

## Class 7, 4/20/2020: Acquisition II

### 1. Assignments

- Read: Adam J. Chong and Megha Sundara (2015) 18-month-olds compensate for a phonological alternation. *BUCLD Proceedings*, Cascadia Press.
- Second homework due Tuesday April 28.
- Make appointment to talk with me about your term paper topic.

### 2. Where we are right now

- The Mennian model with the child's efforts divided between:
  - Silent study of parental lexicon and phonology
  - Audible development of a personal output phonology and lexicon
- Defending aspects of the model with evidence.
- Surveying the application of OT to child phonology: is it appropriate/insightful?
- More generally, adult and child phonology, though thought to be separate systems by Menn, display parallels:
  - constraints used and their phonetic motivation
  - avoidance and the Null Parse
  - near-neutralization

## NEAR-NEUTRALIZATION

### 3. Near-neutralization in adult phonology

- Near-neutralization is by now a widely-studied topic in adult phonology.
- Some familiar processes once thought neutralizing but probably not:
  - Final Devoicing in German and Dutch
  - 3rd Tone Sandhi in Mandarin
  - North American English Tapping
- My favorite theoretical work on near-neutralization:
  - Braver, Aaron (2017) *Degrees of Incompleteness in Neutralization: Paradigm Uniformity in a Phonetics with Weighted Constraints*, Rutgers dissertation. Maxent phonetics with Paradigm Uniformity constraints.

### 4. A classic case of near-neutralization in children: Macken and Barton on VOT in children

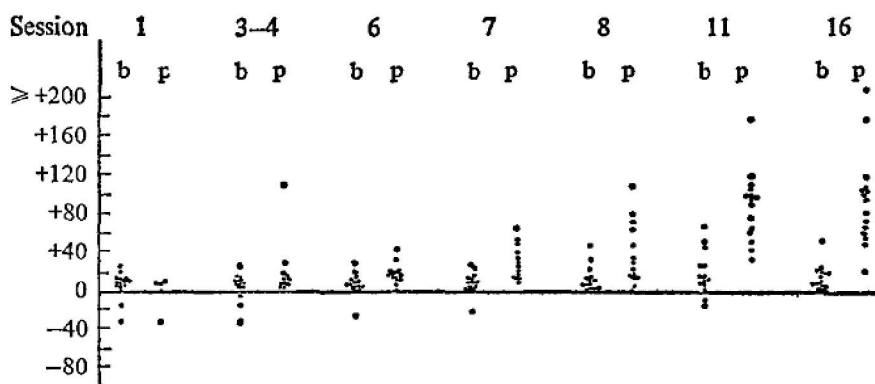
Macken, Marlys and D. Barton (1980) "A longitudinal study of the acquisition of the voicing contrast in American English word-initial stops, as measured by voice onset time," *Journal of Child Language* 7, 41-74.

- Several kids played with a bunch of stop-initial toys in a recording booth,<sup>1</sup> in various sessions, as they got older.
- General age range was 1;5 to 2;4.
- Researchers measured Voice Onset Time for all the word-initial stops.

## 5. Results

- Early on: vegetative values, including reflection of “more voicing in fronter places,” which has an articulatory explanation (Keating and Westbury, *J. Linguistics* 1986).
- Gradually: the clouds of data for the categories voiced/voiceless part, leaving an ever more perceptible distinction.
- During the middle stages: difference is statistically significant, but **transcribers can’t hear it**.

## 6. Example: Little Tessa gradually gets it right



## 7. Near-neutralization II: phrasal compensatory lengthening

- Source:
  - Allyson Carter and Louann Gerken (2004) Do children’s omissions leave traces? *Journal of Child Language* 31:561–586.

- Make the kids say this:

Monosyllabic verbs	He pushed Sandy.	He pushed Cassandra.
	He pushed Cindy.	He pushed Lucinda.
Disyllabic verbs	He pushes Sandy.	He pushes Cassandra.
	He pushes Cindy.	He pushes Lucinda.

- *Cassandra* and (less often, since heavy) *Lucinda* lose their initial upbeat syllables sometimes.

