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Generalized mora affixation

Assumption:

Morphology is always additive.

The Final Frontier: Subtractive Morphology

(1)   **Koasati**   (Martin 1988, Kurisu 2001)

	Singular			*Plural*			
	pit**áf**	-fi	-n	pít**ø**	-li	-n	"to slice up the middle"
	atak**á:**	-li	-n	aták**ø**	-li	-n	"to hang sth."
	tiw**áp**	-li	-n	tíw**ø**	-w	-n	"to open sth."

. . . and similarly morphological vowel shortening & length polarity

Types of Quantity Manipulating Morphology

1. Lengthening (Vowel Lengthening, Gemination)

2. Insertion of Epenthetic Segments

3. Vowel Shortening
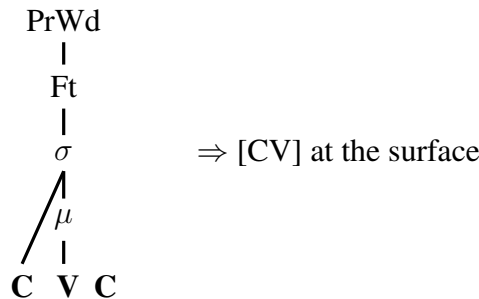
4. Subtractive Morphology

5. Length Polarity

> **Standard Assumption:** Augmentative quantitative morphology $\approx$ mora affixation
>
> (e.g. Samek-Lodovici 1992, Grimes 2002, Davis 2006)
>
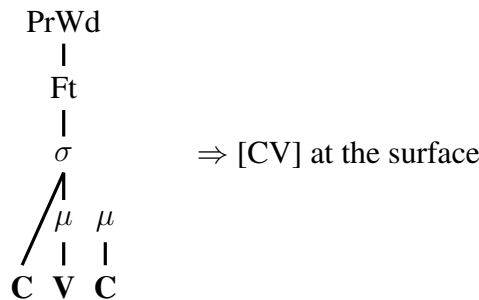> **Our Claim:** Subtractive quantitative morphology $\approx$ mora affixation

1. Theoretical Background

- Containment Theory: Deletion $\approx$ Non-Parsing
  (Prince&Smolensky 1993)

Underlying segmental string CVC:

$$
\begin{array}{c}
\text{PrWd} \\
| \\
\text{Ft} \\
| \\
\sigma \qquad\qquad \Rightarrow \text{[CV] at the surface}\\
\diagup\!|\\
\mu\\
|\\
\mathbf{C}\ \ \mathbf{V}\ \mathbf{C}
\end{array}
$$

Subtraction as Mora Affixation: CVC + morphological μ

$$
\begin{array}{c}
\text{PrWd} \\
| \\
\text{Ft} \\
| \\
\sigma \qquad\qquad \Rightarrow \text{[CV] at the surface}\\
\diagup\!|\\
\mu\ \ \mu\\
|\ \ |\\
\mathbf{C}\ \ \mathbf{V}\ \mathbf{C}
\end{array}
$$

- Colored Containment Theory: (van Oostendorp 2006)

  – Phonological material of a specific morpheme has an unambigous color

  – Insertion $\approx$ Addition of colorless material

  – Deletion $\approx$ Marking of morphological material as phonetically invisible
    $\Rightarrow$ *nothing* can be literally *deleted*

- Phonetically (In)Visible I: Association Lines:
  Association lines obey containment: they cannot be deleted and are marked for whether they are phonetically visible or not.

| Underlying association line | | Inserted association line |
phonetically visible:	phonetically invisible:	phonetically visible:
μ $\|$ S	μ $\vdots$ S	μ $\|$ S
	μ violates Max$\|$ S	μ violates Dep$\|$ S

- Phonetically (In)Visible II: Segmental Material:
  Visibility of segments for phonetics is governed by (2):

(2)   **Axiom of Phonetic Visibility**
        All and only the phonological nodes which are dominated by the designated root
        node through an uninterrupted path of phonetically visible nodes and association
        lines are pronounced.

