The Language Organism
Lecture 1: introduction

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Computers as platforms for *modelling*

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- Key questions:

  - Why would we want to build models in linguistics?
  - Why would computers help?
  - What is a model anyway?

What is a model?

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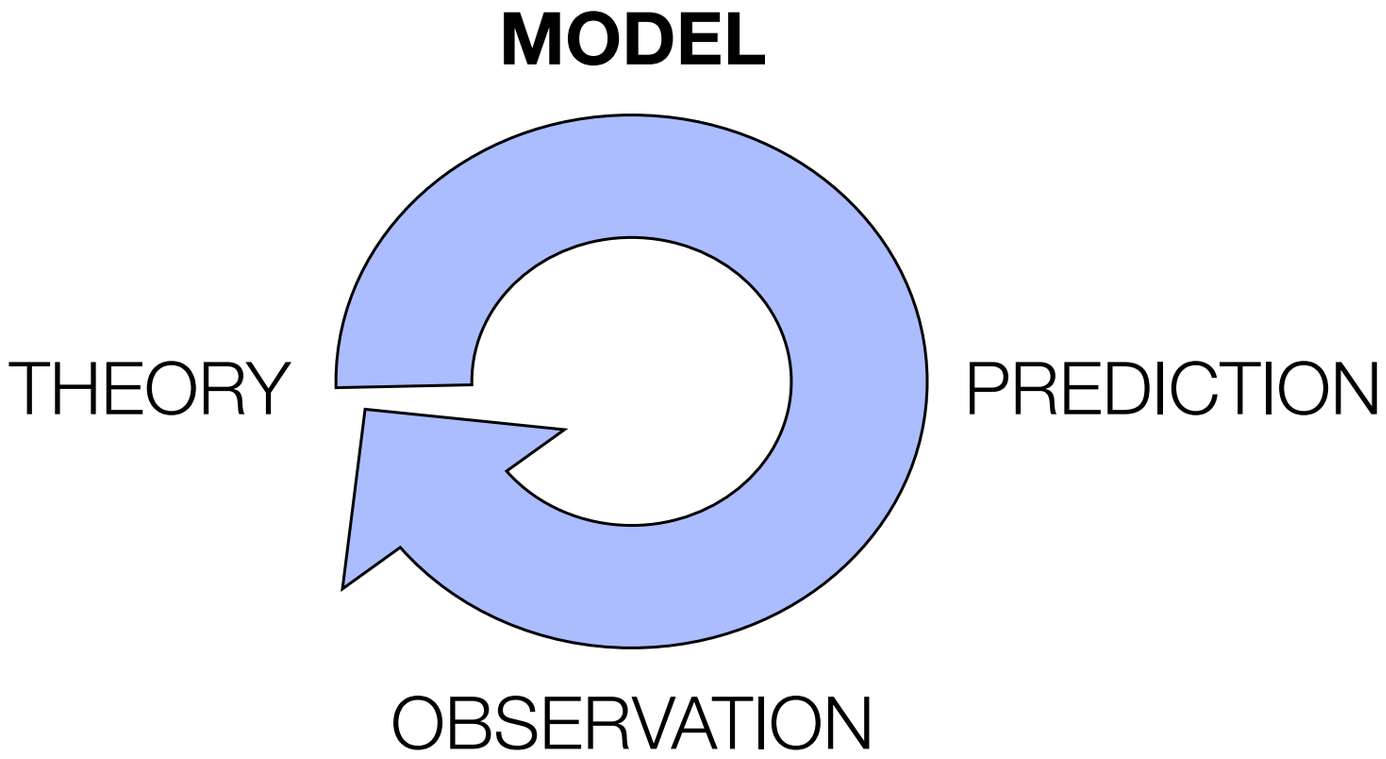
- One view:

