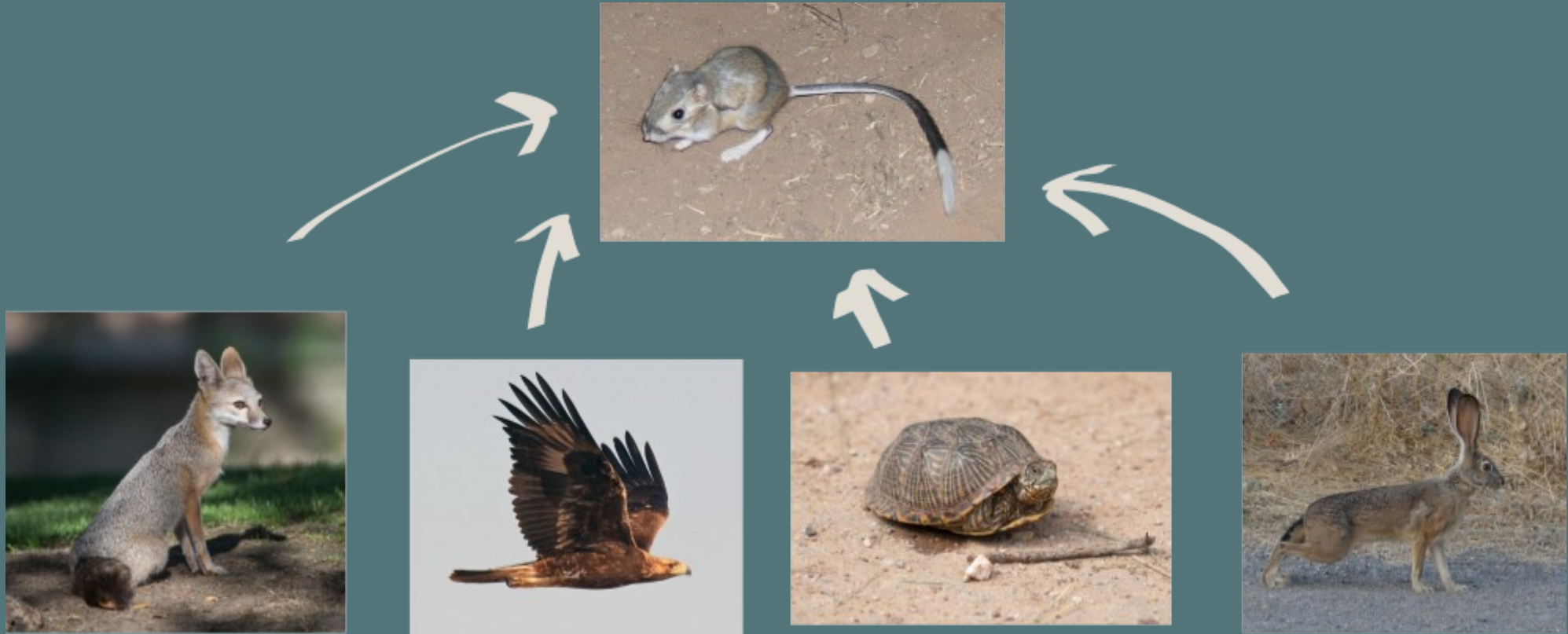


Most probable interactions



$$\Pr(L = 1) > 0.9$$

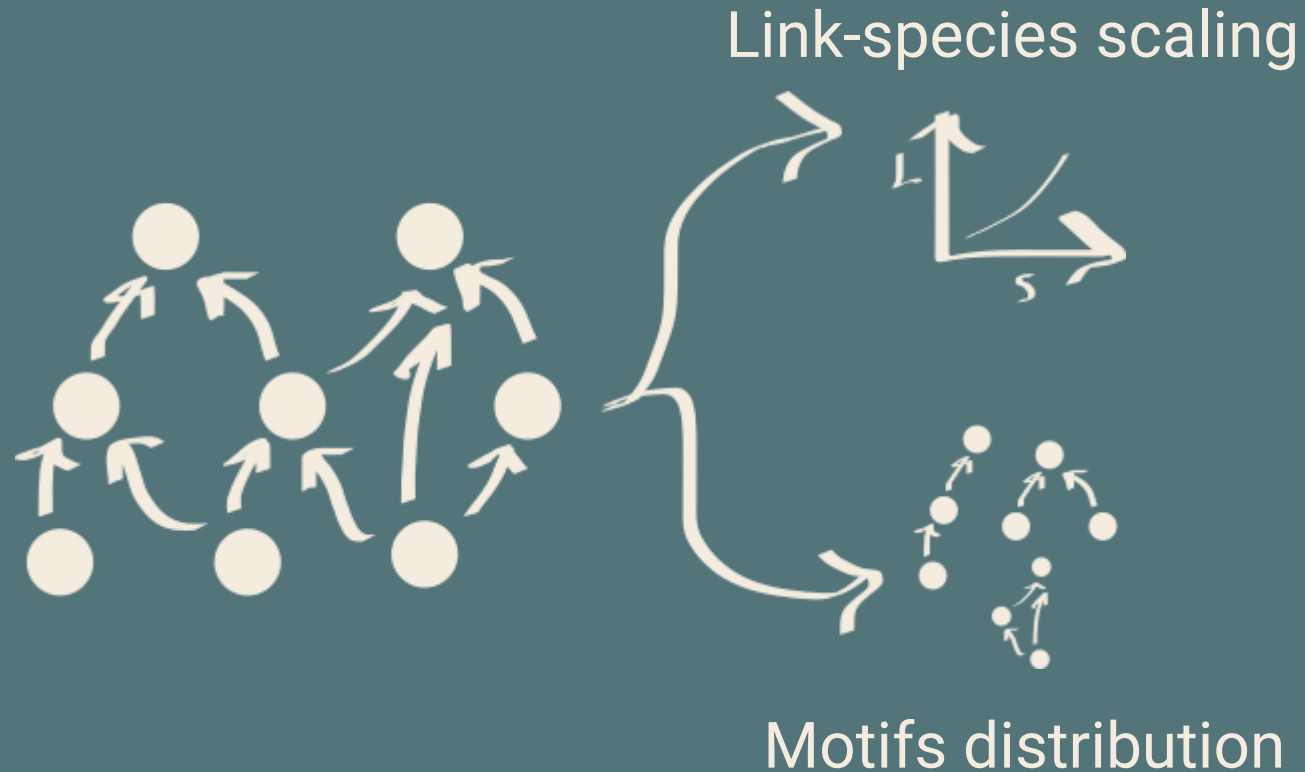
