Recursive prosodic structure in Nez Perce double reduplication
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**Background.** Full and double reduplication are found in nimipuutímt (the Nez Perce language), a Sahaptian language spoken in Idaho, Washington, and Oregon (Aoki 1963, 1970, 1994, Crook 1999, Deal 2016). Full reduplication is characteristic of many nouns (Ns) and adjectives (As), as in (1). (Examples are given in Nez Perce orthography, with a phonemic equivalent in IPA.)

(1)  
- a. yóos-yóos ‘blue’  
- b. cilp-cíilp ‘round’  
- c. seqex-séqex ‘rough’  
- d. xi'yáp-xi'yap ‘angry’

Some fully-reduplicated forms correspond to an extant non-reduplicated based, e.g., cilp ‘to encircle’. Others do not, e.g., there is no word *yóos.

An additional reduplicative process, a Ci- prefix, is used to mark plural:

(2)  
- a. kahát'o  
- b. qi'uy's

Fully-reduplicated forms can be pluralized with the Ci- prefix, which is typically expressed twice, once for each copy of the stem. The plural forms of the adjectives in (1) are given in (3).

(3)  
- a. yí-yóos-yí-yóos  
- b. ci-cilp-ci-cilp  
- c. si-seqex-si-seqex  
- d. xi'-xi'yáp-xí-xiyap

Although both Ns and As may be fully reduplicated, plural marking in Nez Perce is primarily limited to As, so As are the main source of doubly-reduplicated forms (Deal 2016).

**Proposal.** Full and double reduplication in Nez Perce are 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. Here I use patterns of vowel length and plural exponence to advocate for a complex recursive prosodic word structure. The proposal has two parts, in (4). Taken together, they yield the structures in (5).

(4)  
- a. Fully-reduplicated As are preferentially prosodified as two PWds nested in a larger PWd  
- b. Ci- is phonologically an affixal clitic (Selkirk 1996) that adjoins to a minimal PWd

(5)  
- a. Fully-reduplicated  
- b. Doubly-reduplicated

**Vowel length patterns.** Vowel length is contrastive in Nez Perce, but underlying length normally only surfaces when the syllable receives primary stress, otherwise shortening occurs (Crook 1999). Default primary stress in non-reduplicated Ns and As is penultimate (ibid.), though fully-reduplicated As deviate from penultimate stress in a complex but predictable pattern that depends on stem parity (whether mono- or disyllabic) and the distribution of quantity; I simply mark the stress location here.

Atonic shortening can be seen in fully reduplicated As like (1b) and (1d). While the presence of primary stress preserves the long vowel in one copy of the stem, the same vowel is shortened in the other copy: cilp-cíilp ‘round (sg)’ not *cilp-cíilp, and xi'yáp-xi'yap ‘angry (sg)’ not *xi'yáp-xi'yáp. This pattern continues in the plural forms (2b) and (2d). Stress has shifted to the second copy of the Ci- prefix in ci-cilp-ci-cilp ‘round (pl)’, so both stem vowels surface as short. In xi-xi'yáp-xí-xiyap ‘angry (pl)’, stress remains on the long vowel of the first stem, so its shortening pattern is similar to the singular form.
However, atonic shortening is blocked when it would result in a CVC stem, as (1a) shows. We observe *yoo-s-yoo-s ‘blue (sg)’, not *yoo-s-yoo-s. Likewise, in (3a) we find doubly-reduplicated yi-yoo-s-yi-yoo-s ‘blue (pl)’, not *yi-yoo-s-yi-yoo-s, despite the fact that neither long vowel receives primary stress. The blocking of atonic shortening occurs just in CV:C stems, which suggests three things: (i) that full reduplication prefers a bimoraic stem minimum, (ii) that CVC is light (cf. Crook 1999), and (iii) that Ci- is outside of the prosodic constituent that obeys the bimoraic minimum (because it does not ‘rescue’ shortening, i.e., *[yí-yos]-[yí-yos]).

These observations are accounted for with the structures in (5). Full reduplication involves two prosodic words, nested within a larger prosodic word. The larger, maximal PWd is the domain of primary stress assignment, but the smaller PWds must meet a bimoraic minimum. Regular atonic shortening is allowed to occur when a stem would satisfy the bimoraic word minimum irrespective of vowel length (CVCC or CV:CVC), but shortening is blocked when a monomoraic stem would result (*CVC). Moreover, since shortening in a CV:C stem is also blocked in the plural, Ci- behaves as an affixal clitic on the minimal PWd stems of full reduplication, i.e., the structure in (5b).

**Plural exponence.** This proposal receives further support from a surprising corner: a handful of fully-reduplicated As with CVC stems, which only show the plural Ci- prefix once:

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<tbody>
<tr>
<td>a.</td>
<td>kúc-kuc [ˈkuts-kuts]</td>
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<tr>
<td>b.</td>
<td>c’él-c’él [ˈts’æl-ts’æl]</td>
</tr>
<tr>
<td>c.</td>
<td>q’oc-q’oc [ˈq’ots-q’ots]</td>
</tr>
<tr>
<td>d.</td>
<td>kí-kúc-kuc [ˈkɪs-kuts-kuts]</td>
</tr>
<tr>
<td>e.</td>
<td>ci-c’él-c’él [ˈtsi-ts’æl-ts’æl]</td>
</tr>
<tr>
<td>f.</td>
<td>q’i-q’oc-q’oc [ˈq’i-ˈq’ots-q’ots]</td>
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A reduplicated CVC stem violates the bimoraic minimum twice if prosodified as in (5a), *[CVC]PWd*[CVC]PWd. Thus, I propose that the preferred repair is for both copies of the CVC stem to be prosodified into a single PWd, which permits satisfaction of PWd bimoraicity, as in (7a). The unitary exponence of Ci- dovetails precisely with this prosodification if Ci- is an affixal clitic that combines with (a minimal) PWd through adjunction and PWd recursion, (7b).

(7) a. Monomoraic stem singular PWd

<table>
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<tr>
<th>CVC</th>
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b. Monomoraic stem plural PWd

Relevance. Recursive prosodic structure is both a long-standing and contemporary topic of debate in phonology (e.g., Ladd 1986, Itô & Mester 2007, 2009, 2010, 2013, Elfner 2015, Bennett 2018, Idsardi 2018, Miller & Sande 2021), and the previously under-explored phonology of full and double reduplication in Nez Perce brings an additional perspective to the 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 assignment, while the minimal PWd is the target of Ci- adjunction in the morphophonology of reduplication. Finally, examining these data in the context of the rest of the phonology generates new insights into quantity, word minima, and stress in Nez Perce.