

# Recursive Prosodic Structure in Nez Perce Double Reduplication

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## 1 Introduction

Full and double reduplication are found in Nez Perce (nimipuutímt), a Sahaptian language spoken in Idaho, Washington, and Oregon (Aoki, 1963, 1970, 1994; Crook, 1999; Deal, 2016). Full reduplication is characteristic of many nouns and adjectives, while double reduplication occurs when fully-reduplicated forms are subject to an additional reduplicative process, a *Ci-* prefix indicating plural. Reduplication in Nez Perce is fairly well documented (see esp. Aoki, 1963, 1994) and double reduplication has been analyzed morphologically (Deal, 2016), though no previous work looks specifically at the phonology of these forms.

This paper has two aims. First, I describe the quantity-sensitive primary stress pattern of fully- and doubly-reduplicated adjectives, demonstrating a systematic departure from the usual pattern of quantity-insensitive penultimate stress in Nez Perce (Crook, 1999). I then use patterns of vowel length and plural exponence to show that fully-reduplicated adjectives exhibit a bimoraic stem minimum (though fully-reduplicated nouns do not), and I argue that these facts can be understood as a manifestation of a complex recursive prosodic word structure. A Vowel~Ø alternation in doubly-reduplicated forms will also be discussed briefly.

The generalizations reported here are based on a corpus of fully-reduplicated adjectives started by Amy Rose Deal (see, e.g., Deal, 2016), shared with and continued by the author. The corpus contains about 125 fully-reduplicated adjectives, about 75 of which have attested plural forms (i.e., are doubly reduplicated). Most of the forms in the corpus were collected from Aoki's (1994) *Nez Perce Dictionary*, with additional forms from Deal's fieldwork.

## 2 Full and double reduplication

Examples of fully-reduplicated adjectives in Nez Perce are given in (1). Throughout, examples are given in Nez Perce orthography<sup>1</sup>, with the exception of glottal stop which I will write as ? rather than orthographic '. The orthography is largely phonemic and marks primary stress overtly with an acute accent. Dashes between stems and at other morpheme boundaries are not represented in the orthography but are included here. In numbered examples I also include a broad IPA transcription. Orthographic *e* corresponds to IPA [æ], *c* to [ts], and *x* to [χ].

- (1) Fully reduplicated adjectives in Nez Perce
- |              |                 |         |
|--------------|-----------------|---------|
| yoos-yóos    | [jo:s-'jo:s]    | 'blue'  |
| cilp-cílp    | [tsilp-'tsi:lp] | 'round' |
| seqex-séqex  | [sæqæχ-'sæqæχ]  | 'rough' |
| xiyáap-xiyap | [χi'ja:p-χijap] | 'angry' |

Some fully-reduplicated forms correspond to an extant non-reduplicated base, which may be of any category

\* Considerable thanks to Amy Rose Deal for noticing that fully and doubly reduplicated adjectives in Nez Perce are phonologically cool, for starting the corpus on which this is based and sharing it with me, and for being willing to sustain a long-running collaborative discussion about it. I also gratefully acknowledge the speakers of Nez Perce for sharing their language. Thanks to the AMP reviewers and attendees, especially Hossep Dalatian and Peter Guekguezian, for comments and suggestions that with any luck will make it into a future version of this work. The views expressed here are my own, and I alone am responsible for any errors in the reporting or interpretation of the data and generalizations.

<sup>1</sup> Following Nez Perce Tribe Information Systems Department (2018) and "Nez Perce Language Program" (n.d.).

(verb, adjective, noun, or particle [non-inflecting lexical item]), but some do not. For example, there is a verb *cíl̥p*, ‘to encircle’, which is clearly related to *cíl̥p-cíl̥p* ‘round’ (Aoki, 1994:34). And the adjective *xiyáap-xiyap* ‘angry’ coexists with the particle *xiyáap*, a non-inflecting stem which is combined with verbalizer *kúu* ‘to do’ to yield ‘become angry’ (Aoki, 1994:930).<sup>2</sup> However, there is no word \**yóos* from which *yóos-yóos* ‘blue’ might be formed, and likewise no word \**seqex* as a base for *seqex-séqex* ‘rough’. Similar generalizations hold for fully-reduplicated nouns, which are also large in number; i.e., some can be identified with an extant non-reduplicated base but others cannot (Aoki, 1963, 1994; Crook, 1999). The process of full reduplication can therefore be treated in general as simply adjectivalizing (and/or nominalizing), sometimes with additional shades of meaning.<sup>3</sup>

An additional reduplicative process, a *Ci-* prefix, is used to mark plural in adjectives, as in (2). Nouns do not usually mark plural unless referring to humans, and even the overt pluralization that is found on nouns does not usually use *Ci-* prefixation (Deal, 2016).

(2) Plural reduplication in adjectives with *Ci-*

kahát’o	[ka’hat’o]	ki-káhat’o	[ki-’kahat’o]	‘short (sg, pl)’
qúuy’s	[’qu:j’s]	qi-qúuy’s	[qi-’qu:j’s]	‘rich (sg, pl)’

Double reduplication occurs when fully-reduplicated adjectives (FRAs) are pluralized with the *Ci-* prefix. The plural reduplicant is typically expressed twice, once for each copy of the stem.<sup>4</sup> The plural forms of the adjectives in (1) are given in (3). Since plural-marking is primarily limited to adjectives, they are the main source of doubly-reduplicated forms.

