

Kinds of lexical classes / Kinds of information about lexical classes

Andries W. Coetzee

Annual Meeting of the Linguistic Society of America

January 2017, Austin

What is “lexically specific phonology”?

- **Phonological generalizations that apply differently to otherwise phonologically identical forms**
- **What kinds of generalizations?**
 - Static generalizations (Moore-Cantwell)
 - Process application (Shih)
- **Membership determined by (external) principle?**
 - Yes: Lexical category (Shih)
 - No: e.g., exceptions (Moore-Cantwell)
- **What are we modelling?**
 - L1 acquisition?
 - Lexical storage?
 - Adult performance?

Static generalizations (Moore-Cantwell)

Stress placement in bisyllabic English words (Moore-Cantwell)

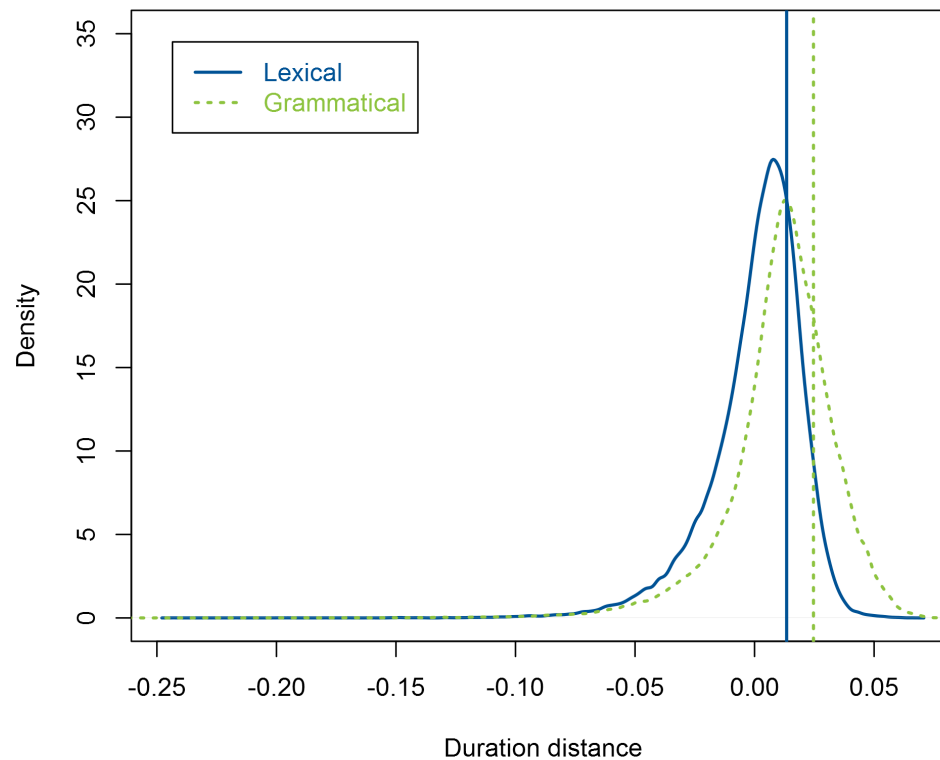
Initial	Final
<i>ácorn</i>	<i>guitár</i>
<i>blánket</i>	<i>banqúette</i>
<i>méllow</i>	<i>merlót</i>

And similarly in Afrikaans

Initial		Final	
<i>kánon</i>	' <i>canon</i> '	<i>kanón</i>	' <i>cannon</i> '
<i>sátan</i>	' <i>satan</i> '	<i>Japán</i>	' <i>Japan</i> '
<i>ríbbok</i>	' <i>antelope</i> '	<i>pandók</i>	' <i>hovel</i> '

Process application (Shih)

Amount of reduction in lexical vs. grammatical words



Process application

Afrikaans vowel lengthening in open, stressed syllables

	sg.		pl.		Gloss
No	<i>kat</i>	[kat]	<i>katte</i>	['ka.tə]	'cat'
Yes	<i>gat</i>	[xat]	<i>gate</i>	['xɑː.tə]	'hole'
No	<i>pet</i>	[pɛt]	<i>pette</i>	['pɛ.tə]	'caps'
Yes	<i>gebed</i>	[xə'βɛt]	<i>gebede</i>	[xə.'bīə.də]	'prayer'
No	<i>mot</i>	[mɔt]	<i>motte</i>	['mɔ.tə]	'moth'
Yes	<i>god</i>	[xɔt]	<i>gode</i>	['xūə.də]	'god'

Kinds of evidence for lexical class membership

Determined by external principle?

- Yes, e.g. lexical category (Shih)
- No, e.g. exceptions (Moore-Cantwell)

Lexical category

What comes first?

