The Morphophonology of Rarámuri Affix Order

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Scopal Orders

\((X \Rightarrow Y \equiv X \text{ has scope over } Y)\)

Des \Rightarrow Caus

tamí nará-t-nare
/tamí nará-ti-na(le)/
1SG.ACC cry-CAUS-DES
‘He wants to make me cry’ (23-b)

Caus \Rightarrow Des

baʔwí bahí-n-ti-ri=ni
/baʔwí bahí-na(le)-ti-ri=ni/
water drink-DES-CAUS-PST.PASS=1SG.NOM
‘They made me want to drink water’ (22-b)
Non-Scopals Order

Caus ▶ Des

nihé mi sú-r-ti-na-ma
/nehé mi sú-r-ti-na(le)-ma/

1SG.NOM 2sg.acc sew-CAUS-CAUS-DES-FUT.SG

‘I will make you want to sew’ (33-a)
Basic Ideas
Basic Ideas: Goal

- **Caballero**: Non-scopal order of Evidential + Desiderative
  is due to prosodic subcategorization

- **Extended Claim**: All Non-scopal affix orders in Rarámuri
  are due to prosodic subcategorization (and phonology)
Advantages of a Morphophonological Approach

- The prosodic approach predicts correlations between independent **phonological factors** (e.g. accent position) and affix ordering.

- The prosodic approach predicts correlations between affix ordering and independent **idiosyncratic properties of affixes** (e.g., multiple exponence and underlying accent).

- The prosodic approach integrates affix ordering with an **explanatory account of length-alternating affixes**.
Basic Ideas: Implementation

- Initial **morphological optimization** derives:
  - only scopal orders
  - Restrictions on possible scopes (e.g., *Causative ▷ Evidential)
  - Linearization bigrams of different strength

- Subsequent **phonological optimization** derives:
  - reordering
  - triggered by prosodic subcategorization requirements of affixes
  - subcategorization requirements may have different strength
The Baseline: Caballero (2010) on Evidential + Desiderative

- Evidential always has scope over the Desiderative
  (Evidential ▷ Desiderative)

- In the default case the Evidential suffix is linearized outside/after the Desiderative suffix

- Evidential moves inside of Desiderative to satisfy its prosodic subcategorization (lexical selection frame):
  - ṣō₃ (following a stressed + an unstressed syllable)
Evidential ▶ Desiderative

**Desiderative < Evidential:**

nakó-n(a)-can-a
/nakó-na(le)-ca(ne)-a/
fist.fight-DES-EV
‘It sounds like they want to fist fight’ (28-a)

**Evidential < Desiderative:**

átís(i)-ca-nare
/atísi-ca(ne)-na(le)/
sneeze-EV-DES
‘It sounds like they want to sneeze’ (29-a)
Derivation in the Stratal OT-Approach adopted here

**Morphological Optimization:**
\[\text{atlísi-nale-cane}\]
Verb-Des-Ev/σσ__

**Phonological Optimization:**
\[\text{atlísi-cane-nale}\]
Verb-Ev/σσ__-Des
Roadmap

- Background on Rarámuri + theoretical assumptions

- The Interaction with Allomorphy and Multiple Exponence: Causative (+Applicative)

- The Interaction with Length-alternating Affixes: Associated Motion (+Causative)

- The Interaction with Stress: Desiderative (+Associated Motion)

- The Role of Weak and Strong Linearization: Desiderative + Applicative
Background
Rarámuri
General Background on (Choguita) Rarámuri

- Polysynthetic Uto-Aztecan language spoken in the Chihuahua state of Mexico

- Documented in detail by Caballero (2008, 2010, 2011) (Example numbers refer to Caballero 2010 unless otherwise noted)

- Stratal morphophonology with a wealth of alternations including stress tone, vowels and consonants

- Complex variable unstressed vowel reduction (change or deletion)

- Length-alternating suffixes -si(mi), -na(le), ca(ne)
Reordering Affixes

- **Applicative** -ki  
  ‘to X for’ (Benefactive or Malefactive)

- **Causative** -ti, -ri, -r, -r-ti  
  ‘make X’

- **Desiderative** -na(le)  
  ‘want to X’

- **(Associated) Motion** -si(mi)  
  ‘to go along X-ing’

- **Evidential** -ca(ne)  
  ‘to sound like X-ing’

*(All other affixes follow a fixed template)*
### The Rarámuri Verb Template (Caballero 2010:168)

(4) Categories expressed in the Choguita Rarámuri verb and verbal domains

<table>
<thead>
<tr>
<th>S1</th>
<th>S2</th>
<th>S3</th>
<th>S4</th>
<th>S5</th>
<th>S6</th>
<th>S7</th>
<th>S8</th>
<th>S9</th>
<th>S10</th>
<th>S11</th>
<th>S12</th>
</tr>
</thead>
<tbody>
<tr>
<td>INCH</td>
<td>TR</td>
<td>APPL</td>
<td>CAUS</td>
<td>APPL</td>
<td>DESID</td>
<td>MOT</td>
<td>EV</td>
<td>Voice/Aspect</td>
<td>TAM</td>
<td>TAM</td>
<td>SUB</td>
</tr>
</tbody>
</table>

**Inner Stem**
- Derived Stem
- Syntactic Stem
- Aspectual Stem
- Finite Verb
- Sub Verb
## Rarámuri Affix Order (Caballero 2010:190)

<table>
<thead>
<tr>
<th>2&lt;sup&gt;nd&lt;/sup&gt;</th>
<th>CAUS</th>
<th>APPL</th>
<th>DESID</th>
<th>MOT</th>
<th>EV</th>
</tr>
</thead>
<tbody>
<tr>
<td>1&lt;sup&gt;st&lt;/sup&gt;</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CAUS</td>
<td></td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>non-comp.</td>
<td>comp., non-comp.</td>
<td>comp., non-comp.</td>
<td>fixed scope</td>
<td></td>
</tr>
<tr>
<td>APPL</td>
<td>✓ comp.</td>
<td></td>
<td></td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>fixed scope</td>
<td>fixed scope</td>
<td>fixed scope</td>
<td>fixed scope</td>
<td></td>
</tr>
<tr>
<td>DESID</td>
<td>✓ comp.</td>
<td>✓</td>
<td></td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>fixed scope</td>
<td></td>
<td>fixed scope</td>
<td>fixed scope</td>
<td></td>
</tr>
<tr>
<td>MOT</td>
<td>✓ comp., non-comp.</td>
<td>✓</td>
<td></td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>fixed scope</td>
<td>comp., non-comp.</td>
<td>fixed scope</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>✓ phon-subcat</td>
<td>non-comp.</td>
<td>fixed scope</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EV</td>
<td>✓ fixed scope</td>
<td>✓ fixed scope</td>
<td>✓ non-comp.</td>
<td>fixed scope</td>
<td></td>
</tr>
</tbody>
</table>

Background Rarámuri
Theoretical Background

- Stratal Optimality Theory
- Subcategorization as Virtual Phonological Structure
- Gradient Symbolic Representations
Stratal Optimality Theory
Stratal Optimality Theory (Kiparsky 2003, Bermúdez-Otero 2018)

- Different OT-grammars for every stratum
  (Root, Stem, Word, Phrase)

- Optimization happens cyclically inwards-out
  (Root, Stem, ...)

