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# Projection feet in reduplication

Charles Reiss & Marc Simpson

Concordia University

January 17, 2009

# The Reduplication Domain

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Finally

- Our model is built around the idea of *projection*.
- Morphological junctures are gradually erased during the *spell-out* of the reduplicated form.
  - { } < >
- For Halle, these junctures are eliminated through special relinearization rules; here, they drive a recursive function, *Project*.

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- Anything placed between square brackets [...] is part of a *reduplication domain*;
- We posit *Project* as a universal spell-out rule;
  - Binary branching.
- Projected strings are subject to further projection;
  - May contain *additional domains* (recursion)
  - May specify gaps (partial reduplication)

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Finally

- We use the brackets to define domains that project (possibly with nesting);
- These create a hierarchically structured representation;
- Linearization is read off from the terminal nodes in the resulting tree from left to right.

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Finally

- The brackets are inserted at anchor points in the input
- The domains are defined by reference to these brackets.
- Traditional phonological feet are considered here as special cases of these reduplication domains
- $\therefore$  we extend the term “reduplication foot” to any such unit of projection.

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## Projection Feet

### Projection feet in reduplication

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# Simple Example

## Input

abc

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# Simple Example

## Input — The Domain

[abc]

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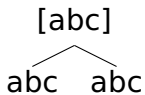
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[abc]  
abc abc

⇒ *abcabc*

# Braces

## Nested Projection

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Braces are used to define nested reduplication domains.

# Right Brace

## Input

[abc}]

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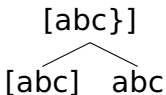
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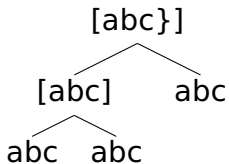
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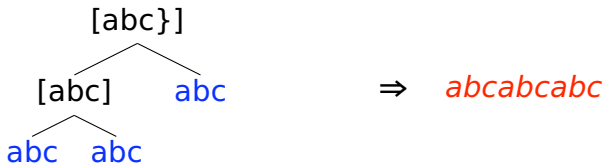
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[{abc}]

# Left Brace

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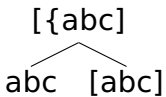
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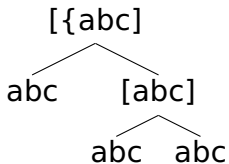
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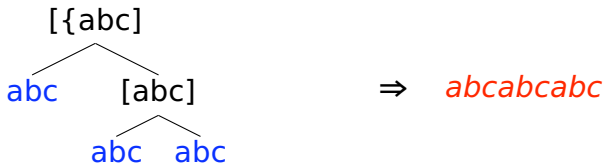
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## A lesson in structure

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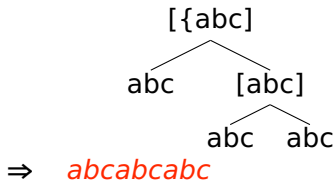
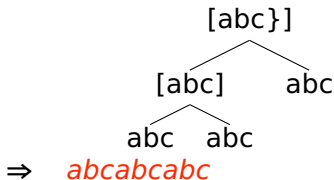
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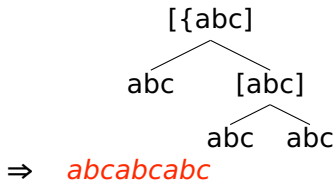
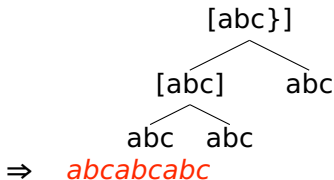
- The previous two examples (repeated below) generated the same output, *abcabcabc*;
- Structural ambiguity (same surface string, different structures)
- We shall make use of this later.



