

## **Today's objectives:**

- **Phonemes, allophones, environments**
- **Review of contrastive vs. complementary distribution**

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*Background preparation:*

- *Practice with features handout*

# 0. Today's plan

- Check-in on working with features (and models)
- Phonemes and allophones
  - Contrastive and complementary distribution
  - How to model these facts about the world

# 1. Check-in: Working with features (and models)

- Building a model allows us to **describe / predict / explain** facts about the world
- We **define** the **entities** in a model, and define their **behaviors** and **interactions** — this allows us to see what the model **predicts**
  - Then we can **test** these predictions on new data
- When we work with a model, we must use it according to how it is defined!
  - Otherwise, we *aren't actually testing* the model

# 1. Check-in: Working with features (and models)

- Examples...
  - If we use **[+front]** to describe a class of vowels **[i e y ø]**, are we testing our feature model?
  - Is our model, as defined, able to **distinguish** the segment classes **[p b f v θ ð]** vs. **[t d s z k g]**?
- Remember — If we apply the model incorrectly, we aren't testing its predictions!
  - Even if the model is a bad fit for the data, we need to “play by the rules of the game” (apply the model as defined) to **show** that it is a bad fit

# 1. Check-in: Working with features (and models)

- Any questions about today's prep questions?
- Feature charts (and answer key) posted for practice  
IMPORTANT:
  - Do **not** try to memorize feature charts!
  - Always think about feature values in terms of the **segment classes** they distinguish

## 2. Phonemes and allophones: Try it

### Group discussion (LING 101 review)

- Data set: [Tohono O'odham](#)

Consider the sounds [t̚ d̚ tʃ̚ dʒ̚]

- How many phonemes are there?
  - Which of these sounds are allophones of the same phoneme?
- No outside resources! 😊
    - Pool your group's knowledge to see what you can remember about how to do this

## 2. Phonemes and allophones: Try it

### Debriefing

- Data set: [Tohono O'odham](#) | [t̥̚ d̥̚ t̥̚ d̥̚]

Some key concepts

- **environment**
  - predictable or unpredictable
  - in contrast
  - complementary distribution
  - how to **group** allophones
- How can we use the highlighted points to **test** the **predictions** of our feature model?

### 3. Segment distribution — predictable?

- Some review from LING 101:
  - What is a **phoneme**? — mental sound category
  - What is an **allophone**? — surface or “phonetic” pronunciation of a sound
- Some plausible made-up examples for illustration:

*Phonemes*

/m/

/d/

*Allophones*

[m]

[d]

[r]



### 3. Segment distribution — predictable?

- Key question: Is the distribution of two sounds **predictable** or **unpredictable**?
  - How can we figure this out?
  - How does this help us test our feature model?

### 3. Segment distribution — predictable?

- Key question: Is the distribution of two sounds **predictable** or **unpredictable**?
  - How can we figure this out?
    - Is the choice between the two sounds something we can **predict** based entirely on the **environment** where they occur?
  - How does this test our feature model?
    - Does the model let us **describe** the crucial environment?
  - Try it for [Tohono O'odham](#) | [t̥̚ d̥̚ t̥̚ d̥̚]

### 3. Segment distribution — predictable?

- Terminology
  - **Contrastive** distribution
  - **Complementary** distribution
- How do these terms match up with...
  - phoneme vs. allophone?
  - predictable vs. unpredictable distribution?

### 3. Segment distribution — predictable?

- Terminology
  - **Contrastive** distribution
    - Sounds are in *contrast*; (near-)minimal pairs
  - **Complementary** distribution
    - Environments are *complements* (as in sets)
- How do these terms match up with...
  - phoneme vs. allophone?
  - predictable vs. unpredictable distribution?
- For more review of these key LING 101 concepts, see handout “Determining the distribution of segments in a language”

### 3. Segment distribution — predictable?

- Key question: Is the distribution of two sounds **predictable** or **unpredictable**?
  - Why does this matter?

### 3. Segment distribution — predictable?

- Key question: Is the distribution of two sounds **predictable** or **unpredictable**?
  - Why does this matter?
- Should our **model** of the phonology of a language propose that a **predictable** pattern is...
  - stored in the mental lexicon?
  - produced by the phonological grammar?

**Why?** (And how could we **test** this prediction?)

## 4. Modeling segment distribution

- When the distribution of two sounds [X] and [Y] in a language is **predictable** (and productive) ...

...we propose that the **grammar** determines whether [X] or [Y] appears in any given surface form

- [X] and [Y] differ phonetically and featurally
- But they belong to the **same phoneme** (mental/cognitive sound category)

*Phoneme*      /(?)/      (← How do we decide this? Later!)

*Allophones*    [X]    [Y]

```
graph TD; A["/(?)/"] --- B["[X]"]; A --- C["[Y]"]
```

## 4. Modeling segment distribution

- **How** does the grammar enforce the predictable distribution of allophones?
  - This is a topic we will continue to develop in the next unit of the course
  - But the **environments** where the allophones occur will be a key part of our analysis
- For now, we can focus on
  - **Identifying** the crucial environments
  - Using our feature model to **describe** them
  - Examples: Tohono O'odham, Scottish English



## 5. Multiple allophone pairs

- How do we pair up allophones when multiple phonemes show the same pattern?
  - Try it for [Tohono O'odham](#) | [t̚ d̚ tʃ̚ d̚ʒ̚]

## 5. Multiple allophone pairs

- How do we pair up allophones when multiple phonemes show the same pattern?
  - Try it for [Tohono O'odham](#) | [t̥̚ d̥̚ t̥̚ d̥̚]
- Consider each pairing hypothesis
  - Which hypothesis is **more insightfully expressed** in our **feature model**?
  - Does this choice seem plausible or insightful to you? (Why?)