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Apportionment and the mass-count distinction in Nez Perce

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Abstract

Is the mass-count distinction a semantic universal? What types of variation are at stake in the different ways the distinction shows up cross-linguistically? This paper addresses these questions through a study of Nez Perce, a language where the mass-count distinction is almost entirely grammatically concealed. In this language, number marking, numerals and the selectional properties of quantifiers do not discriminate between mass and count nouns: both combine with quantifiers and numerals directly, and both are possible in plural nominal projections. Evidence of the mass-count distinction is found only in the intersection of number with quantificational constructions and pseudopartitives. These intersections are extremely rare, suggesting that speakers are able to arrive at a mass-count distinction in the absence of rich cues in the linguistic input. That is no surprise if the semantic distinction springs from an innate cognitive apparatus.

The interpretation of counted or pluralized mass nouns in Nez Perce reflects context-sensitive apportionment of the mass denotation. This interpretation is attributed to partition function variables, which are introduced by a piece of covert structure directly above the NP level. Partitioning allows mass nouns to combine with plural number and with numerals. Partitioning of count denotations is also possible, allowing count nouns to be counted by non-natural atoms. Variation between Nez Perce and English may be seen in terms of whether or not the relevant structural piece is present in the lexicon, or alternatively, in terms of how partition functions are mapped onto lexical items.

1 Introduction

Cheng and Sybesma (1999) and Chierchia (2010) make a proposal about the mass-count distinction of the general form in (1).

(1) *Encoding.*
Every language makes a semantic distinction between mass and count nouns.

There's an attraction to (1) that comes from the way it makes a bridge between linguistic and more general cognitive facts. An interest in distinguishing individuals from substances doesn't require language; it's apparent in pre-linguistic infants (Huntley-Fenner et al. 2002) and even non-human primates (Mahajan et al. 2009). Some sort of cognitive universal seems to be involved. This type of cognitive universal quite plausibly grounds a universal of linguistic semantics, if (1) is true. And that could tell us something about the types of factors responsible for shaping the contents of human language on a larger scale.

None of this is to say that the truth of (1) is particularly obvious. It certainly isn't. There are many languages which pose apparent challenges. One such language is Nez Perce, and this is the focus of attention in this paper. In Nez Perce, certain core grammatical properties that can be used to diagnose the mass-count distinction in English simply treat all nouns the same way.

Consider, first, the combination of nouns with numerals. In English, mass nouns cannot combine with numerals directly; Chierchia (2010) calls this the "signature property" of mass nouns. The signature property is not in evidence in Nez Perce. Rather, all nouns may combine with numerals directly. Mass nouns combining with numerals are interpreted with apportionment or individuation – a type of reading which requires a pseudopartitive in English.

(2) a. k'uyc heesu
nine eel
nine eels

b. k'uyc heecu
nine wood
nine pieces of wood

A similar situation obtains with plural marking, which in English is reserved for count nouns. In Nez Perce, once again, both mass and count nouns behave the same way; all may show plural in the nominal projection. Plural marking is productive across contexts and results in apportioned meanings for mass nouns.

(3) a. yi-yos-yi-yos kapoo
PL-blue coat
blue coats

b. yi-yos-yi-yos mayx
PL-blue sand
quantities of blue sand

Now, parallel facts in a variety of languages have led linguists to conclude that some languages simply lack a distinction between mass and count.[1] As we will see, such a conclusion is unwarranted for Nez Perce. Evidence for the distinction can indeed be found in the language, and it primarily lies

[1] See, e.g., Davis and Matthewson (1999) on St'át'imcets, Lima (2010) on Yudja, Dalrymple and Mofu (2012) on Indonesian, Wiltschko (2012) on Halkomelem and Blackfoot.

in the interaction of quantifiers and plurality. All Nez Perce quantifiers behave like English *all* and *most* in demanding a complement which is cumulative – either count plural, or mass, but not count singular. The cumulativity requirement allows count singulars and mass singulars to be distinguished. Nez Perce, then, does not falsify (1) – initial appearances notwithstanding. It does indeed make a mass-count distinction. Numerals and number marking simply fail to find it.

This type of situation has been noticed before in the literature on (1) concerning Mandarin Chinese. In Mandarin, too, numeral constructions and number marking fail to find a distinction between mass and count nouns – a situation which led Krifka (1995) and Chierchia (1998) to the influential conclusion that all nouns in Mandarin are mass nouns. Cheng and Sybesma (1999) show in response that Mandarin does indeed make a distinction between mass and count, but that this crops up only in the details of its classifier constructions. The distinction is present in the lexicon of every language, they propose, as a matter of linguistic universals; but variation creeps in in the particular ways the distinction is revealed or concealed in particular languages. That is why (1), if true, is not an *obvious* truth. The road to universals in mass and count runs right through the briarpatch of linguistic variation.

