# Syntactic Constraints on the Morphophonology on Reduplication in Bantu

Romi Hill[1]
Boston University
romihill@bu.edu

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## 1 Introduction

- In this talk, I present an analysis of reduplicated verbs from Zulu, a Nguni Bantu language mainly spoken in South Africa, but also in Mozambique, Botswana, Eswatini, Malawi and Lesotho.
- In Zulu, verbs can be reduplicated to convey a meaning of "doing a bad job of (the verb)". In the baseline case, reduplication involves the copying of a bisyllabic foot (Hyman et al., 2008).

(1) Bisyllabic CVCV root (Cook, 2018, p. 48)

a. *u-sébenz-a*
2SG-work-FV
'you work'

b. *u-sébe-sebenz-a*
2SG-**RED**-work-FV
'you do a bad job of working'

- A puzzle emerges when the verbal root is smaller than a bisyllabic foot, where the copying process is not longer a blind copy from the verbal root.
- When the verbal root is monosyllabic, then copying can involve a vowel that does not occur in the base, resulting in a mismatch in the reduplicant and the base, as shown in (2).

(2) Monosyllabic CVC root

a. *u-fúnd-e*
2SG-study-SBJ
'you study'

b. *u-fúnda-fund-e*
2SG-**RED**-study-SBJ
'you do a bad job of studying (subjunctive)'

[1]Many thanks to Colin Davis and Neil Myler for their insightful comments and discussion on this work. All remaining errors are my own.

- A related Bantu language, Kerewe, also exhibits reduplication, where there can also be a mismatch between the reduplicant and the base (data from Odden, 1996; Hyman, 2009).[2]

(3) Reduplicated form of *a-fuz-ílé* "he cleaned"

a. Perfective Form
*a-fuz-ílé*
3SG-clean-PERF
"he cleaned"

b. Reduplicated Perfective Form
*a-ful-a-fuz-ílé*
3SG-RED-clean-PERF
"he cleaned here and there"

(4) Reduplicated form of *n-doz-ílé* "I saw"

a. Perfective Form
*n-doz-ílé*
1SG-see-PERF
"I saw"

b. Reduplicated Perfective Form
*n-dol-a-loz-ílé*
1SG-**RED**-see-PERF
"I saw here and there"

- In addition to these situations, when the root is monosyllabic and vowel initial, there are two possible forms of the reduplicated verb. In this situation, the copying process involves an additional /y/ glide (5b), or involve material to the left of the root (5c).

(5) VC roots and reduplicated forms

a. *s-akh-a*
1PL-build-FV
"we build"

b. *s-akha-y+akh-a*
1PL-**RED**-y+build-FV
"we do a bad job of building"

c. *sakha+s-akh-a*
**RED**+1PL-build-FV
"we do a bad job of building"

- Expanding on the discussion presented in Cook (2018), I argue that the reduplicant morpheme in Zulu copies material from a lower structural position, and that this copying process occurs before other, more general phonological processes are applied.
  - That is, the mismatch between the reduplicant and the base observed in (2) and the Kerewe examples is due to the fact that other, more general, phonological processes are applied.

[2]Though Kerewe won't be the focus of today's presentation, I have provided the relevant data in the appendix.

  - However, when these phonological processes are insufficient to resolve prosodic requirements of Zulu phonology, additional reduplication strategies are implemented to resolve these requirements. This explains the observed variation found in (5).

- This analysis offers a morphosyntactic explanation for the observed mismatches between the reduplicant and the base, as well as for the variation in reduplication forms found in vowel-initial roots.

→ *Takeaway:* This analysis supports the hypothesis for hierarchical structure inside words, and exemplifies a potential case for the need for phonologically-motivated movement rules, as has been discussed in e.g. Caha (2010), Baunaz and Lander (2018), Wiland (2019), and Andermann et al. (2025).

# 2 Zulu

## 2.1 Bisyllabic Roots

- To begin, I outline an analysis of the baseline case of reduplication, by stepping through the derivation for example (6b).
  - Though this particular example does not necessarily suggest an underlying syntactic structure, the step-by-step analysis will clarify the overall process of reduplication in Zulu.
- This will lay the foundation to understand the more complicated examples.

(6) Bisyllabic CVCV root (Cook, 2018, p. 48)

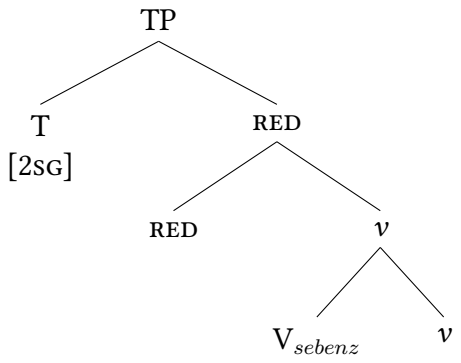
a. *u-sébenz-a*
2SG-work-FV
'you work'

b. *u-<u>sébe</u>-sebenz-a*
2SG-**RED**-work-FV
'you did a bad job of working'

- I assume that the underlying structure of (6b) can be analyzed as shown in figure (7), prior to any Vocabulary Insertion.[3]

[3] All structures of complex words in this presentation are depicted after head movement has occurred.

(7) *Step 1: Pre-Vocabulary Insertion*
*u-sébe-sebenz-a "you do a bad job of working."*




- The crucial information that this structure provides is the *position* of the heads, and by position, I mean both:
  - The linear position of the phrase, and…
  - The hierarchical position of the phrase within the structure.
- We will see that both these notions of position are important to understand reduplication.
- Since our focus is on the interactions between (morpho)phonology and syntax, I leave the investigation of the precise labels of these phrases and the RED head for future work. There are a few oversimplifications that I'm assuming here with respect to the labels of the heads:
  - Following Cook (2018), I assume that the subject prefix *u-* holds a position in the T slot.
  - Additionally, I am also following Cook (2013), and assume that the Final Vowel *-a* is a phonological realization of the verbalizing head *v*.
- I have labeled the reduplicant as a RED head, and have placed it between the TP and *v*.
  - I have an inkling that this RED morpheme is indicating some type of *aspectual* meaning.
  - Doing a "bad job" of something could imply that the action was repeatedly attempted, but failed continuously.
- This is also in keeping with cross-linguistic studies on reduplication, which find that the function of reduplication is often used to express some form of aspectual meaning.

- As such, it may be possible to suggest that the reduplicant is held within an *asp* head, which makes sense of the fact that it is placed between the T and V heads.
- However, a thorough semantic analysis would be required to confirm that this is the case for Zulu. I therefore leave the label of the reduplicant to be a RED.
- Once the syntactic structure has been built, as presented in example 7, we can send the structure to the phonological part of the grammar, so that the morphemes receive their phonological content.
  - To do so, we can posit the following Vocabulary Items for each morpheme in example 8.

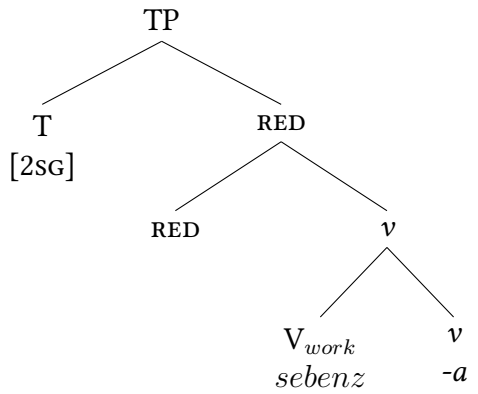
(8) a. $T_{[2SG]} \longleftrightarrow$ u
  b. $V_{work} \longleftrightarrow sebenz$
  c. $v \longleftrightarrow$ a

- The Vocabulary Item for the RED morpheme cannot be stated as a simple phonological string.
  - This is because its form is dependent on the phonological string of the morpheme to its right.
- The Vocabulary Item for the RED morpheme can be formalized as shown in example 9a, where the phonological signal is given to be a bisyllabic template.