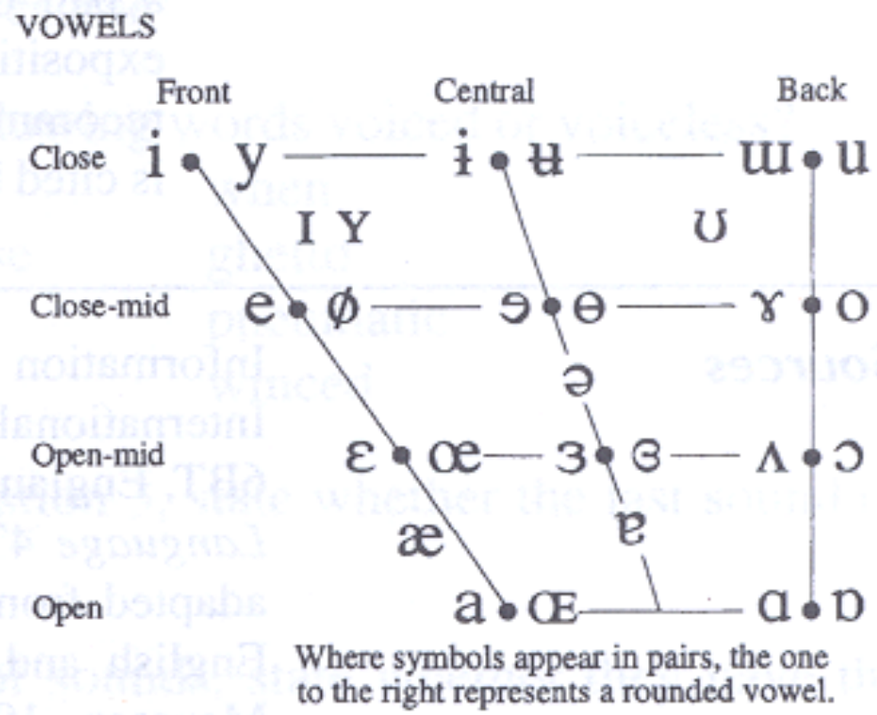


- We use models when we can't be sure what our theories predict

- Especially useful when dealing with *complex systems*

A simple example

- Vowels exist in a “space”



- Only some patterns arise cross linguistically.
  e.g. Vowel space seems to be symmetrically filled.

  Why?

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- Possible theory:
    - **Vowels tend to avoid being close to each other in order to maintain perceptual distinctiveness.**
- How do we tell if our theory is correct?

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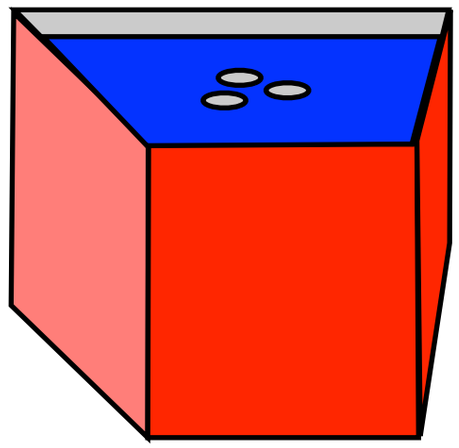

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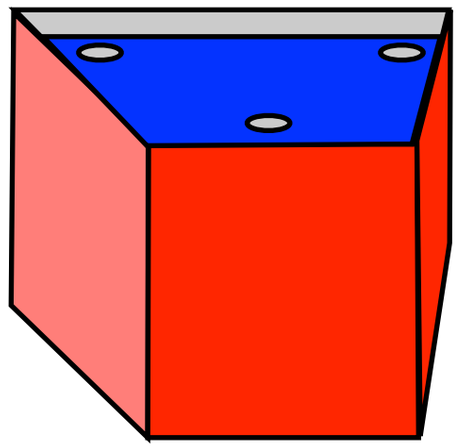

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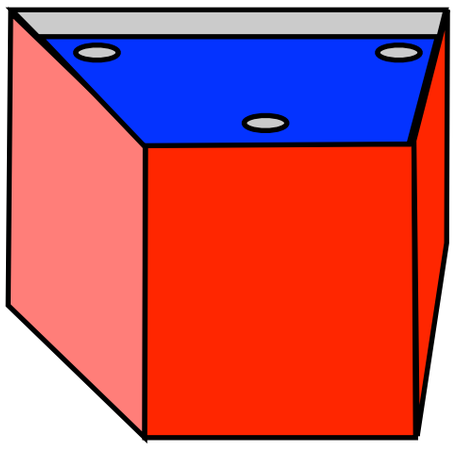

- From this model, predicted patterns can be compared with cross-linguistic data

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- One view is that the model should leave nothing out
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- If not, then where do we draw the line?
- Build your model to have as little extra in it that isn’t part of your theory.

Why use computers for modelling?

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- What if:
  - your theory is too difficult to understand simply through verbal argument, or introspection?
  - or a physical model cannot be constructed simply?
  - or a mathematical model is too difficult (or impossible) to construct?

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- Particularly difficult problems involve dynamic interactions. For example:
  - a child's knowledge changing as she responds to hearing thousands of words
  - people interacting in groups over thousands of years
  - communicating organisms evolving over millenia

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- In this course, we will be building and playing with models to tackle questions like:
  - How do innate signalling systems evolve?
  - How are vocabularies shaped by cultural evolution?
  - Where do grammatical generalisations come from?
  - What do we mean when we say language is innate?

