# Generalized mora affixation

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## Assumption:

Morphology is always additive.

## The Final Frontier: Subtractive Morphology

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

*Singular*        *Plural*

| pitáf**áf** | -fi | -n | pít**ø** | -li | -n | "to slice up the middle" |
|---|---|---|---|---|---|---|
| ataká:**á:** | -li | -n | aták**ø** | -li | -n | "to hang sth." |
| tiwáp**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

# Generalized Mora Affixation

## Standard Assumption:

Augmentative quantitative morphology $\approx$ mora affixation

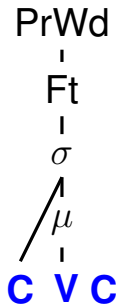(e.g. Samek-Lodovici 1992, Grimes 2002, Davis 2006)

## Our Claim:

Subtractive quantitative morphology $\approx$ mora affixation

(Prince&Smolensky 1993)

underlying segmental string **CVC**:

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

**CVC** + morphological $\mu$:
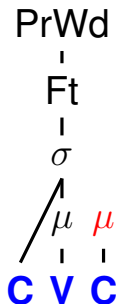
$$
\begin{array}{l}
\text{PrWd} \\
\quad | \\
\quad \text{Ft} \\
\quad | \\
\quad \sigma \\
\quad /|\ | \\
\quad \mu\ \ \mu \\
\quad | \ \ | \\
\textbf{C V C}
\end{array}
\qquad \Rightarrow \text{[CV] at the surface}
$$

## Colored Containment Theory     (van Oostendorp 2006)

- Phonological material of a specific morpheme has an unambigous color

- Insertion ≈ Addition of colorless material

- Deletion ≈ Marking of morphological material as phonetically invisible

  ⇒ *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: |
| $\mu$<br>\|<br>S | $\mu$<br>⋮<br>S | $\mu$<br>\|<br>S |
| | violates Max $\overset{\mu}{\underset{S}{\mid}}$ | violates Dep $\overset{\mu}{\underset{S}{\mid}}$ |

# 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
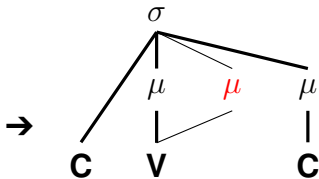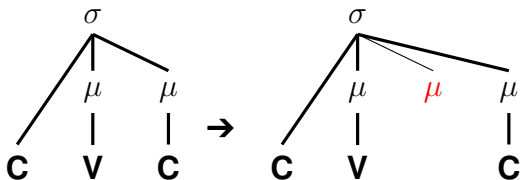      pronounced.

# Containment Theory: Deletion ≈ Non-Parsing
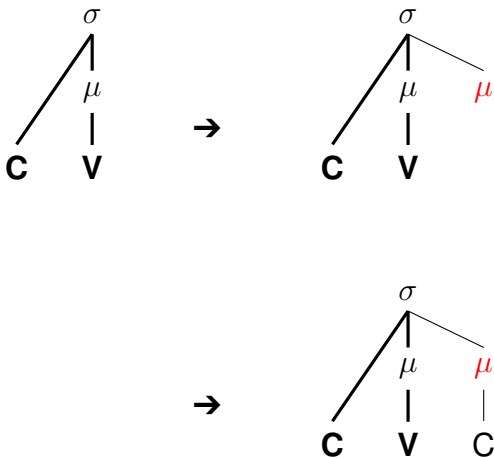
**CVC** with full underlying prosodic structure:

PrWd
Ft
$\sigma$                $\Rightarrow$ [CV]
$\mu$
C V C
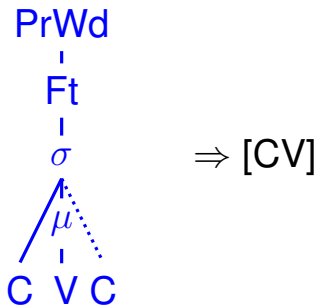
# Quantity Manipulating Morphology: Analyses

1. Lengthening

2. Insertion of epenthetic segments

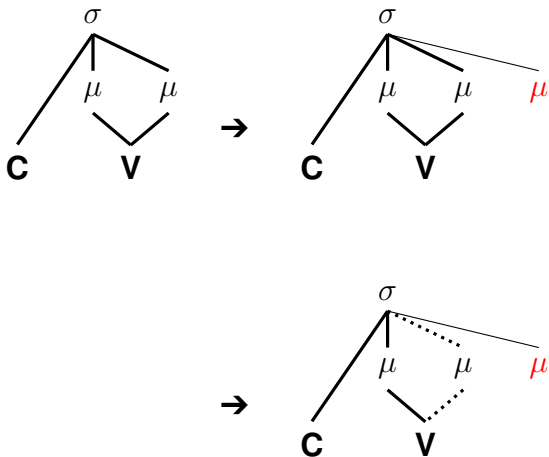3. Vowel Shortening
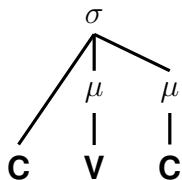
4. Subtraction