<sup>1</sup> “If your family has a Piglet cuddly, please bring it.”

- And the preceding verb gets longer!

	Reduced names (_sandra & _cinda)		Non-reduced names (Sandy & Cindy)	
	Mean duration	SE	Mean duration	SE
Monosyllabic verbs	480·91	32·63	399·19	20·24
Disyllabic verbs	627·31	52·64	555·60	34·05

- Perhaps moras are stranded and dock?
- This is of obvious use in syntactic study, since it might reveal intent to utter definite articles, auxes, etc.

### 8. Near-neutralization III: Tom Priestly pesters his son

Priestly, Tom M. S. (1980) "Homonymy in child phonology," *J. Child Language* 7, 413-427.

D: Turn off the [laɪt].

S: (*does so*)

D: Turn off the [laɪt].

S: (*does so*)

...

D: Turn off the [waɪt].

S: (indignantly) Not [waɪt], [waɪt]!

↑            ↑  
 [+round] [-round]    (visual observation; transcription is auditorily correct)

OPACITY

### 9. Context

- The Classical theory of Faithfulness constraints in McCarthy and Prince (1995) "Faithfulness and Reduplicative Identity" is
  - chosen as the simplest possible theory
  - incapable of dealing with most opacity
- The latter is considered a property of OT, but I think it might also fairly be regarded as a property of *your chosen theory of Faithfulness constraints* — richer theories do better.
  - Banning long-phonetic-distance journeys like [æ] → [i]
  - Faithfulness to lots of things, like bases, careful-speech outputs, UR-define contexts.
- The opacity debates carry over into child phonology, though the forms of Faithfulness would be different (notably: faithfulness of child candidates to the parental representation).

## 10. A famous example involving counterfeeding

- Smith (1973), *The Acquisition of Phonology*, is the data source.
- Scrutiny and reanalysis from
  - Macken, Marlys (1980). The child's lexical representation: the 'puzzle-puddle-pickle' evidence. *Journal of Linguistics* 16:1-17.
- Disturbingly, scholars cite these data as an instance of counterfeeding without knowing about Macken's debunking results.

## 11. Pre-[l] Velarization

- Smith (1973) takes the view that Amahl had an output phonology rule:

alveolar → velar / \_\_\_ l

Thus: *puddle* emerged as [ˈpʌgɫ]

## 12. Background of the rule

- Alveolars and velars are very similar acoustically before /l/.
- Cf. dialectal English [dlæs] for *glass*—this is a sound change you can “get away with.”
- Reason, possibly: alveolars are laterally released in this environment.

## 13. Counterfeeding by Fricative Stopping

- /l/ Velarization is apparently counterfed in Amahl's output phonology; for example:

<i>puddle</i>	<i>puzzle</i>	
/pʌdɫ/	/pʌzɫ/	
pʌgɫ	—	Pre-/l/ Velarization
—	pʌdɫ	z → d (etc.) everywhere

## 14. Further scrutiny of Smith's data by Macken

- Unlike many other rules, Pre-L Velarization was *riddled with exceptions*:

*beetle* [ˈbi:gu], later [ˈbi:tɫ]

*cuddle* [ˈkʌdɫ], later [ˈkʌgɫ]

*little* [ˈdidi:] (this from very first stage of study = 2 yrs 60 days, and quite stable)

- Exception rate: 21%.
- [d] for /z/ substitution, while in effect, was **exceptionless**. No [g] for /z/.
  - Note that the place of /z/ is highly perceptible, there being no such thing as a velar sibilant.

