PROSODIC STRUCTURE IN SPOKANE MORPHOLOGY

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1. Introduction.

The interaction of phonological and morphological rules has been a major area of inquiry in the generative linguistics of this decade (cf. Kiparsky 1982), Selkirk (1984)). Studies of reduplication form a natural focus of this work (cf. Marantz (1982), Clements (1985), McCarthy and Prince (1986)). We propose to contribute to this discussion with an analysis of stress and reduplication in Spokane, an Interior Salish language of Eastern Washington. Of particular interest for the debate is Spokane's morphologically-determined stress placement and the relation of such a stress system to a complex morphological system; Salishan languages are sometimes described as polysynthetic (cf. Thompson (1979:731)).

We begin with an outline of a metrical account of stress in the language, drawing heavily on previous work by Carlson (1980, 1989). The stress analysis has implications for the description of four productive reduplication patterns, each of which is detailed and discussed in turn.

2.1. Morphological stress and the grid in Spokane.

Carlson (1989) summarizes previous work on Spokane stress (Carlson (1972, 1980)), illustrating that stress is morphologically determined. Root and suffix morphemes fall into classes which form a stress hierarchy:

(1) strong suffixes
strong roots
variable suffixes
weak roots
weak suffixes

When morphemes are combined to form words, stress falls on that morpheme which bears the features of the highest place in the stress hierarchy. This analysis enjoys a fair degree of agreement among Salishanists and several descriptions of other Interior Salish languages employ something like the hierarchy in (1) (cf. Mattina (1973), Gibson (1973)). Spokane is typical among Salishan languages in that prefixes are unstressed, but unlike some related languages in having no secondary stress.

As a rule, Salishan unstressed vowels are reduced, but Spokane extends this into a general rule deleting unstressed vowels, subject to certain conditions to which we will return.

The following data illustrate these processes. The strong reflexive suffix -sut will be stressed even if it appears with a strong root like $\underline{\dot{k}^{w}u\text{ł}}$ 'make, do'. Weak suffixes (e.g., transitive -nt) contain no vowels and therefore never receive stress.

(2) strong root + weak suffixes + strong suffix:
k̓ʷul̓-nt-sut -> k̓ʷl̓ncút 'He made himself.'
make-TRANS-REFL

The difference between strong roots and a weak root like <u>šil</u> 'chop' is demonstrated below, where each appears with the variable suffix <u>-exʷ</u> '2nd singular subject', but the suffix retracts stress only off of the weak root:

(3) strong root + weak suffixes + variable suffix:
k̓ʷul̓-nt-exʷ -> k̓ʷúl̓ntxʷ 'You made it.'
make-TRANS-2S

(4) weak root + weak suffixes + variable suffix:
šil-nt-exʷ -> šlntéxʷ 'You chopped it.'
chop-TRANS-2S

Carlson (1989) does not analyze (4) as an instance of stress shift, but only notes that variable suffixes fall between strong and weak roots in the hierarchy of (1). We analyze (4) as a result of stress shift on the basis of a generalization not discussed in Carlson (1989) but implicit in Carlson (1980): when a weak root is followed by a number of variable suffixes, stress goes on the first of these:

(5) weak root ... variable suffix ... variable suffix:
šil-nt-si-en -> šlncín 'I chopped you (up).'
chop-TRANS-2obj-1S

Stress is realized on a weak root only if no suffix is present; this is consistent with (1) or a stress shift analysis:

(6) prefix + weak root
hec-šíl 'It's chopped.'
PROG-chop

A stress shift analysis is attractive for two more reasons: first, it reconciles Spokane to the general Salishan tendency for stress to be a lexical property of roots (Thompson (1979:721)). Second, it is initially tempting to retain (1) and analyze (5) as expressing a generalization about what happens when a word contains two or more morphemes marked for identical values in the hierarchy, a contingency not discussed in Carlson (1989). Perhaps the first in a string of such morphemes receives stress by a general principle. However, a stress shift analysis wins out for (5); the following data show that when a word contains two strong suffixes, or a compound consists of two strong roots, the <u>last</u> of two like-valued elements receives the stress:

(7) strong root ... strong suffix ... strong suffix:
ʔamx̌ʷ-us-nt-sut-tn-eyeʔ-y -> ʔamx̌ʷsncutnéyʔey
shave-face-TRANS-REFL-INSTR-seem to-CONT
'He's pretending to shave his face.'

The surface form of (7) is the result of some phonological processes irrelevant to our point here; the thing to notice is the strong suffix <u>-eyeʔ</u> being stressed over the strong suffix sut. The compound in (8) below derives from the strong roots <u>k̓ʷen</u> 'try, choose' and <u>tew</u> 'to transact business':[1]

(8) strong root + strong root compound:
k̓ʷen-s-tew-cin -> k̓ʷistéwcn 'He went after groceries.'
try,choose-NOM-transact business-mouth,food,etc.

