Week 3 – Optimality Theory — Typology

March 3 and 5, 2008

1 Factorial typology

1.1 Definitions

(1) Assume
   a. A class of universal inputs
   b. Some version of GEN
   c. A set of constraints
   a. Then, each ranking of the constraints defines a set of (UR,SR) mappings. (it is often the case that many rankings define the same mappings, however)

(2) The set of distinct sets of outputs constitutes the factorial typology of the system [called "factorial" because n constraints permit $n!$ rankings]

1.2 Work in factorial typology

(3) The appeal of factorial typology
   a. Proposals can be tested against typological data.
   b. We can consider them for defects of overgeneration as well as undergeneration.

(4) Some bad predicted systems unearthed by factorial typology study
   a. "Delete all the segments that follow a nasalized vowel in the word." (Colin Wilson, ms.)
   b. "When you reduplicate, delete all but the leftmost segment of the stem." (Jason Riggle)
   c. "Harmonize a suffix in backness with which ever kind of vowel (back or front) occurs more often in the stem." (Linda Lombardi; for a remedy see Baković 1993)
   d. "Tone-centering" (Eisner 1997b)
   e. Later in the course we will see that OT seems to undergenerate some well-attested—but opaque—patterns.

(5) These are taken to be evidence that the constraints used were not a valid set; and the authors of these papers offer what they think will be better ones.

(6) Theory-predicted typologies outside OT

a. Principles and Parameters theories: set all possible combinations of parameters. This was widely pursued in metrical stress theory and continues to be an influential approach in syntax.

b. Rule-based theories also have predicted typologies, provided they define possible underlying representations and possible rules

(7) Some work in factorial typology

a. Elenbaas, Nine and René Kager. 1999. Ternary Rhythm and the *LAPSE constraint. *Phonology* 16: 273-330.

b. Matthew Gordon. 2002. A factorial typology of quantity insensitive stress. *Natural Language and Linguistic Theory* 20. 491-552.

c. Abigail Kaun. 1995. The Typology of Rounding Harmony: An Optimality Theoretic Approach. Ph.D. Dissertation, UCLA.

(8) Not everyone agrees with the factorial typology strategy

a. Blended theories: possible language is intersection of UG and possible directions of language evolution (Scott Myers, in press[1])

b. General disagreement about "strength" of UG and the possible role of raw pattern learning. What are the effects/contributions of various factors, both linguistic and non-linguistic?

1.3 Epenthesis: a small simulation

(9) Inputs

a. /ipl/ — Exemplifies a bad-sonority coda

b. /ilp/ — Exemplifies a coda with good sonority profile

(10) Reasonable Outputs

/ipl/	ipl	/ilp/	ilp
	i.pil		i.lip
	ip.li		il.pi
	i.pli		i.li.pi
	i.pi.li		

★ Do we have them all? If not, what would we include to expand the typology?

(11) Should we include [i.lpi] among the outputs?

[1]Myers, Scott. 2002. Gaps in factorial typology: The case of voicing in consonant clusters. `http://roa.rutgers.edu/view.php3?id=636`.

a. Proposal: to keep the problem under control, you can assume some constraints to be undominated (i.e. "we are considering only the class of languages that don't allow sonority-reversed onsets").
b. Often, this leaves enough languages under consideration to make the problem still worthwhile.
c. Thus, let's avoid, for /ilp/: il, ip, lip, pli, ilu (p becomes u).

(12) Constraints

Name	
1. DEP(I)	Penalizes insertion of vowels; quality ignored here.
2. *BAD SONORITY CODA	Should be suitably formalized; violated by final [pl].
3. *CC CODA	
4. *CODA	
5. *BRANCHING ONSET	i.e. *[σ CC
6. CONTIGUITY	one violation for each pair of segments adjacent input but not output
7. ANCHOR	one violation for each segment adjacent to a particular word edge in the input but not in the output

(13) 1, 6, and 7 are from (McCarthy and Prince 1995).

(14) Some Outputs We Need Never Consider
a. /ipl/ → [ip.il]
b. /ipl/ → [i.pi.li.i.i.i]

★ Why?

1.4 Harmonic bounding

(15) If candidate A never violates a constraint more times than candidate B does; and there is at least one constraint violated more times by B than A, then A harmonically bounds B.

(16) Consequence: B can't win under any ranking.