- Variation by variable ranking:
  Variably ranked constraints may be ranked either way,
  but the ranking is fixed for any specific OT-evaluation
Rarámuri Affix Order (Caballero 2010:168)

(4) Categories expressed in the Choguita Rarámuri verb and verbal domains

<table>
<thead>
<tr>
<th>Inner Stem</th>
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<td>S5</td>
<td>S6</td>
</tr>
<tr>
<td>INCH</td>
<td>TR</td>
<td>APP L</td>
<td>CAUS</td>
<td>APPL</td>
<td>DESID</td>
</tr>
</tbody>
</table>

Background Stratal Optimality Theory
(6) **Morphologically conditioned phonology**

<table>
<thead>
<tr>
<th>Inner Stem</th>
<th>Derived Stem</th>
<th>Syntactic Stem</th>
<th>Aspectual Stem</th>
<th>Finite Verb</th>
<th>Subordinate Verb</th>
</tr>
</thead>
<tbody>
<tr>
<td>Haplology</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CL</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Imperative stress-shift</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Passive-triggered lengthening</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Round Harmony</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Strata assumed here

- **Root Level** \(\approx\) Caballero’s Derived Stem

- **Stem Level** \(\equiv\) Caballero’s Aspectual Stem
  - Affix Reordering
  - Lengthening of stressed -nále

- **Word Level** \(\equiv\) the morphosyntactic verb
  - Final lengthening of -na(le), -si(mi), -ca(ne)
  - Partial lengthening of -na(le) + ca(ne) before -i,-a,-o
Prosodic Subcategorization as Virtual Structure
Prosodic Subcategorization

Lexical specification for individual affixes for the specific phonological contexts where they can appear
Applications of Prosodic Subcategorization

- Infixation (Yu 2002)
- Ineffability (Clinton-ize vs. *Bush-ize, Raffelsiefen 2004)
- Stress Shifting (e.g. weak retraction, Bermúdez-Otero 2018)
- Epenthesis (McCarthy and Prince 1993)
Weak Retraction in English (Bermúdez-Otero 2018:25)

a. *heavy antepenult*
   aménable
   coméstible
déléctable
inéluicable

b. *light antepenult*
    indómisible
    indústible
    inexorable
    irréfragible
Weak Retraction by Subcategorization (Bermúdez-Otero 2018:25)

a. 

\[
\begin{array}{c}
\sum \\
\sum_{\text{min}} \\
\sigma_{s} \quad \sigma_{w} \\
\mu \\
\epsilon \: k \: w \: i \\
\text{tə} \\
\text{b} \text{lı}
\end{array}
\]

b. 

\[
\begin{array}{c}
\sum \\
\sum_{\text{min}} \\
\sigma \\
\mu \\
\text{e} \: b \: l \\
-\text{ABLE} \leftrightarrow \text{e} \: b \: l
\end{array}
\]
Subcategorization as Virtual Structure (Lionnet and Rolle 2020)

- Subcategorization $\equiv$ virtual phonological structure

- For every substantive tier, there is a corresponding virtual tier

- Substantive phonology is pronounced. Virtual phonology remains unpronounced, but is matched to substantive phonology

- Virtual and substantive units are integrated (via dominance and precedence relations)
Subcategorization as Virtual Structure (Lionnet and Rolle 2020)

(Shorthand: si°)
Matching

A **substantial path** through a graph $G$ is a path in $G$ which contains only substantial nodes.

A **selectional path** through a graph $G$ is a path in $G$ which contains only selectional nodes.

A **selectional subgraph** of a graph $G$ is a subgraph of $G$ which contains only selectional nodes.

A selectional subgraph $S$ of a Graph $G$ matches $G$ iff for every selectional path $P$ from a substantial node $N$ of $G$ to a node $N'$ of $S$ there is a substantial path $P'$ from $N$ to a substantial node $N''$ such that $\text{Label}(P[i]) = \text{Label}(P'[i])$

(selectional $\equiv$ virtual)
Subcategorization and OT

Different versions of the constraint

**TEMPLATESATISFACTION**

evaluate whether a virtual/selectional structure

is matched in a given output
Subcategorization Discharge

If a selectional subgraph $S$ of $G$ matches $G$

at the output of a stratum,

$S$ is removed from $G$
Virtual Structure and Strata

Virtual structure implies

that subcategorization can be inherited

across strata (if not discharged)
Gradient Symbolic Representations
Gradient Symbolic Representations (Smolensky and Goldrick 2016)

- All linguistic units may have different activation levels $0 \leq A \leq 1$
- Only fully activated units ($A = 1$) are pronounced
- (also: Rosen 2016, Zimmermann 2018, 2019, 2021, Hsu 2022)

**Specific Assumptions here:**
- Combination with Optimality Theory (not Harmonic Grammar)
- Constraints may be gradient or categorial
- Distinction between weak (white), middle (gray), strong (black)
Three Domains of Gradience (Strength)

- **Linear order**: relative order of morpheme pairs is weak or strong

- **Subcategorization**: \( \equiv \) (virtual) structure can be weak, middle strength or strong

- **Segments**: Segments with activation < 1 are not syllabified, not pronounced and cannot satisfy subcategorization requirements

  (but may be strengthened in phonological optimization)
Notation for Different Strengths

Strong 1st $\sigma$, weak 2nd $\sigma$, weak subcategorization: \(-\text{na*le}(\sigma)\)

Strong 1st $\sigma$, weak 2nd $\sigma$, medium subcategorization: \(-\text{simi}(\sigma)\)

Strong subcategorization and segment \(-\delta r_{\text{Caus}}\)
The Interaction of Affix Order with Allomorphy and Multiple Exponence: Causative (+ Applicative)
The Causative: Allomorphy and Multiple Exponence

- 4 surface variants: -ti, -ri, -r and -r-ti
- Choice of -ti vs. -ri dependent on specific lexical roots
- -r and -r-ti only immediately after stressed syllables
Causative Allomorphy: **Analysis**

- Two listed allomorphs -r and -ti

- may be combined: -r-ti

- Specific roots impose rhothicity on a following affix (by a floating [+rhotic] feature or a weak [r])

- -ti → -ri, -r → -r

- Corollary: -ri only appears after roots (not after other affixes)
Caus ▷ Appl

- **Empirical Generalizations:**
  - Scope is fixed
  - Both orders occur

- **Caballero:** Order is in free variation

- **Reinterpretation:**
  - ‘Wrong orders’ involve Causative -r or -r-ti
  - Causative -r subcategorizes for end of stressed syllable (-ọr)
  - Causative -ti is attracted to -r via COHERENCE

- **Prediction:** Order correlates with allomorphy/multiple exponence
Multiple Exponence and Allomorphy: Causative + Applicative

**Caus ➤ Appl**

**Scopal Order**

jéni dúlse íw-ki-ti-ri jadíra
/jéni dúlse íw-ki-ti-ri jadíra/
Yeni candy bring.APPL-APPL-CAUS-IMP.SG Yadira
‘Make Jeni bring candy for Yadira’ (31-c)

