A one (morpheme) by one (morpheme) approach to *paʔapyaʔ:* *-Vʔ-* as a temporal pluractional infix in Comox-Sliammon[*]

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Abstract: The Comox-Sliammon word *paʔapyaʔ* is translated as 'one by one' or 'one at a time'. Though previous work has not explored the semantic function of *paʔapyaʔ*, Matthewson (2000) finds that a cognate form in Lillooet (*pəlpálaʔ/pipálaʔ*) requires temporal distribution over events. An examination of Comox-Sliammon data suggests that *paʔapyaʔ* has similar temporal pluractional properties. *paʔapyaʔ* can be analysed compositionally as diminutive CV reduplication and a pluractional *-Vʔ-* infix applied to a numeral. The requirement for temporal distribution is attributed to the semantic contribution of the pluractional marker *-Vʔ-*. This analysis accounts for *paʔapyaʔ* as well as other 'X by X' constructions, like *saʔasyaʔ* 'two by two', and verbal predicates that take the *-Vʔ-* affix.

Keywords: Comox-Sliammon, event plurality, temporal distribution, pluractional marker, number

1 Introduction

Plurality can be marked on non-nominal predicates in Salish languages to refer to multiple events or subevents that can be distributed in some manner. Plural morphology on verbs can function semantically to convey pluractionality, which is defined by Lasersohn (1995:240) as "a multiplicity of actions, whether involving multiple participants, times, or locations".

Matthewson (2000) analyses a distributive element with pluractional properties in Lillooet, *pəlpálaʔ/pipálaʔ* 'one at a time', which can occur in a predicate/adverbial or quantifier position and requires temporal distribution over events.[1] Though cognate forms can be found in neighbouring Central Salish languages, including *pápəla* in Sechelt (Beaumont 2011) and *paʔapyaʔ* in Comox-Sliammon (Watanabe 2003), it is unclear if these cognates have the same syntactic and semantic properties as *pəlpálaʔ/pipálaʔ* in Lillooet.

In this paper, I provide a semantic analysis of *paʔapyaʔ* in Comox-Sliammon, a Central Salish language with approximately 36 fluent speakers

[1] Examples in this paper are given in or converted to APA to allow for easier comparison.

(FPCC 2014). First, I provide an overview of the syntactic distribution of *paʔapyaʔ* and compare its interpretation to Matthewson's (2000) generalizations about *pəlpálaʔ/pipálaʔ*, finding that it shows a similar preference for temporal distribution. Second, I describe the morphology of *paʔapyaʔ*, demonstrating how its meaning can be derived from the contribution of three morphemes. One of these morphemes is a *-Vʔ-* infix, which occurs with a wide range of lexical items and functions as a temporal pluractional marker. Though *paʔapyaʔ* can be treated under the same formal analysis as *pəlpálaʔ/pipálaʔ* when analysed as a whole, attention to the semantics of its composite morphemes suggests that the temporal pluractionality associated with *paʔapyaʔ* is more common in the language than has been previously described.

2 Data and generalizations about *paʔapyaʔ*

2.1 paʔapyaʔ: An overview

Watanabe (2003:503) ascribes the meanings 'one at a time' and 'one by one' to the lexical item *paʔapyaʔ* in Comox-Sliammon. The data in (1) is consistent with these definitions; *paʔapyaʔ* is translated into English as 'one by one' in (1a) and 'one at a time' in (1b).[2,3] The data given in this paper come from elicitation sessions with five fluent speakers of Comox-Sliammon and involve a combination of translations from English, translations from Comox-Sliammon, and the description of hand-drawn pictures.

(1) a. paʔapyaʔ jə̓kʷ-t-as θəkʷnačtən
    DISTRIB paint-CTR-3ERG chair
    'She is painting the chairs, one at a time.'   PD

  b. paʔapyaʔ pəč-əm
    DISTRIB wake-MDL
    'They (the children) woke up one by one.'   PD

The word *paʔapyaʔ* resembles the cognate *pəlpálaʔ/pipálaʔ* in Lillooet in form and translation, which Matthewson (2000) argues is a distributive element,

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[2] I gloss *paʔapyaʔ* as DISTRIB in Section 2, following Matthewson (2000). Other glossing conventions used in this paper are: 1 - 1st person, 2 - 2nd person, 3 - 3rd person, AINTR - active intransitive, CAUS - causative transitivizer, CONJ - conjunctive CTR - control transitivizer, DET - determiner, DIM - diminutive, ERG - ergative, FUT - future, IMPF - imperfective, INCH - inchoative, IND - indicative, MDL - middle, NTR - non-control transitivizer, PL - plural, POSS - possessive, PST - past, RED - unspecified CV reduplication, SG - singular, and TR - transitivizer. The • notation marks a reduplicant boundary.
[3] Determiners are often elided in Comox-Sliammon and so the absence of a determiner in any particular example should not be treated as significant. The syntactic structure of *paʔapyaʔ* sentences is often ambiguous in the absence of determiners. Additionally, the degree to which determiners are present varies across speakers.

occurring in DP-external and DP-internal positions while quantifying over events and requiring a temporal distribution. This paper explores whether the generalizations about *pəlpálaʔ/pipálaʔ* can be extended to *paʔapyaʔ* through a description of its syntactic distribution, semantic contribution, and morphological composition. Following this, a formal semantic analysis of *paʔapyaʔ* in one syntactic environment (DP-internal) is given.