# Braces

## A lesson in structure

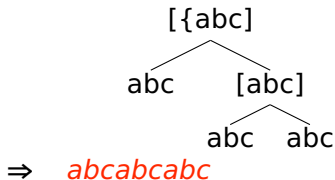
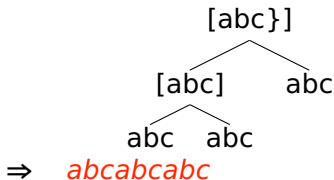
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# Braces, partial Input

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[a}bc]

# Braces, partial Initial Branching

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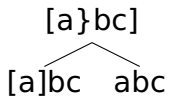
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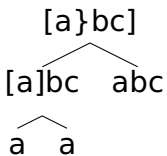
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# Braces, partial Adjoinment

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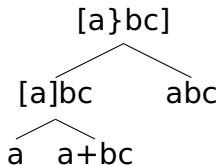
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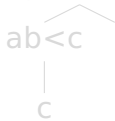


# Angle brackets

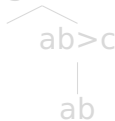
Used for *skipping* — gaps

- Angle brackets are inserted by the morphology to specify substring projection.

- Anything to the *right* of a *left* angle-bracket will project in the *left* branch:



- Anything to the *left* of a *right* angle bracket will project in the *right* branch:

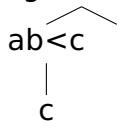


- Left branch: } and <
- Right branch: > and {

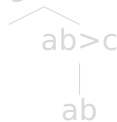
# Angle brackets

Used for *skipping* — gaps

- Angle brackets are inserted by the morphology to specify substrings projection.
- Anything to the *right* of a *left* angle-bracket will project in the *left* branch:



- Anything to the *left* of a *right* angle bracket will project in the *right* branch:

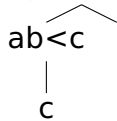


- Left branch: } and <
- Right branch: > and {

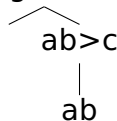
# Angle brackets

Used for *skipping* — gaps

- Angle brackets are inserted by the morphology to specify substring projection.
- Anything to the *right* of a *left* angle-bracket will project in the *left* branch:



- Anything to the *left* of a *right* angle bracket will project in the *right* branch:

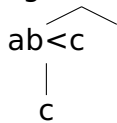


- Left branch: } and <
- Right branch: > and {

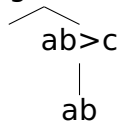
# Angle brackets

Used for *skipping* — gaps

- Angle brackets are inserted by the morphology to specify substring projection.
- Anything to the *right* of a *left* angle-bracket will project in the *left* branch:



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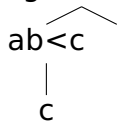


- Left branch: } and <
- Right branch: > and {

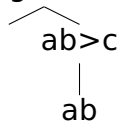
# Angle brackets

Used for *skipping* — gaps

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- Anything to the *right* of a *left* angle-bracket will project in the *left* branch:



- Anything to the *left* of a *right* angle bracket will project in the *right* branch:



- Left branch: } and <
- Right branch: > and {

# Angle Brackets

## Input

[ab<c]

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feet in reduplication

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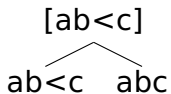
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# Angle Brackets

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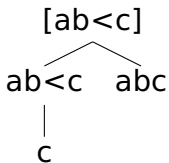
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# Complex Derivation

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$[a]b < c]$

# Complex Derivation

## Initial Branching

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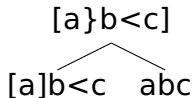
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Since there are no junctures interpretable in the right branch, the right branch is simply *abc*.



# Complex Derivation

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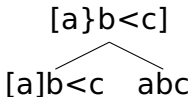
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The left branch is more complex; from the input  $[a]b<c$ , we need to do three things:

- 1 Given  $\}$ , reduplicate (re-project)  $a$  as  $[a]$ .
- 2 Project everything to the right of  $<$ .
- 3 Write out  $c$ .

