

[0] Review

- Distinctive features: interface between lexicon and phonetic component; natural classes
- Ordered rules: effective analysis of alternations and opacity
- Constraints: static well-formedness conditions over lexicon; analysis of possible word
- Conspiracies: cross-linguistically common rule targets with diverse repairs; also appear in a single language; may trigger as well as block a rule
- Markedness: Jakobson's Laws of Solidarity and Stampe's Natural Processes: preference hierarchies: nasal vowel implies oral vowel; velar stop implies a coronal stop, etc.

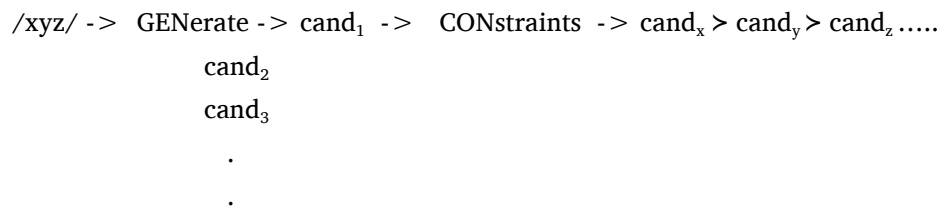
[1]. Optimality Theory (Prince & Smolensky 1993, 2004)

- A model of input-output mapping, not representations
- Assumes distinction between lexical representation and phonetic output
- Rewrite rules $A \rightarrow B / C_D$ are decomposed into two separate functions: the structural description CAD defining the input to the rule is expressed as a static well-formedness (markedness) constraint banning such a structure *CAD and hence compelling a change to the input; the structural change $A \rightarrow B$ is replaced by a GEN function defining a space of possible outputs for that input that could in principle be found in any language
- The other type of constraint is a Faithfulness constraint that militates against a change from the input; in rule terms, it is analogous to an identity rule¹ mapping the input to itself: $A \rightarrow A / C_D$; it is somewhat analogous to Calabrese's "economy of derivation" force that wants to shorten the input-output map and is perhaps the most innovative and distinctive feature of OT
- Markedness constraints are defined over the output and evaluate for the presence or absence of "desirable" features and structures
- They are assumed to be part of UG (innate or induced from common shared experience)
- Markedness constraints are typically stated in negative fashion: *V penalize a nasal vowel, Onset: penalize syllables without a consonantal onset, *Clash: penalize two successive stressed syllables, ...
- Faithfulness constraints penalize disparities between the input and the output
- A correspondence relation is assumed between the input and output indicated (when necessary) by co-indexing over segments (and possibly features as well)

¹ Identity rules were proposed by Kiparsky (1982) in order to restrict rules to derived environments

- The constraints may conflict²: e.g. there are alternative repairs to a hiatus violation *VV
 Inserting a segment not present in the input: Dep
 Deleting a segment from the input: Max
 Changing a feature coefficient in one (or both) of the segments
- A particular grammar arises from imposing a prioritization or ranking on the constraints:
 A » B (“A dominates, outranks B”) e.g. epenthesis as repair (/Fr /blabla-e/ > [blablate])
 Onset, Max-V » Dep-C

[2]. Architecture of Model



- for each input GENerate constructs a (possibly) infinite set of output candidates
- the constraints (in a fixed ranking) **evaluate** the candidates by assessing violation marks
- the **output** for a given input is defined as the candidate that best satisfies the constraint hierarchy
- winner-take-all: a candidate's value is not improved relative to another by performing better on lower ranked constraints
- **tableau** is a device analogous to a truth table to prove that one candidate is more optimal (harmonic) than another

3. simple exemplification: word-final clusters of rising sonority

English	theat[ə]r	cf. theatr-ic but amateur, amaturish; Homer,
Continental French	théâtr	Homer-ic
Canadian French	théat	

Sonority-Sequencing: *word-final clusters of rising sonority such as stop-liquid

Max: penalize a representation with a segment in the input lacking a correspondent segment in the output (“don’t delete”)

Dep: penalize a representation with a segment in the output lacking a correspondent segment in the input (“don’t insert”)

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² There is no global optimization (McCarthy’s “Fallacy of Perfection”). The vocal apparatus was not optimally designed for language, which is an add-on to structures already in use for breathing, swallowing, etc.

