Anti-cyclic mutation in Stratal Containment

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NELS 48
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Two dimensions of cyclicity

- Degree of accessibility:
  - Material from previous cycles is not accessible in any way (~ Spell-out)
  - Phonological material from previous cycles is accessible but its morphological provenience is not visible (Bracket Erasure, Morpheme Merger)

- Degree of preservation:
  - Non-integrated material is erased (Stray Erasure, Phonetization)
  - All phonological structure is preserved across cycles

---

Two dimensions of cyclicity

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  - Phonological material from previous cycles is accessible but its morphological provenience is not visible (Bracket Erasure, Morpheme Merger)

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  - All phonological structure is preserved across cycles

**Goal of this presentation:**
- Present an argument for full preservation

References:
Extended Stratal Containment

- Extended Stratal Containment (= ESC, Trommer 2011)
- Optimality Theory: Phonological structures are evaluated by ranked and violable constraints
- Strata: Grammar is organized into a (semi-fixed?) number of strata, from morpheme to phrase
- Containment: GEN cannot delete phonological material, it can only manipulate association lines
  - | = visible underlying, ‖ = visible epenthetic, ‡ = invisible
- Colors: Morphological provenience is only visible to the phonology on a same/different basis

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How much post-stratal clean-up is necessary?

- **Trommer’s ESC**
  - **Rebirthing (RB)**
    - At the end of each stratum:
      a. Replace the output $O$ of the stratum by its P-structure (**Phonetization**)
      b. Assign the same unique color to all nodes and association lines of $O$ (**Morpheme Merger**)

\[
\begin{array}{c}
\text{LEVEL 1} \\
\begin{array}{ccc}
t & a & g \\
\mid & \rightarrow & \neq \\
[v] & \neq & [v]
\end{array}
\end{array}
\rightarrow
\begin{array}{c}
\text{LEVEL 2} \\
\begin{array}{c}
t a k
\end{array}
\end{array}
\]

Bartholomew Trommer
How much post-stratal clean-up is necessary?

- A more permissive version of ESC
  - **LIMITED REBIRTHING (LR)**
    - At the end of each stratum:
      a. Replace the output \( O \) of the stratum by its P-structure
        \( \text{(Phonetization)} \)
      b. Assign the same unique color to all nodes and association lines
         of \( O \) \( \text{(Morpheme Merger)} \)

\[
\begin{array}{c|ccc|c}
\hline
\text{LEVEL 1} & \text{t} & \text{a} & \text{g} & \text{t} & \text{a} & \text{k} \\
\hline
\text{[v]} & \rightarrow & \n & \n & \n & \n & \n \\
\text{LEVEL 2} & \text{t} & \text{a} & \text{k} \\
\hline
\end{array}
\]

\[
\begin{align*}
\text{LR} & \\
\hline
\text{[v]} & \n & \n
\end{align*}
\]
Empirical testing ground: Unexpected mutations in reduplicants

- In morphology-heavy theories, unexpected phonological behavior in reduplicants can be attributed to
  - Faithfulness to base / Non-faithfulness to input (BRCT, . . .)
  - Construction-specific co-phonologies (MDT, . . .)

**Claim**

What looks like reduplicate-specific processes actually follows from a modular and stratal organization of grammar with LR

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Theoretical Assumptions
Generalized Non-Linear Affixation (GNLA): All mutation and non-concatenative morphology is the result of affixation

Segmental mutation is the result of subsegmental (featural) affixes

Minimal Reduplication

- Copying as a repair strategy for defective prosodic material
- Copied material has its own copy color which is different from the base color and the trigger color

\[
\begin{array}{c}
\mu & \mu & \mu \\
\mid & \mid & \\
\text{te} & \text{ema} & \\
\rightarrow & \mid & \mid & \\
\text{te} & \text{te} & \text{ema} & \\
\end{array}
\]

Saba Kirchner (2010; 2013), Zimmermann (2017a,b)
Constraints

- **Integrity**: Assign one * for every node of the copy color

- **Alternation**: Assign one * for every line linking two nodes of the same color

- **Assign one * for every node \( \beta \) that is not linked to a node \( \alpha \)

- **Dep**: Assign one * for every inserted line between a node \( \alpha \) and a node \( \beta \)

- **Max**: Assign one * for every deleted line between a node \( \alpha \) and a node \( \beta \)

- **Mix**: Assign one * for every node \( N_1 \) that is linked to some node \( N_2 \) via an underlying line and to some node \( N_3 \) via an epenthetic line
The case of Seereer-Siin
Bases with an initial voiced obstruent in Seereer-Siin (North Atlantic) lose their [+v] when they undergo reduplication.

