Class 4, 1/19/2023:   Saltation; Basics of Acquisition

1.   Assignments

- Hand in your Ilokano homeworks. I'll try to grade/return them Tuesday.
- For Tues, 1/19/2023: read
    ➢ Menn, Lise (1983). Development of articulatory, phonetics, and phonological capabilities. In Brian Butterworth (ed.) Language production, vol. 1. London: Academic Press. 3-47
    ➢ on course web site
    ➢ Please do a one-half page summary with just the high points, due Tuesday in class.

2.   Review: dealing with apparent derivational effects in phonology

A suggested method (slightly revised from last time, to reflect what we covered):

1. Do **rule based** analysis for clarity and historical insight (internal reconstruction).
2. Is the phenomenon **opaque**, and in what way?
3. Is the phenomenon **well-studied** (corpus scrutiny, testing for productivity)?
4. Is the phenomenon **diachronically stable**?
5. What **analyses** (in various theories) might be compatible with all the facts?

3.   Stance taken here

- Caution: this is not consensus!
- Despite initial appearances, something not far from classical OT might be scientifically viable:
    ➢ Doubt has been cast on the synchronic validity of some opacity cases (notably, Mayer's result; they work only for frequent words, which might be memorized)
    ➢ Modest beefing up of the classical theory, in ways needed anyway: flexible, similarity-based correspondence; OO-Correspondence or equivalent

DERIVATIONAL EFFECTS, CASE 3: SALTATION IN CAMPIDANIAN

4.   Saltation: schematic definition

A becomes C
while B, which is "phonetically intermediate" between A and C, is stable.[1]

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[1] In Latin, *saltare* can mean "hop"; using in English more in the sense of "jump". "Saltation" is used (disapprovingly) in discussions of Natural Selection: "Natura non facit saltus".

5.   An example of a saltatory alternation: Campidanian Sardinian

- Source: Bolognesi, Roberto (1998) *The Phonology of Campidanian Sardinian*, Holland Institute of Linguistics

[Hmm, is Paolo a native speaker? He grew up 87 km. away, in the same dialect region …]

Intervocalic lenition of voiceless stops /p, t, k/ and the voiceless affricate /tʃ/ (underlying forms justified by appearance in isolation):

bɛlːu [p]iʃːi	→	bɛlːu [β]iʃːi	'nice fish'
sːu [t]rintaduzu	→	sːu [ð]rintaduzu	'the thirty-two'
dɛ [k]uatːru	→	dɛ [ɣ]uatːru	'of four…'
sːu [tʃ]ɛʁu	→	sːu [ʒ]ɛʁu	'the heaven'

Preservation of underlying intervocalic /b, d, g/:

sːa [b]ia	→	sːa [b]ia	'the road'
sːu [g]atːu	→	sːu [g]atːu	'the cat'
donːia [d]ominiɣu	→	donːja [d]ominiɣu	'every Sunday'

6.   The Campidanian saltatory alternation is productive

sːa [p]olonia	→	sːa [β]olonia	'(the) Poland'
sːu [k]omputːɛ	→	sːu [ɣ]omputːɛ	'the computer'
sːu [t]asːi	→	sːu [ð]asːi	'the taxi'

7.   Rule based analysis

- This is amazingly easy in SPE!
- No one even noticed it as a problem/phenomenon, to my knowledge.

$$\begin{bmatrix} -\text{sonorant} \\ -\text{voice} \end{bmatrix} \rightarrow \begin{bmatrix} +\text{voice} \\ +\text{continuant} \end{bmatrix} / \text{V} \underline{\quad} \text{V}$$

- The key wrinkle is that we mention [−voice] on the left side of the arrow and [+voice] on the right.

8.   Other examples of saltation

- Slovak: [i], [u] alternate with [ie], [uo] in various contexts; bypassing [eː] and [oː] (Rubach 1993 *Lexical phonology of Slovak*)
- Colloquial Northern German: /g/ → [x] finally, but /k/ remains. [tagə] 'days' [tax] 'day', [dɪk] 'fat'

➢ Ito and Mester (2003)

9. Saltations never arise by sound change (postlexical processes) but are restructured accidents

- This is the claim of Hayes and White (2015)
- The attempted to find as many saltations as possible;[2] they are hard to find and seem always to arise through a combination of accidental historical circumstances.
    ➢ Bruce Hayes and James White (2015), Saltation and the P-map. *Phonology* 32:267-302.

