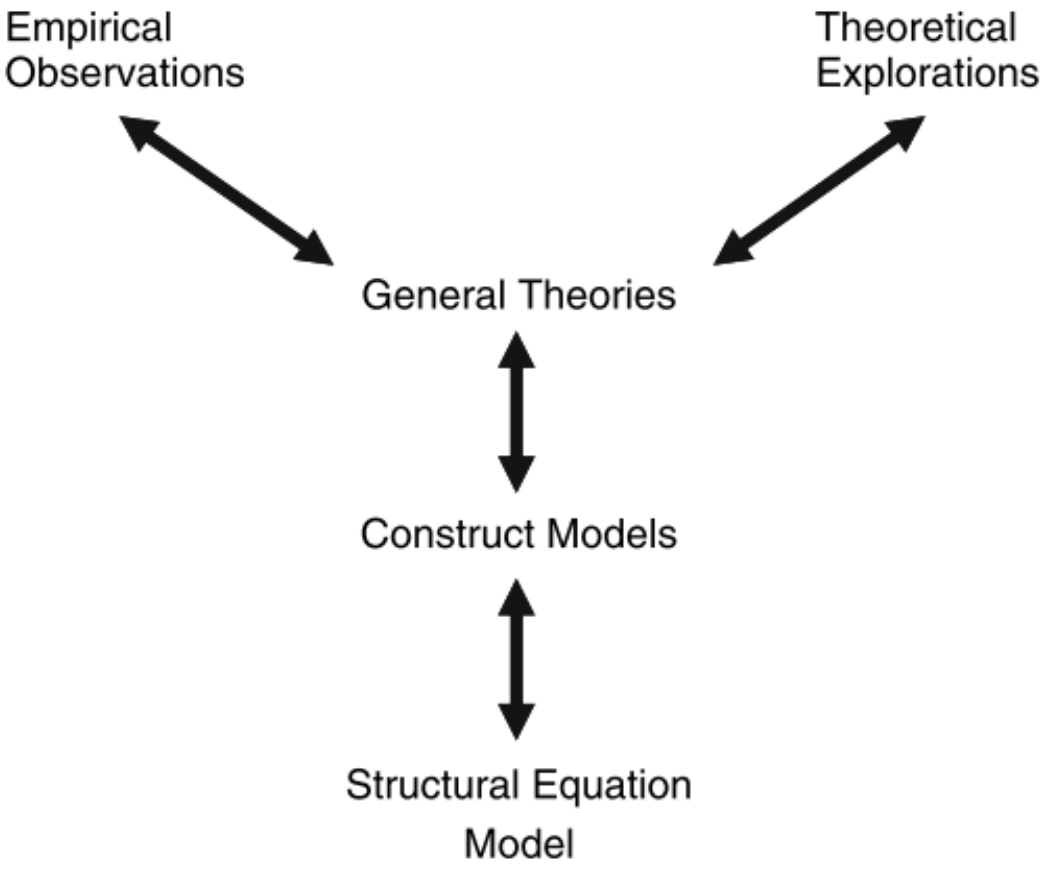
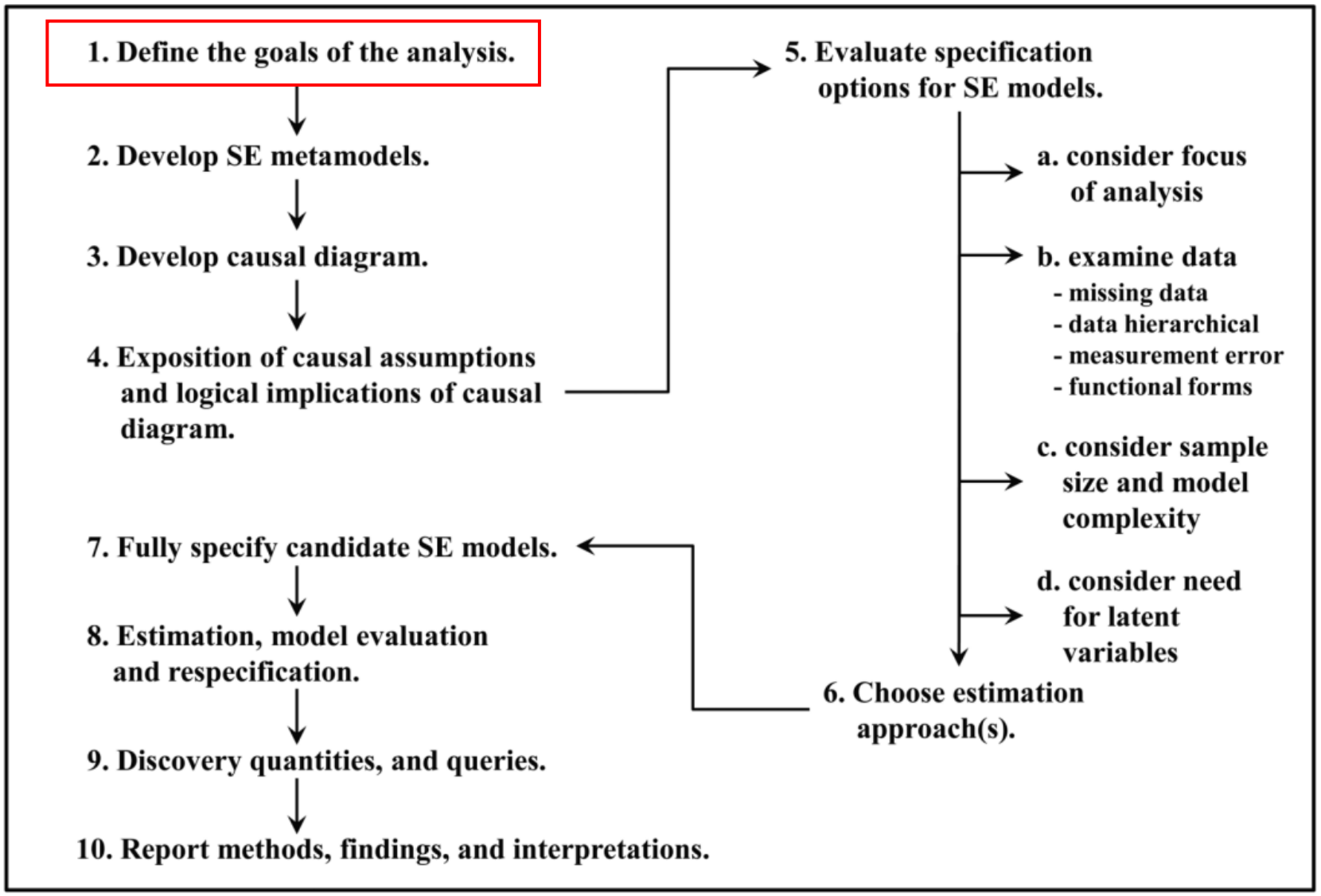
4. Model Building

4. Model Building. The “process”



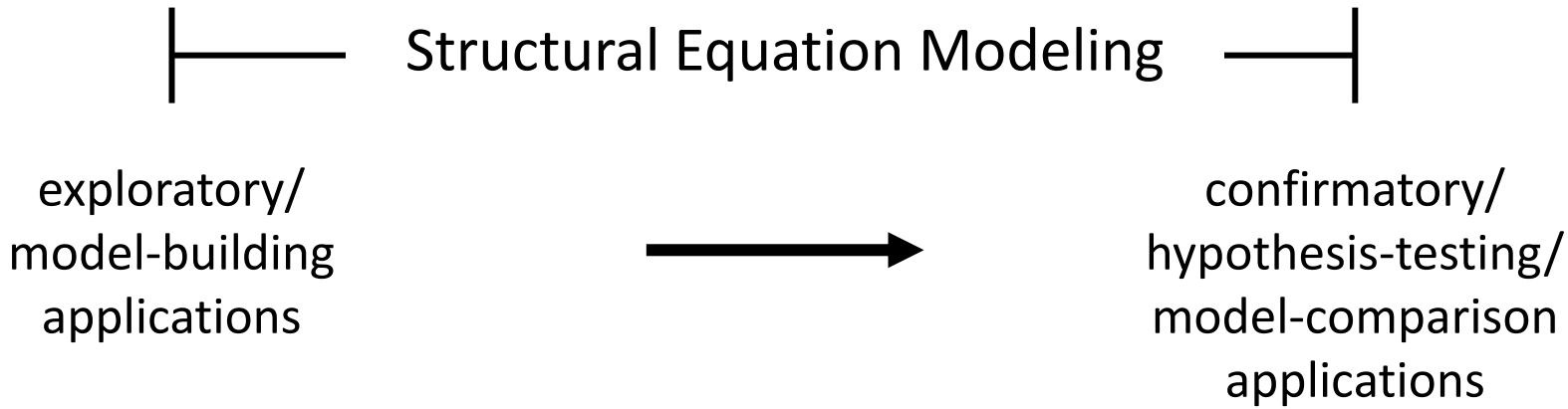
Grace & Bollen 2008 *Environ Ecol Stats*

4. Model Building.



Grace et al. 2012 *Ecosphere*

4. Model Building. The continuum of SEM



It all starts with an underlying model!

4. Model Building. Exploratory SEM

- Evaluate *multiple models*, tweaking along the way
- Suspected causal relationships, testing if paths are *significant*
- Results should be proposed as *preliminary* until further confirmatory testing can be conducted

4. Model Building. Confirmatory SEM

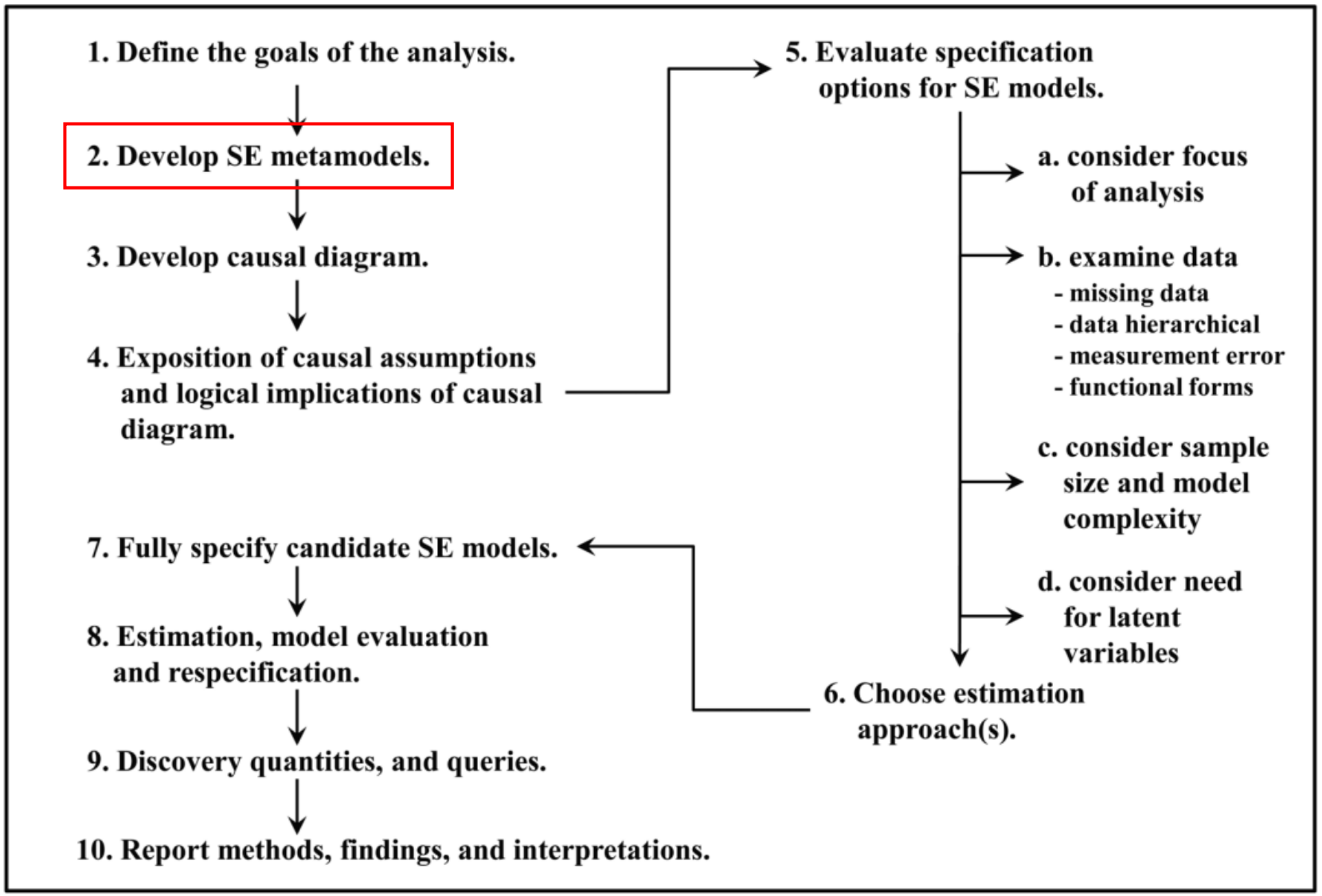
- Evaluate *a single model*
- Little doubt about causal relationships – interested in *strength* of relationships
- If model fails, go to *Exploratory*
- *Nested comparisons* can test multiple hypotheses about how systems work (model selection)

