
Week 13 – Phonetics in Phonology II

May 11 and 13, 2008

1 Phonetically-guided phonology: summarizing so far

- (1) We are seeking a rationale for including particular constraints in the theory.
 - a. One line to pursue is the functionalist line, where favored constraints are those which favor
 - (i) ease of articulation
 - (ii) distinctness of contrasting forms in perception
 - (iii) minimization of alternation including, perhaps, reduction of the phonetic salience of alternation
 - b. We also covered the “is this grammar?” question, citing evidence from Wilson that speakers do have the ability to actively pursue phonetically functional alternatives (see also Kawahara 2006).
- (2) Pursuing perception in particular, we quickly covered some basics:
 - a. internal vs. external cues
 - b. segments with poor internal cues rely on good (sonorous) contexts to provide them with good external cues
 - c. hence a functionalist line for the place of low-sonority (nonsibilant) segments adjacent to high-sonority segments, which is, on the whole, what languages do.
 - d. The auditory boost for suddenly-loud events makes prevocalic position the optimum for placing segments—likewise a fit to typology
 - e. Trashing the prosodic account of segment licensing: being in onset is no use to a segment, if the following segment is non-sonorous.
 - f. Remember . . . this is all taking place within OT
 - (i) the predictions are at the level of factorial typology, not absolute
 - (ii) they tend to be implicational: if you have structure X, then you also have Y (see also Antilla 2008).
- (3) Possible confound: how to access phonetic difficulty facts independent of language facts?
 - a. There is, unquestionably, a huge practice effect for phonetic difficulty, in both perception and production.

- b. One route: in your experiment, use sayable items, controlled for frequency (Wilson palatalization experiment)
 - c. Second route: go with infant subjects, ideally before linguistic experience has crystallized their perception patterns. Ditto, toddlers for production.
- (4) Rest of this week
- a. Fleshing out these ideas
 - b. Place assimilation
 - c. Theory: Steriade and the P-map
 - d. phonological typology of internal cues
 - e. contrasts licenced in “good coda”
 - f. The preference for phonetically non-salient alternation predicts particular outcomes for assimilations, e.g. the characteristically regressive pattern in VCCV, with the special case for V₁tV.

2 Place Assimilation

- (5) Finish up handout (addendum) from last week.

2.1 Theorizing about phonetic influences in phonology

- (6) How could the child consult her own phonetic experience to arrive at constraints?
- (7) This process is called “inductive grounding” by Bruce Hayes (1999), with an effort to extract constraints from a body of data consisting of the difficulty of articulation (specifically, voicing production) in different context.
- (8) The general strategy is ground/project/derive OT constraints and universally fixed rankings of them based on perceptual and articulatory measures. (cf. intrinsic rule ordering)
- (9) As far as I can tell, there is not a unified theory yet, but there are many proposals that fit into this rubric. See every chapter in Hayes et al. (2004).
- a. J. Jun chapter in Hayes et al. (2004)– PRES(place) and WEAKENING constraints
 - b. D. Steriade (reading) – P-Map (see below)
 - c. R. Kirchner chapter in Hayes et al. (2004)– LAZY constraints (a fine grained approach to capture articulatory ease)

2.2 Retroflexes and Place Assimilation

- (10) Steriade (readings) notices another aspect of the typology of place assimilation.
- a. In VC₁C₂V contexts, if either is a retroflex, then C₂ is the target of assimilation (i.e assimilation is progressive and C₂ changes).
- (11) Why should retroflexes behave differently from other consonants?

- (12) Recall that the regressive aspect of assimilation followed since the place cues of C_2 were much stronger than the ones of C_1 , since C_2 is prevocalic.
- (13) What are the external cues for retroflexes and apicals pre- versus post-vocally?
- VC transitions preceding retroflexes point to distinctively low F3, F4 relative to alveolars
 - CV transitions are relatively indistinguishable
 - During retroflex closure, the tongue tip moves forward, so the point of release is the same as for alveolars and thus the cues in the burst are the same
 - Also, shorter voice onset time (VOT) measures for retroflexes
 - Conclusion: Place cues for retroflexes are stronger in VC transitions than in CV transitions, unlike other place cues for other stops.

