

Today's topics:

- **Morpheme alternations in OT**
- **Factorial typology of segment distribution — Implications**

Background preparation:

- *PP: Dutch*

0. Today's objectives

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

- Identify alternating morphemes and propose URs (review from Unit 2)
- Propose OT constraints for a case of morpheme alternations involving segments / features
- Demonstrate the factorial typology of constraints on segment distribution, evaluate the model's predictions, and consider implications

0. Course information

- Updated instructions for the phonological analysis paper
 - Any questions or clarifications?

1. Review: Complementary distribution

- What are the three *general* types of constraints we need in order to analyze a pattern of complementary (predictable) distribution?

1. Review: Complementary distribution

- What are the three *general* types of constraints we need in order to analyze a pattern of complementary (predictable) distribution?

Context-specific M

Context-free M

F

- What does each of these three constraint types do, with respect to an allophone pattern?

1. Review: Complementary distribution

- What are the three *general* types of constraints we need in order to analyze a pattern of complementary (predictable) distribution?

Context-specific M

(penalizes
default allophone
in **specific context**)

Context-free M

(penalizes
specific allophone
in **general**)

F

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

- How are these constraints **ranked** for complementary distribution?

1. Review: Complementary distribution

- **Context-specific M » Context-free M » F**
- *F dominated by both M*: Input choice of allophone is irrelevant; the M constraints will decide everything
 - This is exactly what we need for complementary (**predictable**) distribution!
- *Context-specific M » Context-free M*: Specific allophone is always avoided, except in its specific context, where the default allophone is worse
 - These are the constraints that determine **which allophone** appears where

2. Another segmental distribution pattern

Data set: Dutch

- What is the phenomenon here?
- What phonological factors are relevant?
- How can we model this pattern in OT?
 - Constraints? (Think about Greek!)
 - Rankings? (Think about URs, ROTB)

2. Another segmental distribution pattern

Data set: [Dutch](#)

- Relevant constraints:

IDENT[±voice]: Assign one * for each output segment that differs from its corresponding input segment with respect to [±voice]

*VOI_{OBST}CODA: Assign one * for each segment in a coda that is [-son, +voice]

- How are these constraints ranked for Dutch?
- Does our analysis work for non-alternating roots?

2. Another segmental distribution pattern

- A term you saw in the Odden reading:
neutralization
 - Two sounds are separate phonemes
 - But: In at least one environment, the two sounds have allophones that are identical

/X/	/Y/
	^
[X]	[X] [Y]

3. Factorial typology and segmental distribution

- Here are the three constraints we proposed for our analysis of complementary distribution in [Greek](#)

NOVELAR+FRONTVOWEL

Assign one * for any sequence of segments [DORS] [-bk] in which the [DORS] segment is not also [COR]

*COR-DORS (aka “No palatals”)

Assign one * for any segment that is [COR, DORS]

IDENT[COR]

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

3. Factorial typology and segmental distribution

Discussion, part 1

- How many rankings are there for these three constraints? **NoVEL+FRV**, ***COR-DORS**, **IDENT[COR]**

What are they?

3. Factorial typology and segmental distribution

- How many rankings are there for these three constraints? **NoVEL+FRV**, ***COR-DORS**, **IDENT[COR]**

What are they?

3! = 6 rankings

- 1 NoVEL+FRV » *COR-DORS » IDENT[COR] (= *Greek*)
- 2 IDENT[COR] » *COR-DORS » NoVEL+FRV
- 3 IDENT[COR] » NoVEL+FRV » *COR-DORS
- 4 NoVEL+FRV » IDENT[COR] » *COR-DORS
- 5 *COR-DORS » NoVEL+FRV » IDENT[COR]
- 6 *COR-DORS » IDENT[COR] » NoVEL+FRV

3. Factorial typology and segmental distribution

Discussion, part 2

- Use the tableaux worksheet as a guide
- For each of the rankings...
 - What would happen to the following inputs?
/ka/ /ke/ /ce/ /ca/
 - Describe what **distribution pattern** we see for the segments [k] and [c] in a language with this ranking

3. Factorial typology and segmental distribution

- Ranking (1): NoVEL+FRV » *COR-DORS » IDENT[**COR**]
(this is the ranking for Greek)

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

/ke/	NoVELAR+FRV	*COR-DORS	IDENT[COR]
(a) [ke]	*!		
→ (b) [ce]		*	*

3. Factorial typology and segmental distribution

- Ranking (1): NoVELAR+FRV » *COR-DORS » IDENT[**COR**]
(this is the ranking for Greek)