Violation profile

/teatr/	Sonority Seq	Max	Dep
theat[ə]r			*
théatr	*		
théat		*	

English: Sonority Sequencing, Max » Dep

/teatr/	Sonority Seq	Max	Dep
> theat[ə]r			*
théatr	*!		
théat		*!	

Continental French: Max, Dep » Sonority Sequencing

/teatr/	Max	Dep	Sonority Sequencing
> théatr			*
theat[ə]r		*!	
théat	*!		

Canadian French: Sonority Sequencing, Dep » Max

/teatr/	Sonority Sequencing	Dep	Max
> teat			*
teatr	*!		
theat[ə]r		*!	

Observations

- Continental French has the faithful mapping: output same as input
- to compel a change, some markedness constraint must dominate some faithfulness constraint
- Minimal violation: *thea* also satisfies Sonority Sequencing but with an unnecessary violation of faithfulness (cf. economy of derivation)

[4] Conspiracies

- OT separates the Structural Description (SD) of a rule from the Structural Change
- Hence the same SD expressed as a Markedness constraint may figure in more than one alternation as well as state a static phonotactic constraint
- its scope is determined by its ranking with other constraints
- Lardil revisited

	<u>Citation</u>	<u>inflected</u>	<u>gloss</u>
/miyar/	miyar	miyar-in	spear
/yalulu/	yalul	yalulu-n	flame
/mela/	mela	mela-n	sea
/yak/	yaka	yak-in	fish

Minimal Word: penalize a Prosodic Word composed of just a single syllable

Max-V: penalize deletion of a vowel

Dep-C: penalize insertion of a consonant

*V# (apocope)

Onset: every syllable must have an onset

[4] tableau

- graphic device like a truth table to show that the grammar's constraint ranking chooses the correct candidate output
- it is customary to list the winning candidate first and then the fully faithful candidate (i.e. the input) unless they are the same, and then any relevant competitors
- a valid ranking argument shows that the winning output candidate would lose if the constraints were ranked in the opposite order; thus, the four cells have the form below³
- a solid vertical line separating two constraints indicates that they are ranked; a dotted or dashed line is used to separate constraints that are not (yet) ranked

Apocope » Max-V

/yalulu/	*V#	Max-V
> yalul		*
yalulu	*!	

Min-Word » Apocope

/mela/	Min-Word	*V#
> mela		*
mel	*!	

Min-Word » Dep-V

/yak/	Min-Word	Dep-V
> yaka		*
yak	*!	

Rankings: Min-Word » *V#, Dep-V » Max-V

³ This abstracts away from the (ever-present) possibility that some other (higher-ranked) constraint explains why candidate A is better than B.

[5] Remarks

- The conspiracy where Minimal Word is involved in more than one alternation is now expressed formally with a single constraint
- Economy is built into the model: every departure from input must be for a reason: to satisfy a Markedness constraint
- Thus the derivation where /wite/ ‘interior’ is apocopated and then augmented is automatically ruled out⁴

/wite _i /	Min-Word	*V#	Dep-V
> wite _i		*	
wita _j		*	*!

[6] more details:

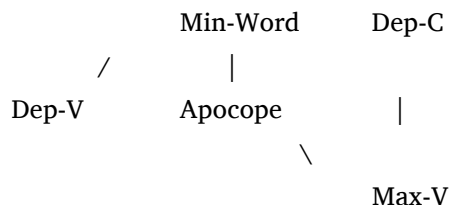
- Alternative repairs must be excluded
- Since the constraint set is assumed to be universal, the grammar of every language has every constraint and so they all must be ranked
- General assumption is that all constraints are undominated until evidence shows that a ranking must be imposed by demoting a constraint (Constraint Demotion algorithm)
- A subfield of OT on learning algorithms explores various scenarios for the initial state: Markedness high, Faithfulness low (M > F for phonotactic learning, F > M for learning alternations).

