

Enhanced Edges: Morphological influence on linearization

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1.0 Javanese Habitual-Repetitive Reduplication

- Javanese has multiple distinct reduplication patterns
- Yip (1998) presents data (in 1) on the pattern of reduplication associated with Habitual-Repetitive semantics

(1) Javanese Habitual-Repetitive Reduplication (Yip 1998:238-242)

- | | | |
|----|----------------------------|------------|
| a. | Default pattern | |
| | eliŋ eləŋ-eliŋ | ‘remember’ |
| b. | Last vowel is /a/ pattern | |
| | udan udan-uden | ‘rain’ |
| c. | No sequence of /a/ pattern | |
| | lali lola-lali | ‘forget’ |

- Important aspects of data in (1):
 - whether *melodic overwriting* occurs in first or second repetition
 - selection of vowels in the *melodic overwriting* patterns
- Note that there are additional total reduplication patterns in Javanese that do not have the *melodic overwriting* present in (1) (Dudas 1976, Inkelas and Zoll 2005, Raimy 2006)

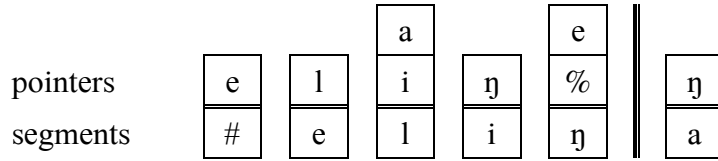
2.0 Precedence Based Reduplication

- Precedence based phonology (Raimy 1999, 2000ab, 2003) argues that phonological representations are *directed graphs* which may be temporally *non-linear*
- Temporally non-linear representations produce surface effects of reduplication, infixation and melodic overwriting
- There is a *bare-output condition* (Chomsky 1995) on the phonology which requires the phonological output to be temporally strictly linear
- *Linearization* is the phonological process which ensures that the output of the phonology is strictly linear
- (2) presents the pre-linearized precedence based representations for the three basic patterns in (1)

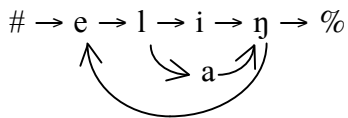
(2) Pre-linearization representations for Javanese Hab-Rep Reduplication

a. Representations for (1a)

i. stack representation (basic)

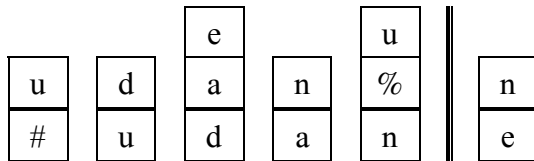


ii. graph representation (derived, abstract)

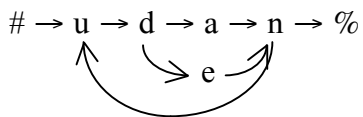


b. Representations for (1b)

i. stack

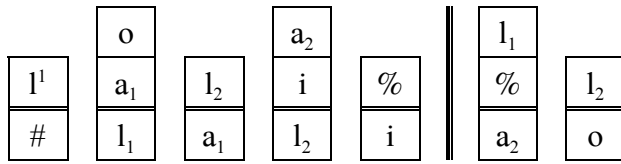


ii. graph

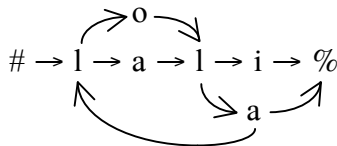


c. Representations for (1c)

i. stack



ii. graph



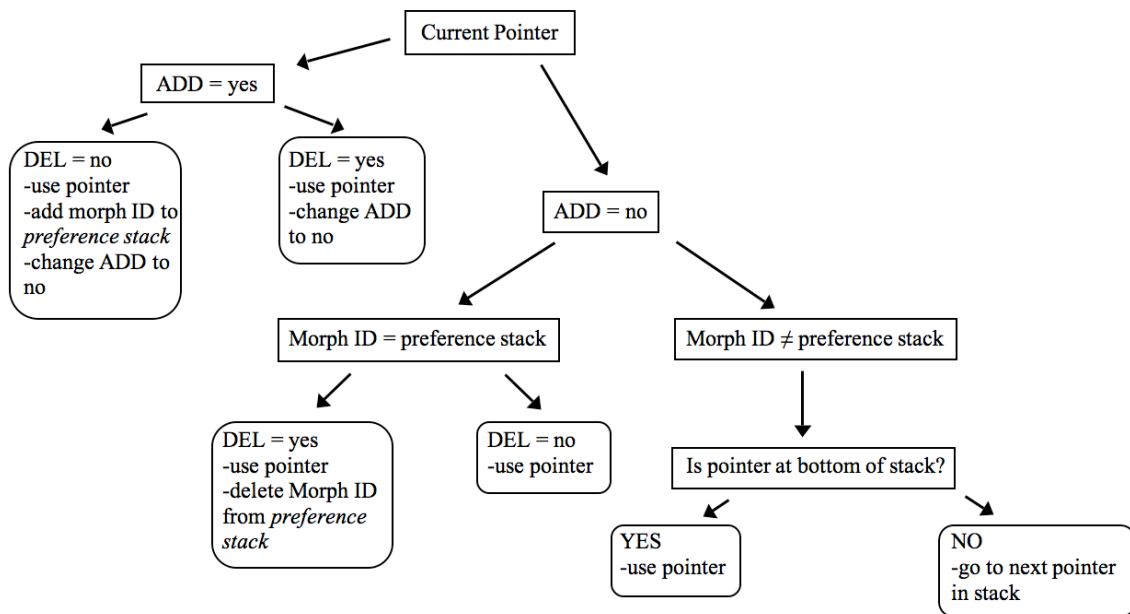
- (2) shows both the stack based encoding of precedence (primitive) and the graph based encoding (derived, abstract)
- The problem Javanese Hab-Rep reduplication poses for *linearization* can be seen when the representations in (2a) and (2b) are compared
- The representations in (2a) and (2b) are identical except for segmental content which means that they should *linearize* in the same way placing the *overwriting vowel* in the first copy
- This is incorrect because (2a) has the *overwriting vowel* in the first repetition (correct) but (2b) has the *overwriting vowel* in the second copy (incorrect!)

