A Newly Discovered Reduplication Pattern in St'át'imcets and its Implications*

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Abstract: There are two parts to this paper. In the first, we argue that what van Eijk (1997) labels *consonant reduplication* in St'át'imcets (Lillooet Salish) actually consists of two distinct stress-aligned C_1 reduplication processes: the first, which we refer to as VOWEL REDUCING $<C_1>$ reduplication, is associated with diminutive semantics; the second, which we call VOWEL RETAINING $<C_1>$ reduplication, is associated with pluractional semantics. In the second part of the paper, we subject the two processes to a detailed phonological analysis, employing Stratal Optimality Theory and Generalized Non-Linear Affixation (GNLA): we show that both occupy the same stratum and are subject to the same set of constraints, but differ in their input: vowel reducing $<C_1>$ reduplication involves simple affixation of a mora, while vowel retaining $<C_1>$ reduplication involves affixation of a lexically stressed mora.

Keywords: St'át'imcets, Salish, reduplication, diminutive, pluractional, phonology

1 Introduction

As described by van Eijk (1997:55–66), there are four main types of reduplication in St'át'imcets (a.k.a. Lillooet, ISO 639-3: lil), for which he adopts the terminology first devised by Kuipers (1967) for neighbouring Sḵwx̱wú7mesh (Squamish).

A. *Total reduplication:* reduplication of the first two consonants of the root, usually with an epenthesized schwa. This process is often referred to as C_1C_2 or CVC reduplication elsewhere in the Salish literature. In St'át'imcets, it has two main functions: *plural* (including plurality of entities in the nominal domain and pluractionality in the verbal domain) and *property denoting* (the equivalent of the "characteristic" function referred to by, e.g., Czaykowska-Higgins 1993a).[1] Examples of plural nouns with C_1C_2 reduplication include ***snək̓ʷ****núk̓ʷa?* 'cousins, relatives, friends', ***sɣəp****ɣáp* 'trees, forest', and *sqʷə́m****qʷəm*** 'mountains, mountain range'; examples of pluractional verbs with C_1C_2 reduplication include ***səq̓ʷ****sáq̓ʷ* 'fly many times and/or of many things', ***məl****mə́l̓-xál* 'be contagious, of disease (infect many people and/or many times)', and ***x̌ət****x̌ə́t?ílx* 'limp (repeatedly and/or of many people or animals)'; examples of property-denoting C_1C_2 reduplication include *kín****kənt*** 'dangerous', *lə́x****lə́x̌*** 'intelligent', and ***nəs****nús* 'damp'.[2]

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[1] Czaykowska-Higgins (1993a) argues that for Nxaʔamxcín (Moses Columbia Salish) "augmentative" (i.e., plural) C_1C_2 reduplication should be treated as separate from characteristic reduplication. Van Eijk (1997:61–66) does not make this distinction in St'át'imcets, although a case could be made for it: plural(actional) C_1C_2 reduplication would be prefixal, and characteristic C_1C_2 reduplication would be infixal.

[2] We employ the North American Phonetic Alphabet (NAPA) in this paper, as in van Eijk (1997, 2013/in prep.). Glossing abbreviations are as follows: ACT = active intransitive marker, AUT = autonomous (lexical

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B. *Initial reduplication*: reduplication of the first consonant of the root. This process is often referred to as C_1 or CV reduplication elsewhere in the Salish literature. In St'át'imcets, it is residual (with plural meanings for nouns and adjectives, and continuative meanings for verbs), confined to narrow semantic domains (for example, marking 'human' on certain numerals), or completely lexicalized. Plural nouns with initial C_1 reduplication include *s**q**ʷ**ə**q*ʷ*yíc* 'rabbits' and ***q**ʷ**ə**q*ʷ*lít-az̓* 'lodgepole pines'; plural adjectives include ***x̌ə**x̌zúm* 'big (PL.)' and ***k**ʷ**ə**k*ʷ*íkʷs* 'small (PL.)'. Continuative verbs with initial C_1 reduplication include ***x**ʷ**í**x*ʷ*itən* 'whistle continuously' and *(ʔə)s**tá**taɬləx* 'stand continuously'; numerals include *n**kə**kaɬ(ʔ)ás* 'three humans' and *n**x̌**ʷ**ə**x̌*ʷ*ʔúcin* 'four people'.[3]

C. *Final reduplication:* reduplication of the consonant following the stressed vowel (usually in the root, but with weak (schwa-only) roots, sometimes in a lexical suffix), with accompanying schwa epenthesis where necessary. This process is often referred to as C_2 or VC reduplication elsewhere in the Salish literature, and particularly in Interior Salish, bears the name 'out-of-control' (following Carlson & Thompson 1982). The function of C_2 reduplication in St'át'imcets is aspectual: it marks a change of state, and as such is semantically very close to (and in competition with) inchoative *(-ʔ-/-p)* marking. This type of reduplication is confined to verbs. Examples include *láp̓**ə**p̓* 'get buried', *qáx*ʷ***ə**x**ʷ* 'get broken', and *púɬ**ə**ɬ* 'come to a boil'.

D. *Consonant reduplication:* reduplication of the consonant preceding the stressed vowel (usually in the root, but with weak roots, also sometimes in a suffix). The stressed vowel may be retained, or it may be replaced by a stressed schwa. Van Eijk (1997:60) remarks that "[i]n most cases, consonant reduplication expresses diminutiveness". Since this process (or as we shall argue, these processes) constitutes the main topic of this paper, we exemplify it extensively below.

Our primary purpose in the first half of this paper is to argue that consonant (infixal <C_1>) reduplication as described in (D) actually encompasses two identifiably distinct types of reduplication, which have different phonological, syntactic, and semantic characteristics. The essential properties of the two C_1 infixes are summarized in Table 1.

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reflexive) marker, C_1- = initial (prefixal) reduplication, <C_1> = consonant (infixal) reduplication, <C_2> = final (infixal) reduplication, C_1C_2 = total reduplication, CIRC = circumstantial, COS = change of state, DET = determiner, DIM = diminutive, DIR = directive (control) transitivizer, ERG = ergative (transitive subject), EXCESS = to excess, EXIS = existential, HAB = habitual, INCH = inchoative, MID = middle intransitive marker, NMLZ = nominalizer, OBJ = object, PL = plural, PLU = pluractional, POSS = possessive, PROS = prospective auxiliary, SG = singular, SJV = subjunctive subject, SUBJ = (indicative) subject. We gloss lexical suffixes in small capitals, but do not abbreviate them. Hyphens (-) mark affix boundaries and equals signs (=) mark clitic boundaries; infixal material is enclosed in angled brackets (< >). Forms specific to Upper St'át'imcets are marked (U), while those specific to Lower St'át'imcets are marked (L).

[3] It is probable that these C_1- prefixes have different historical sources. Notice in particular that on verbs, the copied C_1 is usually followed by a stressed copy of a full vowel, whereas it is followed by an unstressed schwa in the other two cases. The likelihood is that on verbs, the C_1- prefix is related to the Central Salish progressive C_1V- prefix, which is found productively in neighbouring Sḵwx̱wú7mesh (Squamish), shashishalhem (Sechelt), and ʔayʔaǰuθəm (Comox-Sliammon); it appears to have been borrowed into St'át'imcets on a few forms. The C_1ə- prefixes probably relate to an older and more widespread C_1- plural.

Table 1: Diminutive vs. pluractional <C_1> reduplication in St'át'imcets

		Diminutive	*Pluractional*
phonology	stress-sensitive?	yes	yes
	phonological domain	stem (WORD)	stem (WORD)
	Ý replaced by ə?	**yes**	**no**
syntax	category	**noun, adjective, verb**	**verb**
semantics	meaning	**diminutive**	**pluractional**

This is the first time two distinct types of <C_1> reduplication have been recognized in St'át'imcets.

In the second half of the paper, we provide a formal analysis of both reduplicative patterns using *Stratal Optimality Theory* and *Generalized Non-Linear Affixation*, and outline some of the phonological implications of this approach to the St'át'imcets reduplication data.

2 Motivating the distinction between two types of infixal <C_1> reduplication

In this section, we show that recognizing two distinct patterns of infixal <C_1> reduplication in St'át'imcets considerably simplifies the grammar, removing an unexplained set of exceptions to the otherwise productive process of diminutive formation, and establishing the existence of a regular process of pluractional formation.

We begin by laying out the basics of diminutive reduplication in Section 2.1, before turning to pluractional reduplication in Section 2.2. In Section 3, we turn to a more detailed phonological analysis of our findings.

2.1 Diminutive C_1 reduplication

Typical cases of diminutive reduplication involving nouns, adjectives, and verbs are given in (1), (2), and (3), respectively.[4]

(1) *Diminutive Reduplication on Nouns*

	Base form		*Diminutive form*	
a.	smúłac	'woman'	sm**ə́<m̓>**łac	'girl' (U)
b.	c̓úqʷaż	'fish, salmon'	c̓**ə́<c̓>**qʷaż	'little fish, trout'
c.	citxʷ	'house	c**ə́<c>**təxʷ	'little house, outhouse'
d.	naxʷít	'snake'	naxʷ**ə́<x̌ʷ>**t	'worm'
e.	sqʷəm	'mountain, pile'	sqʷ**ə́<qʷ>**əm̓	'hill'

[4] Data used in this paper come from three sources: (i) van Eijk (1997 and particularly 2013/in prep.); (ii) Davis et al. (in prep.); and (iii) direct elicitation with a fluent speaker of Upper St'át'imcets. In the great majority of cases, the data from these three sources are in agreement; however, van Eijk worked primarily with speakers of the Lower dialect who were a generation older than our consultants, so there are inevitable discrepancies. We have noted the most significant differences between our findings and those of van Eijk in the text.

f.	scwaẇx(ʷ)	‘creek’	scwə́<ẉ>ẇəx(ʷ)	‘little creek’[5]
g.	sɣap	‘tree’	sɣə<ɣ̓>p	‘little tree, sapling’
h.	maw	‘cat’	mə́<**m**>əẇ	‘kitten’
j.	tíṗ̓ḷ̓	‘table’	tə́<**t**>pḷ̓̓	‘little table, desk’ (U)
k.	xwał	‘road’	xwə<ẉ>ł	‘little road, trail’

(2) *Diminutive Reduplication on Adjectives*

	Base Form		*Diminutive Form*	
a.	tayt	‘hungry	tə́<**t**>ẏət	‘a bit hungry/hungrier’ (U)
b.	qʷənúx̌ʷ	‘sick’	qʷənə́<n̓>x̌ʷ	‘a bit sick/sicker’ (U)
c.	(ʔəs)qyax̌	‘drunk’	(ʔəs)qyə<ẏ>x̌	‘a bit (more) drunk’
d.	xʷʔit	‘much, many’	xʷʔi<**ʔ**>t	‘a little/a few more’
e.	x̌zum	‘big’	x̌zə́<**z**>əm̓	‘a bit bigger’
f.	kəkáẇ	‘far’	kəkə́<**k**>əẇ	‘a bit further’
g.	huʔ	‘more’	hú<**h**>uʔ	‘a bit more’
h.	zaxt	‘long’	zə́<z̓>xət	‘a bit longer’
i.	ʕálʕəl	‘strong’	ʕə́<**ʕ**>əlʕəl̓	‘a bit stronger’
j.	xaʔ	‘high’	xə́<**x**>aʔ	‘a bit higher’

(3) *Diminutive Reduplication on Verbs*

	Base form		*Diminutive form*	
a.	ʕʷuẏt	‘sleep’	ʕʷə́<**ʕʷ**>ẏət	‘sleep a bit, nap’
b.	ʔíłən	‘eat’	ʔí<**ʔ**>łən̓	‘eat a bit’ (U)
c.	ʔúqʷaʔ	‘drink’	ʔú<**ʔ**>qʷaʔ	‘drink a bit’
d.	míca?q	‘sit’	mə́<m̓>ca?q	‘sit for a bit’
e.	sáẏsəż	‘play’	sə́<**s**>əẏsəż	‘play a bit’
f.	záxtan	‘lengthen s.t.’	zə<z̓>xtán	‘lengthen s.t. a bit’
g.	k̓ḳ̓ḷən	‘score/scratch s.t.’	k̓ḳ̓<**k**>ḷ̓ən	‘score/scratch s.t. a bit’
h.	cákʷən	‘pull s.t.’	cə́<**c**>kʷən̓	‘pull s.t. a bit’
i.	túpun̓	‘punch s.o.’	tə́<**t**>pən̓	‘punch s.o. lightly’
j.	qʷíwin	‘stick s.t. out’	qʷə́<**qʷ**>ẇən	‘stick s.t out a bit’

In Section 2.1.1, we consider the phonology of these cases, before turning to their morphosyntax in Section 2.1.2 and their semantics in Section 2.1.3.