Least probable interactions



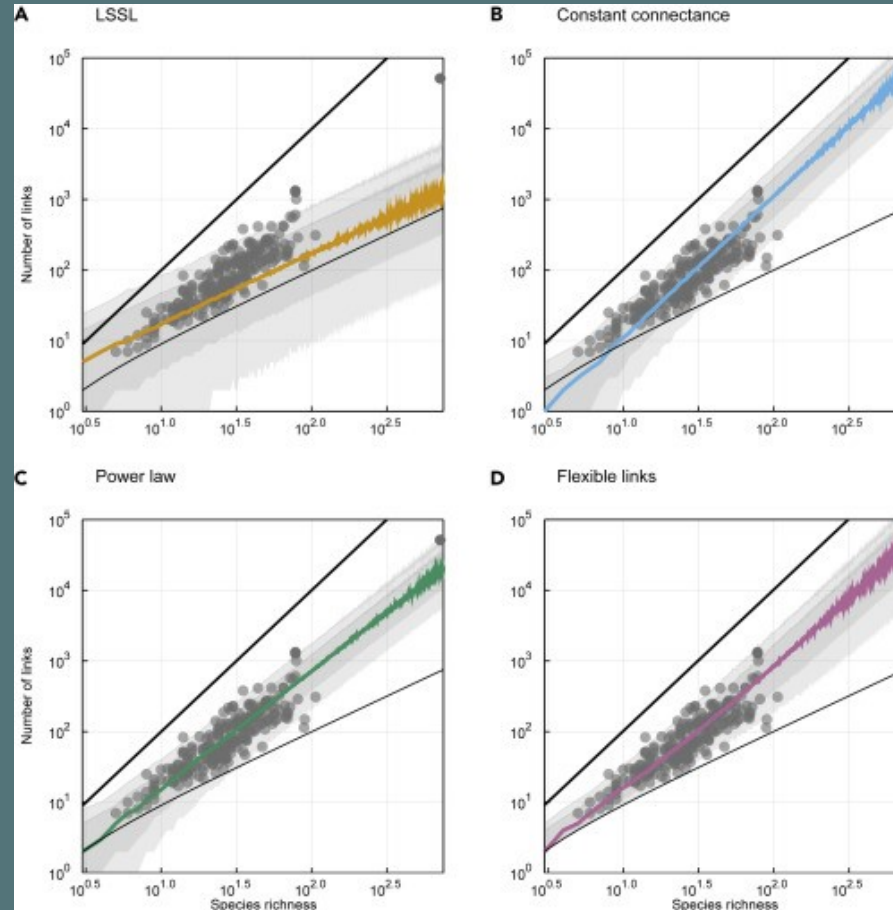
$$\Pr(L = 1) < 0.01$$

Is the food web on Arrakis realistic?