(9) a. RED $\longleftrightarrow \sigma\sigma$

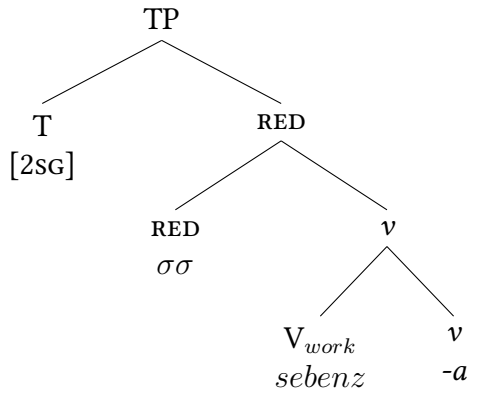
  - Where $\sigma\sigma$ represents the first two syllables to the right of the RED morpheme.
- Now that we have all the Vocabulary Items for every morpheme in the structure, we can begin the Vocabulary Insertion process.
- Assuming that VI is applied from the bottom up, we can assign the Vocabulary Items 8a and 8b to the morphemes in the lowest part of the structure: the *v*P.

(10) *Step 2: VI applied to VP and vP*
*u-sébe-sebenz-a "you do a bad job of working."*



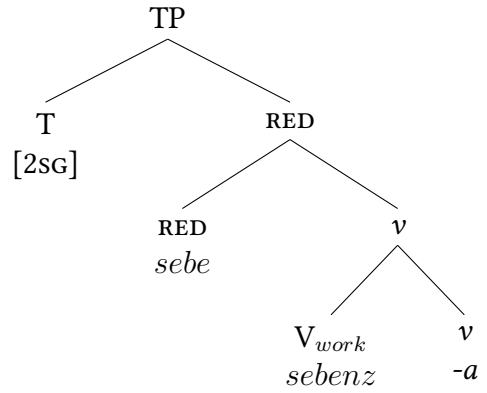

- Moving up the structure, the next morpheme to receive its phonological content is the RED morpheme.
  - Per the Vocabulary Item presented in example 9a, the structure now has the form as shown in figure 11.

(11) *Step 3: VI applied to REDP*
*u-sébe-sebenz-a "you do a bad job of working."*



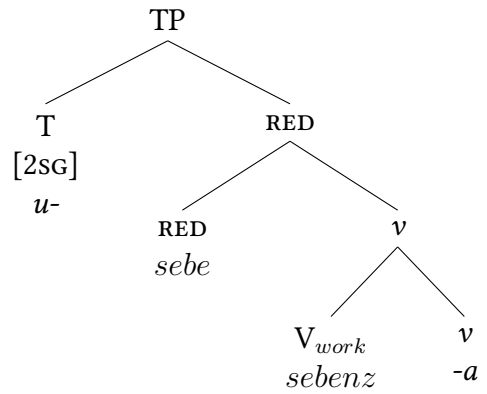

- The Vocabulary Item in example 9a specifies that the morpheme receives its phonological content by copying two syllables to the right of it.
  - Since the root has had Vocabulary Insertion applied to it, the reduplicant can copy the first syllables of the root V$_{work}$.
  - This means the bisyllabic template $\sigma\sigma$ is filled with *sebe*, and the underlying structure can be updated as shown in figure 12.

(12) *Step 4: RED Bisyllabic Template Filled*
*u-sébe-sebenz-a "you do a bad job of working."*




- Finally, the highest morpheme in the structure, the subject prefix, can be assigned its phonology, and the final structure is shown in figure 13.

(13) *Step 5: VI applied to TP; Final Derivation.*
*u-sébe-sebenz-a "you do a bad job of working."*




- The order in which these processes have applied - that prosodic morphology applies cyclically after each instance of Vocabulary Insertion - is also in line with Kalin (2022)'s analysis of infixation and suppletive allomorphy:
  - "... realization proceeds cyclically from the bottom of a morphosyntactic structure up, with basic linear order among morphemes determined first, then exponent choice, then exponent insertion (including infixation of an infixal exponent), and then (morpho)phonology" (Kalin, 2022, p. 642)
- In this process, we have seen that the reduplicant copies two syllables from the morpheme to its right: the root.
- This, then, raises the question of what the reduplicant can copy, when the root is not bisyllabic.

  - How can the grammar fill the bisyllabic template, when there is not enough phonological material to copy?

## 2.2 Monosyllabic Roots

- Monosyllabic roots, with a consonantal onset, follow a similar pattern to that presented in the previous section.
- When the Final Vowel is the default *a*, the reduplicant targets both the root and the FV morpheme, as shown in example 14.

(14) Monosyllabic CVC root with default *a* FV.

a. *u-fúnd-a*
2SG-study-FV
'you study'

b. *u-fúnda-fund-a*
2SG-**RED**-study-FV
'you do a bad job of studying'

- Given this data, we may expect that reduplication is a purely phonological process.
  - So far, we have seen that the reduplicant blindly copies any phonological string to the right of it until the bisyllabic requirement is satisfied.
- However, we observe in other contexts that this is not the case.
  - Specifically, when the final vowel is not the default *a* phoneme, Zulu reduplication exhibits unusual behavior.
- One context, in which the final vowel is pronounced as different phoneme, is in the *subjunctive* mood.
  - In this case, it is expressed as *e*, as shown in example 15 below.

(15) Monosyllabic CVC root with subjunctive *e* FV.

a. *ni-fúnd-e*
2PL-study-FV.SBJ
'you (PL) study (subjunctive)'

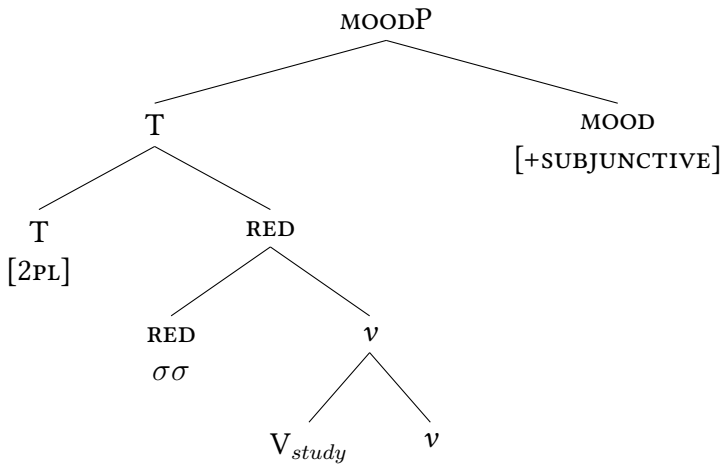
- When this verb form is reduplicated, the reduplicant does not target the final vowel *e*.
  - Instead, the reduplicant contains the default final vowel *a*, as shown in example 16.

(16) Reduplicated verb with monosyllabic CVC root and subjunctive *e* FV.

a. *ni-fúnd**a**-fund-e*
2PL-**RED**-study-FV.SBJ
'you (pl) do a bad job of studying (subjunctive)'

- This pattern shows that **there is more going on in Zulu reduplication, than just the phonological string being copied.**
  - Otherwise, the final vowel *e* would be copied on the reduplicant.
- This pattern can be adequately explained if we posit an underlying syntactic structure.
  - Crucially, the reduplicant is aware of this syntactic structure, and can only copy phonological material of morphemes that it c-commands.
- To begin, the underlying word structure is constructed in the syntax part of the grammar.
  - This structure is similar to the underlying structure for *u-sébe-sebenz-a* presented in figure 7.
- Here, however, there is the addition of a MOODP that specifies the subjunctive mood.

(17) *Step 1: Prior to Vocabulary Insertion*
*ni-fúnda-funde "you (pl) do a bad job of studying (subjunctive)"*




- With this structure, we can begin the Vocabulary Insertion process.
- Like in the previous example, we can posit the following Vocabulary Items for each head in the structure, some of which are repeated for clarity.

