

Today's topics:

- **Review allophone distribution**
- **Review rules for allophones**
- **Begin proposing OT constraints for allophone patterns**

Background preparation:

- *Data set: Greek*

0. Today's objectives

After today's class, you should be able to:

- Determine whether two segments in a language belong to separate phonemes, or are allophones of a single phoneme
- Understand and explain the patterns of distribution in the Greek data set for [k c ç x] — what phonological factors matter?
- Model allophones in rule-based phonology
- Propose some OT constraints for segt. distribution

1. Review: Phonemes, allophones, distribution

- Some review from LING 101 and LING 200/Unit 2:
 - What is a **phoneme**?
 - What is an **allophone**?
- Some plausible made-up examples for illustration:

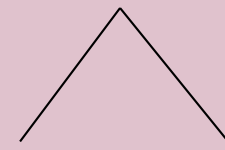
???

/m/

/d/

???

[m]



[d]

[r]

1. Review: Phonemes, allophones, distribution

- Some review from LING 101 and LING 200/Unit 2:
 - 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]

1. Review: Phonemes, allophones, distribution

- How can we tell if two segments in a data set...
 - belong to two **separate phonemes**
or
 - are **allophones** of the same phoneme
?

1. Review: Phonemes, allophones, distribution

A) What do we conclude if the two segments...

- **never** appear in the **same environment**?
- **can** appear in the **same environment**?

B) What do we conclude if there are **minimal pairs** for the two segments?

1. Review: Phonemes, allophones, distribution

A) What do we conclude if the two segments...

- **never** appear in the **same environment**?
- **can** appear in the **same environment**?

- **The key to understanding question (A) is to understand how it relates to question (B)!**

B) What do we conclude if there are **minimal pairs** for the two segments?

1. Review: Phonemes, allophones, distribution

- Key question: Is the distribution of two segments **predictable** or **unpredictable**?

Namely, if we **know the environment**, can we **predict** which of the two segments will appear?

- What is the answer if there are **minimal pairs**?
- What is the answer if the two segments **can** appear in the **same environment**?
- What is the answer if the two segments **never** appear in the **same environment**?

1. Review: Phonemes, allophones, distribution

- Why does it matter whether the distribution of two segments is **predictable** or **unpredictable**?

- When the distribution is _____,
the only possibility is that speakers memorize it
- When the distribution is _____,
the mental grammar can enforce it
systematically

1. Review: Phonemes, allophones, distribution

- Why does it matter whether the distribution of two segments is **predictable** or **unpredictable**?
 - When the distribution is **unpredictable**, the only possibility is that speakers memorize it
 - When the distribution is **predictable**, the **mental grammar** can **enforce** it systematically
 - Assuming we can show that the pattern is **productive** = extended to new situations!

1. Review: Phonemes, allophones, distribution

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

1. Review: Phonemes, allophones, distribution

- 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 concepts, see Unit 2 handout “Determining the distribution of segments in a language”

2. Determining segment distribution

Data set: [Greek](#) | [k], [x], [c], [ç]

- What are the facts in this data set?
 - In what **environments** do these sounds occur?
 - Which sounds are in **unpredictable** (contrastive) vs. **predictable** (complementary) distribution?
- Note: This pattern is not about syllable structure

2. Determining segment distribution

Data set: [Greek](#) | [k], [x], [c], [ç]

- In what **environments** do these sounds occur?

2. Determining segment distribution

Data set: [Greek](#) | [k], [x], [c], [ç]

- In what **environments** do these sounds occur?
 - The palatals [c], [ç] occur only __[-bk]
 - The velars [k], [x] occur __[+bk] *and* __[+cons]
- Which sounds are in **unpredictable** (contrastive) vs. **predictable** (complementary) distribution?