# Lengthening (cf. Davis & Ueda 2002)
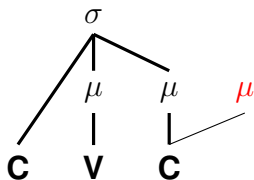
# Insertion (cf. Davis & Ueda 2002)
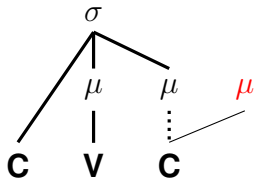
# Vowel Shortening (by catalexis, cf. Seiler 2008)

# Subtraction

# Analyses in detail

1. Relevant Constraints

2. Augmentation in Shizuoka Japanese (Davis&Ueda 2002)

3. Subtraction in Tohono O'Odham: Coda deletion

4. Subtraction in Koasati: Rhyme deletion

5. Vowel Shortening in Anywa

# Constraints on $\mu$-Integration

(3) 
$\begin{array}{c} \mu \\ \Downarrow \\ S \end{array}$ | Assign a violation mark for every $\mu$ that does not dominate (phonetically or morphologically) a segment.

(4) 
$\begin{array}{c} \sigma \\ \Uparrow \\ \mu \end{array}$ | Assign a violation mark for every mora that is not dominated (phonetically or morphologically) by a syllable node.

## General Constraints on Prosody

(5)

$$\begin{array}{c} *\sigma \\ |\rho \\ \mu^4 \end{array}$$

Assign a violation mark for every syllable that dominates more than three moras phonetically.

$$\begin{array}{c} *\mu^3 \\ | \\ V \end{array}$$

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).

# 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 | z**o:**nzai | "impolite" |
|  | suppai | s**u:**ppai | "sour" |
|  | okkanai | **o:**kanai | "scary" |

# Gemination in Shizuoka-Japanese

(7)

| | $\sigma$ $\Uparrow$ $\mu$ | $\mu$ $\Downarrow$ S | Dep $\overset{\mu}{\mid}$ S | Dep $\overset{\sigma}{\mid}$ $\mu$ |
|---|---|---|---|---|
|  | *! | * | | |
|  | *! | | * | |
|  | | *! | | * |
| ☞  | | | * | * |

# Subtraction in Tohono O'Odham

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

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

# Coda deletion in Tohono O'Odham: Analysis

- The affix mora dominates a coda segment,
  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

(9)

| | $\mu$ $\Downarrow$ S | Dep $\mid$ $\mu$ (σ) | 1-Root | σ $\Uparrow$ $\mu$ | Dep $\mid$ S ($\mu$) |
|---|---|---|---|---|---|
| σ over μ μ μ **l** / μ (red) — **m a k** | *! | | | * | |
| σ over μ μ μ / μ (red) — **m a k** | | *! | | | * |
| σ over μ μ μ / μ (red) — **m a k** | | | *! | * | * |
| ☞ σ over μ μ μ / μ (red, dotted) — **m a k** | | | | * | * |

# 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 $\mu$.

(12)

| | $\begin{matrix}\mu\\\Downarrow\\S\end{matrix}$ | $^{*}_{\mu}C_{\mu}$ | 1-Root | Max-S | $\text{Dep}\begin{matrix}\mu\\\vert\\S\end{matrix}$ |
|---|---|---|---|---|---|
|  | *! | | | | |
|  | | *! | | * | * |
|  | | | *! | | * |
| ☞  | | | | * | * |

## Contiguity (e.g. McCarthy & Prince 1995, Landmann 1999)

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.
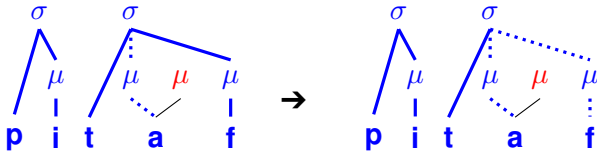
# Vowel Shortening in Anywa
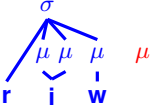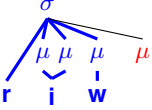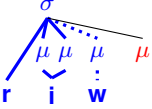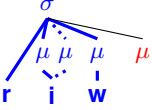
(14) **Antipassive in Anywa** (Reh 1993)