- Phonology: Use phonological information to bootstrap lexical category detection
- Lexical categories: Use categories to identify different phonological patterns

L1 phonological acquisition

- Children acquire phonotactic knowledge before words/morphology (see Hayes 2004)
- Shih showed that this is possible in principle

But what about adults?

Frequency structure of the lexicon

Shih and Moore-Cantwell

- Frequency information in lexicon (or learning data) influences the learning of categories
- and the generalization to novel forms
- Expected, given results showing that frequency matters

Learning biases/primitives?

Many learning algorithms have built-in biases

- Markedness >> IO-Faithfulness
- OO-Faithfulness >> IO-Faithfulness (McCarthy 1998, Hayes 2004, Tessier 2007, Coetzee 2009, etc.)
- “Filters” (Becker *et al.* 2011, Becker *et al.* 2012, Hayes & White 2013, Peperkamp *et al.* 2006, etc.)

Algorithms also need some primitives

- What categories are counted?
- See, e.g., Hayes’s “UG discovery” from 2015 LSA plenary

Which pattern is generalized?

Afrikaans vowel lengthening in open, stressed syllables

	sg.		pl.		Gloss
No	<i>kat</i>	[kat]	<i>katte</i>	['ka.tə]	'cat'
Yes	<i>gat</i>	[xat]	<i>gate</i>	['xɑ:.tə]	'hole'
No	<i>pet</i>	[pɛt]	<i>pette</i>	['pɛ.tə]	'caps'
Yes	<i>gebed</i>	[xə'bɛt]	<i>gebede</i>	[xə.'bīə.də]	'prayer'
No	<i>mot</i>	[mɔt]	<i>motte</i>	['mɔ.tə]	'moth'
Yes	<i>god</i>	[xɔt]	<i>gode</i>	['xūə.də]	'god'

Violates markedness:
Stress-to-Weight

Violates faithfulness and
paradigm uniformity

Which pattern is generalized?

Afrikaans vowel lengthening in open, stressed syllables

	sg.		pl.		Gloss
No	<i>kat</i>	[kat]	<i>katte</i>	['ka.tə]	'cat'
Yes	<i>gat</i>	[xat]	<i>gate</i>	['xɑ:tə]	'hole'
No	<i>pet</i>	[pɛt]	<i>pette</i>	['pɛ.tə]	'caps'
Yes	<i>gebed</i>	[xə'bɛt]	<i>gebede</i>	[xə.'bīə.də]	'prayer'
No	<i>mot</i>	[mɔt]	<i>motte</i>	['mɔ.tə]	'moth'
Yes	<i>god</i>	[xɔt]	<i>gode</i>	['xūə.də]	'god'

Which pattern is extended to new words?

Which pattern is generalized?

In actual Afrikaans

- Non-alternating pattern by far most common
- And frequency matching will therefore favor this pattern
- Artificial language learning with English speakers (Coetzee 2009)

Which pattern is extended to new words?

- Random: New words randomly assigned to one class
- Alternation: Markedness trumps paradigm uniformity
- Non-alternation: Paradigm uniformity trumps markedness

Which pattern is generalized?

In actual Afrikaans

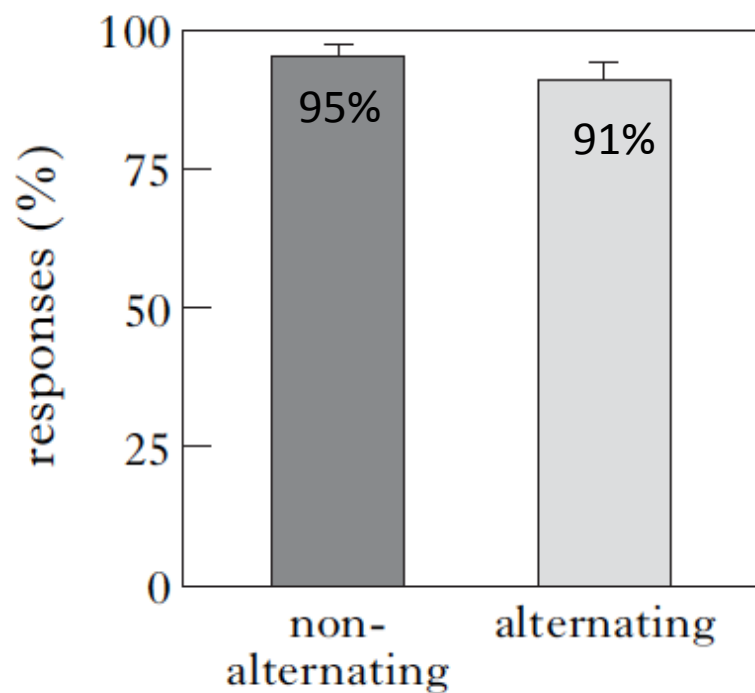
- Non-alternating pattern by far most common
- And frequency matching will therefore favor this pattern
- Artificial language learning with English speakers (Coetzee 2009)

Which pattern is extended to new words?