2.1.1 The phonology of diminutive <C_1> reduplication

Phonologically, diminutive reduplication has an identical effect on nouns, adjectives, and verbs. It can be characterized informally as follows (using *smúłac* ‘woman’ ~ *sməm̓łac* ‘girl’ as an example):

[5] Diminutive reduplication is lexicalized on the St’át’imcets form *scwaẇx*(ʷ) ‘creek’, which is historically derived from the Proto-Interior Salish root *√*cwax* (Kuipers 2002:161). In the contemporary language, there is variable rounding of the final velar fricative, reflecting the influence of the preceding [ẇ].

1. The consonant preceding the stressed vowel is copied after the vowel: *smúłac* 'woman' → *smú**m**łac*.
2. The stressed vowel is replaced by a stressed schwa: *smúmłac* → *sm**ə́**młac*.
3. The final resonant in the stem (WORD) is glottalized: *sməmłac* → *sm**əm̓**łac* 'girl'.[6]

Where reduplication creates an illegitimate consonant sequence, schwas are epenthesized (this is not particular to diminutive reduplication or indeed reduplication in general): for example, *xzum* 'big' → *xzuzm* → *xzəzm* → *xzəzəm̓* → *xzázəm̓* 'a bit bigger'.

Where diminutive reduplication targets either /ʔ/ or /h/, the stressed full vowel is retained in the reduplicated form: *xʷʔit* 'much, many' → *xʔiʔt* 'a little, a few more', *ʔáma* 'good' → *ʔáʔma* 'cute, pretty', and *huʔ* 'more' → *húhuʔ* 'a bit more'.

Diminutive reduplication is stress-sensitive, and with weak roots and/or strong suffixes, where primary stress falls on a suffix, the consonant before the suffixal vowel is targeted:

(4)

	Base form	*Diminutive form*
a.	s-pəq-m̓íx (U) NMLZ-white-EXCESS 'swan'	s-pəq-m̓ə́**<m̓>**x NMLZ-white-EXCESS**<DIM>** 'little swan'
b.	s-k̓ə̓l-íc̓aʔ NMLZ-buckskin-OUTER.COVER '(item of) buckskin clothing'	s-k̓ə̓l-ə́**<l̓>**c̓aʔ NMLZ-buckskin-OUTER.COVER**<DIM>** 'small (item of) buckskin clothing'
c.	paqʷʔ-úł afraid-HAB 'always afraid'	paqʷʔ-**ú<ʔ>**ł afraid-HAB**<DIM>** 'scaredy-cat'
d.	qḷ-ą́kaʔ bad-HAND 'clumsy'	qḷ-ə́**<l̓>**kaʔ bad-HAND**<DIM>** 'a bit clumsy'

2.1.2 The morphosyntax of diminutive <C₁> reduplication

Diminutive reduplication applies freely to nouns and adjectives, including loanwords:

[6] Resonant glottalization in Salish is notoriously variable, and St'át'imcets is no exception. With <C₁> reduplication, it is more reliably present than in many environments, but what counts as the "last" resonant varies: on verbs, for example, the directive transitivizer *-(V)n* and the relation transitivizer *-min* are sometimes glottalized following <C₁>, and sometimes not. For this reason, we have chosen to set resonant glottalization aside for the purposes of this paper, though obviously a more comprehensive account will need to include it.

(5)

	Base form		*Diminutive form*	
a.	kapú	‘coat’	kap**ə́<p>**əẇ	‘light jacket’[7]
b.	ṣtụ	‘store’ (U)	ṣt**ə̣́<t>**əẇ	‘little store’
c.	lapḷás	‘plank or board’	lapḷ**ə̣́<ḷ>**s	‘little plank or board’
d.	kḷísi	‘crazy’ (L)	kḷ**ə̣́<ḷ>**si	‘a little crazy’

On the other hand, diminutive reduplication is more restricted on verbs. On intransitives, it seems to apply fairly freely to both unergatives, as seen in the first five examples in (3) above, and unaccusatives, as shown in (6) and (7).

(6) a. ǎaṅ̓ ta=s-mə́<ṁ>łac=a
get.hurt DET=NMLZ-female<C_1>=EXIS
‘The girl got hurt.’

b. ǎ**ə́<ǎ>**əṅ̓ ta=s-mə́<ṁ>łac=a
get.hurt DET=NMLZ-female<C_1>=EXIS
‘The girl got a bit hurt.’

(7) a. ka-múl-a ta=n-kapúh=a
CIRC-get.immersed-CIRC DET=1SG.POSS-coat=EXIS
‘My coat got dipped in the water.’

b. ka-m**ə́<m>**l̓-a ta=n-kapúh=a
CIRC-get.immersed<C_1>-CIRC DET=1SG.POSS-coat=EXIS
‘A bit of my coat got dipped in the water.’

Diminutive <C_1> reduplication also applies fairly freely to verbs marked with inchoative *-p*, as seen in (8) and (9).

(8) a. cəs-**p** tiʔ kʷu=cəs-p-íċaʔ
stretch-**INCH** that DET=stretch-INCH-OUTER.COVER
‘That sweater stretched.’

b. c**ə́<c>**s-**əp** tiʔ kʷu=cəs-p-íċaʔ
stretch<**C_1>-INCH** that DET=stretch-INCH-OUTER.COVER
‘That sweater stretched a bit.’

(9) a. nəṁ-**p** ʔayɬ tiʔ kʷu=qəɬmə́<m>əṅ̓
blind-**INCH** now that DET=old.person<C_1>
‘That old person has gone blind.’

[7] The forms *kapú*, *ṣtụ*, and other loanwords ending in [u] show interesting phonological behaviour when they undergo diminutive reduplication. In their non-reduplicated forms, a following vowel triggers [h] epenthesis, as in *ta=kapúh=a* ‘the/a coat’, *ta=ṣtụ́h=a* ‘the/a store’: this type of epenthesis is typical for vowel-final stems. However, when these loanwords undergo <C_1> reduplication, they surface with a root-final [ẇ] instead (the glottalization is triggered by the reduplication): thus, we get *ta=kapə́pẇ=a* for ‘a/the little coat’ and *ta=ṣtə̣́tẇ=a* for ‘a/the little store’, rather than **ta=kapə́p(h)=a* or **ta=ṣtə̣́t(h)=a*.

b. nə́**<n̓>**ə**-p** ʔayɬ tiʔ kʷu=qəɬmə́<m>ən̓
blind**<C₁>-INCH** now that DET=old.person<C₁>
'That old person has gone a little blind.'

However, diminutive reduplication is difficult to find on verbs affixed with either the autonomous (lexical reflexive) or active intransitive markers: there are only a few recorded instances with the autonomous marker *-ləx ~ -ílx*, and diminutive <C₁> is typically rejected altogether with the active intransitive suffix *-xal* (10b,c).[8] In order to convey diminutivity with verbs which do not tolerate diminutive reduplication, a paraphrase with *kʷu=kʷíkʷs/ta=kʷíkʷs=a* 'a little' is generally employed instead, as in (10d).[9]

(10) a. məc**-xál**=łkan
write**-ACT**=1SG.SUBJ
'I wrote.'

b. * mə**<m̓>**c**-xál**=łkan
write**<DIM>**-ACT=1SG.SUBJ
'I wrote a bit.'

c. * məc**-xə<x>əl̓**=łkán
write**-ACT<DIM>**=1SG.SUBJ
'I wrote a bit.'

d. məc**-xál**=łkan ta=kʷíkʷs=a
write-ACT=1SG.SUBJ DET=little=EXIS
'I wrote a bit.'

For some (usually weak) roots, an alternative strategy is available, in which *-xal* is replaced by the middle suffix *-əm̓* with diminutive reduplication, as shown in (11) and (12).

(11) a. pəkʷ**-xál**=łkan ʔi=c̓ǩʷút=a
pour.solids**-ACT**=1SG.SUBJ PL.DET=gravel=EXIS
'I poured out the gravel.'

b. pə**<p>**kʷ**-əm̓**=łkán ʔi=k̓ʷík̓ʷənʔ=a c̓ǩʷut
pour.solids**<DIM>-MID**=1SG.SUBJ PL.DET=few=EXIS gravel
'I poured out a bit of the gravel.' (translation volunteered)

[8] To be precise, we have found four cases of the diminutive with the autonomous suffix: *qʷəcə́-<c>l̓əx* 'wriggle' (< *qʷəc-ílx* 'move (oneself)'); *cə́<c>əy-l̓əx* 'crawl (of child)' (< *cáy-ləx* 'crawl'); *x̌ʷəmí-<m>l̓əx* 'hurry a bit (more)' (< *x̌ʷəm-ílx* 'hurry'); and *pn̓əmí-<m>l̓əx* 'go a bit fast(er)' (< *pn̓əm-ílx* 'go fast'). The last three of these have a full vowel instead of the expected stressed schwa, making them doubly irregular.

[9] It is worth emphasizing that this is not due to the morphophonology of *-xal* or *-ləx ~ -ílx*: pluractional <C₁> reduplication is tolerated with both, as discussed in Section 2.2.3 below.

(12) a. pəʕʷ**-xál**=łkan l=ta=sə́ps=a
knock**-ACT**=1SG.SUBJ on=DET=door=EXIS
'I knocked on the door.'

b. pə**<p>**ʕʷ**-əm̓**=łkán l=ta=sə́ps=a
knock**<DIM>-MID**=1SG.SUBJ on=DET=door=EXIS
'I knocked a little bit on the door.' (translation volunteered)

The middle seems generally to tolerate diminutive formation more freely than the autonomous or active intransitivizers.

(13)

	Base form	*Diminutive form*
a.	xʷík̓**-əm** butcher**-MID** 'cut fish'	xʷə́**<xʷ>**k̓**-əm̓** butcher**<DIM>-MID** 'cut a bit of fish / cut small fish / small people cut fish'
b.	ʔíq̓**-əm** scrape**-MID** 'scrape (e.g., hair)'	ʔí**<ʔ>**q̓**-əm̓** scrape**<DIM>-MID** 'scrape hair off a bit'

On transitive verbs, diminutive reduplication is variably acceptable, though not usually produced spontaneously. We have found in elicitation that diminutive transitives are usually (though sometimes grudgingly) accepted and can often be produced with prompting.[10]

(14) a. túp**-un̓**=łkan
punch**-DIR**=1SG.SUBJ
'I hit him.'

b. tə́**<t>**p**-ən̓**=łkan
punch**<DIM>-DIR**=1SG.SUBJ
'I hit him lightly.' (translation volunteered)

(15) a. xʷuż q̓ʷəl**-ən**-ás ta=smúłac=a ta=c̓íʔ=a
PROS cook**-DIR-**3ERG DET=woman=EXIS DET=meat=EXIS
'The woman is going to cook the meat.'

[10] Eliciting reduplicated forms is tricky, because judgments are never straightforward unless the form is in common circulation in the language. For less common / unattested forms, at least the following levels of acceptability must be distinguished: (i) the speaker knows and uses the form readily with the expected meaning; (ii) the speaker has heard the form and can ascribe it the expected meaning, but doesn't use it; (iii) the speaker has never heard the form but can still identify its expected meaning; and (iv) the speaker has never heard the form and doesn't know what it would mean.

b. xʷuż q̓ʷ**ə<q̓ʷ>**l̓**-ən**-ás ta=smúłac=a ta=c̓íʔ=a
PROS cook**<DIM>-DIR-**3ERG DET=woman=EXIS DET=meat=EXIS
'The woman's gonna cook the meat a little bit.' (volunteered, translation volunteered)
Consultant's comment: "I guess they like their meat rare!"

However, just as often, diminutive <C_1> is rejected on transitive verbs; furthermore, it is seldom produced spontaneously, and our consultant generally seems more comfortable using periphrastic diminutives with *kʷikʷs* 'a bit' or *k̓ʷík̓ʷənaʔ* 'a few':

(16) a. xʷuż q̓ʷəláẇ**-ən**-as ta=smúłac=a ʔi=scáqʷəm=a
PROS pick.berry**-DIR-**3ERG DET=woman=EXIS PL.DET=saskatoon=EXIS
'The woman is going to pick the saskatoon berries.'

b. * xʷuż q̓ʷəl**ə<l>**ẇ**-ən**-ás ta=smúłac=a ʔi=scáqʷəm=a
PROS pick.berry**<DIM>-DIR-**3ERG DET=woman=EXIS PL.DET=saskatoon=EXIS

c. xʷuż q̓ʷəláẇ**-ən**-as **kʷu=k̓ʷík̓ʷənaʔ** scáqʷəm
PROS pick.berry**-DIR-**3ERG **DET=few** saskatoon
'She's going to pick a few saskatoons.' (volunteered instead of 16b)

It is possible that there is a semantic distinction at play here: notice that in the case of 'cook' in (15), the diminutive yields a meaning of 'slightly cooked', whereas with 'pick berries' in (16), there is no comparable possible meaning of 'slightly picked'.

