The Derivational Residue in Phonology   Tilburg University, October 5-7, 1995

Identity Effects in Morphological Truncation

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1. Introduction - A Correspondence-Based Model of Morphological Truncation

1.1 Truncatory Identity Effects: Over- and Underapplication in a Parallel Grammar

- **Morphological truncation is a matter of identity**
  Morphologically truncated words show irregular phonology in order to preserve identity with their source word bases.

- Optimality Theory (Prince & Smolensky 1993) can account for truncatory identity effects *without serial derivation.*

- Correspondence Theory (McCarthy & Prince 1995) formalizes the identity relation between truncated words and their bases.
  In morphological truncation, correspondence relates **two separate words**.
  This relation is dubbed **output-to-output** or **OO-correspondence.**

- **OO-Identity constraints**, interacting with structural Phono-Constraints (ONSET, ALIGN, *[cor], OCP, etc.), may force identity effects.
  By recognizing two sets of faithfulness constraints, OO-Identity effects can be modelled in parallel, *with a single constraint hierarchy*.

Overview of the talk

§1.2	Correspondence Theory and the OO-correspondence relation
§2-§4	Truncatory identity effects in English, Icelandic and Hebrew
§5	Comparison to ordered-rule accounts
§6	Outstanding issues - Parallelism and OO-correspondence
§7	Extension of the OO-correspondence proposal: cyclicity effects

NB: Templatic morphological deletion will not be discussed here
(but see Benua 1995, following McCarthy & Prince 1994a on partial reduplication)

Descriptive Terminology (Wilbur 1973)

overapplication - a process applies where it is not properly conditioned
e.g. Tagalog nasal substitution overapplies in
/paN-RED-putul/ ≈ pa-mu-mutul, *pa-mu-putul, *pam-pu-putul

underapplication - a phonological process fails to apply where it is conditioned
e.g. Chumash pre-coronal [l] deletion underapplies in
/RED-c'aluqay/ ≈ c'al-c'aluqay, *c'a-c'auqay', *c'a-c'aluqay'

normal application - a process applies where it is properly conditioned
e.g. Makassarese nasal-stop place assimilation applies normally in
/RED-bulaŋ/ ≈ bulam-bulaŋ, *bulaŋ-bulaŋ, *bulam-bulam

(1) **Morphologically truncated words may violate surface constraints in order to preserve identity with the source word.**

On the irregular phonology of truncated words, see Prince 1975; Anderson 1975; Aronoff 1976; Kahn 1976; Stevens 1968; Kiparsky 1984; Martin 1988; Weeda 1992; McCarthy & Prince 1990; Odden 1993

English [æ] ≈ [ɑ] *ær]$_\sigma$ "no [æ] before a tautosyllabic [r]"

(a)	map	[mæp]	mar	[mɑr]
	carry	[kæ.ri]	car	[kɑr]
	Harry	[hæ.ri]	hard	[hɑrd]
	Larry	[læ.ri]	lark	[lɑrk]

Underapplication in morphological truncation - truncated words violate *ær]$_\sigma$ (Kahn 1976)

(b)	Harry	[hæ.ri]	Har	[hær]
	Larry	[læ.ri]	Lar	[lær]
	Sarah	[sæ.rA]	Sar	[sær]

Truncated words mimic their bases, and as a consequence, they are irregular with respect to the [æ] ≈ [ɑ] alternation

1.2 Correspondence Theory

(2) Correspondence (McCarthy & Prince 1995)

Given two strings S_1 and S_2, correspondence is a relation $\mathcal{R}$ from the elements of S_1 to those of S_2. Segments α (an element of S_1) and β (an element of S_2) are referred to as correspondents of one another when $\alpha\mathcal{R}\beta$.

(2a) Pairs of Strings are Related by Correspondence

S_1 = Input, S_2 = Output	IO-correspondence, evaluated by IO-Faith constraints
S_1 = Base, S_2 = Reduplicant	BR-correspondence, evaluated by BR-Identity constraints
S_1 = Base, S_2 = Truncated Word	OO-correspondence, evaluated by OO-Identity constraints

(3) **Correspondent Identity is Enforced by Ranked Constraints**

MAX	Every segment in S_1 has a correspondent in S_2. That is, Domain (f) = S_1.
DEP	Every segment in S_2 has a correspondent in S_1. That is, Range (f) = S_2.
IDENT([F])	Correspondent segments in S_1 and S_2 have identical values for feature [F].

(4) Base-Reduplicant (BR) Correspondence

Input: / RED-badupi /

candidate output$_a$	$b_1a_2d_3u_4p_5i_6$ - $b_1a_2d_3u_4p_5i_6$	perfect correspondence
candidate output$_b$	$b_1a_2d_3$ - $b_1a_2d_3u_4p_5i_6$	violates MAX-BR
candidate output$_c$	$b_1a_2m_3$ - $b_1a_2d_3u_4p_5i_6$	violates IDENT-BR[place]
candidate output$_d$	ʔa_2d_3 - $b_1a_2d_3u_4p_5i_6$	violates MAX-BR, DEP-BR

(4a)	Axininca Campa	/osampi-RED /	osampi-sampi	ONSET >> MAX-BR
	Balangao	/RED-tagtag /	tagta-tagtag	NOCODA >> MAX-BR
	Makassarese	/RED-bulaŋ /	bulam-bulaŋ	NC-assim >> IDENT-BR[place]

(5) Input-Output (IO) Correspondence

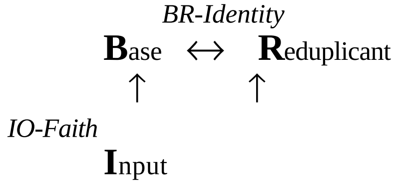
Input: / b_1 a_2 d_3 /

candidate output$_a$	b_1 a_2	violates MAX-IO
candidate output$_b$	b_1 a_2 d_3 i	violates DEP-IO
candidate output$_c$	b_1 a_2 t_3	violates IDENT-IO[voice]
candidate output$_d$	b a_2 d_3	violates MAX-IO, DEP-IO

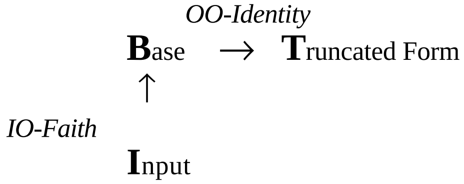
(6) McCarthy & Prince's Suggestion (Utrecht Prosodic Morphology Workshop, June 1994)

"To capture the connections and still leave room for the differences, we need a way to generalize over identity relations - base/reduplicant, input/output, stem/stem (in root-and-pattern, circumscriptional and truncatory morphology)." (1994b: Part II)

(7) Reduplication (McCarthy & Prince 1995)



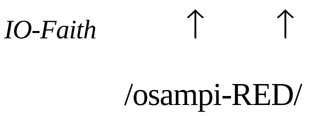
Truncation



- truncated words are related to their sources in the same way that reduplicants are related to their bases - via correspondence relations.
- OO-Identity constraints demand identity between the base and the truncated form. Identity may be achieved by constraint interaction.
- reduplicative BR-correspondence relates two parts of one word; truncatory OO-correspondence relates two separate output words.