(18) a. $\text{T}_{[\text{2PL}]} \longleftrightarrow ni$

b. $\text{V}_{study} \longleftrightarrow$ *fund*

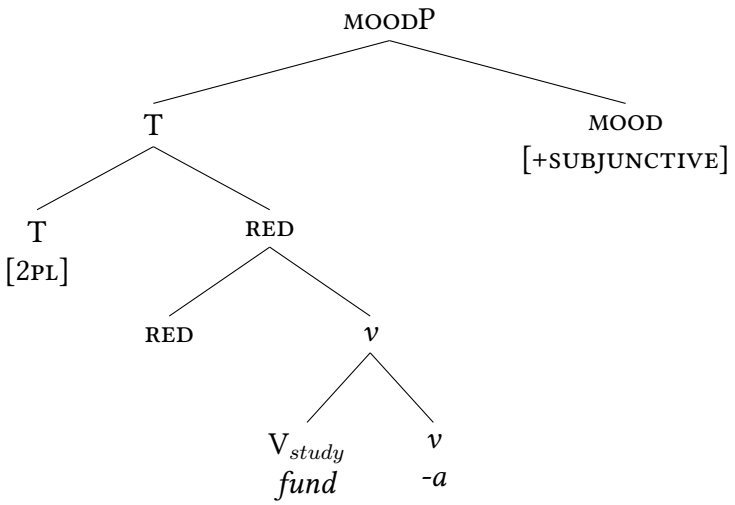
c. $\text{MOOD}_{[+\text{SUBJUNCTIVE}]} \longleftrightarrow$ e

d. $v \longleftrightarrow$ a

e. $\text{RED} \longleftrightarrow \sigma\sigma$

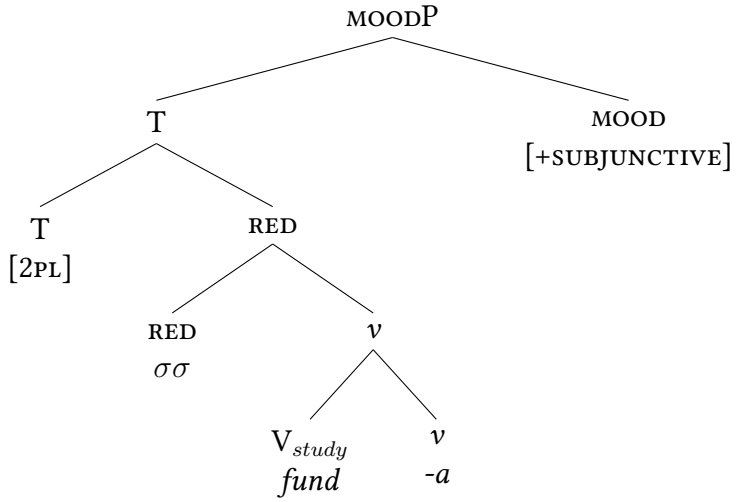
- With these Vocabulary Items, we can assign the phonological content to each morpheme in the structure.
- Starting from the lowest point in the structure, the *v*P, we can assign the phonological signals to those morphemes.

(19) *Step 2: VI applied to vP*
*ni-funda-funde "you (pl) do a bad job of studying (subjunctive)"*



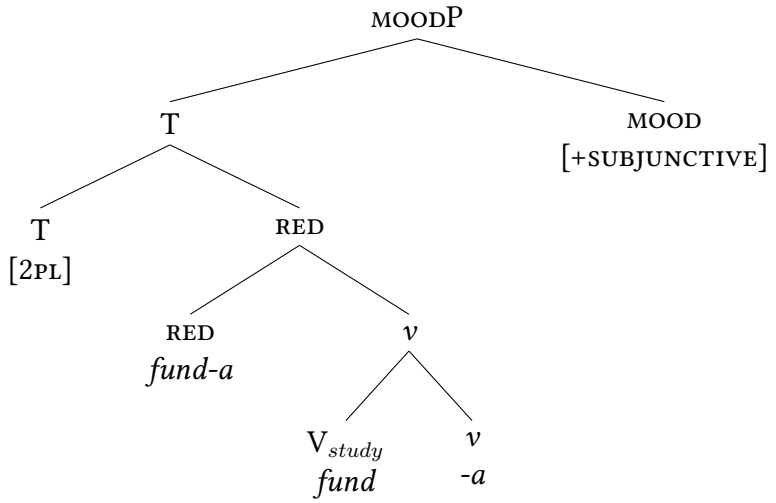
- After the morphemes in the *v*P are assigned their phonological material, the next morpheme, RED, is assigned its bisyllabic template.

(20) *Step 3: VI Applied to REDP*
*ni-funda-funde "you (pl) do a bad job of studying (subjunctive)"*



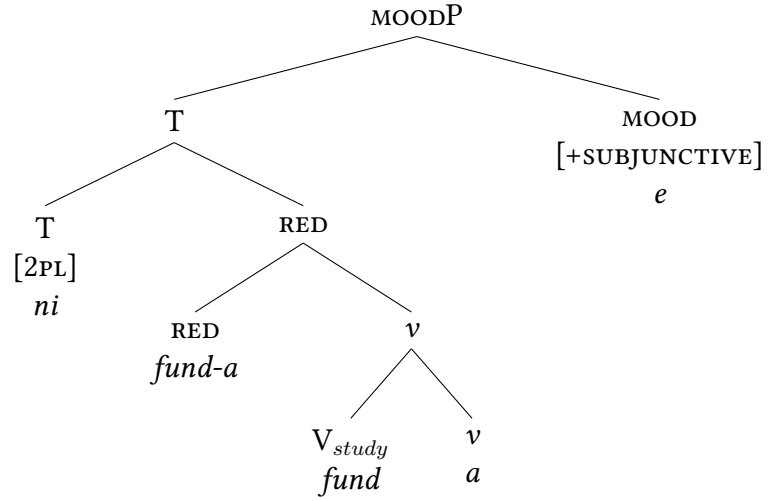

- To fill the bisyllabic template, the morpheme copies the two syllables to the right of it.
  - Since the root $V_{study}$ and the default final vowel *v* have been assigned their content - and no other morphemes have at this stage - the reduplicant copies this phonological material.

(21) *Step 4: Bisyllabic Template Filled*
*ni-funda-funde "you (pl) do a bad job of studying (subjunctive)"*




- Then, VI applies to the remaining morphemes.

(22) *Step 5: Final Vocabulary Items Applied*
*ni-funda-funde "you (pl) do a bad job of studying (subjunctive)"*

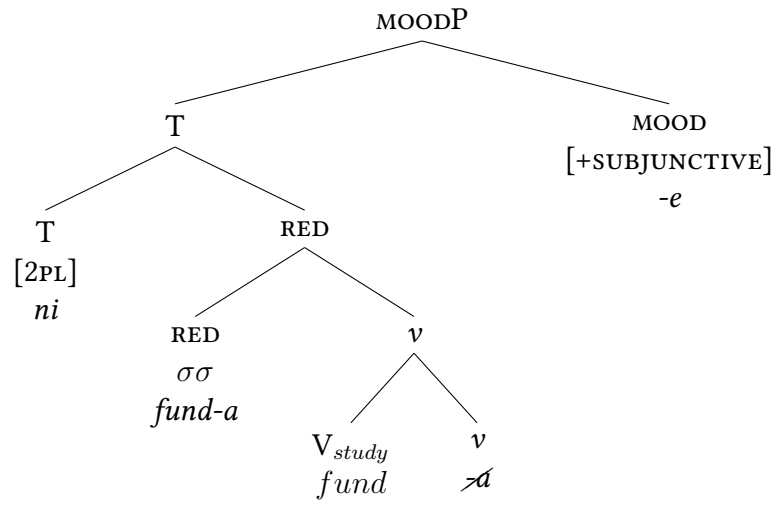



- Once the structure has been assigned all its phonological content, additional phonological processes are applied to adhere to the overall phonological system of Zulu.
- Here, I depart from Cook (2018, p. 50), who states that the MOOD node is a phonological "readjustment" rule that converts the *v* node realized as [a] into [e].
- However, I suggest that the VI rule for the MOOD node is $\text{MOOD}_{[+\text{SUBJUNCTIVE}]} \longleftrightarrow$ e, and that the verbalizing suffix *a* is deleted by general phonological requirements.
  - In Zulu, VV sequences are generally disallowed.
  - Typically, */ae/* sequences are resolved by deleting the first vowel (Posthumus, 2022, p. 17).