4. Model Building. Exploratory vs. Confirmatory SEM

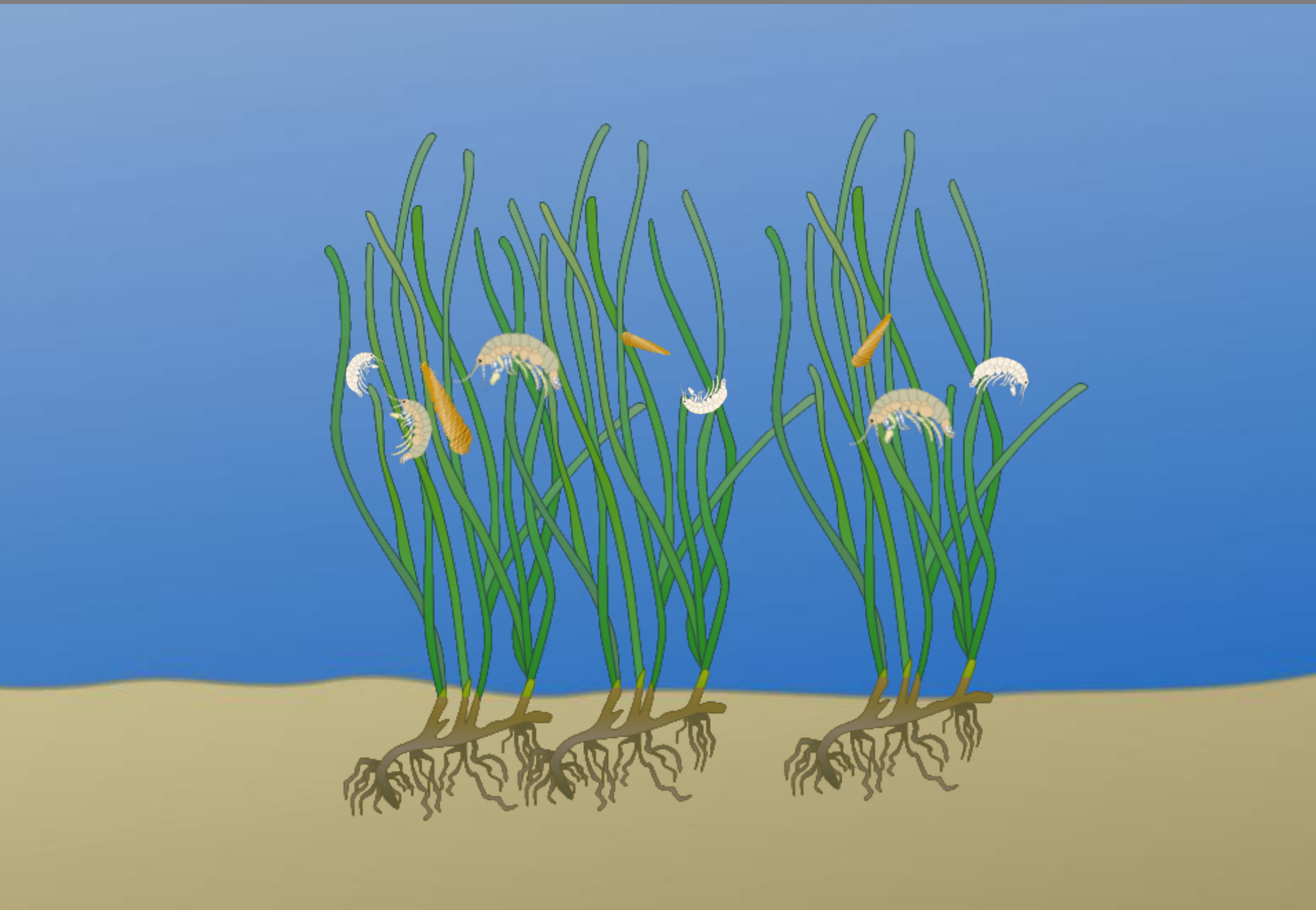
4. Model Building. The truth is out there

- Often have some (strong) sense of causal structure, may need minor tweaking to improve model fit
    - Generally a consequence of correlated errors generating unexpected relationships
- *Everybody* plays with the model a little bit
- Need to be explicit about the goal of the analysis

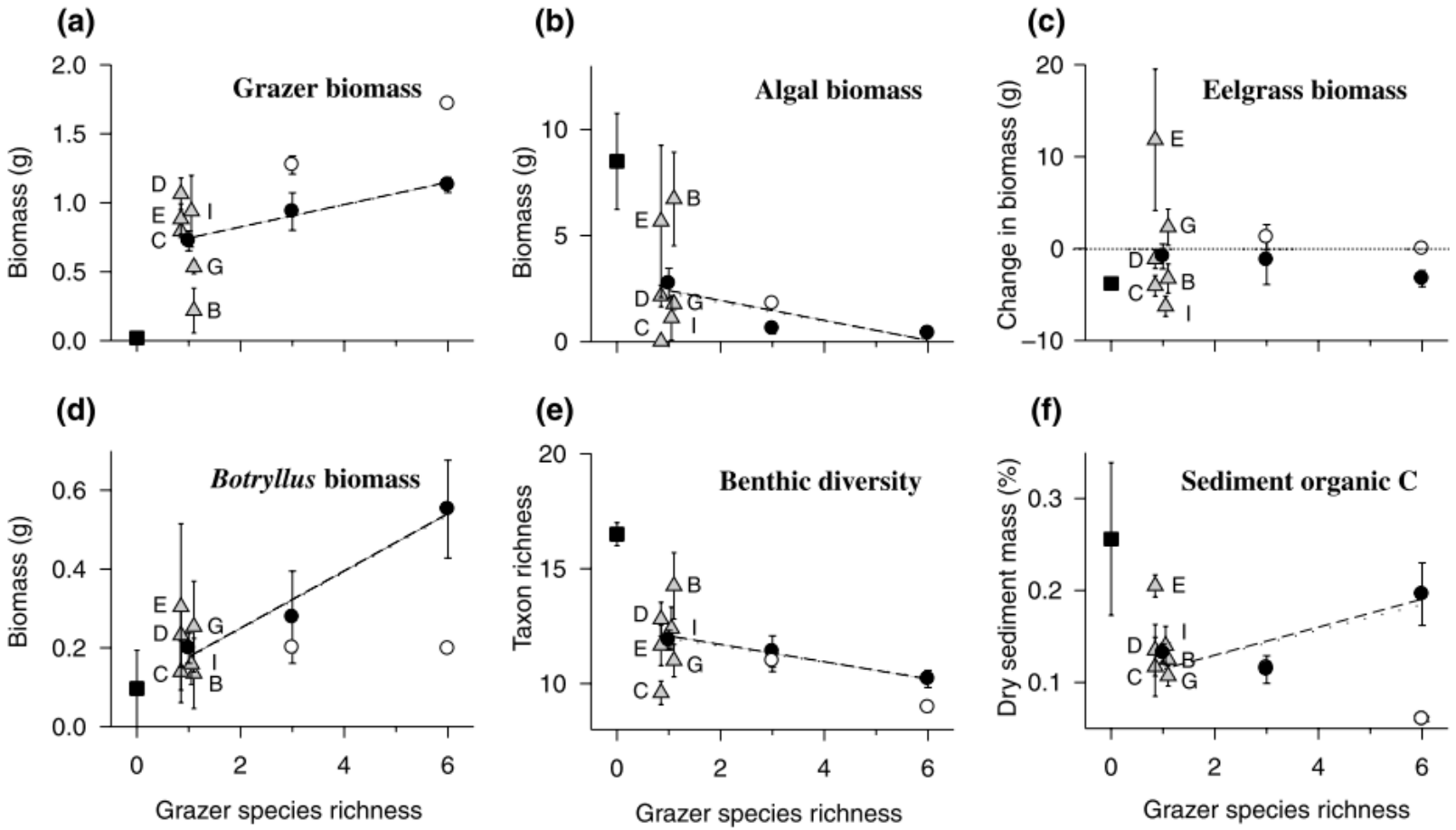
4. Model Building.