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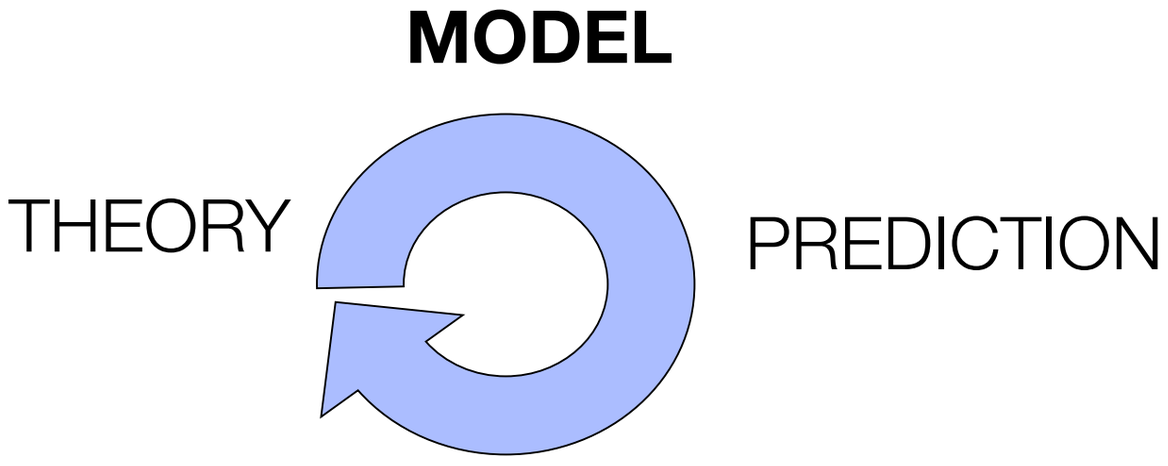

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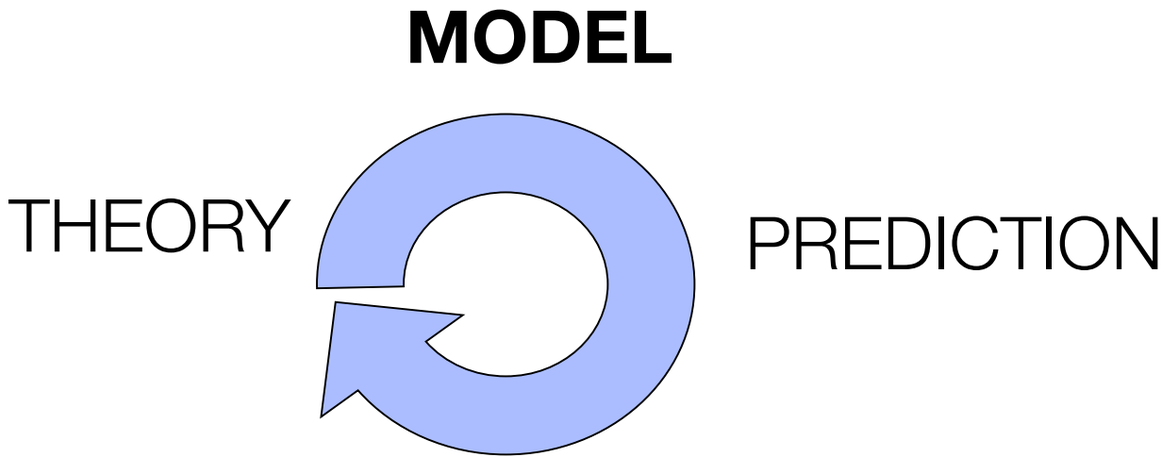

- An alternative / complementary approach: models as tools for understanding

  "Predictions are not the pinnacle of science. They are useful, especially for falsifying theories. However, predicting can't be a model's *only* purpose. ... surely the *insights* offered by a model are at least as important as its *predictions*: they help in understanding things by playing with them." (Sigmund, 1995, *Games of Life*, p. 4)

This is a **practical** course

- We will be spending a lot of our time working with simulations

- You do not need to know how to program, but you do need not to be scared of computers, and willing to try things out

- We will be working in a simplified subset of **Python**

  We will supply the code for the practicals, but you will need to modify it to carry out the tasks on the worksheets.

  This isn't a programming course: I'm not going to teach you how to program, but I will teach you just enough to understand and use some simple models we provide. You will have to meet me half way: you'll get on much better if you get your hands dirty and try things out.