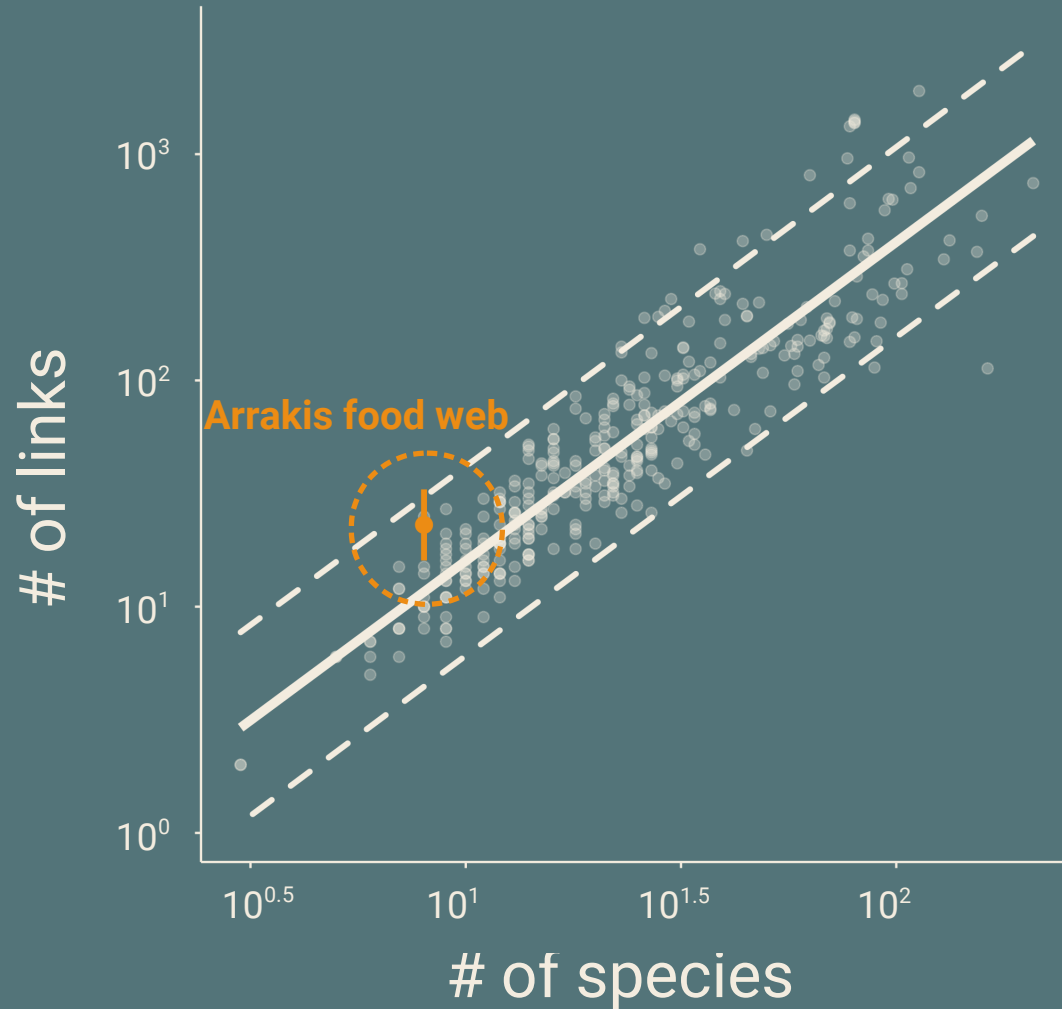
Is the food web **structure** realistic?



Is the predicted **number of links** realistic?



Is the predicted **number of links** realistic?



Is the **motif distribution** realistic?

3-node motifs:



Milo et al. 2009

Baiser et al. 2015

Is the **motif distribution** realistic?