(3) Double reduplication (fully-reduplicated adjective plus *Ci-* prefix)

yi-yoos-yí-yoos	[ji-jo:s-’ji-jo:s]	‘blue (pl)’
ci-cilp-cí-cilp	[tsi-tsilp-’tsi-tsilp]	‘round (pl)’
si-seqex-sí-seqex	[si-sæqæx-’si-sæqæx]	‘rough (pl)’
xi-xiyáap-xi-xiyap	[xi-xi’ja:p-xi-xijap]	‘angry (pl)’

The pattern of *Ci-* doubling is partially suspended in CVC stems. All CVC-stem FRAs in the corpus are listed in (4). Three CVC stems with attested plurals do not double the *Ci-* prefix, expressing it once instead. However, the lone stem with a CVN shape (where N=nasal) patterns with the stems in (3) in showing doubled *Ci-* exponence. (Plural forms are not documented for the remaining two CVC stems.)

(4) Fully-reduplicated adjectives with CVC stems

Singular		Plural		
c’ax-c’áx	[ts’ax-’ts’ax]	–		‘fragile, easy to split’
c’él-c’el	[ts’æl-’ts’æl]	c’i-c’él-c’el	[ts’i-’ts’æl-’ts’æl]	‘awkward’
kúc-kuc	[kuts-kuts]	ki-kúc-kuc	[ki-’kuts-kuts]	‘small’
pox-póx	[pox-’pox]	–		‘grayish colored’
q’oc-q’óc	[q’ots-’q’ots]	q’i-q’óc-q’oc	[q’i-’q’ots-’q’ots]	‘naked, treeless’
cam-cám	[tsam-’tsam]	ci-cám-ci-cam	[tsi-’tsam-’tsi-tsam]	‘quick to step around’

Unlike the plural reduplicant prefix, monosyllabic case suffixes applied to fully- and doubly-reduplicated forms occur only once regardless of stem shape. Some representative examples with objective case (*-ne/-na*) are provided in (5).

<sup>2</sup> Example: *xiyáap kúuse* ‘I get angry.’ Cf. *xiyáap-xiyap híiwe* ‘he is angry’ (Aoki, 1994:930).

<sup>3</sup> Other than a preponderance of reduplicated forms, nouns in Nez Perce are frequently morphologically simplex. Adjectives are usually complex (Crook, 1999:82, Deal, 2016:330), typically being formed with one of several adjectivalizing suffixes if not fully reduplicated. It is possible for the same root to undergo adjectivalization with multiple processes resulting in different meanings, e.g., *qa’án* ‘to respect’ ~ *qa’án-qa’án* ‘respected’ ~ *qa’án’is* ‘modest, respected’ (Deal, 2016:331).

<sup>4</sup> In order to refer to generalizations in the shapes of FRAs throughout I will use the term ‘stem’ to refer to the base of reduplication (or to one copy of the reduplicated form), regardless of whether this is an available lexical item in the language. Thus, for example, the stem of *yóos-yóos* is *yóos*, even though no such word \**yóos* exists independently. The phonological properties of FRAs can be stated on the basis of their surface structures and do not appear to depend on the phonological properties of extant bases (or lack thereof).

## (5) Case-suffixed fully- and doubly-reduplicated adjectives

(a)	'buckskin-colored' (Aoki, 1994:206)		
Singular	kewx-kéewx	[kæwx-'kæ:wx]	
Singular, Obj.	kewx-kéewx-ne	[kæwx-'kæ:wx-næ]	
Plural	ki-kewx-kí-kewx	[ki-kæwx-'ki-kæwx]	
Plural, Obj.	ki-kewx-kí-kewx-ne	[ki-kæwx-'ki-kæwx-næ]	
(b)	'empty' (Aoki, 1994:197)		
Singular	kaʔáw-kaʔaw	[kaʔaw-kaʔaw]	
Singular, Obj.	kaʔáw-kaʔaw-na	[kaʔaw-kaʔaw-na]	
Plural	ki-kaʔáw-ki-kaʔaw	[ki-kaʔaw-ki-kaʔaw]	
Plural, Obj.	ki-kaʔáw-ki-kaʔaw-na	[ki-kaʔaw-ki-kaʔaw-na]	

The next section summarizes the systematic primary stress patterns of fully- and doubly-reduplicated adjectives.

### 3 Stress in reduplicated adjectives

Primary stress in nouns and adjectives has been described as normally penultimate (Crook, 1999). The examples in (6) show initial stress in disyllabic nouns and adjectives, which shifts to the second syllable when a suffix is added, while trisyllabic words have stress on the middle syllable which again shifts when suffixed.