2.1.3 The semantics of diminutive <C_1> reduplication

Little work has been done so far on the semantics of diminutive reduplication in St'át'imcets or in Salish more generally (but see Mellesmoen in prep.).

On count nouns, diminutive yields a 'small entity/entities' reading — never a small number of entities. See (1) for examples. Often, 'small' is somewhat conventionalized: *c̓á**<c̓>**qʷaż* (< *c̓úqʷaż* 'fish/salmon') means 'trout' as well as 'small fish/salmon', *s-qá**<q>**x̌aʔ* (< *s-qáx̌aʔ* 'dog') means 'puppy' as well as 'small dog', and *cá**<c>**təxʷ* (< *citxʷ* 'house') means 'outhouse, toilet' as well as 'small house'.

On mass nouns, diminutive is usually rejected:

(17) a. ʔúm̓-ən-c kʷu=k̓ʷík̓ʷənaʔ l̓ays
give-DIR-1SG.OBJ DET=few rice
'Give me a little rice.' (volunteered)

b. * ʔúm̓-ən-c kʷu=l̓ə̓**<l̓>**ay̓s
give-DIR-1SG.OBJ DET=rice**<DIM>**
Consultant: "I never heard anybody say that!"

(18) a. ʔúm̓-ən-c kʷu=k̓ʷík̓ʷənaʔ x̌ʷəl-mín
give-DIR-1SG.OBJ DET=few saw-LEFTOVER
'Give me a little bit of sawdust.' (volunteered)

b. * ʔúṁ-ən-c kʷu=x̌ʷəl-mə́**<m>**ən̓
give-DIR-1SG.OBJ DET=saw-LEFTOVER**<DIM>**
Consultant: "I don't think so — that's a little piece of sawdust — not the same as a little bit of sawdust."

On adjectives, diminutive yields a 'bit (more)' reading: see (2) for examples. The comparative reading is not part of the semantics of diminutives, but is a lexical property of adjectives (Davis 2011). In some cases (e.g., *xʷʔ**i**<**ʔ**>t* 'a bit more' < *xʷʔit* 'many, much', *xzə́**<z>**əm̓* 'a bit bigger' < *xzum* 'big') only the comparative reading is available, because a diminutive reading of the positive form of the adjective is anomalous (as in, e.g., # 'a little many', # 'a little big' meaning 'slightly many', and 'slightly big', respectively).

On verbs, a number of diminutive readings have been recorded, including 'short duration' and 'small participant' readings, as seen in the (a) and (b) examples in (19) and (20) below, as well as 'small extent', as in, e.g., (14b) and (15b) above. Judgments are variable, and more work is needed.

(19) a. ʕʷə**<ʕʷ>**y̓ət=kán
sleep**<DIM>**=1SG.SUBJ
'I slept a little bit."

b. ʕʷə́**<ʕʷ>**y̓ət ta=sḵʷú<ḵʷ>miʔt=a
sleep**<DIM>** DET=child<DIM>=EXIS
'The little baby slept.'

(20) a. mə́**<m̓>**caʔq=ɬkan ʔəɬ xʷúż=ɬkan ʔayɬ ʔalkst
sit**<DIM>**=1SG.SUBJ and.then PROS=1SG.SUBJ then work
'I sat for a while before going back to work.'

b. mə́**<m̓>**caʔq ta=sḵʷú<ḵʷ>miʔt=a níɬ=x̌uʔ s=cáp̓un[-n]-an
sit**<DIM>** DET=child<DIM>=EXIS COP=EXCL NMLZ=belt[-DIR]-1SG.ERG
l=ta=q̓íl̓q-s=a
in=DET=seat-3POSS=EXIS
'The child sat down and I buckled them in their seat.'

2.2 Pluractional C_1 reduplication

As previewed in Table 1, St'át'imcets has a previously unidentified pattern of infixal <C_1> reduplication which systematically differs from diminutive reduplication in its phonology, morphosyntax, and semantics. More specifically, it retains the stressed vowel from the base form, applies only to verbs, and consistently yields a pluractional interpretation.

Examples are given in (21): compare (3) above.

(21) *Pluractional Reduplication*

	Base form		*Pluractional form*	
a.	n-kám̓-xal	'pick s.t. up'	n-k**á<k>**əm̓-xal	'pick things up here and there'
b.	súq̓^{w}-ən	'skin an animal'	s**ú<s>**q̓^{w}-ən̓	'skin pl. animals'(U)[11]
c.	łuq̓^{w}-usáʔ-ən	'peel a fruit/vegetable'	**łu<ł>**q̓^{w}-usáʔ-ən̓	'peel pl. fruits/vegetables' (U)
d.	n-kál-xal	'follow s.o. or s.t.'	n-k**á<k>**əl̓-xal	'follow s.o. around'
e.	pák^{w}-an̓	'cut or slice s.t.'	p**á<p>**k^{w}-ən̓	'cut/slice s.t. up'
f.	q̓íɬil	'run'	q̓**í<q̓>**ɬil̓	'run around'
g.	tíx̌-in̓	'lay s.t. out'	t**í<t>**x̌-ən̓	'line things up'
h.	**ƛ̓**úq^{w}-un̓	'suck s.t.'	ƛ̓**ú<ƛ̓>**q^{w}-ən̓	'suck s.t. out of s.t.'
i.	síx̌-xal	'move s.t.'	n-s**í<s>**x̌-əm̓	'move things from one container to another'
j.	ʕíƛ̓-xal	'take a bite'	ʕ**í<ʕ̓>**ƛ̓-əm̓	'gnaw a hole'
k.	c̓áq-an̓	'pull s.t. out'	c̓**á<c̓>**q-ən̓	'pluck s.t. (a bird)'
l.	ƛ̓ál̓-ạn	'bite s.t.'	ƛ̓**á<ƛ̓>**l̓-ən̓	'gnaw s.t.'

In many cases, there is no non-reduplicated alternant to compare with the reduplicated form. However, even in such cases, pluractional reduplication is often still identifiable from its distinctive phonology and semantics, as in (22).

(22) *Cases of pluractional reduplication without a non-reduplicated alternant*

	Pluractional form		*Related form*	
a.	n-m**í<m>**l̓-ən	'share things out'	mil̓	'get shared out or divided'
b.	q̓**á<q̓>**ła?	'braid hair'	q̓əɬʔ-álx̓ən	'braided rope'
c.	s**í<s>**q-əm̓	'split wood'	səq-xál	'split s.t.'
d.	q**í<q>**c̓-əm̓	'chew gum'	—	—
e.	ƛ**u<ƛ̓>**k̓^{w}	'do things separately'	—	—
f.	ns-n**á<n>**aʔ	'sneeze'	—	—
g.	m**i<m̓>**x	'move house' (U)	—	—

In Section 2.2.1, we examine the phonology of pluractional <C_1> reduplication more closely, followed by its morphosyntax in Section 2.2.2 and its semantics in Section 2.2.3.

2.2.1 The phonology of pluractional C_1 reduplication

In most ways, the phonology of pluractional <C_1> is the same as that of diminutive <C_1>: for example, both cause final resonant glottalization, both retain a stressed full vowel when /ʔ/ or /h/

[11] This verb is given in van Eijk (2013/in prep.:121) as 'to skin a small animal (squirrel, muskrat, etc.)' — i.e., with diminutive semantics. However, we have found that it has a consistently pluractional meaning for our consultant. This indicates that there is either dialectal or idiolectal variation in the interpretation of verbs with <C_1> reduplication; we suspect the former, as van Eijk (who worked mainly with Lower dialect speakers) reports more diminutive and fewer pluractional verbs than we have found (though not nearly enough to throw into question the generalizations we present here: see Section 2.2.2 below).

are copied, and both are stress-sensitive, which allows for the copied consonant to cross morpheme boundaries, as in the pluractional examples in (23) (compare the diminutive cases in (4) above).

(23)	*Base form*	*Pluractional form*
a.	xʷəlp-ílx turn-AUT 'turn around'	xʷəlp-**í<p>**l̓əx turn-AUT**<PLU>** 'turn around and around'
b.	łəʕʷ-ílx bounce-AUT 'jump'	łəʕʷ-**í<ʕ>**l̓əx bounce-AUT**<PLU>** 'jump up and down'
c.	√k̓ʷs + -alic̓aʔ √singe + -OUTER.COVER (not attested w.o. reduplication)	k̓ʷs-**á<s>**l̓ic̓aʔ singe-OUTER.COVER**<PLU>** 'burn hair or feathers off an animal or bird'
d.	√cẘ + -usaʔ kick + -ROUND.THING (not attested w.o. reduplication)	cẘ-**ú<ẘ>**saʔ kick-ROUND.THING**<PLU>** 'play soccer'

Nevertheless, one systematic and irreducible phonological difference between the two types of <C_1> reduplication stands out: there is no vowel reduction with pluractional reduplication. (For ease of reference we will refer to this distinction from now on as VOWEL RETAINING versus VOWEL REDUCING <C_1> reduplication.)

Van Eijk (1997:60) recognizes the existence of both vowel retaining and vowel reducing types, but maintains that the distinction between them is semantically unpredictable:

> Stressed Á also changes to É in most cases of consonant reduplication. (On formal grounds, it is unpredictable which cases change Á to É, or which retain Á; cf. **pápla?** versus **pə́pla?** […].) (van Eijk 1997:60)

However, this single counterexample is not well chosen: as far as reduplication is concerned, numerals are exceptional, both in St'át'imcets and across the Salish family as a whole (see Anderson 1999). Furthermore, 'one' is idiosyncratic even *within* the class of numerals in St'át'imcets, since it is the only numeral in which human and animal forms both undergo infixal <C_1> reduplication (other human numerals use initial C_1- or C_1C_2 reduplication). By focusing on a single exceptional case, van Eijk fails to notice the systematic correspondence between vowel retaining <C_1> reduplication and pluractionality, and conversely between vowel reducing <C_1> reduplication and diminutivity.[12] As we show in the next section, these correspondences are very robust.

[12] Since van Eijk claims that "in most cases, consonant reduplication expresses diminutiveness" (1997:60), he sometimes struggles with clearly pluractional cases: for example, he remarks that *x̌ʷá<x̌ʷ>y̓ət* 'many people die' (< *x̌ʷayt* 'die or perish') is "…semantically probably an augmentative form of *x̌ʷayt*, although formally a diminutive" (van Eijk 2013/in prep.:354).

2.2.2 The morphosyntax of pluractional <C_1> reduplication

In terms of morphosyntax, there is an obvious difference between pluractional and diminutive reduplication: by definition, pluractionality is a property of *verbs*. This leads to a pair of related predictions: first, any verb with a vowel-retaining <C_1> reduplicant should have a pluractional meaning; and conversely if a verb with a <C_1> reduplicant has a pluractional meaning, it should be vowel retaining.

Both predictions are strongly borne out. Based on a survey of van Eijk (2013/in prep.) and Davis et al. (in prep.), verbs with vowel retaining <C_1> reduplication overwhelmingly show pluractional semantics. Of 114 verbs recorded with a full vowel in the reduplicant, 14 have diminutive meanings; however, six of these involve a reduplicated glottal stop, and are therefore almost certainly disguised vowel reducing cases (recall from Section 2.1.1 that for phonological reasons, a full vowel always surfaces instead of schwa in this environment). Furthermore, of the remaining eight counterexamples, two (*sú**<s>**q̓ʷən̓*, from √*suq̓ʷ* 'skin animals' and *qʷ**ú**<**qʷ**>*s*ə*m̓*, from √*qʷus* 'shoot') have diminutive interpretations according to van Eijk (2013/in prep.) but are clearly pluractional for our Upper St'át'imcets consultant, as shown in the following examples from Davis et al. (in prep.):

(24) xʷuż sú**<s>**q̓ʷ-ən̓-əm láti? ʔi=s-kʷam<əm>-łkáł=a c̓iʔ
PROS skin**<PLU>**-DIR-1PL.ERG there PL.DET=NMLZ-get<COS>-1PL.SUBJ=EXIS deer
'We're going to skin the deer we caught.'