10. Classical OT can't handle this

		Id(cont)	Id(voice)	*V[-cont]V	*V[-vce]V	*β
apa	apa			1	1	
	aba		1	1		
	aβa	1	1			1
aba	apa		1	1	1	
	aba			1		
	aβa	1				1
βa	βa					1
	ba	1				

- Software (or patience) will tell you there is no ranking that works.
- Intuition: if stops are bad intervocalically, and the Faithfulness cost of /b/ → [β] is less than the Faithfulness cost of /p/ → [[β], then we expect /b/ to become [β].

11. Is the phenomenon opaque, and in what way?

- It is not.
    - There are no surface exceptions to Spirantization, and the environment remains clear on the surface.
- But it's a problem for OT, as has been known for a long time.
    ➢ Ito, Junko & Armin Mester (1998). Markedness and word structure: OCP effects in Japanese. Ms, UCSC. Available at Rutgers Optimality Archive, 225, www.roa.rutgers.edu.
    ➢ Ito, Junko & Armin Mester (2003). On the sources of opacity in OT: coda processes in German. In C. Féry & R. van de Vijver (eds.) The syllable in Optimality Theory. Cambridge University Press. 271–303.
    ➢ Lubowicz, Anna (2002). Derived environment effects in Optimality Theory. Lingua 112. 243–280.
    ➢ Lubowicz, Anna (2003). Local conjunction and comparative markedness. Theoretical Linguistics 29. 101–112.

12. Is the phenomenon well-studied (i.e. for Campidanian)?

- Not really — an absorbing dissertation by one single researcher, which covers many other things as well.

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[2] I continue this effort: https://linguistics.ucla.edu/people/hayes/papers/MoreSaltations.htm

- ➢ Bolognese, with great honesty, expresses doubt in some cases about whether he has the facts right.
- No corpus work, no psycholinguistic testing, no replication.

13. Is the phenomenon diachronically stable?

- For Campidanian, we don't know (and perhaps never will, if Campidanian fails to survive).
- However, James White's Artificial Grammar Learning studies on English adults and infants, with made-up pseudo-Campanian, strongly suggest instability

  - ➢ People exposed to alternations like [tap] ~ [tav-i] strongly tend to want to say [kab] ~ [kav-i], even when trained on [kab] ~ [kab-i].

- Here is White's body of research[3]
- Hayes, B. & White, J. (2015). Saltation and the P-map. *Phonology*, 32(2), 1–36.
  - *typology of saltation and how to analyze it in P-map*
  - *It arises only through historical accidents, never directly.*
- White, J. (2014). Evidence for a learning bias against saltatory phonological alternations. *Cognition*, 130(1), 96–115.
  - *experiments on adults*
- White, J. & Sundara, M. (2014). Biased generalization of newly learned phonological alternations by 12-month-old infants. *Cognition*, 133(1), 85–90.
  - *experiments on infants*
- White, James (2017). Accounting for the learnability of saltation in phonological theory: A maximum entropy model with a P-map bias. *Language*.
  - *bias-based learning in the style of Wilson (2006)*

14. White's experiments

- He made up an artificial pseudo-Campidanian, with training examples like sg. [kamap] ~ [kamavi], [veleb] ~ [velebi].
- Subjects get confused, thinking the plural of a novel stem like [minib] should be [minivi].
- … and this is predicted by White's maxent model, using P-map from confusion matrices gathered by psychologists.

15. What analyses might be compatible with all the facts?

- White thinks it's based on phonetic similarity.
- If you use *Map() constraints on segment pairs rather than classical Ident(), you find that Campidanian works only with a phonetically unnatural ranking.

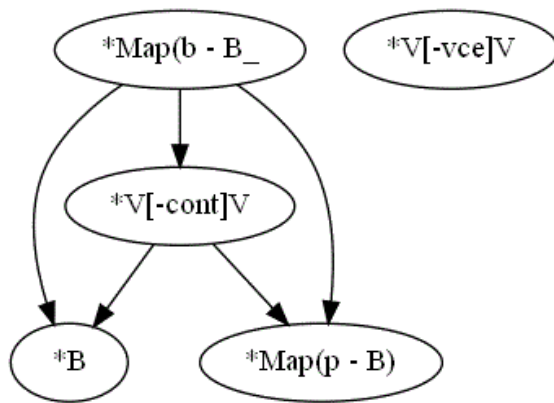[3] It originated in a Linguistics 201A term paper. :=)

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/apa/:
      *V[-vce]V¦*Map(b - β)|*V[-cont]V|*Map(p - β)¦*β
>aβa              ¦              |              |    1      ¦1
 aba              ¦              |    1!        |           ¦
 apa     1!       ¦              |    1         |           ¦