## (6) Nez Perce default penultimate stress (examples from Aoki, 1994)

Nominative		Objective (-ne/-na)		
kéhen	[kæhæn]	kehén-ne	[kæ'hæn-næ]	'biceps, upper arm'
kéetis	[kæ:tis]	ketfís-ne	[kæ'ti:s-næ]	'spear with hooks'
néxsep	[næχsæp]	nexséep-ne	[næχ'sæ:p-næ]	'different, unfamiliar'
nipéhe	[ni'pæhæ]	nipehé-ne	[nipæ'hæ-næ]	(place name)

Stress does not tend to continue shifting rightward with further suffixation and therefore appears generally stem-bounded (or in some cases stem+derivational suffix, Crook, 1999:83). Some nouns, many verb stems, and some bound morphemes (particularly in the verbal morphology) show fixed stress, or attract stress to a particular syllable regardless of suffixation (see Crook, 1999 for details). Quantity-sensitivity is reported to play a role only in secondary stresses (*ibid.*).

Fully-reduplicated adjectives show a departure from the modal stress pattern. The quantity-sensitive primary stress pattern that is visible in these forms is extremely robust but has not been previously reported in the literature on Nez Perce phonology.<sup>5</sup> Setting aside for the moment those with CVC-stems, FRAs show one of two stress patterns, depending on the syllabic composition of the stem.<sup>6</sup>

First, stems of the following shapes pattern together: CVVC, CV(V)CC, and CV.CVC<sub>-G-N</sub>, where V=any vowel, C=any consonant, and C<sub>-G-N</sub>=any non-glide, non-nasal consonant. In the absence of other information on Nez Perce stress and quantity, we would probably call these shapes H (one heavy syllable) and LL (two light syllables).<sup>7</sup> The examples in (7)-(8) show that these forms have primary stress on the first syllable of the second copy of the stem in the singular. Where plural data is available, these forms consistently show that stress shifts to the second copy of the *Ci-* prefix.

<sup>5</sup> The generalizations here are based on the corpus of fully-reduplicated adjectives. Stress in fully-reduplicated nouns appears to be consistent with the adjectives in some respects, but they have not yet been collected systematically for comparison. The pattern reported here could also turn out to be more generally characteristic of (non-reduplicated) compounds, but these forms too await systematic collection and comparison.

<sup>6</sup> There are also a handful of stems with unique shapes that do not conform to those in (7)-(9). I will set these aside for this paper, though a fuller treatment would include them and compare their properties with the more common shapes.

<sup>7</sup> In the context of other evidence for quantity and syllable structure in Nez Perce, however, these labels are potentially problematic. Crook (1999), for example, argues that final CC# sequences are heterosyllabic, based both on the typical pronunciation of such sequences (corroborated by the narrow phonetic transcriptions of Hoard 1978) and on some of their phonological properties (stress and epenthesis; see Crook 1999 for details). Thus, the labels in the text are convenient but should be interrogated further in the context of Nez Perce syllable structure more broadly.

(7) Stress in FRAs with H stems: *Singular* H- $\acute{H}$ , *Plural* Ci-H-Ci-H

- (a) CVVC ( $n=9$ ; 7 with plural form)  
 paax-páax [pa:χ-'pa:χ] 'brown, light bay' (sg, pl)  
 pi-paax-pí-paax [pi-pa:χ-'pi-pa:χ]
- (b) CVCC ( $n=20$ ; 15 with plural form)  
 k'apc-k'ápc [k'apts-'k'apts] 'hot-tempered' (sg, pl)  
 k'i-k'apc-k'í-k'apc [k'i-k'apts-'k'i-k'apts]
- (c) CVVCC ( $n=5$ ; 3 with plural form)  
 tisx-tísx [tisχ-'tisχ] 'tangled' (sg, pl)  
 ti-tisx-tí-tisx [ti-tisχ-'ti-tisχ]

(8) Stress in FRAs with LL stems: *Singular* LL- $\acute{L}L$ , *Plural* Ci-LL-Ci-LL

- CV.CVC-G-N ( $n=18$ , 8 with plural form)  
 seqex-séqex [sæqæχ-'sæqæχ] 'rough' (sg, pl)  
 si-seqex-sí-seqex [si-sæqæχ-'si-sæqæχ]

In contrast, stems with the following shapes show a different pattern: CV.CVG, CV.CVN, and CV.CVVC, where G=glide, N=nasal, and C=any consonant. We might reasonably refer to these as LH stems (light syllable followed by heavy syllable). As the examples below demonstrate, the primary stress in these forms always falls to the final syllable of the *first* copy of the stem, and plural reduplication does not interrupt this pattern.

(9) Stress in FRAs with LH stems: *Singular* LH- $\acute{L}H$ , *Plural* Ci-LH-Ci-LH

- (a) CV.CVG ( $n=18$ , 13 with plural form)  
 cok'áy-cok'ay [tso'k'aj-tsok'aj] 'disinterested, indifferent' (sg, pl)  
 ci-cok'áy-ci-cok'ay [tsi-tso'k'aj-tsi-tsok'aj]
- (b) CV.CVN ( $n=7$ , 3 with plural form)  
 qa?án-qa?an [qa'ʔan-qaʔan] 'respected' (sg, pl)  
 qi-qa?án-qi-qa?an [qi-qa'ʔan-qi-qaʔan]
- (c) CV.CVVC-G-N ( $n=19$ , 8 with plural form)  
 xiYáap-xiyap [xi'ja:p-χijap] 'angry' (sg, pl)  
 xi-xiyáap-xi-xiyap [xi-χi'ja:p-χi-χijap]
- (d) CV.CVVG ( $n=5$ , 2 with plural form)  
 peléey-peley<sup>8</sup> [pæ'læ:j-pælæj] 'foolish, odd, abnormal' (sg, pl)  
 pi-peléey-pi-peley [pi-pæ'læ:j-pi-pælæj]
- (e) CV.CVVN ( $n=3$ , 3 with plural form)  
 yek'é:m-yek'em [jæ'k'æ:m-jæk'æm] 'meek, gentle' (sg, pl)  
 yi-yek'é:m-yi-yek'em [ji-jæ'k'æ:m-ji-jæk'æm]

