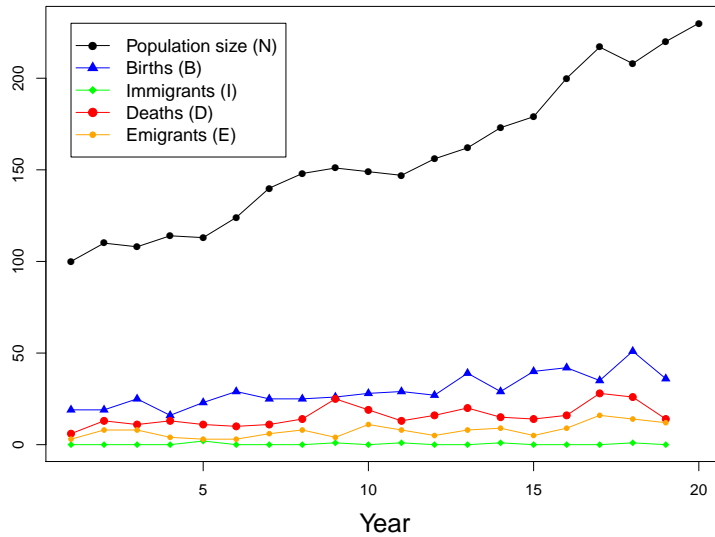


The BIDE model



- 1 DEFINITIONS
- 2 MODELING 101
- 3 BIDE
- 4 ASSIGNMENT

DEFINITIONS

Population dynamics

The study of spatial and temporal variation in population size and structure

Population

Individuals of the same species occurring in the same geographic region

Population size and structure

Size: Abundance

Structure: Distribution of individuals among age groups, sexes, habitat patches, etc. . .

MODELS AND SCIENCE

A model is an abstraction of reality that describes the relationship between two or more variables.

Models help us . . .

- Describe complex natural systems in a manageable way
- Formalize and evaluate hypotheses
- Predict future outcomes
- . . . all while accounting from uncertainty

But don't models require assumptions?

Yes.

We have to simplify, so we have to make assumptions.

We do this all the time, for example when deciding how long it will take you to get to class.



"All models are wrong, but some are useful."

G.E.P. Box (1987)

Putting the model to the test

- How well does it predict?
- Will your results hold up in court?
- Can your results be replicated/reproduced?

- **Conceptual**
- Physical
- Graphical
- **Mathematical**
- **Statistical**

$$N_{t+1} = N_t + B_t + I_t - D_t - E_t$$

- N_t : population size (state variable) at time t
- B_t : births
- I_t : immigrants
- D_t : deaths
- E_t : emigrants

$$N_{t+1} = N_t + B_t + I_t - D_t - E_t$$

As written, this model implies the following:

- B , I , D , and E are not rates, they are the number of events at time t .
- The model is **deterministic**, not **stochastic**
- Time is discrete, not continuous

In reality, things are more complicated, and interest lies in understanding the factors influencing each process.

Group exercise: Break into teams of 4-5 and create list of factors influencing B , I , D , and E .

Read the first 3 pages of Chapter 3 in Conroy and Carroll

Expect a quiz on Wednesday