GRS LX 865
Topics in Linguistics

Week 6. Amahl, Smith, Macken, ChildPhon, and the acquisition of phonology

Smith (1973)

- Smith, Neilson (1973). *The acquisition of phonology: A case study*. Cambridge: Cambridge University Press.
- Diary study of the phonological development of Amahl, British English being the primary language, some exposure to Hindi and Marathi.
  - We have data from "Stage 1" (2;2) and "Stage 29" (3;11).

Crash course in phonology

- The sounds that make up our words can be classified into several categories, each of which at some times act differently from the others.
- Broadly, there are *consonants* and *vowels*.
- Consonants are generally those sounds which are made by obstructing some part of the airflow, vowels are the open sounds.

Consonants and POA

- Consonants can be further divided into categories based on *where* the airflow is constricted (the *place of articulation*):
  - **labial:** airflow is constricted at the lips (*m*, *b*, *p*)
  - **coronal:** airflow is constricted by the tip of the tongue (*t*, *d*, *n*)
  - **dorsal:** airflow is constricted by the back of the tongue (*g*, *k*, *ng*)

Consonants

- Consonants come in several categories along another dimension too. Those relevant to ChildPhon are:
  - **Obstruents** (stops generally)
  - **Nasals** (*m*, *n*, *ng*)
  - **Liquids**, **Lateral**, **Rhotic** (*l* and *r*)
  - **Glides** (*y*, *w*)
- They generally differ in how *sonorous* they are, which roughly corresponds to how much airflow they permit.

Syllables

- A syllable is generally a peak in sonority, so *cat* (OVO), *tramp* (ORVNO).
- Syllables generally cannot fail to be a sort of smooth rise-fall in sonority (**rtapm*).
- ChildPhon knows this, and is able to take a word you type (like *trampoline*) and automatically segment it into syllables (*tram.po.line*).
  - Syllables generally like to have *onsets* (a low-sonority point before the *nucleus,* the vowel part), so a single consonant between two vowels is generally part of the second syllable.

IPA

- The sounds of language are standardly transcribed in the International Phonetic Alphabet, which is the transcription system ChildPhon understands.
- We won't have to enter anything in this system, but you have to be prepared for the phonetic transcription to look a bit different from the English word.

Child phonology

- Kids pronounce things funny.
  - NS: Say 'jump'.
  - A: dup
- The question is: why? And how do they get to the adult system (which we know is relatively complex)?
- Much of the field of phonology has been devoted to showing that lexical representations contain a rather abstract underlying form that is interpreted by a phonological system to reach a pronunciation.

Child phonology

- The adult phonological system takes an input form and, by applying rules one after another, or by evaluating possible output forms against ranked constraints, yields a pronunciation.
  - E.g., word-final devoicing in German, where the output form ends in a devoiced consonant (*hund* [hunt]), but you can see that the distinction between voiced and unvoiced consonants is still there if the consonant is pulled away from the end of the word (*hunden* [hunden]).
- Smith observed systematicity in Amahl's speech, and set out to write rules that would convert abstract underlying representations into the observed pronunciations, studying how the system evolved over time.

Lexical representation

- An important issue when trying to understand child phonology is *what does the child <u>think</u> the underlying form of the word is?*
  - Do they know what the adult word is but can't pronounce it?
  - Or can't they *hear* what the adult form is (and their perceptual system is developing)
- Smith's hypothesis is that the child essentially had the underlying forms correct, but it was the mapping between these underlying forms and the pronunciation that was developing.

Perception, underlying forms

- Amahl seems to recognize that his outputs differ from the target.
- Amahl seems to be able to map the child output to the adult input if it is still in his system and doesn't conflict with an adult word.
  - A identified *start* when hearing himself say *sa:t* ('start the tape recorder') on tape.
  - Later, when A could say *start*, the same tape recording baffled him.

…
NS: No, 'jump'
A: dup.
NS: No, 'jummmmmp'
A: Only Daddy can say 'jump' ([dup]).

NS: What's a seht?
(A points to shirt)
NS: What's a soo?
(A points to shoe)
NS: What's a sip?
A: When you drink.
NS: What else?
A: zip?
NS: No, it goes in the water.
A: A boat.
NS: Say it.
A: No. I can only say sip.

Across the board

- Across-the-board changes.
- For a while, A might say *wi:t* 'feet', *winge* 'finger', *wæ:* 'fire'.
- Then, all of a sudden, they all get fixed (*fi:t*, *finge*, *fæ*), at once—while adult *w*-initial words still come out as *w*-initial.
- *Bed* and *bread* both pronounced as *bed* for a time, but once *br*-type clusters appeared, *bread* was pronounced correctly, and *bed* was never pronounced like *bread*.
- So, he could tell *w* from *f*, and *b* from *br*, and stored it that way, he just couldn't produce the distinction.