# Complex Derivation

## Initial Branching

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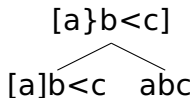
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# Complex Derivation

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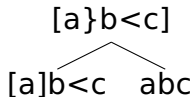
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# Complex Derivation

## Initial Branching

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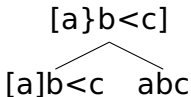
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# Complex Derivation

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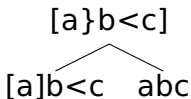
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# Complex Derivation

## Nested Branching

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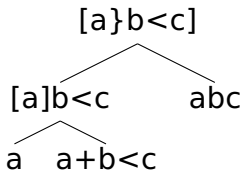
**A complex case**  
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# Complex Derivation

## Substring Projection

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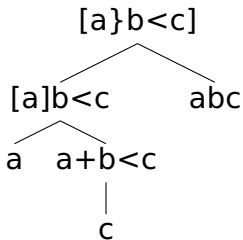
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# Complex Derivation Spellout

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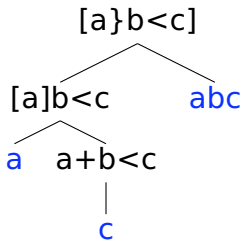
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⇒ *acabc*

# Madurese example

## Partial Reduplication

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Data from Marantz 1982, via Halle 2008.

garadus dusgaradus 'fast and sloppy'

# Madurese example

*garadus* → [*gara<dus*]

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[*gara<dus*]      ‘fast and sloppy’

## *Juncture insertion rules:* (Halle 2008)

- Insert a ] juncture to the right of the last stem segment.
- Insert a [ juncture to the left of the first stem segment.
- Insert a < juncture to the right of the onset of the last stem syllable.

# Madurese example

*garadus* → [*gara<dus*]

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[*gara<dus*]      ‘fast and sloppy’

*Juncture insertion rules:* (Halle 2008)

- Insert a ] juncture to the right of the last stem segment.
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# Madurese example

*garadus* → [*gara<dus*]

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[*gara<dus*]      ‘fast and sloppy’

*Juncture insertion rules:* (Halle 2008)

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# Madurese example

*garadus* → [*gara<dus*]

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[*gara<dus*]      ‘fast and sloppy’

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- Insert a [ juncture to the left of the first stem segment.
- Insert a < juncture to the right of the onset of the last stem syllable.

# Madurese example

## Input

[gara<dus]

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# Madurese example

## Initial Branching

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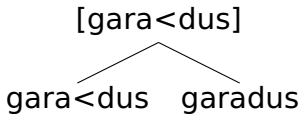
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# Madurese example

## Angle bracket (substring) projection

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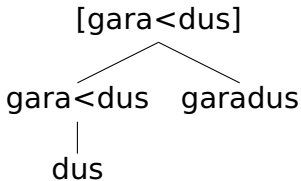
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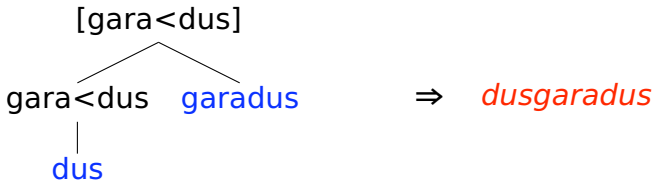
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## On Gaps

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Finally

- Note that the data necessitates a formal account for skipping over input material.
- Following Halle, we employ the notion of the *gap* via an angle bracket.

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## On Gaps

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Finally

- Backcopying is *non-problematic* for derivational models;
- It also offers strong evidence *in favour* of serialism.
- For the Malay case we need a derivation to create an *environment for nasalization*;
- After the application of the nasalization rule, the material that created the environment is removed.

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# Backcopying in Malay

## Malay Data

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aŋẽn 'wind'    ãŋẽn-ãŋẽn 'unconfirmed news'

# Backcopying in Malay

## Our Analysis

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Finally

There are two things that we know about the Malay case:

- 1 It *fully* reduplicates;
- 2 It exhibits 'backcopying' behaviour.

# Backcopying in Malay

## Our Analysis

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# Backcopying in Malay

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Finally

- Our proposal builds on Raimy's insight:
  - The word-initial surface /a/ is in an environment preceded by a nasal.
  - There is no back-copying.
- Unlike Raimy, we posit standard underlying forms;
  - This requires us to rethink the claim of total reduplication.

# Backcopying in Malay

## Our Analysis

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# Backcopying in Malay

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- Our proposal builds on Raimy's insight:
  - The word-initial surface /a/ is in an environment preceded by a nasal.
  - There is no *back-copying*.
- Unlike Raimy, we posit standard underlying forms;
  - This requires us to rethink the claim of total reduplication.