(23) Posthumus (2022, p. 17)
*Abafana (b**a**- + **e**lula >) belula ucingo.*
"The boys straighten/stretch the wire."

- As such, it is reasonable to suggest that the phonological material of the verbalizing suffix *a* is deleted once the MOOD node has been assigned phonological content.
- This will allow us to simultaneously:
  - Delete the superfluous *a* in the *v*P.
  - Maintain the default *a* vowel in the reduplicant.

(24) *Step 6: Vowel Hiatus Resolution*
*ni-funda-funde "you (pl) do a bad job of studying (subjunctive)"*




- In this example, we have seen that the reduplicant morpheme copies phonological material which it c-commands.
  - The phonological content of the base can then be modified by general requirements of the phonological system.
  - This analysis explains why there is an apparent mismatch between the base and reduplicant.
- To summarize, the analyzes up to now have involved the following hypotheses:
  - There is a syntactic structure within the Zulu reduplicated verb.
  - Phonological content of these morphemes are assigned in a systematic way.
  - Additional phonological processes are applied once all the morphemes have been assigned their phonological content.
- In doing so, we can coherently explain multiple aspects of the reduplication process.
- We can explain how the reduplicant is assigned its grammatical *function.*
  - The reduplicant holds a position in the hierarchical structure, which expresses "doing a bad job" at the action.
- We can also explain how the *form* of the reduplicant is assigned its phonological material.
  - The reduplicant copies material that has already been previously assigned.
  - Additionally, this copying process is conducted before other, more general, phonological processes are applied.

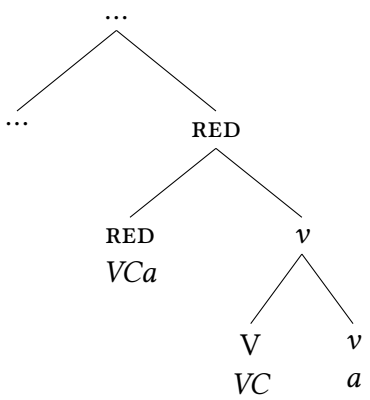
- An important result from this analysis is the explanation for the vowel mismatch between the base and the reduplicant in the subjunctive mood.
  - In previous literature, there has been multiple discussions as to why the reduplicant contains the default vowel /a/.
- In some analyzes (e.g. Downing, 1997), the reduplicant is argued to be a verb stem, without any inflectional marking.
- In an Optimality Theory analysis, for example, there is a constraint that penalizes inflectional material on the reduplicant (Hyman et al., 2008).
  - However, both of these analyses seem to be somewhat arbitrary, and they do not capture the fact that the /a/ epenthesis vowel is identical to the verbalizing suffix.
- As such, a DM analysis not only explains the descriptive facts of Zulu reduplication…
  - …But also provides a morphosyntactic explanation for the the vowel mismatch in the subjunctive mood.

## 2.3 Vowel Initial Monosyllabic Roots

- For the remainder of the section, we will look at another class of monosyllabic roots, which exhibit another form of reduplication patterns. Examples of these are repeated below.
- (25) VC roots and reduplicated forms
  a. Non-reduplicated form
     *s-akh-a*
     1PL-build-FV
     "we build"
  b. VC Root with glide /y/ epenthesis.
     *s-akha-y+akh-a*
     1PL-**RED**-y+build-FV
     "we do a bad job of building"
  c. VC Root with Prefix Material Copied
     *sakha+s-akh-a*
     **RED**+1PL-build-FV
     "we do a bad job of building"
- As mentioned before, the phonology of Zulu has a general dispreference for VV sequences.
  - Additionally, we have seen that the reduplicant requires to be bisyllabic.

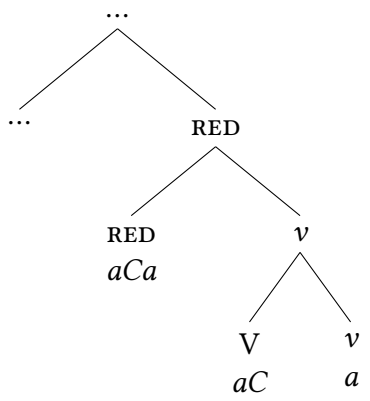
- This raises the question of what happens when the root is monosyllabic, and is vowel initial (VC).
- Given what we have discussed so far, we would expect the underlying structure of a reduplicated verb with a VC root to look like figure 26.

(26) *Schematic Reduplicated Verb with VC Root*

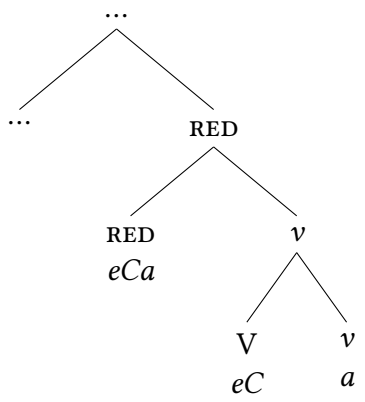



- We can see that, when the verbal root has a VC prosodic structure, the phonological form of the reduplicant and base is *VC**a**VCa*, which results in a illegal vowel sequences at the boundary
- This is schematized in the following figures.

(27) *Schematic Reduplicated Verb with /aC/ Root*



(28) *Schematic Reduplicated Verb with /eC/ Root*




- Posthumus (2022, p. 16) states that VV sequences, where the first vowel is low, are resolved by either deletion, or coalescence.
  - The only examples that Cook (2018) provides of VC verbal roots begin with either an (*enz* "make", *eb* "steal") or an /a/ (*akh* "build", *ang* "hug").
  - Since we expect that the *v* morpheme always maps to /a/, we would predict that the only VV sequences between the reduplicant and the base are /ae/, and /aa/.
- Within the general phonology of Zulu, /ae/ sequences are resolved by deleting the first /a/.
  - Only the /e/ remains.
  - If this were to apply to the reduplicated verb, then the /a/ in the reduplicant is deleted.
  - In this case, the bisyllabic requirement of the reduplicant is unsatisfied.
- A similar issue is presented when attempting to resolve an /aa/ sequence.
  - /aa/ sequences are realized as a short vowel /a/.
  - For the reduplicated verb, this means that either the vowel final /a/ in the reduplicant morpheme is deleted, or the vowel initial /a/ in the root is deleted.
    - If the /a/ in the reduplicant is deleted, then the bisyllabic requirement of the reduplicant is unsatisfied.
    - If the vowel in the root is deleted, then the surface form of the root would contain no vowel (other than the verbalizing suffix), which also seems unlikely.[4]

[4]In Zulu, it is possible to have verbal roots which do not contain a vowel. This means that vowel-less

- There are two reasons that suggest that Zulu disallows the modification of initial segments in verbal roots.
  - Firstly, from an Optimality Theoretic perspective, there may be an $\textsc{max}_{Root}$ faithfulness constraint that requires every input of the root to appear in the output.
  - Secondly, there is evidence from labial disassimilation that suggests the modification of initial segments is disallowed.
- Though it may be tempting to suggest a morphosyntactic motivation to disallow the (morpho)phonological modification of roots, in that some phrases such as VPs "block off" phonological processes occurring within their complements (Newell & Piggott, 2014).
- However, Zulu can allow the modification of verbal roots, where the rightmost bilabial segment is palatalized in the presence of the passive suffix *-w* (Beckman, n.d., p. 4)

(29) a. ɓo**p**$^{h}$a
'tie!'

b. iyaɓo**ʂ**wa
'it is being tied'

(30) a. gu**b**a
'dig!'

b. iyagu**ʝ**wa
'it is being dug'

(31) a. se**ɓ**ɛnza
'work!'

b. iyase**c**ɛnzwa
'it is being worked'

(32) a. ʂu**m**ayela
'preach'

b. iyaʂu**ɳ**elelwa
'it is being preached'

- However, this process does not apply if the rightmost bilabial segment is root-initial.

(33) a. **b**ala
'write'

b. iya**b**alwa
'it is being written'

(34) a. **ɓ**uta
'collected!'

b. iya**ɓ**utwa
'it is being collected'

(35) a. **p**$^{h}$uza
'drink!'

b. iya**p**$^{h}$uzwa
∗iya**ʂ**uzwa
'it is being drunk'

verbal roots is not disallowed by the general phonological system.