4. Model Building. Seagrass fauna example



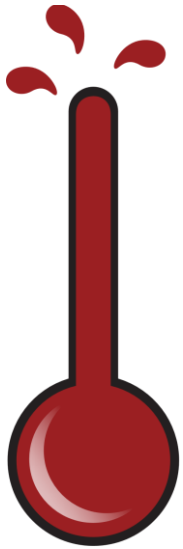
4. Model Building. Seagrass diversity



Duffy et al 2003 *Ecol Lett*

4. Model Building. Functional traits

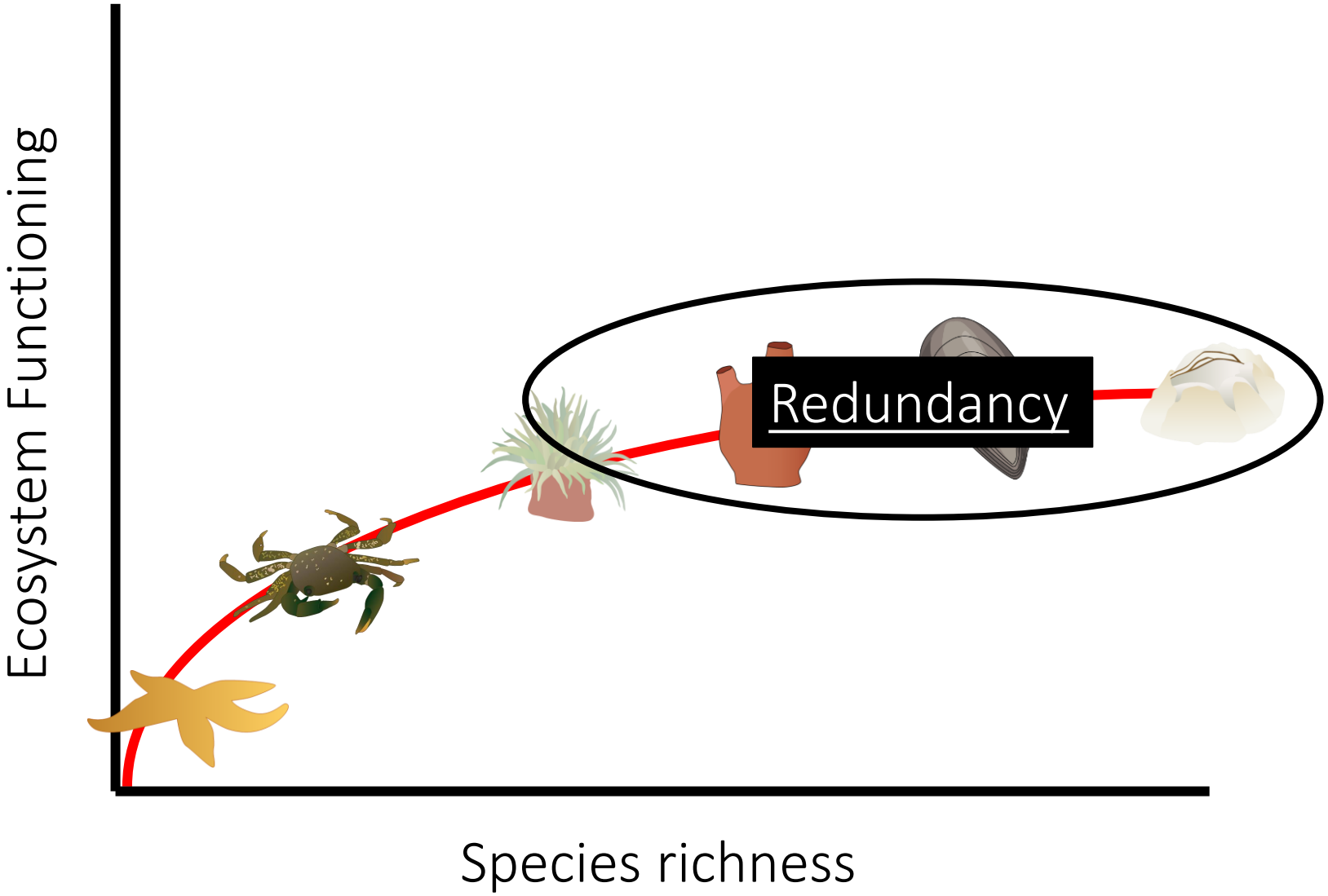
Trophic position



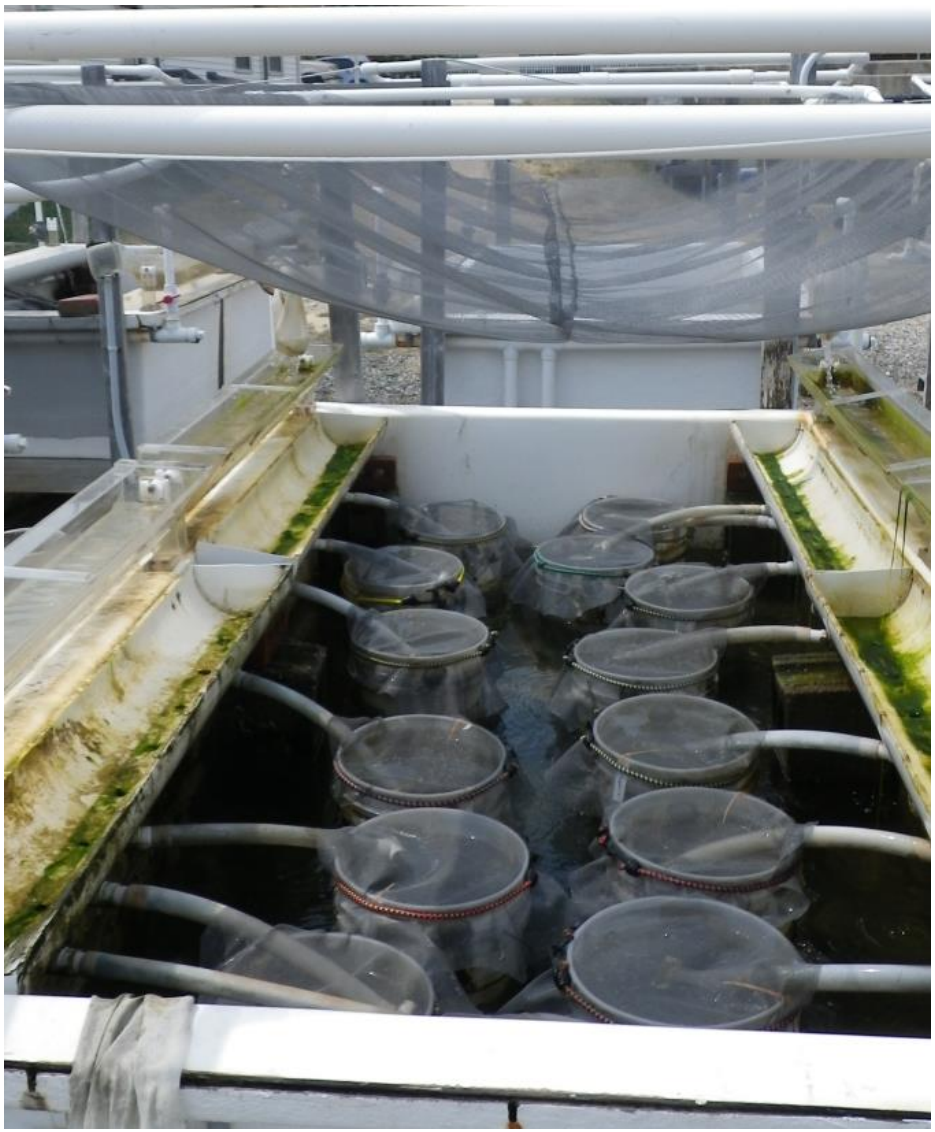
Physiological tolerance

Traits are generalizable!