2.2   The syntactic distribution of *paʔapyaʔ*

The expression *paʔapyaʔ* is found in DP-external and DP-internal environments in Comox-Sliammon. Examples of the former are given in (2) and (3), where *paʔapyaʔ* is in a DP-external position and occurs with either a subordinate or relative clause. In (2), *paʔapyaʔ* is predicative and takes a nominalized subordinate clause. In (3), *paʔapyaʔ* takes a headless relative clause.

(2)   paʔapyaʔ=səm   [kʷə=t$^\theta$ təqʷ-t=səm   tə   χʷaχʷit]
       DISTRIB=FUT   [DET=1SG.POSS   crack-CTR=FUT   DET   egg]
       'I will crack the eggs one at a time.'   MH

(3)   paʔapyaʔ   [tə   kʷa•kʷat-ig-an]
       DISTRIB   [DET   IMPF•pass.by-PL-1SG.CONJ]
       'One by one, they (the cars) passed by me.'   MH

An example of *paʔapyaʔ* within a DP is given in (4), where *paʔapyaʔ* occurs in a post-predicative, DP-internal position, forming a constituent with *tə χʷaχʷit* 'the eggs'.

(4)   yəp̓-ʔəm=t$^\theta$əm   [paʔapyaʔ   tə   χʷaχʷit]
       break-AINTR=1SG.IND.FUT   [DISTRIB   DET   egg]
       'I will break the eggs one at a time.'   FL

The DP-internal structure in (4) is similar to the one that Matthewson (2000) analyses for *pəlpálaʔ/pipálaʔ*. She finds that *pəlpálaʔ/pipálaʔ* can modify events, despite occurring in a DP-internal position. Following Matthewson (2000), I provide an analysis that can account for the semantics of *paʔapyaʔ* in a DP-internal position, leaving the DP-external cases for future examination.

2.3   The semantic interpretation of *paʔapyaʔ*

In order to approach the analysis of *paʔapyaʔ* in a systematic way, I follow the general approach adopted by Matthewson (2000). Specifically, I assess whether *paʔapyaʔ* universally quantifies over individuals, requires all subevents to be distributed, and shows a preference for no temporal overlap between subevents.

   Matthewson (2000) first explores the possibility that *pəlpálaʔ/pipálaʔ* functions like the English quantifier *each*, which universally quantifies over individuals. This hypothesis was disproved by data showing that *pəlpálaʔ/pipálaʔ* can be used felicitously in situations where not every

individual picked out by the DP participates in the action. While English *each* quantifies over individuals, requiring participation of all individuals in a set, *pəlpálaʔ/pipálaʔ* does not.

The word *paʔapyaʔ* in Comox-Sliammon resembles its Lillooet cognate, rather than *each* in English. As in Lillooet, *paʔapyaʔ* is acceptable in situations where not every individual in the denotation of the relevant DP partakes in the event. Two examples of this are given in (5), where *paʔapyaʔ* is permissible in a context where not every individual in the DP participates in the event. In (5a), only five of a total of six cups were broken, leaving one still intact and not subject to the breaking event. Similarly, there are a dozen eggs in (5b), but only four are cracked, as per instructions from a recipe, leaving eight intact.

(5) a. paʔapyaʔ   kʷaʔsta   yəṗ-t-an-uɬ
         DISTRIB   cup   break-CTR-1SG.ERG-PST
         'I broke the cups one by one.'
         Context: I have six cups and I break five of them.   JF

     b. paʔapyaʔ   təqʷ-t-an   χʷaχʷit
         DISTRIB   crack-CTR-1SG.CONJ   egg
         'I broke the eggs one at a time.'
         Context: A recipe calls for four eggs, but I have a dozen.   EP

The difference from English *each* is clearer in (6), which shows that *paʔapyaʔ* can be followed by an explicit statement specifying an individual who does not participate in the action. This statement, given in parentheses, is optional.

(6) paʔapyaʔ pəč-əm   ɬu   məm•mimaw (qəǰi ƛ̓əč̓t paʔa mimaw)
     DISTRIB awake-MDL DET PL•cat   (still sleep one   cat)
     'The cats woke up one at a time (but one cat is still sleeping).'
     Context: There are five cats, four of them have woken up in succession
     throughout the day, but one has remained asleep.   JF

Two parallel English sentences are provided in (7), where *each* is not acceptable if all of the cats did not wake up. In a situation where only four out of the five woke up, using *each* is contradictory, regardless of whether this is made explicit or not. Thus, *paʔapyaʔ* does not universally quantify over individuals like *each*.

(7) a. #Each of the cats woke up.
     b. #Each of the cats woke up, but one is still asleep.
            Context: You have five cats, and one is still asleep.

Matthewson (2000) also finds that *pəlpálaʔ/pipálaʔ* in Lillooet requires total distributivity across events. Her data shows that sentences with *pəlpálaʔ/pipálaʔ* are not accepted if the context includes a combination of distributive and non-distributive events. The Comox-Sliammon quantifier shows the same pattern. In (8), it is not felicitous to use *paʔapyaʔ* when describing putting away chairs if

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two chairs were put away at the same time in the midst of cleaning up, even if all the other chairs were put away individually.

