

Class 7, 4/23/2018: Acquisition I

1. Assignments

- Hand in bias homeworks.
- New reading for Wed. 4/25/18: Intro. and Chapter 1 of Neilson Smith (1973) *The Acquisition of phonology*, Cambridge University Press. On course web site.
 - Please note: if you would like *all* of Smith there are four copies in the UCLA library.
- Third homework (acquisition), newly assigned, and due in class April 30.

WARMUP EXERCISE

2. Data from Amahl

- Readings
- Age under observation is 2 years + 233-242 days.
- Assume Smith is right in saying that the “no variation” forms are indeed without variation for Amahl at this time.

No variation		Free Variation		
<i>anything</i>	ɛni:kɪŋ	<i>desk</i>	dɛk	gɛk
<i>cheek</i>	k ^h i:k	<i>dog</i>	dɔg	gɔg
<i>cheque</i>	kɛk	<i>drink</i>	dɪŋk	gɪŋk, etc.
<i>choke</i>	k ^h o:k	<i>duck</i>	dʌk	gʌk
<i>doctor</i>	gɔktə ¹	<i>sock</i>	t ^h ɔk	k ^h ɔk
<i>flapjack</i>	læpgæk	<i>sugar</i>	t ^h ugə	kugə
<i>joke</i>	go:k	<i>take</i>	t ^h eɪk	k ^h eɪk
<i>stroke</i>	gɹɔ:k	<i>think</i>	t ^h ɪŋk	k ^h ɪŋk
<i>thing</i>	gɪŋ, kɪŋ ²			
<i>tickle</i>	kɪkəl			

OUTLINE OF FIELD; THE MENNIAN CONCEPTION

3. There are two main strands of research

- Older, and still active: diary and corpus study of child production: the (relatively) systematic set of mutilations that toddlers inflict on the adult language.

¹ Dad speaks Received Pronunciation British English, Mum a rhotic variety of Indian English. Other inputs: RP-speaking relatives of Dad, a few months in American day care, a little time in India...

² Note on transcription: Smith used short [ɪ][ʊ] for what most people nowadays transcribe as [ɪ] [ʊ] (which are also IPA).

- More recent: experimental work probing what children (passively) know. This includes infants.

4. The Mennian view of how it all happens (Menn 1983, readings)

	<i>Child's theory of the parental language</i>	<i>Child's own ad hoc output system</i>
<i>Lexicon</i>	Words learned, mostly accurately, by listening.	The child's current, memorized, personal pronunciation: "I currently say <i>duck</i> [dʌk] as /gʌk/."
<i>Phonology (phonotactics and alternations)</i>	A system that describes and predicts how adults speak. An (evolving) target for how the child should speak.	The strategy for mapping adult pronunciations into entries in the personal kiddie-lexicon.

- The double bifurcation
 - grammar
 - lexicon
- For approving commentary, updated by 20 years, see e.g. Hayes (2004) Phonological acquisition in Optimality Theory: the early stages, in Kager et al. *Constraints in Phonological Acquisition*.

5. The natural history of a word in Menn's system

- It occurs spoken by Mommy/Daddy.
- Junior does the following — even in infancy:
 - segments it from context, a neat trick (below)
 - forms an auditory, perhaps phonemic image of it
 - stores it in the Lexicon of Mommy/Daddy
 - perhaps — but not necessarily successfully at first — makes a guess about meaning.
- A probably-older Junior seeks to become able to use the word herself.
- She has a **personal output phonology**, mapping the Mommy/Daddy lexical representation into a representation in the Lexicon of Me ("output lexicon").
- Should she wish to produce the word in an utterance, she extracts it from the Lexicon of Me, then applies her own (mostly phrasal?) phonology.

6. Ref. for last point

- Joseph Stemberger (1988) Between-word processes in child phonology. *Journal of Child Language* 15(1):39-61.
 - Several lovely examples from his child Gwendolyn.

7. What Menn didn't know in 1983

- This was just before a revolution happened in our ability to assess infant/child passive knowledge, notably the head-turn preference paradigm.
 - ... as here in the UCLA lab.
- I think the subsequent results only further validate her bifurcated point of view — now we know so much more about the infant/child's knowledge of the Mommy/Daddy system.