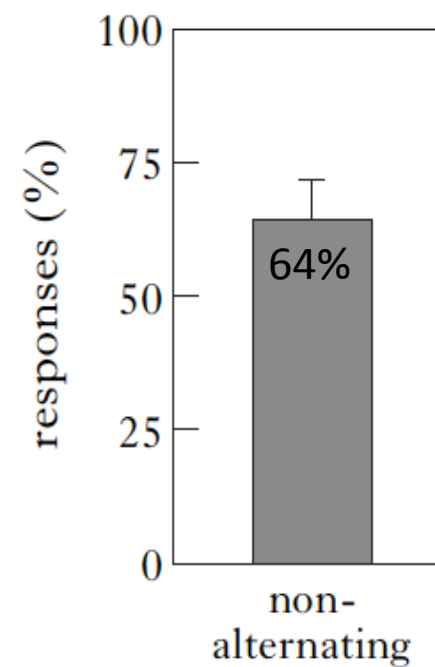
- Random: New words randomly assigned to one class
- Alternation: Markedness trumps paradigm uniformity
- Non-alternation: Paradigm uniformity trumps markedness

Experiment 1: Equal evidence for both

In training data



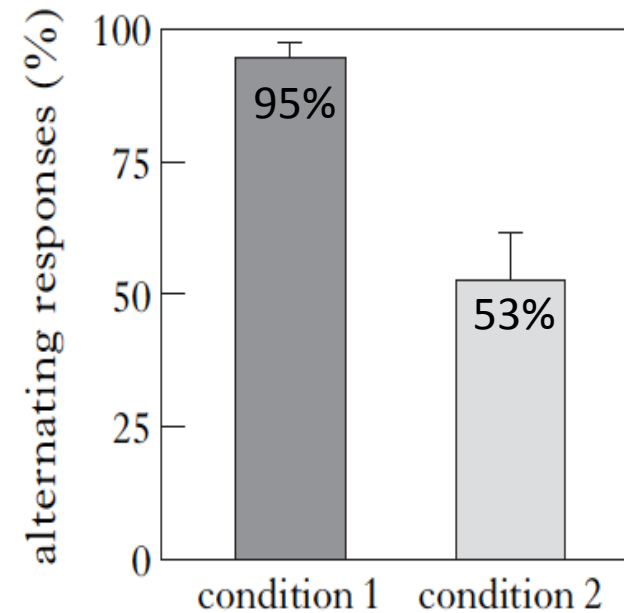
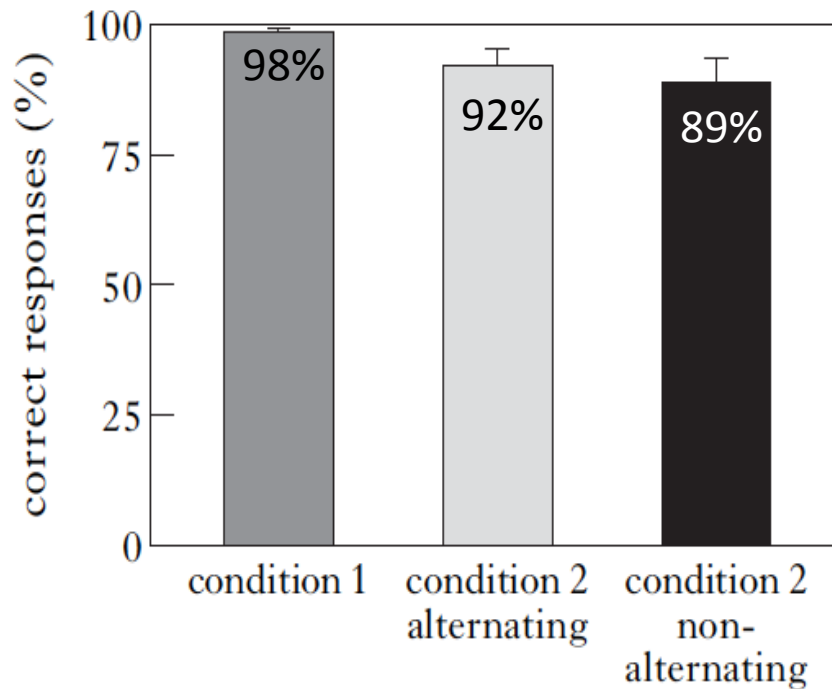
Novel