<table>
<thead>
<tr>
<th>BASE</th>
<th>AGENT NOUN</th>
</tr>
</thead>
<tbody>
<tr>
<td>bind</td>
<td>o-piː-bind</td>
</tr>
<tr>
<td>dap</td>
<td>o-taː-dap</td>
</tr>
<tr>
<td>gaʔ</td>
<td>o-kaː-gaʔ</td>
</tr>
<tr>
<td>ŋik</td>
<td>o-ciː-ŋik</td>
</tr>
</tbody>
</table>

Phonology

- **Vowels:** /i, iː, e, eː, a, aː, o, oː, u, uː/

- **Consonants:**

  \[
  \begin{array}{ccccccc}
  \text{p} & \text{b} & \text{t} & \text{d} & \text{ʧ} & \text{k} & \text{g} & \text{q} & \text{ʔ} \\
  \text{ɓ} & \text{ɓ} & \text{ɗ} & \text{ɗ} & \text{ʡ} & \text{ʢ} & \text{ʠ} & \text{ʢ} & \text{ʡ} \\
  \text{mb} & \text{nd} & \text{ʠ} & \text{ŋ} & \text{ŋ} & \text{NG} & \text{x} & \text{x} & \text{x} \\
  \text{f} & \text{s} & \text{x} & \text{x} & \text{x} & \text{x} & \text{x} & \text{x} & \text{x} \\
  \text{m} & \text{n} & \text{ŋ} & \text{ŋ} & \text{ŋ} & \text{ŋ} & \text{ŋ} & \text{ŋ} & \text{ŋ} \\
  \text{w} & \text{r} & \text{l} & \text{j} & \text{j} & \text{j} & \text{j} & \text{j} & \text{j} \\
  \end{array}
  \]

- **Final stress, no tones**

## Nominal morphology

<table>
<thead>
<tr>
<th>CLASS</th>
<th>PREFIX</th>
<th>GRADE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>o-</td>
<td>b</td>
</tr>
<tr>
<td>2</td>
<td>a</td>
<td></td>
</tr>
<tr>
<td>3a</td>
<td>a-</td>
<td>a</td>
</tr>
<tr>
<td>3b</td>
<td>a-</td>
<td>c</td>
</tr>
<tr>
<td>4</td>
<td>a-</td>
<td>b</td>
</tr>
<tr>
<td>5</td>
<td>a</td>
<td>a</td>
</tr>
<tr>
<td>6</td>
<td>c</td>
<td>c</td>
</tr>
<tr>
<td>7</td>
<td>a</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>fo-</td>
<td>a</td>
</tr>
<tr>
<td>9</td>
<td></td>
<td>b</td>
</tr>
<tr>
<td>10</td>
<td>o-</td>
<td>a</td>
</tr>
<tr>
<td>11</td>
<td>xa-</td>
<td>b</td>
</tr>
<tr>
<td>12</td>
<td>o-</td>
<td>c</td>
</tr>
<tr>
<td>13</td>
<td>fo-</td>
<td>c</td>
</tr>
<tr>
<td>14</td>
<td>fa-</td>
<td>c</td>
</tr>
<tr>
<td>15</td>
<td>pa-</td>
<td>b</td>
</tr>
</tbody>
</table>

Mc Laughlin (2000, p. 361)
Nominal morphology

- **Paradigm for /roːn/ ‘milk bowl’:**

<table>
<thead>
<tr>
<th>CLASS</th>
<th>GRADE</th>
<th>WORD</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>a</td>
<td>o- roːn</td>
<td>SINGULAR</td>
</tr>
<tr>
<td>11</td>
<td>b</td>
<td>xa-töːn</td>
<td>PLURAL</td>
</tr>
<tr>
<td>12</td>
<td>c</td>
<td>o- ndoːn</td>
<td>DIM. SINGULAR</td>
</tr>
<tr>
<td>13</td>
<td>c</td>
<td>fo-ndöːn</td>
<td>DIM. PLURAL</td>
</tr>
<tr>
<td>3a</td>
<td>c</td>
<td>a- ndöːn</td>
<td>AUGM. SINGULAR</td>
</tr>
</tbody>
</table>