(8) # paʔapyaʔ   θəkʷnačtən   qə•qəms-at-as   Gloria
     DISTRIB   chair   IMPF•put.away-CTR-3ERG   Gloria
     'Gloria is putting the chairs away.'
     Context: Gloria puts one chair away, then another, then two together, and
     then the last one alone.   JF

The example in (9), previously (5b), was felicitous if four eggs were cracked in succession, following a recipe. The same sentence is rejected if the same four eggs are involved, but two were cracked at the same time. This shows that *paʔapyaʔ* is not felicitous when one of the subevents is non-distributive, even if it happens to be the last event and all those before had been distributive.

(9) # paʔapyaʔ   təqʷ-t-an   χʷaχʷit
     DISTRIB   crack-CTR-1SG.CONJ   egg
     'I broke the eggs one at a time.'
     Context: The recipe calls for four eggs and I crack one egg, then another,
     before cracking the last two together (as a chef might).   EP

Examples (8) and (9) suggest that the use of *paʔapyaʔ* in Comox-Sliammon requires events to be distributed in time. In Lillooet, Matthewson (2000) argues that *pəlpálaʔ/pipálaʔ* has a strong preference for temporal distribution. Similar tests in Comox-Sliammon show that this generalization can be extended to *paʔapyaʔ*. In (10), it is not acceptable to use *paʔapyaʔ* to describe squishing multiple worms at the same time. The sentence itself is grammatical and can be used in a situation where all the worms are squished, but the squishing of each worm must have happened separately in a distinct stepping subevent.

(10) # paʔapyaʔ   ʔim-əxʷ-an   t̓θit̓θik̓ʷ
     DISTRIB   walk-NTR-1SG.ERG   worm
     'I stepped on the worms.'
     Context: I squished five worms in one step.   JF

The same is true of (11), where *paʔapyaʔ* is rejected in a context where all the doors of a car lock at the same time. However, it is acceptable to use *paʔapyaʔ* if each door is locked manually or if the locking event is part of a series of locking events, such as someone locking the doors of individual cars consecutively at a car dealership. The examples in (10) and (11) suggest that *paʔapyaʔ* is used in situations where events are temporally distributed, rather than just spatially.

(11) paʔapyaʔ   ləkli-t-as   ʔəm•ʔimin
      DISTRIB   lock-CTR-3CONJ   PL•door
      'She locked the doors.'
      Context: I went around and manually locked each door on the car.
      Context: I work at a dealership and I press buttons to lock each car.
      #Context: I pressed a button and all the doors locked on my car.   JF

Though a strong preference for temporal distribution of subevents is found for 'one by one' in both Lillooet and Comox-Sliammon, Matthewson (2000) does find that spatial distribution is marginally sufficient for the felicitous use of *pəlpálaʔ/pipálaʔ*, provided spatial distribution is emphasized. This is also the case in Comox-Sliammon, as *paʔapyaʔ* is permissible in a particular situation with an emphasized spatial, but not temporal, distribution. Though the sentence in (12) was explicitly rejected in a context where two guests arrived at a party at the same time and walked in side-by-side, it was acceptable if the two guests entered the house at the same time, but from different doors.

(12) paʔapyaʔ   qʷəl təs-uɬ   Kaining   higa   Daniel
      DISTRIB   come reach-PST   Kaining   and   Daniel
      'Daniel and Kaining arrived one by one.'
      Context: They entered different doors on opposite sides of the house at the same time.
      #Context: They entered through one door, side by side.   JF

While the example in (12) suggests that a spatial distribution may be sufficient to license the use of *paʔapyaʔ*, further elicitation is needed to understand whether this is systematic and how much emphasis needs to be put on spatial distribution in order for *paʔapyaʔ* to be accepted without temporal distributivity. Despite this, it is safe to conclude that *paʔapyaʔ* minimally requires spatio-temporal distribution. As in Lillooet, there is a strong preference for temporal distribution, such that subevents are non-overlapping in running times. While spatial distribution alone is generally rejected, such as in (10) and (11), almost every accepted *paʔapyaʔ* sentence involves temporally distributed events. This suggests that the function of *paʔapyaʔ* is quite similar to *pəlpálaʔ/pipálaʔ*.

3   The morphology of *paʔapyaʔ*

Though Matthewson (2000) notes that *pəlpálaʔ/pipálaʔ* is reduplicated, she analyses the word as a whole, rather than considering its parts. The equivalent Comox-Sliammon word is also morphologically complex. It follows from the principle of compositionality that the meaning of a morphologically complex word would come from the denotations of its composite morphemes. Further, I assume that word-formation processes add, but cannot remove, meaning, which follows from the principle of monotonicity (Koontz-Garboden 2007). In this section, I argue that *paʔapyaʔ* in Comox-Sliammon should be treated compositionally, as a combination of the meaning of its component morphemes.

A compositional treatment of *paʔapyaʔ* has the benefit of being able to account for other 'X by X' or 'X at a time' words. In (13), a set of words with the root *paʔa* 'one' are given, where the simple number has corresponding forms that mean 'just/only one' and one that means 'one by one'. These forms are systematic in their morphology; Watanabe (2003:503) analyses them with CV (diminutive) and CVʔV (meaning unknown) reduplication. In (13), the root vowel deletes in base and there is an alternation between /y/ and /ʔ/. See Footnotes 7 and 10 for a brief discussion of these phonological processes.