- 'Deletion' for a CVC string with a full underlying prosodic structure would be represented
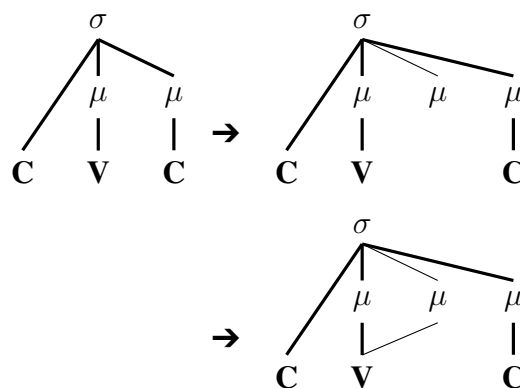 as follows:

$$\Rightarrow \text{[CV]}$$
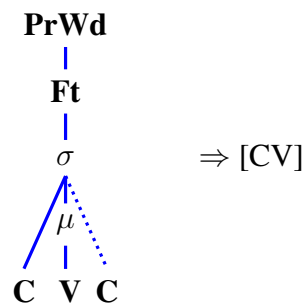
$\Rightarrow$ The final C is not integrated under the highest prosodic node through an uninterrupted
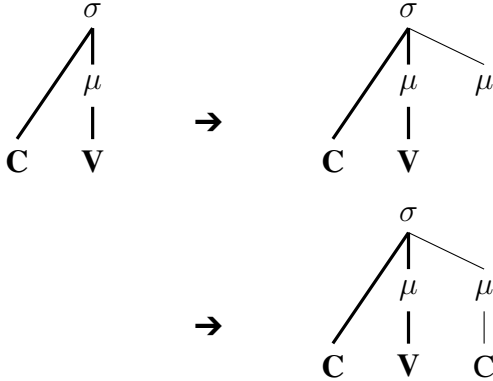path of phonetically visible nodes and association lines

2.   Generalized Mora Affixation

2.1.   Overview: Quantity Manipulating Morphology
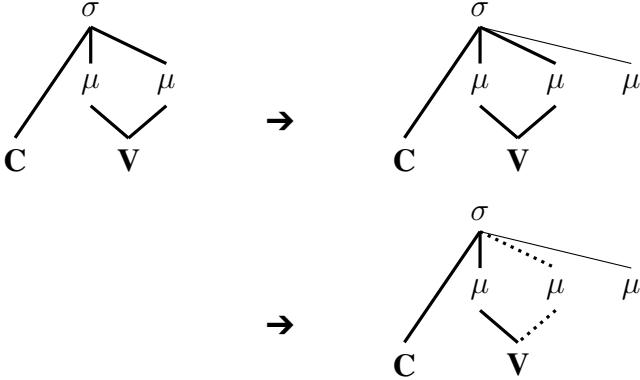
Lengthening (cf. Davis & Ueda 2002)
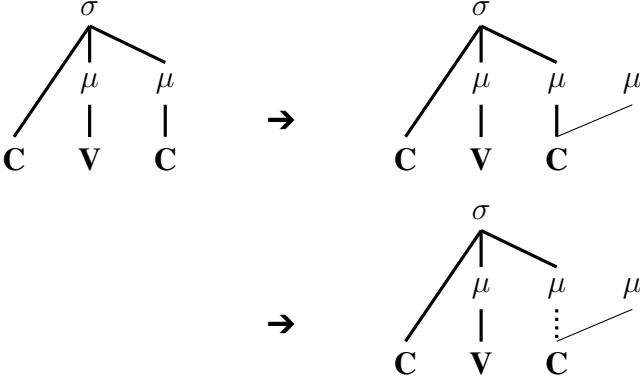
Insertion (cf. Davis & Ueda 2002)

Vowel Shortening (by catalexis, cf. Seiler 2008)

Subtraction

2.2. Constraints

Constraints on μ-Integration:

(3) | μ | | Assign a violation mark for every μ that
     | $\Downarrow$ | | does not dominate (phonetically or morphologically)
     | S | | a segment.