The task of this paper is to elucidate the nature of the universal in (1) and the types of variation involved as they relate to the behavior of nominals in Nez Perce. We begin with a look at three key areas of the grammar – number marking, numerals and quantifiers – which have not been described in depth in the previous literature, but which bear in a crucial way on the distinction between mass and count. In section 2 we see how number marking works, and that it does not make a distinction between mass and count. All nouns behave like English count nouns in supporting number distinctions in their nominal projections; mass nouns receive apportioned interpretations. In section 3 we turn to numeral constructions, showing that mass and count nouns behave the same way, and that classifiers are not involved. All nouns behave morphosyntactically as English count nouns do; nouns combine with numerals directly, and mass nouns receive apportioned interpretations. Section 4 then shows how quantificational constructions finally reveal the mass-count distinction in Nez Perce through the selective imposition of requirements of plurality.

This empirical background lays the groundwork for the second part of the paper, which explores the elements of language design underlying (1), along with points of variation in the impact of the mass-count distinction. Ramifications of Nez Perce quantifier constructions for the nature and origin of linguistic universals in mass and count are the topic of section 5. The semantics of apportioned readings of mass nouns are then taken up

in full in section 6. To handle generalized, context-sensitive apportionment of mass denotations, a functional category α is proposed, which attaches just above the NP level and introduces variables over partitions. In Section 7 we see that apportionment is not a repair strategy in Nez Perce, but rather a possibility which is generally available both for mass nouns and for count nouns. The combination of α with count nouns makes it possible to count by aggregations or non-natural atoms. Apportionment via the αP structure is compared with the pseudopartitive in section 8, uncovering an additional, subtle source of evidence for the mass-count distinction. In section 9, the overall proposal is then defended against an alternative that attributes generalized apportionment in Nez Perce to a special semantics for plural number and the numeral 'one'. General conclusions are drawn in section 10.

A few words on the language and the data are in order as we begin. Nez Perce is a Penutian language indigenous to the Columbia River plateau. The language is severely endangered at the time of writing. There are approximately 30 speakers, all of them elderly. The bulk of the data here comes from field research with two speakers, conducted in the summers of 2011, 2012 and 2013 in the town of Lapwai, ID. Grammatical sketches of the language complementing the data here are available in Aoki 1970, Rude 1985, Crook 1999 and Deal 2010. This is the first investigation of the mass-count distinction in Nez Perce.

2 Three types of number marking

Let us begin by acquainting ourselves with the ways in which Nez Perce morphology indicates the distinction between singular and plural. The number system of this language features morphological plural marking in multiple places. In (4b), plural appears on the noun, the verb (by agreement), and the noun modifiers (by concord):

(4) a. yoˆ kuhet 'aayat hii-we-s 'eemtii
DEM tall woman 3SUBJ-be-PRES.SG outside
That tall woman is outside.

b. yoˆ-me ki-kuhet ha-'aayat hi-w-siix 'eemtii
DEM-PL PL-tall PL-woman 3SUBJ-be-PRES.PL outside
Those tall women are outside.

The marking of number information in these three ways is not totally generalized. Rather, the morphological locus or loci of plural is determined by the noun class of the plural argument. The class system is animacy-based, dividing nouns into three groups: human, non-human animate, and inanimate. Human-class nouns occur with all types of plural morphology;

inanimate-class nouns occur only with adjectival plural; non-human animates occupy an intermediate position. The distribution of plural by noun class is summarized in (5).

(5) The distribution of plural marking by noun class

	Human	Non-human animate	Inanimate
Nominal plural	Y (mostly)	n	n
Verbal plural	Y	Y	n
Adjectival plural	Y	Y	Y

It is partly, though not entirely, thanks to this interaction between noun class and number marking that number marking does not find a mass-count distinction.

There is no previous literature on the interaction between animacy and plural marking in Nez Perce. Therefore, in the next sections, we review each type of plural marking one by one. For plural marked on nouns and plural marked on verbs, animacy effects are sufficient to explain why the mass-count distinction is not in evidence. These types of plural do not apply to inanimate arguments, whether they describe substances or individuals. It is in the case of plural marked on adjectives that we are able to see that mass nouns and count nouns within a single noun class behave the same way regarding plural.

2.1 Plural marked on nouns

The marking of plural on nouns is highly correlated with human noun class: when plural marking is possible, human reference is possible as well.[2] A selection of nouns showing plural forms is given in (6).

(6) a. qaaca lawtiwaa 'aayat haama teeq'is pit'íin
maternal.grandma friend woman man elder girl

b. qaaca-ma lawtiwaa-ma ha-'aayat ha-ham
maternal.grandmas friends women men
ti-teeq'is pi-pít'in
elders girls

These examples demonstrate the three allomorphs of plural in the nominal projection: *-me/ma*, for kinship terms (plus a few lexical exceptions); *he/ha-*,

[2] Note that this implication is only in one direction. Nouns such as *titooqan* 'person' lack plural forms; so do most nouns of ethnicity/tribal affiliation (e.g. *niimiipuu* 'Nez Perce person', *sooyaapoo* 'white person', *celmen* 'Chinese person'), and all nouns formed by the agentive deverbal suffix *(n)ew'eet* (e.g. *saykiptaw'aat* 'doctor', *sepeehitem'enew'eet* 'teacher', *'inpew'eet* 'cop').

otherwise for nouns beginning with glottal segments (/h/ or /'/); and *Ci-*, where C reduplicates the initial consonant, otherwise.