(25) cíxʷ=kał píx̌əm̓, qʷ**ú<qʷ>**s-əm̓=łkał láti? [kʷu=]cə́<c>l̓əkst
get.there=1PL.SUBJ hunt shoot**<PLU>**-MID=1PL.SUBJ there [DET=]five<ANIMAL>
x̌ʷiɬ̓áż, záy̓-ɬc̓aʔ=łkał ʔaył ʔəł xʷúy̓=łkał
mountain.goat cut-FLESH=1PL.SUBJ then and.then PROS=1SG.SUBJ
zaxən-sqáx̌aʔ
carry-DOMESTIC.ANIMAL
'We went hunting, shot five mountain goats, then cut them up before we packed them on horseback.'

Counting these two forms as pluractional reduces the number of vowel-retaining diminutives to 5% of the total.

The converse prediction is also strongly supported. Of 117 verbs with infixal <C_1> reduplication and identifiably pluractional meanings, 104 are vowel retaining. Interestingly, of the twelve counterexamples, nine involve *both* <C_1> and C_1C_2 reduplication, as exemplified in (26).

(26)

	Base form	*Pluractional form*
a.	záq̓il peek 'peek'	**zəq̓**-zá**<z>**q̓il **PLU**-peek**<PLU>** 'peeking around'[13]
b.	sáw-en ask-DIR 'ask s.o. s.t.'	**səw**-sə́**<s>**ẇ-ən **PLU**-ask**<PLU>**-DIR 'ask s.o. a lot of questions'

[13] This form from van Eijk (2013/in prep.:404) lacks the expected glottalization on the final resonant.

c.	q̓áy-ləx	**q̓əy**-q̓á<**q̓**>əy-lə̓x
	jump-AUT	**PLU**-jump<**PLU**>-AUT
	‘jump’	‘jump up and down (PL.)’
d.	cúɬ-xal	**cəɬ**-cá<**c**>ɬ-xal
	point-ACT	**PLU**-point<**PLU**>-ACT
	‘point’	‘make all kinds of signs’

It is unclear why vowel reduction is allowed in these “double pluractional” cases, particularly since there are also double pluractionals with vowel retention, such as ***q̓ʷəm***-*q̓ʷm*-***í<m>****lə̓x* ‘curl up ready to pounce’ and *n*-***cəs***-*cəs*-*p*-***á<p>****lusəm* ‘squint (stretch one’s eyes)’. However, even counting double pluractionals, the number of vowel reducing cases is only 10% of the total, very strongly supporting the generalization that pluractional <C_1> reduplication is vowel retaining; if we do not count them, the percentage of counterexamples drops to less than 5%.

It is important to mention that where both could potentially occur, diminutive and pluractional <C_1> are in strict complementary distribution. Our attempts to elicit doublets with vowel retention and vowel reduction have invariably failed, as shown in (27).

(27)

	Pluractional form		*(Hypothetical) Diminutive form*
a.	n-k**á<k>**əm̓-xal	‘pick things up here and there’	* n-k**ə<k>**əm̓-xál
b.	s**ú<s>**q̓ʷ-ən̓	‘skin (PL.) animals’	* s**ə́<s>**q̓ʷ-ən̓
c.	**ɬu<ɬ>**q̓ʷ-usáʔ-ən̓	‘peel (PL.) fruit/vegetables’	* **ɬə<ɬ>**q̓ʷ-usáʔ-ən̓

Though it is not entirely possible to predict whether a particular verb will take diminutive or pluractional <C_1> reduplication, there are some strong tendencies, as outlined below.

First, whereas, as we saw in (8), diminutives are avoided on verbs with the active intransitive marker *-xal*, this is not the case with <C_1> pluractionals. All six attested cases of <C_1> on active intransitives are pluractional, including *n-k****á<k>****əm̓****-xal*** ‘pick up things here and there’ (< *kam̓-xal* ‘pick things up’), *n-k****á<k>****əl̓****-xal*** ‘follow s.o. around’ (< *kál-xal* ‘follow s.o. ’), and ***ʔəx̌ʷ***-*ʔú*<***ʔ***>*x̌ʷ*-***xal*** ‘whittle’ (< *ʔúx̌ʷ-xal* ‘carve’: this is a double pluractional case). At the same time, the alternation between active-marked base forms and middle-marked reduplicated forms which we observed in (11) and (12) with the diminutive also characterizes the pluractional, as can be seen in (28):

(28)

	Base form		*Pluractional form*	
a.	cáṣ-**xal**	‘feel for s.t.’	c**á<c>**ṣ-**əm̓**	‘feel around for s.t.’
b.	ʕíƛ̓-**xal**	‘bite’	**ʕí<ʕ>**ƛ̓-**əm̓**	‘gnaw’
c.	pəqʷ-**xál**	‘split wood’	p**ə́<p>**qʷ-**əm̓**	‘make shakes (for roofing)’
d.	ʔúx̌ʷ-**xal**	‘carve wood’	**ʔú<ʔ>**x̌ʷ-**əm̓**	‘whittle’[14]

Second, autonomous-marked verbs also prefer the pluractional to the diminutive (see footnote 6): ten out of 14 cases of <C_1> with the autonomous suffix are pluractional, including *ləʕʷ-í*<***ʕʷ***>***lə̓x*** ‘jump up and down’ (< *ləʕʷ-ílx* ‘jump’), *n-s****í<s>****x̌-lə̓x* ‘move from one conveyance to another’ (< *síx̌-ləx* ‘move (oneself)’), and *xʷəlp-****í<p>****lə̓x* ‘turn round and around’ (< *xʷəlp-ílx* ‘turn around’).

[14] There is an interesting contrast between pluractional *ʔú<ʔ>x̌ʷ-****əm̓***, where the middle suffix *-əm̓* replaces active intransitive *-xal*, and the double pluractional ***ʔəx̌ʷ***-*ʔú*<***ʔ***>*x̌ʷ*-***xal***, where *-xal* is retained. (As far as we can ascertain, there is no meaning difference between the two forms.)

Third, and most strikingly, almost all cases of pluractional <C_1> appear on agentive verbs (activities and accomplishments). Pluractional <C_1> is systematically missing from change of state verbs, whether unaffixed or affixed with the inchoative marker *-p*: in contrast, as we saw in Section 2.1.2, diminutive <C_1> attaches fairly freely to both bare and inchoative-marked change of state verbs.

2.2.3 The semantics of pluractional <C_1> reduplication

Turning briefly to semantics, all the cases in (21) to (28) above are clearly pluractional, with a tendency towards *event-internal* as opposed to *event-external* readings. Event-internal pluractionals denote a multiplicity of actions which form part of the same event, whereas event-external pluractionals denote multiple events: see Henderson (2012) and references therein, as well as Huijsmans and Mellesmoen (2021) for discussion of the distinction with respect to C_1C_2 reduplication in ʔayʔaǰuθəm (Comox-Ṣliammon).

Pluractional forms such as *ʕíʕ<ʕ>ʔ̓-əm̓* 'gnaw a hole' (versus *ʕíʔ̓-xal* 'take a bite') exemplify event-internal plurality: gnawing by definition consists of a series of biting actions, so it is "inherently" plural. The same goes for *c̓á<c̓>q-ən̓* 'pluck s.t. (e.g., a bird)' versus *c̓áq-an̓* 'pull s.t. out', and *tí<t>x̌-ən̓* 'line things up side by side' versus *tíx̌-in̓* 'set things out (e.g., when laying a table)'.

There are also, however, plenty of clear event-external cases amongst pluractional verbs with <C_1> reduplication. They include *n-ká<k>əm̓-xal* 'pick up things here and there', *sú<s>q̓ʷ-ən̓* 'skin multiple animals', and *ʔ̓u<ʔ̓>kʷ* 'do things separately'.

Double pluractional verbs such as those in (26) provide a potentially interesting test of the difference between event-external and event-internal pluractionals, particularly in view of the finding in Huijsmans and Mellesmoen (2021) that in ʔayʔaǰuθəm (Comox-Sliammon), C_1C_2 reduplication always marks event-external pluractionality. However, at least judging by the cases in (29) and (30) below, when <C_1> and C_1C_2 pluractional reduplication occur together in St'át'imcets, they can either mark event-external or event-internal pluractionality: the (a) cases (with a plural subject) involve plural events of hopping/jumping, while the (b) cases (with a singular subject) involve a single event of having a tantrum (with component actions of jumping up and down).

(29) a. waʔ **łəʕʷ**-ɬʕʷ-**í<ʕʷ>**l̓əx ʔi=s-qʷəyíc=a
IPFV **PLU**-bounce-AUT**<PLU>** PL.DET=NMLZ-rabbit=EXIS
'The rabbits are jumping up and down.'

b. waʔ **łəʕʷ**-ɬʕʷ**í-<ʕʷ>**l̓əx ta=qlíl=a s-k̓ʷú<k̓ʷ>miʔt
IPFV **PLU**-bounce-AUT**<PLU>** DET=angry=EXIS NMLZ-child<DIM>
'The angry child is throwing a tantrum by jumping up and down.'

(30) a. ʔác̓x̌-ən, waʔ **q̓əy**-q̓ə́**<q̓>**əy-l̓əx ʔi=p̓əʕ̓ʷp̓íʕ̓ʷłh=a
see-DIR IPFV **PLU**-jump-**<PLU>**-AUT PL.DET=frog=EXIS
'See, the frogs are jumping up and down.'

b. kán=as kʷ=s=**q̓əy**-q̓ə́**<q̓>**əy-l̓əx=s
whether=3SJV D/C=NMLZ=**PLU**-jump-AUT**<PLU>**=3POSS
'Maybe he's having a tantrum.'

It thus appears that the event-internal/external distinction is not reflected directly in the grammar of reduplication in St'át'imcets, unlike in ʔayʔaǰuθəm.

2.3 Interim summary

We conclude that there are not one, but two infixing (stress-aligned) <C_1> reduplicative processes in St'át'imcets, one with diminutive and the other with pluractional semantics. Though their phonology is similar, they differ systematically with respect to vowel reduction (diminutive) versus vowel retention (pluractional). Since there are no pluractional nouns or adjectives, the distribution of the two types overlaps only in the case of verbs, and even within the class of verbs, a given root will either take pluractional or diminutive <C_1>, never both.

In terms of productivity, diminutive <C_1> is productive and freely available on nouns and adjectives, including on loan words (see (5)). It is more restricted on verbs, partly because it is in competition with pluractional <C_1>; however, it is often dispreferred even when there is no competing pluractional form. Pluractional <C_1> is confined to verbs, and further restricted by verb class, being found almost exclusively on activities and accomplishments. Nevertheless, there is some evidence that it may be or may have recently been active in the formation of neologisms, as shown by the examples in (31).

(31)

	Base form	*Pluractional form*
a.	√c̓aq̓ + -usaʔ √throw + -ROUND.THING	c̓aq̓^{w}-**ú<q̓^{w}>**saʔ throw-ROUND.THING**<PLU>** 'juggle'
b.	√tl̓áwən √visit (< English 'town')	**təw-**tl̓**<t>**wən̓ **PLU-**visit**<PLU>** 'go visiting'
c.	√pay̓t √fight (< English 'fight')	**pl̓y-**pl̓**<p>**y̓ət **PLU-**fight**<PLU>** 'quarrel, squabble'

The example in (31a) is an obvious neologism (and probably quite a recent one); see also *cw̓**ú**<**w̓**>saʔ* 'play soccer' in (23d) above for a similar form. The other two are double pluractionals based on loanwords, and therefore clearly innovated. All three have pluractional rather than diminutive semantics (though (31c) might be construed as an event-internal diminutive plural involving lots of small actions). In any case, these examples show that pluractional <C_1> has been used to derive new words in the recent past. As we show next, it also actively participates in the phonological grammar.

3 Phonological analysis of the two types of C_1 reduplication

In this section, we present a phonological analysis of the two types of infixal (stress-aligned) <C_1> reduplication in St'át'imcets which we identified in the first part of the paper. We first address the question of whether the distinction between vowel reducing (diminutive) and vowel retaining (pluractional) patterns arises from differences in the phonological domain, the phonological

grammar, or the input. We then undertake a formal analysis of both patterns employing Stratal Optimality Theory and Generalized Non-Linear Affixation (GNLA).

3.1 Phonological grammar and theoretical assumptions

We adopt Stratal Optimality Theory (Stratal OT) for our analysis. Stratal OT is a modification of classic (parallel) Optimality Theory (McCarthy 2002; Prince & Smolensky 2004). In Stratal OT, the core tenets of Optimality Theory are combined with the level ordering proposed in Stratal Phonology or Lexical Phonology (Mohanan 1982; Kiparsky 1985; Bermúdez-Otero 2017).