Mc Laughlin (1994, p. 283)
The three grades of Initial Consonant Mutations (ICM):

- **a** = voicing mutation
- **b** = continuancy mutation
- **c** = nasal mutation

<table>
<thead>
<tr>
<th></th>
<th>/p</th>
<th>b</th>
<th>w</th>
<th>f</th>
<th>t</th>
<th>d</th>
<th>r</th>
<th>s</th>
<th>c</th>
<th>f</th>
<th>k</th>
<th>x/</th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>b</td>
<td>b</td>
<td>w</td>
<td>f</td>
<td>d</td>
<td>d</td>
<td>r</td>
<td>s</td>
<td>t</td>
<td>f</td>
<td>g</td>
<td>x</td>
</tr>
<tr>
<td>b</td>
<td>p</td>
<td>b</td>
<td>p</td>
<td>t</td>
<td>d</td>
<td>t</td>
<td>c</td>
<td>c</td>
<td>f</td>
<td>k</td>
<td>q</td>
<td></td>
</tr>
<tr>
<td>c</td>
<td>mb</td>
<td>b</td>
<td>mb</td>
<td>mb</td>
<td>nd</td>
<td>nd</td>
<td>n̥</td>
<td>n̥</td>
<td>f</td>
<td>n̥</td>
<td>n̥</td>
<td>NG</td>
</tr>
</tbody>
</table>

Mc Laughlin (2000)
Agent nouns

- Agent nouns are formed by prefixing a CV: sized copy of the initial stem syllable and a class 1 prefix.
- Bases with an initial voiced obstruent lose their [v] when they undergo reduplication.

<table>
<thead>
<tr>
<th>BASE</th>
<th>AGENT NOUN</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>bind</td>
<td>o-\textipa{pi:}-bind</td>
<td>'write / writer'</td>
</tr>
<tr>
<td>dap</td>
<td>o-\textipa{ta:}-dap</td>
<td>'launder / launderer'</td>
</tr>
<tr>
<td>gaʔ</td>
<td>o-\textipa{ka:}-gaʔ</td>
<td>'see / seer'</td>
</tr>
<tr>
<td>jik</td>
<td>o-\textipa{ci:}-jik</td>
<td>'buy / buyer'</td>
</tr>
</tbody>
</table>

Mc Laughlin (2000, p. 334)
Analysis
Mutation triggers

The three grades of Initial Consonant Mutations (ICM):
- **a** = voicing mutation
- **b** = continuancy mutation
- **c** = nasal mutation

<table>
<thead>
<tr>
<th></th>
<th>/p</th>
<th>b</th>
<th>w</th>
<th>f</th>
<th>t</th>
<th>d</th>
<th>r</th>
<th>s</th>
<th>c</th>
<th>j</th>
<th>g</th>
<th>x</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>a</strong></td>
<td>b</td>
<td>b</td>
<td>w</td>
<td>f</td>
<td>d</td>
<td>d</td>
<td>r</td>
<td>s</td>
<td>j</td>
<td>j</td>
<td>g</td>
<td>x</td>
</tr>
<tr>
<td><strong>b</strong></td>
<td>p</td>
<td>b</td>
<td>p</td>
<td>t</td>
<td>d</td>
<td>t</td>
<td>c</td>
<td>c</td>
<td>j</td>
<td>j</td>
<td>k</td>
<td>q</td>
</tr>
<tr>
<td><strong>c</strong></td>
<td>mb</td>
<td>mb</td>
<td>mb</td>
<td>nd</td>
<td>d</td>
<td>nd</td>
<td>n̥</td>
<td>n̥</td>
<td>j</td>
<td>j</td>
<td>η</td>
<td>η</td>
</tr>
</tbody>
</table>

Mutation grades are the result of floating features
- **a** = voicing mutation = floating [v]
- **b** = continuancy mutation = floating [-c]
- **c** = nasal mutation = floating [n]

Mc Laughlin (2000)
Mutation triggers

- ICM is triggered by floating features

<table>
<thead>
<tr>
<th>GRADE</th>
<th>FEATURE</th>
<th>/roːn/</th>
<th>‘milk bowl’</th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>[v]</td>
<td>o[v]-roːn</td>
<td>‘milk bowl’</td>
</tr>
<tr>
<td>b</td>
<td>[-c]</td>
<td>xa[-c]-toːn</td>
<td>‘milk bowls’</td>
</tr>
<tr>
<td>c</td>
<td>[n]</td>
<td>o[n]-ndoːn</td>
<td>‘small milk bowl’</td>
</tr>
</tbody>
</table>