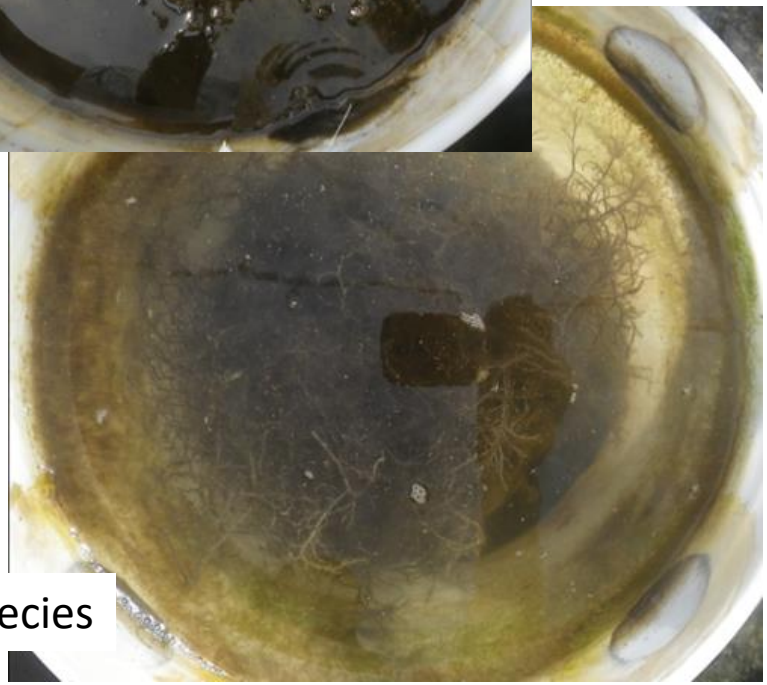
4. Model Building. Functional traits



4. Model Building. Mesocosm Experiments



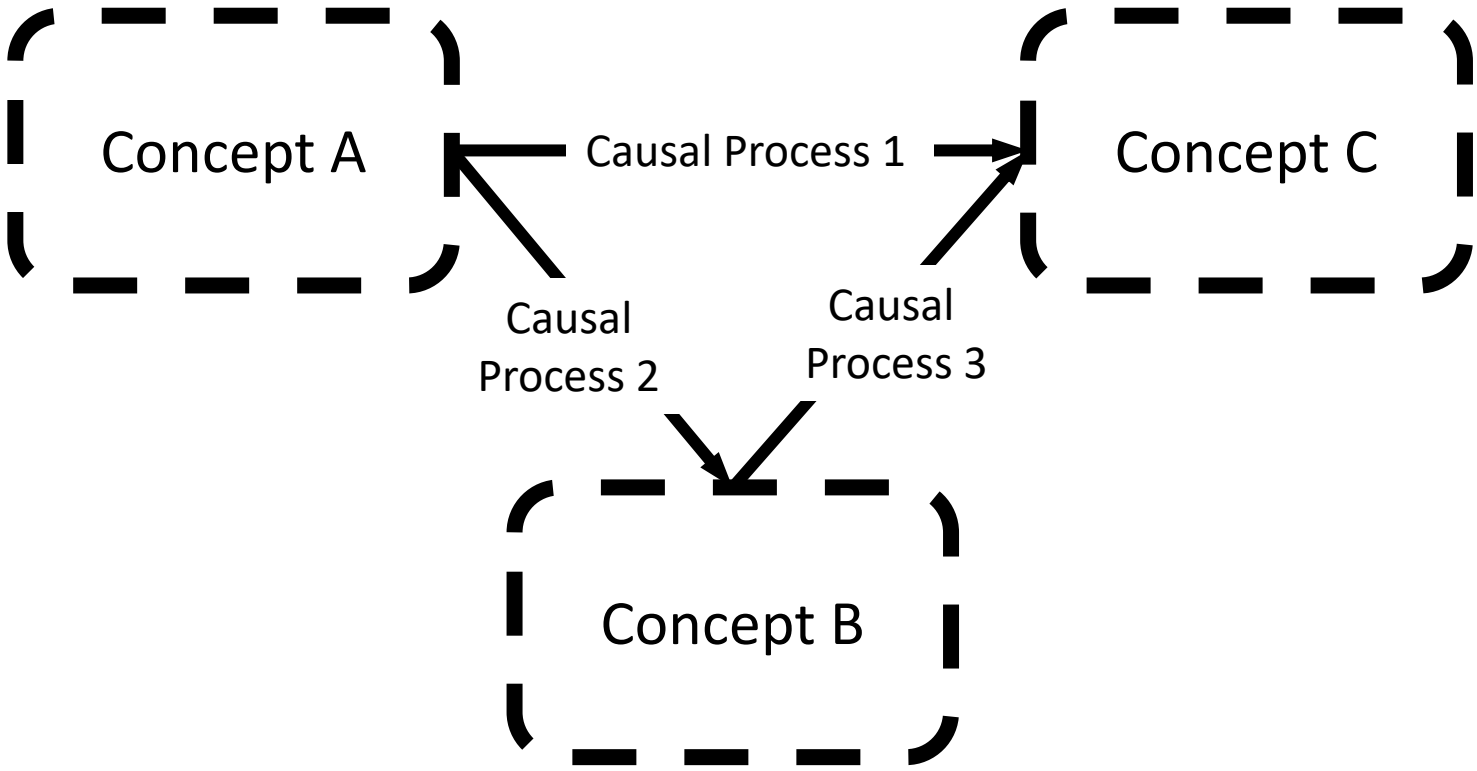
Blue crab only



All species

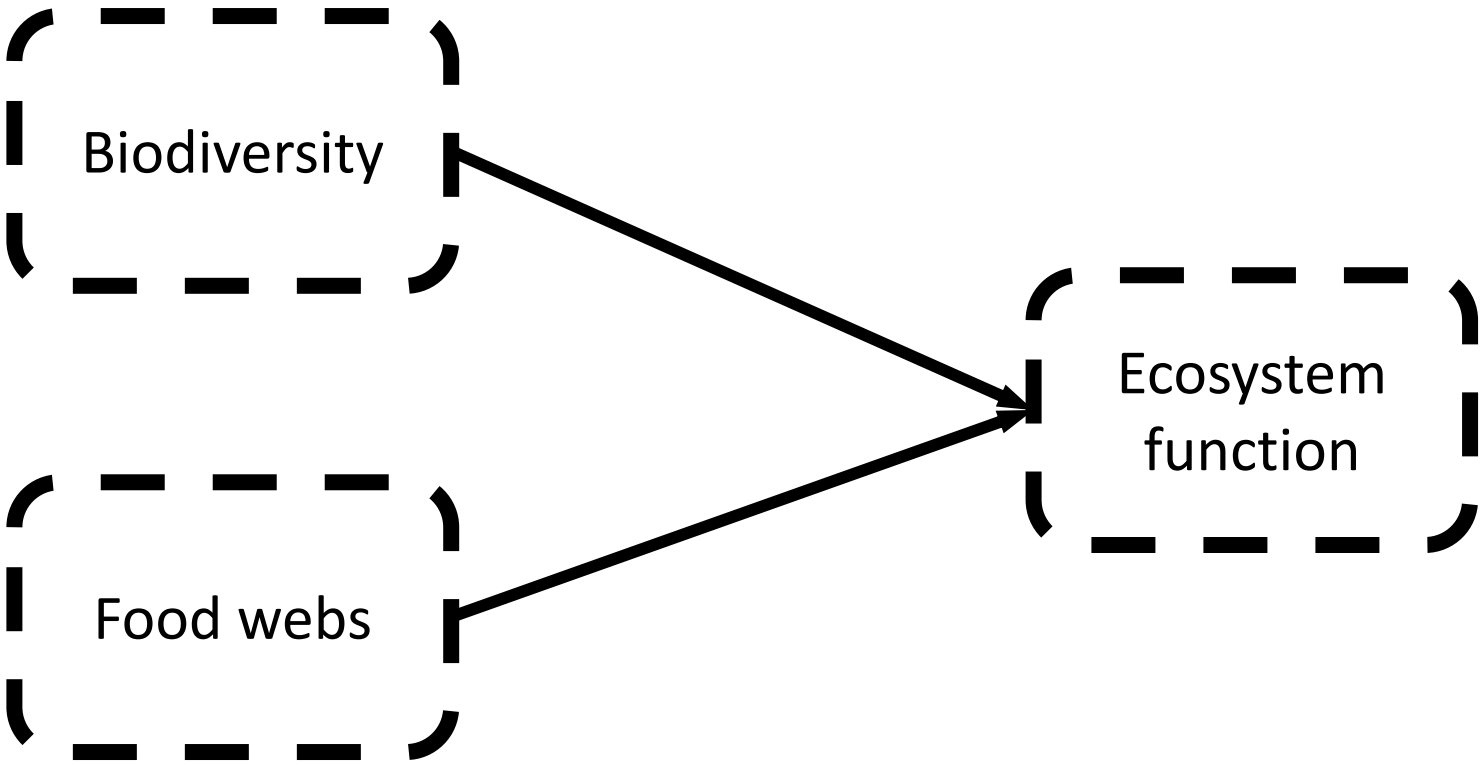
4. Model Building. What is a meta-model?

- Start BIG
- Identify the general concepts and their relationships



4. Model Building. What is a meta-model?

- Focus the question and begin to build out the model



4. Model Building. What is a meta-model?

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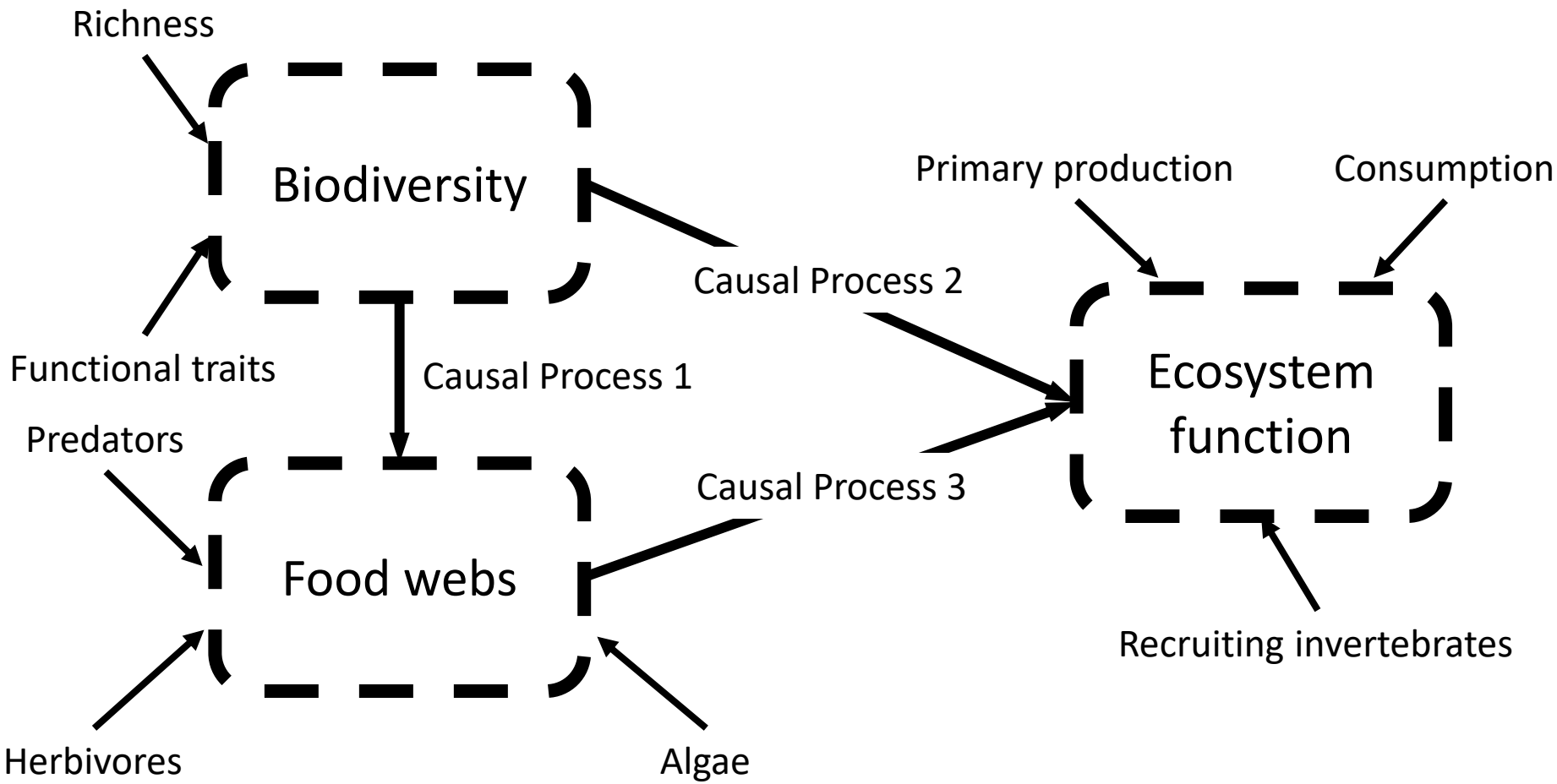
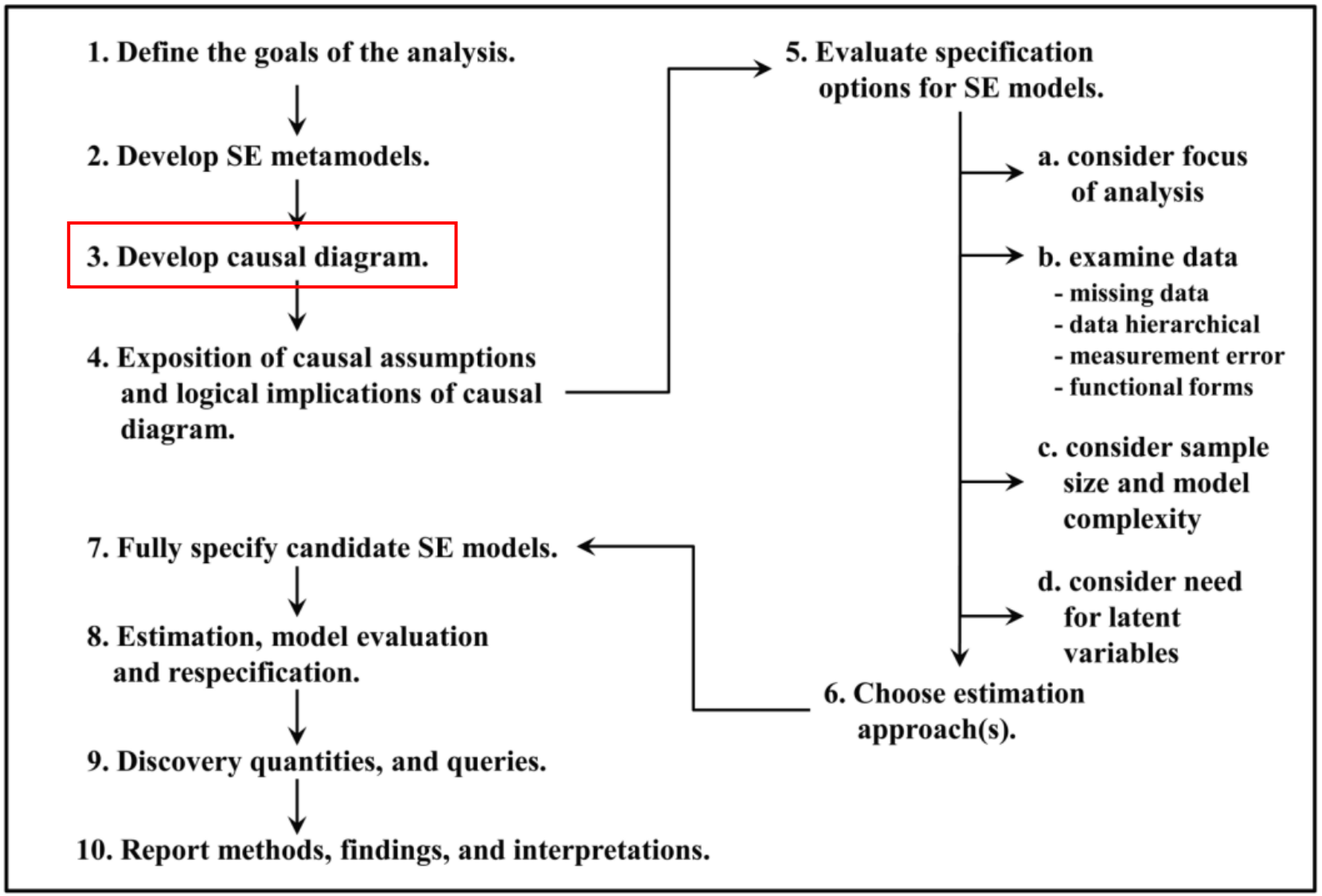
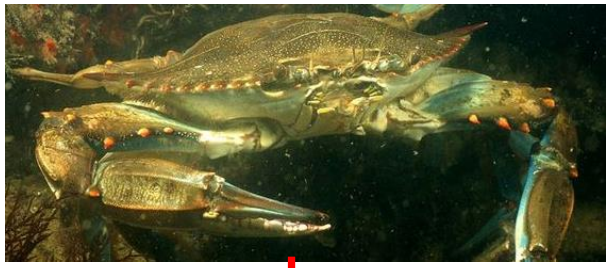
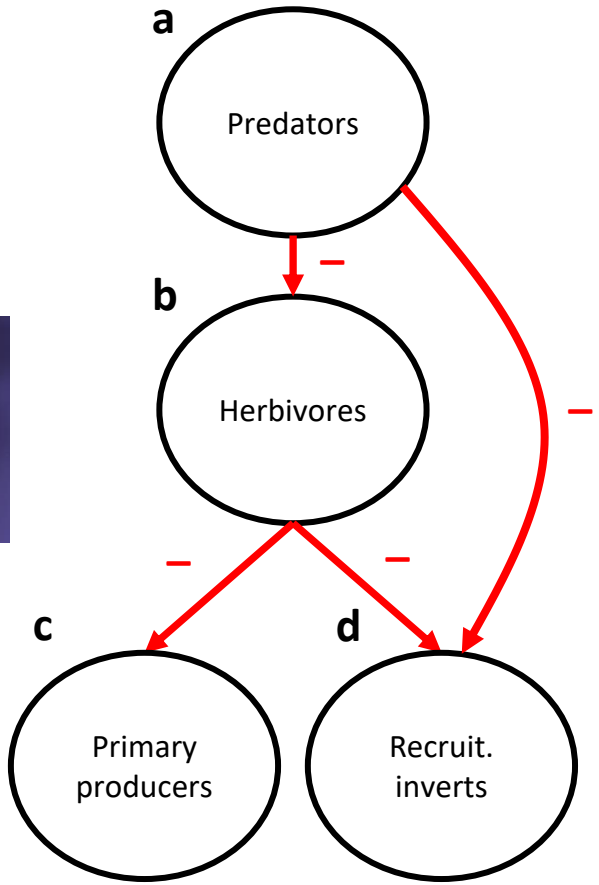