JUSTIFICATION OF THE MOMMY-DADDY LEXICON

8. Argument 1: its role in perception

- Children hear distinctions between words that they cannot make.
 - Either they are too young to talk at all.
 - Or they can talk but they neutralize the distinction,
 - or they don't even try (avoidance).

Cute anecdote: Smith on *mouse/mouth*

NVS	What does [maus] mean?
A	Like a cat.
NVS	Yes: what else?
A	Nothing else.
NVS	It's part of you.
A	[disbelief]
NVS	It's part of your head.
A	[fascinated]
NVS	[touching A's mouth] What's this?
A	[maus]

Only after a few more seconds did it dawn on him that they were the same."

- Menn emphasizes the confusion created when you confront kids with their own productions — they do not expect them from adults.

9. A second argument for the Mommy/Daddy lexicon: instant repair in production

- When the output phonology changes, some words get "fixed" even though the child has not heard them again since the change.

Smith, p. 139: "Once [Amahl] had learnt to produce clusters of a consonant plus [l], for both of adult /Cl/ and /Cr/, this cluster appeared immediately and correctly in words which it is quite certain he had not heard since before the critical day:

ground → [glaund] (previously [gaund])
 footprint → [wutplit] etc.

quite spontaneously. Similarly once [ʔ] appeared for /sl/ it appeared in all words containing initial at nearly the same time:

slug → [ʔʌg]
 slipper → [ʔipə] etc.”

10. A third argument for the Mommy/Daddy lexicon: using it to learn more

- Junior studies the Mommy/Daddy lexicon, learns the phonotactics, passes the blink test — at 9 months, see below.
- Or, learns (at 6 months!) that -s is some kind of suffix in English.
 - Hearing [glɪps] leads them to attend to [glɪp] as word.
 - Hearing [glɪpʃ] does not.
 - Kim, Yun .J. (2015). 6-month-olds' Segmentation and representation of morphologically complex words. Doctoral Dissertation, UCLA

JUSTIFYING THE CHILD'S OUTPUT LEXICON

11. The basic argument

- Another reference on this:
 - Menn, L. and Matthei, E. (1992). The "Two-lexicon" account of child phonology" looking back, looking ahead. In Ferguson, C., Menn, L., and Stoel-Gammon, C. (eds). *Phonological Development: Models, Research, Implications*. (pp. 211-247). Timonium, MD: York Press.
- How to prove it? Couldn't the child be storing Mommy-Daddy forms and applying her personal phonology at production time?
- Answer: *delayed update*
- Output phonology changes
 - Words learned exactly at that time get updated to correct pronunciation.
 - Old words — often, highly frequent old words — take some time to update.
- Sensible conception: hard unconscious mental work is happening at naptime.
 - Create novel output-lexicon representations, derived from the Mommy-Daddy representations, and replace the old entries.

12. Delayed update I: persistence of forms following process-loss

- Let's look at the Warmup Exercise in more detail:

a. Age 2 years + 233-242 days:

Still Harmonized	Free Variation	Not Harmonized
<i>anything</i> ɛni:kɪŋ	<i>desk</i> dɛk gɛk	<i>dagger</i> dægə
<i>cheek</i> k ^h i:k	<i>dog</i> dɔg gɔg	<i>drinking</i> dɪŋkɪn
<i>cheque</i> kɛk	<i>drink</i> dɪŋk glɪŋk, etc.	<i>drunk</i> dɪŋt
<i>choke</i> k ^h o:k	<i>duck</i> dʌk gʌk	<i>strong</i> tɹɔŋ
<i>doctor</i> gɔktə ³	<i>sock</i> t ^h ɔk k ^h ɔk	<i>tongue</i> tʌŋ
<i>flapjack</i> læpgæk	<i>sugar</i> t ^h ugə kugə	
<i>joke</i> go:k	<i>take</i> t ^h eɪk k ^h eɪk	
<i>stroke</i> gɹɔ:k	<i>think</i> t ^h ɪŋk k ^h ɪŋk	
<i>thing</i> ɡɪŋ, kɪŋ ⁴		
<i>tickle</i> kɪkəl		

b. Age 2 years + 247-256 days:

Still Harmonized	Free Variation	Not Harmonized
<i>chocolate</i> k ^h ɔkɪt	<i>tickle</i> t ^h ɪkəl k ^h ɪkəl	<i>chalk</i> t ^h ɔ:k
<i>take</i> k ^h eɪk		<i>flapjack</i> læpdæk
		<i>dog</i> dɔg
		<i>duck</i> dʌk
		<i>sugar</i> t ^h ugə
		<i>strong</i> t ^h ɹɔŋ
		<i>doctor</i> dɔktə
		<i>thank you</i> t ^h æŋku:
		<i>think</i> tɪŋk
		+ 13 more

c. The special history of *take*

[k^heɪk] lasted to age **3 years 45-70 days**—about 170 days after stage (b) above.