- *Pickle* words were acquired accurately. But toward the end of Amahl's fourth year, two of them **regressed**:

<i>pickle</i>	[pitʃ]	(earlier, with /k/)
<i>circle</i>	[sə:tʃ]	(earlier, with /k/)

- And there was a case of the opposite substitution:  

<i>winkle</i>	[wintʃ]	(new word)
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- My own counts suggest a random walk between alveolars and velars, all the way to the end of the study.<sup>2</sup>

## 15. Interpretation

- The “puggle” phenomenon seems to have all the traits of perceptual misacquisition: a subtle acoustic distinction, gradual learning, necessity of rehearing a form to get it right.
- *So it's not rule ordering at all, and doesn't bear on any opacity debates.*

## 16. Implication

- The analyst must inspect diary data carefully for whether a process is the result of misperception or the Output Phonology.<sup>3</sup>
- Diagnostic for the latter: institution of a contrast *faster than it could be gotten by relearning from ambient data* (as discussed earlier).

## 17. The mystery of late un-confusion

- In infancy, children are *universal perceivers*, since learning to perceive at this stage is not helped by negative evidence.
  - For a recent defense of this view, see Sundara, M., Ngon, C., Skoruppa, K., Feldman, N. H., Onario, G. M., Morgan, J. L., & Peperkamp, S. (2018). Young infants' discrimination of subtle phonetic contrasts. *Cognition* 178: 57–66.
- [d]l vs. [gl] involves, I conjecture, very close or overlapping clouds of data points in acoustic space—Amahl must have merged these clouds, forcing himself to rely on guessing when he learned these words.
- Undoing two merged clouds must be hard work ...

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<sup>2</sup>

	<i>Puddle-type</i> words:	<i>Pickle-type</i> words:
regress	2	2
wrong throughout	30	1
progress	5	1
right throughout	7	5

<sup>3</sup> To give Smith credit: he *did* detect misperception in certain other cases; see p. 147 of Smith (1973).

## 18. Another exercise in child opacity

*Voiced and voiceless obstruents word-initially and intervocalically (Barlow & Keare 2008:84)*

a. [dɔ:k]	'dog'	[tʰʌ:p]	'tub'
b. [bi:ts]	'bridge'	[fis]	'fish'
c. [tʃi:zi]	'cheese (dim.)'	[fisi]	'fish (dim.)'

*Voice contrast neutralized word-finally (Barlow & Keare 2008:84)*

a. [dɔ:k]	'dog'	[dʌk]	'duck'
b. [dʌ:f]	'glove'	[wif]	'leaf'

*Morphophonemic alternations for target morpheme-final voiced obstruents (Barlow & Keare 2008:85)*

a. [dɔ:k]	'dog'	[dɔ:gi]	'dog (dim.)'
b. [dʌ:f]	'glove'	[gʌ:vi]	'glove (dim.)'

- Ultimate source: Barlow, Jessica A. and Amanda Keare. 2008. Acquisition of final voicing: An acoustic and theoretical account. *Indiana University Working Papers in Linguistics*: Volume 6.
- Pasted from: Urek, Olga (2013) Overapplication opacity in phonological acquisition. *Nordlyd* 40: 338 - 358.
- ☞ What assumptions about the organization of child phonology would make this counterbleeding interaction treatable in standard OT?

## 19. A case given by Stemberger

- Stemberger, J.P. (1993). Rule ordering in child phonology. In M. Eid & G. Iverson (Eds.), *Principles and prediction: The analysis of natural language* (pp. 305-326). Amsterdam: John Benjamins.
- A child with normal final obstruent devoicing: *bib* and *sad* have [p] and [t].

<i>froggy</i>	<i>finger</i>	<i>sticker</i>	<i>egg</i>	<i>(sing)</i> <sup>4</sup>	<i>sick</i>	
/fiagi/	/fiŋgə/	/stikə/	/eig/	/siŋ/	/sɪk/	UR
fagi	fiŋŋə	tɪkə	—	—	—	rules not discussed
fadi	finnə	—	eɪd	sɪn	—	g, ŋ → d, n
—	—	—	ert	—	—	Final Devoicing
[fadi]	[finnə]	[tɪkə]	[ert]	[sɪn]	[sɪk]	output

- ☞ Identify and classify the opacity.
- ☞ What extended forms of Faithfulness might account for this derivation in OT?

<sup>4</sup> Inferred from Stemberger's description; he cites no form with final /ŋ/.