We could have solved the Apocope violation by insertion of a final consonant so that /yalulu/ > [yalulut]. To exclude this derivation another ranking must be imposed.

Dep-C » Max-V

/yalulu/	Dep-C	Max-V
> yalul		*
yalulut	*!	

- A Hasse diagram is typically used to illustrate and keep track of the rankings



⁴ Derivations of this form (aka Duke of York) are claimed to exist but they are apparently not frequent.

[7] Hiatus

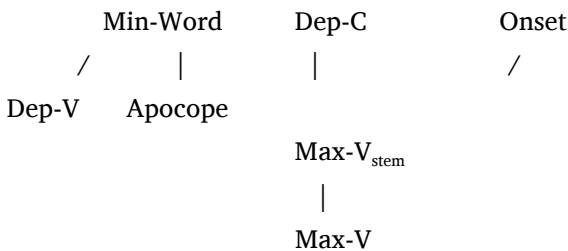
- Vowel-final stem plus vowel-initial suffix: /mela-in/ > mela-n
- Onset: penalize a syllable without a consonantal onset

/mela-in/	Onset	Dep-C	Max-V
> melan			*
mela.in	*!		
melin			*
melatin		*!	Max-V

- Now we must distinguish mela-n over meli-n
- Positional faithfulness: refer to direction or to grammatical status: $\text{Max-V}_{\text{stem}} \gg \text{Max-V}$

/mela	$\text{Max-V}_{\text{stem}}$	Max-V
> mela-n		*
mel-in	*!	Max-V

Ranking revised:



[8] analysis of an alternation $A \approx B$ in OT

- Somali
 - sun sun-ta sum-o ‘poison’
 - dan dan-ta dan-o ‘affair’
- Identify the conditioned alternant and the basic (elsewhere) case
 - [n] occurs in coda and [m] elsewhere
- To force change of A to B in context X__Y we must identify a markedness constraint that bars XAY: e.g. $*[+ \text{cons}, + \text{lab}]_{\text{coda}}$
- This M constraint must outrank the Faithfulness constraint that would protect A from change: e.g. $*[+ \text{cons}, + \text{lab}]_{\text{coda}} \gg \text{Ident-C}[\text{place}]$
- Alternative repairs (e.g. epenthesis) that would also satisfy M must be excluded by $F \gg F$

- Thus tableau looks like

/XAY/	M	F	F
> XBY			*
XAY	*!		
XAC		*!	

- Somali

/sum/	*[+ cons, + lab] _{coda}	Dep-V	Ident-C[place]
sun			*
sum	*!		
sumu		*!	

[9] Ilocano (Hayes & Abbad 1989)

<u>verb base</u>	<u>derivative</u>	<u>gloss</u>
tú:lad	tula:d-en	mimic
gá:taŋ	gata:ŋ-en	buy
sá:ŋit	pag-saŋí:t-en	cry
masa:he	masahj-én	massage
babá:wi	babawj-én	regret
sá:nto	pag-santw-án	saint, sanctify
ba:sa	basá:-?en	buy
sa:ka	pag-saká:-?en	walk barefoot
pjá:	pag-pja-?én	make healthy

- Stress is largely penultimate
- Stressed vowel is long in an open syllable
- Stems may end in a vowel or a consonant
- If stem ends in a vowel, hiatus is created when -en is added
- Hiatus repaired by devocalization; but the low vowel lacks a glide counterpart
- Here hiatus repaired by insertion of glottal stop, an alternative repair

[10] Constraints

Align-Stress-Right: stress the rightmost syllable of the word

Non-Finality: penalize stress on a final syllable

Culminativity: penalize more than one stress per word

Culminativity⁵, Nonfinality » Align-Stress Right

/tulad/	Culminativity	Nonfinality	Align-Stress Right
> tú:lad			*
tulád		*!	
túlád	*!		