Keiking the cake

- One case Smith points to is A's use of *take*, which seemed to persist as *keik* even after the rule that would have caused */take/* to come out as *keik* ceased to function for other words.
- NS observed that this also held for *taking* (*keikin*) and *taken* (*keiken)*, and concluded that here A had actually "relexicalized" the word, here he actually had the underlying representation wrong (in part, telling us something about how many A had gotten right).

Puzzles, recidivism

- One celebrated case in A's data was a point where he would say *pudEl* 'puzzle', but *pugEl* 'puddle'.
- So it's not about *puddle* being hard to say, it's about a *system* of mapping underlying forms to output forms.
- Also, some progressions (*recidivism*) were observed where a contrast is made, then lost.
  - *dait* 'light', 'side' (/s/, /l/ -> [d])
  - *dait* 'side', *lait* 'light' (/s/->[d], /l/ appears)
  - *lait* 'light', 'side' (/s/->[l])
- Overall conclusion: Kids lexicalize adult forms, and have a systematic phonology converting them to the child pronunciations.

Smith's task

- What Smith set out to do is write a set of rules (which A seemed to be following) that could predict what A would say (systematically) based on the adult form.
- Then, Smith analyzed what happened to each rule over the course of development (increasing in priority, becoming optional, disappearing, or appearing).

A sampling of Smith's rules

- R1: A nasal consonant is deleted before any voiceless consonant:
  - *stamp*: deb (<dep) *bump*: bUb
  - *drink*: gig (<gik) *tent*: ded
  - *uncle*: Ugu *empty*: ebi:
- R2: A voiced consonant is deleted after a nasal consonant:
  - *window*: winu: *hand*: en
  - *mend*: men *band*: ben
  - *round*: daun *finger*: winge
- R6: *l* is deleted finally and before a consonant
  - *ball*: bO: *milk*: mik
- R7: *s* is deleted before a consonant
  - *skin*: gin *spoon*: bu:n
- R25: All consonants are voiced

For example…

- Starting with the (RP) English pronunciation and executing some rules:
- Starting with *stamp*:
  - Delete nasal *m* before voiceless *p* (R1)
    stap
  - Delete *s* before *t* (R7)
    tap
  - All consonants are voiced (R25)
    dab (close enough: *deb*)

Macken (1980)

- Argues that there are after all some perceptual problems for kids ("upstream from the lexical entry"), resulting in a non-adult underlying form, not just production problems ("downstream from the lexical entry").
- Focuses specifically on the puzzle~puddle~pickle evidence.

Puzzle~puddle~pickle

- Smith's rules:
- R3: n becomes ng, t/d become g before a syllabic l.
  - Handle -> engu beetle -> bi:gu
    bottle -> bOgu pedal -> begu
- R24: f, v, s, z, sh, zh, tch, dzh -> t/d
  - Brush, bus -> but John -> dOn
    other -> uhdeh
- So puddle->puggle by R3;
  puzzle->puddle by R24

Exceptions

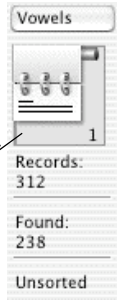
- Macken located puddle words (R3 should change them to puggle). About 20% of them didn't change.
- She located puzzle words (R24 should change them to puddle). They all changed.
- She also located "pickle" words.
  - If puddle->puggle (R3) and then R3 goes away, puddle should revert to puddle— but if in the process pickle words go too (pickle->puttle) then puddle words and pickle words were probably stored the same way (as puggle/pickle).
  - Almost 40% of the sample (3 words out of 8) picked up an errant t: cirtles, pittle, wintle 'winkle'.

Upstream, downstream

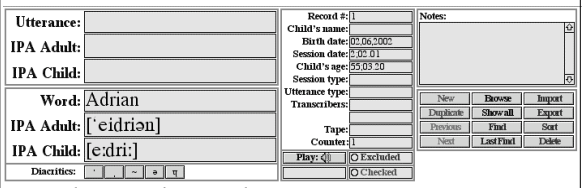
- Macken concluded that Smith's data suggest that A actually stored some (80%) of the puddle words as puggle underlyingly, as a result of mishearing them (systematically, an upstream perceptual rule).
- R24 (puzzle->puddle) does seem to be as Smith described, a downstream rule which, when it changes affects everything it could apply to.

ChildPhon organization

- ChildPhon is organized essentially like a bunch of index cards.
- Each card has a single word on it, the adult form, the child form, and some notes about the transcript it comes from.
- Clicking on the "rolodex" moves you from card to card.



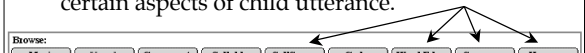
ChildPhon "cards"



- This is what each "card" looks like.
- For the Smith data, "counter" has the stage number (either 1 or 29).