The data in (7) and (8) argue against the putative generalization supported by (5), in fact showing the need for a general principle targeting the final element in a string ambiguous with respect to the hierarchy in (1). This leaves (5) with no explanation but a stress shift analysis, supported by the distribution facts above: nothing in Carlson's (1989) analysis predicts the fact that the only position in which variable suffixes surface with stress is in immediate post-weak root position (ignoring weak suffixes). By generating stress in the weak root and retracting it to the nearest vowel, the distribution of variable stress is explained.

The addition of a stress shift rule to the phonology of Spokane requires a representation for stress which can be modified during the course of a derivation. We suggest the metrical grid as the proper formalism (cf. Prince (1983), Selkirk (1984)). The rule would be stated as follows, where the bracket would be labeled with the features of a weak root:

(9) Weak Shift:

```
x ]              ]   x
x ]   x  --->   x]   x
```

This rule has the advantage of correctly showing the suffixal vowel as adjacent to the root vowel at the relevant level of representation; alternative rule statements lacking some nonlinear representation for stress would employ crucial variables and require two rules:[2]

(10) straw-man linear stress shift rules:

a. V -> [+str] / [+str] X] Y ___
b. V -> [-str] / ___ X] Y [+str]

Seminal work in metrical theory (cf. Liberman and Prince (1977), Hayes (1981)) conclusively demonstrates the inadequacy of approaches like (10); we will not review those arguments here, but will assume a grid model henceforth.[3]

The move to adopt metrical theory is further supported because it allows considerable simplification of the analysis in (1). The five categories in the stress hierarchy are primitive in Carlson's (1989) treatment. However, if stress assignment is viewed as the creation of a grid from the lexical properties of the morphemes in a word, only two features are required. All roots and those suffixes which can bear unshifted stress share a feature [+stressable]. Second, strong roots and strong suffixes carry a feature [+strong].[4] The default value for each of these features is minus. Prefixes, since they do not interact with any of the prosodic rules, can be considered extrametrical as a class (cf. Hayes (1981)).

Our rules for building the grid are based on Selkirk's universal typology of such rules (Selkirk (1984:52-71); no special addenda to the theory are required. The basic procedure may be outlined as follows:

(11) i. create first grid level
ii. realize lexical stress
iii. move stress off weak roots
iv. in a series of same-level columns, make the last one most prominent

These rules will serve to determine the placement of primary stress; since the language does not display secondary stress, at some point non-crucial contrasts between grid columns will be neutralized. Below we formulate rule statements for each of the processes in (11).

The first grid level is created by a rule which delineates the stress-bearing unit of the language in question; our formulation designates vowels as the relevant unit, although further research could implicate the syllable as the stress-bearer in Spokane.

(12) Demibeat Alignment:
Align just one demibeat with every vowel.

This is rule is taken from Selkirk (1984:57); she argues that it is a universal rule, and is always the first grid-construction rule to apply.

The rules realizing lexical stress are Selkirk's Basic Beat Rules, which "align syllables with beats on the second metrical level by virtue of (a) their composition (i.e., the composition of their rime) and/or (b) their position with respect to a particular syntactic domain" (1984:54). She gives the following sample rule, on which the Spokane rule in (14) is modelled:

(13) Beat Addition:
Align a (basic) beat with the {first,last} syllable on the domain Word. Selkirk (1984:54)

The basic generalization about Spokane is that roots carry stress (cf. other Salishan languages); the fact that some suffixes must also be marked for stress is related to the root-like properties of those suffixes, which may be connected to their historical source as roots. The beat addition rule for Spokane must be sensitive to the two features mentioned above in order to derive all of the distinctions in (1):

(14) Spokane Beat Addition:
i. Align a beat with a morpheme marked [+stressable].
ii. Align a beat with a morpheme marked [+strong].

Note that there is no specification in (14) governing whether the beat aligns with the beginning or the end of the morpheme (cf. (13)). Spokane morphemes are usually monosyllabic, and there is some evidence that uncommon polysyllabic morphemes are lexically specified as to which vowel is targeted by the beat addition rules. The suffix -<u>éye?</u> 'seems to be' has two vowels, and the first is stressed, while it is the second vowel of the bisyllabic strong root <u>?ax̌íl</u> 'be a certain way' which is stressed.[5]

A few derivations will serve to illustrate the system as it stands. The following sample lexicon recasts the data in (2) - (6) in terms of our new features.

(15) Sample lexical entries

k̓ʷul̓	'make, do', root, [+stressable], [+strong]
šil	'chop', root, [+stressable]
sut	'reflexive', suffix, [+stressable], [+strong]
eye?	'seem to be', suffix, [+stressable], [+strong]
exʷ	'second person singular subject', suffix
nt	transitive stem-forming suffix
hec	'progressive', prefix [+extrametrical]
cin	'mouth, food, language, tongue' lexical suffix, [+stressable]

We have included in (15) the lexical suffix -cin shown in (8); this addition is to illustrate that the two features are distributed evenly among roots and suffixes. Lexical suffixes, a common feature of Salishan, have semantic properties typical of free morphemes and have a historical source as roots.[6] It could be that there is a unified semantic feature common to all [+stressable] morphemes, but we will not pursue this possibility here.