- It appears that Zulu VPs *can* modified by general morphophonological changes, but root initial segments seem to hold a special status, and resists any modification.
- So, from both a theoretical and descriptive perspective, there is compelling reasons to avoid the modification of first segment of the root.
- That is, reduplicated verbs with VC roots create phonological environments that the general phonology of Zulu disallows.

→ Given these facts, it should come as no surprise that the reduplicated verb in these environments indeed behave differently to what was described above.

- To resolve these illegal phonological environments, there are two possible reduplicated verb forms, shown in example 36 below.

(36) VC roots and reduplicated forms

a. Non-reduplicated form

*s-akh-a*
1PL-build-FV
"we build"

b. VC Root with glide /y/ epenthesis.

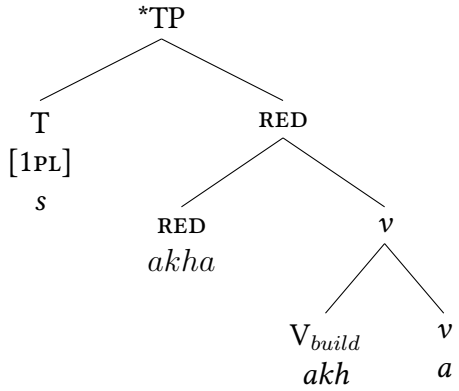
*s-akha-y+akh-a*
1PL-**RED**-y+build-FV
"we do a bad job of building"

c. VC Root with Prefix Material Copied

*sakha+s-akh-a*
**RED**+1PL-build-FV
"we do a bad job of building"

- To illustrate the issue of reduplication with monosyllabic and vowel initial roots, figure 37 illustrates how the reduplication of *s-akh-a* would be constructed under typical reduplication processes.

(37) **s-akha-akha*: "we do a bad job of building"




- Examples 36b and 36c show are these illegal sequences are resolved.
- In example 36b, the RED morpheme targets the *v*P, in a similar manner to bisyllabic and CVC roots.
  - However, unlike before, the glide *y* is inserted between the reduplicant and base.[5]
  - In doing so, the epenthesis glide /y/ breaks up the VV sequence.
- An extra context specific Vocabulary Item can be posited for this situation, as shown in example 38.

(38) Additional RED Vocabulary Item for Vowel Initial Roots
RED$\longleftrightarrow \sigma\sigma$ y / _ V

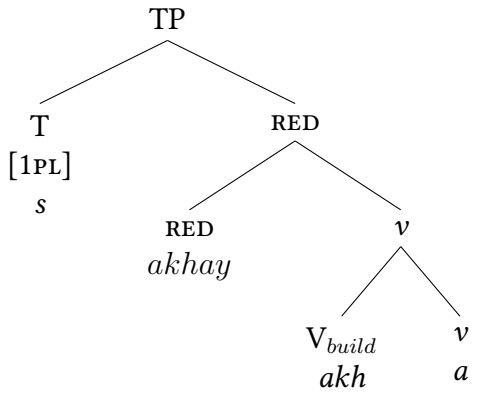
- The remaining Vocabulary Items for each morpheme is also provided below.

(39) a. $T_{[1PL]} \longleftrightarrow s$
b. $V_{build} \longleftrightarrow akh$

- The structure of example 36b is provided in figure 40 below. As the derivation of this structure is identical to the previous examples, I present the final derivation of *s-akha-y-akh-a* with all nodes already assigned their Vocabulary Items.

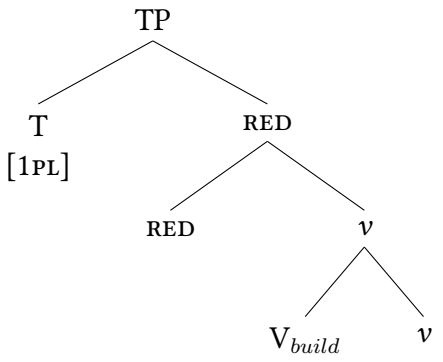
[5]Cook (2018, p. 57) includes the *y* morpheme as a part of the base: *s-**akha**+y-akh-a*. However, I assume that the *y* morpheme is actually attached to the reduplicant, to avoid a VV sequence between the reduplicant and base.

(40) *s-akhay-akh-a*: "we do a bad job of building", epenthesis *y* included



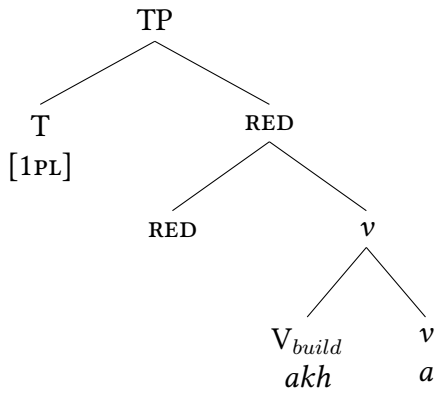

- Vowel initial monosyllabic roots can also be reduplicated as shown in example 36c, where the RED morpheme includes the subject prefix.
  - This suggests that the RED morpheme is placed in a higher structural position than what we have seen up to now.
- The idea that morphemes move to a different position, in order to satisfy language-specific phonological requirements, has been discussed in the previous literature (e.g. Caha, 2010; Baunaz and Lander, 2018; Wiland, 2019).
  - So, it is not unexpected that the morpheme has moved to create an environment where the reduplicant avoids a VV sequence.
- To illustrate this idea, I will step through an analysis of example 36c, starting with the underlying structure presented in figure 41.

(41) *sakha-s-akh-a*: "we do a bad job of building"
Step 1: Underlying Structure




- With this base structure, the morphemes at the lowest point in the structure, $V_{akh}$ and *a*, can be assigned their Vocabulary Items.

(42) *sakha-s-akh-a*: "we do a bad job of building"
Step 2: $V_{akh}$ and *a* assigned their Vocabulary Items

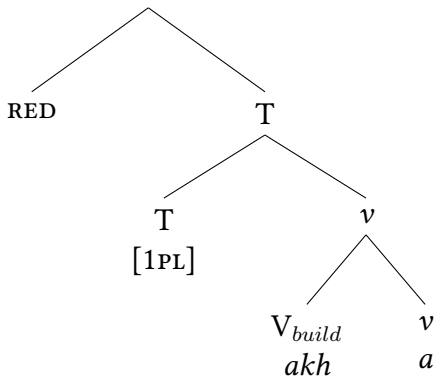



- At this stage, the Vocabulary Item for the RED attempts assignment to its terminal node.

→ However, this would create an illegal phonological environment, and typical phonological processes cannot resolve it.

  – The RED morpheme therefore moves to a position above T.[6]

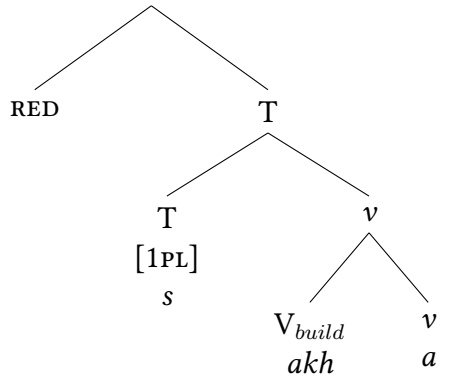
(43) *sakha-s-akh-a*: "we do a bad job of building"
Step 3: RED moves to a different position




[6]I have left the root of this structure unlabelled, as it is not clear whether this should still be a TP, or REDP, without further investigation into word formation head movement.

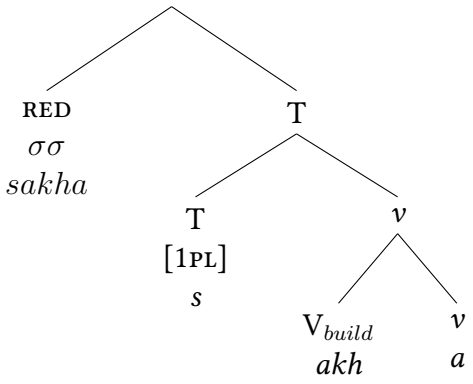
- With this new structure, the Vocabulary Insertion process continues.