- Continuancy mutation (b-grade):

\[
\mu \mu \mu \\
\mu \mu \mu \\
\mu \mu \mu \\
\mu \mu \mu \\
xa \rightarrow xa \\
[-c] [+] \\
[-c] [+] \\
\]

Mc Laughlin (2000)
Morphology of agent nouns

- The agentive morpheme:

  \[ \text{[AGENT]} \leftrightarrow \mu \mu \]

- The two defective \( \mu \) trigger CV-sized copying

\[
\begin{align*}
\mu & \mu & \mu \\
| & & | \\
p & i & n & d & \rightarrow & \mu & \mu & \mu \\
& & & & | \\
p & i: & p & i & n & d
\end{align*}
\]
Morphology of agent nouns

- Two mutation grades in infinite and finite verb forms
- Voicing in the infinitive is due to a-grade mutation, not an underlying [v]!

<table>
<thead>
<tr>
<th>Infinitive A-grade</th>
<th>Singular A-grade</th>
<th>Plural C-grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>bug</td>
<td>bugu</td>
<td>mbugu</td>
</tr>
<tr>
<td>ɓaf</td>
<td>ɓafa</td>
<td>ɓafa</td>
</tr>
<tr>
<td>waːɗ</td>
<td>waːɗa</td>
<td>mbaːɗa</td>
</tr>
<tr>
<td>duʔ</td>
<td>duʔa</td>
<td>nduʔa</td>
</tr>
<tr>
<td>deg</td>
<td>dega</td>
<td>ɗega</td>
</tr>
<tr>
<td>ref</td>
<td>arefu</td>
<td>andefu</td>
</tr>
<tr>
<td>ɭir</td>
<td>ɭir</td>
<td>ɭɭir</td>
</tr>
<tr>
<td>gen</td>
<td>agenu</td>
<td>aŋgenu</td>
</tr>
<tr>
<td>xoːx</td>
<td>axoːxu</td>
<td>angoːxu</td>
</tr>
</tbody>
</table>

Mc Laughlin (2000, p. 338)
Morphology of agent nouns

- AN’s are built from the infinitive stem, not the bare root
- The infinitive stem consists of the verbal root and a-grade (voicing) mutation
- The complete structure of agent nouns:

\[
\text{WORD} \quad [\quad \text{STEM} \quad ] \quad ] \quad ] \\
\text{CL.1} \quad [\quad \text{AGEN} \quad [\quad \text{INF} \quad \sqrt{v} \quad ] \quad ] \quad ] \\
\text{o} \quad [-c] \quad + \quad \mu \mu \quad + \quad [v] \quad + \quad \text{pind}
\]
Derivation of agent nouns

- If the floating [v] from the infinitive morpheme induced voicing at the stem level, word-level reduplication would be expected to create a copy of the voiced stop

<table>
<thead>
<tr>
<th>Input</th>
<th>[v] + pind</th>
<th>Output</th>
<th>bind</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stem</td>
<td></td>
<td>Word</td>
<td>obi:bind Ʃ</td>
</tr>
<tr>
<td>[v] + pind</td>
<td>o [-c] + μ μ + bind</td>
<td>bind</td>
<td></td>
</tr>
<tr>
<td></td>
<td>obi:bind Ʒ</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Derivation of agent nouns

- Instead, the [v] stays floating on the level where it is introduced . . .
- . . . and links to a C root node only at some later point, when reduplication has already taken place

<table>
<thead>
<tr>
<th>STEM</th>
<th>WORD</th>
<th>PHRASE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output</td>
<td>[v] pind</td>
<td>opi: [v] pind</td>
</tr>
</tbody>
</table>

- Crucial assumption: Floating material is not copied along segmental material (cf. cases of underapplication in Lakota and Kulina)

Shaw (1980), Dienst (2014)
The issue of directionality

Problem: How to ensure the floating [v] ends up at the desired root C?

- Root material cannot be favored over affix material on the phrase level due to Morpheme Merger.
- Base material cannot be favored over reduplicant material because there is no red morpheme.