Several aspects of these generalizations are notable. First, we see that they depend on treating syllables with a long vowel, glide coda/diphthong, or nasal coda as heavy. That nasal codas pattern with long vowels and glide codas/diphthongs, while all other single consonants do not appear to contribute weight in coda position, is surprising in the context of Nez Perce. Although it is not typologically unusual for sonorant codas to be considered 'heavier' than obstruent codas, the heaviness of nasal codas has only been mentioned for Nez Perce in connection with FRAs (Deal, 2016). Primary stress is reportedly otherwise not sensitive to codas at all, and the minimal word (for nouns) is CVC, where the final C may be an obstruent (Crook,

<sup>8</sup> The singular form of this word, with its vowel length in the second syllable, comes from Crook (1999:380). It is attested in Aoki (1994:524) as *peléy-peley* with short vowels. Of the available sources, the plural is attested only in Aoki (1963:44), where the vowels of the singular and plural are transcribed as *a*, not *e*. The plural form provided here is a 'triangulated' form based on Aoki's (1963) attestation, the updated vowels of Aoki (1994) and Crook (1999), and the vowel length attested from the singular in Crook (1999).

1999).<sup>9</sup> Second, there is almost no aspect of these generalizations that lines up with the otherwise-regular penultimate stress pattern. Although these patterns are almost entirely systematic, it is somewhat difficult to identify an overarching principle at all (e.g., foot type or alignment preferences) that accounts for both sets beyond simply stating the generalizations. Third, the interaction with case suffixes in these forms further deviates from the shifting penult pattern reported in non-reduplicated nouns and adjectives, as case has no effect of the position of stress in FRAs. The examples in (5) from the previous section illustrate this.

Finally, the handful of attested CVC-stem FRAs appear to have unpredictable stress, as the list of these forms in (4) reveals. In their singular forms, three have second-stem (and therefore final syllable) stress, while two have first-stem (and therefore penultimate) stress. For those with attested plurals, stress appears to regularize in the plural to penultimate position. The one CVN stem in the corpus shows the second-stem pattern, though it also shows an unexpected shift to first-stem stress in the plural (see (4)).<sup>10</sup>

In sum, the primary stress location in fully-reduplicated adjectives is almost entirely predictable on the basis of stem size and shape when long vowels, singleton glide or nasal codas, and complex codas are treated as heavy and remaining CVC syllables are light. These same quantity generalizations resurface in the patterns of vowel lengthening and plural exponence discussed in the next section, further supporting their phonological relevance.

#### 4 Vowel length and plural exponence

Vowel length in Nez Perce is contrastive but usually neutralized outside of primary stress position (Crook, 1999). In stems with regular penultimate stress, nominative (bare) forms will reveal length in the first syllable if underlyingly present, while case-marked forms will reveal length in the second syllable if underlyingly present. The examples in (10) are typical. Underlyingly, nominal roots commonly have one long vowel in final position as in (10a), long vowels in final and penultimate syllables as in (10b), or no underlying long vowels as in (10c) (Crook, 1999:301-306).<sup>11</sup> Verbs and adjectives are not reported to be exceptional in general with respect to atonic vowel shortening. Although there are exceptional long vowels that do not shorten in some morphemes, atonic shortening is a largely regular process that occurs with all categories.

(10) Underlying vowel length neutralized outside of primary stress (Crook, 1999:297)

- (a) One underlying long vowel, /siluu/  
       sílú        ['silu]        'eye'  
       silúu-ne [si'lu:næ] 'eye (obj)'
- (b) Two underlying long vowels, /weeptees/  
       wéep̄tes [wæ:pt̄æs] 'eagle'  
       wept̄ées-ne [wæp't̄æ:s-næ] 'eagle (obj)'
- (c) No underlying long vowels, /piskis/  
       pískis [piskis] 'door'  
       piskís-ne [pis'kis-næ] 'door (obj)'

As discussed in the previous section, fully-reduplicated adjectives do not follow the usual pattern for penultimate stress nor undergo stress shift with case suffixation. But they do for the most part obey the dictate that atonic syllables surface with short vowels, even when this introduces violations of reduplicative identity. As shown in (11), in the singular forms of FRA stems with long vowels, primary stress will fall onto

<sup>9</sup> However, Deal (2016:332) cites personal communication with Harold Crook that CVC nouns are pronounced with lengthening of the coda, arguably exhibiting a minimal word augmentation consistent with the avoidance of truly monomoraic CVC words.