(13) a. paʔa   b. pa•pyaʔ   c. paʔa•pyaʔ
          one   DIM•one   RED•one
          'one'   'just/only one'   'one by one'

Forms that correspond to *paʔa* in (13) are provided in (14) for *saʔa* 'two' and *čalas* 'three' are provided in (14). As shown in Table 1, this regularity is found in other Central Salish languages, which also have 'X by X' constructions formed by reduplication, as shown in Table 1.[4]

(14) a. *saʔa* 'two'   *sasyaʔ* 'just/only two'   *saʔasyaʔ* 'two by two'
      b. *čalas* 'three' *čačlas* 'just/only three'   *čaʔačləs* 'three by three'

Table 1: 'one', 'one by one', 'two', and 'two by two' in Central Salish languages

	'one'	'one by one'	'two'	'two by two'
Comox-Sliammon	*paʔa*	*paʔapyaʔ*	*saʔa*	*saʔasyaʔ*
Sechelt	*pála*	*pápəla*	*t́ám-šín*	
Twana	*dáhqas*	*dáqs*	*ʔəsále(h)*	*ʔəsásəle(h)*
Lushootseed	*dəčúʔ*	*dídidču*	*sáliʔ*	*salsaliʔ*
Klallam	*nə́ćuʔ*	*nəćnə́ćuʔ*	*čə́saʔ*	
Saanich	*nə́t̓θəʔ*	*nət̓θnə́t̓θəʔ*	*čáseʔ*	
Musqueam	*nə́ćaʔ*	*nəćnánćaʔ*	*ʔiséĺə ~ ʔəséĺə*	*yəsyə́ýsələ*

Comox-Sliammon and Sechelt form a cognate set for 'one', while the other languages form another.[5] Despite different words for 'one', the 'X by X' construction is common in Central Salish languages and formed by reduplication in each, suggesting that it is not an idiosyncratic innovation restricted to particular languages, as suggested by Anderson (1999). It is also worth noting

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[4] Data in Table 1 comes from: Beaumont (2011) – Sechelt; Drachman (1969) – Twana; Bates, Hess, and Hilbert (1994) and Anderson (1999) – Lushootseed, Montler (2012) – Klallam; Montler (1986) – Saanich; and Suttles (2004) – Musqueam.

[5] Kuipers (2002) reconstructs **nak*/**nk̓-uʔ* for 'one' in Proto-Salish. This root is found in some Comox-Sliammon words, such as *naćaxʷ* 'one time' (Watanabe 2003:504). *paʔa* cognates are also found in Lillooet and Thompson (Anderson 1999).

that this construction, termed "distributive" by Drachman (1969), is attested in Twana up to the number ten, using -VC reduplication.[6]

Though the reduplication in 'X by X' forms reported in other Salish languages may be lexicalized, the construction appears to still be productive in Comox-Sliammon. Though its semantic function is difficult to ascertain, a CVʔV pattern is found in non-numerical lexical items. Previous work treats this as a single reduplicative process (e.g., Watanabe 2003) or a combination of reduplication and an *-L'-* affix (e.g., Blake 2000).[7,8] While I follow Blake (2000) in splitting the CVʔV sequence into a reduplicant (CV) and an affix (-*V*ʔ-), I treat the affix as an infix (instead of a prefix) and I propose that it has a more specific semantic function than just expressing a general sense of plurality.[9]

I assume the morpheme breakdown in (15). The unreduplicated numeral is *paʔa* 'one', while *papyaʔ* 'just/only one' has a diminutive CV reduplicant. The plural -*V*ʔ- infix is added to *papyaʔ* to yield *paʔapyaʔ*.

(15)   a.   paʔa   b.   pa•pyaʔ   c.   p<aʔ>a•pyaʔ
            one   DIM•one   DIM<PL>•one
            'one'   'just/only one'   'one by one'

While I follow Watanabe (2003:503) in assuming *papyaʔ* 'just/one only' has undergone diminutive CV reduplication, it is relevant to note that CV reduplication is also used to mark imperfective aspect and plurality. Imperfective reduplication can be set apart because it behaves differently from the other two in the phonology. Watanabe (2003) suggests that the base vowel in strong roots is retained in imperfective reduplication while it is deleted in diminutive and plural reduplication.[10] The result of this is that diminutive and

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[6] 'One' is an exception, but Drachman (1969) offers a phonological explanation for it.

[7] Blake (2000) treats the L' in this affix as an archiphoneme, which can be realized as [ẇ], [ẏ], [ʔ], and [ɫ]. She argues that this affix is cognate to a plural infix found in other Salish languages. The affix occurs with diminutive (CV), plural (CVC), characteristic (CVC), imperfective (CV), and inchoative (VC) reduplication. A future question is why this affix often occurs with reduplication. There may be phonological reasons for this.

[8] Watanabe's (2003:503) inclusion of word-final glottalization is consistent with *paʔapyaʔ* having diminutive CV reduplication, which shifts or assigns glottalization toward the right edge of the word.

[9] As the language has lost all prefixes aside from reduplicants, I find that it is more intuitive to treat this as an infix. Additionally, I choose to treat it as infixing (C<Vʔ>V), rather than prefixing/suffixing (CV-ʔV) due to its behaviour with other reduplicants.