3.0 Enhanced Edges Algorithm

- The Enhanced Edges algorithm makes three modifications to the LIFO linearization algorithm from Raimy (1999)
- The first modification is the addition of a *preference stack* which contains an ordered list of morphemes and indicates which pointer should be used when there is a choice based on what morpheme the pointer is associated with
- The second modification is that there is additional information associated with the pointers that encodes (a) what morpheme the pointer is associated with and (b) has a *preference command* which manipulates the *preference stack*

- The *preference command* consists of a binary value for two parameters ADD and DELETE which produce 4 distinct instructions:
 - ADD = yes, DEL = no >> add morpheme ID of current pointer to top of the *preference stack*
 - ADD = no, DEL = yes >> delete the morpheme ID from the top of the *preference stack*
 - ADD = yes, DEL = yes >> add and delete current morpheme ID to *preference stack*
 - ADD = no, DEL = no >> do not manipulate the *preference stack*
- The final modification is the linearization algorithm represented by the decision tree in (3)

(3) Enhanced Edges Linearization Algorithm



4.0 Enhanced Edges Analysis of Javanese

- (4) presents complete morphological analysis of Habitual Repetitive reduplication in Javanese given the adoption of the Enhanced Edges approach to linearization

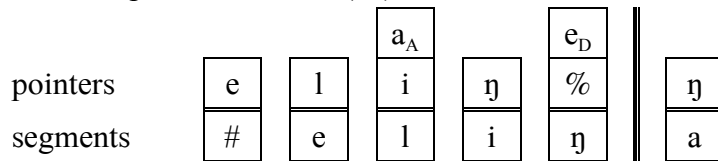
(4) Habitual Repetitive Morphology

Hab-Rep \Leftrightarrow $\{_1st V\} >_{ADD} o > \{1stV_ \}$ / 1st V = /a/
 $\{_lastV\} >_{DEL} e > \{lastV_ \}$ / last vowel = /a/
 $\{_lastV\} >_{ADD} a > \{lastV_ \}$ / elsewhere
 $\{last\} >_{ADD} \{first\}$ / last vowel = /a/
 $\{last\} >_{DEL} \{first\}$ / elsewhere

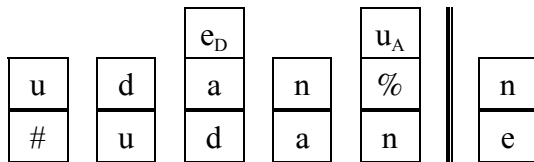
- The morphology in (4) produces modified representations for the forms in (2)

(5) Enhanced Edges representations for the forms in (2)

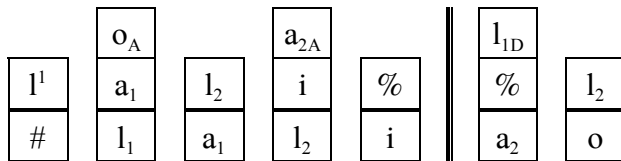
i. Stack representation for (2a)



b. Stack representation for (2b)



c. Stack representation for (2c)



- The representations in (5) for (2a) and (2b) are now differentiated:
 - the overwriting vowel /a/ is marked as ADD which causes it to be used the first time it is encountered thus appearing in the first repetition
 - the overwriting /e/ is marked as DEL which causes it to be skipped on its first encounter but it is used after the reduplicative link changes the Morph ID to the Hab Rep morpheme

- (2c) receives a structure similar to (5a) in that both overwriting vowels are marked as ADD and thus used in the first repetition
- This completes the analysis of Javanese Habitual Repetitive reduplication

5.0 Conclusion

- *Linearization* as a process is a completely local and deterministic once morphological information is included in the representation
- Linearization algorithm has similarities to Dijkstra's Algorithm with the following modification:
 - preference stack* determines 'shortest distance' aspect of these graphs
 - 'shortest distance' is manipulated via the *preference commands*
 - nodes in a graph can be revisited
- Similarity to Dijkstra's algorithm suggests that *linearization* itself may be optimized
- Future work:
 - reanalysis of current body of precedence based phonology to check empirical adequacy
 - modification of computational acquisition work (Chinn and Raimy 2006, Iba and Nevins 2002) to incorporate current linearization algorithm

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