<sup>10</sup> Although CVC-stem FRAs are few, there are numerous fully-reduplicated nouns with CVC stems. These could be collected and compared to adjectives in future work to provide additional insight into the relationship between full reduplication and the modal stress pattern.

<sup>11</sup> According to Crook (1999:305f) there do not appear to exist length alternations of the following hypothetical sort: \*wéep̄tes ~ wept̄ésne, which would suggest underlying \*/weeptes/, with a long-short vowel arrangement. Surface long-short vowel stems either reveal the second syllable to have an underlying long vowel as in the actual wept̄éesne 'eagle (obj)' or they do not show stress shift with suffixation, as in láaqa ~ láaqaana 'pine (nom, obj)' (ibid.)

the long vowel of either the first or the second stem, following the generalizations in §3. The corresponding long vowel in the other stem will surface as short. Shortened vowels are underlined in these examples.

(11) Fully-reduplicated adjectives undergo atonic shortening

- (a) Singulars
- |              |                  |                    |
|--------------|------------------|--------------------|
| kewx-kéewx   | [kæwx-'kæ:wx]    | 'buckskin-colored' |
| cilp-cíl̥p   | [tsilp-'tsi:l̥p] | 'round'            |
| xiyáap-xiyap | [χi'ja:p-χijap]  | 'angry'            |
- (b) Plurals (*Ci-*)
- |                    |                          |                         |
|--------------------|--------------------------|-------------------------|
| ki-kewx-kí-kewx    | [ki-kæwx-'ki-kæwx]       | 'buckskin-colored (pl)' |
| ci-cíl̥p-cí-cíl̥p  | [tsi-tsíl̥p-'tsi-tsíl̥p] | 'round (pl)'            |
| xi-xiyáap-xi-xiyap | [χi-χi'ja:p-χi-χijap]    | 'angry (pl)'            |

However, a systematic failure of atonic shortening is observed among fully-reduplicated adjectives when it would result in either copy of the stem surfacing as CVC, with a short vowel and singleton coda. This can be seen in stems with the shape CVVC, as in (12). The singular forms show that the non-primary-stressed stem retains its long vowel. The plural forms moreover show that both stems retain long vowels even when neither receives primary stress, due to the regular pattern of stress shifting to the second-stem plural prefix (see §3).

(12) Atonic shortening blocked in FRAs when CVC would result

- (a) Singulars
- |           |              |                        |
|-----------|--------------|------------------------|
| yoos-yóos | [jo:s-'jo:s] | 'blue'                 |
| *yos-yóos |              |                        |
| taas-táas | [ta:s-'ta:s] | 'dark (lack of light)' |
| *tas-táas |              |                        |
| tuux-tuux | [tu:x-'tu:x] | 'odd tasting'          |
| *tux-tuux |              |                        |
- (b) Plurals (*Ci-*)
- |                 |                    |                             |
|-----------------|--------------------|-----------------------------|
| yi-yoos-yí-yoos | [ji-jo:s-'ji-jo:s] | 'blue (pl)'                 |
| *yi-yos-yí-yos  |                    |                             |
| ti-taas-tí-taas | [ti-ta:s-'ti-ta:s] | 'dark (lack of light) (pl)' |
| *ti-tas-tí-tas  |                    |                             |
| ti-tuux-tí-tuux | [ti-tu:x-'ti-tu:x] | 'odd tasting (pl)'          |
| *ti-tux-tí-tux  |                    |                             |

The regular occurrence of atonic shortening in (11) follows from general principles of Nez Perce phonology, and therefore the systematic suspension of shortening in both the singular and plural forms of CVVC stems is a departure that requires an explanation. Taken together, the two sets of examples suggest that full reduplication in adjectives obeys a size minimum that is met by CVVC (and by CVCC) but not by CVC, and can therefore be characterized as bimoraic. It also suggests that the plural prefix, *Ci-*, is generally treated as outside of this domain of minimality, otherwise we might expect the extra material to 'rescue' CVVC stems in the plural and allow shortening to occur in the forms of (12 b).

A bimoraic minimum is a surprising finding for these FRAs for two reasons. First, the stem minimum appears unique to adjectives and does not seem to apply to otherwise-similar nouns. I will discuss this further in §6, where the conclusion will simply be that Nez Perce admits category-specific phonology, not unlike many other languages (e.g., Smith, 2011). The second reason that a bimoraic minimum is surprising ends up being more informative. Namely, the apparent avoidance of CVC-stem creation through shortening must be squared with the fact that CVC-stem FRAs do exist independently, as illustrated in §2. Rather than challenging the minimality generalization, however, these forms end up providing support for it. CVC-stems are unusual not only in their apparently sub-minimal stem size but also in the fact that they show only one exponent of the plural *Ci-* prefix, as we have already seen. The next section gives a proposal that accounts for both the vowel length facts and predicts the distribution of single vs. multiple exponence of the plural prefix following from the size of the stem.

## 5 Proposal: prosodic word recursion and prefix adjunction

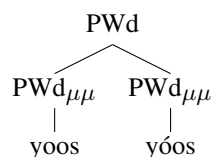
I propose that the prosody of fully- and doubly-reduplicated adjectives in Nez Perce can be captured with two representational generalizations, given in (13).