## WHERE DOES MORPHOLOGY SIT IN THE MENNIAN SYSTEM?

### 20. A helpful paper

- Stemberger, Joseph Paul and Barbara Bernhard (1998) Phonological constraints and morphological development. In Bernhardt, Barbara and Joseph Stemberger. 1998. *Handbook of Phonological Development: From the Perspective of Constraint-based Nonlinear Phonology*. San Diego: Academic Press.
- They present a bunch of combinatorial possibilities for English, which we can try to serially analyze.

### 21. Three ways for Junior to do morphology

- Let the parents do it for you, and memorize their inflected forms.
  - Prediction: you will flunk a wug test, or fail when you try to inflect a form you haven't heard before.
- Learn an Output Morphology, apply its rules to base (essentially parental) forms and send result on the Output Phonology.
  - Thus, the concatenated morphemes of the morphology are parental.
- Concatenate morphemes of the Output Lexicon, then apply Output Phonology to them.

### 22. On the earliest stage, memorization

- This is the origin of a deeply confused literature on the “U-shaped curve”, still taught to freshmen.
  - Early stage: there are only memorized forms; if kid can say the word, she gets it right.
  - Middle stage: kid has learned rule, errs for irregulars not memorized
  - Final stage: irregulars all memorized.
- This was figured out by Pinker and colleagues:
  - *Overregularization in Language Acquisition* (1992), by Gary F. Marcus, Steven Pinker, Michael Ullman, Michelle Hollander, T. JohnRosen, Fei Xu and Harald Clahsen

### 23. Start with an easy case

Morgan, 2;9-2;10 *Reduction to second consonant*

first	/fɜːst/	[foːtʰ]	guessed	/gɛst/	[gɛtʰ]	(cf. guess [gɛs])
soft	/sɔft/	[saːtʰ]	laughed	/læft/	[læːtʰ]	(cf. laugh [læːf])

- ☞ Assess possible approaches.

### 24. Morphology unexpressed

Gwendolyn, 2;11-3;1 *inflection not expressed*

fox	/fɔks/	[faːs]	rocks	/rɔks/	[waːt]	(cf. rock [waːt])
fix	/fɪks/	[fɪs]	sticks	/stɪks/	[tʰɪt]	(cf. stick [tʰɪt])

- I think we are to assume that vowel-final stems like *boy* would receive a plural suffix.
- So this rules out a morphology-blind Output Phonology.
- ☞ What might work here?

## 25. Simplify the cluster in a stem, but not in a plural

Gwendolyn, 3;1-3;7

fox [fɑ:s]

rocks

[wa:ts]

- ☞ How to get this one?
- This pattern persists into adult English: quite a few final clusters are possible only in inflected forms (e.g., *rub*s [ɹʌbz]).

## 26. Another case with different output in affixed vs. monomorphemic form

- From a nice term paper by undergraduate student Angela Uribe, submitted for UCLA's Linguistics 120A.
- s, z → θ in coda:

*miss* [mɪθ] but

*Nessa* [nesə]

but inflected forms with underlying /s/ nevertheless get [θ] in intervocalic position.

*missing* [mɪθɪŋ]

*misses* [mɪθəθ]

- These are very few data but the pattern is plausible and consistent (and attested with other children).
- ☞ analysis?

## 27. Another case from Bernhardt and Stemberger: overused of [-əd] allomorph

Morgan, 2;10 via *Schwa Insertion*

first /fɜːst/ [foɪtʰ]

kissed /kɪst/ [tʰɪtʰ]~[tʰɪsəd]

choosed /tʃuːzd/ [tʰuːd]~[tʰuːzəd]

- Amahl likewise misused allomorphs, e.g. [-əz] after [f].
- Cases of non-veridical learning compel our attention!
- I conjecture that Morgan *knows* the parental distribution, but uses her own distribution to ease articulatory difficulty.



## LEARNING THE PARENTAL SYSTEM

### 28. This is perhaps the key to our theoretical future

- Sooner or later, linguists will not analyze languages, but will develop models that learn languages.
  - The test of these models will be if they make testing judgments just like native speakers (and the same errors as children along the way).
- UG hypotheses will be embedded, often as biases, in the learning system.
  - They will prove their worth if they make learning possible.