**Non-scopal Order**

mi=n tamí kocí ubá-r-ti-ki-ma
/mi=n tamí kocí ubá-r-ти-ki-ma/
2SG.ACC=1SG.NOM 1SG.ACC dog bathe-CAUS-CAUS-APPL-FUT.SG
‘I’ll make you bathe the dog for me’ (32-c)
### Underlying Linearization: Causative

<table>
<thead>
<tr>
<th>Scope</th>
<th>Caus ➔ Appl</th>
<th>Des ➔ Appl</th>
<th>Caus ↔ Des</th>
<th>Caus ↔ Mot</th>
</tr>
</thead>
<tbody>
<tr>
<td>Linear.</td>
<td>fixed</td>
<td>fixed</td>
<td>free</td>
<td>free</td>
</tr>
<tr>
<td>Strength</td>
<td>weak</td>
<td>strong</td>
<td>strong</td>
<td>weak</td>
</tr>
<tr>
<td>Reversal-triggered by</td>
<td>Caus</td>
<td>—</td>
<td>Caus</td>
<td>Caus, Mot</td>
</tr>
</tbody>
</table>

Caus ➔ Appl, Des ➔ Appl, Caus ↔ Des, Caus ↔ Mot
Constraints (I)

\[ \text{TEMP(LATE)} \]
\[ \text{SAT(ISFACTION)}_{\text{Strong}} \]
Assign * to every subcategorization frame of activation 1 which is not matched in the output

\[ \text{TEMP(LATE)} \]
\[ \text{SAT(ISFACTION)} \]
Assign \( X \) violations to every subcategorization frame of activation \( X \) which is not matched in the output
Constraints (II)

**COH(ERENCE)**  Assign * to every coreferential pair of affixes which are not adjacent in the output

**LIN(EARITY)\textsubscript{Strong}**  Assign * to every pair of affixes $A_1$, $A_2$ such that $A_1 \prec\text{Strong} A_2$ in the input and $A_2 < A_1$ in the output

**LIN(EARITY)**  Assign $X$ to every pair of affixes $A_1$, $A_2$ such that $A_1 \prec X A_2$ in the input and $A_2 < A_1$ in the output
Overall Ranking

\[ \text{TEMPSat}_{\text{Strong}} \equiv \text{COHERENCE} \]

\[ \gg \]

\[ \text{LINEARITY}_{\text{Strong}} \]

\[ \gg \]

\[ \text{DEP} \downarrow \sim \text{DEP} \ast \]

\[ \gg \]

\[ \text{LINEARITY} \sim \text{TEMPSat} \]
Subcategorization of Causative -r

-r should be final in the main-stressed syllable of the PWord containing -r

\[ \omega \]
\[ \sum_s \]
\[ \sigma_s \]
\[ r \rightarrow . \]

("." \equiv right edge)
Multiple Exponence and Allomorphy: Causative + Applicative

Caus ➤ Appl (fixed scope)

Scopal Order

<table>
<thead>
<tr>
<th>Input: = a.</th>
<th>TEMP SAT St</th>
<th>COH</th>
<th>LIN</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. íwi-ki\textsubscript{Appl}-t\textsubscript{i}\textsubscript{Caus}</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. íwi-t\textsubscript{i}\textsubscript{Caus}-ki\textsubscript{Appl}</td>
<td></td>
<td></td>
<td>!</td>
</tr>
</tbody>
</table>

Non-scopal Order

Strong Subcategorization: -\overset{\hat{r}}{Caus}

<table>
<thead>
<tr>
<th>Input: = a.</th>
<th>TEMP SAT St</th>
<th>COH</th>
<th>LIN</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. ubá-ki\textsubscript{Appl}-\overset{\hat{r}}{Caus}-t\textsubscript{i}\textsubscript{Caus}</td>
<td></td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>b. ubá-_\textsubscript{r}-ki\textsubscript{Appl}\textsubscript{Caus}-t\textsubscript{i}\textsubscript{Caus}</td>
<td></td>
<td></td>
<td>*</td>
</tr>
<tr>
<td>c. ubá-_\textsubscript{r}\textsubscript{Caus}-t\textsubscript{i}\textsubscript{Caus}-ki\textsubscript{Appl}</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

-\overset{\hat{r}}{Caus} moves inside to satisfy its subcategorization and drags -ti along
Multiple Exponent and Allomorphy: Causative + Applicative

Exceptional Causative Reordering without -r

tamí ko=mi o?pés-ti-ki-ma aré ba
/tamí ko=mi o?pési-ti-ki-ma alé ba/
1SG.ACC EMPH=2SG.NOM vomit-CAUS-APPL-FUT.SG DUB CL
‘You’ll make him throw up on me’ (32-a)
Exceptional Causative Reordering without -r

- Hidden presence of -r
- -r attaches to bisyllabic root with initial stress (pési) ← -r
- -r’s subcategorization causes deletion of unstressed vowel (pésr)₀
- (Infixation is independently excluded: *pé-rsi)
- The [sr]-cluster is tolerated at the Stem Level but repaired by deletion at the Word Level: o’(pésr)₀-ti-ki-ma → o’(pés)₀-ti-ki-ma

**Prediction**: Causative Reordering without -r is only possible if roots have nonfinal stress
Length-alternating Affixes:
Causative + Associated Motion
Length-alternating Affixes

- Several suffixes involved in reordering appear either:
  - Bisyllabic
    in prominent (stressed or final) position
  - Monosyllabic
    in non-prominent (unstressed and non-peripheral) position

- **Analysis** – two lexical properties:
  - a single lexical syllable + subcategorization for a second syllable
  - ‘strong’ (fully activated) segments in the first syllable
    ‘weak’ (partially activated) segments potentially filling a second σ

- **Warning**: Long and short variants may be additionally shortened by syncope: -simi → -sim, -si → -s
Final length-alternating Affixes

may trigger rightward movement of an inner affix

to satisfy their subcategorization requirement

for a following syllable
Length-alternating Affixes: Evidential -ca(ne)

Long in final position:

páki-cani
/páki-ca(ne)/ ‘It sounds like brewing’
brew-EV

Short before another syllable:

atís-ca-nar-a
/atís-ca(ne)-na(le)-a/ ‘It sounds like they want to sneeze’
sneezeEV-EV-DES-PROG

(2008:289)
Length-alternating Affixes: Motion -si(mi)

Long in final position:

nári-\textit{simi}
/nale-\textit{si(mi)}/
ask-MOT

Short before another syllable:

ticí-k-\textit{si}-ma
/ticí-ki-\textit{si(mi)}-ma/
bark-CAUS-MOT-PST

(2008:297+)
Length-alternating Affixes: Causative + Associated Motion

Caus $\triangleright$ Mot

**Scopal Order**

\[
\begin{align*}
\text{mi}=n & \quad \text{tán}-\text{si}-\text{ti}-\text{ma} & \quad \text{rá} \\
/\text{mi}=\text{ni} & \quad \text{táni}-\text{si(}\text{mi})-\text{ti}-\text{ma} & \quad \text{olá/}
\end{align*}
\]