The lexical entries in (15), plus the rules of Demibeat Alignment and Beat Addition, will create the following representations for the data in (2), (3) and (4):[7]

```
(16)
a.   x        x     b.  x            c.                  Beat Addition ii
     x        x         x                    x           Beat Addition i
     x        x         x       x            x      x    Demibeat Alignment
    k̓ʷul̓-nt-sut       k̓ʷul̓-nt-exʷ          šil-nt-exʷ
```

Most of the distinctions implied in (1) are present in (16), but it remains to resolve the conflict between the same-height columns in (a) and account for the behavior of the weak root in (c). Taking the second task first, if we assume a default rule applies to fill in [-strong] to all morphemes unmarked for that feature underlyingly, Weak Shift can be stated in terms of [-strong], and can employ the formalism introduced in (9). Compare the examples in (18) below. The first continues the derivation for (16.c), while the second provides the grid for (6) above.

```
(18) a.              b.
                                  Weak Shift ->
      (x) -> x               x    Beat Addition i (gives (x))
       x     x               x    Demibeat Alignment
      šil-nt-exʷ      hec-šil
     [-strong]            [-strong]
```

Since there is no grid column after šil in (18.b), the structural description of Weak Shift is not met. Stress is moved off the root in (18.a), correctly deriving the contrast between (4) and (6) above.

Weak Shift will move stress off of a root, or off of the combination of a root plus certain stem-building suffixes, but will not move stress from the combination of a root plus other suffixes. We attribute this to the latter's lack of ability to percolate the [-strong] feature.

One last rule is required to resolve the "stress conflict" in (16.a); this rule was hinted at with regard to (7) and (8), and is formalized in (19).

```
(19)                                   x
          Clash Avoidance:  x  x  ->  x  x
```

The Clash Avoidance rule creates the desired grids below, continuing (16.a) and deriving (7)); Weak Shift is not applicable.

```
(20)
a.        x   b.                   x       Clash Avoidance
   x      x      x          x      x       Beat Addition ii
   x      x      x    x     x      x       Beat Addition i
   x      x      x    x     x      x x     Demibeat Alignment
  k̓ʷuƚ-nt-sut     ?amx̌ʷ-us-nt-sut-tn-eye?-y
```

The system can now derive the results of Carlson's (1989) analysis, as well as accounting for several generalizations not discussed in that work. The various grid levels created by the four rules are further motivated by an investigation into the prosodic properties of lexical suffixes, presented in the next section. Since Carlson (1989) does not discuss lexical suffixes, they provide a perfect testing ground for the present analysis.

2.2. Stress and lexical suffixes.

The prosodic behavior of weak roots mandates the use of two features, rather than a simple binary opposition governing lexical stress. A morpheme can be plus or minus [stressable], and if it is [+stressable], it may be [+strong]. Lexical suffixes comprise another category, which, like weak roots, must be specified as being able to bear unshifted stress, but which defer prosodically to a [+strong] morpheme. There are also a few strong lexical suffixes, which behave like the strong grammatical suffix in (2). Some more lexical entries serve to illustrate these points, augmenting the list in (15) and providing the basis for derivations to follow:

```
(21) Sample lexical entries, continued:
     ičn   'back',  lexical suffix, [+stressable]
     ewl 'vehicle', lexical suffix, [+stressable][8]
     ečst  'hand',  lexical suffix, [+stressable]
     qinšn 'leg',   lexical suffix, [+stressable][9]
     cin   'mouth, words', lexical suffix, [+stressable]
     utye? 'around on a surface' lexical suffix, [+stressable],
     compare:                                    [+strong]
     ƚas   'hard',        root, [+stressable]
     ćiq́   'throw it',    root, [+stressable]
     caq   'put, place', root, [+stressable]
     en    'first person singular subject', suffix
```

The present analysis predicts that a [+stressable] lexical suffix will receive stress if it appears with a weak root, but not with a strong root. This prediction is met, as shown below in the stress derivations for the surface forms <u>šléwln</u> 'I chopped down a tree to make a boat for him' and <u>k̓ʷúƚuɬn</u> 'I made a vehicle for him', continuing with our practice of abstracting away from the effects of productive phonological rules like Unstressed Vowel Deletion.[10]

```
(22) a. weak root          b. strong root
            x                   x                Clash Avoidance
            |                   x                Beat Addition ii
         x  x                   x  x             Beat Addition i
         x  x      x            x  x      x      Demibeat Addition
        šil-ewl-nt-en          ƙʷuľ-ewł-nt-en
    chop-vehicle-TRANS-1S  do-vehicle-TRANS-1S
```

The correct results are derived in the derivations of (22), but this contrast could have been effected by Weak Shift if lexical suffixes were analyzed as having no underlying stress features. Motivation for the feature values in (21) is provided by the following generalization: when multiple lexical suffixes follow a weak root, stress falls on the final lexical suffix. Surface nƭsčnéčst 'callous' is an example, showing that Clash Avoidance must be operative, and therefore that lexical suffixes are [+stressable]:

```
(23)
                     x               Clash Avoidance
                     |               Beat Addition ii
             x   x   x               Beat Addition i
             x   x   x               Demibeat Addition
          n-ƭas-íčn-ečst
         in-hard-back-hand
```

Weak Shift is (correctly) non-applicable in this derivation only if íčn and ečst are analyzed as being [+stressable]; if they did not bear this feature, stress would incorrectly retract onto the first suffix, deriving the ungrammatical *n-ƭas-íčn-ečst.