Stress-to-Weight: penalize a stressed light syllable (CV.)

Ident-[long]-V: an input vowel and its output correspondent have the same value for [long]

Stress-to-Weight » Ident-[long]-V

/tulad/	Stress-to-Weight	Ident-[long]-V
> tú:lad		*!
túlád	*!	

Alternative repair: geminate consonant to satisfy Weight-to-Stress

Ident[long]-C » Ident-[long]-V

/tulad/	Ident-[long]-C	Ident-[long]-V
> tú:lad		*!
túllad	*!	

[11] Ranking

Nonfinality	Stress-to-Weight	Ident-[long]-C	Culminativity
	\	/	
Align-St-Right	Ident-[long]-V		

[12] Hiatus:

Onset: penalize a syllable without an onset

Onset » Ident-[syllabic], Ident-[high]

/santo-an/	Onset	Ident-[syllabic]	Ident-[high]
> santw-án		*	*
santó-an	*!		

Alternative repairs: sant-an (truncation), santo?an (epenthesis)

⁵ Culminativity is not ranked with respect to the other constraints; we show it in the top stratum

Max-V » Ident-[syllabic]

/santo-an/	Max-V	Ident-[syllabic]
> santw-án		*
sánt-an	*!	

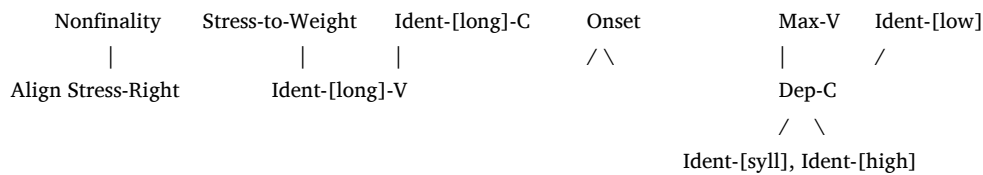
Dep-C » Ident-[syllabic]

/santo-an/	Dep-C	Ident-[syllabic]
> santw-án		*
santó:ʔan	*!	

[13] basá:ʔen alternative repairs with glides baswán and basján are too distant

Ident-[low] » Dep-C

/basa-en/	Ident-[low]	Dep-C
> basá:ʔen		*
baswán	*!	



Stress in *sánto* but *pag-santw-án* looks suspiciously like a derivation in which stress is assigned to the penult of */pag-santo-an/* and then the *ó* is devocalized with the stress shifting to the next vowel: */pag-santo-an/* -> */pag-santó-an/* -> *pag-santw-án*. This opacity cannot be expressed in Classic OT where the derivation between input and output occurs in one step. There are variants of OT that propose serial derivations such as Stratal OT (Kiparsky 2000, Bermudez-Otero 2011) and McCarthy's (2007) Harmonic Serial OT. The former can express penultimate stress followed by devocalization as a switch in constraint rankings from *Ident-[syll]* » *Onset* to *Onset* » *Ident-[syll]* plus some reasonable assumptions about prosodic foot structure. In Harmonic Serial OT the input is gradually transformed to the output by a series of Gen-Eval cycles. Some opaque derivations arise from ranked precedence constraints that demand a certain sequence of unfaithful mappings to reach the output. You will learn about these approaches in 24.962.

References

Bermudez-Otero, Ricardo. 2011. Cyclicity. *The Blackwell Companion to Phonology*. Pp. 2019-48.
 Kiparsky, Paul. 2000. Opacity and cyclicity. *The Linguistic Review* 17, 351-67.
 Prince, Alan and Paul Smolensky. 1993, 2004. *Optimality Theory: Constraint Interaction in Generative Grammar*. Blackwell Publishers, Malden: MA and Oxford.

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