$2\text{SG.ACC}=1\text{SG.NOM}$ ask-$\text{MOT-CAUS-FUT.SG}$ CER

‘I’ll make you go along asking for things’ (21-b)

**Non-scopal Order**

\[
\begin{align*}
\text{mi}=n & \quad \text{piwá}-\text{r}-\text{si}-\text{mo} & \quad \text{rá} \\
/\text{mi}=\text{ni} & \quad \text{piwá-}\text{r}-\text{si(}\text{mi})\text{-ma} & \quad \text{olá/}
\end{align*}
\]

$2\text{SG.ACC}=1\text{SG.NOM}$ smoke-$\text{CAUS-MOT-FUT.SG}$ CER

‘I’ll make you go along smoking’ (34-b)
Length-alternating Affixes: Causative + Associated Motion

Mot ▶ Caus

Scopal Order

\[
\text{we tamí korú-ti-simi}
\]
\[
/we tamí korú-ti-simi/
\]
\[
\text{INT 1SG.ACC feel.like.eating-CAUS-MOT}
\]

‘They are going along making me want to eat’ (20-d)

Non-scopal Order

\[
\text{nihé mi sú-s-ti-ma sipúci}
\]
\[
/nehé mi sú-si-ti-ma sipúca/
\]
\[
\text{1SG.NOM 2SG.ACC sew-MOT-CAUS-FUT.SG skirt}
\]

‘I will go along making you sew the skirt’ (34-d)
Length-alternating Affixes: Causative + Associated Motion

Caus \textless,\textgreater Mot

- **Empirical Generalizations:**
  - both scopal readings possible
  - both linear orders for both readings

- **Analysis:**
  - weak linearization
  - \( \rightarrow \) Mot may trigger reordering of Caus -ti
  - Orders depending on multiple exponence:
  - -r blocks/triggers reordering
Underlying Structure of Associated Motion -si(mi)
Different Subcategorizations

Strong: \(-\sigma r_{\text{Caus}}\)

Medium: \(-\text{simi}\sigma \text{Mot}\)

None: \(-\text{ti}_{\text{Caus}}\)
Constraint on Adding Activation

\[ \text{DEP} \Downarrow \text{Assign } \ast \text{ to every morpheme } M \]
\[ \text{such that for some phonological unit in } M \]
\[ \text{its output activation is greater than its input activation} \]

(Blocks satisfaction of -si(mi)’s subcategorization
by realizing its weak segments)
# Length-alternating Affixes: Causative + Associated Motion

## Caus → Mot (Stem Level)

### Input: sú-simi Mot-όr

<table>
<thead>
<tr>
<th>(34-b,c)</th>
<th>TEMP SAT St</th>
<th>DEP</th>
<th>LIN</th>
<th>TEMP SAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. sú-simi Mot-όr</td>
<td>*!</td>
<td></td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>b. sú-r Caus -simi Mot</td>
<td></td>
<td>*!</td>
<td>*</td>
<td></td>
</tr>
</tbody>
</table>

### Moving in -όr

(Also: (34-a) under assumption of a hidden -r_Caus)

### Input: sú-simi Mot ti

<table>
<thead>
<tr>
<th>(21-a,b,c)</th>
<th>TEMP SAT St</th>
<th>DEP</th>
<th>LIN</th>
<th>TEMP SAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>☞ a. sú-simi Mot ti Caus</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. sú-simi Mot ti Caus</td>
<td></td>
<td>*!</td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. sú-ti Caus -simi Mot</td>
<td></td>
<td>*!</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>d. sú-ti Caus -simi Mot</td>
<td></td>
<td>*!</td>
<td>*</td>
<td></td>
</tr>
</tbody>
</table>

### No reordering with -ti
Length-alternating Affixes: Causative + Associated Motion

Mot ▷ Caus (Stem Level)

No reordering possible with -őr:

<table>
<thead>
<tr>
<th>(20-b,c)</th>
<th>Tempsat&lt;sub&gt;St&lt;/sub&gt;</th>
<th>Dep</th>
<th>Lin</th>
<th>Tempsat</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. sú-r&lt;sub&gt;Caus&lt;/sub&gt;-si&lt;sub&gt;Mot&lt;/sub&gt;&lt;sup&gt;ó&lt;/sup&gt; Mot</td>
<td></td>
<td></td>
<td></td>
<td>*</td>
</tr>
<tr>
<td>b. sú-r&lt;sub&gt;Caus&lt;/sub&gt;-si&lt;sub&gt;Mot&lt;/sub&gt; Mot</td>
<td></td>
<td></td>
<td>*!</td>
<td></td>
</tr>
<tr>
<td>c. sú-si&lt;sub&gt;Mot&lt;/sub&gt;-őr&lt;sub&gt;Caus&lt;/sub&gt;</td>
<td>*!</td>
<td></td>
<td>*</td>
<td></td>
</tr>
</tbody>
</table>
### Free variation with -ti:

<table>
<thead>
<tr>
<th>(20-a,d)</th>
<th>TEMP\textsuperscript{SAT}\textsubscript{St}</th>
<th>DEP (\downarrow)</th>
<th>LIN</th>
<th>TEMP\textsuperscript{SAT}</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. (\text{sú-ti}<em>{\text{Caus}}\text{-si}</em>\text{Mot}) Mot</td>
<td></td>
<td></td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>b. (\text{sú-ti}<em>{\text{Caus}}\text{-si}</em>\text{Mot}) Mot</td>
<td></td>
<td>*!</td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. (\text{sú-si}<em>\text{Mot}\text{-ti}</em>{\text{Caus}})</td>
<td></td>
<td></td>
<td>*!</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>(34-d)</th>
<th>TEMP\textsuperscript{SAT}\textsubscript{St}</th>
<th>DEP (\downarrow)</th>
<th>TEMP\textsuperscript{SAT}</th>
<th>LIN</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. (\text{sú-ti}<em>{\text{Caus}}\text{-si}</em>\text{Mot}) Mot</td>
<td></td>
<td></td>
<td>*!</td>
<td></td>
</tr>
<tr>
<td>b. (\text{sú-ti}<em>{\text{Caus}}\text{-si}</em>\text{Mot}) Mot</td>
<td></td>
<td>*!</td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. (\text{sú-si}<em>\text{Mot}\text{-ti}</em>{\text{Caus}})</td>
<td></td>
<td></td>
<td></td>
<td>*</td>
</tr>
</tbody>
</table>
Word Level Extension of -si(mi)

<table>
<thead>
<tr>
<th>(20-b,c)</th>
<th>TEMP</th>
<th>SAT</th>
<th>DEP</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. súr_{Caus} -si_{mi} {Mot}</td>
<td>*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. sú-r_{Caus} -si_{mi} Mot</td>
<td></td>
<td>*</td>
<td></td>
</tr>
</tbody>
</table>
The Importance of Strata for length-alternating Affixes

- The option of realizing weak segments does not interfere with the triggering of affix movement by $\bar{\sigma}$-subcategorization

