Class 18
Syllable Structure and Optimality Theory

3/23/2022

1 Optimality Theory

- The constraint-based phonological theory we introduced last class is called Optimality Theory [OT] (Prince & Smolensky 1993/2004; Kager 1999).

- As with rule-based theories, each derivation has an Underlying Representation (Input).
- OT works by considering different possible Surface Representations (Candidate Outputs) and comparing them to one another.
- If a candidate violates a constraint, it gets a * in that constraint's column.

(1)

/Input/ (UR)		Constraint1	Constraint2
	[Candidate A] (potential SR)	*!	
☞ (winner)	[Candidate B] (potential SR)		*

Procedure

- Check the column of the **highest-ranked** (leftmost) constraint.
  - If there is a candidate that has 0 violations, eliminate all the candidates that have a violation.
  - If all candidates have at least one violation, identify the candidate(s) with the fewest violations and eliminate everything else.
- Move to the next highest-ranked constraint.
  - Considering only the candidates that have not yet been eliminated, repeat the previous step.
- Continue until only one candidate remains. That candidate is the winner (actual output).

2 Spanish syllabification in OT

- Spanish prefers to syllabify a sequence of consonants between vowels as a complex onset, rather than as a simple coda + simple onset.
- However, if the sequence of consonants does not have rising sonority, it syllabifies them as simple coda + simple onset.

⋆ We can understand this as an interaction between **conflicting constraints**, and express this logic easily in OT.

- These are the constraints we used:

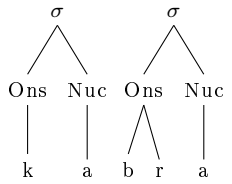
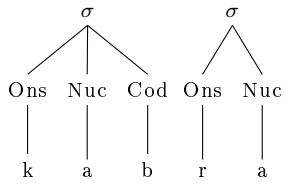
(2) a. **Sonority Sequencing Principle (SSP):** Assign one violation to a candidate for each complex onset that it has that does not have rising sonority.
b. **NoCoda:** Assign one violation to a candidate for each coda that it has.
c. **NoComplexOnset:** Assign one violation to a candidate for each complex onset that it has.

- If we rank the constraints as in (3), we generate the syllabification facts of Spanish.

(3) **Ranking:** SSP ≫ NoCoda ≫ NoComplexOnset

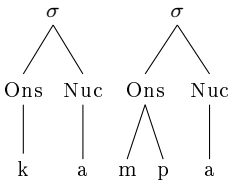
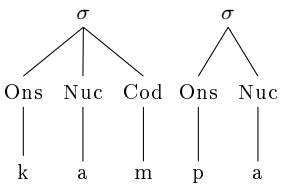
- When the sequence of consonants has **rising** sonority, SSP is satisfied, so NoCoda eliminates the coda + simple onset candidate (4b) in favor of the complex onset candidate (4a).

(4) Complex onset if rising sonority: /kabra/ → [ka.bra] (*[kab.ra])

/kabra/		SSP	NoCoda	NoComplexOnset
☞ a. [ka.bra]				*
b. [kab.ra]			*!	

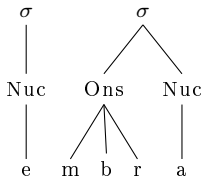
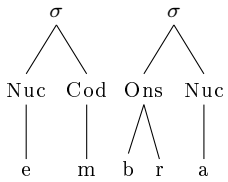
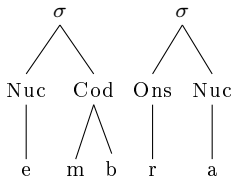
- However, when the sequence of consonants has **falling** sonority, SSP is *violated*, which rules out the complex onset candidate (5a) in favor of the coda + simple onset candidate (5b).
  - The NoCoda violation is still there for (5b), but it's not strong enough to overcome the SSP violation.

(5) Coda + simple onset if falling sonority: /kampa/ → [kam.pa] (*[ka.mpa])

/kampa/		SSP	NoCoda	NoComplexOnset
a. [ka.mpa]		*!		*
☞ b. [kam.pa]			*	

- The same ranking also explains what happens in longer strings of consonants, as long as we add in NoComplexCoda above NoComplexOnset:

(6) Coda + complex onset for 3-consonant clusters: /embra/ → [em.bra]

/embra/	SSP	NoCoda	NoComplexCoda	NoComplexOnset
a. [e.mbra] 	*!			*
☞ b. [em.bra] 		*		*
c. [emb.ra] 		*	*!	

⋆ An OT analysis is only successful when a single ranking properly selects the winning candidate for each different type of form.

→ This is just like a rule-based analysis, where you need to right set of rules in order to generate all the different types of forms.