³ Dad speaks Received Pronunciation British English, Mum a rhotic variety of Indian English. Other inputs: RP-speaking relatives of Dad, a few months in American day care, a little time in India...

⁴ Note on transcription: following British IPA tradition, Smith uses short [ɪ][ʊ] for what you probably transcribe as [ɪ] [ʊ] (which are also IPA).

13. Interpretation

- The *already-known* words had to undergo a restructuring within the Lexicon of Amahl before he could pronounce them correctly.
- The Lexical Phonology of Amahl (newly modified so as not to inflict Velar Place Harmony) created the new L-of-A entries by **processing** the MD Lexicon. The old entries were cleared out, over a period of about a month.
- A novel word has no lexical entry in the Lexicon of Amahl. It acquires a lexical entry in the MD Lexicon through speech perception, and a Lexicon of Amahl entry through the Lexical Phonology of Amahl.

14. Delayed update II: persistence of forms following process-introduction

- How could this even be possible?
- Not clear, but there are **phonological idioms**, like Hildegard Leopold saying “pretty” accurately at 9 months.
 - She later acquired a more systematic approach and pronounced it as ['bidi].
- Daniel Menn had the following history:

<i>down</i>	<i>stone</i>	<i>dance</i>	<i>train</i>	
[dæʊn]	[don]	?	?	stage I
same	same	[næns]	[neɪn]	Nasal Harmony kicks in
[dæʊn ~ næʊn]	[don ~ non]	same	same	regularization begins
[næʊn]	[non]	same	same	regularization ends

THE CHILD'S OUTPUT PHONOLOGY

15. The arrival of OT in child phonology in the 1990's

- An existing field acknowledging that kiddie-mutilations reflect phonetic naturalness and other apparent Markedness effects.
- ... and that child phonology can be conspiratorial (Smith 1973, Menn readings)

16. OT was a natural, perhaps?

- Conspiracies
- Strong cross-child resemblances
- Effects of dominated constraints (Pater dissertation)
- Free variation

17. A refreshing trait of child output-phonology

- It is invented afresh by Junior and has no history.

- It's tempting to say, "hooray, finally a phonology with no obscuring diachronic effects!"
 - So it all comes out by ranking the Universal Constraint Inventory, whee!

18. There is an enormous literature in OT child phonology

- ... over which I have only modest command, caveat caveat
- among the leading lights are Anne-Michelle Tessier, Joseph Stemberger, Joe Pater, Karen Jesney, Paula Fikkert, others
- A volume with several essays is: *Constraints in Phonological Acquisition* (2004) edited by René Kager, Joe Pater, Wim Zonneveld

IS CHILD MARKEDNESS THE SAME AS ADULT MARKEDNESS?

19. Some examples

- a) Amahl, at age 2 years, 60 days, rendered all stops as voiceless unaspirated lenis initially, voiced in medial position, and voiceless finally; thus [ʰebu] 'table', [a:t] 'hard', [ʰwə:gɪn] 'working'. Cf. Lac Simon, Korean, German, respectively.
- b) Amahl required every consonant to be either prevocalic or final, so he produced no consonant clusters. Cf. Gokana (Hyman 1982, 1985).
- c) Some children impose gaps in their stop inventories at [p] or at [g] (Ferguson (1975), Macken (1980b). Cf. Arabic, Dutch, respectively.
- d) Some children voice obstruents postnasally (Ferguson 1975, 11; Locke 1983, 120, also references in Kager text). Cf. Ecuadorian Quechua (Orr 1962), Eng. dial. *Washington* [ʰwɑʃɪŋdən].⁵
- e) Sharon Inkelas's child did "velar fronting" — wiping out all velars in the same environment adult English forbids velar nasals:

⁵ References cited, and others relevant:

Donegan, Patricia Jane and David Stampe (1979) "The study of Natural Phonology," in Daniel A. Dinnsen, ed., *Current Approaches to Phonological Theory*, Indiana University Press, Bloomington, pp. 126-73.