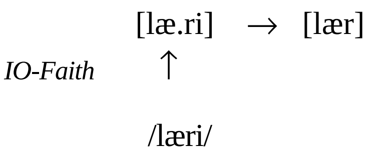
(8) OO-Correspondence is a Transderivational Relation

Reduplication



BR-correspondence relates two parts of a single word

Truncation



OO-correspondence relates two separate output words

2. New York-Philadelphia English - Underapplication

(Ferguson 1972; Kahn 1976; Payne 1980; Labov 1981; Borowsky 1986, 1993; Dunlap 1987)

(9) **æ-Tensing** [æ] --> [E] / __C]$_{\sigma}$ low front vowels are tense in closed syllables

(a)

open σ, lax [æ]		closed σ, tense [E]	
manage	[mæ.nəǰ]	man	[mEn]
Pamela	[pæ.mə.lə]	clam	[klEm]
cafeteria	[kæ.fə.ti.ria]	laugh	[lEf]
mathematics	[mæ.θə.mæ.tIks]	psychopath	[say.ko.pEθ]
cannibal	[kæ.nə.bl̩]	mandible	[mEn.dI.bl̩]

Truncated forms are closed syllables, but æ-tensing **underapplies**

(b)

Pamela	[pæ.mə.lə]	Pam	[pæm]	
Janice	[jæ.nIs]	Jan	[jæn]	
cafeteria	[kæ.fə.ti.ria]	caf	[kæf]	cf. 'calf' [kEf]
Massachusetts	[mæ.sə.ču.sɛts]	Mass	[mæs]	cf. 'mass' [mEs]
pathology	[pæ.θə.lə.ǰi]	path	[pæθ]	cf. 'path' [pEθ]

It is more important to respect identity with the base
than to conform to the regular æ-tensing pattern

Conditions on æ-Tensing

consonants inside the box trigger æ-tensing in NY; vcd obstruents do not trigger tensing in Philadelphia

vcls stops	p	t	č	k		
vcd stops	b	d	ǰ	g		
vcls fricatives	f	θ	s	š	h	
vcd fricatives	v	z			ð	ž
nasals	m	n			ŋ	
liquids	l	r				
glides	w	y				

excluded segments:

i. [h, ð, ž&] never appear in codas following [æ]

ii. to exclude [vcls stops] requires a sonority condition on æ-tensing

iii. [dorsal sonorants] prevent raising and fronting of vowel in an OCP effect - dorsal obstruent [g] doesn't interact with the sonorant vowel (see Padgett 1991)

2.1 Allophony in OT (McCarthy & Prince 1995)

Output constraints cannot guarantee presence of the "basic" allophone in the input
- surface alternation enforced by **Phono-Constraint >> Faithfulness**

(10) i. æ-TENSING *æC]$_{\sigma}$ "no lax [æ] in closed syllables"
if | C | > | [-cont, -vc] |

ii. *TENSE-lo "no tense low vowels"

iii. IDENT-IO[tense] "correspondent vowels agree in tenseness"

(11) æ-TENSING >> *TENSE-lo >> IDENT-IO[tense]

æ-TENSING >> *TENSE-lo forces tense [E] in closed syllables
***TENSE-lo >> IO-Faith** ensures that the tense alternant is limited to the closed syllable environment, *no matter which allophone is posited in the input.*

(a) closed σ - lax input ≈ tense output

Input: /plæn/	æ-TENSING	*TENSE-lo	IDENT-IO[tns]
a. plæn	*!		
b. √ plEn		*	*

closed σ - tense input ≈ tense output

Input: /plEn/	æ-TENSING	*TENSE-lo	IDENT-IO[tns]
a. plæn	*!		*
b. √ plEn		*	

(b) open σ - lax input ≈ lax output

Input: /pæmələ/	æ-TENSING	*TENSE-lo	IDENT-IO[tns]
a. √ pæ.mə.lə			
b. pE.mə.lə		*!	*

open σ - tense input ≈ lax output

Input: /pEmələ/	æ-TENSING	*TENSE-lo	IDENT-IO[tns]
a. √ pæ.mə.lə			*
b. pE.mə.lə		*!	

the surface allophone (æ/E) is reliably present only in the output

2.2 Underapplication is preservation of OO-Identity

- truncated words are faithful to allophone in the source word (the base)

$$\begin{tikzcd}
\text{[pæ.mə.lə]} \arrow[r, "\textit{OO-Identity}"] & \text{[pæm]} \\
\text{/pEmələ/} \arrow[u, "\textit{IO-Faith}"] &
\end{tikzcd}$$

- base and truncated form differ in syllabification (= environment of æ-tensing)
- satisfaction of OO-Identity entails violation of æ-TENSING

(12) IDENT-OO[tense] >> æ-TENSING

Base: [pæ.m«.l«]	IDENT-OO[tns]	æ-TENSING
a. ☞ pæm		*
b. pEm	*!	

Summary - NY-Philadelphia English æ-Tensing

- Preserving identity of the truncated word with the source word base takes precedence over conforming to the regular æ-tensing pattern
- In underapplication identity effects, preserving word-word identity entails violation of the Phono-Constraint that drives the alternation

IDENT-OO[tense] >> æ-TENSING >> *TENSE-lo >> IDENT-IO[tense]

Underapplication OO-Identity >> Phono-Constraint >> IO-Faith

3. Icelandic Deverbal Action Nouns - Under- & Overapplication

(Kiparsky 1984; Ores&nik 1972, 1978ab; Itô 1986)

(13)	Infinitive	Action Noun	
a.	klif.ra	klifr	'climb'
	ham.ra	hamr	'hammer'
	gren.ja	grenj	'cry'
b.	söö.tra	söötr	'sip'
	snuu.pra	snuupr	'chide'
	puu.kra	puukr	'conceal'

Two "irregularities" in the truncated forms

i. impermissible final clusters - underapplication of epenthesis and deletion
ii. unmotivated vowel length in (13b) - ordinarily, long vowels appear only in open syllables. Vowel lengthening apparently overapplies in (13b).

3.1 Icelandic Final Clusters

(14) In non-truncatory phonology, only falling-sonority final clusters are possible (e.g., *björn* 'bear', *folald* 'young foal'); rising-sonority final clusters never occur

Cr clusters eliminated by epenthesis

/tek-/	tek**u**r	'take' (pres.ind.3sg.)	cf. tek	(pres.ind.1sg.)
/hest-/	hest**u**r	'horse' (nom.sg.)	cf. hesti	(dat.sg.)
/akr-/	ak**u**r	'field' (nom.sg.)	cf. agri	(dat.sg.)

Cj clusters eliminated by deletion

/bylj-/ 'snowstorm'

acc.sg/pl	byl	bylji
dat.sg/pl	byl	byljum
gen.sg/pl	byls/byljar	bylja

(15) SON-CON "complex onsets rise and complex codas fall in sonority"
Sonority Hierarchy | glide | > | liquid | > | nasal | > | fricative | > | stop |

MAX-IO "every segment in the input has a correspondent in the output"
DEP-IO "every segment in the output has a correspondent in the input"

(16) SON-CON >> MAX-IO >> DEP-IO

(a) Epenthesis in *Cr* clusters

Input: /dag - r/	SON-CON	MAX-IO	DEP-IO
a. dagr	*!		
b. dag		*!	
c. √ da.g**u**r			*

(b) Deletion in *Cj* clusters

Input: /bylj + ø/	SON-CON	MAX-IO
a. bylj	*!	
b. √ byl		*

candidate [byl**u**j] ruled out by CODACOND - no [j] in codas
candidate [bylj**u**] ruled out by OCP? - no [j] before epenthetic [u]

(17) **Underapplication in Truncated Words**

- truncated words have rising-sonority clusters, violate SON-CON

MAX-OO, DEP-OO >> SON-CON

Base: [söö.tra]	MAX-OO	DEP-OO	SON-CON
a. sööt	**!		
b. söö.t**u**r	*	*!	
c. √ söötr	*		*

Note Some speakers prefer *normal application* of epenthesis in Cr-final action nouns, so that (17b) is optimal, rather than (17c). This is obtained by ranking DEP-OO below SON-CON. MAX-OO must still be high-ranking, to rule out (17a).