2. Determining segment distribution

Data set: [Greek](#) | [k], [x], [c], [ç]

- In what **environments** do these sounds occur?
 - The palatals [c], [ç] occur only __[-bk]
 - The velars [k], [x] occur __[+bk] *and* __[+cons]
- Which sounds are in **contrastive** (unpredictable) vs. **complementary** (predictable) distribution?
 - Contrastive: [k] vs. [x]; [c] vs. [ç]
 - Complementary: [k] and [c]; [x] and [ç]

Generalizations:

2. Determining segment distribution

Data set: [Greek](#) | [k], [x], [c], [ç]

- In what **environments** do these sounds occur?
 - The palatals [c], [ç] occur only __[-bk]
 - The velars [k], [x] occur __[+bk] *and* __[+cons]
- Which sounds are in **unpredictable** (contrastive) vs. **predictable** (complementary) distribution?
 - Velars and palatals are in **predictable** (complementary) distribution
 - Dorsal stops **contrast** with dorsal fricatives (stop vs. fricative is unpredictable)

3. 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)



3. Modeling segment distribution

- **How** does the grammar **enforce** the predictable distribution of allophones?
 - We need a means for the grammar to **make adjustments** to a phoneme's surface form depending on the **environment**
 - In a **rule-based** model, we do this by ...
 - In **OT**, we do this by ...

3. Modeling segment distribution

- **How** does the grammar **enforce** the predictable distribution of allophones?
 - We need a means for the grammar to **make adjustments** to a phoneme's surface form depending on the **environment**
 - In a **rule-based** model, we do this by proposing a **rule to change features** in some environment
 - In **OT**, we do this by determining the **constraint ranking** that makes the appropriate output **win**

4. Modeling allophone distribution: Rules

Data set: [Greek](#) | [k], [x], [c], [ç]

- In what **environments** do these sounds occur?
 - The palatals [c], [ç] occur only $_[-bk]$
 - The velars [k], [x] occur $_[+bk]$ *and* $_[+cons]$
- Which are the “**elsewhere**”/default allophones?

4. Modeling allophone distribution: Rules

Data set: [Greek](#) | [k], [x], [c], [ç]

- In what **environments** do these sounds occur?
 - The palatals [c], [ç] occur only $_\text{[-bk]}$
 - The velars [k], [x] occur $_\text{[+bk]}$ *and* $_\text{[+cons]}$
 - Which are the “**elsewhere**”/default allophones?
 - The velars [k], [x] have no single, easily statable environment
- If we were doing rule-based phonology, what **rule** would we write for this pattern?

4. Modeling allophone distribution: Rules

Data set: [Greek](#) | [k], [x], [c], [ç]

- In what **environments** do these sounds occur?
 - The palatals [c], [ç] occur only __[-bk]
 - The velars [k], [x] occur elsewhere
- If we were doing rule-based phonology, what **rule** would we write for this pattern?
 - Remember: palatals are [COR, DORS] in our model

$$\left[\begin{array}{c} \text{DORS} \\ \text{-son} \end{array} \right] \rightarrow [\text{COR}] / _ _ [-bk]$$

4. Modeling allophone distribution: Rules

Data set: [Greek](#) | [k], [x], [c], [ç]

- What analysis would our rule-based model give for...

[ceri] 'candle' [kori] 'daughter'

- What is the UR?
- What rule applies, and what is the result?

5. Modeling allophone distribution: OT (part 1)

Data set: [Greek](#) | [k], [x], [c], [ç]

- But our current model of the phonological grammar **does not include rules!**
- What do we need in order to model allophone (predictable) distribution in terms of **OT?**

5. Modeling allophone distribution: OT (part 1)

Data set: [Greek](#) | [k], [x], [c], [ç]

- What do we need in order to model allophone (predictable) distribution in terms of **OT**?
 - What is a word from the data set that you would propose *doesn't* look like its UR?
 - What constraint does the winner violate?
 - What is the most important useful loser (for allophone distribution)?
 - What factor makes this competitor lose? Can you use it to propose a constraint?

6. For next time

- We will **formalize** the constraints from this last discussion in an upcoming class
- But — Before we return to a full OT analysis of allophones in complementary (predictable) distribution, we need to discuss another key idea:
 - *How do we make an OT grammar **enforce predictable information**?*
- The prep questions for next time go back to syllable structure in order to look at this question