### 29. As applied to acquisition

- Researchers will attempt to fill the gulf between **acquisition** and **learnability**.
- (historically: two fields, with distinct personnel and scientific cultures)

### 30. Generalities about research in this area

- Given what we have seen, it seems likely that *listening to children* will often, at early stages, be *very uninformative* about their knowledge of the parental system:
  - badly mutilated pronunciations
  - data gaps from avoidance
- So wug-testing, or other forms of passive testing, are necessary.
  - It's a good thing that testing methodology for babies and little kids has become so sophisticated.
- We also might want to be sure to **test the adults** before we turn to the children — only a few languages, like Japanese, are currently the subject of a full-scale research program, with
  - formal analysis
  - corpus study
  - productivity experiments
- To my knowledge, the really glorious phonologies, with tons of alternation, are not yet on the table for investigation.

### 31. The plausible course of learning the parental pattern

- **Segmentation**, done distributionally at first, later with world-knowledge and grammar-knowledge.
- **Phonological analysis** of the discovered words and allomorphs:
  - **phonotactic** analysis (which might in turn help segmentation, in virtuous circle)
  - discovery of **alternations** and underlying forms

### 32. Learning alternations

- A standard bifurcation in phonological theory:

- **Productive phonology** needs to be treated with some kind of GEN + EVAL architecture, which would permit generalization of alternations to novel morphemes (*blitting* ['blɪrɪŋ], reluctantly done by Albright/Hayes 2003 subjects).
- Else learn to deploy the **listed allomorphs** in their correct contexts.

### 33. Learning good old fashioned phonology

- This has been the focus of classical work in OT since the 1990's
- We have a theory to derive outputs and algorithms to rank/weight the constraints.
  - Though we wish we could discover the constraints themselves.
- It probably would help to use **alignment** to find the particular segmental alternations:
  - Example: Polish [vuɫɕ] 'lead-imp.sg.' ~ [voɫz-e] 'lead-1 sg.'

a.	v	u	ɫɕ	not:	b.	v	uɫɕ	∅
	v	o	ɫz			∅	vo	ɫz

Therefore:

[u] ~ [o]	is an attested alternation.
[ɫɕ] ~ [ɫz]	is an attested alternation.
[u] ~ [v]	is not an attested alternation.

- This is a standard technique, taught for instance in Albright and Hayes (2003, *Cognition*)
- Some research in this area:
  - Gaja Jarosz (2006 dissertation, later work)
  - Ryan Cotterell, Jason Eisner et al. (big ACL bake-off with computer scientists and large data sets. Connectionism wins!)
  - Bruce Tesar (2014) *Output-Driven Phonology*

### 34. Allomorphs in contemporary linguistics

- Laura McPherson's articles in *Language* and *NLLT* on phrasal allomorphy in Tommo So and other Dogon languages.
- Jie Zhang's work on the limited productivity of phrasal phonology in varieties of Chinese
  - <https://linguistics.ku.edu/jie-zhang/link3>
- When we do bases later, we will study **lexical conservatism**, a theory that presupposes a lot of allomorph-memorization.

### 35. Learning to take the wug test

- Classical phonological analysis does not equip the child for this!
  - It only *rationalizes* the data pattern, showing how the data could be derived from a set of underlying forms.

- To wug-test, you must go from **surface data** to **surface data**.
- How to fix this?
  - Albrightianism: there are privileged forms in the paradigm that always permit the UR to be inferred (e.g. by grabbing the relevant allomorph and undoing the allophonic rules). E.g. Adam Albright (2010) Base-driven leveling in Yiddish verb paradigms. *NLLT* 28:475-537.
  - Perception grammars, part of a large bidirectional program by Boersma.
  - Bayesianism: evaluate UR's on the basis of the probability with which they would yield observed SR's in general, then predict the SR's you want by applying the grammar in the forward direction from the distribution of UR's you deduced.