Summary - Icelandic word-final clusters

- truncated words preserve identity with the base; the base has adjacent consonants, and their correspondents are similarly adjacent in the truncated word.
- OO-Identity is preserved at the expense of SON-CON, the constraint against rising-sonority coda clusters

MAX-OO, DEP-OO >> SON-CON >> MAX-IO >> DEP-IO

Underapplication OO-Identity >> Phono-Constraint >> IO-Faith

3.2 Icelandic Vowel Length

(18) In non-truncatory phonology, vowel length is predictable:
- long vowels appear always and only in stressed (initial) open syllables

(a) Polysyllables, initial stress

Stressed Open σ, Long V		Stressed Closed σ, Short V	
höö.fuð	'head'	har.ður	'hard'
aa.kur	'field'	af.laga	'out of order'
faa.ra	'ride'	kal.la	'call'
voo.kva	'water'	flas.ka	'bottle'

(b) Monosyllables

V-Final, Long V		C-Final, Long V		CC-Final, Short V	
skoo	'shoe'	haas	'hoarse'	björn	'bear'
buu	'homestead'	ljoos	'light'	haft	'have'
tɛɛ	'tea'	skiip	'ship'	skips	'ship's'

(19) Allophony Constraints

i.	STRESS-to-WEIGHT (S-->W)	"if stressed, then heavy"
ii.	NO-LONG-V (*VV)	"no long vowels"
iii.	IDENT-IO[v-length]	"correspondent vowels agree in length"

(20) STRESS-to-WEIGHT >> NO-LONG-V >> IDENT-IO[v-length]

(a) open stressed σ, input vowels are short

Input: /sötra/	S -->W	*VV	IDENT-IO[v-lgth]
a. sö.tra	* !		
b. söö.traa		* * !	* *
c. √ söö.tra		*	*

(b) open stressed σ, input vowels are long

Input: /söötraa/	S -->W	*VV	IDENT-IO[v-lgth]
a. sö.tra	* !		* *
b. söö.traa		* * !	
c. √ söö.tra		*	*

(c) closed stressed σ, input vowels are long

Input: /kuumraa/	S -->W	*VV	IDENT-IO[v-lgth]
a. √ kum.ra			* *
b. kuum.raa		* * !	
c. kuum.ra		* !	*

(21) **Overapplication is preservation of OO-Identity**

- truncated words are always faithful to base vowel length
- length is reliably present only in surface form of the base

$$\begin{tikzcd} \text{[söö.tra]} \arrow[r, "\textit{OO-Identity}"] & \text{[söötr]} \\ \text{/sötra/} \arrow[u, "\textit{IO-Faith}"] & \end{tikzcd}$$

- base and truncated word differ in syllabification (= conditioning context for length)
- truncated word does not meet structural conditions of lengthening; lengthening "overapplies" in the truncated forms

(22) IDENT-OO[v-length] >> NO-LONG-V

Base: [söö.tra]	IDENT-OO[v-lgth]	*VV
a. √ söötr		*
b. sötr	*!	

- OO-Identity cannot be ranked with respect to S-->W. Both candidates in (22) satisfy S-->W. The optimal form incurs irrelevant violation of the markedness constraint NO-LONG-VOWEL.

Summary - Icelandic vowel length

- Truncated words preserve identity with the base, as demanded by undominated OO-Identity. The relevant OO-Identity constraint cannot be ranked with the constraint that drives the alternation, S-->W, because all competitive truncated candidates satisfy S-->W. In Icelandic, preservation of identity incurs violation of a context-free markedness constraint.

IDENT-OO[v-lgth], STRESS-to-WEIGHT >> *VV >> IDENT-IO[v-lgth]

Overapplication OO-Identity, Phono-Constraint >> IO-Faith

(23) Truncatory Identity Effects are Not Formally Distinct

- both are forced by undominated OO-Identity

Overapplication OO-Identity, Phono-Constraint >> IO-Faith

Underapplication OO-Identity >> Phono-Constraint >> IO-Faith

In reduplication, over- and underapplication do require distinct rankings (see McCarthy & Prince 1995, and §6 below).

4. Tiberian Hebrew - Normal Application (Plus)

(Prince 1975; McCarthy 1979)

Imperatives - truncate base-initial CV
normal application of epenthesis and spirantization
overapplication of vowel-glide coalescence and nasal-assimilation
underapplication of Barth Ginsberg Gesetz ([a] --> [i] / #C_CC)

Jussives and 2fs verbs - truncated base-final V
underapplication of spirantization
underapplication of epenthesis
normal application of epenthesis

> each truncation pattern is associated with a distinct set of OO-Identity constraints
> (see Urbanczyk 1995 on double reduplications)

4.1 Imperatives - normal application of epenthesis and spirantization

- imperatives are formed by truncation of the CV prefix of the imperfective stem
  (underlining marks spirantization, over-lining marks long vowels)

(24)

Root	Imperfective	Imperative	
/ktb/	yik̠tōb̠	kət̠ōb̠	write
/ṣḥq/	yiṣḥáq̄	ṣəḥáq̄	laugh
/šmʕ/	yišmáʕ	šəmáʕ	hear
/lmd/	yilmád̠	ləmád̠	learn

- truncated imperatives are **not identical** to the final string of imperfective bases
  Epenthesis in initial clusters and post-vocalic spirantization apply "normally" in the truncated words, where expected on the basis of the language's surface patterns

normal application entails violation of OO-Identity

(25) **Epenthesis** - *COMPLEX >> DEP-IO, DEP-OO_{imp}

*COMPLEX ($*_{\sigma}$[CC) (Prince & Smolensky 1993) "no complex onsets"

(a) Epenthesis in input-output mapping

Input: /gbūl/	$*_{\sigma}$[CC	DEP-IO
a. gbūl	*!	
b. √ gəbūl		*

(b) Epenthesis in output-output mapping

Base: [yik̠.tōb̠]	$*_{\sigma}$[CC	DEP-OO_{imp}
a. ktōb̠	*!	
b. √ kət̠ōb̠		*

(26) **Post-Vocalic Spirantization - Allophony revisited**

- In non-truncatory phonology, all and only post-vocalic stops are spirantized

i. *V-STOP $*V\ \underset{[\text{-cont}]}{C}$ "no post-vocalic noncontinuants"

ii. *SPIR *[-son, -strident] "no non-strident fricatives"

iii. IDENT-IO[cont] "correspondents agree in continuancy"

(27) *V-STOP >> *SPIR	spirantized stops always appear post-vocalically
*SPIR >> IDENT-IO[cont]	spirantized stops only appear post-vocalically

(28) *V-STOP >> *SPIR >> IDENT-OO_{imp}[cont]

Base: [yiḵ.tōḇ]	*V-STOP	*SPIR	IDENT-OO_{imp}[cont]
a. ḵətōḇ	*!	**	
b. kəṯōb	*!	*	***
c. ḵəṯōḇ		***!	*
d. √ kəṯōḇ		**	**

(28a) - correspondent consonants are identical
(28b) - correspondent consonants are non-identical
(28c) - all stops are spirantized
√ (28d) - all and only post-vocalic stops are spirantized

Summary - Normal Application in Imperatives

- Truncated words conform to the regular surface patterns by sacrificing identity with the base. The Phono-Constraint that drives the alternation is respected, and OO-Identity is violated.

epenthesis: $*_{\sigma}$[CC >> DEP-OO_{imp}, DEP-IO
spirantization: *V-STOP >> *SPIR >> IDENT-OO_{imp}[cont], IDENT-IO[cont]

Normal Application Phono-Constraint >> OO-Identity, IO-Faith

NB: In Normal Application, *the truncated word does not mimic surface properties of the base*

4.2 Imperatives - Identity Effects (Prince 1975)

(29) Overapplication of vowel-glide coalescence ay --> ē

Root	Imperfective	Imperative	
/ydʕ/	yēḏaʕ	daʕ	*yəḏaʕ
/yšb/	yēšēḇ	šēḇ	*yəšēḇ

- the prefixed imperfective shows coalescence /ya + ydaʕ/ --> [yēḏaʕ]

•• "overapplication" of coalescence results in loss of root-initial consonant. Even though the truncated word does not condition coalescence (since truncation removes the prefix's low vowel), coalescence (over)applies, forcing loss of the root-initial glide.

(30) Overapplication of nasal assimilation ...nt --> tt

Root	Imperfective	Imperative	
/ntn/	yittēn	tēn	*nəṯēn
/ngš/	yiggaš	gaš	*nəḡaš
cf. /nhg/	yinhaḡ	nəhaḡ	*haḡ

- the prefixed imperfective shows n-assimilation /ya+ ntēn/ --> [yittēn]

•• "overapplication" of n-assimilation results in loss of root-initial consonant. Even though the truncated form does not condition n-assimilation (because if the prefix is truncated, the nasal is not in coda position), n-assimilation (over)applies, forcing loss of the root-initial nasal.
If n-assimilation is blocked in the imperfective (e.g., by a guttural consonant), the root-initial nasal segment does appear in the truncated imperative stem.