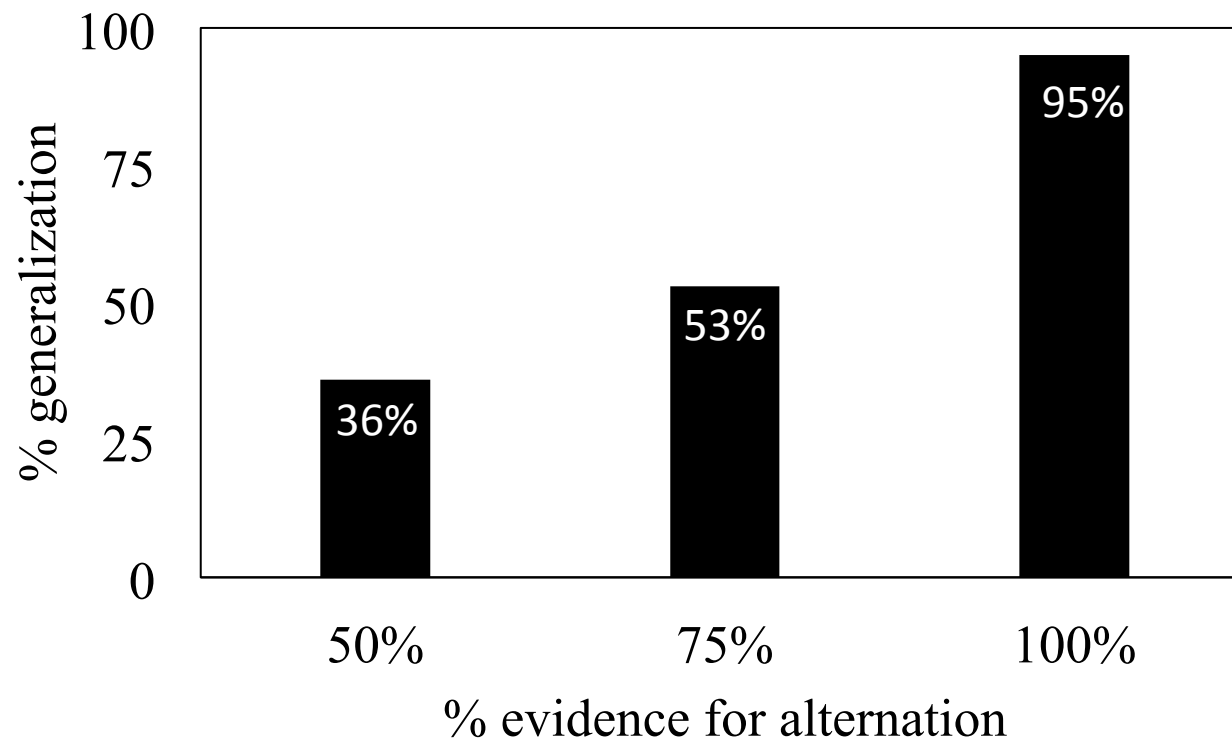
Experiment 3: 75% vs. 100% alternation

In training data

Novel



Alternation: evidence vs. generalization



- There is a strong non-alternation bias
- Lexical classes are not "equal"

Main ideas

What is lexically specific phonology?

- A unified phenomenon?
- Or different things that share some features?
- One model to account for them? Or different models?

Evidence for lexical classes

- What are we modeling? L1 acquisition? Adult grammar?
- Frequency patterns in lexicon
- Learning biases (UG)
- Phonology external evidence

References

- Becker, Michael, Nihan Kerets, and Andrew Nevins. 2011. The surfeit of the stimulus: analytic biases filter lexical statistics in Turkish laryngeal alternations. *Language* 81:84-125.
- Becker, Michael, Andrew Nevins, and Jonathan Levine. 2012. Asymmetries in generalizing alternations to and from initial syllables. *Language* 88:231-268.
- Coetzee, Andries W. 2009. Learning lexical indexation. *Phonology* 26:109-145.
- Hayes, Bruce. 2004. Phonological acquisition in Optimality Theory: the early stages. In René Kager, Joe Pater, and Win Zonneveld (eds.) *Constraints in phonological acquisition*. Cambridge: Cambridge University Press. p. 158-203.
- Hayes, Bruce, and James White. 2013. Phonological naturalness and phonotactic learning. *Linguistic Inquiry* 44:45-75.
- McCarthy, John J. 1998. Morpheme structure constraints and paradigm occultation. *CLS* 34:2. 125–150.
- Peperkamp, Sharon, Rozenn Le Calvez, Jean-Pierre Nadal, and Emmanuel Dopoux. 2006. The acquisition of allophonic rules: statistical learning with linguistic constraints. *Cognition* 101:B31–B42.
- Tessier, Anne-Michelle. 2007. *Biases and stages in phonological acquisition*. PhD dissertation, University of Massachusetts, Amherst.