The lexical suffix facts support the present analysis because they show that [+/- stressable] and [+/- strong] are distributed freely among morpheme types, as would be expected of lexical features. The following examples show that [+strong] is distributed among lexical suffixes; a strong lexical suffix takes the stress over sixʷ 'pour', a strong root, in snsexʷmútye? 'pancake'.[11] The derivation is shown in (24.a) below; (24.b) provides a simpler example sułtúmš 'He asks people (for information)'.

```
(24)  a.
                        x            Clash Avoidance
                  x     x            Beat Addition ii
                  x     x            Beat Addition i
                  x     x  x         Demibeat Addition
              s-n-sixʷ-m-utye?
         NOM-in-pour-REP-DER'm'-around on a surface

      b.
                  x                  Clash Avoidance
             x    x                  Beat Addition ii
             x    x                  Beat Addition i
             x    x                  Demibeat Addition
           sew-łtumš
           ask-people
```

While the lexical suffixes support our feature characterization of Spokane prominence, there are some grammatical suffixes which provide further evidence for our other central claim, that a rule of beat movement is responsible for the difference in behavior of the strong versus weak roots. This evidence is presented in the next section.

2.3. Weak shift and epenthesis.

With the Weak Shift rule, the present analysis can help account for some otherwise puzzling facts about a set of stem-forming suffixes; the -nt suffix of (15), the 'inchoative' -p, and the 'middle' -m, (and a few others) surface with a vowel only when they attach to a weak root and no other vowel-containing suffixes are present. This is demonstrated with the imperatives, which are formed without person markers:

(25) a. weak root imperative:
šil-nt -> šlínt 'Chop it!'
chop-TRANS

čuw-p-š -> čwúpš 'Shut up!'
quiet-inchoative-IMP,sg

n-čr-p-š -> nčrípš 'Swim!'
in-swim-inchoative-IMP,sg

caẍʷ-nt -> cẍʷúnt 'Head it off!'
headed off-TRANS

b. strong root imperative:
ćew̓-nt -> ćéw̓nt 'Wash it!'
wash-TRANS

Now, the vowel in (25.a) is clearly epenthetic; its quality is predictable and there is no evidence that it is underlyingly part of the suffixes in question. Weak Shift takes place in (25.a); compare (25.b), which shows a strong root taking the stress, as we would expect.

When these vowelless suffixes (-nt, -p, etc.) attach to roots, they occasion a certain kind of prosodic illformedness with regard to Spokane stem structure. In Spokane, as in other Salish languages, the overwhelming majority of roots are of the shape CVC. Historically, this shape was probably the only one allowed, but at present the languages display a number of CVCC roots which cannot be analyzed with reference to the historical suffixation process which originally created the consonant cluster. But even in the synchronic grammar, such roots exhibit strange prosodic properties which we cannot review here. We suggest that what was once a lexical constraint on CVC roots has shifted to a prosodic constraint on roots and stems: they are subject to syllabification rules which value the CVC structure. The syllabification rules create the following configuration:[12]

```
(26)      Syllabification:
                            σ
                           / \
                          C   m
                             / \
                            V   C
```

Elements not incorporated into this prosodic structure are extrasyllabic and are subject to rules which conspire to reduce extrasyllabicity within stems. One such rule is given below, where an extrasyllabic consonant is abbreviated C':

(27) Stem Epenthesis: $\emptyset \rightarrow V \ / \ ]_{root} \_\_\_\_ C'$

Stem Epenthesis operates to incorporate the stem-building suffixes into the prosodic structure of the stem. The derivation in (28) illustrates the operation of Stem Epenthesis and Weak Shift to derive the imperative forms of weak roots.

```
(28)  a.   šil-nt  ->  šilVnt     Stem Epenthesis

           x                      Beat Addition i
           x x                    Demibeat Alignment
      b.   šilVnt

             x
           x x                    Weak Shift
      c.   šilVnt

      d.   šlínt                  Vowel Quality,
                                   Unstressed Vowel Deletion
```

2.4. Summary of rules.

The following summarizes the relevant phonological rules of Spokane. They apply cyclically, in the order given. Unstressed Vowel Deletion, is given but not formalized in (29); the stress rules are repeated informally. Resonant Glottalization will be treated in later sections.

```
(29)  Rules:
      Syllabification:      σ
                           / \
                          C   m
                             / \
                            V   C
```

Stem Epenthesis: $\emptyset \rightarrow V \ / \ ]_{root} \_\_\_\_ C'$

Demibeat Alignment: V gets a beat

Beat Addition i: [+stressable] gets a beat

Beat Addition ii: [+strong] gets a beat

(29, continued)

Weak Shift: Move stress off a [-strong] constituent.

```
                                x
Clash Avoidance:    x x  ->    x x
```

Unstressed Vowel Deletion: (informal)
Delete a V dominated by a non-maximal grid column.
Condition: A vowel adjacent to a laryngeal does not delete.