Solution: [v] is not a prefix, it is an infix.

- Pivotal position: right side of first root C.

[v] links to an onset C because voiced coda C’s are dispreferred.

- \( \text{Max} \gg \text{NoVcdCoda} \gg [v] \rightarrow \text{C} \)
- Skipping is banned (\( \text{NoSkip} \))

Derivation of agent nouns: Stem level

- Infinitive stem: \[ \text{INF} \left[ \sqrt{v} \right] \]

<table>
<thead>
<tr>
<th>Input = a.</th>
<th>DEP \downarrow [v]</th>
<th>DEP \uparrow [v]</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. p i nd</td>
<td>\mu \downarrow \mu</td>
<td>*</td>
</tr>
<tr>
<td>\quad [v]</td>
<td>[v]</td>
<td></td>
</tr>
<tr>
<td>b. b i nd</td>
<td>\mu \downarrow \mu</td>
<td>*!</td>
</tr>
<tr>
<td>\quad [v]</td>
<td>[v]</td>
<td></td>
</tr>
</tbody>
</table>
Derivation of agent nouns: 
**Word level**

Agent noun word: [ **CL.1** [ **AGEN** [ **INF.-STEM** ] ] ]

<table>
<thead>
<tr>
<th>Input = a.</th>
<th>*Mix</th>
<th>DEP</th>
<th>DEP</th>
<th>μ</th>
<th>↑</th>
<th>μ</th>
<th>μ</th>
<th>μ</th>
<th>μ</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **a.** o p i n d
- **b.** o p i: p i n d
- **c.** o p i: b i n d

**Notes:**
- **Mix Dep Soon Dep**
- **μ ↓ • μ ↑ [v]**
- ***!* *"**
### Derivation of agent nouns: Phrase level

- **Agent noun word:** \[ \text{CL.1-AGENT-NOUN} \]

<table>
<thead>
<tr>
<th>Input = a.</th>
<th>Max</th>
<th>( \uparrow )</th>
<th>No</th>
<th>NoVcd</th>
<th>Dep</th>
<th>Alt</th>
</tr>
</thead>
</table>
| \[\begin{array}{c}
\mu \\
\mid \\
a. o p i: p i nd
\end{array}\] | \[\begin{array}{c}
\mu \\
\mid \\
\mu
\end{array}\] | \[\begin{array}{c}
\mu \\
\mid \\
\mu
\end{array}\] | \[\begin{array}{c}
\mu \\
\mid \\
\mu
\end{array}\] | \[\begin{array}{c}
\mu \\
\mid \\
\mu
\end{array}\] | \[\begin{array}{c}
\mu \\
\mid \\
\mu
\end{array}\] | \[\begin{array}{c}
\mu \\
\mid \\
\mu
\end{array}\] | \[\begin{array}{c}
\mu \\
\mid \\
\mu
\end{array}\] |
| \[\begin{array}{c}
\mu \\
\mid \\
\mu
\end{array}\] | \[\begin{array}{c}
\mu \\
\mid \\
\mu
\end{array}\] | \[\begin{array}{c}
\mu \\
\mid \\
\mu
\end{array}\] | \[\begin{array}{c}
\mu \\
\mid \\
\mu
\end{array}\] | \[\begin{array}{c}
\mu \\
\mid \\
\mu
\end{array}\] | \[\begin{array}{c}
\mu \\
\mid \\
\mu
\end{array}\] | \[\begin{array}{c}
\mu \\
\mid \\
\mu
\end{array}\] | \[\begin{array}{c}
\mu \\
\mid \\
\mu
\end{array}\] |
| \[\begin{array}{c}
\mu \\
\mid \\
\mu
\end{array}\] | \[\begin{array}{c}
\mu \\
\mid \\
\mu
\end{array}\] | \[\begin{array}{c}
\mu \\
\mid \\
\mu
\end{array}\] | \[\begin{array}{c}
\mu \\
\mid \\
\mu
\end{array}\] | \[\begin{array}{c}
\mu \\
\mid \\
\mu
\end{array}\] | \[\begin{array}{c}
\mu \\
\mid \\
\mu
\end{array}\] | \[\begin{array}{c}
\mu \\
\mid \\
\mu
\end{array}\] | \[\begin{array}{c}
\mu \\
\mid \\
\mu
\end{array}\] |
| \[\begin{array}{c}
\mu \\
\mid \\
\mu
\end{array}\] | \[\begin{array}{c}
\mu \\
\mid \\
\mu
\end{array}\] | \[\begin{array}{c}
\mu \\
\mid \\
\mu
\end{array}\] | \[\begin{array}{c}
\mu \\
\mid \\
\mu
\end{array}\] | \[\begin{array}{c}
\mu \\
\mid \\
\mu
\end{array}\] | \[\begin{array}{c}
\mu \\
\mid \\
\mu
\end{array}\] | \[\begin{array}{c}
\mu \\
\mid \\
\mu
\end{array}\] | \[\begin{array}{c}
\mu \\
\mid \\
\mu
\end{array}\] |
| \[\begin{array}{c}
\mu \\
\mid \\
\mu
\end{array}\] | \[\begin{array}{c}
\mu \\
\mid \\
\mu
\end{array}\] | \[\begin{array}{c}
\mu \\
\mid \\
\mu
\end{array}\] | \[\begin{array}{c}
\mu \\
\mid \\
\mu
\end{array}\] | \[\begin{array}{c}
\mu \\
\mid \\
\mu
\end{array}\] | \[\begin{array}{c}
\mu \\
\mid \\
\mu
\end{array}\] | \[\begin{array}{c}
\mu \\
\mid \\
\mu
\end{array}\] | \[\begin{array}{c}
\mu \\
\mid \\
\mu
\end{array}\] |