4. Model Building

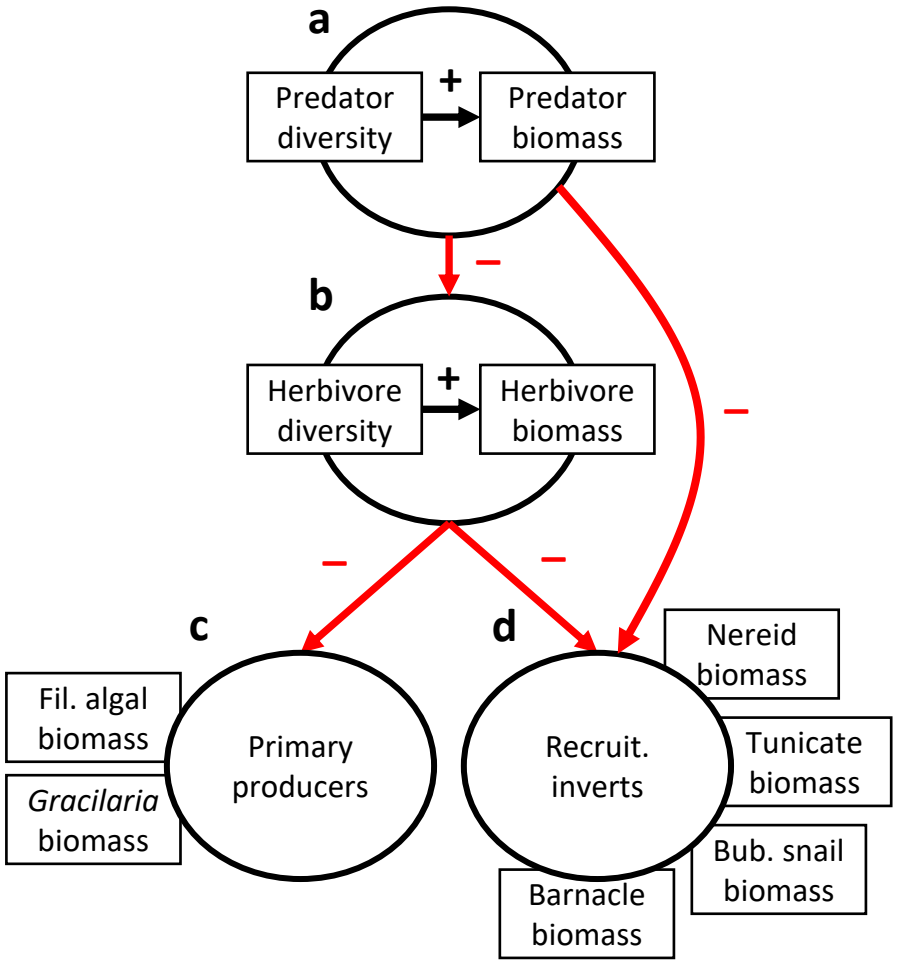


4. Model Building. Build out the meta-model

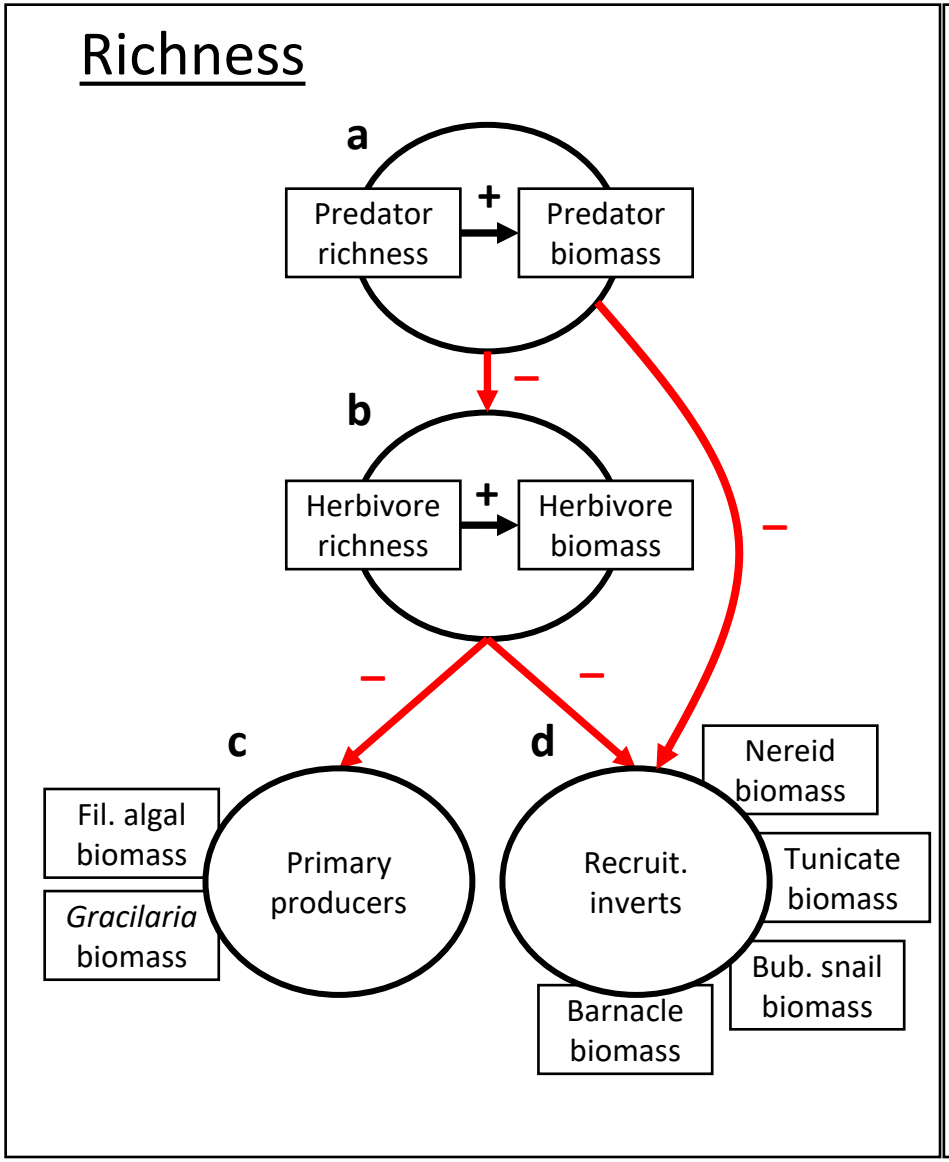


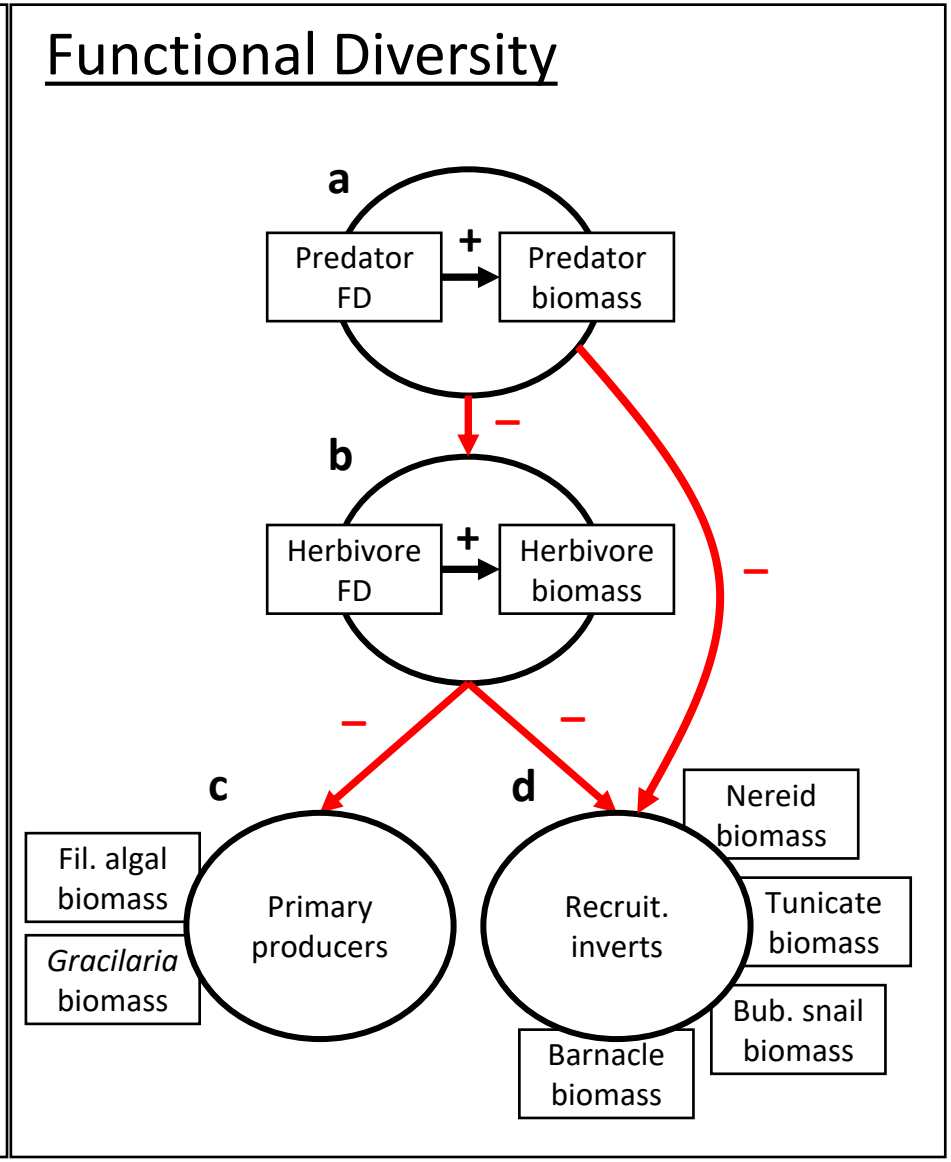


4. Model Building. Populate variables

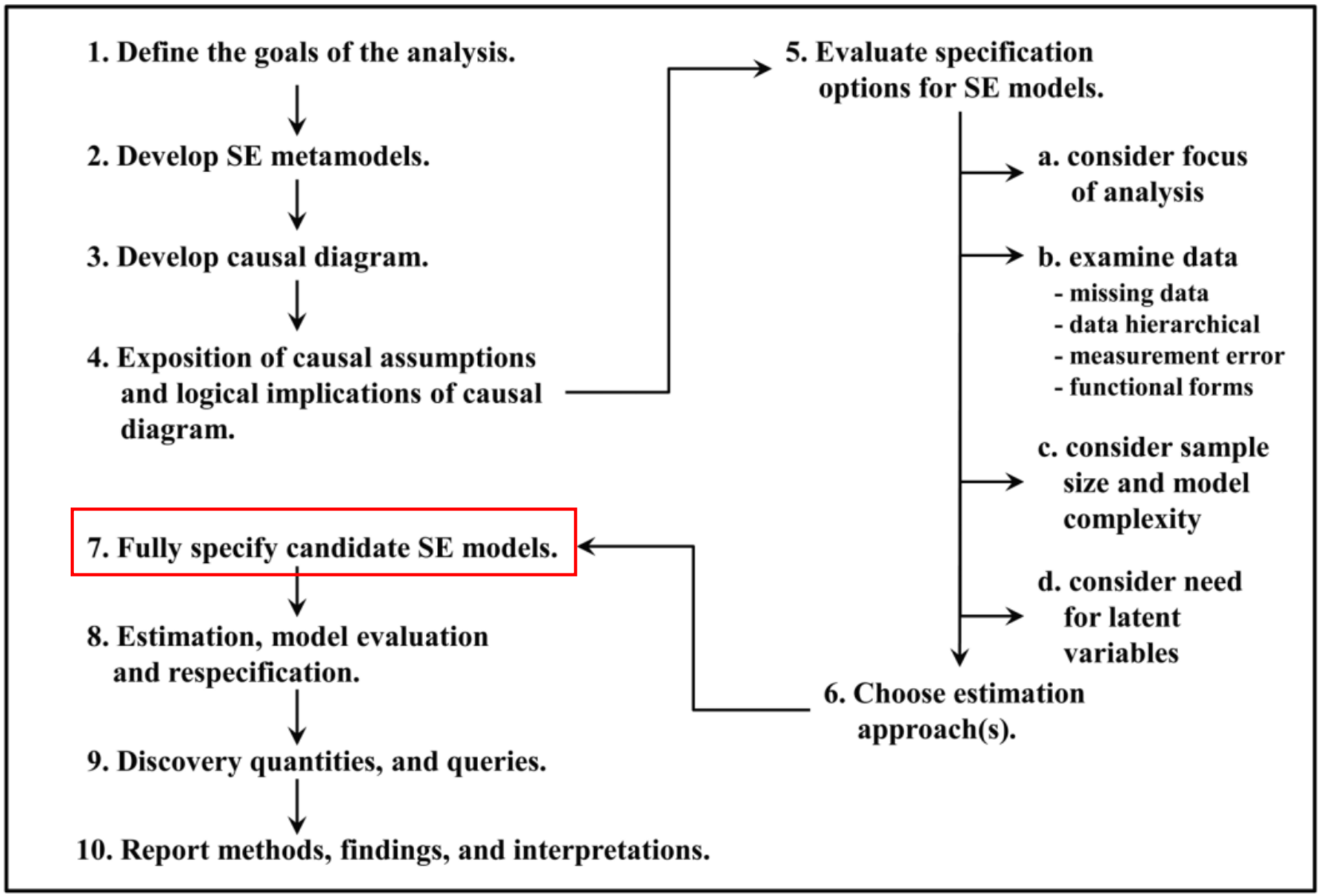


4. Model Building. Consider alternate models