The two key components of Stratal OT are STRATIFICATION and MODULARITY (Kiparsky 2015). Stratification means that the phonological grammar has different levels, or strata, which each have a different constraint ranking. Modularity means that the grammar is structured such that the output of one stratum is the input to the next.

The proposed structure of the grammar and the corresponding domains for stress and reduplication in St'át'imcets are shown in Table 2, from Mellesmoen (in prep.). The STEM stratum consists of the root, where stress is assigned to the first full vowel (or the first vowel if there are no full vowels).[15] The output of the STEM stratum is the input to the WORD stratum, where stress may shift if the relevant criteria are met. We argue here that both stress-aligned $<C_1>$ reduplication processes apply at the WORD stratum.[16]

Table 2: Morphological domains, stress, and reduplication across strata in St'át'imcets

Stratum, cf. Mellesmoen (in prep.)	*Morphological Domain*	*Stress Assignment*	*Type of Reduplication*
STEM	[root]	Stress assigned	C_1C_2 Plural\Property Denoting C_1 Initial
WORD	[[$Stem_{output}$] + lexical suffixes]	Possible stress shift (depending on shape of lexical suffixes)	C_1 Diminutive C_1 Pluractional C_2 Change of State
WORD+	[[$Word_{output}$] + transitivizers/pronouns]	Possible stress shift (depending on number of syllables)	
PHRASE	[[$Word+_{output}$] + clitics]	Possible stress shift (depending on number of syllables)	

[15] The labels STEM, WORD, and PHRASE come from the Stratal Phonology framework (see, e.g., Bermúdez-Otero 2017 and references therein). Different labels for domains or strata have been used elsewhere in the Salish literature. For example, Czaykowska-Higgins (1993b) uses ten numbered strata, each designated as either cyclic or non-cyclic. Dyck (2004) proposes four levels: PRoot, PStem, PWord, and PPhrase. For work specifically on St'át'imcets, see Davis (in prep.), who distinguishes three stress domains: root (corresponding to STEM plus WORD in Table 2), stem (corresponding to WORD+ in Table 2), and word (corresponding to PHRASE in Table 2).

[16] See van Eijk (1997) and Davis (in prep.) for further details about stress assignment in St'át'imcets.

3.2 Diminutive and pluractional <C_1> reduplication at the same stratum

A comparison of diminutive and pluractional <C_1> reduplication with the edge-aligned (initial) C_1-reduplication briefly discussed in Section 1 shows that the two stress-aligned <C_1> patterns behave alike, and contrast in several ways with the edge-aligned pattern. We account for this by assigning edge-aligned C_1- reduplication to the STEM level and both stress-aligned <C_1> patterns to the WORD level.

The first contrast is in sensitivity to stress. Initial C_1- reduplication always aligns with the left edge of the stem, irrespective of stress. In some cases of C_1- reduplication, stress falls on the initial vowel of the word (32), whereas in others it falls on a non-initial vowel (33), but in either case stress assignment is orthogonal to the position of the reduplicant (and largely lexicalized).

(32)	a.	**xʷí-**xʷitən	b.	**ná-**n̓atxʷ	c.	**q̓á-**q̓aw-am̓
		C_1-whistle		**C_1-**day		**C_1-**howl-MID
		‘keep whistling’		‘morning’		‘howl’
(33)	a.	**qʷə-**qʷal̓út	b.	**la-**líl̓təm	c.	**kə-**káw̓
		C_1-speak		**C_1-**adult		**C_1-**far
		‘talk (PL.), speak all the time’		‘adults’		‘far’

On the other hand, the position of diminutive and pluractional <C_1> reduplicants is determined by stress, which means that both types can target suffixal material when stress at the WORD level falls on a non-root vowel, as shown in (34) for the diminutive and (35) for the pluractional; see also (4) and (23) above.

(34) łə̓mx̌ʷ-**ə́<x̌ʷ>s** tiʔ kʷu=s-k̓ʷú<k̓ʷ>miʔt
dirty-**FACE<DIM>** that DET=NMLZ-child<DIM>
‘That child’s face is a little dirty.’[17]

(35) waʔ p̓kʷ-**í<kʷ>l̓əx** ta=n-c̓qáx̌ʔ=a l=ta=s-q̓áq̓pʔ=a[18]
IPFV dust.whirls-**AUT<PLU>** DET=1SG.POSS-horse=EXIS in=DET=NMLZ-sand=EXIS
‘My horse is whirling up dust (by rolling around) in the sand.’ (Davis et al. in prep)

The second contrast is in phonological regularity. Initial C_1- reduplication is unproductive and largely lexicalized. As can be seen in (32) and (33) above, it is not entirely predictable which vowel will surface in the reduplicant, nor whether the vowel will be stressed or unstressed. In contrast, as we have seen, both diminutive and pluractional reduplication predictably target the consonant

[17] In this example, the uvular fricative on √*łə̓mx̌* ‘dirty’ is rounded because it is adjacent to the round vowel /u/ in the lexical suffix *-us* ‘FACE’ at the STEM stratum (*łə̓mx̌ʷ-**ús***); labialization at the STEM stratum is preserved at the WORD stratum, even though the original vowel in the suffix has been replaced by schwa.

[18] The verb *p̓kʷ**í<kʷ>**l̓əx* ‘whirl up dust’ in this example (from our Upper St’át’imcets-speaking consultant) differs from the equivalent verb in van Eijk (2013/in prep.:12), given as *pəlkʷ**í<kʷ>**l̓əx*. The latter is transparently derived from the root √*pəl̓kʷ* ‘dust(y)’, whereas the former is derived from the otherwise unattested root √*p̓əkʷ*, possibly related to √*p̓ukʷ* ‘pour/spill solids’, and likely innovated. Note also that the mass noun *s-**q̓á<q̓>**paʔ* ‘sand’ contains a lexicalized instance of vowel retaining <C_1> reduplication (there is no non-reduplicated form of this root). A not insignificant number of nouns and adjectives show this pattern, which probably goes back to an old <C_1> plural parallel to pluractional <C_1> on verbs.

before the stressed vowel at the WORD level: the stressed vowel is then consistently realized as schwa (in the diminutive) or as the original stressed vowel (in the pluractional). These differences in phonological regularity follow if initial C_1- reduplication is a STEM-level morpheme, while diminutive and pluractional <C_1> are both affixed at the WORD level: within Stratal OT, STEM-level morphology may be non-analytical and involve stored stems, while WORD-level morphology is more regular and tolerates fewer lexicalized exceptions (Bermúdez-Otero 2012).

The third and most crucial difference is in co-occurrence restrictions between reduplicative processes. Mellesmoen and Urbanczyk (2021a) propose a restriction on the phonological grammar which bans multiple reduplication at the same stratum. If initial C_1- reduplication is at the STEM level, but both diminutive and pluractional <C_1> are at the WORD level, this restriction makes a series of predictions about multiple reduplication, as summarized in Table 3. (For a more complete account of co-occurrence between reduplicants in St'át'imcets, see Mellesmoen in prep.)

Table 3: Co-occurrence restrictions between reduplicative processes in St'át'imcets

	Initial C_1-	*Plur(action)al/ Property Denoting C_1C_2*	*Change of State <C_2>*
Initial C_1-		*	✓
Diminutive <C_1>	✓	✓	*
Pluractional <C_1>	✓	✓	*

Two other stratal claims are incorporated here, which we do not have space to justify in detail (see Table 2, and Mellesmoen in prep.): first, C_1C_2 reduplication is situated at the STEM level, like initial C_1- reduplication; and second, <C_2> reduplication is situated at the WORD level, like diminutive and pluractional reduplication. One argument in favour of this organization is based on alignment: like initial C_1- reduplication, C_1C_2 reduplication is edge-aligned, whereas <C_2> reduplication is stress-aligned, like diminutive and pluractional reduplication.

The first set of predictions are that initial C_1- reduplication should in principle be compatible with both diminutive and pluractional reduplication, since they are at different strata. Though it is not easy to find appropriate candidates, due to the irregular and lexicalized status of initial reduplication, the following cases show that where testable, the prediction is borne out: (36a–c) feature diminutives together with initial reduplication on an adjective, a noun, and a verb, respectively, while (36d) features pluractional <C_1>.

(36)	*Base*	*C_1-*	*<C_1>*	*C_1- + <C_1>*
a.	ǩzum 'big'	**ǩə-**ǩzúm 'big (PL.)'	ǩz**á<z>**əm̓ 'a bit bigger'	**ǩə-**ǩz**á<z>**əm̓ 'a bit bigger (PL.)'
b.	s-q^{w}yic 'rabbit'	s-**q^{w}ə-**q^{w}yíc 'rabbits'	s-q^{w}y**á<y̓>**əc 'little rabbit'	s-**q^{w}ə-**q^{w}y**á<y̓>**əc 'little rabbits'
c.	q^{w}al̓út 'speak'	**q^{w}ə-**q^{w}al̓út 'speak (PL.)'	q^{w}al**á<l̓>**t 'converse'	**q^{w}ə-**q^{w}al**á<l̓>**t 'converse (PL.)'[19]

[19] Van Eijk (2013/in prep.:316) gives the meaning of *q^{w}əq^{w}al̓út* as 'to talk loudly, bawl someone out': however, for our consultant, it is a simple pluractional, referring to more than one event of talking (by one or more speakers).

d.	p̓akʷ	—	p̓a<**p̓**>kʷ	**p̓a-**p̓**á<p̓>**kʷ
	‘surface’	—	‘float’	‘float (PL.)’ [20]

The next set of predictions concerns co-occurrence with C_1C_2 reduplication, which is situated at the STEM level, by hypothesis. Initial C_1- reduplication is predicted not to co-occur with C_1C_2 reduplication, since they are at the same stratum: as the data in (37) show, even where both are independently possible, they may not co-occur in either order.

(37)		*Base*	*C_1-*	*C_1C_2*
	a.	ʔəs-táɬ-ləx	ʔəs-**tá-**taɬ-ləx	ʔəs-**təɬ-**táɬ-ləx
		‘standing up’	‘standing up continuously’	‘standing up (PL.)’
			*C_1- + C_1C_2	*C_1C_2 + C_1-
			*ʔəs-**ta-təɬ-**táɬ-ləx	*ʔəs-**təɬ-tá-**taɬ-ləx
	b.	*Base*	*C_1-*	*C_1C_2*
		qʷal̓ú̓t	**qʷə-**qʷal̓ú̓t	**qʷəl̓-**qʷal̓ú̓t
		‘speak’	‘speak (PL.)’	‘speak (PL.)’
			*C_1- + C_1C_2	*C_1C_2 + C_1-
			***qʷə-qʷəl̓-**qʷal̓ú̓t	* **qʷəl̓-qʷə-**qʷal̓ú̓t

On the other hand, both types of stress-aligned <C_1> reduplication, which by hypothesis are situated at the WORD level, are predicted to be compatible with C_1C_2 reduplication. This prediction is fully borne out: the most common multiple reduplication patterns in the language feature either pluractional <C_1> and C_1C_2, as shown in (26) above, or diminutive <C_1> and C_1C_2, as shown in (38) below.

(38)		*Base*	*C_1C_2*	*Diminutive <C_1>*	*C_1C_2 + Diminutive <C_1>*
	a.	s-kʷúzaʔ	s-**kʷəz-**kʷúzaʔ	s-kʷ**ə́<kʷ>**zaʔ	s-**kʷəz-**kʷ**ə́<kʷ>**zaʔ
		‘(s.o.’s) child’	‘(s.o.’s) children’	‘(s.o.’s) small child’	‘(s.o.’s) small children’
	b.	s-ɣap	s-**ɣəp-**ɣáp	s-ɣ**ə<ɣ̓>**p	s-**ɣəp-**ɣ**ə́<ɣ̓>**p
		‘tree’	‘trees’	‘little tree’	‘little trees’
	c.	qʷənúx̌ʷ (U)	**qʷən-**qʷənúx̌ʷ	qʷən**ə́<n̓>**xʷ	**qʷən-**qʷən**ə́<n̓>**xʷ
		‘sick’	‘sick (PL.)’	‘a little sick’	‘a little sick (PL.)’
	d.	zaxt	**zəx-**záxt	z**ə́<z̓>**xət	**zəx-**z**ə́<z̓>**xət
		‘long’	‘long (PL.)’	‘a little longer’	‘a little longer (PL.)’

Next, consider co-occurrence restrictions with <C_2> (change of state) reduplication, which is a stress-aligned infix and is therefore assigned to the WORD level. Here, the predictions are the inverse

[20] The form *p̓á-p̓akʷ*, with initial but not pluractional reduplication, has not been recorded or elicited so far, which is why it is missing here, though it is predicted to be licit with the suggested meaning.

of those with C_1C_2: prefixal C_1- should in principle be compatible with $<C_2>$, while neither type of infixal $<C_1>$ should co-occur with it.