Eimas, Peter (1996) "The perception and representation of speech by infants," in James L. Morgan and Katherine Demuth, eds., *Signal to Syntax: Bootstrapping from Speech to Grammar in Early Acquisition*, Lawrence Erlbaum Associates, Mahwah, NJ, pp. 25-39.

Ferguson, Charles (1975) "Sound patterns in language acquisition," in Daniel P. Dato, ed., *Developmental Psycholinguistics: Theory and Applications, Georgetown University Round Table on Languages and Linguistics*, 1975, Georgetown University Press, Washington, DC, pp. 1-16.

Hamp, Eric P. (1974) "Wortphonologie," *Journal of Child Language* 1, 287-288.

Hyman, Larry M. (1982) "The representation of nasality in Gokana," in Harry van der Hulst and Norval Smith, eds., *The Structure of Phonological Representations, Part I*, Foris, Dordrecht, pp. 111-130.

Locke, John L. (1983) *Phonological Acquisition and Change*, Academic Press, New York.

Macken, Marlys A. (1980) "Aspects of the acquisition of stop systems: a cross-linguistic perspective," in Grace H. Yeni-Komshian, James F. Kavanagh, and Charles A. Ferguson, eds., *Child Phonology, Volume 2: Production*, Academic Press, New York, pp. 143-168.

Orr, Carolyn (1962) "Ecuadorian Quichua phonology," in Benjamin Elson, ed., *Studies in Ecuadorian Indian Languages I*, Summer Institute of Linguistics, Norman, Okla.

Stampe, David (1973) *A Dissertation on Natural Phonology*, Ph.D. dissertation, University of Chicago. Distributed 1979 by Indiana University Linguistics Club, Bloomington.

cup → [tʌp]	*[ɲʌp]	
again → [ə'din]	*[ə'ɲɛn]	
conductor → [tən'dʌktə]	*[ɲən'dʌktə]	
but		
bucket → ['bʌkɪt]	gingham	['gɪŋəmə]
book → ['bʊk]	thing	['θɪŋ]

- Sharon Inkelas and Yvan Rose (n.d.) "Velar Fronting Revisited", with Yvan Rose. In Barbara Beachley, Amanda Brown & Fran Conlin (eds.), *Proceedings of the 26th Annual Boston University Conference on Language Development*. Somerville, MA: Cascadia Press.

20. Theories of constraint origin: phonetic difficulty

- Background literature to this: efforts to deduce the constraint set from “maps” of phonetic difficulty.
 - Hayes, Bruce (1999) "Phonetically-Driven Phonology: The Role of Optimality Theory and Inductive Grounding" in Michael Darnell, Edith Moravcsik, Michael Noonan, Frederick Newmeyer, and Kathleen Wheatly, eds., *Functionalism and Formalism in Linguistics, Volume I: General Papers*, John Benjamins, Amsterdam, pp. 243-285
 - Archangeli and Pulleyblank
 - Steriade, Donca. 2009. The Phonology of Perceptibility Effects: the P-map and its consequences for constraint organization. in Kristin Hanson and Sharon Inkelas (eds.) *The Nature of the Word: Studies in Honor of Paul Kiparsky*, pp. 151-79.
 - others
- The [p]-gaps and [g]-gaps in children seem appealingly explained in this way.
- The tendency to place consonants next to vowels renders them maximally detectible.
 - If you're going to throw stuff away, increase your perceptibility by throwing away the least salient stuff.

21. Some things children do that adults don't (with possible explanations)

- a) Consonant harmony: *sock* = [gʌk]
 jaw-governed consonant articulation vs. tongue/lip-governed articulation
- b) Front-to-back place ordering constraints within words:

Alice, for example, produces consonants in a front to back order in terms of articulatory place (e.g., labial before palatal or velar), regardless of their order of occurrence in the target word (Jaeger, 1997). Thus, *sheep* becomes [piç] ... kite [taik], and T.V. [piti] ([p] substitutes for /v/).⁶

Has anyone checked this in adult languages? It might be a tendency.
 The method we used on medial clusters could help with rigor.