# Backcopying in Malay

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- The environment for triggering nasalation was present during the derivation
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- This gives: [ $\{a_n\}en<$ ]

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## Input

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[{aŋen<}]

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## Initial Branching

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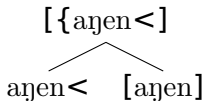
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## Rule Application — The Claim

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Rules can be triggered after *each* projection cycle;  
an environment can span branches of the same  
level.

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## Rule Application

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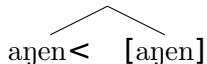
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Finally

- Consider:



- Here, the root-final nasal /n/ of the left branch precedes the root-initial /a/ of the right branch's reduplication domain.
- In Malay, *this environment triggers nasalization*.

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## Rule Application

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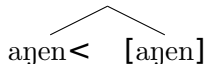
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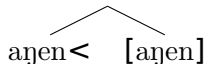
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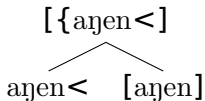
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Rule Application — Note the environment

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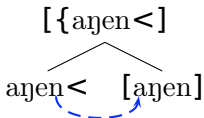
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## Rule Application — Between branches

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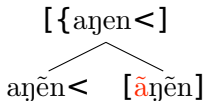
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## Rule Application — All nasalized vowels

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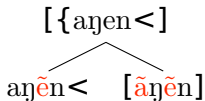
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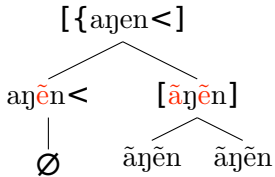
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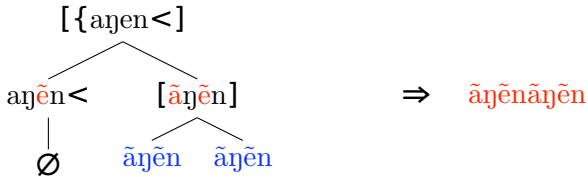
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The deletion of the left branching  $an\tilde{e}\eta <$  in Malay is accomplished by the same mechanism that deletes in (gara)dusgaradus.

- A gap.

# Backcopying in Malay

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# Theoretical Implications

## McCarthy and Prince 1

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*Reduplication is a matter of identity: the reduplicant copies the base. Perfect identity cannot always be attained; templatic requirements commonly obscure it.*

*(McCarthy and Prince 1995:1)*

# Theoretical Implications

## Rebuttal 1

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Finally

- Neither copy is privileged in the output string.
- There is only one string of segments in the input.
- No RED.
- Even in cases of partial projection, we cannot distinguish 'base' from 'reduplicant'.

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*Crucial evidence distinguishing serialist from parallelist conceptions is not easy to come by; it is therefore of great interest that reduplication phonology interactions supply a rich body of evidence in favor of parallelism.*

*(McCarthy and Prince 1995: 121)*

# Theoretical Implications

## Rebuttal 2

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Finally

- McCarthy and Prince are referring to **backcopying effects**.
- Raimy has shown one way to deal with these effects in a serialist paradigm
  - Through enriched representations.
- We have provided an alternative structural model appealing to derivational history.

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Finally

*The architecture proposed here is this: the phenomena called overapplication and underapplication follow in Correspondence Theory from the very constraints on reduplicant-base identity that permit reduplication to happen in the first place. The constraints responsible for the ordinary copying of a base also govern the copying of phonologically derived properties.*

*(McCarthy and Prince 1995:7)*

# Theoretical Implications

## Rebuttal 3

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Finally

- There *aren't* over- and under- application effects,
- $\rightsquigarrow$  *only application*.

# Theoretical Implications

## Rebuttal 3

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- $\rightsquigarrow$  only **structure dependent** application.

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In the paper we:

- Cover underapplication (Akan).
- Deal with Fixed Segmentism.
- Provide a complete LISP implementation
  - Generates *all* forms in Halle 2008,
  - as well as other complex patterns.

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- Cover underapplication (Akan).
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feet in reduplication

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Concordia University

January 17, 2009