[10] It is not immediately clear why there is a phonological difference between imperfective and plural/diminutive CV reduplication. Urbancyzk (2005) argues that the difference arises to enhance contrast between the reduplicated forms. Mellesmoen (2017) suggests that it is due to the diminutive (and likely plural) reduplicants being C_1 infixes. For consistency here, I follow Watanabe (2003) and gloss the imperfective, plural, and diminutive as C_1V reduplication.

plural CV reduplication are essentially homophonous.[11] Further, even with context, it can be hard to separate diminutive and plural reduplication on verbal roots. The semantic functions of CV reduplication need further exploration. For this reason, I gloss the combination of CV reduplication and the *-Vʔ-* affix as RED<PL> for non-numeral roots.

4   Analysis of *paʔapyaʔ*

Though the interpretation of *paʔapyaʔ* is comparable across different syntactic environments, the formal analysis pursued in this paper addresses *paʔapyaʔ* in a DP-internal position. As the interpretation and syntactic position of *paʔapyaʔ* parallel Matthewson's (2000) description of *pəlpálaʔ/pipálaʔ*, it follows that her analysis can likely account for both. The lexical entry she proposes is given in (16). It makes use of event semantics, in the style of Kratzer (2003), and Lasersohn's (1995) analysis of pluractional markers.

(16) $[\![pəlpálaʔ]\!] = \lambda x \lambda R_{\langle e,st \rangle} \lambda e' \big[\exists e_1 \ ... \ \exists e_n \ [e' \ = \ e_1 \ + \ ... \ +$
        $e_n \ \& \ \forall e_n \exists y [y < x \ \& \ atom \ (y) \& \ R \ (y)(e_n)] \& \ \forall e_n, e_m [\neg \ \tau(e_n) \circ$
        $\tau \ (e_m)]]\big]$

<div align="right">(Matthewson 2000:109)</div>

The lexical entry in (16) states a sentence containing *pəlpálaʔ/pipálaʔ* is true of a plural individual x, a predicate R, and an event e' if and only if e' consists of multiple subevents and there is a plural individual made up of atomic subparts, and for each subevent there is an atomic individual who participates in that subevent. The group x is defined by the relevant DP. The lexical entry also defines a temporal condition, where the running time of subevents is represented with τ, which states that the running times of the events must not overlap.

Matthewson's (2000) analysis also makes the correct predictions for *paʔapyaʔ* in Comox-Sliammon. However, she analyses *pəlpálaʔ/pipálaʔ* as a single lexical entry and the relative semantic contribution of the number itself is not crucial to the analysis. As argued in Section 3, there is reason to treat *paʔapyaʔ* as a combination of three morphemes. This approach can be extended to other 'X by X' forms, while (16) can only account for *paʔapyaʔ*, and requires modification for *saʔasyaʔ* 'two by two' or *čaʔačlas* 'three by three'.

The 'X by X' words are decomposable into three morphemes: the number, the diminutive CV reduplication, and the plural *-Vʔ-* affix. To understand the contributions of each morpheme in *paʔapyaʔ*, it is necessary to examine some data where CV reduplication occurs on numbers without *-Vʔ-*. The sentences in (17) and (18) have CV reduplication and were translated with 'only' and 'just'.

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[11] Watanabe (2003:383–384) reports that there may be contrastive vowel length in the first syllable that serves to differentiate them, with the plural stative forms having a longer initial vowel. I have not yet found this in a preliminary acoustic examination.

(17) jəkʷ-t-ig-as   pa•pyaʔ   θəkʷnačtən
      paint-CTR-PL-3ERG   DIM•one   chair
      'They painted just one chair.'   JF

(18) sa•syaʔ   ʔim-əxʷ-an   t̓θit̓θik̓ʷ
      DIM•two   walk-NTR-1SG.ERG   worm
      'I stepped on only two worms.'
      Context: I stepped on two worms.
      #Context: I stepped on one worm.
      #Context: I stepped on three worms.   JF

Watanabe (2003:502) finds that diminutive CV reduplication on numbers can refer to an exact number of objects. When diminutive reduplication is applied to *paʔa* 'one', it means 'exactly one'. The same applies for *saʔa* 'two', which becomes 'exactly two'. The *sasyaʔ* sentence in (18) is only accepted if two, and only two, worms were squished. If three were stepped on, *sasyaʔ* is rejected, despite the fact it was technically true that two were squished. Diminutive reduplication on numerals forces an 'exactly' reading.

    In contrast, the sentences in (19) are provided as an example where the numbers 'one' and 'two' are used without additional morphology. The English translations do not include words like *just* and *only*.

(19) a.   yə•yč-it=čxʷ   paʔa   k̓ʷaʔsta
           PL•fill-STV=2SG.IND one   cup
           'You are pouring them into one cup.'
           Context: I have two cups that I am pouring together (with both hands) into a different cup.   FL

      b.   saʔa   χʷaχʷit   yəq̓-aš-an
           two   1SG.ERG   use-TR-1SG.ERG
           'I am using two eggs.'   EP

Bare numerals can also have 'at least' interpretations. An example of this is given in (20), which shows that it is fine for a speaker to say she has two apples in a context where she has more than that. This means that the bare numerals may be used in situations where the context identifies a greater number, as long as there are at least two.

(20) saʔa   t̓θ   ʔapəls
      two   1SG.POSS   apple
      'I have two apples.'
      Context: You have three apples.   PD

To explain the difference between *paʔa* and the diminutive reduplicated *papyaʔ*, I adopt Krifka's (1999) proposal for numbers with alternatives. An example of

this is given in (21) for *one* in English, where N is the set of all number words and the number words themselves are represented by numbers, such that $1(x)$ expresses that x is a total of one. Subscript A marks the set of alternatives.