⁶ From:

<http://www.york.ac.uk/media/languageandlinguistics/documents/staff/publications/Velleman&Vihman%20ch%202.pdf>

- c) Obligatory long-distance movement of /s/: *step* = [pɛts] (Hamp 1985) (though compare historical Ilokano *ta:ŋis > *sa:ŋit ‘weep’ (Aklanon ta:ŋis, Toba Batak taŋis), *tamʔis > samʔit ‘sweet’ (Aklanon tamʔis, Tagalog tamis, Timugon Murut ma-tamis), and similar cases).⁷

22. Menn’s theory of serendipitous, temporary markedness

- Child A is practicing, playing ...
- She hits on the way to say [l] right, repeats, learns (is happy?)
- This becomes a plausible way to render [j], as yet unlearned motorically; because the two are phonetically similar.
- Child B is A’s mirror image: she accidentally learns [j] first!
- This idea is often ignored, I suspect, in the OT acquisition literature.
- “Informal observation suggests that [l] and [j] are roughly equally likely to be found substituting for each other.” p. 22
- N.B. quite unlikely you will learn final [bdg] first and substitute them for correct [ptk] — often real differences of difficulty induce consistent “Markedness” patterns across children.

23. An alternative point of view

- Much more orthodox-OT
 - Paul Boersma & Clara Levelt (2000) Gradual constraint-ranking learning algorithm predicts acquisition order. Proceedings of Child Language Research Forum 30, Stanford, California, pp. 229-237.
 - Curtin, Suzanne and Kie Zuraw (2002). Explaining Constraint Demotion in a Developing System. In Anna H.-J. Do, Laura Domínguez, and Aimee Johansen, editors, BUCLD 26: Proceedings of the 26th annual Boston University Conference on Language Development. Cascadilla Press.
- Let the Markedness constraints have a high bias, Faithfulness a low one.⁸
- Assume a constraint ranking/weighting algorithm.
- Input adult data, following the typical frequencies of the adult language.
- Constraints rerank/reweight following these frequencies.

24. Commentary

- Such models will never be fully predictive, per Menn, since they cannot take into account the effects of accidental “discovery order”.
- Yet it seems fully sensible that adult frequencies would affect acquisition order; this is probably functional to the child.

⁷ From Andrew Garrent and Juliette Blevins (2004) “The evolution of metathesis” in *Phonetically-based phonology*, ed. by Bruce Hayes, Robert Kirchner, and Donca Steriade (Cambridge: Cambridge University Press), pp. 117-156.

⁸ In the papers cited, this is done with *a priori* rankings, not maxent biases.

25. Menn and others on “templates”

- I’m not aware of OT work on this, yet it forms Menn’s primary case of conspiracies.
- Citing Priestly, she gives these mappings for little Christopher:

pillow [pijal]
 Brenda [bajan]
 tiger [tajak]
 rabbit [rajat]
 melon [majan]
 woman [wajum]
 dragon [dajan] “Week 4”, [dajak] “Week 5”⁹

- This seems amazingly Semitic, but solves a phonological problem.
- A revival in OT analytic interest in templatic morphology might well include these kiddy-cases as well.
- Are they Faithfulness to a made-up morpheme? Markedness “credits”??

26. Other pseudo-morphology used for phonological purposes

- Iambs are hard; e.g. [bun], [lun] are common for *balloon*.
- Some tykes adopt scavenged “prefix” replacements for initial pretonic syllables:
 - Amahl used [ri]
 - Gnanadesikan’s kid used [fi] (perhaps her rendering of proclitic *for*).
- Amahl data:

attack [ri'tæk]

and: re-range, re-turb, re-lastic, re-scape, re-jaffe, re-mometer

- He then briefly tried *in-* before giving up and saying the words correctly.

AVOIDANCE IN CHILD PHONOLOGY

27. This happens, though less often, for adults

/silly + ly/	*[I] + LY	*VC _x əC _x V	*NULL PARSE
☞ Null Parse			*
['sɪləli]		*!	
['sɪlɪli]	*!		

⁹ My son at the very earliest stages idiosyncratically said ['aja] to mean “light”, baffling his parents; but he never adopted a [CajaC] template like Christopher.