(4) | σ | | Assign a violation mark for every mora that
     | $\Uparrow$ | | is not dominated (phonetically or morphologically)
     | μ | | by a syllable node.

General Constraints on Prosody:

(5) | $*\sigma$ | Assign a violation mark for every syllable
     | $|_p$ | that dominates more than three moras
     | μ^4 | phonetically.

| $\dfrac{*\mu^3}{V}$ | Assign a violation mark for every vowel that is dominated by more than two moras. |

| 1-ROOT | Assign a violation mark for every node that has more than one root (=nodes that are not dominated by another node). |

2.3. Case Studies

2.3.1 *Augmentation in Shizuoka-Japanese*

(6) **Emphatic Adjective formation**   (Davis & Ueda 2002)

Adjective	*Emphatic Form*	
hade	ha**n**de	"showy"
ozoi	o**n**zoi	"terrible"
nagai	na**ŋ**gai	"long"
katai	ka**tt**ai	"har"
osoi	o**ss**oi	"slow"
takai	ta**kk**ai	"high"
zonzai	**zo:**nzai	"impolite"
suppai	s**u:**ppai	"sour"
okkanai	**o:**kanai	"scary"

(7)   **Gemination in Shizuoka Japanese**

	σ $\Uparrow$ μ	μ $\Downarrow$ S	μ Dep| S	σ Dep| μ
σ σ μ μ μ μ k a t a i	*!	*		
σ σ μ μ μ μ k a t a i	*!		*	
σ σ μ μ μ μ k a t a i		*!		*
☞ σ σ μ μ μ μ k a t a i			*	*

2.3.2   Subtraction in Tohono O'Odham

(8)   **Perfective Formation of Verbs**   (Fitzgerald 1997, Horwood 2001)

Imperfective	*Perfective*	
bis**k**	bisc	"sneezed"
ñeo**k**	ñeo	"spoke"
ma:**k**	ma:	"gave"

- The affix mora dominates a coda segment, to integrate into prosodic structure, but fails to be dominated by a syllable node due to faithfulness

- To avoid domination of a segment by two root nodes, a stem-mora & segment dissociate from the overall prosodic structure

- Non-integration of mora & segment is phonetically interpreted as non-pronunciation

(9)　**Coda deletion in Tohono O'Odham**

	μ $\Downarrow$ S	σ Dep| μ	1-Root	σ $\Uparrow$ μ	μ Dep| S
[σ tree: m a k with four μ]	*!			*	
[σ tree: m a k with four μ]		*!			*
[σ tree: m a k with four μ]			*!	*	*
☞ [σ tree: m a k with four μ, dotted lines]				*	*

2.3.3　Subtraction in Koasati

(10)　**Plural formation of verbs**　　　　　　　　(Horwood 2001, Kurisu 2001)

Singular		*Plural*
pit**áf**-fi-n	pít-li-n	"to slice up the middle"
atak**á:**-li-n	aták-li-n	"to hang sth.
tiw**áp**-li-n	tíw-w-n	"to open sth."

Rhyme deletion in Koasati: The "subtracting" mora dominates the final stem *vowel*, not the coda (as in Tohono).

(11)　$^*_\mu C_\mu$:

Assign a violation mark for every consonant that is dominated (phonetically or morphologically) by two μ.