(31) Underapplication of A-to-I (Barth Ginsberg Gesetz) [a] --> [i] / #C_CC

- Pi e@l Binyan - doubling of medial consonant creates raising environment

perfective	imperfective	imperative	
giddēl	yəgaddēl	gaddēl	*giddēl
limmāḏ	yəlammēḏ	lammēḏ	*limmēḏ

•• A-to-I applies in the perfective stem, as expected. A-to-I does not apply in the imperfective, because it is not properly conditioned: the imperfective's [a] is not in the word-initial syllable. A-to-I fails to apply in the imperative, even though it has an [a] in the raising environment. Undominated OO-Identity constraints force the truncated imperative to faithfully copy the vowel in the imperfective base.

Summary - Tiberian Hebrew Imperatives

- some phonological processes apply normally, while other phonological processes over- or underapply.

Identity between base and truncated form must be enforced by a full complement of constraints, which separately evaluate every variable dimension of the representation for identity with its correspondent string.

OO-Identity cannot be required wholesale, by a monolithic identity constraint
as suggested in Kraska-Szlenk 1995, Yip 1995, Flemming & Kenstowicz 1995; Steriade 1995

4.3 Jussives and Second Feminine Singular (2fs) Stems - Final-V truncation

(32) Jussives - suppress final V of the imperfective stem

- all truncated verbs are III-[w,y], with historically weak third consonants

a. Epenthesis applies normally

Imperfective	Jussive	
yiḡlē	yiḡəl	uncover
yiḇzē	yiḇəz	despise
yiḇne	yiḇən	build
yišʕē	yišaʕ	gaze
yimḥē	yimaḥ	wipe (out)
not attested	yiḥad	become sharp

b. Epenthesis underapplies

Imperfective	Jussive	
yišbē	yišb	take captive
yip̄tē	yip̄t	be simple
yēšte	yēšt	drink
yēḇke	yēbk	weep
yiśṭe	yēśṭ	turn aside
yirdē	yērd	rule
yašqe	yašq	drink

(33) Second Feminine Singular Affix /ti/ truncates word-finally

- vowel surfaces when not word-final [kəratt̄im] 'you (fs) cut them (m) off'
- deletion is not phonologically motivated [kāratt̄i] 'I cut them off'

		Truncated 2fs Stem			1st person /t̄i/	
/karat + t̄i/	>	kəratt	'you cut off'	cf.	kāratt̄i	'I cut them off'
/katab + t̄i/	>	kāṯaḇt	'you (fs) wrote'	cf.	kāṯaḇt̄i	'I wrote'
/šamaʕ + t̄i/	>	šāmaʕat	'you (fs) heard'	cf.	šāmaʕt̄i	'I heard'
/šalaḥ + t̄i/	>	šālaḥat	'you (fs) sent'	cf.	šālaḥt̄i	'I sent'

Generalizations

i. **Epenthesis** underapplies in word-final clusters in truncated words, unless
   (a) the consonant sequence rises in sonority, or
   (b) the first consonant of the sequence is a guttural.

ii. **Spirantization** underapplies in truncated words (e.g. `yih@ad`, `s&a@lah@at`).

(34) **Jussives and 2fs Stems - Spirantization**

- stops that follow epenthetic vowels in juss/2fs stems are not spirantized

Underapplication	OO-Identity >> Phono-Con >> IO-Faith

(35) IDENT-OO$_{\text{js/2fs}}$[cont] >> *V-STOP >> *SPIR >> IDENT-IO[cont]

Base: [šāmaʕt̄i]	IDENT-OO$_{\text{js/2fs}}$ [cont]	*V-STOP
a. šs̄maʕaṯ	*!	
b. √ šāmaʕat		*

- The analogous IDENT-OO constraint on imperative truncation is crucially dominated by *V-STOP, forcing normal application of spirantization in imperative stems (see (28) above). The two IDENT-OO[cont] constraints are ranked differently in the Tiberian Hebrew grammar:

IDENT-OO$_{\text{js/2fs}}$[cont] >> *V-STOP >> IDENT-OO$_{\text{imp}}$[cont]

- This demonstrates that **each truncation morpheme in Tiberian Hebrew must be associated with it's own set of OO-Identity constraints.**
  (Urbanczyk 1995 shows that in a language with more than one reduplicative morpheme, each RED morpheme is similarly associated with a distinct set of BR-Identity constraints)

Proposal: **Affixes "trigger" correspondence relations**; e.g., the initial-CV-truncating morpheme imposes an OO_{imp}-correspondence on imperative stems, and the final-V-truncating morpheme imposes an $OO_{js/2fs}$-correspondence on jussive and 2fs stems.

(36) **Jussives and 2fs Stems - Epenthesis**

- Non-truncatory phonology doesn't allow complex codas

Input: /ʔērb/	$*CC]_\sigma$	DEP-IO
a. ʔērb	*!	
b. √ ʔērəb̲		*

(37) Truncated jussive/2fs stems allow less-marked (falling-sonority) complex codas, and prohibit more-marked complex codas (those with rising sonority profile).

Emergent Unmarkedness: a markedness distinction not visible in the language as a whole emerges in a special morphological domain
(McCarthy & Prince 1994a)

(38) Sonority-Driven Epenthesis

(a) SON-CON >> $DEP\text{-}OO_{js/2fs}$ (SON-CON "complex codas fall in sonority")

Base: [yiḡlē]	SON-CON	$DEP\text{-}OO_{js/2fs}$
a. yiḡl	*!	
b. √ yiḡəl		*

(b) SON-CON >> $DEP\text{-}OO_{js/2fs}$ >> *COMPLEX ($*CC]_\sigma$)

Base: [yirdē]	SON-CON	$DEP\text{-}OO_{js/2fs}$	$*CC]_\sigma$
a. √ yērd			*
b. yērəd̲		*!	

Sonority-Driven Epenthesis is forced by ranking the faithfulness constraint against epenthesis in jussive/2fs forms ($DEP\text{-}OO_{j/2fs}$) between a specific constraint (SON-CON) and a general constraint (*COMPLEX). By this ranking, only a subset of possible complex codas - those with a falling sonority profile - can occur in truncated stems.

The constraint against epenthesis in the input-output mapping (DEP-IO) ranks below the general constraint *COMPLEX. This rules out all complex codas in non-truncated words, no matter what their sonority contour.

SON-CON >> $DEP\text{-}OO_{js/2fs}$ >> *CPLX ($*CC]_\sigma$) >> DEP-IO

Emergent Unmarkedness

$\text{Phono-Constraint}_1$ >> OO-Identity >> $\text{Phono-Constraint}_2$ >> IO-Faith
(where $*\text{Phono-Con}_2 \supset *\text{Phono-Con}_1$)

(39) Epenthesis in Guttural-Obstruent Clusters

(1) Epenthesis occurs after guttural consonants - gutturals are dispreferred as syllable codas

i. CODA-COND $*[\text{pharyngeal}])_\sigma$ "no gutturals in codas" see McCarthy & Prince 1993b:42

ii.

ye.ʔe̱.sōp	'he will gather'
ya.ʕa̱.mōd	'he will stand'
ye.ħe̱.zaq	'he is strong'

iii. CODA-COND >> DEP-IO

Input: /ya + ʔsōp/	CODA-COND	DEP-IO
a. yaʔ.sōp	*!	
b. √ ya.ʔa.sōp		*

(2) Epenthesis does not occur if parsing the guttural as a coda leads to stem-syllable alignment

i. ALIGN-R "every stem is aligned at its right edge with (M&P 1994b)
Align (Stem, R, syllable, R) the right edge of some syllable"

ii.

rēʕ	'companion'
yəḏaʕ|.tem	'you knew'
šālaħ|.t̄i	'I sent'
šəmáʕ	'hear!' (imperative)
šāmaʕ	'he heard' (jussive)

iii. MAX-IO, ALIGN-R (Stem, syllable) >> CODA-COND >> DEP-IO

Input: /rēʕ/	MAX-IO	ALIGN-R	CODA-COND	DEP-IO
a. rē	*!			
b. rē.ʕ|a		*!		*
c. √ rēʕ			*	

(3) Truncated jussive/2fs stems pattern with non-truncated words w.r.t. guttural codas - they show epenthesis after gutturals, unless parsing the guttural as a coda leads to stem-syllable alignment. Therefore, the OO-Identity constraints on js/2fs truncation must have the same rank w.r.t. ALIGN-R and CODA-COND as the IO-Faith constraints in (2iii):

MAX-OO$_{js/2fs}$, ALIGN-R >> CODA-COND >> DEP-OO$_{js/2fs}$

This is the ranking that forces epenthesis in guttural-obstruent clusters in js/2fs stems:

Base: [šā.maʕ|.t̄i]	MAX-OO$_{js/2fs}$	ALIGN-R	CODA-COND	DEP-OO$_{js/2fs}$
a. šā̆.maʕ|	**!		*	
b. šā.maʕ|t.	*	*	*!	
c. √ šā.ma.ʕ|at.	*	*		*

(4) **Summary** CODA-COND penalizes a subset of the candidates that violate $*CC]_\sigma$. The constraint against epenthesis in truncated words ranks below the specific constraint, but above the general constraint. By this ranking, only the least-marked complex codas will occur in truncated words. Because the constraint against epenthesis in the IO mapping is ranked below the general constraint, no complex codas of any kind are allowed in non-truncatory phonology. Thus, no markedness distinction between types of complex codas is visible in non-truncated words; this distinction emerges in the special domain of jussive/2fs truncation.