$<C_2>$ marks a change of state. This makes it extremely challenging to find prefixal C_1- candidates for it to combine with, since almost all of the small number of verbs with C_1- denote either a continuing state or an activity, leading to aspectual incompatibility. The only viable candidate we have been able to find so far is the adjective *xzum* 'big', which exceptionally takes both $<C_2>$ reduplication and a C_1- plural: since change of state is semantically compatible with plural, they can and do co-occur:

(39)	*Base*	*C_1-*	*$<C_2>$*	*C_1- + $<C_2>$*
	ǎzum 'big'	**ǎ**ə-ǎzúm 'big (PL.)'	ǎz**ú**m**<əm>** 'get bigger'	**ǎ**ə-ǎzúm**<əm>** 'get bigger (PL.)'

In contrast, while there is no semantic incompatibility between change of state $<C_2>$ and diminutive $<C_1>$, the prediction is that they should not co-occur, since they are at the same stratum. This prediction is borne out, as shown in (40). (There is one minor complication here: $<C_2>$ normally only occurs on bound roots, so bare roots and their diminutive variants do not surface independently of $<C_2>$).

(40)		*Base*	*$<C_2>$*	**Diminutive $<C_1>$ + $<C_2>$*
	a.	√ƛ̓up 'twist'	ƛ̓úp**<əp>** 'get twisted'	*ƛ̓ə**<ƛ̓>**p**<əp>**
	b.	√ɬil 'sprinkle'	ɬíl**<əl>** 'sprinkle (rain)'	*ɬə**<ɬ>**l**<əl̓>**
	c.	√nus 'damp'	nús**<əs>** 'get damp'	*nə**<n̓>**s**<əs>**
	d.	√kən̓ 'bump'	kən̓**<ən̓>** 'get bumped'	*kə**<k>**n̓**<ən̓>**

On the other hand, since pluractional $<C_1>$ is never found on change of state verbs (see Section 2.2.2), it is impossible to test for its co-occurrence with $<C_2>$.

Summarizing the evidence presented in this section, Table 4 shows which relevant combinations of reduplication are possible.

Table 4: Observed co-occurrence restrictions between reduplicative processes in St'át'imcets

	Initial C_1-	*Plur(action)al/ Property Denoting C_1C_2*	*Change of State $<C_2>$*
Initial C_1-		*	(✓)
Diminutive $<C_1>$	✓	✓	*
Pluractional $<C_1>$	✓	✓	-

Though it is not always easy to find relevant cases, either due to a paucity of relevant forms (as with combinations involving C_1-) or independent restrictions (as with pluractional <C_1> plus <C_2>), a comparison of the predictions in Table 3 with the results in Table 4 provides strong support both for the stratal model as a whole and the particular analysis of strata provided here, with C_1- situated at the STEM level, and crucially both diminutive and pluractional <C_1> situated at the WORD level.

3.3 Distinguishing between diminutive and pluractional <C_1>: the role of the input

There is a major consequence to the conclusion we have just reached that both diminutive and pluractional <C_1> reduplication occupy the WORD stratum: within the Stratal OT model, operations at the same stratum must be subject to the same phonological grammar (i.e., the same constraint ranking).

This in turn means that the phonological grammar cannot account for the phonological *differences* between the two <C_1> processes, and in particular, the key distinction between the vowel reducing pattern characteristic of the diminutive and the vowel retaining pattern characteristic of the pluractional. And that in turn leaves only one option within the Stratal OT model we have adopted: *the two patterns must have different inputs*.

In this section, we lay out an account of these differences employing the theory of Generalized Non-Linear Affixation. Our core proposal is that both types of <C_1> reduplication involve the *affixation of a mora*, but that the diminutive involves an extra specification to the effect that the mora is *lexically stressed.*

The additional prosodic information associated with the diminutive is supported by cross-Salishan considerations. The vowel retaining pattern associated with pluractional <C_1> is typical of infixed C_1 reduplication across the family (see for example Jimmie 1994 on Nłeʔkepmxcín and Nakamura 2000 on Secwepemctsín). In contrast, the vowel reducing <C_1> pattern is only attested in St'át'imcets. Therefore, the vowel reducing pattern requires extra lexical specification (beyond what is needed for other Salish languages) to motivate the marked /ə́/.

3.3.1 Input for non-concatenative morphology and theoretical assumptions

Within the Generalized Non-Linear Affixation model which we have adopted, reduplication is triggered by affixation of "empty" prosodic representations which lack segmental content (see, e.g., Bye & Svenonius 2012; Bermúdez-Otero 2012; Zimmermann 2013).

An example of this approach applied to St'át'imcets reduplication is given in Figure 1, showing the derivation for the change of state form *púɬ**<əɬ>*** 'come to a boil' (<*√púɬ* 'boil'), where the input for <C_2> ("final") reduplication (applied at the WORD stratum) is a syllable (Mellesmoen in prep.).

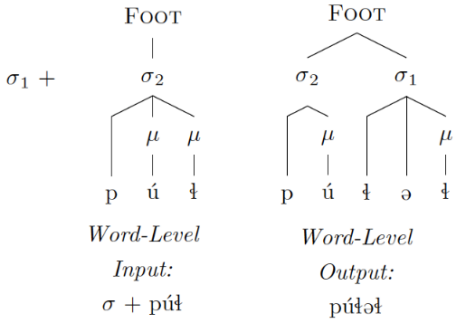

Figure 1: <C_2> reduplication in St'át'imcets is an affixed σ

In GNLA, morphemes with reduplicative exponents are not inherently "reduplicative" and there are no reduplication-specific constraints in the grammar. The grammar of the language determines the least marked strategy to associate a floating prosodic unit in the input with segmental content in the output.

3.3.2 Assumptions about syllable structure and moraicity in St'át'imcets

We follow previous analyses of Salish syllable structure and assume that /ə/ is nuclear (which means it can be in a stressed syllable) but non-moraic (which means it is "weightless"): see, e.g., Shaw et al. (1999), Blake (2000), Leonard (2019).[21] Further, we treat coda consonants as moraic, which is also consistent with previous phonological analyses of St'át'imcets: see, e.g., Roberts and Shaw (1994), Caldecott (2009). Examples of a weightless syllable and two types of monomoraic syllable are shown in Figure 2, while two examples of bimoraic syllables are shown in Figure 3.

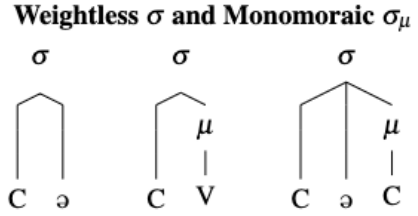

Figure 2: Weightless and monomoraic syllables in St'át'imcets

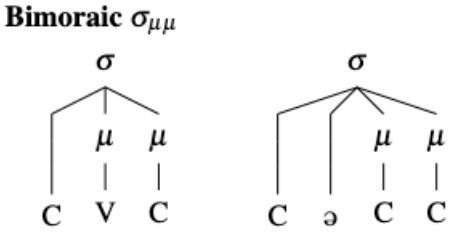

Figure 3: Bimoraic syllables in St'át'imcets

There are two types of monomoraic and bimoraic syllables in St'át'imcets, shown in Figures 2 and 3 above: those with a /ə/ nucleus and those with a full vowel nucleus.[22] A full vowel contributes a mora to the weight of the syllable, allowing for an open monomoraic syllable (CV) or a closed

[21] In order to ensure that a syllable with /ə/ as a head can bear stress (and be associated with phonetic correlates of prominence), we propose that /ə/ itself cannot host a mora but may share a mora with a coda consonant, given that the mora is licensed by the coda consonant. However, since this requires further discussion beyond the scope of the present paper, we represent /ə/ in the diagrams here as unaffiliated with a mora, consistent with previous work.

[22] Minor syllables (which lack a vocalic nucleus) are not considered here. See Bates and Carlson (1992) for further discussion on minor or simple syllables in the Southern Interior language Spokane.

bimoraic syllable with a simple coda (CVC). With a /ə/ nucleus, the weight comes exclusively from the coda consonants, allowing for a closed monomoraic syllable (CəC) or a closed bimoraic syllable with a complex coda (CəCC).

3.3.3 A mora (pluractional) and a lexically stressed mora (diminutive)

We propose that both types of stress-aligned <C_1> reduplication add a coda to a stressed syllable. Since a coda consonant in St'át'imcets is moraic, both diminutive and pluractional reduplication therefore add a mora.

The pluractional <C_1> pattern can be characterized simply as the addition of a mora, with the reduplication of a consonant providing segmental content for the mora. The pluractional <C_1> morpheme is given the lexical entry in (41).

(41) *Lexical Entry for Pluractional <C_1>*

μ ⇔ <PLU>

Figure 4 shows the derivation of *mi<**ṁ**>x* (< √*mix*) 'move house' (U) with pluractional <C_1> reduplication. First, stress is assigned at the STEM stratum. The pluractional μ is affixed at the WORD stratum, and subsequently triggers reduplication of the consonant before the stressed vowel. The affixed mora (and associated segment) is positioned following the stressed mora in the word. Additional affixation may follow at subsequent strata.

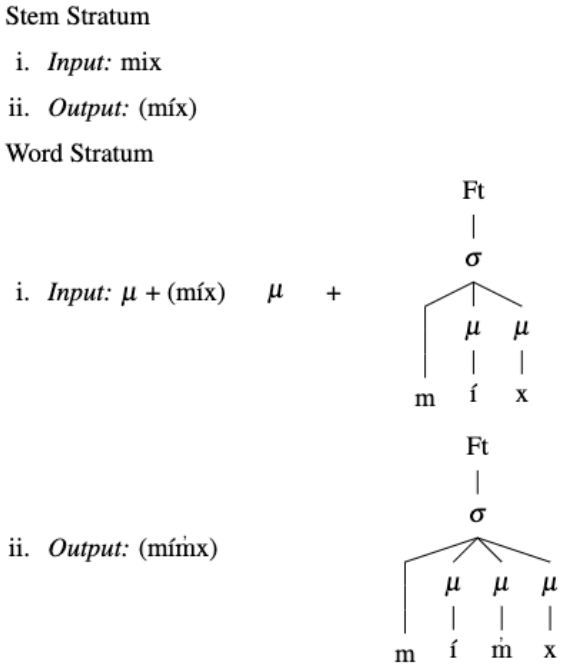

Figure 4: Sample derivation with pluractional <C_1> reduplication

We also analyze diminutive <C_1> reduplication as a mora, but with the crucial extra condition that it is marked for lexical stress. We use a privative feature [stress] to mark lexical stress in the input (de Lacy 2020). A segment or prosodic unit which has the feature [stress] in the input must also be the designated terminal element (DTE) in the output.[23] The diminutive is therefore an affixed mora which bears the [stress] feature, as in (42).

(42) *Lexical Entry for Diminutive <C_1>*

$\mu_{[stress]} \Leftrightarrow$ <DIM>

Though de Lacy (2020) associates the stress feature with a root node, we follow Paschen (2018) in assuming that affixed prosodic units may also carry features.[24] The [stress] feature marks lexical stress and designates what should be a DTE in the output. Figure 5 shows a derivation where diminutive is affixed at the WORD stratum. The affixed mora with the feature [stress] ends up replacing the stressed (head) mora in the input.[25]

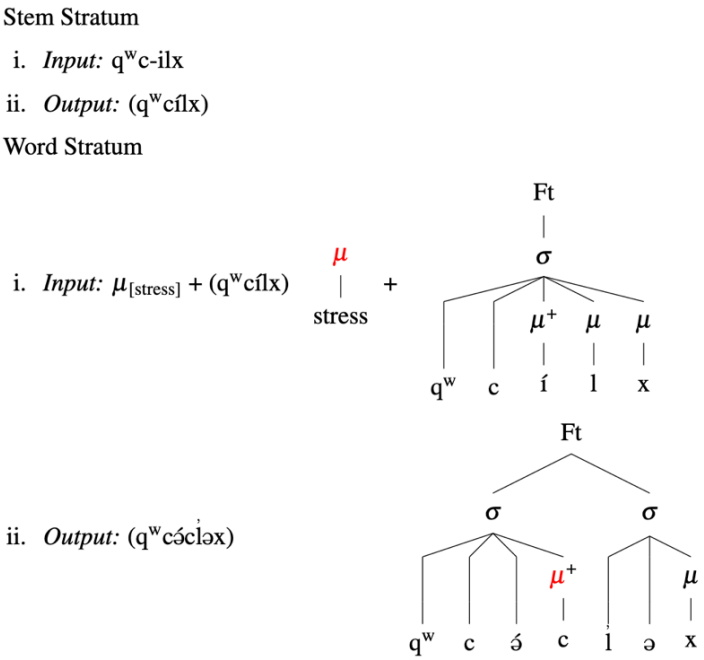

Figure 5: Sample derivation with diminutive <C_1> reduplication

[23] More specifically, a unit "that bears [stress] in the output must also be [associated with] the 'designated terminal element' (DTE) of a prosodic word (PrWd) — i.e., the [segment associated with] the head mora of the head syllable of the head foot of a PrWd" (de Lacy 2020:1).
[24] Paschen (2018) uses a mora which is affixed with a [PHAR] feature.
[25] The additional /ə/ and second syllable in the output of the WORD Stratum in Figure 5 follows from the general phonological grammar of the language (i.e., it is not specific to diminutive reduplication). See the following section for an analysis (and further explanation) of the V́ > ə́ change.