(13) Proposal

- (a) Fully-reduplicated adjectives are preferentially prosodified as two prosodic words nested in a larger prosodic word.
- (b) The plural *Ci-* is phonologically an affixal clitic (Selkirk, 1995) that adjoins to a minimal prosodic word.

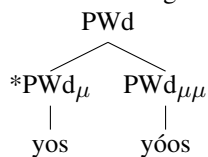
The generalization in (13 a) yields the structure in (14) for a fully-reduplicated adjective with a CVVC stem shape, like *yóos-yóos* ‘blue’.

(14) Each FRA stem is a PWd



The parsing of each stem of the FRA as a separate PWd prevents shortening in either copy of the stem, regardless of stress placement, if we assume that PWds obey a bimoraic minimum. Although there are some nouns with a CVC shape in Nez Perce, there are no adjectives this small.<sup>12</sup> Therefore, I adopt the assumption that the minimal word, at least for adjectives, is bimoraic, and thus the failure of shortening in CVVC stems is due to this requirement.

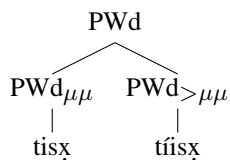
(15) Bimoraic PWd minimum blocks shortening in CVVC stems



Stems of a larger size which also have long vowels, such as CVVCC and CV.CVVC, would meet the minimal word requirement even without their vowel length. Therefore atonic shortening occurs without interruption in these forms, as in (16). These examples also illustrate why it is necessary to assume that the individual PWd stems are grouped into a larger PWd: primary stress occurs only once in the fully-reduplicated form and therefore some constituent contains both stems. Crook (1999:380) reports that the copy of the stem that does not receive primary stress does have a secondary stress on the corresponding syllable. Since this stress does not prevent shortening, it could not phonologically be a primary stress. I will assume that the maximal PWd is therefore the domain of primary stress assignment.

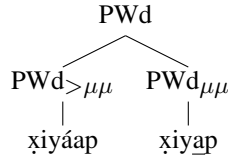
(16) Larger stems permit atonic shortening

- (a) *tisx-tíisx* ‘tangled’



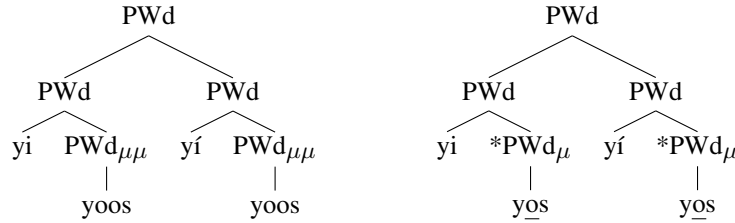
<sup>12</sup> It might also be the case that the CVC nouns undergo minimal word augmentation; see fn. 9.

- (b)
- ɣiyáap-ɣiyap*
- ‘angry’



The treatment of FRA stems as PWds in (13 a) accounts for the vowel length distribution of singular forms. The additional generalization in (13 b) is needed to account for the length facts of plural forms. Recall that inflecting CVVC forms with the plural *Ci-* prefix does not rescue atonic shortening—it is still blocked in these forms. Thus, the proposal is that *Ci-* is an affixal clitic that adjoins to a minimal PWd but is not incorporated into it. This is illustrated below.

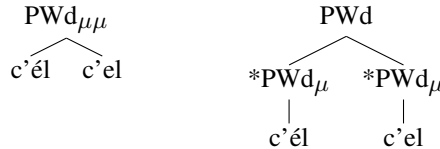
- (17) Plural
- Ci-*
- is an affixal clitic



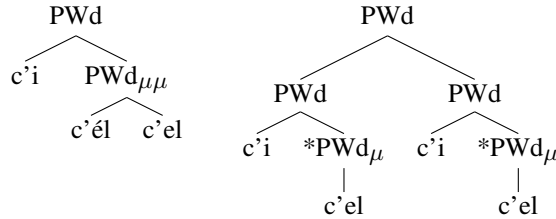
As in (16), larger stems will continue to permit atonic shortening in unstressed syllables because the minimal word requirement is always met, even when stress shifts to *Ci-*.

In addition to accounting for the distribution of atonic shortening, the proposal in (13) accounts for the unique behavior of CVC-stem FRAs. When the stem is lexically CVC (that is, when there is no underlying vowel length), the minimal word requirement is not met by the individual stems, and vowel lengthening is not attested as a repair. Therefore, rather than being prosodified as two sub-minimal PWds, the CVC stems are prosodified together as a single PWd to meet the bimoraic minimum, (18 a). In turn, the *Ci-* prefix is expressed only once, as expected of an affixal clitic when there is only one PWd to which it may adjoin, (18 b).

- (18) (a) CVC-stem FRAs are parsed into a single PWd
- 
- c'él-c'el*
- ‘awkward’



- (b)
- Ci-*
- is adjoined to the (minimal) PWd
- 
- c'i-c'él-c'el*
- ‘awkward (pl)’



The lone exception to the unitary exponence of *Ci-* for small stems is *ci-cám-ci-cam*, ‘quick to step around (pl)’. But this too follows from the current proposal. As we saw in §3, nasal codas pattern with long vowels and glide codas/diphthongs in attracting stress and can therefore be considered heavy. The stem *cam* is therefore bimoraic and able to function as a minimal PWd. Although this is the only known FRA with a CVN stem shape, its behavior is exactly what we would expect from the quantity pattern in FRA stress and the proposal in this section.