/happy + ly/	*[I] + LY	*VC _x ∅C _x V	*NULL PARSE
☞ ['hæpəli]			
Null Parse			*!
['hæpili]	*!		

- Exceptions to *VC_x∅C_xV: *canonization, classicist, diocesan, probable, indescribable*; all can be apologized for in some way.

28. More or less standard approach in OT: NullParse

- Earlier work, but especially
- John J. and Wolf, Matthew, "Less than zero: Correspondence and the null output" (2007). *Modeling Ungrammaticality in Optimality Theory*. 22.

29. It's much more common for little kids

- To prove it you have to show that the kid knows a lot of words with the avoided sound or sequence; this has been done.

30. A tiny exercise: Jacob Hankamer's velar stops (Menn 18)

#k → #k
 #g → don't try to say these words
 k# → k#
 g# → k or null

The other places of articulation make this harder; I'm puzzled that [p] is avoided initially but not finally.

NEAR-NEUTRALIZATION

31. Near-neutralization

- Near-neutralization is by now a widely-studied topic in adult phonology, with many studies especially of Final Devoicing.
- Current 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.

32. 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 toys in a recording booth, in various sessions, as they got older.
- General age range was 1;5 to 2;4.
- Interesting problem: the kids tended to have avoidance for [p] and [g]. Experimenters introduced discussions of goats, gates, and pennies. Parents were urged to bring in their household's Piglet ...
- Researchers measured Voice Onset Time for all the word-initial stops.

33. Results

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

34. Near-Neutralization II: Compensatory Lengthening

Allyson Carter 1999, *An Integrated Acoustic and Phonological Investigation of Weak Syllable Omissions*, U. Arizona dissertation. Don't have with me, but data look like:

<i>banana</i>	[¹ næ:nə]
<i>two</i>	[¹ tu:]
<i>two bananas</i>	[¹ tu:; ¹ nænə]

35. 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

36. Is the child's output phonology opaque? A famous false example

- Macken (1980, *Journal of Linguistics*)¹⁰ showed that Smith was not entirely right: children *do* mispronounce some words because they misheard them.
- The mishearing is not just an isolated form, but can involve an entire contrast.
- We should be surprised that such effects exist, given the exquisite phonetic hearing possessed by infants.

37. Pre-L Velarization

Smith (1973) takes the view that Amahl had a (Lexical) Phonology of Amahl rule:

alveolar → velar / __ l

Thus: *puddle* emerged as [ˈpʌgɫ]

38. 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.

39. Interesting Further Issue: Opacity

/l/ Velarization is apparently counterfed in the Phonology of Amahl; for example:

<i>puddle</i>	<i>puzzle</i>	
/pʌdɫ/	/pʌzɫ/	
pʌgɫ	—	Pre-L Velarization
—	pʌdɫ	z → d everywhere

40. Further Scrutiny of Smith's Data by Macken (1980)

- 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%.

¹⁰ Macken, Marlys (1980). The child's lexical representation: the 'puzzle-puddle-pickle' evidence. *Journal of Linguistics* 16: 1-17

- [t] 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>	[pitʔ]	(earlier, with /k/)
<i>circle</i>	[sə:tʔ]	(earlier, with /k/)
<i>winkle</i>	[wintʔ]	(new word)

41. My Own Counts

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

- It's possible that these data reflect no real progress at all, only a tendency to start guessing /t/ more often—cf. the linguist's pathetic transcription strategy; “guess the more frequent one”.
- Hence I'm not convinced by Smith's and Macken's view that Amahl had gotten it right by the end of the study.

42. Summing Up the Macken Results

- The “puggle” phenomenon seems to have all the traits of perceptual misacquisition: a subtle acoustic distinction, gradual learning, necessity of rehearsing a form to get it right.
- The analyst must therefore inspect diary data carefully for whether a process is the result of misperception or a systematic production module.¹¹
- Diagnostic for MD Lexicon: institution of a contrast *faster than it could be gotten by relearning from ambient data* (per above).

43. 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.
- [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.
- How did Amahl ever recover? Perhaps the sample size simply got big enough to reveal the bimodal distribution.

¹¹ To give Smith credit: he *did* detect misperception in certain other cases; see p. 147 of Smith 1973.