/ce/	NoVELAR+FRV	*COR-DORS	IDENT[COR]
→ (a) [ce]		*	
(b) [ke]	*!		*

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

3. Factorial typology and segmental distribution

- Ranking (1): $\text{NoVEL+FRV} \gg *_{\text{COR-DORS}} \gg \text{IDENT}[\text{COR}]$
(this is the ranking for Greek)
 - Outcomes:
/ka/ → **[ka]** /ca/ → **[ka]** (default env: [k])
/ke/ → **[ce]** /ce/ → **[ce]** (/_[-bk]: [c])
 - Distribution:

3. Factorial typology and segmental distribution

- Ranking (1): NoVEL+FRV » *COR-DORS » IDENT[COR]
(this is the ranking for Greek)
 - Outcomes:
/ka/ → [ka] /ca/ → [ka] (default env: [k])
/ke/ → [ce] /ce/ → [ce] (/_[-bk]: [c])
 - Distribution: **complementary** (predictable)
 - Faithfulness is lowest — choice of [k] vs. [c] in input has *no influence*
 - Context-specific M » context-free M — environment determines [k] vs. [c]

3. Factorial typology and segmental distribution

- Pause for an important question:

What about all the other candidates?

- What are some **other useful losers** for this output?

/ke/	NoVELAR+FRV	*COR-DORS	IDENT[COR]
(a) [ke]	*!		
→ (b) [ce]		*	*
...			

3. Factorial typology and segmental distribution

- Pause for an important question:

What about all the other candidates? Examples:

/ke/	NoVELAR+FRV	*COR-DORS	IDENT[COR]
(a) [ke]	*!		
→ (b) [ce]		*	*
(c) [ka]		L	L
(d) [e]		L	L
(e) [kre]		L	L

3. Factorial typology and segmental distribution

- What about all the other candidates? Examples:

/ke/	IDENT [bk/lo]	NoDEL	No EPENTH	NoVEL+ FRV	*COR- DORS	IDENT [COR]
(a) [ke]				*!		
→ (b) [ce]					*	*
(c) [ka]	* w				L	L
(d) [e]		* w			L	L
(e) [kre]			* w		L	L

- Other constraints outrank *COR-DORS, ID[COR] in Greek

3. Factorial typology and segmental distribution

- What about all the other candidates?
 - **Other constraints** » *COR-DORS, ID[COR] in Greek
 - For the rest of the discussion, we will keep our focus on languages where such other constraints dominate the key CS-M and F constraints
 - Why? Only because we are interested in **how constraints can predict distribution patterns between two segments**
 - The above other types of patterns are also predicted to exist! — that's just a separate discussion topic

3. Factorial typology and segmental distribution

- Ranking (2): IDENT[**COR**] » ***COR-DORS** » No**VEL+FRV**
- Ranking (3): IDENT[**COR**] » No**VEL+FRV** » ***COR-DORS**

/ka/	IDENT[COR]	* COR-DORS	No VELAR+FRV
→ (a) [ka]			
(b) [ca]	*!	*	

/ke/	IDENT[COR]	* COR-DORS	No VELAR+FRV
→ (a) [ke]			*
(b) [ce]	*!	*	

3. Factorial typology and segmental distribution

- Ranking (2): IDENT[**COR**] » ***COR-DORS** » No**VEL+FRV**
- Ranking (3): IDENT[**COR**] » No**VEL+FRV** » ***COR-DORS**

/ce/	IDENT[COR]	* COR-DORS	No VELAR+FRV
→ (a) [ce]		*	
(b) [ke]	*!		*

/ca/	IDENT[COR]	* COR-DORS	No VELAR+FRV
→ (a) [ca]		*	
(b) [ka]	*!		

3. Factorial typology and segmental distribution

- Ranking (2): IDENT[COR] » *COR-DORS » NoVEL+FRV
- Ranking (3): IDENT[COR] » NoVEL+FRV » *COR-DORS
 - Outcomes:
/ka/ → **[ka]** /ca/ → **[ca]** (default env: ??)
/ke/ → **[ke]** /ce/ → **[ce]** (/_[-bk]: ??)
 - Distribution:

3. Factorial typology and segmental distribution

- Ranking (2): IDENT[COR] » *COR-DORS » NoVEL+FRV
- Ranking (3): IDENT[COR] » NoVEL+FRV » *COR-DORS
 - Outcomes:
/ka/ → [ka] /ca/ → [ca] (default env: ??)
/ke/ → [ke] /ce/ → [ce] (/_[-bk]: ??)
 - Distribution: **contrastive** (unpredictable)
Note the presence of “minimal pairs”!
 - Faithfulness is highest — input [k] and [c] will both survive unchanged, no matter what