Summary of **§2-4** - Factorial Typology

- Inherently typological constraint-ranking predicts the range of results; truncated words are **sometimes identical,** and **sometimes non-identical** to their source words bases.

Underapplication	OO-Identity >> Phono-Constraint >> IO-Faith
Overapplication	OO-Identity, Phono-Constraint >> IO-Faith
Normal Application	Phono-Constraint >> OO-Identity, IO-Faith
Emergent Unmarkedness	Phono-Con$_1$ >> OO-Identity >> Phono-Con$_2$ >> IO-Faith (where $*\text{Phono-Con}_2 \supset *\text{Phono-Con}_1$)
or	IO-Faith >> Phono-Constraint >> OO-Identity (M&P 1994a)

5. Rule Ordering

Overapplication	phonological rule applies **before** truncation
Underapplication	phonological rule applies **before** truncation
Normal Application	phonological rule applies **after** truncation

5.1 New York-Philadelphia English

- *underapplication* of æ-tensing in closed syllables

(40) New York-Philadelphia English Truncation, Serially (Borowsky 1986, 1993; Dunlap 1987)

	'Pamela'	'mandible'
input	/pæmələ/	/mæn.dIbl̩/
syllabification	pæ.mə.lə	mæn.dI.bl̩
æ-tensing	n/a	mEn.dI.bl̩
truncation	pæm	n/a

- truncation applies after the allophonic (post-lexical) æ-tensing rule
- æ-tensing does not get another chance after truncation alters the syllabification

5.2 Icelandic

- *underapplication* of epenthesis in *Cr* clusters, deletion in *Cj* clusters
- *overapplication* of vowel lengthening

(41) Icelandic Deverbal Action Noun Truncation (Kiparsky 1984)

	Input	/sötra/	/grenja/
Lexical Rules	syllabification	sö.tra	gren.ja
	initial stress	sö.tra	grén.ja
	epenthesis, j-deletion	n/a	n/a
Post-Lexical Rules	epenthesis, j-deletion	n/a	n/a
	v-lengthening	söö.tra	n/a
Morphology	**truncation**	söötr	grenj
		'sipping'	'crying'

(42) Icelandic - normal application of epenthesis in [r]-final forms - *söötur*, **söötr*

	Input	/sötra/	/grenja/
Lexical Rules	syllabification	sö.tra	gren.ja
	epenthesis, j-deletion	n/a	n/a
Morphology	**truncation**	sötr	grenj
Post-Lexical Rules	epenthesis, j-deletion	söt**u**r	gren
	v-lengthening	söö.t**u**r	n/a
	output	sööt**u**r	*gren
		'sipping'	'crying'

to get the right result in both forms, truncation has to be ordered between post-lexical phonological rules: after j-deletion, but before epenthesis, v-lengthening

5.3 Tiberian Hebrew

(43) **Imperative Truncation**

- *overapplication* of vowel-glide coalescence, nasal-assimilation
- *underapplication* of A-to-I (a --> i / #C__CC)
- *normal application* of degemination, epenthesis, spirantization

Input	/ya-ydaʕ/	/ya-gaddel/	/ya-nten/	/ya-ktob/
A-to-I			yintēn	
n-assimilation			yittēn	
VG-coalescence	yēdaʕ			
Imperative truncation	daʕ	gaddel	ttēn	ktōb
degemination			te@n	
epenthesis				kətōb
spirantization				kət̲ōb̲
Output	daʕ	gaddel	tēn	kət̲ōb̲

(44) **Jussive/2fs Truncation**

- *underapplication* of spirantization
- *underapplication* of epenthesis
- *normal application* of epenthesis in context: tautosyllabic C--[son], [gutt] -- C

Input	/yiptē/	/yiglē/	/šāmaʕ + t̄i/
general epenthesis			
spirantization	yip̄tē	yiḡlē	
Jussive/2fs Truncation	yip̄t	yiḡl	šāmaʕt
C - [son] epenthesis		yiḡəl	
[gutt] - C epenthesis			šāmaʕat
Output	yip̄t	yiḡəl	šāmaʕat

(45) Arguments

- Spirantization should be a late rule; it's an automatic, allophonic alternation (the only exceptions are truncated forms), it applies between words, etc. But in (43-44), spirantization is followed by both morphology and phonology.

- Special rules are required for truncated forms. The C-son and Gutt-C epenthesis rules are otherwise unmotivated; non-truncated words (and imperatives) prohibit all complex syllable margins. Rules prohibiting a subset of complex codas are not generalizable beyond jussive and 2fs stems.

- The late clean-up rules target the most marked clusters. Rule ordering describes this, but does not explain it. Constraint ranking does; specific constraint outranks general constraint, OO-Identity is ranked between the specific and general constraints.

- Generally, arbitrariness is problematic for rule-ordering theories. Constraint-ranking is inherently arbitrary.

- In rule-based theories, truncatory identity is an accident, the by-product of the derivational history. In the correspondence model, identity of base and truncated counterpart is an ever-present concern, imposed by the OO-correspondence relation.

6. Parallelism? The Priority of the Base

OO-correspondence does not demonstrate parallelism

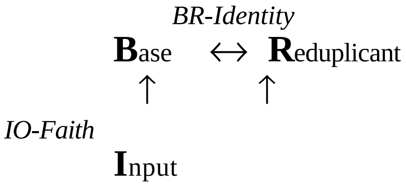
6.1 **The Priority of the Base -** truncatory OO-correspondence is a "one-way" relation. The base of truncation cannot "copy" the truncated word; that is, the base does not adjust to accomodate constraints on its truncated counterpart. *The base of truncation always conforms to the regular surface patterns of the language.*

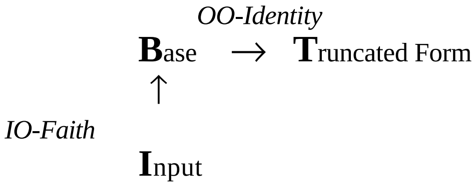
English:	[pæ.mə.lə]	≈	[pæm],	*[pE.mə.lə]	≈	[pEm]
Icelandic:	[söö.tra]	≈	[söötr],	*[sö.tra]	≈	[sötr]

In reduplication, the base can "copy" the reduplicant, and as a result, the base may violate surface patterns. This shows that reduplicative BR-correspondence is a "two-way" relation**.** This kind of interaction is strong evidence that base and reduplicant are generated simultaneously, in a fully parallel derivation of the reduplicated word (see McCarthy & Prince 1993a, 1995).

Tagalog:	/paN-RED-putal/	pa-mu-mutal,	*pa-mu-putal
Chumash:	/k-RED-ʔaniš/	k'an-k'aniš,	*k'an-ʔaniš

6.2 There is no evidence of a relation between the truncated word and the input. The truncated word is never more faithful to the input than the base is.





6.3 Truncation — Base of truncation and truncated word are *separate words*
OO-Identity and IO-Faith constraints cannot conflict -
OO-Identity and IO-Faith evaluate non-overlapping sets of words.

Reduplication — Base of reduplication and reduplicant are part of a single word
BR-Identity and IO-Faith constraints can conflict - evaluate the same word.