(21)   a. $[\![one]\!] = \lambda P \lambda x[1(x) \,\&\, P(x)]$
          b. $[\![one]\!]_A = \{\lambda P \lambda x[n(x) \,\&\, P(x)] \mid n \in N\}$

The standard interpretation, or meaning, of the lexical item *one* is given in (21a). In (21a), $[\![one]\!]$ requires that x refer to exactly one of something. However, the set of alternatives, represented by the denotation in (21b), allows for the inclusion of 'at least' and 'at most' readings. This reflects the fact that *one* can be used in situations where the amount is either greater or less than one, context-permitting. Examples of this in English are given in (22), where *I weigh 51 kilograms* can have an 'at most' or 'at least' reading if the context allows it. These represent alternatives to the standard interpretation. However, the alternatives are only available if they are appropriate in the context. Otherwise, the only permissible reading would be the standard interpretation.

(22)   I weigh 51 kilograms.
        Context: I have qualified to compete in the 51kg weight class in   a wrestling tournament, where I must be under 51 kilograms at the time of the weigh-in to compete. I weigh 50 kilograms.
        Context: I want to compete in the 54kg weight class in a tournament. My coach says I must be at least 51 kilograms. I weigh 52 kilograms.

Assuming alternatives are available, though subject to pragmatic constraints, the difference between $[\![pa\Omega a]\!]$ and $[\![papya\hat{\Omega}]\!]$ can be explained as the loss of alternatives. However, the denotations must be modified to reflect the fact that numerals are cardinality predicates in Salish (Jelinek 1995). Denotations for the standard interpretations and alternatives are given in (23) for $[\![pa\Omega a]\!]$ and $[\![sa\Omega a]\!]$.

(23)   a. $[\![pa\Omega a]\!] = \lambda x[|x| = 1]$
              $[\![pa\Omega a]\!]_A = \{\lambda x[|x| = 1] \mid n \in N\}$
          b. $[\![sa\Omega a]\!] = \lambda x[|x| = 2]$
              $[\![sa\Omega a]\!]_A = \{\lambda x[|x| = 2] \mid n \in N\}$

The application of the diminutive CV reduplication to a number results in the elimination of alternatives. Losing the possibility of alternatives leaves only the standard interpretation, which denotes an exact quantity. This would have the desired consequence of limiting *papya?* to 'one and only one', while *pa?a* can mean 'at least one'. Denotations for $[\![papya\Omega]\!]$ and $[\![sasya\Omega]\!]$ are given in (24).

(24)   a. $[\![papya\Omega]\!] = \lambda x[|x| = 1]$
          b. $[\![sasya\Omega]\!] = \lambda x[|x| = 2]$

The denotations given in (24) provide a way to adapt Matthewson's (2000) formula. She used atoms to limit individuals as required for the 'one by one' reading. In order to make it work for a broader range of numbers, the restriction 'atom (y)' in (16) should be traded for $|y| = n$, where n is a natural number and corresponds to the cardinality specified by the numeral root. This is demonstrated in (25) and (26), where the number of atomic individuals in a given event is limited to one and two.

(25) $\llbracket pa\Omega apya\Omega \rrbracket = \lambda x \lambda R_{\langle e,st \rangle} \lambda e' \Big[\exists e_1 \ldots \exists e_n \big[e' = e_1 + \ldots + e_n \,\&\, \forall e_n \exists y [y < x \,\&\, |y| = 1 \,\&\, R\,(y)(e_n)] \,\&\, \forall e_n, e_m [\neg \tau\,(e_n) \circ \tau\,(e_m)]\big]\Big]$

(26) $\llbracket sa\Omega asya\Omega \rrbracket = \lambda x \lambda R_{\langle e,st \rangle} \lambda e' \Big[\exists e_1 \ldots \exists e_n \big[e' = e_1 + \ldots + e_n \,\&\, \forall e_n \exists y [y < x \,\&\, |y| = 2 \,\&\, R\,(y)(e_n)] \,\&\, \forall e_n, e_m [\neg \tau\,(e_n) \circ \tau\,(e_m)]\big]\Big]$

The denotation in (25) states that a sentence containing *pa?apya?* will be true of a plural individual x, a predicate R, and an event e' if and only if e' is made up of subevents that do not overlap in running time. For each subevent, there needs to be a plural individual x, and for each subevent there must be a subpart of x which has a cardinality of one. The denotation in (26) has the same conditions, except the sum of the subparts involved in each subevent must equal two.

The analysis laid out here suggests the *-V?-* affix is responsible for the temporal pluractionality associated with *pa?apya?*. Neither $\llbracket papya\Omega \rrbracket$ nor $\llbracket pa\Omega a \rrbracket$ refer to plurality or temporal distribution. However, $\llbracket pa\Omega apya\Omega \rrbracket$ has the semantics given in (25) and requires that an event be comprised of a sum of subevents that do not overlap in time. This suggests that the pluractional component of the formulae in (25) and (26) must be attributed to the *-V?-* affix.

The denotation for $\llbracket$*-V?-*$\rrbracket$ is given in (27). The crucial difference from Matthewson's (2000) analysis of *pəlpála?/pipála?* is that the semantics of the reduplicated number have been incorporated. Formally, this involves substituting $|y| = n$ for the atomic condition.