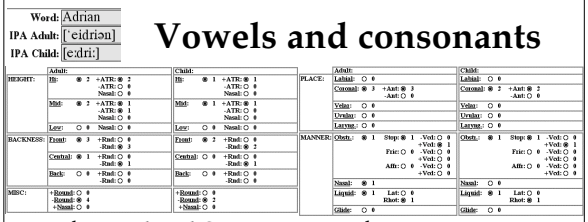
ChildPhon sections

- You can view information on each card from several angles, each providing information on certain aspects of child utterance.



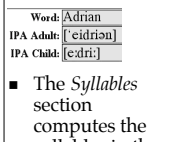
- Most give you only information about the particular card you are looking at, but some (indicated) also give you summary information about the set of cards you have currently selected.

Vowels and consonants

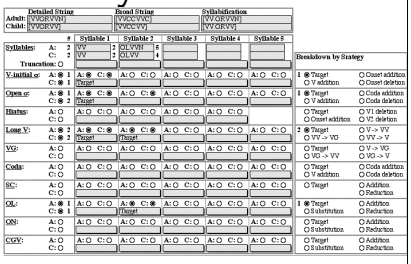


- The *Vowels* and *Consonants* views show you summary information about the vowels and consonants in the word on this card, with the adult form on the left and the child form on the right.
- So, the adult has a nasal (at the end), the child does not have any nasals.
- The totals are for the whole word.
- Note that these are filled in for you, based on the IPA.

Syllables

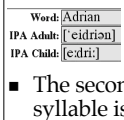


- The *Syllables* section computes the syllables in the adult and the child form, then gives you a few types of syllable properties you might wish to look at in child speech.

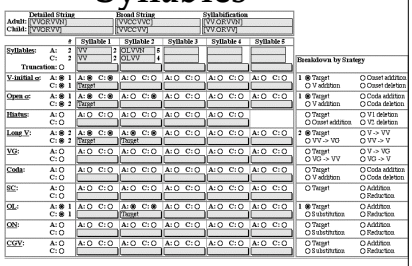


- The first syllable is vowel-initial for the adult and for the child (the child hit the target with respect to syllable type).
- This is recorded on the right.

Syllables

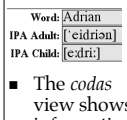


- The second syllable is a *closed syllable* for the adult (does not end in a vowel), but is an *open syllable* for the child.
- *Hiatus* means two vowels next to each other.

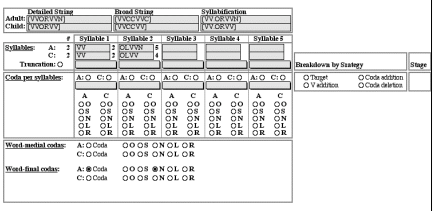


- *Long vowels* are double-length (written with a colon in the transcription).
- *Obstruent*, *Liquid*/*Resonant*, *Nasal*, *Strident*.

Codas

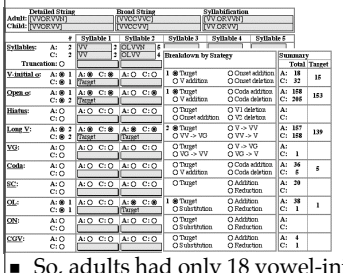


- The *codas* view shows information specifically about the coda consonants.



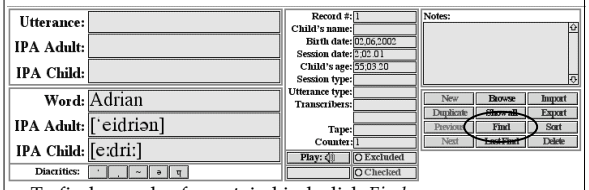
- Also information differentiating word-final and word-medial (for multi-syllable words) codas, since they often act different from one another.
- This word seems not to count as having any codas, except in the word-final row. (I don't really understand why the second syllable adult didn't count as having a nasal coda).

Syllable summary



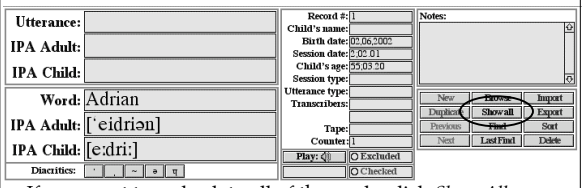
- The syllable summary view is one of the more interesting ones, because it shows the overall targets across the whole selected card set (here, stage 1).
- So, adults had only 18 vowel-initial syllables, 15 of which A produced correctly as being vowel-initial, but there are also 17 more syllables that *weren't* vowel-initial but which A produced as being vowel-initial.

Searching



- To find records of a certain kind, click *Find*.
- This brings up a blank record, and allows you to enter the search criteria. Then click the find button on the left (or hit Enter) to actually select the set of cards that match.
- For example, *counter* of 29 returns stage 29.
- We can then look at syllable summary to see summaries for the selected cards (stage 29).

Searching



- If you want to go back to all of the cards, click *Show All*.
- *Next* and *Previous* just move between cards.
- *Last Find* will recall the settings of the most recent *Find* you did (so you can add further criteria to narrow the search).
- Now, on to some actual tasks.