	Truncation	Reduplication
Overapp.	OO-ID, Ph-Constraint >> IO-Faith	BR-ID, Ph-Constraint >> IO-Faith
Underapp.	OO-ID >> Ph-Constraint >> IO-Faith	C, BR-ID >> Ph-Constraint >> IO-Faith
Normal App.	Ph-Constraint >> OO-ID, IO-Faith	Ph-Constraint >> IO-Faith >> BR-ID

(McCarthy & Prince 1995)

OO-correspondence is consistent with parallelism
-there are no intermediate stages of derivation;
the base of truncation is a fully-formed output word
- only two "levels" are relevant: input and output

7. Other Applications of OO-correspondence: Cycles and Strata

- The study of truncation morphology showed that **correspondence relations can hold between separate words**. This OO-correspondence relation is evaluated by identity constraints, which demand perfect correspondence between the related words. Through constraint interaction, identity may or may not be achieved.

- The analysis of Tiberian Hebrew showed that each truncation morpheme imposes a distinct OO-correspondence relation, regulated by distinct OO-Identity constraints. This suggests that the morphology is responsible for the correspondence relation; in the sense that **affixes "trigger" correspondence relations.**

- Many "cyclic effects" (patterns attributed to cyclic derivation) can be understood in a similar way. Affixes may trigger correspondence relations between words; ranked identity constraints may demand that affixed words are faithful to their unaffixed bases.

Burzio (1994), in a different framework, similarly relies on relations between words to analyze English stress

<u>CAVEAT</u>: Not all "cyclic effects" require OO-correspondence; alignment of morphological and prosodic categories may account for many cases of apparent cyclicity. See McCarthy & Prince 1993b on MCat-PCat alignment, and Cohn & McCarthy 1994 for an implementation; see also Liberman & Prince 1977 on English stress

(46) Cycles or Levels in Optimality Theory

Cycles, or serially ordered levels of derivation, are not incompatible with OT
(see McCarthy & Prince 1993a; Orgun 1994; Inkelas 1995; Kenstowicz 1995)

In OT, distinct levels of derivation are motivated by constraint re-ranking
(e.g., Constraint A >> Constraint B on cycle 1, but Constraint B >> Constraint A on cycle 2)

If two sets of faithfulness constraints are recognized, constraint re-ranking, and hence levels of derivation, are no longer necessary

(47) **Level Sensitivity and New York-Philadelphia æ-Tensing**

æ-tensing overapplies in words with Class 2 affixation

Unaffixed		Class 1 Affix		Class 2 Affix	
class	[klEs]	classic	[klæ.sIk]	classy	[klE.si]
mass	[mEs]	massive	[mæ.sIv]	massable	[mE.sə.bl̩]
pass	[pEs]	passive	[pæ.sIv]	passing	[pE.siŋ]

Observation: æ-tensing overapplies in *classy* to preserve identity with *class*

Proposal: class 2 affixes set up an OO-correspondence between an independently-occurring word and the string to which the affix attaches

(48) **Affixes Subcategorize Correspondence Relations**

a. Class 1 affixes

Subcategorization

/-Iv/ V --> Adj
suffix
IO-correspondence

schematic derivation

[pæ.sIv]
↑ *IO-Faith*
/pæs - Iv/

Class 1 affixes select IO-correspondence

- this is an ordinary OT derivation

b. Class 2 affixes

Subcategorization

/-əbl/ V --> Adj
suffix
OO-correspondence

schematic derivation

OO-Identity
[pE.sə.bl] ← [pEs]
Afx-Faith ↑ ↑ *IO-Faith*
/X - əbl/ /pæs/

Class 2 affixes select OO-correspondence

- the affixed word *passable* is related to the unaffixed base *pass*
- tense [E] in *passable* is forced by undominated OO-Identity constraints

- the affix itself is faithful to its lexical form by Afx-Faith constraints, else it's [ba] (on Root-Faith and Affix-Faith, see M&P 1994b and Urbanczyk in prep.)

(49) Allophonic NY-Philadelphia æ-Tensing Revisited (see (9)-(12) above)

*æC]$_\sigma$ >> *TENSE-lo >> IDENT-IO[tns]

Input: /pEs/	*æC]$_\sigma$	*TENSE-lo	IDENT-IO[tns]
a. pæs	*!		*
b. √ pEs		*	

Input: /pEs-iv/	*æC]$_\sigma$	*TENSE-lo	IDENT-IO[tns]
a. √ pæ.siv			*
b. pE.siv		*!	

(50) Overapplication with class 2 affixation

IDENT-OO[tns], *æC]$_\sigma$ >> *TENSE-lo >> IDENT-IO[tns]

Input: /X + iŋ/ Base: [pEs]	IDENT-OO[tns]	*TENSE-lo
a. pæ.siŋ	*!	
b. √ pE.siŋ		*

Summary - Level-Sensitivity in NY-Philadelphia æ-Tensing

- OO-Identity constraints compare the affixed word *passing* to the unaffixed base *pass*. Undominated IDENT-OO[tns] forces the tense allophone to appear in the open syllable of *passing*.

- With OO-correspondence, level-sensitivity can be modelled in a parallel grammar, with a single constraint hierarchy.

(51) **Cyclicity in Sundanese**

(Robins 1957; Anderson 1972; van der Hulst & Smith 1982; Cohn 1990)

Phenomenon:	nasal harmony overapplies in infixed words: the infix's oral consonant fails to block nasal spread
Cyclic Analysis:	nasal spread applies both before and after infixation (Cohn 1990)

(52) Sundanese Nasal Harmony

Vowels are nasal in post-nasal context. Glottal consonants are transparent (a). Harmony is blocked by oral consonants, including stops and fricatives (b), liquids (c) and glides (d).

a.	/ɳiar/	ɳĩãr	'seek' (active)
	/naatkɨn/	nãʔãtkɨn	'dry' (active)
	/bɨŋhar/	bɨŋhãr	'to be rich'
b.	/ŋatur/	ŋãtur	'arrange' (active)
	/ŋisər/	ŋĩsər	'displace' (active)
c.	/ŋuliat/	ŋũliat	'stretch' (active)
	/marios/	mãrios	'examine' (active)
d.	/ŋiwat/	ŋĩwat	'elope'
	/ŋajak/	ŋãjak	'sift' (active)

(53) Sundanese plural infixation

The plural affix /aR/ is infixed after the first C of C-initial bases. On the [r ≈ l] alternation in this affix, see Holton 1995.

Vowels that follow the infix are nasal, even though they are not in a post-nasal environment. Nasal harmony appears to overapply.

/aR + ɳiar/	ɳãlĩar	'seek' pl.	cf. ɳĩãr
/aR + ɳaur/	ɳãlãur	'say' pl.	cf. ɳãũr
/aR + ɳaian/	ɳãrãĩãn	'wet' pl.	cf. ɳãĩãn
/aR + mahal/	mãrãhãl	'expensive'	cf. mãhãl
/aR + ɳaatkɨn/	ɳãr̃ʔãtkɨn	'dry'	cf. nãʔãtkɨn

(54)

OO-Identity

[ɳĩãr] → [ɳãlĩãr]

↑ ↑ *Afx-Faith*

Root-Faith

/ ɳiar / / aR + X /

OO-Identity forces nasalization in the vowels that follow the oral infix

(55) **Infixation** NO-CODA >> EDGEMOST (Prince & Smolensky 1993)

Input: /ar + X/ Base: [mãhãl/	NO-CODA	EDGEMOST
a. ar.mã.hal	**!	
b. √ mã.rã.hal	*	m
c. mã.hã.ral	*	mãh !

- infixation results in more harmonic syllable structure (see also Anderson 1972)

(56) **Nasal Harmony** (McCarthy & Prince 1995 on Madurese)

i. $*\text{NV}_{\text{oral}}$ "no oral vowels following a nasal segment"
ii. $*\text{V}_{\text{nasal}}$ "no nasal vowels"
iii. IDENT-IO[nasal] "correspondent segments agree in nasality"

Input: / na /	$*\text{NV}_{\text{oral}}$	$*\text{V}_{\text{nas}}$	IDENT-IO[nas]
a. na	*!		
b.√ nã		*	*

Input: / nã /	$*\text{NV}_{\text{oral}}$	$*\text{V}_{\text{nas}}$	IDENT-IO[nas]
a. na	*!		*
b. √ nã		*	

Input: / ba /	$*\text{NV}_{\text{oral}}$	$*\text{V}_{\text{nas}}$	IDENT-IO[nas]
a. √ ba			
b. bã		*!	*

Input: / bã /	$*\text{NV}_{\text{oral}}$	$*\text{V}_{\text{nas}}$	IDENT-IO[nas]
a.√ ba			*
b. bã		*!	