3.3.4 A constraint-based analysis of <C_1> reduplication at the WORD stratum

One benefit of the GNLA approach is that it does not require anything that is not already present in the phonological grammar of the language; the grammar provides segmental content to an affixed mora in the most optimal way. Both types of <C_1> reduplication surface as infixes: the linear order of the segmental content follows from how the grammar integrates the mora into existing prosodic structure that was built at an earlier stage in the derivation.

Recall that when a prosodic unit is affixed, it has no segmental content: the grammar must fill the floating mora.[26] Constraints that ensure a floating mora will be associated with segmental content include REALIZEMORPHEME (which requires a morpheme in the input to be realized with phonological content in the output) and *FLOAT (which rules out leaving a prosodic unit floating in the output). These constraints are defined in (43).

(43) a. REALIZEMORPHEME (RM): Let α be a morphological form, β be a morphosyntactic category, and F(α) be the phonological form from which F(α+β) is derived to express a morphosyntactic category β. Then RM is satisfied with respect to β iff F(α+β) ≠ F(α) phonologically. (Kurisu 2001:39)

b. *FLOAT: ∀*p* ∈ O, where *p* is a prosodic unit: ∃*s*, where s is a segment, and *p* dominates *s*. (Kirchner 2010:232)

Reduplication exemplifies the phonological process of *fission*, where one segment in the input corresponds to two segments in the output. Each instance of fission incurs a violation under INTEGRITY (McCarthy & Prince 1999), defined in (44).

(44) INTEGRITY: No element of the input has multiple correspondents in the output.

The relative ranking of faithfulness constraints will determine whether reduplication occurs, or whether another repair process will be used, such as epenthesis. A grammar which uses reduplication to fill an affixed unit will necessarily have DEP, defined in (45), ranked above INTEGRITY.

(45) DEP-IO (DEP): Output segments must have input correspondents. (Kager 1999:68)

The tableau in (46) shows how the ranking *FLOAT, REALIZEMORPHEME >> DEP >> INTEGRITY predicts the attested candidate (46b) for pluractional <C_1>: the winning candidate only violates INTEGRITY. Candidates which epenthesize a consonant, as in (46a), leave the mora floating,

[26] Reduplication is just one of the possible ways a mora may be associated with segmental content. Given the right constraint ranking, other strategies may arise, as in the Tsamosan language Upper Chehalis, where the diminutive is also an affixed mora, but independent changes to the grammar have led to the emergence of contrastive vowel length; this reranking allows an affixed mora to be filled by lengthening a segment rather than by reduplication (Mellesmoen 2022).

as in (46c), or delete the mora, as in (46d), result in fatal violations. This ranking chooses reduplication over epenthesis to fill an affixed mora.[27]

(46) Word-Level Derivation of Pluractional <C_1> *mi<ṁ>x* (< *√mix*) 'move house' (U)

	μ + √míx	*FLOAT	RM	DEP	INTEGRITY
a.	míʔx			*!	
b. ☞	míṁx				*
c.	μ míx	*!			
d.	míx		*!		

3.3.4.1 Deriving pluractional <C_1> reduplication at the WORD stratum

The ranking exemplified in (46) accounts for why reduplication occurs at the WORD stratum to fill an affixed prosodic unit, but it does not yet account for why the pluractional <C_1> reduplication surfaces as an infix. The position of the reduplicant is predicted by a series of constraints which relate to prosodic structure in the output.

First, the constraint ANCHOR$_{FOOT}$, defined in (47), ensures that there is a foot in the output for every foot in the input, such that the edges of the output foot correspond to the edges of the input foot. The ANCHOR$_{FOOT}$ constraint adapts and combines two constraints from Özçelik (2014).

(47) ANCHOR$_{FOOT}$

a. ANCHOR-R: The right edge of every foot in the input corresponds to the right edge of some foot in the output.

b. ANCHOR-L: The left edge of every foot in the input corresponds to the left edge of some foot in the output.

Second, the constraint *STRUC-FT, defined in (48), penalizes structure in the output, such that every foot in the output incurs a violation mark. The relative ranking of ANCHOR$_{FOOT}$ over *STRUC-FT ensures that there will be as least as many feet in the output as the input.

(48) *STRUC-FT: No feet. Assign a violation mark for every foot.
(modified from Zoll 1997)

The constraints PARSE-μ and *-△FT > △FT, defined in (49), ensure that the affixed mora will be integrated into a foot, resulting in (surface) infixation.[28] PARSE-μ is violated by every mora that is not parsed into a foot, and *-△FT > △FT is violated by bisyllabic feet where the head syllable

[27] A finer-grained ranking of DEP-C >> INTEGRITY, DEP-V would permit the epenthesis of schwa for sonority purposes while blocking the epenthesis of a consonant. See Mellesmoen and Urbanczyk (2021b), who argue on the basis of data from hul'q'umi'num' (Island Halkomelem) that INTEGRITY and DEP should be divided into constraints evaluating consonants and vowels separately, in order to predict which segments are copied in reduplication.

[28] The △ symbol means designated terminal element (DTE), as defined by de Lacy (2006).

is lighter than the non-head syllable. Together, these constraints favour candidates where the affixed mora is integrated into the head syllable of an existing foot.

(49) a. PARSE-μ: Moras are parsed by feet. (modified from Kager 1999:153)

b. *-△FT > △FT: Assign a violation for every non-head syllable in a foot with a greater weight than the corresponding head syllable.

The tableau in (50) shows how the position of the reduplicant is predicted by the given constraints. REALIZEMORPHEME and *FLOAT are excluded from the subsequent tableaux because they are never violated. Candidate (50a) doubles the /q̓ʷ/ and creates a bimoraic unstressed syllable, which is heavier than the monomoraic stressed syllable in the same foot: this incurs a fatal violation of *-△FT > △FT. Candidate (50b) avoids violating *-△FT > △FT by not having a foot in the input, which results in a fatal violation of $\text{ANCHOR}_{\text{FOOT}}$. Candidates which reduplicate the first consonant (and the vowel) are ruled out because they must either leave a mora unparsed (50c) or build a second foot (50d), fatally violating PARSE-μ and *STRUC-FT, respectively. The attested candidate integrates the affixed mora into the stressed syllable (50e).

(50) WORD-Level Derivation of Pluractional <C_1> *súsq̓ʷən̓* 'skin animals' (21) < √súq̓ʷ + -ən

	μ + (súq̓ʷən)	$\text{ANCHOR}_{\text{FOOT}}$	DEP	*-△FT > △FT	*STRUC-FT	PARSE-μ	INTEGRITY
a.	(súq̓ʷəq̓ʷn̓)			*!	*		*
b.	suq̓ʷəq̓ʷn̓	*!				***	*
c.	su(súq̓ʷən̓)				*	*!	**
d.	(súsu)(q̓ʷən̓)				**!		**
e. ☞	(súsq̓ʷən̓)				*		*

3.3.4.2 Deriving diminutive <C_1> reduplication

In order to derive the vowel reducing diminutive pattern, which by hypothesis involves the affixation of a mora marked for lexical stress, two more constraints are needed. First, CULMINATIVITY-μ^+ requires there to be only one strong (head) mora (μ^+) (51a). Second, STRESSSTRESS requires an input [stress] feature to correspond to a designated terminal element in the output (51b).

(51) a. CULMINATIVITY-μ^+ (CULMIN): Every word has exactly one accent (at the level of the mora) that is greater than all others.
(modified from Alderete 2013)

b. STRESSSTRESS: Assign a violation mark for any prosodic unit with a [stress] feature in the input that does not correspond to a head in the output.

In addition to CULMINATIVITY-μ^+ and STRESSSTRESS, an additional constraint pertaining to epenthesis is required. DEP-IO_{FV}, defined in (52), is violated when a full vowel (a vowel that is not /ə/) is epenthesized. It is ranked higher than DEP, which means /ə/ will surface as the epenthetic vowel unless the epenthesis of a full vowel is motivated by other high-ranked constraints.[29] This is consistent with the general phonology of the language, since /ə/ is the default epenthetic vowel.

(52) DEP-IO_{FV} (DEP-FV): A full vowel in the output must have an input correspondent.

A tableau demonstrating how the constraints predict the correct position and vowel quality for diminutive <C_1> reduplication is given in (53).[30] CULMINATIVITY-μ^+ and STRESSSTRESS are highly ranked. Additionally, DEP-FV is crucially ranked above DEP. This ranking allows for the attested candidate (45a) to win, despite the epenthesis of /ə/ (violating DEP). In the winning candidate, the input stressed vowel is replaced by epenthetic /ə/ and the head mora is replaced by the affixed mora.

(53) Word-Level Derivation of Diminutive *spəqm̓ə́m̓x* 'little swan' (4a) < s-√pəq-m̓íx[31]

	$\mu_{[stress]}$ + spəq(m̓í$_{\mu+}$x)	ANCHOR$_{ROOT}$	CULMIN	STRESSSTRESS	DEP-FV	*-ΔFT > ΔFT	DEP	*STRUC-FT	PARSE-μ	INTEGRITY
a. ☞	spəq(m̓ə́m̓$_{\mu+}$x)						*	*	*	*
b.	spəq(m̓í$_{\mu+}$m̓x)			*!				*	*	*
c.	spəq(m̓í$_{\mu+}$m̓$_{\mu+}$x)		*!					*	*	*
d.	(spə́p$_{\mu+}$q)(m̓í$_{\mu+}$x)		*!					**		*
e.	spəq(m̓á$_{\mu+}$x)				*!		*	*	*	

Candidate (53b) retains the input stressed vowel and does not parse the affixed mora as a head mora, which fatally violates STRESSSTRESS. Candidates (53c) and (53d), which are faithful to the stressed vowel and head mora in the input, and also retain the affixed mora as a second head mora,

[29] A violation of DEP-FV is also necessarily a violation of DEP, but a violation of DEP is not necessarily a violation of DEP-FV.

[30] Head moras are only marked with the μ^+ notation where relevant in tableaux (i.e., only in this section).

[31] The nominalizer *s-* in (53) is ignored for the purposes of reduplication (like all prefixes); we set aside this issue for current purposes.

fatally violate CULMINATIVITY-μ^{+}. Finally, candidate (53e) shows that epenthesis of a full vowel fatally violates DEP-FV.[32]

Recall from Section 2.1.1 that when the copied consonant is /ʔ/ or /h/, the diminutive form appears to have the vowel retaining pattern instead of the vowel reducing pattern (leading to homophony with pluractional <C_1>). There is a general ban on tautosyllabic [əʔ] sequences in the language, which follows from the high-ranked constraint *əC$_{ʔ/h}$]$_\sigma$, defined in (54). The constraint *əC$_{ʔ/h}$]$_\sigma$, abbreviated as *əʔ]$_\sigma$, is violated whenever a /ʔ/ or /h/ is in the coda of a syllable with /ə/ as the nucleus.

(54) *əC$_{ʔ/h}$]$_\sigma$ (*əʔ]$_\sigma$): Sequences of əʔ or əh within a single syllable are not permitted.