/aba/:
      *V[-vce]V¦*Map(b - β_|*V[-cont]V|*Map(p - β)¦*β
>aba              ¦              |    1         |           ¦
 aβa              ¦      1!      |              |           ¦1
 apa     1!       ¦              |    1         |           ¦


/βa/:   RICH BASE CANDIDATE: GET THE PHONOTACTICS RIGHT
     *V[-vce]V¦*Map(b - β_|*V[-cont]V|*Map(p - β)¦*β
>ba              ¦              |              |           ¦
 βa              ¦              |              |           ¦1!
```


16. Summing up: Saltation and OT

- Formally, is can be addressed if we adopt the richer *Map() constraint type, instead of the McCarthy-Prince (1995) minimum.
- Substantively, we have a body of work supporting a learning bias for phonetically minimal alternation.

FILLING IN ON *MAP CONSTRAINTS

17. References

- Zuraw, Kie (2007). The role of phonetic knowledge in phonological patterning: Corpus and survey evidence from Tagalog. *Language* 83: 277-316.
- Zuraw, Kie (2013) *Map constraints. http://www.linguistics.ucla.edu/people/zuraw/dnldpprs/star_map.pdf
- Steriade reading

18. Background: how atomistic should Faithfulness constraints be?

- Should they have **context**? Most analysts let them, starting with Beckman
  - ➢ Jill Beckman 1997 "Positional Faithfulness, Positional Neutralisation, and Shona Vowel Harmony," *Phonology* 14.1.
- Should they be **minimal**? E.g. IDENT() constraints penalize a *one-feature* difference.

19. Zuraw's proposal

- With Beckman et al., the constraints can be contextual.
- Out on a limb: they need not be minimal

20. *MAP()

$$\text{*MAP- } S_1 S_2 (^A X^B, {}^C Y^D)$$

an $\underline{X}$ in the environment $A\_\_B$ in string $\underline{S_1}$ must not correspond to a $\underline{Y}$ in the

environment $C\_\_D$ in string $\underline{S_2}$.

21. *MAP and phonetics

- Following earlier work by Steriade (to be covered), the *MAP constraints that are ranked highest are those that penalize large phonetic differences, like [p]-[β].

PHONOLOGICAL ACQUISITION

WARMUP EXERCISE

22. Data from Amahl (N. Smith 1971, *The Acquisition of Phonology*)

- 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		
anything	ɛniːkɪŋ	*desk*	dɛk	gɛk
cheek	kʰiːk	*dog*	dɔg	gɔg
cheque	kɛk	*drink*	dɪŋk	glɪŋk, etc.
choke	kʰoːk	*duck*	dʌk	gʌk
doctor	gɔktə[4]	*sock*	tʰɔk	kʰɔk
flapjack	læpgæk	*sugar*	tʰugə	kugə
joke	goːk	*take*	tʰeɪk	kʰeɪk
stroke	gɹoːk	*think*	tʰɪŋk	kʰɪŋk
thing	gɪŋ, kɪŋ			
tickle	kɪkəl			

OUTLINE OF FIELD; THE MENNIAN CONCEPTION

23. 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.
- More recent: experimental work probing what children (passively) know. This extends down to infants.

24. The motto that becomes ever more true as research proceeds

- Perception precedes production — even infants, who can only cry or coo, know a lot.

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

- Bifurcation principle
  - ➢ Child's theory of the ambient language
  - ➢ Child's tacit decisions about her principles of realization
- The bifurcation is manifested in both:
  - ➢ grammar
  - ➢ lexicon

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[4] 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...

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

- Further comment on this scheme is given in e.g. Hayes (2004) Phonological acquisition in Optimality Theory: the early stages, in Kager et al. *Constraints in Phonological Acquisition.*

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

- It occurs spoken by (let us say) parents.
- Junior does the following — even in infancy:
  - ➤ segments it from context, a neat trick (modeled these days by computationalists)
  - ➤ forms an auditory, perhaps phonemic image of it
  - ➤ stores it in the Input Lexicon
  - ➤ perhaps — but only if possible — makes first guess about meaning.
- Quite a bit later, a todder version of Junior seeks to become able to use the word herself.
- She has a **personal output phonology**, mapping the lexical representation in the Input Lexicon into a representation in the Output Lexicon.
  - ➤ Notice that the Output Phonology is rather like one version of classical Lexical Phonology (Kiparsky 1982 etc.) — its outputs get listed in the lexicon.

JUSTIFICATION FOR THE INPUT LEXICON

27. 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.

28. Argument 2 for the Input 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 [ɬ] appeared for /sl/ it appeared in all words containing initial at nearly the same time:

  | slug | → | [ɬʌg] |
  | slipper | → | [ɬipə] etc." |

29. Argument for the Input Lexicon: using it to learn more