(44) *sakha-s-akh-a*: "we do a bad job of building"
Step 4: T is assigned its Vocabulary Item




- Finally, the reduplicant receives its phonological material. To save space, I have collapsed two operations into one.

(45) *sakha-s-akh-a*: "we do a bad job of building"
Step 5: RED is assigned its Vocabulary Item




- This data on reduplication in vowel initial monosyllabic roots suggest that syntactic movement operations may be triggered by phonological requirements.

# 3 Discussion and Conclusion

- In this talk, we posited that the reduplicant morpheme copies phonological material from morphemes that it c-commands.
- This analysis not only models the observed data accurately, but also validates the assumption within Distributed Morphology that phonological material is assigned from the bottom up (Bobaljik, 2000).

  - Since the reduplicant is placed in a higher syntactic position than the base, the phonological material of the base must already be assigned in order for the reduplicant morpheme to copy it.

- I have also presented data where there is a mismatch between the reduplicant and the base, suggesting that reduplication in these languages is not blindly copying material that follows the reduplicant.
  - These patterns can be understood by proposing that general phonological processes are applied only *after* morphemes have been assigned their Vocabulary Items.
  - Specifically, I suggested that the verbalizing suffix *-a* is adjacent to the verbal root, and is deleted in the presence of the vowel expressing the subjunctive mood *-e*.
- Finally, Zulu exhibits various reduplicant forms with particular roots.
- I proposed that variants in reduplicated verbs can be explained by placing the RED in different positions of the structure.
- I argued that the RED head is placed in a higher position in the stucture, when the "typical" placement of the RED head would create an environment with a illegal VV sequence. Furthermore, typical phonological processes to resolve this sequence still result in illegal phonological environments.

→ Within DM, the suggestion that merge can be triggered by phonological material is a rather novel approach.
  - A more "orthodox" DM approach may suggest that the reduplicant begins in a higher position, and "lowers" via local dislocation.
  - However, local dislocation and readjustment rules have received some criticism in the literature, in that they are idiosyncratic and are a tool that can overgeneralize word forms (Haugen & Siddiqi, 2016).

- By avoiding these rules, the present analysis makes explicit the processes which are defined by syntax/morphology, and general phonological processes.
- In future work, there are a few areas where I hope to extend the analysis:
  - More data on this "movement-based" mechanism, by looking at roots with additional prosodic structures, together with morphemes that may give rise to VV sequences.
  - Though it seems that the final vowel is sitting in a position that is c-commanded by the reduplicant, I'm not sure whether the vowel really is a verbalizing head.

  - Finally, the semantics of reduplication in Zulu is understudied. Further investigation into the semantic contribution of Zulu reduplication could assist in establishing a better understanding of its role and position in the word internal structure.

- For now, the results from this analysis demonstrate that patterns that emerge from the morphophonological process of reduplication can be accurately accounted for by positing internal syntactic structure.
- This approach allows us to systematically explain how reduplicants derive their phonological form.
- While some open questions remain, it is hoped that this talk has highlighted the value of exploring the interface between syntax and phonology.
  - By focusing on reduplication — a process that lies at the intersection of phonology, morphology, and syntax — we can directly test how these grammatical subsystems interact.
  - In doing so, we gain a deeper understanding of each subsystem, and how they come together to shape the architecture of grammar.

# References

Andermann, F., Sommer, J., & Trommer, J. (2025, March). Mirror Principle Violations are Phonologically Conditioned: Evidence from Choguita Rarámuri [LingBuzz Published In: submitted to Phonological Data and Analysis]. Retrieved April 11, 2025, from https://lingbuzz.net/lingbuzz/008942

Baunaz, L., & Lander, E. (2018, June). *Nanosyntax* (Vol. 1). Oxford University Press. https://doi.org/10.1093/oso/9780190876746.003.0001

Beckman, J. (n.d.). Feature Organization and the Strong Domain Hypothesis in Zulu [labial] Phonology. *University of Massachusetts Occasional Papers in Linguistics*, *19*(2). Retrieved April 11, 2025, from https://core.ac.uk/reader/334981530

Bobaljik, J. D. (2000). The Ins and Outs of Contextual Allomorphy. In K. Grohmann & C. Struijke (Eds.), *University of Maryland Working Papers in Linguistics* (pp. 35–71, Vol. 10).

Caha, P. (2010). The parameters of case marking and spell out driven movement. *Linguistic Variation Yearbook*, *10*, 32–77. https://doi.org/10.1075/livy.10.02cah

Cook, T. (2013). *Morphological and Phonological Structure in Zulu Reduplication* [Doctoral dissertation, University of Pennsylvania]. https://repository.upenn.edu/edissertations/745

Cook, T. (2018). The Inclusion of Prefixal Material in Zulu Reduplication. *Studies in African Linguistics*, 43–69. https://doi.org/10.32473/sal.v47i1.107653

Downing, L. (1997). Correspondence Effects in Siswati Reduplication. *Studies in the Linguistic Sciences*, *25*.

Haugen, J., & Siddiqi, D. (2016, June). Towards a restricted realization theory: Multimorphemic monolistemicity, portmanteaux, and postlinearization spanning. In D. Siddiqi & H. Harley (Eds.), *Morphological Metatheory* (pp. 343–387, Vol. 229). John Benjamins Publishing Company. https://doi.org/10.1075/la.229

Hyman, L. M. (2009). The Natural History of Verb-Stem Reduplication in Bantu. *Morphology*, *19*(2), 177–206. https://doi.org/10.1007/s11525-009-9140-y

Hyman, L. M., Inkelas, S., & Sibanda, G. (2008). Morphosyntactic Correspondence in Bantu Reduplication. In K. Hanson & S. Inkelas (Eds.), *The Nature of the Word*. The MIT Press. https://doi.org/10.7551/mitpress/7894.003.0017

Kalin, L. (2022). Infixes really are (underlyingly) prefixes/suffixes: Evidence from allomorphy on the fine timing of infixation. *Language*, *98*(4), 641–682. https://doi.org/10.1353/lan.2022.0017

Newell, H., & Piggott, G. (2014). Interactions at the Syntax–Phonology interface: Evidence from Ojibwe. *Lingua*, *150*, 332–362. https://doi.org/10.1016/j.lingua.2014.07.020

Odden, D. (1996). Patterns of Reduplication in Kikerewe. *OSU Working Papers in Linguistics*, *48*, 111–148.

Posthumus, L. (2022). A Systemized Explanation for Vowel Phoneme Change in the Inadmissible Phonological Structure /VV/ in Zulu. *STUDIES IN AFRICAN LANGUAGES AND CULTURES*, (56). https://doi.org/10.32690/56.1

Wiland, B. (2019). *The spell-out algorithm and lexicalization patterns: Slavic verbs and complementizers*. Language Science Press.