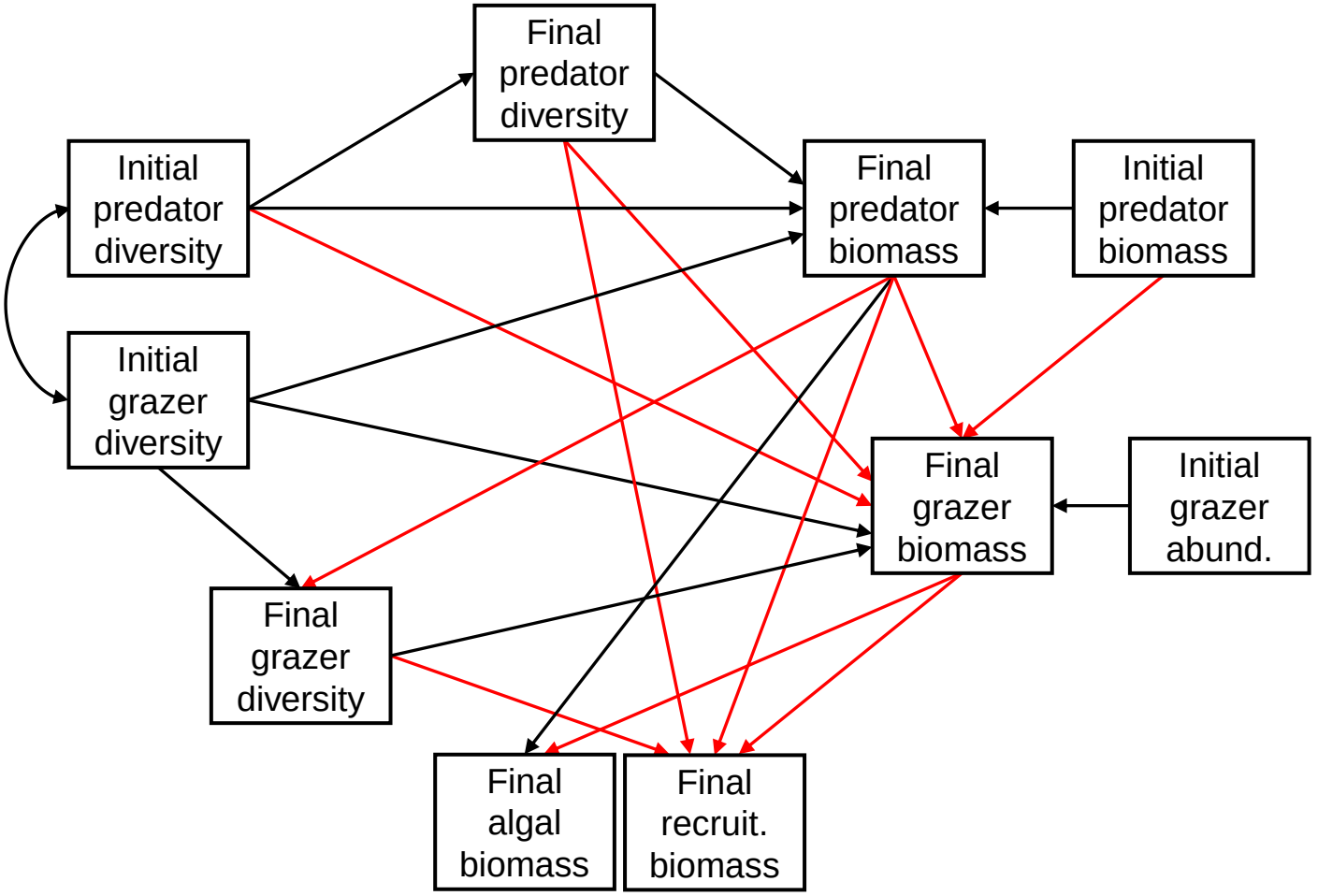




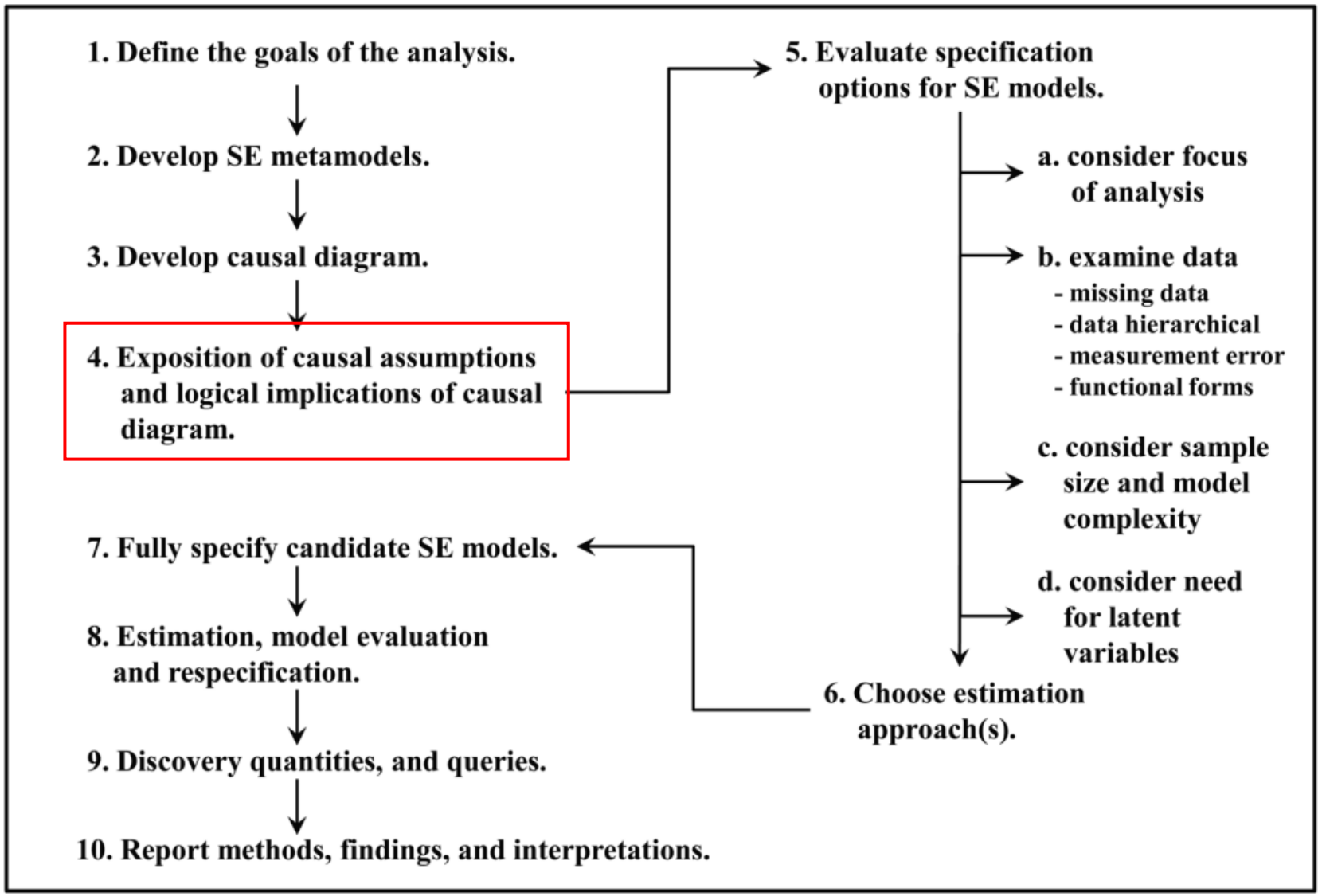
4. Model Building



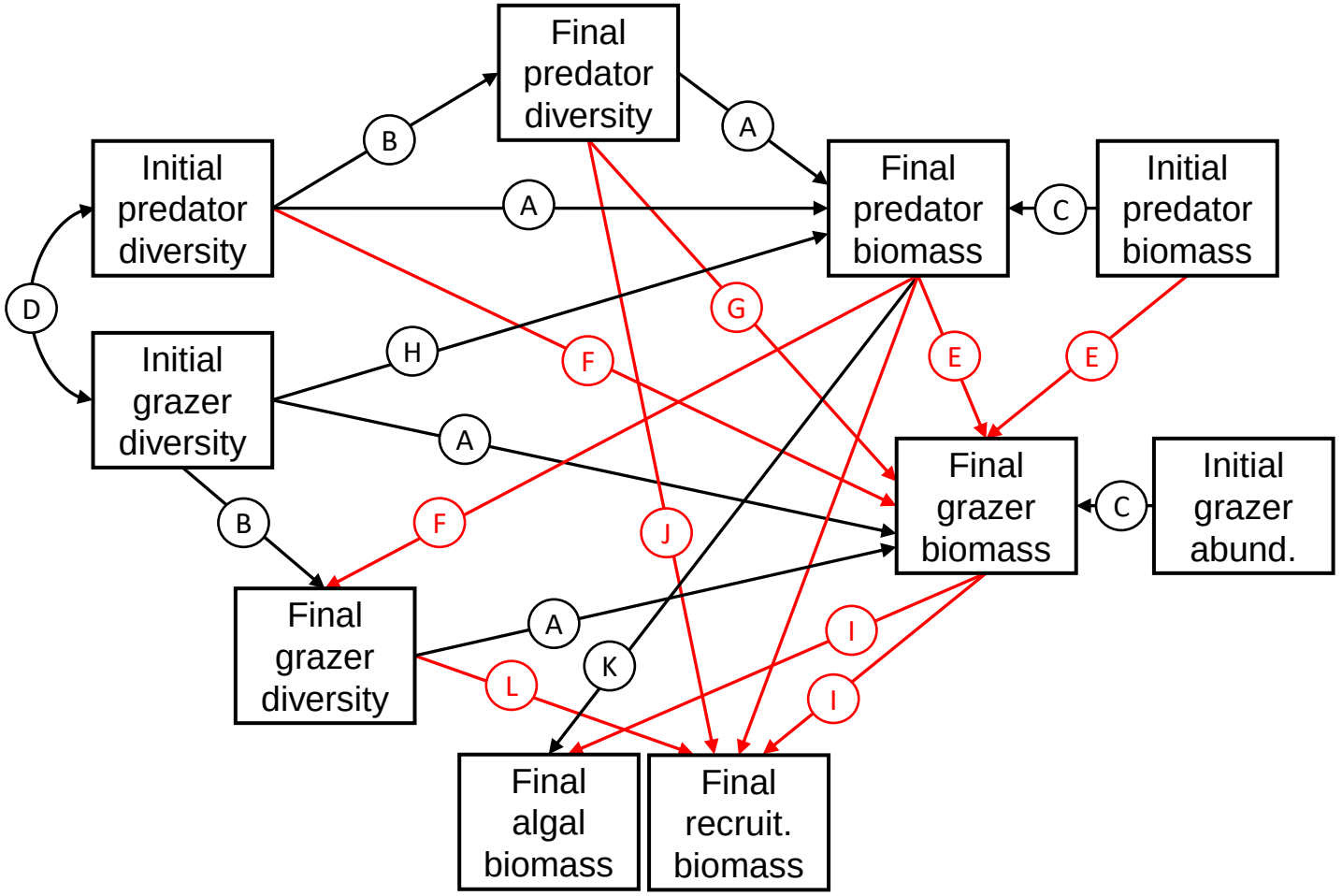
4. Model Building. Construct path model



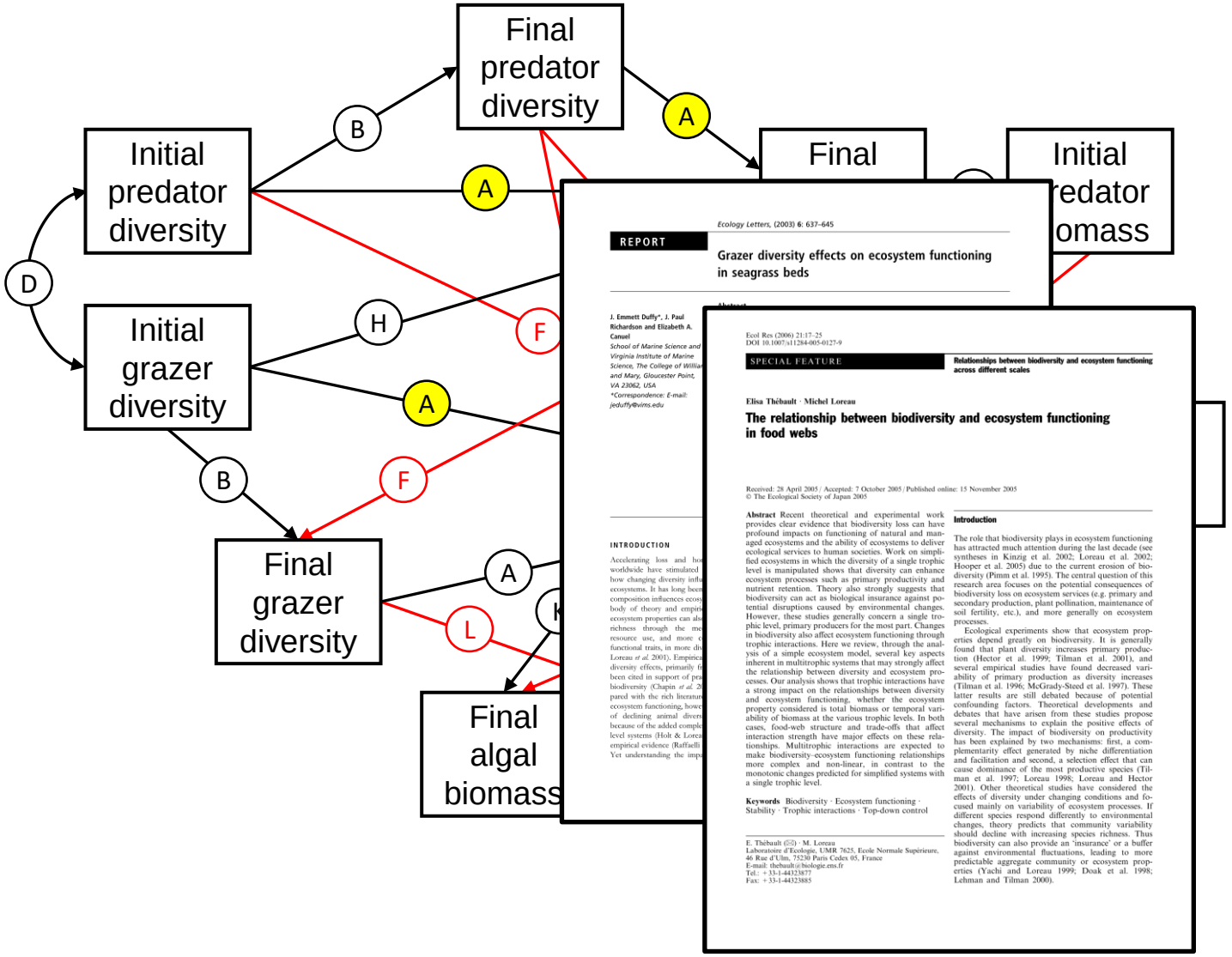
4. Model Building



4. Model Building. Construct path model