★ Show this to be true with the outputs above

1.5 Ten possible UR-SR mappings

(17) According to the factorial typology calculator in "OTSoft"

`http://www.linguistics.ucla.edu/people/hayes/otsoft/`

	Mapping #1	**Mapping #2**	**Mapping #3**	**Mapping #4**
/ipl/:	[ipl]	[i.pil]	[i.pil]	[ip.li]
/ilp/:	[ilp]	[ilp]	[i.lip]	[ilp]
	Persian	Turkish	Palestinian Arabic	I know no case; = Egyptian-Turkish blend

	Mapping #5	**Mapping #6**	**Mapping #7**	**Mapping #8**
/ipl/:	[ip.li]	[i.pli]	[i.pli]	[i.pli]
/ilp/:	[il.pi]	[ilp]	[i.lip]	[il.pi]
	Egyptian Arabic	French, at least in some speaking styles		I know no case; = Egyptian-French blend

	Mapping #9	**Mapping #10**
/ipl/:	[i.pli]	[i.pi.li]
/ilp/:	[i.li.pi]	[i.li.pi]
		Japanese loan adaptation: tax → [takusu]

★ Let us examine the implicational patterns across forms.

- What must happen to /ilp/ when /ipl/ → [ipl]? Why?
- What must happen to /ilp/ when /ipl/ *rightarrow* [i.pi.li]? Why?
- Under what condition can epenthesis be "external" in one form but "internal" in the other (Mapping #7)? Why?

1.6 Computing Typologies

(18) A few notes about computing OT typologies with OTSoft

a. You provide the candidate outputs
b. You provide the number of violations for each constraint
c. Don't overlook anything or make a mistake!

(19) Is there a way to compute OT typologies with well-defined constraints? Yes, Riggle (2004) shows how us how to do this provided all the constraints are explicitly defined.

(20) Finite State Optimality Theory (Ellison 1994, Eisner 1997a, Riggle 2004, Albro 2005)

a. Constraints are defined as finite-state transducers (see Figure 1 and Figure 2).
b. Underlying forms can also be expressed as finite-state transducers (not shown here).
c. GEN can be similarly be expressed (not shown here).

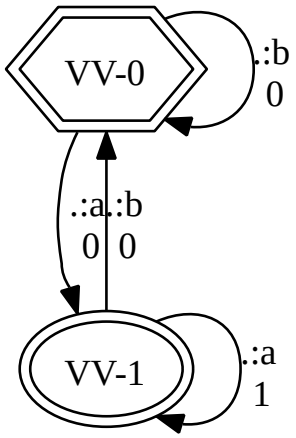

Figure 1: A finite-state transducer representing *VV

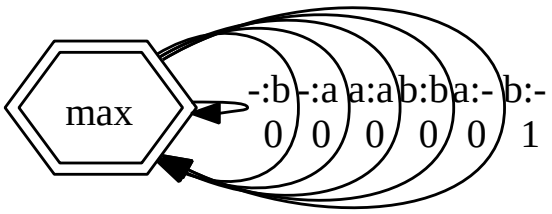

Figure 2: A finite-state transducer representing MAX-C

(21) Building on the work of others cited above, Riggle (2004) extends certain regular operations (composition, intersection) and gives us an algorithm for finding the *contenders*.

a. The *contenders* are only those candidates that can win under some permutation of the ranking (i.e. non-harmonically bounded candidates).

(22) Once we have contenders, we have only those candidates we ever need consider and so we can thus compute typologies.

(23) In sum: Riggle's 2004 dissertation

a. provides concrete mechanisms which allow us to
   (i) Let the computer do the work figuring out which forms violate which constraints how many times
   (ii) Consider all and only the relvant candidates (the non-harmonically bounded ones)
b. But you have to code your constraints as finite-state transducers!

(24) Check out the Erculator (still in Beta I think)

`http://clml.uchicago.edu/?page_id=11`

2 Socratic questions about factorial typology

(25) Dep Assume constraints:

1. Dep(V) "Disallow inserted vowels"
2. Dep([-high]) "Disallow inserted nonhigh vowels."
3. *Branching coda

★ What are predictions about can be inserted to resolve a branching coda?

(26) The Syllabification of the Repair

★ If /pla/ is repaired, can it be repaired as [i.pla]? If not, why not? What alternative theories predict that this could happen?

References

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Ellison, Mark. 1994. Phonological Derivation in Optimality Theory. In *COLING 94*, volume 2. pages 1007–1013. Kyoto, Japan.

McCarthy, John and Alan Prince. 1995. Faithfulness and Reduplicative Identity. In *Papers in Optimality Theory*, edited by Jill Beckman, Laura Walsh Dickey, and Suzanne Urbanczyk, number 18 in University of Massuchusetts Occasional Papers in Linguistics. pages 249–384.

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