The distribution of vowel shortening and the exponence of the plural prefix *Ci-* together support the complex recursive prosodic word structure entailed by the generalizations in (13) and illustrated in the



examples in this section. Recursive prosodic structure is both a long-standing and contemporary topic of debate in phonology (e.g., Ladd, 1986; Ito & Mester, 2007, 2009, 2012, 2013; Elfner, 2015; Bennett, 2018; Guekguezian, 2017; Idsardi, 2018; Miller & Sande, 2021), and the phonology of full and double reduplication in Nez Perce brings new evidence to this debate. The vowel length and plural exponence facts in Nez Perce support a view of the prosodic hierarchy that permits multiple recursively constructed prosodic words.

These data also demonstrate the special properties of maximal and minimal PWds. In this case, the maximal PWd is the domain of primary stress, while the minimal PWd is the target of *Ci-* adjunction in the morphophonology of reduplication. Case suffixation would also seem to apply at the maximal PWd level, accounting for the fact that case suffixes occur only once with fully- and doubly-reduplicated adjectives.

## 6 Discussion

This section presents two remaining points of discussion with respect to the fully- and doubly-reduplicated adjectives of Nez Perce and the proposal in this paper.

**6.1 *Adjectives vs. Nouns*** The failure of atonic shortening in CVVC-stem FRAs is exceptionless in the corpus. All attested CVVC-stem FRAs fail to shorten the unstressed stem in the singular and fail to shorten either stem in the plural (where plural data are available). Yet, looking to fully-reduplicated *nouns* reveals a different picture. Nouns with apparent CVVC stems regularly shorten in the unstressed stem. Some examples are given in (19).

(19) CVVC-stem reduplicated nouns permit atonic shortening (examples from Aoki, 1994)

qéet-qet	[qæt:t-qæt]	‘duck’
táas-tas	[tʰa:s-tas]	‘white female duck’
sáax-sax	[sa:χ-saχ]	‘fishhawk’
téep-tép	[tʰæ:p-tæp]	‘butterfly’
móol-mol	[mo:l-mol]	‘water container of horn or wood’

On the basis of these forms, I suggest that fully-reduplicated nouns and adjectives are not subject to the same phonological requirements, i.e., that their phonological properties are at least partly category-specific. Specifically, fully-reduplicated nouns are not prosodified as two PWds, but as one. This releases the unstressed stem of words like (19) from the minimal word requirement and its vowel therefore shortens as expected. This predicts that any nouns affixed with plural *Ci-* would exhibit unitary exponence, since there is only the one PWd. Such forms are unlikely to be numerous because of the restrictions on whether and how nouns will inflect for plural (see §2; Deal, 2016), but the one example I have found so far of a fully-reduplicated noun that pluralizes with *Ci-* indeed confirms this hypothesis, as shown in (20).

(20) Fully-reduplicated noun with *Ci-* plural (Aoki, 1994:67)

c’éew-c’ew	[tʰs’æ:w-ts’æw]	‘ghost (sg)’
c’i-c’éew-c’ew	[tʰs’i-tʰsæ:w-ts’æw]	‘ghost (pl)’

I conclude, therefore, that despite superficial similarities in fully-reduplicated nouns and adjectives, the adjectives are marked to prefer two-PWd prosodification, while the nouns are not. Their different patterns of vowel shortening and the one example of *Ci-* plural in a fully-reduplicated noun follow from this assumption.

**6.2 *Remaining puzzle*** Before concluding, I will present a remaining puzzle concerning fully- and doubly-reduplicated adjectives in Nez Perce. The generalizations presented here are not accounted for by the proposal given in §5 and await a fuller treatment in future work.

Many disyllabic FRAs exhibit a Vowel~Ø alternation between their singular and plural forms. Representative examples are given below. The location of the ‘Ø’ vowel is underlined>.

(21) Some stems have V~Ø alternation

qatat-qátat	qi-q tat-qí-q tat	[qi-qtat-‘qi-qtat]	‘solid, compact’
peqex-péqex	pi-p qex-pí-p qex	[pi-pqæχ-‘pi-pqæχ]	‘unlucky’
lokóy-lokoy	li-l koy-lí-l koy	[li-l koj-li-l koj]	‘slender’
yuk’úum-yuk’um	yi-y k’úum-yi-y k’um	[ji-j k’u:m-ji-jk’um]	‘wrinkled, crumpled’

Of course, many stems do not show the alternation, such as the others referenced throughout this paper. Some of these are repeated in (22) for comparison. They are otherwise-phonologically-similar to the stems that do not undergo the alternation.