- Junior studies the entries in the Input Lexicon, learns the phonotactics, passes the blick test ([blɪk]/*[bnɪk])— at 9, perhaps just 6 months (see below).
  - ➢ Sundara, Megha, Z. L. Zhou, Canaan Breiss, Hironori Katsuda, and Jeremy Steffman. Infants' developing sensitivity to native language phonotactics: A meta-analysis. *Cognition* 221 (2022): 104993.
- ➢ 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 Jung, and Megha Sundara. "6–month–olds are sensitive to English morphology." *Developmental science* 24, no. 4 (2021): e13089.

30. Argument for the Output Lexicon

- This is more subtle, based on the retention of old forms like [keɪk] for *take*, well after the phonology would derive them. See problem just done.

<center>THE CHILD'S OUTPUT PHONOLOGY</center>

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

- Menn's article in many places reflects a yearning for OT.[5]
  - ➢ Conspiracies
  - ➢ Output filters
  - ➢ Naturalness of the constraints
- The field already acknowledged that kiddie-mutilations reflect phonetic naturalness and other apparent Markedness effects.
- I.e. a field yearning to integrate analytic description of children with general principles of markedness in phonology.

32. By now, there has developed a large literature in OT child phonology

- 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

33. OT was a natural, perhaps?

- Strong cross-child resemblances
- Effects of dominated constraints (Joe Pater's Ph.D. dissertation)
- Free variation

34. A refreshing trait of child output-phonology

- It is invented afresh by Junior and has no diachronic influences.[6]
- 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, yay!
  - ➢ This is probably naïve, see below …

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[5] Actually, when OT arrived, Menn was ambivalent …
[6] Other than on the lexicon that Junior is trying to learn …

IS CHILD MARKEDNESS THE SAME AS ADULT MARKEDNESS?

35. 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 [ˈb̥ebu] 'table', [aːt] 'hard',

[ˈwəːgɪn] '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* [ˈwɔʃɪŋdən].[7]

e) Sharon Inkelas's child did "velar fronting" — wiping out all velars in the same environment adult English forbids velar nasals:

cup → [tʌp]		*[ŋʌp]	
again → [əˈdin]		*[əˈŋɛn]	
conductor → [tənˈdʌktə]		*[ŋənˈdʌktɚ]	
but			
bucket → [ˈbʌkɪt]		*gingham*	[ˈgɪŋəm]
book → [ˈbʊk]		*thing*	[ˈθɪŋ]

> ➢ 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: Cascadilla Press.

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[7] 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.

36. 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 Moravscik, Michael Noonan, Frederick Newmeyer, and Kathleen Wheatly, eds., *Functionalism and Formalism in Linguistics*, Volume I: General Papers, John Benjamins, Amsterdam, pp. 243-285Archangeli 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.

37. Menn's interesting take on child-specific constraints

- Learning to talk is perhaps like learning to whistle — you explore, get lucky, find something that works.
- Such accidents lead to inter-child differences, meaning that environment is not deterministic!

38. Outright creativity in children

- Who would have the idea of moving all the sibilants to the end of a word? Eric Hamp's granddaughter: *step* = [pɛts] (Hamp, *IJAL* 1985)
- Citing Priestly, Menn 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"

  These are not unlike the morphological templates of Semitic languages.

- Amahl Smith solved a phonological problem (pretonic initial syllables are tough) with a morphological solution:

  attack [riˈtæk]
  and: re-range, re-turb, re-lastic, re-scape, re-jaffe, re-mometer

AVOIDANCE IN CHILD PHONOLOGY

39. This happens, though less often, for adults

/silly + ly/	*[I] + LY	*VC$_X$ƏC$_X$V̌	*NULL PARSE
☞ Null Parse			*
[ˈsɪləli]		*!	
[ˈsɪlili]	*!		

/happy + ly/	*[I] + LY	*VC$_X$ƏC$_X$V̌	*NULL PARSE
☞ [ˈhæpəli]			
Null Parse			*!
[ˈhæpili]	*!		

- Exceptions to *VC$_X$ƏC$_X$V: *canonization, classicist, diocesan, probable, indescribable*; all can be apologized for in some way.

40. More or less standard approach in OT: NullParse

- My favorite paper that addresses this idea is:
  - ➢ John J. and Wolf, Matthew, "Less than zero: Correspondence and the null output" (2007). *Modeling Ungrammaticality in Optimality Theory*. 22.

41. Avoidance is 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.

42. 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
```

43. Null Parse and the Output Lexicon

- Presumably these are "entries"! Don't say this word at all.