Resonant Glottalization: (informal)
Spread the lexically marked feature [+glott] to all resonants in a word.

3. Reduplication.

Having introduced the analysis of Spokane phonology, we can now turn to a discussion of reduplicative forms in the language, again taking Carlson's (1989) analysis as a point of departure. Particular attention will be paid to the interaction of the morphological aspects of the reduplications and their phonology as defined by the rules in (29).

3.1. Out of control.

The first kind of reduplication we will review provides more evidence for the rule of Weak Shift. The following data exemplify the reduplication, which copies the first vowel and second consonant of the base and is glossed as 'out of control':[13]

(30) a. strong root with VC out-of-control reduplication:
k̓ʷul̓-ul -> k̓ʷúl̓l̓ 'It was born, created, baptised'
make-OC

miƛ̓-iƛ̓ -> miƛ̓ƛ̓ 'it got smeared on by accident'
smear-OC

b. weak root OC reduplication
šil-il -> šlíl 'It accidently got cut'
chop-OC

t̓uk̓ʷ-uk̓ʷ -> t̓k̓ʷúk̓ʷ 'It fell over by accident'
lie-OC

The OC reduplicated data in (30) exhibit the now familiar asymmetry between strong and weak roots, with stress once again falling one vowel further to the right in weak forms than in strong forms. We know from this that Weak Shift is operating in (30.b), so we turn first to the simpler derivation for (30.a) in order to focus on the description of the reduplication.

The analysis of (30.a) is not without issues for phonological theory.

Broselow and McCarthy (1983) outline how Marantz' (1982) model for reduplication encounters some difficulties in accounting for the cognate reduplication in Lushootseed; the reduplicated material does not come from the periphery of the root, which is the normal case. The problems with internal reduplication of this type have also been described in Davis (1988) and Sloan (1989). McCarthy and Prince (1986) provide a framework in which OC can be analysed as copying peripheral segments, as long as a prosodic constituent, rather than the root, is identified as the base for the reduplication. The relevant prosodic constituent, we claim, is the mora, described in (26) above.[14] With this assumption, we can simply say that OC involves suffixation of VC to the (initial) mora of the root.[15]

In the widely accepted analysis of reduplication provided by Marantz (1982), reduplicative patterns are treated as empty skeletal affixes arising from normal word-formation rules, and are filled out autosegmentally. The derivation of the forms in (30.a) would proceed as follows under this framework. Broselow and McCarthy (1983) and McCarthy and Prince (1986) argue that the copying procedure which creates the new phonemic material for the reduplication only copies the melody of the constituent which forms the base for the affixation. Thus, in the derivation below, only the phonemic melody of the base mora has been copied. Right-to-left association is the normal case for suffixal reduplication (cf. Marantz (1982)).

(31)

```
C V C
| | |     ---> syllabification --->
k̓ʷu ɬ

  σ
 / \
C   m
   / \
  V C
| | |     ---> affix OC --->
k̓ʷu ɬ

  σ
 / \
C   m
   / \
  V C
| | |              ---> Demibeat Alignment, Beat Addition i, ii, copying --->
k̓ʷu ɬ

          u ɬ
   m
  / \
C V C V C
| | |              ---> Associate  R-L  --->
k̓ʷu ɬ
  x   x
  x
  x
```

(31, continued)

```
          u r̓
   m     / /
  / \   / /
C V C V C
| | |              ---> Unstressed Vowel Deletion --->   k̓ʷúr̓r̓
k̓ʷu r̓
  x   x
  x
  x
```

The assumption that only the mora melody copies is justified by strong roots of the form CVCC, for example, ?ač̓x̌ 'watch, look at': the OC form is ?ač̓č̓x̌ 'observe'. If the entire root melody copied, right-to-left association would render the illformed *?ač̓x̌x̌.

Now that the operation of OC reduplication has been illustrated, the derivation for (30.b) is a straightforward matter; as (32) shows, Weak Shift applies to the output of OC reduplication, and the reduplicated vowel ends up being stressed.