- Affix movement happens also in the presence of following Word-Level affixes:

  nihé  mi  sú-s-ti-ma  sipúci
  /nehé  mi  sú-si-ti-ma  sipúca/

  1SG.NOM  2SG.ACC  sew-MOT-CAUS-FUT.SG  skirt

  ‘I will go along making you sew the skirt’ (non-scopal order) (34-d)
Correct Predictions of the Analysis

- In forms with Causative -r this will always be internal, independently of scope

- In forms with Causative -ti and Caus ▷ Mot only scopal ordering is possible
Stress:
Desiderative + Associated Motion
Special Features of Desiderative -na(le)

- The only length-alternating suffix which may carry accent
- ≈ the only length-alternating suffix with an underlying accent
- Only the long variant may carry accent
- The only length-alternating suffix which may occur non-finally in its long variant
Rarámuri Stress

- Lexical Accent System:
  Realize underlying accent if possible, otherwise default accent

- Three-syllable window at left word-edge

- (local accent shift and other complications irrelevant here)
Des ◄, ► Mot

- Empirical Generalizations:
  - both scopal readings possible
  - both linear orders for both readings

- Analysis:
  - Mot’s subcategorization may trigger reordering of Des
  - Des may move inside of Mot to provide fenestral stress
  - ⇒ Ordering partially contingent on stress
Underlying Structure of Desiderative -na(le)
Relevant Constraints on Stress

1* Every prosodic word should have exactly one overt accent

3σ□ Underlying accent must originate in a morpheme in the 3 initial syllables

DEP * Assign * to every epenthetic accent

2nd Accent should be on the second syllable of a PWord
Stress: Desiderative + Associated Motion

Des ▶ Mot – Non-Scopal Order

kurí uʔpá naparí=n ku simí-ka koci-nál-si-a=n iná-ri
kurí uʔpá naparí=n ku simí-ka koci-nál(e)-si(mi)-a=ni iná-li
just last REL=1SG.NOM REV sleep-DES-MOT-PROG-1SG.NOM go-PST
‘Last time I went there, I wanted to go along sleeping’ (35-c)

(translation reconstructed/corrected from description + Spanish translation)

Des -ná(le) moves inside to provide non-epenthetic accent
**Stress: Desiderative + Associated Motion**

## Des ▶ Mot – Non-Scopalkal Order

\[
\text{Input} = \text{koci-simi}^{\text{Mot-na}} \ast \text{le}^{\text{Des}}
\]

<table>
<thead>
<tr>
<th>1* (3\sigma)</th>
<th>DEP *</th>
<th>DEP (\perp)</th>
<th>TEMP (\text{SAT, LIN})</th>
<th>2nd</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. ko ci si (\sigma) na (\sigma)</td>
<td>*!</td>
<td></td>
<td></td>
<td>(\sigma) (\sigma)</td>
</tr>
<tr>
<td>b. ko ci si na le</td>
<td></td>
<td>*!</td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. ko ci si na le</td>
<td>*</td>
<td></td>
<td>*!</td>
<td></td>
</tr>
<tr>
<td>d. ko ci na le si mi</td>
<td>*</td>
<td></td>
<td>**!</td>
<td>*</td>
</tr>
<tr>
<td>e. ko ci na le si (\sigma)</td>
<td>*</td>
<td></td>
<td></td>
<td>(\sigma)</td>
</tr>
</tbody>
</table>
Stress: Desiderative + Associated Motion

Mot ▶ Des – Non-scopal Order

ne we koʔá-\text{-s-niri}
/ne we koʔá-si(mi)-na(le)/
\begin{tabular}{lll}
1SG.NOM & INT & eat-\text{MOT-DES-PROG} \\
\end{tabular}

‘I’m going along wanting to eat’ (35-a)

-na(le) moves out to satisfy -si(mi)’s $\sigma$-subcategorization
Stress: Desiderative + Associated Motion

Mot ➤ Des – Non-scopal Order

Stem Level:

Input = ko?a-na*leσDes-simiσMot

<table>
<thead>
<tr>
<th></th>
<th>DEP</th>
<th>DEP *</th>
<th>TEMP</th>
<th>SAT</th>
<th>LIN</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. ko?a-nále-Des-simi_Mot</td>
<td><em>!</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. ko?á-naleDes-simi_Mot</td>
<td>*!</td>
<td>*</td>
<td></td>
<td></td>
<td>*</td>
</tr>
<tr>
<td>c. ko?á-naleDes-simiMot</td>
<td>*</td>
<td></td>
<td>*!</td>
<td></td>
<td>*</td>
</tr>
<tr>
<td>d. ko?á-simiMot-naleσDes</td>
<td>*</td>
<td>*</td>
<td></td>
<td></td>
<td>*</td>
</tr>
</tbody>
</table>

Word Level:

Mot ▶ Des – Scopal Order (2 short Allomorphs)

ne isíi-n-si-a iná-ro
/ne isíi-na(le)-si(mi)-a iná-ro/
1SG.NOM urinate-DES-MOT-PROG go-MOV
‘I’m going along wanting to urinate’ (19-c)
### Mot ▶ Des – Scopal Order (2 short Allomorphs)

**Stem Level:** Movement blocked by LIN ≫ TEMP SAT

**Full Input Representation:** isi-na*le(si)-simi(Ø)

<table>
<thead>
<tr>
<th>Input: = a.</th>
<th>1*</th>
<th>3σ□</th>
<th>DEP ~/ DEP *</th>
<th>LIN</th>
<th>TEMP SAT</th>
<th>2nd</th>
</tr>
</thead>
<tbody>
<tr>
<td>✟ a. i si na si(Ø)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*</td>
</tr>
<tr>
<td>✟ b. i si si na(σ)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*!</td>
</tr>
<tr>
<td>✟ c. i si na si mi</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*!</td>
</tr>
</tbody>
</table>
Des ▶ Mot – Scopal Order

**Stem Level:** Movement blocked by DEP ≫ DEP *

Input = to-simi Mot-na*le Des

<table>
<thead>
<tr>
<th>Input: = a.</th>
<th>1* 3σ</th>
<th>DEP ≔</th>
<th>DEP *</th>
<th>TEMPSAT</th>
<th>LIN</th>
<th>2nd</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. to si na</td>
<td>!</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. to si na</td>
<td>*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. to na si</td>
<td>!</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>d. to si na</td>
<td>!</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>e. to na le</td>
<td>!</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Word Level:

<table>
<thead>
<tr>
<th>Input:</th>
<th>DEP *</th>
<th>LIN</th>
<th>TEMP</th>
<th>SAT DEP</th>
<th>DEP $^*$</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. to</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>!</td>
</tr>
<tr>
<td>sinele</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. to</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>sinele</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Correct Predictions

- Des -na(le) may only move inside of Mot -si(mi) with unstressed roots
Desiderative + Applicative
The Role of weak and strong
Linearization
### Rarámuri Affix Order (Caballero 2010:190)