(57) Oral Consonants Block Nasal Harmony in Sundanese

- In unaffixed words, all and only post-nasal vowels are nasal

Input: /ŋatur /	$*\text{NV}_{\text{oral}}$	$*\text{V}_{\text{nasal}}$	IDENT-IO[nas]
a. ŋatur	*!		
b. ŋatũr	*!	*	**
c. ŋãtũr		**!	*
d. √ ŋãtur		*	*

(58) **Overapplication** OO-Identity, Phono-Con >> IO-Faith

Input: / aR + X / Base: [ŋĩãr]	IDENT-OO [nas]	$*\text{NV}_{\text{oral}}$	$*\text{V}_{\text{nasal}}$	IDENT-IO [nas]
a. ŋaliar	**!	*!		(*)
b. ŋãliar	**!		*	(*)
c. ŋalĩãr		*!	**	(*)
d. √ ŋãlĩãr			***	(*)

- root vowels are nasalized by high-ranking OO-Identity constraint
- infix's vowel is nasalized by high-ranking $*\text{NV}_{\text{oral}}$
- IDENT-IO[nas] violations are assessed against the affix only

(59) What is the Base of OO-Correspondence?

- The base of OO-correspondence is an independently-occurring word that is identified with the string to which the OO-correspondence-triggering affix attaches.

$$\begin{tikzcd}
\text{[gratifyingly]} & \text{[gratifying]} \arrow[l, "\text{OO-Identity}"'] & \text{[gratify]} \arrow[l, "\text{OO-Identity}"'] \\
\text{/ X + ly /} \arrow[u] & \text{/ X + ing /} \arrow[u] & \text{/ grat + ify /} \arrow[u]
\end{tikzcd}$$

<u>-ly triggers OO-correspondence</u>	<u>-ing triggers OO-correspondence</u>	<u>-ify triggers IO-correspondence</u>
between the string it attaches to and the base [gratifying]. The affix itself corresponds to its lexical form. Ranked OO-Ident constraints may require the affixed word to be faithful to the phonology of the base.	between the string it attaches to and the base [gratify]. The affix itself corresponds to its lexical form. Ranked constraints may require the affixed word to be faithful to the phonology of the base.	between the string it attaches to and the lexical form of the root. Both root and affix correspond to their lexical forms, and must be as faithful to them as ranked IO-Faith constraints demand.

(60) "Cyclic Effects" are Word-Based

- Affixes that subcategorize for OO-correspondence cannot attach to bound stems; to satisfy the subcategorization frame of the affix, an output base must exist.

- "Cyclic effects" must be word-based; the "first cycle" constituent must be an independently-occuring word (Brame 1974, Selkirk 1980).

- Identity effect phenomena should not be observed in affixal material; affixes are linked to their inputs by IO-Faith, and therefore should be regular w.r.t. the language's surface patterns.

(61) Further Illustrations

Spanish (Kiparsky 1982)

coda depalatalization overapplies

/desdeñ/ ≈ [desden]	'disdain' (noun sg.)	nasal depalatalizes in coda position
/desdeñ-es/ ≈ [des.de.ñes]	'you disdain' (2sg. verb)	nasal stays palatal in onset
/desdeñ-es/ ≈ [des.de.nes]	'disdain' (noun pl.)	depalatalization overapplies in pl. noun

- *the plural affix triggers an OO-relation, and the verb agreement triggers IO-correspondence*

Spanish (Harris 1985, 1989; Halle & Vergnaud 1987; Halle, Harris & Vergnaud 1991)

diphthongization of stressed mid vowels overapplies with "non-cyclic" affixes

b**ué**n-o	'good'	mid V is a diphthong when stressed
b**o**n-dád	'goodness'	mid V is not a diphthong when unstressed, with a cyclic affix
b**ue**n-ísimo	'very good'	mid V is unstressed but still a diphthong, w/ a non-cyclic affix

- *"cyclic" affixes trigger IO-correspondence, and "non-cyclic" affixes trigger OO-correspondence*

Palestinian Arabic (Brame 1974; Kiparsky 1982; Halle & Kenstowicz 1991)

syncope of unstressed high vowels underapplies with object clitics

fíhim	'he understood'	regular penult stress on high vowel
fhím-na	'we understood'	subj. 'ending' shifts stress to 2nd root σ, 1st σ syncopates
fihím-na	'he understood us'	unstressed high vowel doesn't syncopate

- *subject agreement triggers IO-correspondence, object "clitics" trigger OO-correspondence*

Carib (Hoff 1968; Inkelas 1989, 1991; Kenstowicz 1995)

monosyllabic prefixation disrupts alternating iambic vowel lengthening

kuraama	'he understood'	unaffixed word - regular iambic length pattern
ki-kuuraamako		monosyllabic prefix - adjacent long vowels

- *prefixes trigger OO-relations, length on 3rd syllable of the prefixed word is required by OO-Identity*

Rotuman (Blevins 1994, McCarthy 1995)

stress-dependent ATR harmony overapplies in affixed words

/mare/ ≈ [mæ.re]	low vowel is raised when stressed and followed by [e]
/mare-ʔaki/ ≈ [mæ.re.ʔá.ki]	with certain suffixes, the vowel is affected even when unstressed

- *suffixes, but not clitics, trigger an OO-correspondence with the unaffixed base*

Polish (Kraska-Szlenk 1995)

syllabically-conditioned [o ≈ u] alternation disrupted in diminutive paradigms;
vowels match the nom.sg. form, which is regular w.r.t. the [o ≈ u] pattern]

open σ - [o]		closed σ - [u]	
nom.sg. = do.lek		nom.sg. = kruw.ka	
nom pl.	dol.ki	nom pl.	kruw.ki
gen.sg	dol.ka	gen.sg	kruw.ki
gen. pl.	dol.kow	gen. pl.	kru.wek
dat.sg.	dol.ko.wi	dat.sg.	kruw.ce
dat.pl.	dol.kom	dat.pl.	kruw.kom

- *diminutive marking triggers an OO-relation with the zero-affixed nom.sg. form. OO-Identity outranks the constraints that drive the vowel alternation.*

8. Summary & Conclusion

Words stand in correspondence with one another, in the same way that base and copy are related in reduplicated words, and the same way that inputs are related to outputs in parallel OT derivation.

By positing correspondence relations between a word and its truncated counterpart, we can account for over- and underapplication identity effects in truncation. Other transderivational relations, including the kind of phenomena that have been attributed to the cyclic application of phonological rules, can be understood in the same way.

The OO-correspondence proposal can be straightforwardly extended to other phonological identity relations, including infixational morphology, root-and-pattern and templatic systems, and other "circumscriptional" effects. With correspondences between output words, many circumscriptional phenomena can be understood as *prosodic identity effects* (see McCarthy 1995 and Benua 1995 for some development of these ideas).

References

Anderson, Stephen R. (1972) "On Nasalization in Sundanese," *Linguistic Inquiry* 3, 253-268.

- - - - (1975) "On the Interaction of Phonological Rules of Various Types," *Journal of Linguistics* 11, 39-62.

Aronoff, Mark (1976) *Word Formation in Generative Grammar*, MIT Press, Cambridge, Massachusetts.

Benua, Laura (1995) "Identity Effects in Morphological Truncation," in J.Beckman, L. Walsh-Dickey & S. Urbanczyk (eds), *University of Massachusetts Occasional Papers in Linguistics* 18, *Papers in Optimality Theory*, GLSA, Amherst.

Blevins, Juliette (1994) "The Bimoraic Foot in Rotuman Phonology and Morphology," *Oceanic Linguistics* 22, 491-516.

Borowsky, Toni J. (1986) "Topics in the Lexical Phonology of English," Doctoral DIssertation, University of Massachusetts, Amherst.