# A Additional Data: Kerewe

## A.1 Baseline Cases

(46) Hyman (2009, p. 185)

a. Non-reduplicated form

*ku-lim-il-an-a*
INF-cultivate-APPL-RECIP-FV
"to cultivate for each other"

b. Full copy

*ku-lim-il-an-a-lim-il-an-a*
INF-**RED**-cultivate-APPL-RECIP-FV
"to cultivate for each other here and there"

c. Truncated reciprocal *-an* Hyman (2009, p. 185)

*ku-lim-il-~~an~~-a-lim-il-an-a*
INF-**RED**-cultivate-APPL-RECIP-FV

d. Truncated reciprocal *-an* and applicative *-il*Hyman (2009, p. 185)

*ku-lim-~~il-an~~-a-lim-il-an-a*
INF-**RED**-cultivate-APPL-RECIP-FV

e. Truncated applicative *-il* only is ungrammatical

**ku-lim-~~il~~-an-a-lim-il-an-a*
INF-**RED**-cultivate-APPL-RECIP-FV

## A.2 Puzzle With Final Vowel

(47) Odden (1996, p. 136)

a. Non-reduplicated form

*noo-habúúl-é*
3PL-advise-SUBJN
"we should advise"

b. Asymmetrical reduplication

*noo-habuul-a-habúúl-é*
3PL-**RED**-advise-SUBJN
"we should advise here and there"

(48) VV Hiatus Resolution in "they steal"

a. ba-yíbá

b. béébá

(49) Asymmetrical Reduplication with Perfective Suffix

a. Perfective Form

*a-báník-ílé*
3SG-roast-PERF
"he roasted"

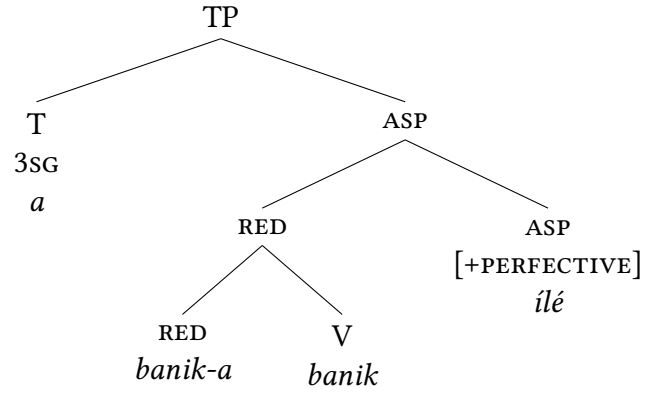
b. Reduplicated Perfective Form

*a-banik-a-báník-ílé*
3SG-**RED**-roast-PERF
"he roasted here and there"

c. (Inferred)

∗*a-banik-a-banik-élé*

(50) *Final derivation*
*a-banik-a-banik-ílé "he roasted here and there"*




## A.3 General Phonological Processes Triggered by the Perfective Suffix

(51) Spirantization rule $l \rightarrow z$

a. Infinitive Form

*ku-ful-a*
INF-clean-FV
"to clean"

b. Perfective Form

*a-fuz-ílé*
3SG-clean-PERF
"he cleaned"

(52) Spirantization rule $t \rightarrow s$

a. Infinitive Form

*ku-buut-a*
INF-choke-FV
"to choke"

b. Perfective Form

*a-buus-ílé*
3SG-choke-PERF
"he choked"

(53) Spirantization rule $d \rightarrow z$

a. Infinitive Form
*ku-geend-a*
INF-go-FV
"to go"

b. Perfective Form
*a-geenz-ílé*
3SG-go-PERF
"he went"

(54) Rule $l \rightarrow z$ Does Not Target the Reduplicant

a. Perfective Form
*a-fuz-ílé*
3SG-clean-PERF
"he cleaned"

b. Reduplicated Perfective Form
*a-ful-a-fuz-ílé*
3SG-RED-clean-PERF
"he cleaned here and there"

(55) Rule $t \rightarrow s$ Does Not Target the Reduplicant

a. Perfective Form
*a-buus-ílé*
3SG-choke-PERF
"he choked"

b. Perfective Form
*a-buut-a-buus-ílé*
3SG-RED-choke-PERF
"he choked here and there"

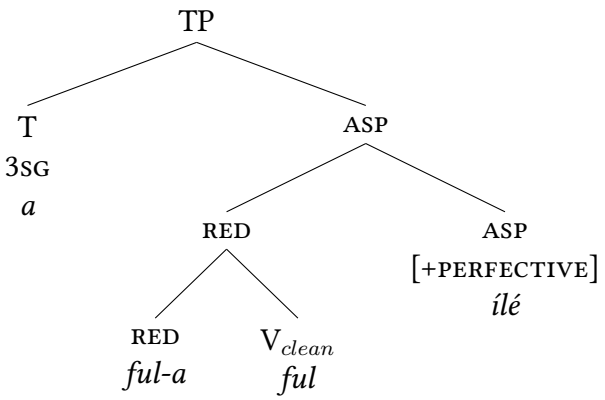
(56) Rule $d \rightarrow z$ Does Not Target the Reduplicant

a. Perfective Form
*a-geenz-ílé*
3SG-go-PERF
"he went"

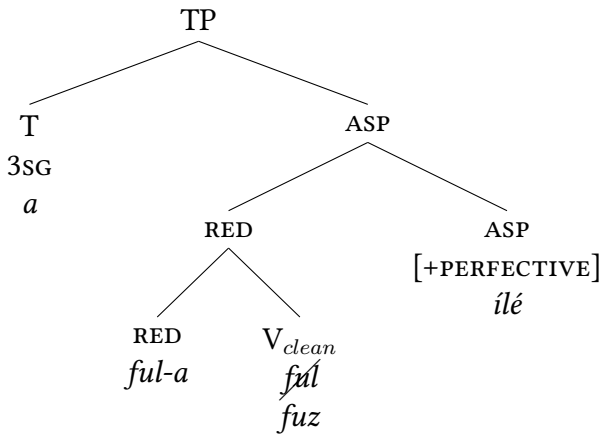
b. Perfective Form
*a-geend-a-geenz-ílé*
3SG-RED-go-PERF
"he went here and there"

## A.4 Derivations

(57) *Underlying Form*
*a-ful-a-fuz-ílé "he cleaned here and there"*



(58) *Final Derivation*
*a-ful-a-fuz-ílé "he cleaned here and there"*




(59) /l/ assimilates to /d/, following /n/ (plus spirantization rule $d \rightarrow z$)

a. Infinitive Form
*ku-lol-a*
INF-see-FV
"to see"

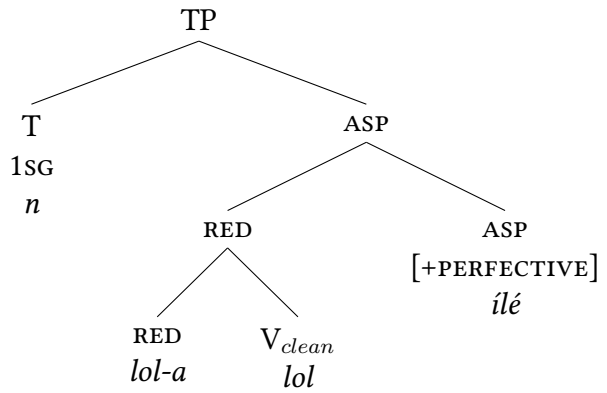
b. Perfective Form
*n-doz-ílé*
1SG-see-PERF
"I saw"

(60) Reduplicated form of *n-doz-ílé* "I saw"

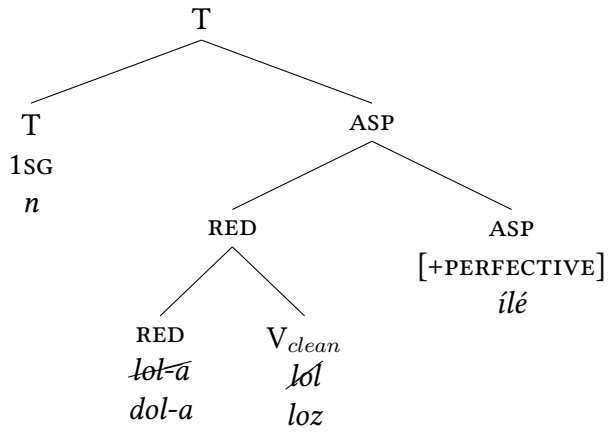
a. Perfective Form
*n-doz-ílé*
1SG-see-PERF
"I saw"

b. Reduplicated Perfective Form
*n-dol-a-loz-ílé*
1SG-**RED**-see-PERF
"I saw here and there"