4. Model Building. Construct path model



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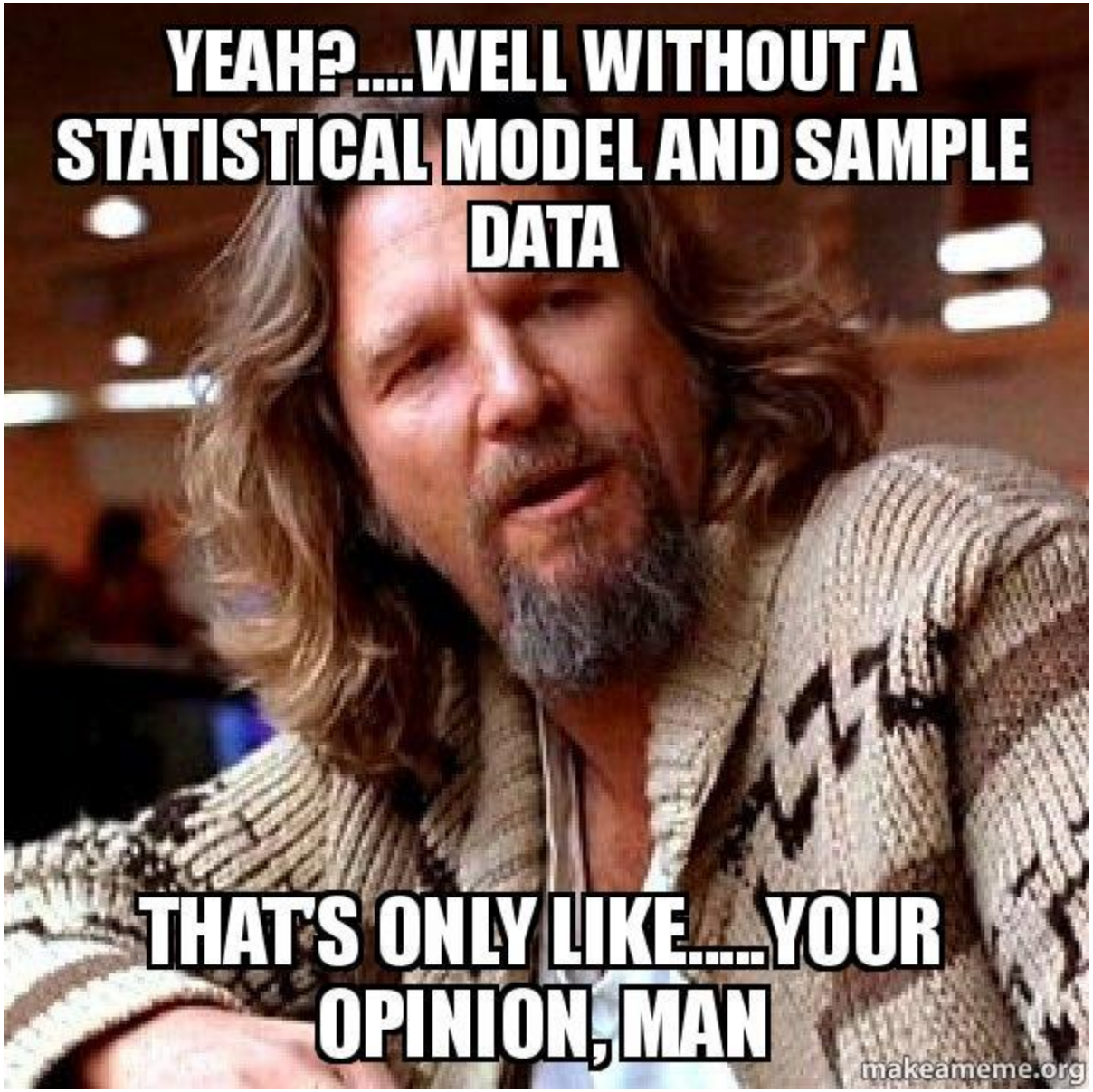
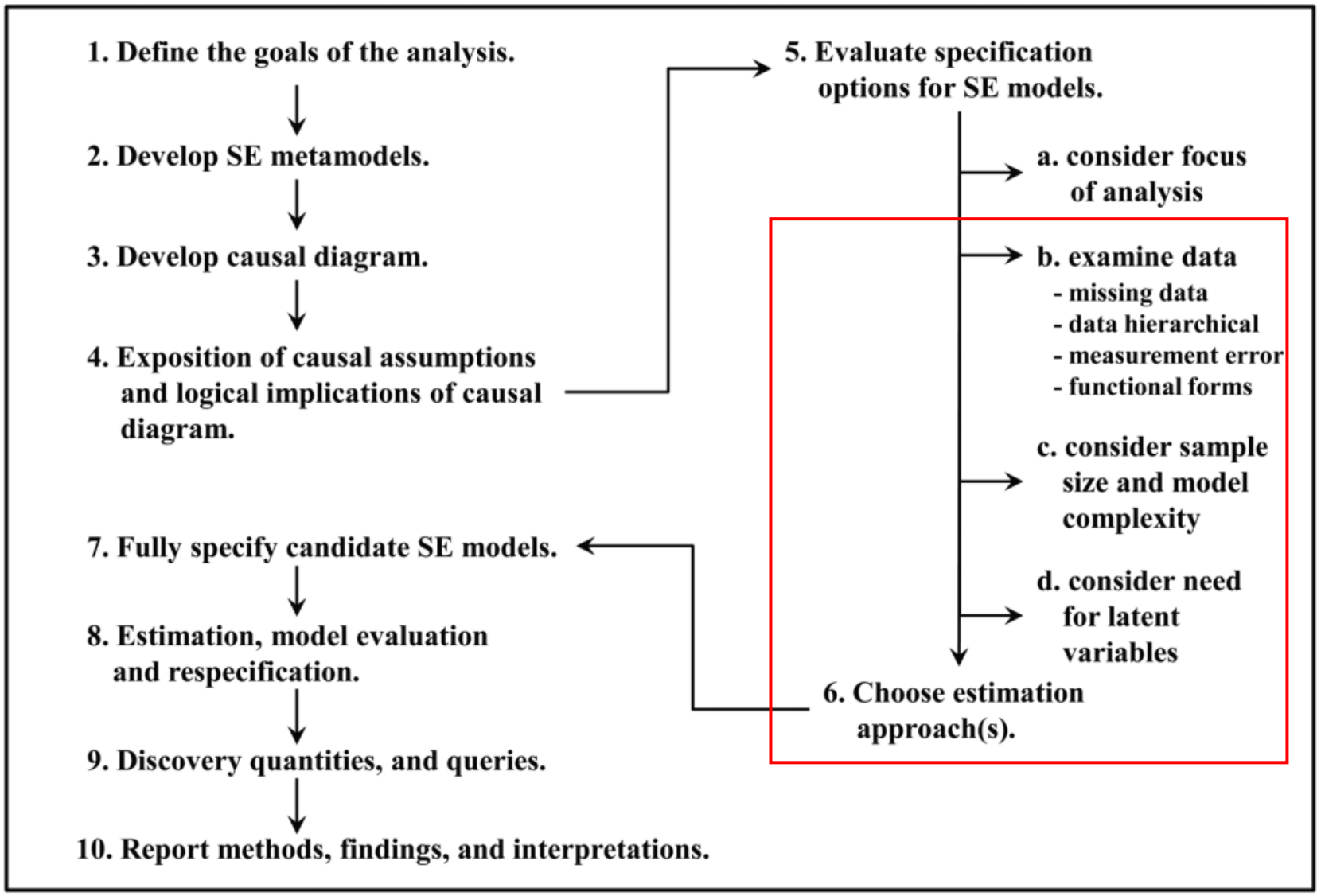
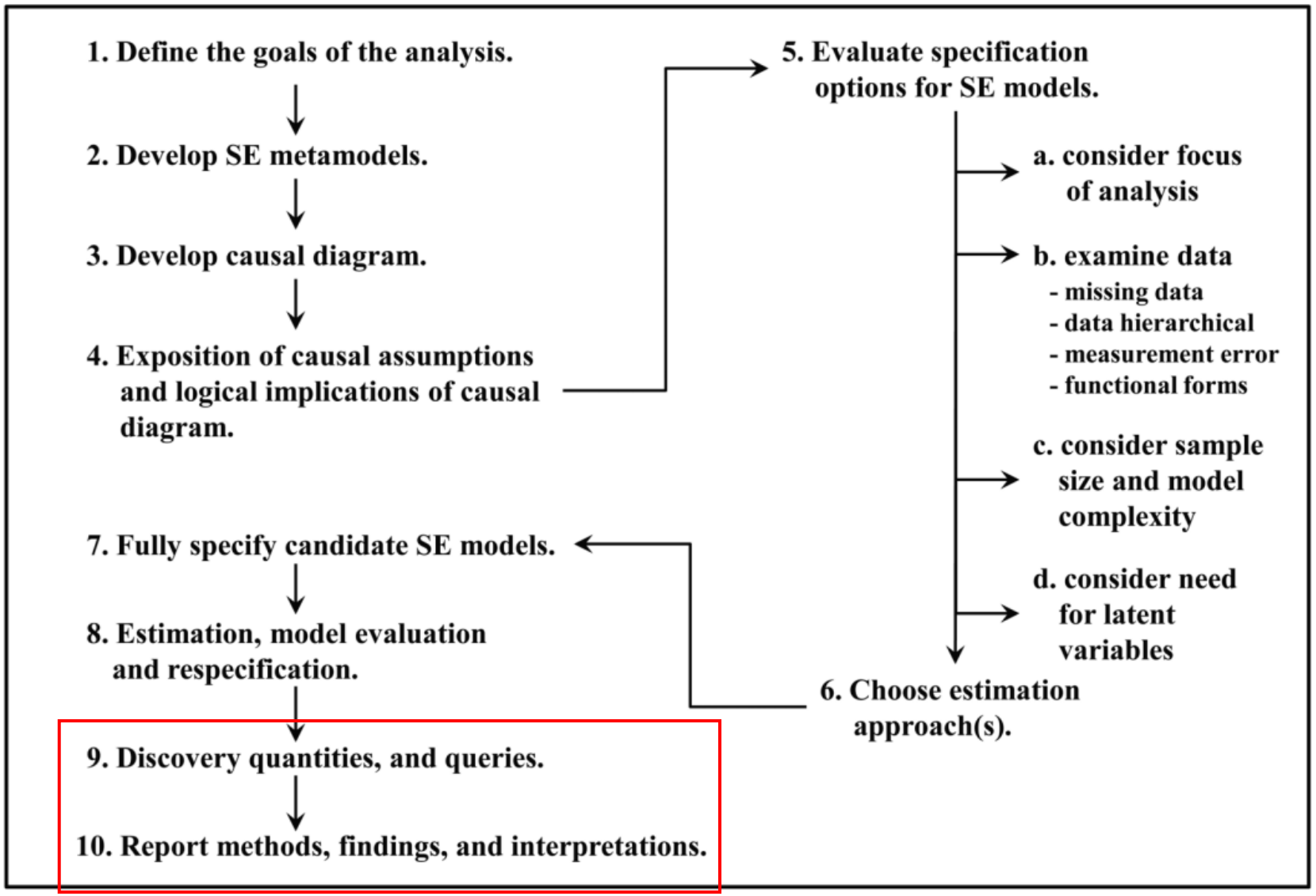


4. Model Building

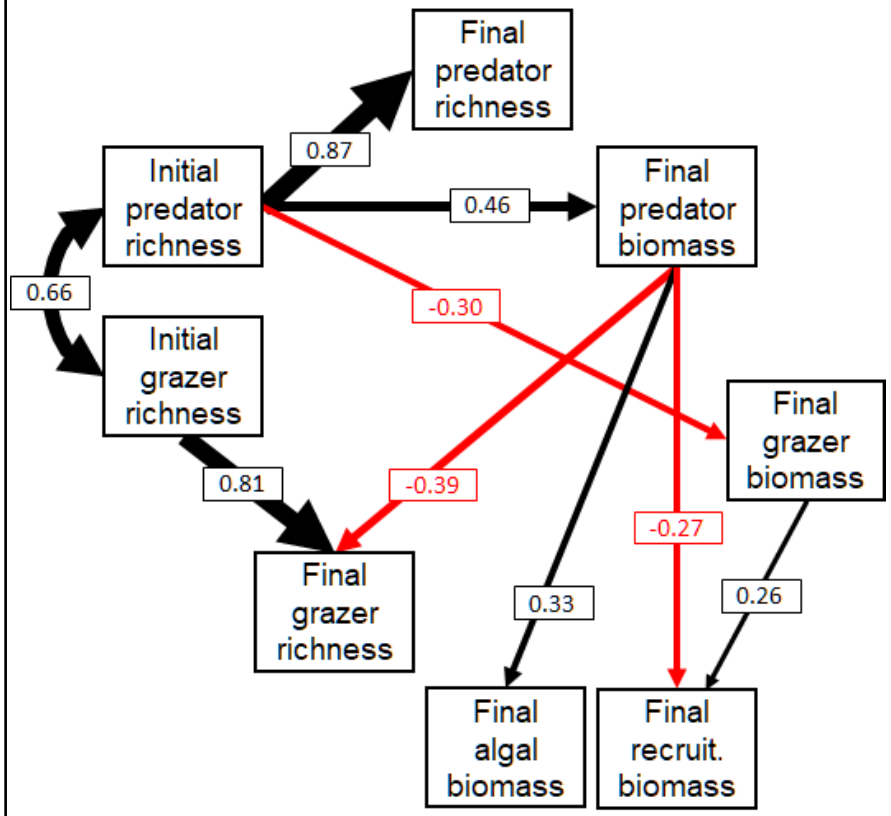


4. Model Building. Fit Model