(32)

```
C V C
| | |     ---> syllabification --->
š i l

  σ
 / \
C   m
   / \
  V C
| | |     ---> affix OC --->
š i l

  σ
 / \
C   m
   / \
  V C + V C
| | |                ---> Demibeat Alignment, Beat Addition i, copying --->
š i l


          i l
   m
  / \
C V C V C
| | |              ---> Associate R-L  --->
š i l
  x   x
  x
```

(32,continued)

```
          i l
   m     / /
  / \   / /
C V C V C
| | |             ---> Weak Shift --->
š i l
  x   x
  x
          i l
   m     / /
  / \   / /
C V C V C
| | |             ---> Unstressed Vowel Deletion  --->  šlíl
š i l
```

Weak roots of the shape CVCC serve to motivate both Weak Shift and the restriction on the copying procedure; calx̌ʷ 'clustered' produces the OC form cllx̌ʷntén 'I laid a bunch of round things down accidentally'. The suffix -en receives the stress by Weak Shift.[16] Only the l is reduplicated, as is expected if the copying procedure only affects the melody of the mora, and the reduplicated vowel deletes after stress moves off the weak root.

3.2. Plural.

The next kind of reduplication is prefixal, and as such does not interact with the stress analysis. The plural reduplication (PL) constitutes a copy of the first CVC of the base.

(33) strong and weak roots with CVC Plural:

k̓ʷuľ-k̓ʷuľ -> k̓ʷľk̓ʷúľ 'A bunch of people are working,
PL-do doing something'

šil-šil -> šlšíl 'A bunch of things are chopped'
PL-chop

The stress analysis of these is straightforward - stress is generated on, and remains on, the root vowel. The extrametrical status of all prefixes in the language, including PL, predicts that the reduplication process will be unaffected by the presence of stress-attracting suffixes; this prediction is borne out by the surface forms below:

(34) šl-šl-nt-éxʷ 'You chopped some things.'
PL-chop-TRANS-2S

kʷn-kʷn-m-útye?-st-n 'I embraced them.'
PL-take-DER-around-CAUS-1S

3.3. Diminutive.

The diminutive reduplication (DIM) deserves more comment, however. Carlson (1989) analyzes the diminutive as prefixal reduplication of the first CV; glottalization of the resonants in the resulting word accompanies this reduplication:

(35) DIM surface forms:
a. strong root
kʷúkʷl̓ 'Something small is created, made.'

b. weak root
ššíl̓ 'A small thing is chopped.'

Here we have the familiar asymmetry between strong and weak roots, with the stress showing up one syllable to the right in the weak roots; Weak Shift must be at play. But Weak Shift cannot be operable if the reduplication is prefixal, as Carlson (1989) claims; stress wouldn't interact with the diminutive any more than it does with the plural in (33). In fact, Carlson (1989) must stipulate the diminutive morpheme as idiosyncratically taking the stress off a strong root only.[17] Our solution to this problem is to claim that DIM is a CV infix inserted after the first V. This is a case of what Broselow and McCarthy term "true infixing reduplication", in which a copy of root-peripheral material is inserted into the middle of a base.

(36) kʷú-kʷu-l̓ -> kʷúkʷl̓
make-DIM 'Something small is created, made'

(37) ší-ši-l -> ši-ší-l -> ššíl̓
chop-DIM 'A small thing is chopped'

The stress rules apply regularly to derive initial stress with a strong root, and Weak Shift will correctly stress the reduplicated vowel after a weak root, as illustrated in (36) and (37).[18]

3.4. Repetitive.

The fourth and final reduplication discussed in Carlson (1989) is the Repetitive (REP). It has two surface allomorphs: an infix -<u>e</u>-, and this -<u>e</u>- preceded by a copy of the first root consonant. Like DIM, it triggers resonant glottalization:

(38) a. š-e-l̓ṅtéṅ 'I chopped it up repeatedly'
b. kʷ-e-kʷúl̓ 'Something is made over and over.'
š-e-šíl̓ 'Something is chopped repeatedly'

In exploring REP forms, we first consider the unusual disjunction in the shape of the two allomorphs, and second, the distribution of these allomorphs. With any case of differing surface shapes for a single morpheme, it is reasonable to ask which form bears closest resemblance to the basic form of the morpheme. Carlson (1989) in effect treats the reduplicative form as basic; we suggest instead that the infix is the basic form of REP in Spokane, and the reduplication of the initial consonant arises only when the conditions for infixation are not met. This suggestion will be supported to the extent that we can provide a cogent analysis which relies on it.

First, consider the behavior of the infix -<u>e</u>- in (38.a). It is similar to other infixes in the language, for example, the infix -<u>?</u>- which signals a type of plural. This plural infix is inserted after the stressed vowel, wherever it appears in the word; compare x̌ʷúy 'He went' with x̌ʷú?y 'They went'. Where is the REP -e- inserted within a word? A look at its distribution will help answer this question.

The REP infix appears within weak roots which have shifted stress to a suffix, as shown in (38.a) and the following, in which the infix is lowered to -a- before a following uvular:

(39) ć-a-ṗq̓-ńt-éń 'I stuck it in more than one place'
stick-REP-TRANS-1S

It also appears within strong roots that have lost their stress to a strong suffix:

(40) hec-k̓ʷ-e-ľ-m̓-éẏ?e-ẏ 'He's just passing the time.'
PROG-do-REP-DER-seem to-CONT

ẇ-e-č-m̓tús 'He's having hallucinations.'
see-REP-visions

Finally, the infix occurs with the small number of roots of the shape CCVC, regardless of where the stress falls; the following examples show the weak root q̓sip 'long time ago', and the strong root ptax̌ʷ 'spit', the final consonant of which conditions the lowering of the infix.