The high ranking of *əʔ]$_\sigma$ blocks the replacement of a stressed full vowel with /ə/, as shown in the tableau in (55).[33] In the winning candidate (55a), the glottal stop is doubled to provide segmental content to the diminutive mora, but a full vowel is necessarily the head mora of a stressed syllable. Thus, the diminutive mora in the winning candidate cannot be the head mora. This pattern also shows that CULMIN must be ranked above STRESSSTRESS to rule out candidates which assign stress to the diminutive mora as well as the nuclear mora (e.g., 47c).[34]

(55) Word-Level Derivation of Diminutive *ʔúʔqʷaʔ* 'drink a bit' (3) (< √ʔúqʷaʔ)

	$\mu_{[stress]}$ + (ʔúqʷaʔ)	*əʔ]$_\sigma$	CULMIN	ANCHOR$_{FOOT}$	DEP-FV	*-△FT > △FT	STRESSSTRESS	DEP	*STRUC-FT	PARSE-μ	INTEGRITY
a. ☞	(ʔú$_{\mu+}$ʔqʷaʔ)						*		*		*
b.	(ʔáʔ$_{\mu+}$qʷaʔ)	*!				*!		*	*		*
c.	(ʔú$_{\mu+}$ʔ$_{\mu+}$qʷaʔ)		*!						*		*

The constraint ranking given in (56) accounts for both <C_1> reduplication processes. The affixation of a plain mora results in the vowel retaining pattern while the affixation of a lexically stressed mora results in the vowel reducing pattern.

[32] A potential candidate with the affixed mora associating with the existing stressed vowel is not considered in (53) because it would yield an identical output to the form without reduplication; this candidate would fatally violate REALIZEMORPHEME, which is undominated.

[33] Candidate (55b) shows an additional violation of *-△FT > △FT, which would also rule it out. However, *əʔ]$_\sigma$ is needed for the grammar more generally, and *-△FT > △FT does tolerate exceptions outside of reduplication (suggesting it would not be as highly ranked in the grammar and would not reliably exclude Candidate 55b).

[34] Another potential candidate (ʔáʔə)(qʷàʔ) is ruled out by a higher ranked *STRUC-σ, which is violated by every syllable in the output. Where an additional [ə] is found in diminutive or plural forms (following the copied consonant), this represents epenthesis at a later stratum, which allows for epenthesis as a repair because constraints pertaining to sonority outrank STRUC-σ.

(56) *əʔ]$_{\sigma}$, CULMIN, ANCHOR$_{FOOT}$, DEP-FV, *-△FT > △FT >> STRESSSTRESS· >> DEP >> *STRUC-FT >> PARSE-μ, INTEGRITY

4 Implications for phonological theory

Using GNLA and Stratal OT, we have now shown how the core distinction between vowel reducing and vowel retaining <C_1> can be accounted for by positing a lexically stressed mora for the diminutive, distinct from the plain mora marking the pluractional. In this section, we address some of the broader theoretical questions that our analysis raises.

4.1 Lexical stress and the [stress] feature

We have adopted the [stress] feature proposed by de Lacy (2020) because it provides a way to enrich the representation of reduplication in St'át'imcets, while also being compatible with stress assignment elsewhere in the language. St'át'imcets stress may be lexically specified, which means that the grammar has both underlying and derived stress.

Adopting a [stress] feature allows us to differentiate between underlying and derived stress, because without it the representation of lexical stress in the input would be identical to stress (and prosodic structure) built at an earlier stratum. In the case at hand, the diminutive bears lexical stress and is introduced at the WORD stratum; failing to distinguish between the pre-existing prosodic structure in the input (present in the output of the STEM derivation) and the [stress] feature associated with the diminutive could result in the diminutive mora not receiving stress. Additionally, distinguishing between [stress] and derived prosodic structure has the benefit of predicting that stress shift will be possible at later stratum, even when a root bears lexical stress. In other words, understanding the interplay of lexical and derived stress patterns is independently necessary for a complete analysis of the phonology of St'át'imcets, beyond its specific role in accounting for reduplication.

Note that while the approach taken here draws inspiration from de Lacy's (2020) discussion of [stress], we do not adopt his central claim "that there is no underlying prosodic structure whatsoever, apart from tone", since this is incompatible with an analysis such as ours that treats reduplication as the affixation of prosodic units. His arguments for rejecting the presence of moras (and higher prosodic structure) in the input are based on analyses of contrastive length and stress, which do not extend to non-concatenative phenomena like Salish reduplication (see, e.g., Bye & Svenonius 2011).

4.2 GNLA and the vowel reducing pattern

Without adopting the assumptions of GNLA, it is unclear how the vowel reducing pattern in the diminutive can be analyzed. One of the strengths of the GNLA approach is that reduplication can arise from morphemes with different underlying representations (e.g., different prosodic units), as opposed to a single underlying representation that corresponds to every reduplicative morpheme (e.g., a generic RED morpheme), as in Base-Reduplicant Correspondence Theory (BRCT: see McCarthy & Prince 1995).

It is difficult to see how a single underlying representation could account for all the reduplication patterns in St'át'imcets, particularly given the existence of two separate but very similar <C_1> processes, as discussed here. Following Urbanczyk's (2001) analysis of Lushootseed, we could capture the distinction between C_1C_2 and <C_1>/<C_2> reduplication using Generalized

Template Theory (with reduplicants specified as either root or affix), and we could possibly handle the distinction between <C_1> and <C_2> by position (prefixal vs. suffixal). However, an analysis of this type would struggle to differentiate between three *different* types of C_1 reduplication (both types of <C_1> as well as C_1-), regardless of their form.

The diminutive pattern is particularly problematic for a BRCT analysis. Under BRCT, unmarked patterns are expected to emerge in reduplication as part of a phenomenon called The Emergence of the Unmarked (TETU). Reduplication follows the affixation of phonologically null RED morphemes which then trigger reduplication and allow for the default (or least marked) patterns to emerge. However, the vowel reducing <C_1> pattern yields a stressed /ə/, which is highly marked within the grammar of St'át'imcets, within the Salish language family as a whole (see, e.g., Urbanczyk 2001), and more broadly cross-linguistically (Kenstowicz 1994). This is all the more striking because a more faithful candidate with a stressed full vowel would fare better on both faithfulness and markedness constraints; in other words, BCRT predicts that St'át'imcets vowel reducing (diminutive) reduplication should not exist.

The problems faced with BRCT and the emergence of marked structure are not shared by GNLA, where each morpheme may be a different prosodic unit (e.g., a mora or a syllable). An affixed mora, which may be designated as lexically stressed, allows for marked segments (such as stressed /ə/) to surface in order to fill the affixed mora and satisfy high ranked constraints on prosodic structure. Having different inputs also means that the same constraint ranking can predict reduplication with an affixed plain mora and with an affixed stressed mora. The analysis provided here using GNLA is therefore not only well-suited to explaining both <C_1> reduplication patterns, but also consistent with the general phonological grammar of the language.

4.3 Significance of the input

One of the most important implications of the analysis presented here is that prosodic affixes must be able to carry lexical stress.[35]

An alternate approach would be to posit that a fixed segment /ə/ is associated with the diminutive morpheme. Though this would provide a schwa where one would not otherwise be anticipated, it is unclear what constraint ranking would motivate the deletion of a stressed full vowel over /ə/ without predicting deletion of full vowels elsewhere. Furthermore, since /ə/ is arguably absent from underlying representations in St'át'imcets (see Matthewson 1994), positing a fixed segment /ə/ would require adding /ə/ to the phonemic inventory of the language for a single morpheme.[36]

In terms of the specific prosodic affix we have chosen, a stressed mora is best able to account for the empirical data when the larger reduplicative system is taken into consideration. An alternative analysis where the pluractional is an affixed mora and the diminutive is an affixed syllable (which could somehow be integrated into an existing foot and bear stress) creates a new problem for the grammar: the <C_2> change of state reduplication is affixed at the same stratum (as

[35] Though we have chosen to represent lexical stress with a [stress] feature, we are agnostic about the best way to encode lexical stress on a floating mora. Other possible representations may involve diacritics or lexical specifications as a strong mora, head, or designated terminal element (see, e.g., de Lacy 2006; Prillop 2013; Köhnlein 2018).

[36] The diminutive is one of only three morphemes in St'át'imcets that allow for a stressed /ə/ when other suitable full vowels are present (see, e.g., discussion in Caldecott 2009).

evident from its alignment to stress) but is best analysed as the affixation of a syllable (see Mellesmoen in prep.).

Regardless of whether the affixed unit is a mora or a syllable, the diminutive must be designated differently with respect to its prosodic role.

5 Conclusion

This paper has both descriptive and theoretical consequences. Descriptively, we hope to have provided convincing evidence that what van Eijk (1997) described as "consonant reduplication" actually consists of two stress-aligned <C_1> reduplicative processes, a vowel reducing diminutive and a vowel retaining pluractional. Distinguishing the two simplifies the description of reduplication in St'át'imcets, and reveals previously unrecognized phonological and semantic regularities in the grammar.

The behavior of the two <C_1> processes sheds light on a number of aspects of phonological theory. First of all, their interaction with other types of reduplication provides evidence for a Stratal version of Optimality Theory, in which different reduplicative processes occupy distinct levels of the phonological grammar, and multiple reduplication is banned at the same stratum. Second, the fact that both <C_1> processes occupy the same stratum argues that they are subject to the same constraints and the same constraint ranking. This means that the differences between them — in particular, the contrast between vowel retention and vowel reduction — must be accounted for by different underlying representations in the input. We develop an account along these lines using the theory of Generalized Non-Linear Affixation (GNLA), in which both types of <C_1> reduplication involve the affixation of a mora, but where the vowel reducing diminutive pattern involves an extra specification to the effect that the mora is lexically stressed. To the extent that our account succeeds in explaining the complex phonological behavior of <C_1> reduplication in St'át'imcets, it provides support both for the GNLA approach and the necessity for lexical specification of prosodic affixes.

Before concluding, we would like to make some additional brief remarks about productivity and lexicalization in the analysis of reduplication. We have adopted a hybrid methodological approach here, which has involved a combination of searching existing corpora (largely, dictionaries) and eliciting both positive and negative data from our consultant. The latter has extended our empirical reach, particularly in terms of non-existent and/or impossible reduplication patterns and combinations, but it has also made us aware that we have to distinguish more than one level of productivity.

We can illustrate this point with reference to the three types of C_1 reduplication we have examined in this paper. As we have seen, prefixal ("initial") C_1- is a relic process which applies to a small subset of eligible roots and is both phonologically and semantically irregular — while there are discernable sub-patterns, they are almost outnumbered by the exceptions. Unsurprisingly, our consultant neither produces nor recognizes cases of C_1- beyond existing lexical entries. Nevertheless, as we saw in Section 3.2, C_1- still interacts in predictable ways with other more productive reduplication processes: in particular, as a STEM-level operation, it can co-occur with both diminutive and pluractional <C_1>, which are at the WORD level, but not with C_1C_2, which is also at the STEM level. In other words, even this least productive of reduplicative processes is not entirely lexicalized: if it were, it would presumably lose its status altogether as a separate affixal morpheme.

At the other extreme, diminutive <C_1> reduplication is the most productive of all reduplicative processes in the language: it applies across the board to eligible roots (though its status on verbs is

less clear, partly because it is blocked by the application of pluractional <C_1>). Our consultant can produce, recognize, and interpret novel forms with diminutive reduplication, and it applies freely to loanwords.

Now, however, consider pluractional <C_1> reduplication. Like prefixal C_1-, it looks at first sight like a relic process, since it applies to a fixed (though quite large) subset of eligible forms (verbs). However, in other ways, it resembles diminutive <C_1> more closely than prefixal C_1-; both its phonological form and its meaning are almost fully predictable, and as a stress-aligned process, it can apply across morpheme boundaries at the WORD stratum. Its intermediate status is also reflected in the way that our consultant treats it: though he does not use it productively, and does not extend it to novel forms, he recognizes it as distinct from diminutive <C_1>, and is happy to correct us when we mistakenly produce a diminutive form instead of a pluractional on a particular lexical item. Furthermore, as observed above with respect to the forms in (31), there is evidence that, though it cannot be used like the diminutive to freely generate new forms "online", pluractional <C_1> has been employed in neologism formation in the recent past, suggesting that speakers still control it with some degree of productivity.

All this suggests a more nuanced view of "lexicalization", with implications for the types of methodology appropriate to investigate reduplication and other non-concatenative morphology. It is clearly not adequate to rely on corpora, because speaker judgments are critical in investigating possible and impossible forms and meanings. On the other hand, the varying effects of lexicalization mean we cannot simply investigate reduplication using standard syntactic and semantic tests either, since they tend to gloss over different levels of productivity and (de)compositionality. As suggested in footnote 10, a more refined approach to elicitation is probably necessary, in which a consultant is asked to rate the acceptability of a particular form on a scale, with the top corresponding to free and productive use, and the bottom corresponding to failure to even recognize the existence of a reduplicative morpheme. This type of scale allows us to access more nuanced levels of productivity, reflecting the mental representation of reduplicative morphemes more accurately.

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