- a. Skip
- b. NoVcd
- c. NoVcd
- d. No

\[\begin{array}{c}
\mu \\
\mid \\
\mu
\end{array}\]
Derivation of agent nouns: Phrase level

### Effect of $\text{NOVcdCoda}$

<table>
<thead>
<tr>
<th></th>
<th>$\text{Input} = a.$</th>
<th>$\text{Max \space [v]}$</th>
<th>$\text{No \space Skip \space [v]}$</th>
<th>$\text{NoVcd \space Coda}$</th>
<th>$\text{Dep \space [v]}$</th>
<th>$\text{Alt}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>$\mu \mu \mu \mu$</td>
<td>$\mu \mu \mu \mu$</td>
<td>$\mu \mu \mu \mu$</td>
<td>$\mu \mu \mu \mu$</td>
<td>$\mu \mu \mu \mu$</td>
<td>$\mu \mu \mu \mu$</td>
</tr>
<tr>
<td></td>
<td>$b. \quad o \quad t\quad a: \quad d\quad a\quad p$</td>
<td>$b. \quad o \quad t\quad a: \quad d\quad a\quad p$</td>
<td>$b. \quad o \quad t\quad a: \quad d\quad a\quad p$</td>
<td>$b. \quad o \quad t\quad a: \quad d\quad a\quad p$</td>
<td>$b. \quad o \quad t\quad a: \quad d\quad a\quad p$</td>
<td>$b. \quad o \quad t\quad a: \quad d\quad a\quad p$</td>
</tr>
<tr>
<td></td>
<td>$c. \quad o \quad t\quad a: \quad t\quad a\quad b$</td>
<td>$c. \quad o \quad t\quad a: \quad t\quad a\quad b$</td>
<td>$c. \quad o \quad t\quad a: \quad t\quad a\quad b$</td>
<td>$c. \quad o \quad t\quad a: \quad t\quad a\quad b$</td>
<td>$c. \quad o \quad t\quad a: \quad t\quad a\quad b$</td>
<td>$c. \quad o \quad t\quad a: \quad t\quad a\quad b$</td>
</tr>
</tbody>
</table>
Further evidence I

- The plural of agent nouns involves class 2 morphology, i.e. voicing (a-grade) mutation
- Devoicing is only observed in class 1 but not in class 2
- This is because there are two floating [v] features, one introduced at the stem and the other at the word level

<table>
<thead>
<tr>
<th>BASE</th>
<th>AGENT NOUN SG</th>
<th>AGENT NOUN PL</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>bind</td>
<td>o-\textipa{</td>
<td>piː</td>
<td>}-bind</td>
</tr>
<tr>
<td>dap</td>
<td>o-\textipa{</td>
<td>taː</td>
<td>}-dap</td>
</tr>
<tr>
<td>ga˚</td>
<td>o-\textipa{</td>
<td>kaː</td>
<td>}-ga˚</td>
</tr>
<tr>
<td>ŋik</td>
<td>o-\textipa{</td>
<td>ciː</td>
<td>}-ŋik</td>
</tr>
</tbody>
</table>