(61) *Underlying Form*
*n-dol-a-loz-ílé "he cleaned here and there"*



(62) *Final Derivation*
*n-dol-a-loz-ílé "he cleaned here and there"*




## A.5 Derivation of Partial Reduplication Forms

(63) Full reduplication *-an* Hyman (2009, p. 185)

a. *ku-lim-il-an-a-lim-il-an-a*
INF-**RED**-cultivate-APPL-RECIP-FV

(64) Truncated reciprocal *-an* Hyman (2009, p. 185)

a. *ku-lim-il-~~an~~-a-lim-il-an-a*
INF-**RED**-cultivate-APPL-RECIP-FV

(65) Truncated reciprocal *-an* and applicative *-il*Hyman (2009, p. 185)

a. *ku-lim-~~il-an~~-a-lim-il-an-a*
INF-**RED**-cultivate-APPL-RECIP-FV

(66) Truncated applicative *-il* only is ungrammatical

a. **ku-lim-~~il~~-an-a-lim-il-an-a*
INF-**RED**-cultivate-APPL-RECIP-FV

(67) a. $\text{T}_{[\text{INF}]} \longleftrightarrow ku$

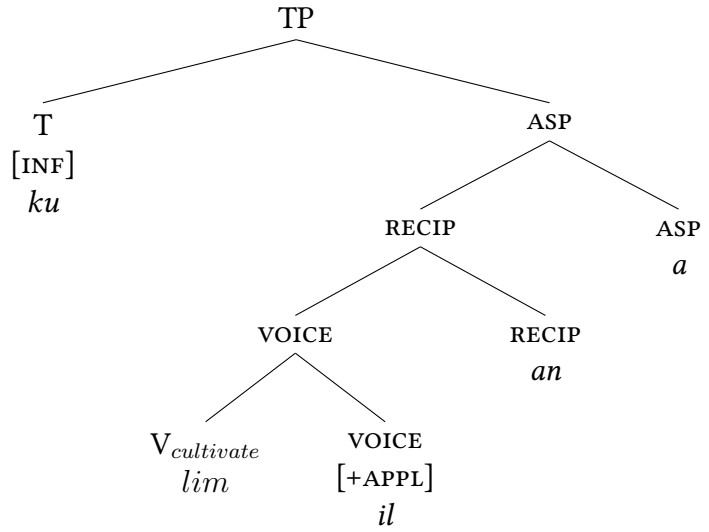
b. $\text{V}_{cultivate} \longleftrightarrow lim$

c. $\text{VOICE}_{[+\text{APPL}]} \longleftrightarrow il$

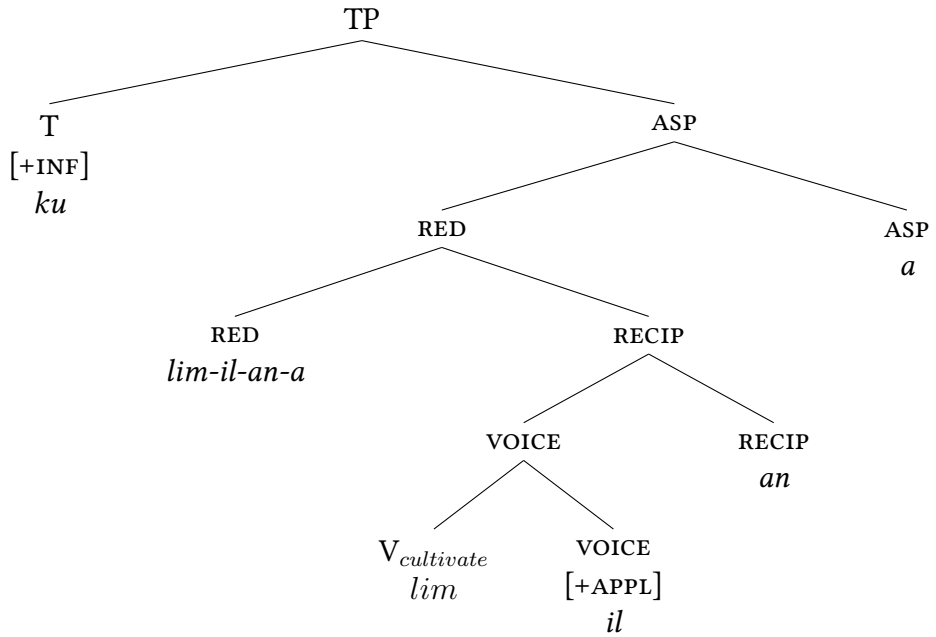
d. $\text{RECIP} \longleftrightarrow an$

e. $\text{ASP} \longleftrightarrow a$

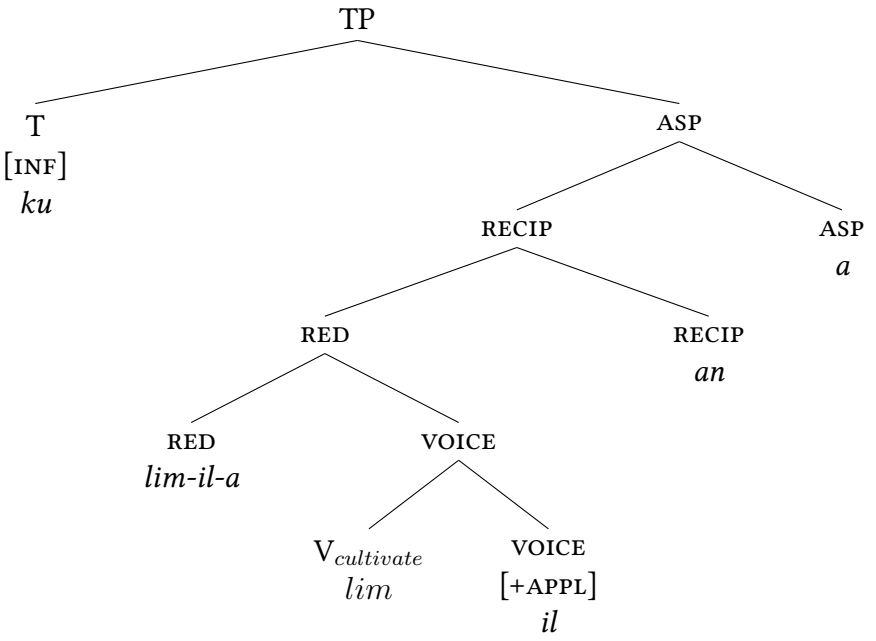
(68) *kulimilana "to cultivate"*



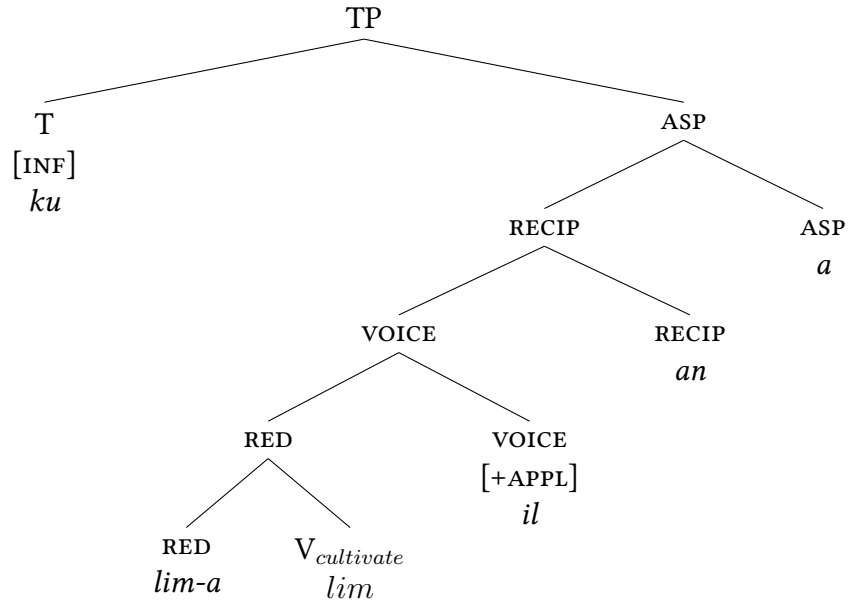

(69) *ku-lim-il-an-a-lim-il-an-a*: full reduplication



(70) *ku-lim-il-a-lim-il-an-a*: truncated reciprocal suffix




(71) *ku-lim-a-lim-il-an-a*: truncated reciprocal and applicative suffix




(72) Truncated applicative *-il* only is ungrammatical

**ku-lim-~~il~~-an-a-lim-il-an-a*

INF-**RED**-cultivate-APPL-RECIP-FV