(27) $\llbracket$*-V?-*$\rrbracket = \lambda S_{\langle e,t \rangle}\, \lambda x \lambda R_{\langle e,st \rangle}\, \lambda e' \Big[\exists e_1 \ldots \exists e_n \big[e' = e_1 + \ldots + e_n \,\&\, \forall e_n \exists y [y < x \,\&\, S(y) \,\&\, R(y)(e_n)] \,\&\, \forall e_n, e_m [\neg \tau\,(e_n) \circ \tau\,(e_m)]\big]\Big]$

The formula in (27) allows for the derivation of *sa?asya?* and *ča?ačləs*, as well as *pa?apya?*. When $\llbracket$*-V?-*$\rrbracket$ is applied to a 'just X' form like $\llbracket papya\Omega \rrbracket$, with the semantics in (24a), it results in the formula given in (25) for $\llbracket pa\Omega apya\Omega \rrbracket$. A 'one by one' reading arises from the combination of the semantics of 'just one' with event plurality and a restriction on temporal overlap. The pluractional and

distributive qualities associated with *paʔapyaʔ* can be attributed to the *-Vʔ-* affix, meaning *-Vʔ-* is a pluractional marker requiring temporally distributed events.

5 Further evidence for a temporal pluractional *-Vʔ-* infix

Characterizing *-Vʔ-* as a temporal pluractional marker is supported by its occurrence with other lexical items, where it is associated with similar temporal conditions to those in (27). An example of this is given in (28), where the *-Vʔ-* infix occurs with the root *yəm-* 'to kick'.

(28) y<iʔ>i•ym-t-as
      RED<PL>•kick-CTR-3ERG
      'She is (repeatedly) nudging him.'   EP

Treating the *-Vʔ-* affix as a temporal pluractional marker leads to the prediction that verbs with it should be subject to the same requirement for temporal distribution as *paʔapyaʔ*, but number should be irrelevant. This follows from the proposal to treat *paʔapyaʔ* compositionally, where the denotation of root *paʔa* 'one' contributes to the overall meaning of the word. Without *paʔa* 'one', there should be no numerical limit on the distribution of the event across individuals.

This prediction turns out to be valid, as shown in (29), where the same verb is shown with and without the *-Vʔ-* affix. In (29a), the affix is absent and the sentence describes a group of children who are all sick. In (29b), with the affix, the sentence refers to children who got sick in sequence. The "getting sick" event is temporally distributed across individual children.

(29) a.   ʔuk̓ʷ   kʷə•kʷt-im   čəy•čuy
            all   PL•sick-MDL   PL•child
            'All the children got sick (at the same time).'   JF

      b.   ʔuk̓ʷ   kʷ<iʔ>i~kʷt-im   čəy•čuy
            all   RED<PL>•sick-MDL   PL•child
            'All the children got sick (one after another).'   JF

A further example, with a transitive verb, is given in (30). Multiple brushes can be dipped in water at the same time with the *-Vʔ-* affix, as long as the action is repeated, showing that argument number does not affect its acceptability.

(30) ƛ<iʔ>i•ƛm-i-t-as   brushes
      RED<PL>•wet-STV-CTR-3ERG   brushes
      'She is wetting all the brushes, repeatedly / #one time.'
      Context: Dipping a bunch of paintbrushes in water to get them wet. JF

If temporal distribution comes from the semantic contribution of *-Vʔ-*, temporal overlap should be acceptable for forms without it. The example in (31) with *papyaʔ* and *paʔapyaʔ* shows that a reduplicated numeral without *-Vʔ-* is accepted if two people are painting the same chair together. This situation involves

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temporal overlap, as the painting event is only distributed across participants who are participating simultaneously in the painting event. This temporal overlap is incompatible with *paʔapyaʔ*, as expected.

(31) Daniel higa Gloria ǰəkʷ-t   pa•pyaʔ/#p<aʔ>a•pyaʔ   θəkʷnačtən
     Daniel and Gloria   paint-CTR   DIM•one/#DIM<PL>•one   chair
     'Daniel and Gloria were painting the one chair.'
     Context: A single chair with two people painting it.   JF

Similarly, *saʔasyaʔ* 'two by two' also requires temporal distribution. In (32), two worms are crushed in one step and the form with -*Vʔ*-, requiring that subevents do not overlap, is rejected. Note that *sasyaʔ* is accepted in this context.

(32) sa•syaʔ/#s<aʔ>a•syaʔ   ʔim-əxʷ-an   tθit̓θik̓ʷ
     DIM~two/#DIM<PL>~two   walk-NTR-1SG.ERG   worm
     'I stepped on just two worms.'   JF

If -*Vʔ*- is a temporal pluractional marker, another prediction is it should be compatible with readings with varying temporal distance between events. If the restriction is just about overlap, it should not matter if the events are immediately sequential or spread out over a wider, or more sporadic, range of time. This prediction is supported by the data in (33–35), as -*Vʔ*- occurs in a situation where the events are minimally spaced out in (33), confined to a specific time range without a given interval in (34), and with an unconstrained time range but structured interval in (35).