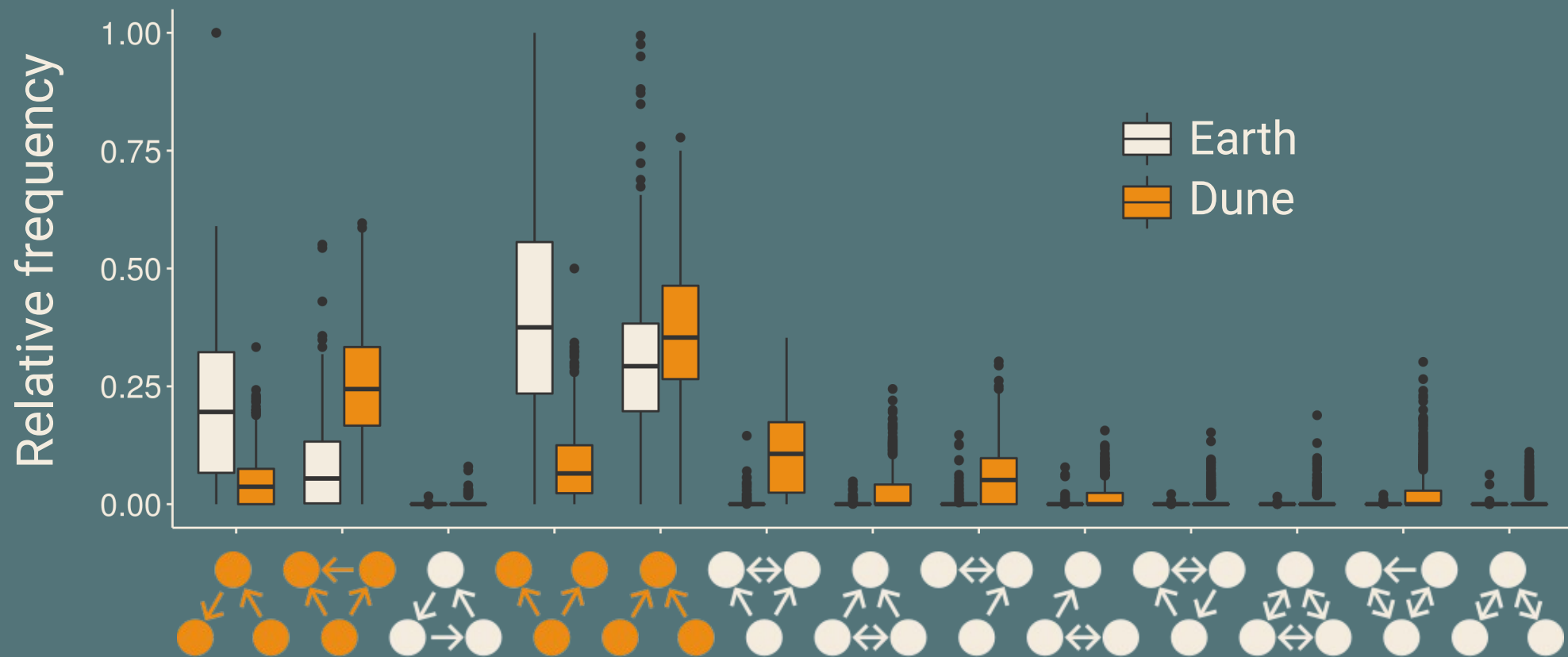
3-node motifs:



Milo et al. 2009

Baiser et al. 2015

Is the **motif distribution** realistic?




Is Dune's **food web** unrealistic?

OR

Is it the **model predictions** that are biased?



**THE TEST IS SIMPLE. LOSE YOUR
TRUST IN THE BLACK BOX, AND YOU DIE.**



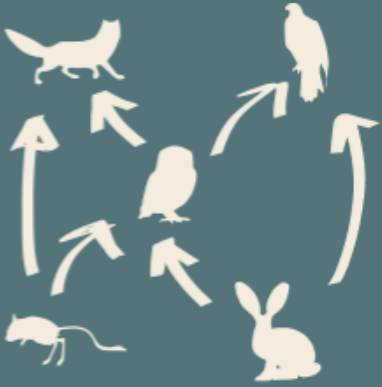
WHAT'S IN THE BOX?



BIAISES

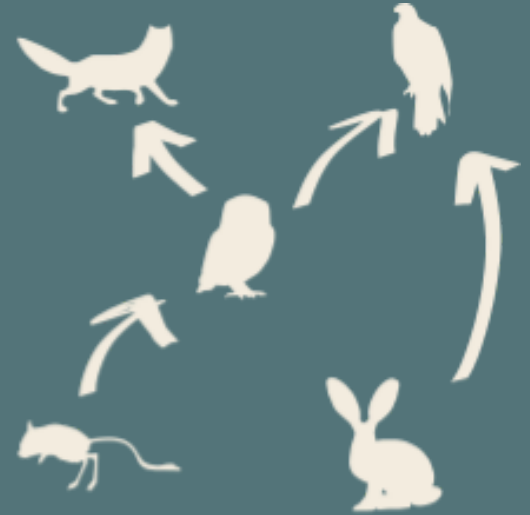


Interaction model



Bias
correction?

Corrected food web



Structural model