2.3 The P-Map

- (14) Here we will cover a comparable theory in the perceptual domain, the P-map hypothesis of Steriade (readings)
- (15) This is another proposal
- (16) The P-map
- Find all pairs of phonetic entities [A]-[B] in all contexts
 - To each pair, assign a quantity P corresponding to the perceptibility of the [A]-[B] distinction in each context.
- (17) Steriade uses fonts, but let's just read off the numbers:

	V___ V	V___ #	V___ C	#___ V	C___ V	C___ C
s/ʃ	24	24	20	16	16	12
t/ʈ	18	18	16	12	10	9
n/ɳ	14	14	12	12	8	8

2.4 How to use the P-map to rank constraints

- (18) The constraints may be assumed to be either IO-Faithfulness or OO-Faithfulness.
- (19) Steriade:
- If two contrasts a-b and x-y are known to differ in degree of similarity, with a-b more similar than x-y, then correspondence constraints that prohibit an a-b difference between input (a pronunciation norm) and output (a modified realization of it) are lower ranked than correspondence constraints that ban an x-y difference between input and output.
- (20) Tableaux: Apical Assimilation
- /t+t/ → [tt]

/at-ṭa/	Agree	Ident[ant]/ V[apical,stop]C	Id [ant]/ C[apical,stop]V
↗ atta			
aṭṭa			
aṭṭa			

b. /t+t/ → [tt]

/at-ṭa/	Agree	Ident[ant]/ V[apical,stop]C	Id [ant]/ C[apical,stop]V
↗ aṭṭa			
atta			
aṭṭa			

(21) Tableaux: General Place Assimilation

a. /tp/ → [pp]

/atpa/	Agree	Ident [place]/ C____ V	Ident [place]/ V____ C
↗ appa			
atta			
atpa			

b. /pt/ → [tt]

/apta/	Agree	Ident [place]/C____ V	Ident [place]/ V____ C
↗ atta			
appa			
apta			

(22) More Intricate Tradeoffs: Sanskrit

stop-stop: ḍ+d^h → ḍḍ^h
ḍ+t → tt
nasal-stop: i. ṇ+t → [nt]
ii. ṇ+d̄₃ → [ṇd̄₃]

★ What must we assume about the P-map for Sanskrit?

2.5 Further discussion of the p-map hypothesis

(23) Grammaticization

a. A context C____ V is just one of many, using natural classes.

- b. The child probably doesn't have the data to sample all possible environments, so...
- c. Some aggregation into broader, phonologically-relevant categories plausibly takes place: "before vowels" vs. "before some particular vowel"
- d. A gradient issue in this area: how coarse/refined is the phonetic grid that goes into phonological constraints? cf. the readings, with discussion of how fine is the grid for voicing in consonants.

$$*g: < *d: < *b: < *g < *d < *b$$

suggesting that sometimes a rather refined grid is used.

- (24) Another form of grammaticization: idealizing for speaking rate
 - a. Relative perceptibility may vary with speaking style, rate, acoustic ambience. See Steriade's earlier work for the notion of a "reference style/rate" which is assumed as the basis for getting these values.
 - b. Note that it is possible that what solves a problem at one speaking rate does not solve it at another, or is superfluous.
- (25) The problem in general (infinitely variegated phonetics, stable phonology) is sometimes called the stabilization problem (readings).
- (26) Worth noting: much of the output is not stable! At the "phonetic level" there is a huge amount of variation. Accounting for it, and how it could possibly be learned, and why phonology can be different, is a central task of phonetic and phonological theory.
- (27) Perhaps, phonetic tendencies are balanced by obedience to particular simplicity dictates (Gordon 2004 on syllable weight).

2.6 The P-map hypothesis and the "too many solutions" problem

- (28) Too-many-solutions, example:
 - a.

/rat/	[rat]	[rat-əs]
/rad/	[ran]	[rad-əs]
/ran/	[ran]	[ran-əs]
 - b. I.e. repair final voiced obstruents by nasalizing them ...or deleting them, or epenthesizing a vowel after them.
- (29) The "Natural phonology" approach of Stampe, from the 1970's, offers a (direct, stipulative) solution.
 - a. all the rules are innate.
 - b. The flip side of this solution: quite a few phonotactic problems have multiple solutions; notably hiatus resolution
- (30) Taken literally, the P-map hypothesis says that any phonotactic problem should have just one solution, the one that creates the smallest perceptual deviation.
- (31) Probably not true, but perhaps phonetic similarity limits the number of solutions

...or guides the “spontaneous” solutions (compare ubiquitous glottal epenthesis with funny-English-specific [textturnr]-epenthesis)

References

Hayes, Bruce, Robert Kirchner, and Donca Steriade, eds. 2004. *Phonetically-Based Phonology*. Cambridge University Press.