- - - - (1993) "On the Word Level," in Sharon Hargus & Ellen M. Kaisse, eds., *Phonetics and Phonology 4, Studies in Lexical Phonology*, Academic Press, New York.

Brame, Michael K. (1974) "The Cycle in Phonology: Stress in Palestinian, Maltese and Spanish," *Linguistic Inquiry* 5, 39-60.

Burzio, Luigi (1994) *Principles of English Stress*, Cambridge Univerity Press.

Cohn, Abigail C. (1990) "Phonetic and Phonological Rules of Nasalization," doctoral dissertation, UCLA.

Cohn, Abigail C. and John J. McCarthy (1994) "Alignment and Parallelism in Indonesian Phonology," ms., Cornell University and University of Massachusetts, Amherst.

Dunlap, Elaine R. (1987) "English [æ] Tensing in Lexical Phonology," ms., University of Massachusetts, Amherst.

Ferguson, Charles A. (1972) "'Short a' in Philadelphia English," in M. Estellie Smith, ed., *Studies in Linguistics in Honor of George L. Trager*, Mouton.

Flemming, Edward & Michael Kenstowicz (1995) "Base-Identity and Uniform Exponence: Alternatives to Cyclicity," ms., MIT.

Halle, Morris & Michael Kenstowicz (1991) "The Free Element Condition and Cyclic versus Noncyclic Stress," *Linguistic Inquiry* 22, 457-501

Halle, Morris & Jean-Roger Vergnaud (1987) "Stress and the Cycle," *Linguistic Inquiry* 18, 45-84

Halle, Morris, James Harris & Jean-Roger Vergnaud (1991) "A Reexamination of the Stress Erasure Convention and Spanish Stress," *Linguistic Inquiry* 22, 141-159.

Harris, James W. (1985) "Spanish Diphthongization and Stress: A Paradox Resolved," *Phonology* 2, 31-45.

- - - - (1989) "The Stress Erasure Convention and Cliticization in Spanish," *Linguistic Inquiry* 20, 339-363.

Hoff, B.J. (1968) *The Carib Language*, Martinus Nijhoff, The Hague.

Holton, David (1995) "Assimilation and Dissimilation of Sundanese Liquids" in J.Beckman, L. Walsh-Dickey & S. Urbanczyk (eds), *University of Massachusetts Occasional Papers in Linguistics* 18, *Papers in Optimality Theory*, GLSA, Amherst.

van der Hulst, Harry & Norval Smith (1982) Prosodic Domains and Opaque Segments in Autosegmental Theory," in H. van der Hulst & N. Smith, eds., *The Structure of Phonological Representations (Part II)*, Foris, Dordrecht.

Inkelas, Sharon (1989) "Prosodic Constituency in the Lexicon," doctoral dissertation, Stanford University.

- - - - (1993) "Deriving Cyclicity," in Sharon Hargus & Ellen M. Kaisse, eds., *Phonetics and Phonology 4, Studies in Lexical Phonology*, Academic Press, New York.

- - - - (1994) "Exceptional Stress-Attracting Suffixes in Turkish: Representations vs. the Grammar," ms., University of California, Berkeley.

Itô, Junko (1986) "Syllable Theory in Prosodic Phonology," Doctoral dissertation, University of Massachusetts, Amherst.

Kahn, Daniel (1976) *Syllable-Based Generalizations in English Phonology*, Garland, New York, 1980.

Kiparsky, Paul (1984) "On the Lexical Phonology of Icelandic," in Claes-Christian Elert, Iréne Johansson, Eva Strangert, eds., *Nordic Prosody* III, University of Umea.

Kenstowicz, Michael (1995) "Cyclic vs. Non-Cyclic Constraint Evaluation," ms., MIT, to appear in *Phonology*.

Kraska-Szlenk, Iwona (1995) "The Phonology of Stress in Polish," doctoral dissertation, University of Illinois at Urbana-Champaign.

Labov, William (1981) "Resolving the Neogrammarian Controversy," *Language* 57, 267-308.

Liberman, Mark & Alan S. Prince (1977) "On Stress and Linguistic Rhythm," *Linguistic Inquiry* 8, 249-336.

Martin, Jack (1988) "Subtractive Morphology as Dissociation," Proceedings of the Seventh West Coast Conference on Formal Linguistics.

McCarthy, John J. (1979) *Formal Problems in Semitic Phonology and Morphology*, Garland Press, New York, 1985.

- - - - (1995) "Extensions of Faithfulness: Rotuman Revisited," ms., University of Massachusetts, Amherst

McCarthy, John J. & Alan M. Prince (1986) "Prosodic Morphology," ms., University of Massachusetts, Amherst and Brandeis University.

- - - - (1990) "Foot and Word in Prosodic Morphology: The Arabic Broken Plural," *Natural Language and Linguistic Theory* 8, 209-283.

- - - - (1993a) "Prosodic Morphology I: Constraint Interaction and Satisfaction," ms., University of Massachusetts, Amherst and Rutgers University.

- - - - (1993b) "Generalized Alignment," in Geert Booij & Jaap van Marle, eds., *Yearbook of Morphology 1993*, Kluwer, Dordrecht.

- - - - (1994a) "The Emergence of the Unmarked," Proceedings of NELS 21, GLSA, Amherst.

- - - - (1994b) "An Overview of Prosodic Morphology," talk presented at Prosodic Morphology Workshop, Utrecht.

- - - - (1995) "Faithfulness and Reduplicative Identity," in J.Beckman, L. Walsh-Dickey & S. Urbanczyk (eds), *University of Massachusetts Occasional Papers in Linguistics* 18, *Papers in Optimality Theory*, GLSA, Amherst.

Odden, David (1993) "Interaction between Modules in Lexical Phonology," in Sharon Hargus & Ellen M. Kaisse, eds., *Phonetics and Phonology 4, Studies in Lexical Phonology*, Academic Press, New York.

Ores&nik, Janez (1972) "On the Epenthesis Rule in Modern Icelandic," *Arkiv för nordisk filologi* 87, 1-32, reprinted in Magnús Pétursson ed., *Studies in the Phonology and Morphology of Modern Icelandic*, Helmut Buske Verlag, Hamburg, 1985.

- - - - (1978a) "The Age and Importance of the Modern Icelandic Type *klifr*," The Nordic Languages and Modern Linguistics 3, J. Weinstock, ed., reprinted in Magnús Pétursson ed., *Studies in the Phonology and Morphology of Modern Icelandic*, Helmut Buske Verlag, Hamburg, 1985.

Padgett, Jaye (1991) "OCP Subsidiary Features," NELS 21, GLSA, University of Massachusetts, Amherst.

Payne, Arvilla C. (1980) "Factors Controling the Acquisition of the Philadelphia Dialect by Out-of-State Children," in William Labov, ed., *Locating Language in Time and Space*, Academic Press, New York.

Prince, Alan M. (1975) "The Phonology and Morphology of Tiberian Hebrew," Doctoral dissertation, MIT.

Prince, Alan M. & Paul Smolensky (1993) "Optimality Theory: Constraint Interaction in Generative Grammar," ms., Rutgers University and University of Colorado, Boulder.

Robins, R.H. (1957) "Vowel Nasality in Sundanese," reprinted in *Diversions of Bloomsbury, Selected Writings on Linguistics*, North-Holland, London, 1970.

Selkirk, Elisabeth O. (1980) "The Role of Prosodic Categories in English Word Stress," *Linguistic Inquiry* 11, 563-605.

Urbanczyk, Suzanne (1995) "Double Reduplications in Parallel," in J.Beckman, L. Walsh-Dickey & S. Urbanczyk (eds), *University of Massachusetts Occasional Papers in Linguistics* 18, *Papers in Optimality Theory*, GLSA, Amherst.

- - - - (in prep.) "Patterns of Reduplication in Lushootseed" Doctoral dissertation, University of Massachusetts, Amherst.

Weeda, Donald Stanton (1992) "Word Truncation in Prosodic Morphology," Doctoral dissertation, University of Texas, Austin.

Wilbur, Ronnie (1973) "The Phonology of Reduplication," Doctoral dissertation, University of Illinois, Urbana-Champaign.

Yip, Moira (1995) "Repetition and its Avoidance: The Case of Javanese," ms., University of California, Irvine.

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