Objectives:

- **Analyze complementary distribution in OT**
- **Implications: Predictablility and 'Richness of the Base'**

Background preparation:

- *Data set: Greek*

0. Today's plan

- Checking in / past material & from Tuesday's class
  - The OT principle of 'richness of the base'
  - Greek allophones: Environments and traditional approach to UR

- Predictable distribution (allophones) in OT
  - Context-specific allophones
  - Constraints for featural faithfulness and context-specific markedness
  - Default allophones and relevant constraints

- Preview: Factorial typology of segment distribution

1. Checking in

- How do we test **typological predictions** in OT?

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    - **Factorial typology** =

      Consider all possible rankings of the constraints at hand: are the language patterns plausible?

- How do we make a language's grammar robust enough to **enforce predictable information**?

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- How do we test **typological predictions** in OT?

  - **Factorial typology** =

    Consider all possible rankings of the constraints at hand: are the language patterns plausible?

- How do we make a language's grammar robust enough to **enforce predictable information**?

  - **Richness of the base** =

    Test the grammar against hypothetical inputs that represent structures judged ungrammatical in the language; are they dealt with?

- Data set: Greek

    - Which allophones are we taking to be the UR of each of the two phonemes, and why?

    - What does it mean to find a word in the data set whose surface form is not the same as its UR?

    - What do we conclude from comparing [xufta] and [kufeta]?

1. Checking in

- Any other questions about the material from Tuesday (or other recent topics)?

Concepts behind predictable distribution in OT

- Find a **surface form** that **differs** from (what we would traditionally propose as) its UR

    - Propose and define a constraint that this surface form is **violating**, *by being different* from its UR

- The **faithful candidate** is an informative loser

    - Propose and define a constraint that makes this candidate **lose** — based on your understanding of *what matters in this allophone pattern*

- There is **one more** crucial case to analyze…

2. Predictable distribution in OT

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]

- In rule-based phonology, what rule would we write?

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$$\begin{bmatrix} \text{DORS} \\ \text{–son} \end{bmatrix} \rightarrow [\ \text{COR}\ ] / \underline{\quad} [\text{–bk}]$$

- Which are the... **default** allophones?
  context-specific allophones?

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  context-specific allophones? [c ç]

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Data set: Greek | [k], [x], [c], [ç]

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Data set: Greek | [k], [x], [c], [ç]

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    - If the "elsewhere allophone" is the UR, what's a surface form that *differs* from its UR?

      Example: **[ceri]** 'candle' — UR would be **/keri/**

3. Context-specific allophones

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

- Find a **surface form** that **differs** from (what we would propose as) its UR | **[ceri]** 'candle', **/keri/**

  - Here we see a **context-specific allophone**

- How did the grammar produce context-specific allophones in our rule-based model?

3. Context-specific allophones

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

- Find a **surface form** that **differs** from (what we would propose as) its UR | **[ceri]** 'candle', **/keri/**

  - Here we see a **context-specific allophone**

- How did the grammar produce context-specific allophones in our rule-based model?

  - It was precisely the job of the rules to produce the context-specific allophones in the appropriate context

- What will the OT approach look like?

3. Context-specific allophones

Data set: Greek | [k], [x], [c], [ç]

- Find a **surface form** that **differs** from (what we would propose as) its UR | **[ceri]** 'candle', **/keri/**

Group discussion

- Propose and define a constraint that this surface form is **violating**, *by being different* from its UR
  - Make the definition **formal** by referring to entities in our phonological model

Data set: [Greek](#) | /keri/ → [ceri] 'candle'

Debriefing

- Propose and define a constraint that this surface form is **violating**, ***by being different*** from its UR

    - What's different? | [c] (palatal) vs. [k] (velar)

    - How is this difference **represented** in our mental grammar?

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    - How is this difference **represented** in our mental grammar? | [c] has [COR]; [k] does not

    - What **kind** of constraint would assign * for this?