<table>
<thead>
<tr>
<th>2&lt;sup&gt;nd&lt;/sup&gt; → 1&lt;sup&gt;st&lt;/sup&gt;</th>
<th>CAUS</th>
<th>APPL</th>
<th>DESID</th>
<th>MOT</th>
<th>EV</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAUS</td>
<td>✓ non-comp.</td>
<td>✓ comp., non-comp.</td>
<td>✓ comp., non-comp.</td>
<td>✓ comp., non-comp.</td>
<td>✓ fixed scope</td>
</tr>
<tr>
<td>APPL</td>
<td>✓ comp.</td>
<td>✓ fixed scope</td>
<td>✓ fixed scope</td>
<td>✓ fixed scope</td>
<td>✓ fixed scope</td>
</tr>
<tr>
<td>DESID</td>
<td>✓ comp.</td>
<td>× fixed scope</td>
<td>✓ comp., non-comp.</td>
<td>✓ fixed scope</td>
<td>✓ fixed scope</td>
</tr>
<tr>
<td>MOT</td>
<td>✓ comp., non-comp.</td>
<td>× fixed scope</td>
<td>✓ comp., non-comp.</td>
<td>✓ fixed scope</td>
<td>✓ fixed scope</td>
</tr>
<tr>
<td>EV</td>
<td>× fixed scope</td>
<td>× fixed scope</td>
<td>✓ non-comp. phon-subcat</td>
<td>× fixed scope</td>
<td>✓ fixed scope</td>
</tr>
</tbody>
</table>
Weak And Strong Linearization: Desiderative + Applicative

Des ➤ Appl

Scopal Order:

(Examples in Caballero 2010

only with the (Root-Level) Applicatives -si/-wi/-ni)
Empirical Generalization:
- Scope is fixed
- only scope-conforming order occurs

Analysis:
- Des subcategorizes for a following syllable, but
- Subcategorization is weak, linear order is strong
- → no reordering
Des ▶ Appl

Reading: Desiderative ▶_{Str} Applicative

Strong linearization

Weak Subcategorization: -naΟ_{Des}

<table>
<thead>
<tr>
<th>Input: = a.</th>
<th>TEMP SAT_{Str}</th>
<th>LIN_{Str}</th>
<th>DEP *</th>
<th>TEMP SAT</th>
<th>LIN</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. ticí-ki_{Appl}naΟ_{Des}</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*</td>
</tr>
<tr>
<td>a. ticí-na_{Des}ki_{Appl}</td>
<td>*!</td>
<td></td>
<td></td>
<td></td>
<td>*</td>
</tr>
</tbody>
</table>
More on Length-alternating Suffixes
Three Reasons for Choosing the Long Alternant

- Final position (-na(le), -ca(ne), -si(mi))
- Being stressed (only -ná(le))
- Preceding PROG -a, IMPF -i or EPIST -o (only -na(le) and -ca(ne))
More on Length-alternating Suffixes

Long -nale and -cane before -a/-i-o

nará-t-can-a-ci
/nará-ti-cane-a-ci/
cry-CAUS-EV-PROG-TEMP
‘When it sounds like they are making her cry…’ (2008:299)

kací-si-nir-i
/kací-si-nale-i/
spit-MOD-IMPF
‘He was feeling like going along spitting…’ (2008:300)
More on Length-alternating Suffixes

Long -nale and -cane before -a/-i-o

koá-r-ti-nir-o
/kóá-r-ti-nale-o/
eat-CAUS-CAUS-DES-EP
‘When it sounds like they are making her cry…’ (2008:300)

but:

porá-p-ti-si-o
/porá-p-ti-si-o/
cover-REV-REFL-MOT-EP
‘I went along wanting to sleep’ (2008:301)

*porá-p-ti-sim-o
More on Length-alternating Suffixes

Lengthening before -a/-i/-o – Analysis

- -a/-i/-o subcategorize for a preceding coronal consonant

- e.g. $\text{c}_{\text{cor}}a$

- At the Word Level, this triggers realization of the medial coronal consonants in -na(le) and -ca(ne) by adding activation

- No effect for -si(mi) since weak [m] is labial
More on Length-alternating Suffixes

Extension of Length-alternating Suffixes before -a/-i/-o (Word Level)

Extending -nale

Input = korá-r-ti-na*le_{Des}(C_{cor})a

<table>
<thead>
<tr>
<th>Input: = a.</th>
<th>DEP</th>
<th>C</th>
<th>LIN</th>
<th>TEMPSAT</th>
<th>DEP ?</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. korá-r-ti-na*le_{Des}(C_{cor})a</td>
<td></td>
<td></td>
<td></td>
<td>] !</td>
<td></td>
</tr>
<tr>
<td>b. korá-r-ti-na*le_{Des}t_a</td>
<td>!</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. korá-r-ti-nale*_{Des}-a</td>
<td></td>
<td></td>
<td></td>
<td>*</td>
<td></td>
</tr>
</tbody>
</table>

Not Extending -simi

Input = porá-p-ti-simi_{Mot}(C_{cor})o

<table>
<thead>
<tr>
<th>Input: = a.</th>
<th>DEP</th>
<th>C</th>
<th>LIN</th>
<th>TEMPSAT</th>
<th>DEP ?</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. porá-p-ti-simi_{Mot}(C_{cor})o</td>
<td></td>
<td></td>
<td></td>
<td>]</td>
<td></td>
</tr>
<tr>
<td>b. porá-p-ti-simi_{Mot}t-o</td>
<td>!</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. porá-p-ti-simi_{Mot}(C_{cor})o</td>
<td></td>
<td></td>
<td></td>
<td>] !</td>
<td></td>
</tr>
</tbody>
</table>
Added Value of the Approach here

The combination of

subcategorization as virtual structure

+ 

Gradient Symbolioc Representations

captures the disjunctive conditions on length alternating suffixes

as unitary processes
All non-scopal orders of Rarámuri suffixes can be captured by phonological optimization or prosodic subcategorization.

This makes better – finer grained – predictions on the occurring combinations of ordering patterns and other affix properties.

Added value: Unified account of length-alternating suffixes.

Crucial role of gradient symbolic representations, strata and subcategorization via virtual phonological structure.
Overall Ranking

\[ \text{TEMPSEAT}_{\text{Strong}} \equiv \text{COHERENCE} \]
\[ \gg \]
\[ \text{LINEARITY}_{\text{Strong}} \]
\[ \gg \]
\[ \text{DEP} \downarrow \sim \text{DEP} \ast \]
\[ \gg \]
\[ \text{LINEARITY} \sim \text{TEMPSEAT} \]
Constraints (I)

\[
\text{TEMP(LATE)} \
\text{SAT(ISFACTION)}_{\text{Strong}}
\]
Assign \( \ast \) to every subcategorization frame of activation 1 which is not matched in the output

\[
\text{TEMP(LATE)} \
\text{SAT(ISFACTION)}
\]
Assign \( X \) violations to every subcategorization frame of activation \( X \) which is not matched in the output
Constraints (II)

**COH(ERENCE)**
Assign * to every coreferential pair of affixes which are not adjacent in the output

**LIN(EARITY)_{Strong}**
Assign * to every pair of affixes $A_1, A_2$ such that $A_1 <_{\text{Strong}} A_2$ in the input and $A_2 < A_1$ in the output

**LIN(EARITY)**
Assign $X$ to every pair of affixes $A_1, A_2$ such that $A_1 <_{X} A_2$ in the input and $A_2 < A_1$ in the output
Constraints (III)