Mc Laughlin (2000, p. 359)
Further evidence 1

- The plural of agent nouns involves class 2 morphology, i.e. voicing (a-grade) mutation
- Devoicing is only observed in class 1 but not in class 2
- This is because there are two floating [v] features, one introduced at the stem level and the other at the word level

<table>
<thead>
<tr>
<th>STEM</th>
<th>WORD</th>
<th>PHRASE</th>
</tr>
</thead>
</table>
Further evidence II

- How do we know *bind*, *opi:bind*, and *bi:bind* derive from */pind/* and not from a form with an underlying voiced C?
- Nasal (c-grade) mutation: [n] realized except with implosives

| /p | f | t | r | s | c | k | x | c | mb | mb | mb | nd | nd | ṅ | ṅ | f | ṅg | ṅG |
Further evidence II

- How do we know *bind*, *opi:bind*, and *bi:bind* derive from /pind/ and not from a form with an underlying voiced C?
- Nasal (c-grade) mutation: [n] realized except with implosives

<table>
<thead>
<tr>
<th></th>
<th>/p</th>
<th>b</th>
<th>w</th>
<th>f</th>
<th>t</th>
<th>ç</th>
<th>r</th>
<th>s</th>
<th>c</th>
<th>ʃ</th>
<th>k</th>
<th>x/</th>
</tr>
</thead>
<tbody>
<tr>
<td>c</td>
<td>mb</td>
<td>b</td>
<td>mb</td>
<td>mb</td>
<td>nd</td>
<td>ç</td>
<td>nd</td>
<td>ɲ t</td>
<td>ɲ t</td>
<td>ʃ</td>
<td>ɲ g</td>
<td>NG</td>
</tr>
</tbody>
</table>

- Verbs that have a voiced C in the infinitive are always voiceless underlyingly:

<table>
<thead>
<tr>
<th>Infinitive A-grade</th>
<th>Singular A-grade</th>
<th>Plural C-grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>bug</td>
<td>bugu</td>
<td>mbugu</td>
</tr>
<tr>
<td>duʔ</td>
<td>duʔa</td>
<td>nduʔa</td>
</tr>
<tr>
<td>ɓaf</td>
<td>ɓafa</td>
<td>ɓafa</td>
</tr>
<tr>
<td>ɗeg</td>
<td>ɗega</td>
<td>ɗega</td>
</tr>
</tbody>
</table>

‘want, like’  
‘stutter’  
‘pour out waste water’  
‘cut’

Mc Laughlin (2000, p. 338)
Discussion
Stray Erasure one of the main insights of early LP analyses of tone
- Post-lexical L deletion in Bari
- Cyclic free feature deletion in Igbo

However, there is also some evidence to the contrary
- Post-lexical L metathesis in Tiv
- Deletion of floating M vs. retention of floating H (in some contexts) in Yongning Na

Limited Rebirthing might be too strong as a universal principle

Languages may differ with respect to interface operations

Potential advantage of Correspondence over Containment

Theory: Every stratum can have a grammar that either allows floating output material or enforces deletion thereof

Yokwe (1987); Clark (1990); Pulleyblank (1986); Michaud (2017)
Saving LR:
A tier- and/or level-specific parameter

- Fundamental division: Tone vs. Segments?
  - Segmental features much less amenable to deletion
  - ATWD subsegment preservation in French Liaison
  - Late integration of PHAR in Fox Meskwaki

- Fundamental division: Stem vs. Word vs. Post-lexical?
  - Individual strata have been argued to have certain innate unique properties
  - LP acknowledges different cyclic properties between different levels
  - The “stem-level syndrome”: Cyclic reapplication requires nonanalytic listing, which does not go beyond the stem level
  - Interface operations between the word and phrase level can be dramatic (e.g. tonal readjustments in Kinande)

ESC and opacity

- (Monostratal) Containment can only deal with certain types of opacity
- ESC and ESC with Limited Rebirthing extend the space of opaque patterns that can be accounted for
- ESC makes the prediction that over- and under-application in reduplication are essentially different in nature as they have two distinct sets of potential sources:
  - Overapplication may be the consequence of excitatory sequential interaction (feeding)
  - Underapplication must be the result of something else, e.g. non-copying of triggering features
- This is in stark contrast to the standard treatment of reduplicative opacity in BRCT, which directly follows from faithfulness