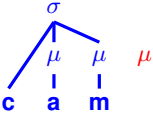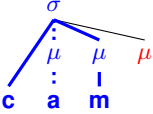|  | *Root* | *Antipassive* |  |
|---|---|---|---|
| **V: ⇒ V** | ri:w- | riw- | "to lay sth. crosswise" |
|  | ma:θ- | maθ- | "drink sth." |
|  | cʊ:l- | cʊD- | "pay sth." |
| **V ⇒ V** | cam- | cam- | "eat sth." |
|  | ŋɔl- | ŋɔl- | "cut sth. off" |
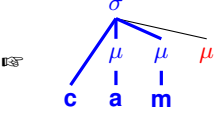
# Vowel Shortening in Anywa: Analysis

- The affix-$\mu$ attaches to the $\sigma$-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)

| *Long Stem Vowels* | $\sigma$ $\Uparrow$ $\mu$ | $*\sigma$ $\mid_p$ $\mu^4$ | MAX-S | Dep$\mid$ $\sigma$ $\mu$ |
|---|---|---|---|---|
| $\sigma$ — $\mu\,\mu\,\mu$ $\mu$ / r i w | *! | | | |
| $\sigma$ — $\mu\,\mu\,\mu$ $\mu$ / r i w | | *! | | * |
| $\sigma$ — $\mu\,\mu\,\mu$ $\mu$ / r i w | | | *! | * |
| ☞ $\sigma$ — $\mu\,\mu\,\mu$ $\mu$ / r i w | | | | * |

(16)

| *Short Stem Vowels* | $\sigma$ $\Uparrow$ $\mu$ | $*\sigma$ $\vert p$ $\mu^4$ | MAX-S | $\sigma$ Dep$\vert$ $\mu$ |
|---|---|---|---|---|
|  | *! | | | |
|  | | | *! | * |
| ☞  | | | | * |

# Conclusion

- Quantity-manipulating morphology
  is triggered by affixation of a $\mu$

- Non-augmentative effects follow from
  partial prosodic non-integration of a $\mu$

- 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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- Samek-Lodovici, Vieri (1992), A Unified analysis of crosslinguistic morphological gemination. Proceedings of CONSOLE-1 Utrecht

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# Length Polarity in Päri

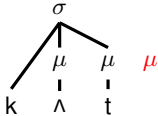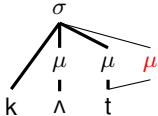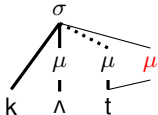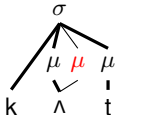(17)  **Multiplicative verb stems in Päri**                    (Andersen 1989)

*Stem*                    *Multiplicative*
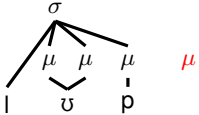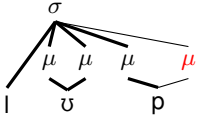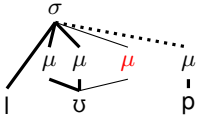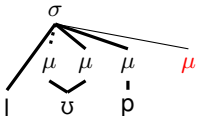
*Short stem vowels: lenghtening*

a-y**a**p        "open"        a-**ya:**mb-ɪ

a-nh**ɔ**th      "suck"        a-nh**ɔ:**ndh-ɪ

a-y**ɪ**k        "make"        a-y**ɪ:**ŋg-ɪ

a-k**ʌ**t        "plait"        k**ʌ:**nd-ɪ


*Long stem vowels: shortening*

a-l**ʊ:**p       "speak"       a-l**ʊ**p-ɪ

a-kw**a:**n      "count"       a-kw**a**nd-ɪ

a-r**ɪ:**th      "sew"         a-r**ɪ**th-ɪ

a-w**a:**ŋ       "burn"        a-w**a**ŋg-ɪ

| | $\mu$<br>$\Downarrow$<br>S | $*\sigma$<br>$\mid_p$<br>$\mu^4$ | $^\star_\mu C_\mu$ | Max$\mid$<br>$\mu$ |
|---|---|---|---|---|
|  | *! | | | |
|  | | | *! | |
|  | | | *! | * |
|  | | | | |

| | $\mu \Downarrow S$ | $*\sigma \mid p \; \mu^4$ | MAX-S | $*\mu^3 \mid V$ | $*_\mu C_\mu$ | Max $\mid \sigma \; \mu$ |
|---|---|---|---|---|---|---|
| (candidate 1) | *! | | | | | |
| (candidate 2) | | *! | | | * | |
| (candidate 3) | | | *! | * | | |
| ☞ (candidate 4) | | | | | | * |