(12)   **Rhyme deletion in Koasati**

	$\begin{matrix}\mu\\ \Downarrow\\ S\end{matrix}$	$^*_\mu C_\mu$	1-ROOT	MAX-S	$\begin{matrix}\mu\\ \text{Dep} \mid\\ S\end{matrix}$
σ σ — μ μ μ μ — **p i t a f**	*!				
σ σ — μ μ μ μ — **p i t a f**		*!		*	*
σ σ — μ μ μ μ — **p i t a f**			*!		*
☞ σ σ — μ μ μ μ — **p i t a f**				*	*

A CONTIG constraint demands that "deletion" inside a contiguous string is impossible: if the stem-internal vowel remains phonetically uninterpreted, the final C must remain unparsed as well:

(13)   CONTIGUITY
         Assign a violation mark for every instance of a phonetically uninterpreted segment that is not at the edge of a string.

σ σ — μ μ μ μ — **p i t a f**   ➔   σ σ — μ μ μ μ — **p i t a f**
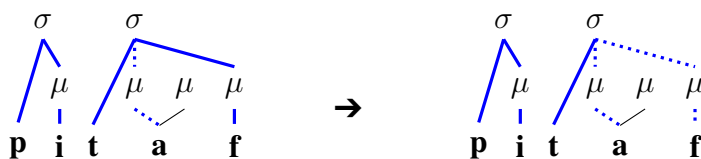
2.3.4   *Vowel Shortening in Anywa*
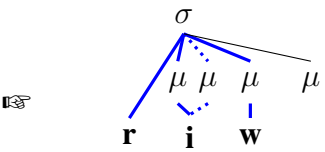
(14)   **Antipassive in Anywa**   (Reh 1993)

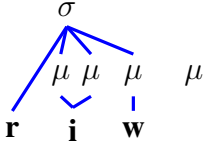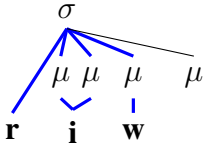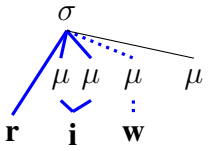|	*Root*	*Antipassive*	
	r**i:**w-	r**i**w-	"to lay sth. crosswise"
V: ⇒ V	m**a:**θ-	m**a̟**θ-	"drink sth."
	c**ʊ:**l-	c**ʊ̟**D-	"pay sth."
V ⇒ V	cam-	c**a̟**m-	"eat sth."
	ŋɔl-	ŋɔ̟l-	"cut sth. off"

- The affix-μ attaches to the σ-node to integrate into prosody but fails to dominate a segment due to faithfulness

- Long vowels are shortened to satisfy a maximal limit of 3 moras per syllable

(15)   **Vowel Shortening in Anywa: Long stem vowels**

	σ $\Uparrow$ μ	$*\sigma$ $\vert_p$ μ^4	MAX-S	σ Dep$\vert$ μ
(candidate: σ over $\mu\,\mu\,\mu$ μ / r i w)	*!			
(candidate: σ over $\mu\,\mu\,\mu$ μ / r i w)		*!		*
(candidate: σ over $\mu\,\mu\,\mu$ μ / r i w)			*!	*
☞ (candidate: σ over $\mu\,\mu\,\mu$ μ / r i w)				*

(16)   **Vowel Shortening in Anywa: Short stem vowels**

	$\begin{array}{c}\sigma\\\Uparrow\\\mu\end{array}$	$\begin{array}{c}*\sigma\\\mid_P\\\mu^4\end{array}$	Max-S	$\begin{array}{c}\sigma\\\text{Dep}\mid\\\mu\end{array}$
σ tree: c a m	*!			
σ tree: c a m			*!	*
☞ σ tree: c a m				*

3.   Conclusions

- Quantity-manipulating morphology is triggered by affixation of a μ

- Non-augmentative effects follow from partial prosodic non-integration of a μ

- Subtractive/Shortening/Polarity effects in morphology follow from the same mechanisms as mora augmentation

Advantages of the Prosodic Analysis

- accounts for the restriction of subtractive morphology to coda consonants (and vowels)

- accounts for the local adjacency of subtraction to morpheme edges

- extends naturally to cases of length polarity
  (Wolff 2001, Andersen 1988)

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