Zimmermann and Trommer (2016); McCarthy and Prince (1995)
References


References III


Appendix
More on segmental alternations in mutation

- Mc Laughlin (2000) argues that gaps and unexpected alternations in the Seereer-Siin mutation paradigms are derivable by a set feature coocurrence constraints
- Fricatives resist voicing: \( \text{FRIC/VCE} \): If a fricative, then not [v]
- Implosives escape prenasalization: \( \text{NAS/CGL} \): If [cg], then not [n]
- Prenasalization creates ND segments: \( \text{NAS/VCE, NAS/CONT} \): If [n], then [v] and [-c]
- For /r/ \( \rightarrow \) /t/ in the b-grade, Mc Laughlin (ibid.) proposes a lexically indexed constraint against voiced initial consonants in the b-grade that she argues is additionally motivated by the devoicing pattern in agent nouns
- As was argued earlier, the latter receives a much more elegant treatment in a stratal analysis
- /r/ \( \rightarrow \) /t/ (and not /r/ \( \rightarrow \) */d/) in the b-grade can be attributed to /r/ being underlying voiceless and being redundantly interpreted as voiced by the phonetics due to it being [+son]
Optional overapplication of continuancy mutation

<table>
<thead>
<tr>
<th>BASE</th>
<th>AGENT NOUN</th>
<th>'Search / researcher'</th>
<th>'Dance / dancer'</th>
<th>'Weave / weaver'</th>
<th>'Cultivate / farmer'</th>
</tr>
</thead>
<tbody>
<tr>
<td>waːd</td>
<td>o-baː-waːd</td>
<td>~ o-baː-baːd</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>fec</td>
<td>o-peː-fec</td>
<td>~ o-peː-pec</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>riw</td>
<td>o-tiː-riw</td>
<td>~ o-tiː-tiw</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>xo:x</td>
<td>o-qoː-xoːx</td>
<td>~ o-qoː-qoːx</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Optional overapplication of continuancy mutation

- Mutation overapplication in Seereer agent nouns is the result of greedy root nodes, triggered by a constraint [-son]→[-c] demanding obstruents to dominate a [-c]
- This constraint can only be satisfied when a floating [-c] is present due to $\text{DEP}$ and $\text{*MIX}$
- Optionality arises from variable ranking of the NCC and [-son]→[-c]
- Underlying continuants are protected by $\text{MAX}$
Optional overapplication of continuancy mutation

<table>
<thead>
<tr>
<th>Input = a.</th>
<th>MAX ( \downarrow ) *3(\text{[-c]})</th>
<th>NCC ( \downarrow ) [-c]</th>
<th>DEP ( \downarrow ) [-c]</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(\text{[-c]})</td>
<td>[+c]</td>
<td>([v])</td>
<td>([+c])</td>
</tr>
<tr>
<td>b. ((\text{[88]})</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(\text{[-c]})</td>
<td>[+c]</td>
<td>([v])</td>
<td>([+c])</td>
</tr>
<tr>
<td>c. ((\text{[88]})</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(\text{[-c]})</td>
<td>[+c]</td>
<td>([v])</td>
<td>([+c])</td>
</tr>
</tbody>
</table>
Association lines

- Standard assumptions about association lines in ESC:
  - Two types of association lines: Underlying (⟨⟩) and epenthetic (⟨⟩)
  - Underlying association lines have the same color as the nodes they connect
  - Lines can be made phonetically invisible (⟨⟩)
  - At the end of each stratum, invisible lines are removed and colored lines are monochromized

- Alternation: If an association line links two elements of color $\alpha$, the line should also have color $\alpha$. (van Oostendorp, 2007)
Association lines

Two problems:

- Conceptual: Lines are merely relations between phonological nodes and as such do not correspond to a morphological entity
- Empirical: Evidence for retention of invisible lines across strata

Proposal:

- Lines do not have a color, simple binary distinctions between | vs. ∣ and visible vs. invisible
- Lines are preserved throughout the course of a derivation
- The phonology has access to the information whether a line was there underlyingly or not at any given point

Prediction:

- The derivational history of a phonological form from as early as the stem stratum may be relevant phonological processes for as late as the phonology-phonetics interface
- Evidence: Exception vowel mutation triggers and apparent paradigm uniformity in Lakota