**DEP** * Assign * to every epenthetic accent

**DEP** Ʌ Assign * to every morpheme $M$
such that for some phonological unit in $M$
its output activation is greater than its input activation
Causative + Desiderative
## Rarámuri Affix Order (Caballero 2010:190)

<table>
<thead>
<tr>
<th>2\textsuperscript{nd}</th>
<th>CAUS</th>
<th>APPL</th>
<th>DESID</th>
<th>MOT</th>
<th>EV</th>
</tr>
</thead>
<tbody>
<tr>
<td>1\textsuperscript{st}</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CAUS</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td></td>
<td>non-comp.</td>
<td>comp., non-comp.</td>
<td>comp., non-comp.</td>
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</tr>
<tr>
<td>APPL</td>
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<td>✓</td>
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<td>fixed scope</td>
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<tr>
<td>DESID</td>
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<td>x</td>
<td></td>
<td>✓</td>
<td>✓</td>
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<tr>
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<td>fixed scope</td>
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<tr>
<td>MOT</td>
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<td>x</td>
<td>✓</td>
<td>✓</td>
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<td>comp., non-comp.</td>
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<td>comp., non-comp.</td>
<td>fixed scope</td>
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<tr>
<td>EV</td>
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<td>x</td>
<td>✓</td>
<td>x</td>
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<td>fixed scope</td>
<td>non-comp. phon-subcat</td>
<td>fixed scope</td>
<td></td>
</tr>
</tbody>
</table>
Caus ↪, ↦ Des

▶ **Empirical Generalization:**
  ▶ both scopal readings possible
  ▶ Caus ↦ Des: both linear orders
  ▶ Des ↦ Caus: only scopal order

▶ **Analysis:**
  ▶ Caus has strong subcategorization (may trigger reordering)
  ▶ Des has weak subcategorization (cannot trigger reordering)
  ▶ \{ Caus, Des \} has strong linearization
  Stress (DEP *) cannot trigger reordering
Scopal Orders

Des ▸ Caus

tamí nará-t-nare
/tamí nará-\textit{ti-na(\textit{le})}/
1SG.ACC cry-\textit{CAUS-DES}
‘He wants to make me cry’ (23-b)

Caus ▸ Des

baʔwí bahí-n-ti-ri=ni
/baʔwí bahí-\textit{na(\textit{le})-ti-ri}=ni/
water drink-\textit{DES-CAUS}-PST.PASS=1SG.NOM
‘They made me want to drink water’ (22-b)
Non-Scopal Order

**Caus ▶ Des**

nihé mi sú-r-ti-na-ma
/nehé mi sú-r-ti-na(le)-ma/
1SG.NOM 2sg.acc sew-CAUS-CAUS-DES-FUT.SG
‘I will make you want to sew’ (33-a)

koʔá-r-ti-ni-sa
/koʔá-r-ti-na(le)-sa/
eat-CAUS-CAUS-DES-IMP
‘Let’s make her want to eat’ (33-d)
## Underlying Linearization: Causative

<table>
<thead>
<tr>
<th>Caus $\triangleright$ Appl</th>
<th>Des $\triangleright$ Appl</th>
<th>Caus $\leftrightarrow$ Des</th>
<th>Caus $\leftrightarrow$ Mot</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Scope</strong></td>
<td>fixed</td>
<td>fixed</td>
<td>free</td>
</tr>
<tr>
<td><strong>Linear. Strength</strong></td>
<td>weak</td>
<td>strong</td>
<td>strong</td>
</tr>
<tr>
<td><strong>Reversal triggered by</strong></td>
<td>Caus</td>
<td>—</td>
<td>Caus</td>
</tr>
</tbody>
</table>
## Caus $\rightarrow$ Des (stressed root)

**Reading: Causative $\rightarrow$ Desiderative (strong linearization)**

**Strong Subcategorization:** \(-r_{\text{Caus}} / \overset{\text{Non-scopal}}{\text{ō}}\)

**Weak Subcategorization:** \(-\text{na}_{\text{Des}} / \overset{\text{Scopal}}{\text{ō}}\)

<table>
<thead>
<tr>
<th>Input: = a.</th>
<th>(\text{TEMP} \text{SAT}_{\text{St}})</th>
<th>(\text{COH})</th>
<th>(\text{LIN}_{\text{St}})</th>
<th>(\text{TEMP} \text{SAT} )</th>
<th>(\text{LIN})</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. (\text{sú-na}<em>{\text{Des}} - r</em>{\text{Caus}} - \text{ti}_{\text{Caus}})</td>
<td>*!</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. (\text{sú-r-na}<em>{\text{CausDes}} - \text{ti}</em>{\text{Caus}})</td>
<td>*!</td>
<td>*</td>
<td></td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>c. (\text{sú-r}<em>{\text{Caus}} - \text{ti}</em>{\text{Caus}} - \text{na}_{\text{Des}})</td>
<td>*</td>
<td>*</td>
<td></td>
<td>*</td>
<td>**</td>
</tr>
</tbody>
</table>

**Reading: Causative $\rightarrow$ Desiderative (strong linearization)**

**Weak Subcategorization:** \(-\text{na}_{\text{Des}} / \overset{\text{Scopal}}{\text{ō}}\)

<table>
<thead>
<tr>
<th>Input: = a.</th>
<th>(\text{TEMP} \text{SAT}_{\text{St}})</th>
<th>(\text{COH})</th>
<th>(\text{LIN}_{\text{St}})</th>
<th>(\text{TEMP} \text{SAT} )</th>
<th>(\text{LIN})</th>
</tr>
</thead>
<tbody>
<tr>
<td>✧ a. (\text{bahí-na}<em>{\text{Des}} - \text{ti}</em>{\text{Caus}})</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>b. (\text{bahí-ti}<em>{\text{Caus}} - \text{na}</em>{\text{Des}})</td>
<td>*!</td>
<td>*</td>
<td></td>
<td>*</td>
<td>**</td>
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</table>
Des ▶ Caus (stressed root)

Reading: Desiderative ▶ Causative (strong linearization)

Weak Subcategorization: -na\textsubscript{Des} / _ Scopal

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<th>Input: = a.</th>
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<th>LIN\textsubscript{St}</th>
<th>TEMP\textsubscript{SAT}</th>
<th>LIN</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. \textsc{nará-ti}<em>{\textsc{Caus}} -na\textsc{0}</em>{\textsc{Des}}</td>
<td></td>
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</tr>
<tr>
<td>b. \textsc{nará-na}<em>{\textsc{Des}} -ti</em>{\textsc{Caus}}</td>
<td></td>
<td></td>
<td>*</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Des ▷ Caus (unstressed root)

\[
\begin{align*}
\text{ma}=\text{ni} & \quad \text{mi} & \quad \text{ubá}-r\text{-nare} \\
/\text{ma}=\text{ni} & \quad \text{mi} & \quad \text{uba}-r\text{-na(le)}/ \\
\text{already } = & \quad 1\text{SG.NOM} & \quad 2\text{SG.ACC} & \quad \text{bathe-CAUS-DES} \\
\text{‘I want to bathe you’ (23-c)} & \\
\end{align*}
\]

