

## ***Today's topics:***

- **Child phonology in OT**
- **Rethinking segmental rules**

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*Background preparation: (none)*

# 0. Today's objectives

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

- Model a child's phonological grammar using OT
- Discuss problems posed by child phonology for rule-based models of grammar
- Begin describing "goals" and formalizing constraints concerning segments and features
- Explain how the markedness/faithfulness distinction plays a key role in the difference between child and adult phonological grammars

# 1. Child-specific phonological processes

- We propose that **children's URs**, stored in their mental lexicon, are (typically) the **same** as adult URs
  - What is some evidence for this? (Ling 101)
  - **Are children's surface forms** always the same as adult surface forms?

# 1. Child-specific phonological processes

- What do these observations tell us about child URs?
  - Children often react with confusion, surprise, laughter, etc., when adults produce the child's surface form instead of the adult form
  - Experiments show that children can correctly identify pictures that require them to know which adult pronunciation goes with which word meaning, even when the child's surface forms of the two words are the same

# 1. Child-specific phonological processes

## Group discussion

- Data set: [Consonant patterns in child phonology](#), (1)
  - What **systematic** patterns can we find in this child's productions that differ from adults?
  - Do any of them relate to **syllable structure**?
  - Can we **rank** any syllable-structure or faithfulness **constraints** for this child, assuming adult-like URs?

# 1. Child-specific phonological processes

## Debriefing

- Data set: [Consonant patterns in child phonology](#), (1)
  - What **systematic** patterns can we find in this child's productions that differ from adults?
  - Do any of them relate to **syllable structure**?

/ple:/ → [be:] 'play'

/tɛnt/ → [dɛt] 'tent'

/swiŋ/ → [wiŋ] 'swing'

/bʌmp/ → [bʌp] 'bump'

## 2. Child phonology and syllable structure

- *Child grammar*: What constraints are relevant?

/swiŋ/ 'swing'		
→ (a) <b>[wiŋ]</b>		
(b) [swiŋ]		

/bʌmp/ 'bump'		
→ (a) <b>[bʌp]</b>		
(b) [bʌmp]		

## 2. Child phonology and syllable structure

- *Child grammar*: What are the constraint rankings?

/swiŋ/ 'swing'	NoONSETCLUSTER	NoDELETION
→ (a) <b>[wiŋ]</b>		*
(b) [swiŋ]	*	

/bʌmp/ 'bump'	NoCODACLUSTER	NoDELETION
→ (a) <b>[bʌp]</b>		*
(b) [bʌmp]	*	

## 2. Child phonology and syllable structure

- *Child grammar*: What are the constraint rankings?
  - NoONSETCLUSTER » NoDELETION

/swiŋ/ 'swing'	NoONSETCLUSTER	NoDELETION
→ (a) <b>[wiŋ]</b>		*
(b) [swiŋ]	* W	L

- NoCODACLUSTER » NoDELETION

/bʌmp/ 'bump'	NoCODACLUSTER	NoDELETION
→ (a) <b>[bʌp]</b>		*
(b) [bʌmp]	* W	L

## 2. Child phonology and syllable structure

- *Adult grammar:* What are the constraint rankings?

/swiŋ/ 'swing'	NoONSETCLUSTER	NoDELETION
(a) [wiŋ]		*
→ (b) <b>[swiŋ]</b>	*	

/bʌmp/ 'bump'	NoCODACLUSTER	NoDELETION
(a) [bʌp]		*
→ (b) <b>[bʌmp]</b>	*	

## 2. Child phonology and syllable structure

- *Adult grammar*: What are the constraint rankings?

- NoDELETION » NoONSETCLUSTER

/swiŋ/ 'swing'	NoDELETION	NoONSETCLUSTER
(a) [wiŋ]	* W	L
→ (b) <b>[swiŋ]</b>		*

- NoDELETION » NoCODACLUSTER

/bʌmp/ 'bump'	NoDELETION	NoCODACLUSTER
(a) [bʌp]	* W	L
→ (b) <b>[bʌmp]</b>		*

## 2. Child phonology and syllable structure

- Summary

- Child: NoONSETCLUSTER » NoDELETION  
NoCODACLUSTER » NoDELETION
- Adult: NoDELETION » NoONSETCLUSTER  
NoDELETION » NoCODACLUSTER

- How does the child's grammar **differ** from adult English with respect to consonant clusters?