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  - What **kind** of constraint would assign * for this?
    - A **faithfulness** constraint

4. Featural faithfulness: IDENT[*F*] constraints

Data set: [Greek]() | /keri/ → [ceri] 'candle'

- We can define **faithfulness constraints** that penalize **changes in feature values**

  - These are called IDENT[*F*] constraints ("Identity")
  - There is one for each feature [*F*] in the model

  IDENT[COR]:   Assign one * for any output segment that differs from its corresponding input segment with respect to [CORONAL]

Data set: **Greek** | /keri/ → [ceri] 'candle'

- The **faithful candidate** as informative loser (*[keri])

/keri/ 'candle'	IDENT[COR]
→ (a) [ceri]	*
(b) [keri]	L

- The winner violates a constraint
- The faithful candidate didn't win — why not? (What's our next step in the analysis?)

Data set: <u>Greek</u> | /keri/ → [ceri] 'candle'

/keri/ 'candle'	??		IDENT[COR]	
→ (a) [ceri]			*	
(b) [keri]	*	W		L

Group discussion

- Propose and define a constraint that makes this candidate **lose** (by preferring the winner)
- Base this constraint on your understanding of **what matters in this allophone pattern**

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Data set: <u>Greek</u> | /keri/ → [ceri] 'candle'

Debriefing

- Propose and define a constraint that makes this candidate **lose** (by preferring the winner)
- Base this constraint on your understanding of ***what matters in this allophone pattern***

- What is "wrong" with *[keri]?

  - It has a velar obstruent before a front vowel
  - > This is what our new constraint needs to assign a violation for

5. Preferring the context-specific allophone

Data set: Greek | /keri/ → [ceri] 'candle'

- What is "wrong" with *[keri]?

  - It has a velar obstruent before a front vowel

- In general: When we have complementary distribution, we can define a **markedness constraint** that captures what is "wrong" with the **default allophone** in the **specific environment**

  NoVELAR+FRONTVOWEL: Assign one * for any sequence of segments [DORS] [–bk] in which the [DORS] segment is not also [COR]

Data set: Greek | /keri/ → [ceri] 'candle'

- What is "wrong" with *[keri]?

  - It has a velar obstruent before a front vowel

/keri/ 'candle'	NoVELAR+FRV	IDENT[COR]
→ (a) [ceri]		*
(b) [keri]	* W	L

- This tableau picks [ceri] over *[keri] for input /keri/

- How are IDENT[COR], NoVELAR+FRONTVOWEL ranked? Why?

6. Preferring the default allophone

Data set: Greek

- We're not actually finished with this analysis yet!

  (Here is where it gets particularly interesting…)

- If [k] and [c] are in **predictable** (complementary) distribution in a language, with [c] before [–bk] and [k] elsewhere, which of these are **grammatical**?

    [ke]   [ka]   [ce]   [ca]

Data set: Greek

- If [k] and [c] are in **predictable** (complementary) distribution in a language, with [c] before [–bk] and [k] elsewhere, which of these are **grammatical**?

  * *[ke]*   **[ka]**   **[ce]**   *[ca]*

- Which of these are **predicted** by our grammar to be grammatical?

  - How can we investigate this?

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6. Preferring the default allophone

Data set: Greek

- Which of these should be **grammatical**?

  * [ke]   **[ka]**   **[ce]**   **[ca]*

- Which of these are **allowed** by our grammar?

/ke/	N$_{O}$V$_{ELAR}$+F$_{R}$V	I$_{DENT}$[$_{COR}$]
→ (a) [ce]		*
(b) [ke]	*!	

-   *[ke] is correctly avoided: /ke/ surfaces as [ce]

Data set: Greek

- Which of these should be **grammatical**?

  * *[ke]*　　　**[ka]**　　　**[ce]**　　　*[ca]*

- Which of these are **allowed** by our grammar?

/ka/	NoVelar+FrV	Ident[cor]
→ (a)　[ka]		
(b)　[ca]		*!

- [ka] wins, as desired, without turning into *[ca]

Data set: Greek

- Which of these should be **grammatical**?

  * *[ke]*   **[ka]**   **[ce]**   *[ca]*

- Which of these are **allowed** by our grammar?

  - We know that [ce] is allowed because /ke/→[ce]

Data set: Greek

- Which of these should be **grammatical**?

  * *[ke]*   **[ka]**   **[ce]**   *[ca]*

- Which of these are **allowed** by our grammar?

  - How do we know if our grammar allows *[ca]?
  - We saw above that /ka/ doesn't turn into *[ca]…
    Is this enough?