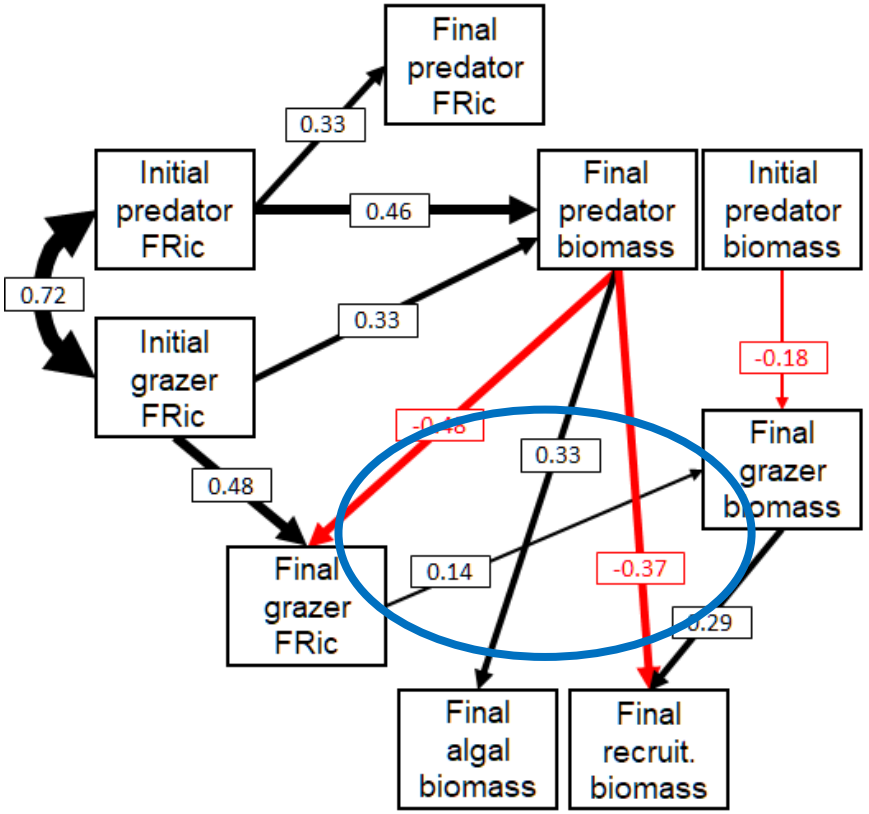


4. Model Building. Biodiversity Experiment Results

Richness



Functional Diversity



ACTIVITY

- Choose a dataset
- Come up with the meta-model
- Derive the full SEM
- Consider causal interpretations
- Write down the justification for each path
- Share!