(22) Some stems do not have V~Ø alternation

seqeḡ-séqeḡ	si-seqeḡ-sí-seqeḡ	[si-sæqæχ-'si-sæqæχ]	'rough, uneven'
cok'áy-cok'ay	ci-cok'áy-ci-cok'ay	[tsi-tso'k'aj-tsi-tsok'aj]	'disinterested'
yek'éem-yek'em	yi-yek'éem-yi-yek'em	[ji-jæ'k'æ:m-ji-jæk'æm]	'meek, gentle'

It is not generally possible to predict which stems will undergo this alternation and which will not.<sup>13</sup> There are some correlations with stem shape, e.g., all but one CV.CVC<sub>-G-N</sub> stem undergoes the alternation. The lone exception is *seqeḡ-séqeḡ* ~ *si-seqeḡ-sí-seqeḡ* 'rough, uneven', but there is nothing that phonologically distinguishes it from the undergoers (cf. *peqeḡ-péqeḡ* ~ *pipqeḡ-pípqeḡ* 'unlucky', for example). Among other stem shapes, about half of attested plurals show the alternation while the other half do not, again with no clear surface phonological differences accounting for their divergence. There is also no interaction with stress, as plural forms always have stress on a vowel that is not in the potentially-Ø position. Whether or not a stem undergoes the alternation does not affect (and is not affected by) surface stress in either singular or plural.

In general there is a great deal of V~Ø alternation reported for Nez Perce, some of which has been analyzed as epenthesis and some deletion. Crook (1999:26) notes that epenthesis occurs to break up underlying initial CC and CCC clusters, as there is sometimes a reason to set up underlying #CC(C) morphemes, and all sources agree that the maximal (and minimal) onset in Nez Perce is C (Aoki, 1970; Hoard, 1978; Rude, 1985; Crook, 1999). Crook (1999:387ff) also argues that a V~Ø alternation seen word-internally is an epenthetic process motivated by maintenance of penultimate stress, in the context of CC# being treated as heterosyllabic (e.g., *tupé?c* 'rib' ~ *tupe?ésne* 'rib (obj)' [note that c→s before a sonorant]), though Rude (1985:19) reporting on similar forms calls this vowel deletion (e.g., *tewlíkt* 'tree' ~ *tewlikítpe* 'in a tree'). Crook (1999) notes that deletion is an unlikely analysis because of forms like *qáhas* ~ *qahásna* 'milk (nom/obj)', where one might expect \**qáhs* in the bare form (cf. *púhs* ~ *puhúsne* 'inner skin (nom/obj)'; Crook, 1999:389). Crook countenances vowel deletion in other contexts (1999:405ff), and both syncope and deletion end up being tied to stress shifts under affixation. I believe it is fair to say that a comprehensive account of morphophonemic V~Ø alternation in Nez Perce has not yet been established.

In this context it is difficult to say whether the V~Ø alternation in pluralized FRAs is syncope or epenthesis (and even whether it is primarily phonologically or morphologically motivated). Since it is not possible to fully predict which forms undergo the alternation, this might tip the balance in favor of treating this as epenthesis rather than deletion. In other words, stems with the alternation might begin with an underlying CC cluster, which is repaired by epenthesis in singular forms and by incorporation of the *Ci*- prefix in plurals.<sup>14</sup> To pursue this analysis we would have to assume that the preference for *Ci*- to be an adjoining affixal clitic is violable and that the prefix may be incorporated into the stem's prosodic word when phonological reasons require it. This has the potential to undermine the proposal given above tying the multiple exponence of *Ci*- to its status as an affixal clitic, and it would also need to account for why the repair of a CCVC stem/syllable is a sufficiently compelling reason for *Ci*- incorporation but satisfying a word minimum amidst atonic shortening in CVVC stems is not.

To summarize, there is an intriguing further aspect of the surface phonology of Nez Perce fully-reduplicated adjectives in the form of a V~Ø alternation. But at present a comprehensive generalization of the phenomenon is elusive, as is its proper analysis in general and in the context of the foregoing proposal.

## 7 Conclusion

Fully- and doubly-reduplicated adjectives in Nez Perce show a number of interesting, systematic phonological and morphological properties, including quantity-sensitive primary stress, suspension of atonic

<sup>13</sup> Thanks are due to Amy Rose Deal for initiating the collection of these generalizations.

<sup>14</sup> For this to go through we would expect the vowel that appears in the first syllable of singular alternating disyllables to be predictable. Although there are some regularities in the distribution of vowels in disyllabic FRAs, the patterns do not clearly distinguish the alternating from the non-alternating stems, so this does not provide a ruling in favor of the epenthesis account. On the other hand, the V~Ø patterns that Crook argues are stress-motivated-epenthesis also involve only partially-predictable vowel qualities (1999:388).

shortening in small stems, and multiple exponence of the plural *Ci-* prefix in most forms. The stress data reported in §3 complicates the prevailing view of Nez Perce primary stress as penultimate and suggests that in at least some subsets of the lexicon (or as a function of some derivational processes), primary stress is quantity-sensitive and distributed according to different systematic principles. These principles were described in §3 but await further analysis and typological classification. The vowel length and plural exponence generalizations presented in §4 led to the proposal in §5 that fully- and doubly-reduplicated adjectives in Nez Perce evince a complex, recursive prosodic word structure where individual stems are prosodic words and *Ci-* is an affixal clitic to the minimal-PWd. Both sets of data converge on the further generalization that nasal codas contribute weight for both stress determination and word-minima, while other single consonants do not. At the same time, a puzzle remains in the form of an unexplained V~Ø alternation in doubly-reduplicated plurals.

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