### 3. Child phonology in a rule-based model

- What systematic patterns do we see in this child's data involving **segment classes** (not syllables)?

/smiθ/ → [mit] 'Smith'      /ʌðə/ → [ʌdə] 'other'

/bʌs/ → [bʌt] 'bus'      /zu:/ → [du:] 'zoo'

/bʌʃ/ → [bʌt] 'brush'

### 3. Child phonology in a rule-based model

- If we are working in a rule-based model ...
  - What are the **implications** for how the child's **grammar** differs from the adult grammar?
  - Is there anything surprising about this?

/smɪθ/ → [mit] 'Smith'      /ʌðə/ → [ʌdə] 'other'

/bʌs/ → [bʌt] 'bus'      /zu:/ → [du:] 'zoo'

/bʌʃ/ → [bʌt] 'brush'

### 3. Child phonology in a rule-based model

- If we are working in a rule-based model ...
  - When SR differs from UR, this means that a **phonological rule** has applied
  - A child's developing grammar has **more rules** than an adult's grammar — the child's grammar appears to be **more complex**

### 3. Child phonology in a rule-based model

- Note that this conclusion only follows if it is the mental grammar, rather than a motor-control (phonetic) issue, causing the child-specific SR
  - In some cases, it can be hard to tell
  - But there are other cases where it is clear that the child can produce the sound in question
- Look at adult /s/ in (2) of the data set:
  - child turns it into [d] in onsets
  - child produces [s] in codas
    - *producing* [s] is not a problem

### 3. Child phonology in a rule-based model

- Summary of our discussion so far
  - Children's **surface forms** are often less complex than adult surface forms
  - What happens when we compare child and adult **grammars...**
    - in a rule-based model?
    - in OT?

## 4. Fricative 'stopping' in OT

- Can we model **fricative 'stopping'** in OT?

- This is a common pattern in child phonology

/smɪθ/ → [mit] 'Smith'      /ʌðə/ → [ʌdə] 'other'

/bʌs/ → [bʌt] 'bus'      /zu:/ → [du:] 'zoo'

/bʌʃ/ → [bʌt] 'brush'

- Can we state a **phonological goal**?
  - Can we formalize it as a **constraint**?
  - What **kinds of languages** does this constraint predict (if ranked highest)?

## 4. Fricative 'stopping' in OT

- *Goal:*  
Fricative 'stopping' is a way of avoiding fricatives
- *Formal definition:* (constraint *names* are arbitrary)  
NoFRICATIVE Assign one \* for every segment  
that is [+cont, -son]
- *Typological predictions:*  
World Atlas of Language Structures (WALS) Online  
map: [Languages with no fricatives](#)

## 4. Fricative 'stopping' in OT

- Adult grammar: What are we predicting?

/ʌðə/ 'other'	NoFRICATIVE	
→ (a) [ʌðə]	*	
(b) [ʌpə]		L

- What else must be in the grammar?

## 4. Fricative 'stopping' in OT

- Adult grammar: How can we make (b) lose?

/ʌðə/ 'other'	NoFRICATIVE	
→ (a) [ʌðə]	*	
(b) [ʌpə]		L

- What constraint is loser (b) violating?
  - What's **different** between UR and (b)?
  - How is this difference **represented** in our mental grammar?
  - What **kind** of constraint would assign \* for this?

## 4. Fricative 'stopping' in OT

- We can define **faithfulness constraints** that penalize **changes in feature values**
  - These are called  $\text{IDENT}[F]$  constraints ("Identity")
  - There is one for each feature  $[F]$  in the model

$\text{IDENT}[\pm\text{cont}]$ : Assign one \* for any output segment that differs from its corresponding input segment with respect to  $[\pm\text{cont}]$

$\text{IDENT}[\pm\text{strid}]$ : Assign one \* for any output segment that differs from its corresponding input segment with respect to  $[\pm\text{strid}]$

## 4. Fricative 'stopping' in OT

- *Adult grammar*: What are the constraint rankings?