3 Ancient Greek

- Here's some data from Ancient Greek. The present tense form of the verb is on the left, the perfect tense form of the verb is on the right. Lots of things change between the forms. Just focus on the syllabification.
  - ∗ The initial [(C)e-] of the perfect is a prefix.
  - ∗ Not shown: the only consonants that words can end in are [r,l,n,s], just like Spanish.

(7)

Present			**Perfect**		
στελλω	[stel.lɔː]	'I prepare'	ἐσταλκα	[es.tal.ka]	'I have prepared'
σπειρω	[speː.rɔː]	'sow'	ἐσπαρμαι	[es.par.mai]	'I have sown'
σκεπτομαι	[skep.to.mai]	'I view'	ἐσκεπται	[es.kep.tai]	'he has viewed'
στρατευω	[stra.teu.ɔː]	'I lead an army'	ἐστρατευμαι	[es.tra.teu.mai]	'I have led an army'
σβεννυμι	[sben.nuː.mi]	'I extinguish'	ἐσβεσμαι	[es.bes.mai]	'I have extinguished'
ζευγνυμι	[zdeug.nuː.mi]	'I yoke'	ἐζευγμαι	[ez.deug.mai]	'I have yoked'
κτεινω	[kteː.nɔː]	'I kill'	ἐκτονα	[ek.to.na]	'I have killed'
κτιζω	[ktiz.dɔː]	'I found'	ἐκτισμαι	[ek.tis.mai]	'I have founded'
πτισσω	[ptis.sɔː]	'I pound'	ἐπτισμαι	[ep.tis.mai]	'I have pounded'
φθειρω	[$p^h t^h$eː.rɔː]	'I destroy'	ἐφθαρμαι	[ep^h.t^har.mai]	'I have destroyed'
πσευδω	[pseu.dɔː]	'I lie'	ἐψευσμαι	[ep.seus.mai]	'I have lied'
ξεω	[kse.ɔː]	'I shave'	ἐξεσμαι	[ek.ses.mai]	'I have shaved'
κρινω	[kriː.nɔː]	'I decide'	κεκριμαι	[kek.ri.mai]	'I have decided'
κλεπτω	[klep.t^hɔː]	'I steal'	κεκλοφα	[kek.lo.p^ha]	'I have stolen'
πνεω	[pne.ɔː]	'I breathe'	πεπνυμαι	[pep.nuː.mai]	'I have breathed'
τλαω	[tla.ɔː]	'I suffer'	τετληκα	[tet.lɛː.ka]	'I have suffered'
πεμπω	[pem.pɔː]	'I send'	πεπομφα	[pe.pom.p^ha]	'I have sent'

- Describe how Ancient Greek differs from Spanish in terms of what syllable types it allows where.

⋆ What ranking of the syllabification constraints that we introduced for Spanish will generate the Ancient Greek facts? (Try to put together OT tableaux to prove your ranking.)

4 Spanish

- As we briefly discussed last time, Spanish exhibits epenthesis (vowel insertion). This is evidenced in the words below. This is not a deletion process, because other [e]'s in these environments are retained under affixation.

(8)

Simple words				Suffixed words			
/verd/	→	[ver.de]	'green'	/verd-ura/	→	[ver.du.ra]	'greenness'
/padr/	→	[pa.dre]	'father'	/padr-ino/	→	[pa.dri.no]	'godfather'
/karn/	→	[kar.ne]	'meat'	/karn-oso/	→	[kar.no.so]	'meaty'
/tripl/	→	[tri.ple]	'triple'	/tripl-ikar/	→	[tri.pli.kar]	'to triple'

(9)

Simple words				Prefixed words			
/skribir/	→	[es.kri.bir]	'write'	/pre-skribir/	→	[pres.kri.bir]	'prescribe'
/sfera/	→	[es.fe.ra]	'sphere'	/emi-sfera/	→	[e.mis.fe.ra]	'hemisphere'

⋆ How does epenthesis relate to syllable structure in Spanish?

- Assume that there is a constraint that penalizes epenthesis:

(10) **DEP:** Assign one violation to each candidate for each vowel it inserts.

⋆ How does this constraint rank with respect to the syllable structure constraints? (Note: you may have to tinker a little bit with the ranking I gave you before.)

⋆ How does this constraint rank with respect to the syllable structure constraints **in Ancient Greek**?

References

Kager, René. 1999. *Optimality Theory.* Cambridge: Cambridge University Press.

Prince, Alan & Paul Smolensky. 1993. Optimality Theory: Constraint Interaction in Generative Grammar. Technical Report TR-2 Cognitive Science Center Rutgers University.

———. 2004. *Optimality Theory: Constraint Interaction in Generative Grammar.* Malden, MA: Blackwell Publishing.