Today's objectives:

- **Model building, hypothesis testing**
- **Representing speech sounds**

Background preparation:

- PP - Arabic consonants

0. Check-in: Preparation questions on Canvas

- Any **technical issues** with prep questions?
  - Accessing the “quiz” when assigned
  - Accessing scores and feedback when complete

- How to **make use of the feedback**
  - Assume you have a “Pass” (if submitted) unless the feedback tells you otherwise
  - Look at your **point score** to see how **accurate** your answers are
  - Read the **feedback comments**
  - Anything to ask about, or review?

0. Today's plan

- Phonology as science (see outline from last time)
- Building a model and testing hypotheses
- Describing sound classes, revisited
- Introducing feature theory

1. Phonology as natural science

- See outline from last class, sec 3

2. Building a model, testing hypotheses

- In scientific investigation, what is a **model**?
  - Can you think of any examples of models from various areas of science?

2. Building a model, testing hypotheses

- A model is an **abstract explanatory device** designed to **account for data**
  - ‘Abstract’ = exists in the minds of the explainers
  - Data = facts that we observe about the world
- What does having a model allow us to do?

2. Building a model, testing hypotheses

- A model is an **abstract explanatory device** designed to **account for data**
- What does having a model allow us to do?
  - **Describe** what we observe
  - **Predict** what else should happen
  - (Attempt to) **explain** why phenomena occur
- If we can get our model to be a **good match** with how the world works, we conclude that properties of the world are like properties of our model
  - We check this by **testing hypotheses**

2. Building a model, testing hypotheses

- When we propose a model, what are some of the characteristics we have to give it?
  - We propose **entities** that exist in the model
  - We propose ways in which those entities **behave** or **interact**
  - We **carefully define** those elements or entities and their relations, so that it is clear what the model allows, or requires, them to do

3. Describing sound classes, revisited

- How do US coins differ from one another? (<Wikipedia)

3. Describing sound classes, revisited

- How do US coins differ from one another? (<Wikipedia)

				
Color	copper	silver	silver	silver
Size	smallish	medium	small	large
Edge	smooth	smooth	ridged	ridged
Weight	2.5 g	5.000 g	2.268 g	5.67 g
Image/text	Lincoln	Jefferson	FDR	Washington

- How could we **find out** which of these differences are **used by humans**? → **Hypotheses**?

3. Describing sound classes, revisited

- We can ask this same question for speech sounds!
  - We can measure how segments are physically (phonetically) different from one another
  - But…
    - Which of those potential differences are **used by the mental grammar**?
    - How can we **find out**?

3. Describing sound classes, revisited

- How can we find out which differences among sounds are used by the mental grammar?
- We need evidence about…
  - **Phonological natural classes**: What properties are needed to account for classes of segments that pattern together in languages?
  - **Categories**: What properties are needed to distinguish all segments that are treated as distinct mental sound categories in languages?

3. Describing sound classes, revisited

PP: Arabic consonants

- These "groups" are **phonological natural classes**
  - That is, each group is distinguished from all the other consonants by the mental grammar

- What sound properties are used by the grammar?
  - *Hypothesis:* The traditional phonetic properties that we reviewed for the quiz are **necessary** and **sufficient** to uniquely describe each class
  - You tested this hypothesis…what did you find?

3. Describing sound classes, revisited

PP: Arabic consonants

- What we need to consider in our analysis:
  - Does the class have **shared properties**?
  - Are these shared properties **unique** to the class in question?

3. Describing sound classes, revisited

PP: Arabic consonants

- What sound properties are used by the grammar?
  - *Hypothesis:* The traditional phonetic properties that we reviewed for the quiz are **necessary** and **sufficient** to uniquely describe each class
  - You tested this hypothesis…what did you find?
- The hypothesis is not supported
  - This is not the (exact) set of consonant properties used by the mental grammar

3. Describing sound classes, revisited

Data set: Turkish

- Checking in: What information is provided in a "paradigm" data set like this?

3. Describing sound classes, revisited

Data set: Turkish

- What determines the form of the **plural suffix**?

- What determines the form of the **genitive suffix**?

3. Describing sound classes, revisited

Group discussion

Data set: Turkish

- What determines the form of the plural suffix?
  - **Two** phonological natural classes of vowels here
- What determines the form of the genitive suffix?
  - **Four** phonological natural classes of vowels here

3. Describing sound classes, revisited

Data set: Turkish

- *Hypothesis:* The traditional phonetic properties that we reviewed for the quiz are **necessary** and **sufficient** to uniquely describe each class
  - Can each class be **uniquely identified** (distinguished from all vowels not in the class)?
  - What is the **smallest number** of vowel properties we need in order to do this?

4. Feature theory: a model of sounds/classes

- **Feature theory** — part of our model of the phonological grammar
  - This is the set of phonological properties that we propose to be relevant for the mental grammar
  - Subject to revision based on new evidence!
    - Does our model's behavior match the real world well?
    - Make predictions and test hypotheses!

- For next time: Read "Phonological features" handout; practice with Arabic and Turkish (prep Qs)