-na(le) doesn’t move in across -r even with an unstressed root
**Underlying Linearization: Causative**

<table>
<thead>
<tr>
<th>Caus</th>
<th>Des</th>
<th>Caus ↔ Des</th>
<th>Caus ↔ Mot</th>
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<tbody>
<tr>
<td>Scope</td>
<td>fixed</td>
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<td>free</td>
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<td>Caus</td>
</tr>
</tbody>
</table>
### Des ⊃ Caus – Scopal Order (unstressed root)

Strong Subcategorization: \(-r_{\text{Caus}} \, /{\_\_}\)  

Strong Linearization (**blocks movement of -na(le))** by \(\text{TEMPSAT}_{\text{St}}\)

<table>
<thead>
<tr>
<th>Input: = a.</th>
<th>3(\sigma) ∎ (\text{TEMPSAT}_{\text{St}})</th>
<th>(\text{LIN}_{\text{St}})</th>
<th>(\text{DEP} ∎)</th>
<th>(\text{TEMPSAT} , \text{Lin})</th>
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<tbody>
<tr>
<td>(∵) b. u ba r na re</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>(\text{☞}) c. u ba na le r</td>
<td>*</td>
<td>*</td>
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<td>*</td>
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</table>
Back to the Evidential
## Rarámuri Affix Order (Caballero 2010:190)

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<th>CAUS</th>
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<tr>
<td>1st</td>
<td>↓</td>
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<tr>
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<td>🟢</td>
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<td>comp., non-comp.</td>
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<td>🟢</td>
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<td></td>
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## Underlying Linearization: Evidential

<table>
<thead>
<tr>
<th></th>
<th>Ev ▶ Appl</th>
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<th>Ev ▶ Des</th>
<th>Ev ▶ Mot</th>
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<td>Scope</td>
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<td>Strength</td>
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<td>Reversal triggered by</td>
<td>—</td>
<td>—</td>
<td>Ev</td>
<td>—</td>
</tr>
</tbody>
</table>

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Appendix More on the Evidential
Open Question

Could Evidentials reorder wrt other affixes?
(Applicative, Causative, etc.)

(predicted by the analysis here)
Open Answer

In all data of Caballero (2010) with Evidential + \{ Applicative, Causative, \ldots \}

the prosodic subcategorization of Evidential is already satisfied

in the scopal order
# Root Stress

<table>
<thead>
<tr>
<th>Root</th>
<th>Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>awi  ‘dance’</td>
<td>(unstressed) unstressed occurrence (2008, p144:(47-a))</td>
</tr>
<tr>
<td>bahí ‘drink’</td>
<td>(stressed) stressed before -sá (2008, p.179:(8-b))</td>
</tr>
<tr>
<td>iki ‘happen’</td>
<td>(unstressed) unstressed occurrence (2008, p.434:(3))</td>
</tr>
<tr>
<td>isí ‘urinate’</td>
<td>(stressed) stressed before -sá (2008, p.179:(8-c))</td>
</tr>
<tr>
<td>to ‘take’</td>
<td>(unstressed) unstressed occurrence (2011, p.752:(1-f))</td>
</tr>
<tr>
<td>ko’ ‘eat’</td>
<td>(unstressed) unstressed occurrence (2008, p.340:(10-a))</td>
</tr>
<tr>
<td>ko’a ‘eat’</td>
<td>(unstressed) unstressed occurrence (2011, p.10:(16-c))</td>
</tr>
<tr>
<td>koci ‘sleep’</td>
<td>(unstressed) unstressed occurrence (2008, p.340:(10-b))</td>
</tr>
<tr>
<td>nará ‘cry’</td>
<td>(stressed) stressed before -ká (2008, p.426:(30-a))</td>
</tr>
<tr>
<td>ra’ici ‘speak’</td>
<td>(unstressed) variable stress (2. or 3.ο) (2008, p.119:(17))</td>
</tr>
<tr>
<td>sú ‘sew’</td>
<td>(stressed) stressed before -sá (2011, p.762:(T-3))</td>
</tr>
<tr>
<td>uba ‘sleep’</td>
<td>(unstressed) unstressed occurrence (2008, p.296:(11-a))</td>
</tr>
<tr>
<td>-bú ‘remove’</td>
<td>(stressed) stressed before ká (2008, p.127:(30-c))</td>
</tr>
</tbody>
</table>
Appendix Rest

Exceptional Long Allomorph Triggers

a. nakó-n-čan-a
/nakó-na-čane-a/
fist.fight-DESID-EV-PROG
‘It sounds like they want to fist fight’

(2010:183:(28a))

[ [ [V] CAUS ] MOT (go along) ] [X goes along [cause Y to V] ]
a. ma=ti počí-ti-si-a
/ma=ti počí-ti-si-a/
already=1PL.NOM jump-CAUS-MOT-PROG
iná-r-ti-po?
/iná-ri-ti-po/ go CAUS-CAUS FUT PL

(2010:177:(20a))
## Exceptional Long Allomorph Triggers

### Word Level:

**Input** = $\text{nako-nale}_{\text{Des}} \cdot \text{cane}_{\text{Mot}} \cdot \text{C}_{\text{cor}}$, a

<table>
<thead>
<tr>
<th></th>
<th>DEP C</th>
<th>TEMP SAT</th>
<th>LIN</th>
<th>DEP /</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. nako-nale$<em>{\text{Des}}$ · cane$</em>{\text{Mot}}$ · C$_{\text{cor}}$ a</td>
<td></td>
<td>*!</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. nako-nale$<em>{\text{Des}}$ · cane$</em>{\text{Mot}}$ · ta</td>
<td></td>
<td>*!</td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. nako-nale$<em>{\text{Des}}$ · cane$</em>{\text{Mot}}$ · a</td>
<td></td>
<td></td>
<td>*<em>!</em></td>
<td></td>
</tr>
<tr>
<td>d. nako-nale$<em>{\text{Des}}$ · cane$</em>{\text{Mot}}$ · a</td>
<td></td>
<td></td>
<td>*</td>
<td></td>
</tr>
</tbody>
</table>

**Input** = poci-ti-simi$_{\text{Mot}}$ · C$_{\text{cor}}$, a

<table>
<thead>
<tr>
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<td>☞ a. poci-ti-simi$<em>{\text{Mot}}$ · C$</em>{\text{cor}}$ a</td>
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<td>*!</td>
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</tr>
<tr>
<td>☞ c. poci-ti-simi$<em>{\text{Mot}}$ · C$</em>{\text{cor}}$ a</td>
<td></td>
<td>*</td>
<td></td>
<td>*!</td>
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References


Overview

Basic Ideas

Background
   Rarámuri
   Stratal Optimality Theory
   Prosodic Subcategorization as Virtual Structure
   Gradient Symbolic Representations

Multiple Exponence and Allomorphy: Causative + Applicative
Length-alternating Affixes: Causative + Associated Motion
Stress: Desiderative + Associated Motion
Weak And Strong Linearization: Desiderative + Applicative

More on Length-alternating Suffixes

Summary

Appendix
   Overall Ranking
   Causative + Desiderative
   More on the Evidential
   Root Stress
   Rest