6. Preferring the default allophone

Data set: [Greek](#)

- How do we know if our grammar allows *[ca]?

    - We saw above that /ka/ doesn't turn into *[ca]…
    Is this enough? No.

- Last class, we learned about **richness of the base**…

    - How does that concept apply here?

Data set: Greek

- How do we know if our grammar allows *[ca]?

  - We saw above that /ka/ doesn't turn into *[ca]...
    Is this enough? **No.**

- Last class, we learned about **richness of the base**...

  - We can't claim that *[ca] is ungrammatical just because there are no URs with /ca/ in Greek

  - The grammar must **actively get rid of** /ca/!

    - Presumably by turning it into [ka]
      (because [k] and [c] are allophones)

Data set: Greek

- Which of these should be **grammatical**?

  * *[ke]*   **[ka]**   **[ce]**   *[ca]*

- Which of these are **allowed** by our grammar?

/ca/	NoVELAR+FRV	IDENT[COR]
✖ (a) [ca]		
(→) (b) [ka]		*!

- **Wrong** winner! *[ca] beats the intended [ka]

Data set: Greek

- We need a **third constraint** for allophone patterns!

  - We need a markedness constraint that will **enforce the default allophone** (by penalizing the context-specific one)

  - Can we make this constraint refer to the "elsewhere" environment?

    - ***Do we need to?***

6. Preferring the default allophone

Data set: [Greek](#)

- We need a **third constraint** for allophone patterns!

  - We need a markedness constraint that will **enforce the default allophone** (by penalizing the context-specific one)

  *C<small>OR</small>-D<small>ORS</small> (aka "No palatals"): Assign one * for any segment that is [<small>COR</small>, <small>DORS</small>]

- How is this constraint ranked with respect to the others?

Data set: Greek | How are these constraints ranked?

/ca/	*Cor-Dors	NoVelar+FrV	Ident[cor]
→ (a) [ka]			*
(b) [ca]	* W		L

/ke/	*Cor-Dors	NoVelar+FrV	Ident[cor]
→ (a) [ce]	*		*
(b) [ke]	L	* W	L

6. Preferring the default allophone

Data set: [Greek] | How are these constraints ranked?

NoVelar+FrontVowel » ***Cor-Dors** » **Ident[cor]**

- In **rule-based phonology**, how did we guarantee…
  - only the specific allophone shows up in the special context ([ce], *[ke])?
  - only the default allophone shows up outside the special context ([ka], *[ca])?

- In **OT**, how do we guarantee…
  - only the specific allophone shows up in the special context ([ce], *[ke])?
  - only the default allophone shows up outside the special context ([ka], *[ca])?

- In **rule-based phonology**, how did we guarantee…

  - only the specific allophone shows up in the special context ([ce], *[ke])? | a phonological rule
  - only the default allophone shows up outside the special context ([ka], *[ca])? | only default in URs

- In **OT**, how do we guarantee…

  - only the specific allophone shows up in the special context ([ce], *[ke])? | constraint ranking
  - only the default allophone shows up outside the special context ([ka], *[ca])? | constraint ranking

- In **OT**, how do we guarantee...

    - only the specific allophone shows up in the special context ([ce], *[ke])? | constraint ranking
    - only the default allophone shows up outside the special context ([ka], *[ca])? | constraint ranking

> It **doesn't matter** which allophone is in the input!

    - *if* the distribution of the allophones is completely predictable (so, *not* in cases of neutralization)
    - Default allophone still useful as a **label** for the phoneme
    - What do speakers do? **We can't tell** *from the data*

- General ranking for **complementary distribution**:

Context-specific M

(prefers specific allophone in context)

»

Context-free M

(prefers default allophone)

»

F

(the faithfulness constraint(s) on the features that
distinguish the two allophones)

The prep questions for next time will look at:

- How many distinct rankings are there for IDENT[COR], NoVELAR+FRONTVOWEL, *COR-DORS? What are they?

- For **each ranking**, which candidate will win?
  /ka/   /ke/   /ce/   /ca/
  [ka]?   [ke]?   [ke]?   [ka]?
  [ca]?   [ce]?   [ce]?   [ca]?

- What kinds of languages do we predict? Are they plausible? Do we have **names** for these patterns of distribution?