3. Factorial typology and segmental distribution

- Ranking (4): NoVEL+FRV » IDENT[**COR**] » *COR-DORS

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

/ke/	NoVELAR+FRV	IDENT[COR]	*COR-DORS
(a) [ke]	*!		
→ (b) [ce]		*	*

3. Factorial typology and segmental distribution

- Ranking (4): NoVEL+FRV » IDENT[**COR**] » *COR-DORS

/ce/	NoVELAR+FRV	IDENT[COR]	*COR-DORS
→ (a) [ce]			*
(b) [ke]	*!	*	

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

3. Factorial typology and segmental distribution

- Ranking (4): NoVEL+FRV » IDENT[COR] » *COR-DORS
 - Outcomes:
 - /ka/ → **[ka]** /ca/ → **[ca]** (default env: ??)
 - /ke/ → **[ce]** /ce/ → **[ce]** (/_[-bk]: [c])
 - Distribution:

3. Factorial typology and segmental distribution

- Ranking (4): $\text{NoVEL+FRV} \gg \text{IDENT}[\text{COR}] \gg * \text{COR-DORS}$
 - Outcomes:
 $/ka/ \rightarrow [\mathbf{ka}]$ $/ca/ \rightarrow [\mathbf{ca}]$ (default env: ??)
 $/ke/ \rightarrow [\mathbf{ce}]$ $/ce/ \rightarrow [\mathbf{ce}]$ ($/_[-bk]: [c]$)
 - Distribution: **neutralization**
Note “minimal pair” $[ka] \neq [ca]$, but $/ke/ \rightarrow [ce]$
 - NV+FV requires ‘special’ segment in special context
 - Otherwise, faithfulness prevails

3. Factorial typology and segmental distribution

- Ranking (5): *COR-DORS » NoVEL+FRV » IDENT[**COR**]
- Ranking (6): *COR-DORS » IDENT[**COR**] » NoVEL+FRV

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

/ke/	*COR-DORS	NoVELAR+FRV	IDENT[COR]
→ (a) [ke]		*	
(b) [ce]	*!		*

3. Factorial typology and segmental distribution

- Ranking (5): *COR-DORS » NoVEL+FRV » IDENT[**COR**]
- Ranking (6): *COR-DORS » IDENT[**COR**] » NoVEL+FRV

/ce/	*COR-DORS	NoVELAR+FRV	IDENT[COR]
(a) [ce]	*!		
→ (b) [ke]		*	*

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

3. Factorial typology and segmental distribution

- Ranking (5): *COR-DORS » NOVEL+FRV » IDENT[COR]
- Ranking (6): *COR-DORS » IDENT[COR] » NOVEL+FRV
 - Outcomes:
/ka/ → **[ka]** /ca/ → **[ka]** (default env: [k])
/ke/ → **[ke]** /ce/ → **[ke]** (/_[-bk]: [k])
 - Distribution:

3. Factorial typology and segmental distribution

- Ranking (5): *COR-DORS » NOVEL+FRV » IDENT[COR]
- Ranking (6): *COR-DORS » IDENT[COR] » NOVEL+FRV
 - Outcomes:
 - /ka/ → [ka] /ca/ → [ka] (default env: [k])
 - /ke/ → [ke] /ce/ → [ke] (/_[-bk]: [k])
 - Distribution: **“inventory gap”** (illegal segment)
Note that there is no [c] in any output ever
 - ‘Special’ segment is banned, regardless of context and regardless of input
 - This is how OT handles **absent** segments

3. Factorial typology and segmental distribution

- **Summary** of rankings and distribution patterns:

(1) NoVEL+FRV » *COR-DORS » IDENT[COR]	predictable (complementary)
(2) IDENT[COR] » *COR-DORS » NoVEL+FRV	contrastive
(3) IDENT[COR] » NoVEL+FRV » *COR-DORS	
(4) NoVEL+FRV » IDENT[COR] » *COR-DORS	neutralization
(5) *COR-DORS » NoVEL+FRV » IDENT[COR]	inventory gap
(6) *COR-DORS » IDENT[COR] » NoVEL+FRV	

3. Factorial typology and segmental distribution

- Implications of the OT approach to segmental distribution:
 - If some language has a context-specific allophone and a default (“elsewhere”) allophone...
 - ...which one is predicted to be an illegal segment in another language?
- Rule-based phonology does not make this connection

4. Summary: Segmental distribution in OT

- General ranking for _____ :
Context-specific M » Context-free M » F
- General ranking for _____ :
F » { Context-specific M , Context-free M }
- General ranking for _____ :
Context-specific M » F » Context-free M
- General ranking for _____ :
Context-free M » { Context-specific M , F }

4. Summary: Segmental distribution in OT

- General ranking for **predictable distribution**:
Context-specific M » Context-free M » F
- General ranking for **contrastive distribution**:
F » { Context-specific M , Context-free M }
- General ranking for **neutralization**:
Context-specific M » F » Context-free M
- General ranking for **inventory gap**:
Context-free M » { Context-specific M , F }