(41) s-n-q̓-e-sp-ľs-cút-ń 'second-hand store'
NOM-in-long time ago-REP-feeling-REFL-INSTR

s-n-p-a-táx̌ʷ-m̓ń 'spitoon'
NOM-in-spit-REP-INSTR

If the effects of the stress rules and Unstressed Vowel Deletion are taken into account before the application of REP, the unifying feature of the three environments in (39) - (41) becomes clear: the infix targets a root-initial extrasyllabic consonant. It was noted earlier that the unmarked syllable structure of Spokane stems is CVC; application of the syllabification rules to the underlying CCVC roots in (41) would render the first C extrasyllabic, and Unstressed Vowel Deletion would derive the same prosodic configuration for the underlying CVC roots of (39) and (40).[19] The following derivations illustrate; recall that prefixes are extrametrical, and as such neither participate in the syllabification process or in the resonant glottalization triggered by REP.

```
(42)  a.                          /ptax̌ʷ/
          Earlier cycles:  s-n-ptáx̌ʷ-mn
          Syllabification:       σ
                                / \
                               C    m
                                   / \
                                  V   C
                               |  |   |
                   (s-n-) p    t  a   x̌ʷ -mn

          REP infixation:  (s-n-)p-e-táx̌ʷ-mn
          Glottalization:  (s-n-)p-e-táx̌ʷ-m̓ń̓
          Lowering:        s-n-p-a-táx̌ʷ-m̓ń̓     'spitoon'

      b.                          /wič/
          Earlier cycles:   wč-mtús
          Syllabification:       σ
                                / \
                               C    m
                                   / \
                                  V   C
                               |  |   |
                  w č - m      t  u   s

          REP infixation:   w-e-č-mtus
          Glottalization:   w̓-e-č-m̓tús     'He's having
                                             hallucinations.'
```

Cyclic derivation of (42.b) is required to allow Unstressed Vowel Deletion to correctly create an extrasyllabic C which the infix may be inserted after; further research will support the implicit claim that REP applies late in the list of word-building processes of Spokane. The derivation in (42.a) shows that the extrasyllabic segment is occasioned by the application of the structure-building syllabification rules to a nonderived root with an initial consonant cluster. Each creates the target environment for REP infixation.

A few factors can combine, however, to create forms which lack an extrasyllabic segment available to the infix. When stress falls on a CVC root, strong or weak, Unstressed Vowel Deletion is inapplicable and all stem segments are syllabified. When a root vowel is adjacent to a laryngeal, it cannot delete due to the protective qualities of the latter, discussed above. In this case, too, a root-initial consonant will be syllabified prior to the application of REP infixation. Two examples appear in (38.b), more appear below; the weak root qʷeʔ 'familiar with', has a glottal stop which protects its root vowel from deletion, and a uvular which conditions the lowering of the infix:

(43) qʷ-a-qʷeʔ-m̓n̓-cút   'He practiced.'
REP-familiar with-INSTR-REFL

n̓-e-n̓íč   'Something is cut repeatedly.'
REP-cut

l̓-e-l̓úk̓ʷ-s   'wooden mask'
REP-wood-face

These forms lack an anchor for the REP -e̲-, and in these forms only, a process of reduplication copies the root-initial consonant, manufacturing the requisite extrasyllabic segment. REP infixation can then proceed normally, as shown in the derivation below:

```
(44)                      /nič/
          Syllabification:     σ
                              / \
                             C   m
                                / \
                               V   C
                             |  |  |
                             n  i  č
          (no extrasyllabic segment)
          Reduplication:   nnič
          Syllabification:     σ
                              / \
                             C   m
                                / \
                               V   C
                             |  |  |
                         n   n  i  č

          REP infixation:   n-e-nič
          Glottalization:   ń-e-ńíč     'Something is cut
                                          repeatedly.'
```

The analysis now accounts for the distributional facts regarding repetitive forms. Note that Unstressed Vowel Deletion never deletes the infix -e̲-, even though it is unstressed. We tentatively suggest that the infix is protected by a glottal stop at the relevant level of representation; the protective segment surfaces in the cognate -a̲?̲- infix in the closely related language Colville-Okanagan: cf. ɬ̲ə̲č̲ɬ̲-̲a̲?̲-̲č̲á̲p̲ 'he jumps up and down' (Mattina (1987a)). Perhaps in Spokane the glottalization of resonants is the surface realization of the protective glottal stop. We will not pursue this suggestion here, however, since DIM triggers the same glottalization, but lacks the protective quality, and as yet it is unclear what distinguishes the two affixes in terms of their underlying representation of this feature. Neither are we able to provide a completely unified underlying representation for the two allomorphs of REP, leaving open the question of whether the reduplicative C template forms part of the UR for the infix, or some other mechanism is involved. At this point we are content to give the following lexical entry for the REP morpheme, comparing it with the plural infix -?̲- and the true reduplications discussed earlier:

(45) lexicon, revisted. (cf. (15), (21))

ʔ	'plural',	infix, inserted after stressed vowel
e | [+glott]	'repetitive',	infix, inserted after C' If C_1 not C', then reduplicate C_1.
CVC	'plural',	prefix, [+extrametrical]
VC	'out of control',	suffix on root mora
CV | [+glott]	'diminutive',	infix, inserted after root V

NOTES

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[1]The unstressed [i] in the surface form <u>**k̓ʷistéwcn**</u> is the result of a phonological rule changing certain nasals to vowels, ordered after unstressed vowel deletion. See Carlson (1976) for details.

[2](10.b) would not be required under a theory which included a Stress Subordination Convention (cf. Chomsky and Halle (1968)). However, standard arguments in metrical theory rally against the validity of such a convention, supporting our grid theory for Spokane.

[3]Since Spokane does not require reference to metrical feet, we have chosen the simple grids of Selkirk (1984) for our model; the analysis would be equally compatible with the augmented grid representations of Hammond (1984) and Halle and Vergnaud (1987).

[4][+/- strong] seems to us the logical heuristic for this feature, given the history of the analysis of Spokane stress (cf. (1)); this name is not to be confused with the s(trong) label employed in Liberman and Prince (1977), Hayes (1981) and related work. The latter expresses a local relation of relative prominence between metrical constituents, and is always paired with a w(eak) sister. The Spokane label is the type of lexical feature needed in any system in which stress is morphologically determined.

[5]This is not unreasonable, given the history of such forms; for example, the <u>eʔ</u> in <u>éyeʔ</u> clearly derives from a historical suffix, probably <u>-m̓</u> which vocalized. The strong root <u>púteʔ</u> 'be exact, be able, be correct, to honor' contains the same element, as does the weak root <u>ʔócqeʔ</u> 'go out'.

[6]A number of Salishanists (including Egesdal (1981) and Mattina (1987b)) have traced the development of lexical suffixes from roots. Carlson (in press) presents evidence internal to Spokane which suggests that productive

compounding, especially of nominal objects and locatives led to the set of bound morphemes referred to as lexical suffixes.

[7]The derivations in (16) are presented as though the stress rules apply noncyclically; this is for ease of exposition. There is reason to believe that all of the phonological rules discussed in this paper actually apply cyclically, a possibility which we will not discuss here. In any case, cyclic derivation is not crucial for the forms cited in this section.

[8]The suffix -ewl has a variant form -ewɬ, which is not phonologically predictable and will be treated as a UR.

[9]The form -qiṅšn 'leg' is historically a compound lexical suffix composed of -qin 'head' and -šin 'foot'; the vowel of the second is lost in the fused form and does not participate in the prosody of -qiṅšn. There are other complex lexical suffixes of this type.

[10]The vertical line in (22.a) is intended to show that it is Weak Shift, not Beat Addition II which makes ewl the most prominent in its domain; wellformedness conditions on grid structures prevent "holes" in grids (cf. Selkirk (1984)), and the resulting column over ewl has only three levels. We will continue to use the vertical line as a placeholder for the exposition of grid derivations.

[11]The first vowel in the surface form snsexʷṁútẏe? 'pancake' is the Repetitive infix -e-, to which we return in Section 3.4.

[12]This is a relatively uncontroversial syllable structure for CVC, which we will not justify here. The vowel forms a constituent with a single following consonant; we label this constituent m for Mora, following McCarthy and Prince (1986), although Rime would serve as well for our purposes.

[13]A number of linguists have recognized control as a category in Salish languages. Morphemes indicate whether an agent is in control of a situation or not. OC reduplication in Spokane indicates that something has happened by accident, by spontaneous occurrence, as a result of natural phenomena, or simply by the lack of control an entity has in a situation (cf. Carlson and Thompson (1982)).

[14]Sloan (1989) suggests a similar account for the cognate reduplication in Lushootseed.

[15]The template itself could also be analysed as consisting of an empty mora, instead of the VC template we suggest. The former would be more in keeping with suggestions of McCarthy and Prince (1986) and Sloan (1989).

[16]This requires cyclic application of Weak Shift. See Footnote 7.

[17]Further, Carlson (1989) notes some truly exceptional stress facts involving PL forms which take stress on the prefix, the problem with such a treatment is that it is impossible to formally distinguish the normal behavior of the DIM from these manifestly exceptional cases in the PL.

[18]As noted in Carlson (1989), some strong root diminutives have an

optional form in which stress appears on the infix; along with the expected ńíňč 'Something small is cut', the form ńńíč is also attested.

[19]It should be kept in mind that the CVC syllable structure is primarily a constraint on stem structure, and that extrasyllabic consonants are allowable in Spokane surface representations, especially as the result of non-stem-building morphology; the surface forms in (41) serve to illustrate Spokane's tolerance for surface consonant sequences.

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