(33) ɬ<uʔ>u•ɬt̓-ut
     RED<PL>•sip-CTR
     'sipping'
     Context: The drink is really hot; you take a lot of little sips because you're impatient.   FL

(34) tih-mut=č   p<iʔ>i•pč-əm   snat-uɬ
     big-very=1SG.IND   RED<PL>•wake-MDL   tonight-PST
     'I kept waking up last night.'   JF

(35) paya   p<iʔ>i•pč-əm   čuy
     always   RED<PL>•awake-MDL   child
     'The child is always waking up.'
     Context: Every night, the baby wakes up at four and starts crying.   JF

Further, there is no reason to suspect that -*Vʔ*- would affect the rate and duration of the event, given that it only stipulates that subevents should not overlap. This seems to be the case. The temporal pluractional affix co-occurs with the

temporal adverbials *ƛ̓imut* 'very quickly', *hahaysmut* 'very slowly', and *χuχmut* 'for a very long time' in (36).

(36)   ƛ̓i-mut/hahays-mut/χuχ-mut   kʷ<iʔ>i•kʷt̓θ-əm
       quick-very/slow-very/long.time-very   RED<PL>•jump-MDL
       'She jumped quickly/slowly/for a long time.'   JF

In the absence of time adverbials, however, the unmodified form can be associated with a slower rate. One consultant translated *paʔapnaʔam* in (37) as 'digging slowly'.[12]

(37)   p<aʔ>a•pn-aʔam
       RED<PL>•bury-AINTR
       'digging slowly'   JF

The slow rate associated with (37) may come from the semantic contribution of CV reduplication, rather than the *-Vʔ-* infix. As mentioned in Section 3, plural and diminutive reduplication are homophonous in Comox-Sliammon. It is not clear whether (37) should be analysed as having a diminutive or plural reduplicant. However, it is possible that the reduced rate in (37) can be attributed to the function of the diminutive.

A final prediction is that the pluractional *-Vʔ-* affix might be incompatible with individual-level predicates, as it requires a kind of repetition or temporal distribution that is not typical of this type of lexical item. However, (38) shows that the *-Vʔ-* affix can occur in individual-level predicates, with eye colour.

(38)   kʷ<iʔ>i•kʷsim+awus
       RED<PL>•blue+eye
       'Eyes keep changing.'
       Context: Colour contacts are put in and taken out, changing my eye
       colour from blue to brown to blue to brown, etc.   JF

The form in (38) is typical of aspectual coercion, where event plurality is applied to an individual-level predicate. Forms like this are only accepted with very specific (and generally odd) contexts.[13] Given the limited data available right now, I conclude that *-Vʔ-* is only marginally acceptable with individual-level predicates. In many cases, attempts to add the *-Vʔ-* affix to an individual-level predicate were rejected or corrected, as in (39).

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[12] The form in (37) was translated as 'planting a little, here and there' by PD.

[13] Their acceptability may relate to the amount of patience the consultant had with me. In one session, things like (38) were readily accepted and produced. But, in the next session, more were rejected and she was more tentative about acceptable ones, even if she attributed the expected meaning to suggested forms.

(39) * p̓i?i•p̓θ
    RED\<PL\>•black
    'Things that are changing colour (from black).'
    Consultant: ?ukʷ   pə•pθ•əθ   qʷəł•qʷəłayšin
               all   PL•black•INCH   PL•shoe
               'All the shoes are getting black.'   JF

The patterns observed for *pa?apya?*, other 'X by X' forms, and other predicates with *-V?-* are consistent with treating *-V?-* as a temporal pluractional marker.

6   Remaining questions

A problem for labelling *-V?-* as a pluractional marker arises from diminutive plural forms of a noun with CV reduplication and something resembling the *-V?-* affix, as in (40). If *-V?-* is pluractional, it is unclear why it occurs with nouns.

(40)   a.   t\<i?\>i•tkʷəłi   b.   m\<i?\>i•m?in
             DIM\<PL\>•rabbit   DIM\<PL\>•carrot
             'small rabbits'   'small carrots'
                                              (Watanabe 2003:401–402)

The data in (40) is not necessarily problematic for the present analysis though, as this construction occurs with relatively few lexical items. The diminutive plural can also be formed by combining CV diminutive and CVC plural reduplication or by using *titul* 'small' or *qəχ* 'lots'. Phrases with *titul* 'small' and *qəχ* 'lots' are most commonly produced. The diminutive plural with *-V?-* may be highly lexicalized. The degree to which it challenges this analysis is unclear.

Finally, the formal analysis laid out in Section 4 accounts for the DP-internal use of *pa?apya?*, leaving the DP-external cases for future work. Though the interpretation of *pa?apya?* appears to be constant across syntactic environments, a compositional analysis will need further adjustment to account for the fact that *pa?apya?* can take either a subordinate clause or relative clause.

7   Conclusion

In this paper, I have argued that *pa?apya?* is very similar to the corresponding Lillooet lexical item *pəlpála?/pipála?,* described by Matthewson (2000). Though this cross-linguistic comparison served as the foundation for a formal analysis, *pa?apya?* in Comox-Sliammon can be analysed as the combination of a diminutive and pluractional morpheme operating on a numeral. The requirement for the event to be a sum of subevents with non-overlapping running times is attributed to the semantic contribution of a temporal pluractional marker *-V?-*, rather than *pa?apya?* itself. This analysis has the benefit of being able to account for other 'X by X' constructions, like *sa?asya?* 'two by two', and verbs that take the affix with a similar iterative interpretation. The data presented in this paper provide evidence that *-V?-* functions as a temporal pluractional marker.

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