<i>/ʌðə/ 'other'</i>	NoFRICATIVE	IDENT[±cont]
→ (a) [ʌðə]	*	
(b) [ʌpə]		*

<i>/zu:/ 'zoo'</i>	NoFRICATIVE	IDENT[±cont]	IDENT[±strid]
→ (a) [zu:]	*		
(b) [du:]		*	*

## 4. Fricative 'stopping' in OT

- *Adult grammar*: What are the constraint rankings?

- IDENT[±cont] » NoFRICATIVE

/ʌðə/ 'other'	NoFRICATIVE	IDENT[±cont]
→ (a) [ʌðə]	*	
(b) [ʌpə]	L	* W

- { IDENT[±cont] <or> IDENT[±strid] } » NoFRICATIVE

/zu:/ 'zoo'	NoFRICATIVE	IDENT[±cont]	IDENT[±strid]
→ (a) [zu:]	*		
(b) [du:]	L	* W	* W

## 4. Fricative 'stopping' in OT

- *Child grammar*: What are the constraint rankings?

<i>/ʌðə/ 'other'</i>	NoFRICATIVE	IDENT[±cont]
(a) [ʌðə]	*	
→ (b) [ʌpə]		*

<i>/zu:/ 'zoo'</i>	NoFRICATIVE	IDENT[±cont]	IDENT[±strid]
(a) [zu:]	*		
→ (b) [du:]		*	*

## 4. Fricative 'stopping' in OT

- Child grammar:* What are the constraint rankings?

/ʌðə/ 'other'	NoFRICATIVE	IDENT[±cont]
(a) [ʌðə]	* W	L
→ (b) [ʌpə]		*

/zu:/ 'zoo'	NoFRICATIVE	IDENT[±cont]	IDENT[±strid]
(a) [zu:]		*	*
→ (b) [du:]	* W	L	L

## 4. Fricative 'stopping' in OT

- *Child grammar*: What are the constraint rankings?
  - **NoFRICATIVE** » **IDENT[±cont]**

/ʌðə/ 'other'	NoFRICATIVE	IDENT[±cont]
→ (a) <b>[ʌdə]</b>		*
(b) [ʌðə]	* W	L

- **NoFRICATIVE** » { **IDENT[±cont]**, **IDENT[±strid]** }

/zu:/ 'zoo'	NoFRICATIVE	IDENT[±cont]	IDENT[±strid]
→ (a) <b>[du:]</b>		*	*
(b) [zu:]	* W	L	L

## 5. Child vs. adult grammars in OT

- In general, how do child **surface forms** differ from adult surface forms? | **simpler**
- In a **constraint-based model** of phonology, how do we have to say a child's **grammar** differs from the target (adult) grammar?
- What occurs during children's acquisition of phonology?

## 5. Child vs. adult grammars in OT

- In general, how do child **surface forms** differ from adult surface forms? | **simpler**
- In a **constraint-based model** of phonology, how do we have to say a child's **grammar** differs from the target (adult) grammar? | **different ranking, same constraints**
- What occurs during children's acquisition of phonology?
  - The constraints **get reranked** to match adults

## 5. Child vs. adult grammars in OT

- Can we make any **generalizations** about *how* the child and adult rankings differ across these patterns?

### **Child:**

{ NoONSETCLUSTER, NoCODACLUSTER } » NoDELETION  
NoFRICATIVE » { IDENT[±cont], IDENT[±strid] }

### **Adult:**

NoDELETION » { NoONSETCLUSTER, NoCODACLUSTER }  
{ IDENT[±cont] } » NoFRICATIVE

## 5. Child vs. adult grammars in OT

- Can we make any **generalizations** about *how* the child and adult rankings differ?

**Child: Markedness » Faithfulness**

{ NoONSETCLUSTER, NoCODACLUSTER } » NoDELETION

NoFRICATIVE » { IDENT[±cont], IDENT[±strid] }

**Adult: Faithfulness » Markedness**

NoDELETION » { NoONSETCLUSTER, NoCODACLUSTER }

{ IDENT[±cont] } » NoFRICATIVE

## 6. For next time

- We're going to expand on our discussion of **segmental phonology** in OT
- Prep questions: Review **allophones** and **predictable distribution** (also known as **complementary distribution**)