In some languages allowing noun plurals only for human-class nouns, plural markers encode definiteness along with plurality. It is famously so in Chinese and Japanese, for instance. (An accessible introduction to those data is provided by Kurafuji (2004).) But this is not the case in Nez Perce. Nez Perce lacks articles, and bare nouns may generally have definite or indefinite interpretations. Plural nouns are no exception. Definite and indefinite interpretations are shown in (7) for bare singular nouns, and in (8) for bare plurals.

(7) haama kaa 'aayat hi-pa-'ac-∅-a.
man and woman 3SUBJ-S.PL-enter-P-REM.PAST
A man and a woman came in.

haama hii-we-s kuhet, 'aayat hii-we-s qetu
man 3SUBJ-be-PRES.SG tall woman 3SUBJ-be-PRES.SG DEG
kahat'o.
short
The man is tall, the lady is short.

(8) hi-w-siix ha-ham kaa ha-'aayat 'eemtii,
3SUBJ-be-PRES.PL PL-man and PL-woman outside
There are men and women outside,

kaa paa-tk'ay-cix ha-ham-na ha-'aayato-nm.
and 3/3-watch-IMPERF.PL PL-man-OBJ PL-woman-ERG
and the women are watching the men.

The facts are the same for nouns which mark plural via the suffix *-me/ma*, rather than via a prefix.

Nouns outside the human noun class do not possess plural forms.[3] This is shown for non-human animates in (9) and inanimates in (10).

(9) Non-human animates

'iceyeeye	picpic	'imes	ciq'aamqal	sik'em
coyote(s)	cat(s)	deer (sg or pl)	dog(s)	horse(s)

(10) Inanimates

tiim'en'es	piswe	timaanit	tiim'es	'iniit
pencil(s)	rock(s)	apple(s)	book(s)/ paper(s)	house(s)

[3] There are three exceptions to this pattern reported in the *Nez Perce Dictionary* (Aoki 1994): *(pi)pohol* 'ravine(s)', *(he)'iskit* 'road(s)', *(he)'iyeeq'ispe* 'hotspring(s)'. My consultants report a varying degree of familiarity with the plurals of these words, but are not comfortable using them in sentences. They are comfortable with plural forms only for the human-class nouns discussed in the main text.

There are no mass nouns with plural forms, and this fact should now be unsurprising. The fact that mass nouns don't take plural suffixes follows immediately from their membership in the inanimate class.

2.2 Plural marked on verbs

Plural marking on verbs also shows an animacy effect. It is found only with animate arguments. The argument itself need not mark plural overtly; it only needs to belong to the animate class. Because the plural subject in (11) belongs to the animate class, verbal agreement in plural is obligatory.[4]

(11) lep-it picpic hi-w-siix / *hii-we-s 'iniit-pe
two-SUF cat 3SUBJ-be-PRES.PL / *3SUBJ-be-PRES.SG house-LOC
Two cats are in the house.

In (12), on the other hand, the subject belongs to the class of inanimates, and verbal agreement in plural is rejected.

(12) lep-it cepeepy'uxtin' hii-we-s / *hi-w-siix
two-SUF pie 3SUBJ-be-PRES.SG / *3SUBJ-be-PRES.PL
'iniit-pe
house-LOC
Two pies are in the house.

The animacy constraint on verbal number agreement is highly consistent across a number of test conditions. Nez Perce has distinct verbal affixes for agreement with plural subjects and with plural objects; both subject and object agreement are subject to the same animacy restriction. The restriction is furthermore insensitive to the choice of verb, the definiteness of the arguments, and the presence of a numeral. Verbs other than the copula are shown in (13) and (14); in both cases the speaker specifically comments on the plural form's restriction to animate arguments. In a first case, she rejects the use of plural subject agreement with an inanimate subject (pencils):

(13) 'uyleptix tiim'en'es hi-tq'ewi-s-∅ / *hi-pe-tq'ewi-s-∅
both pencil 3SUBJ-fall-P-PRES / *3SUBJ-S.PL-fall-P-PRES
Both pencils fell.
Comment: "*hipetq'ewis* is more for people or animals."

In a second case, she rejects the use of plural object agreement with an inanimate object (eggs):

(14) *hi-naac-'yaaqi-n-∅ tam'aam-na
3SUBJ-O.PL-find-P-PRES egg-OBJ
intended: He found (the) eggs.
Comment: "That's more to people or animals."

[4] The suffix *-Vt* appearing on the numeral here is discussed in section 3.

Against this backdrop, the facts on mass nouns are once again unsurprising. There are no mass nouns known to control verbal plural agreement. This simply follows from the fact that mass nouns belong to the inanimate class, and inanimate nouns quite generally do not control verbal plural agreement in Nez Perce.

2.3 Plural marked on attributive adjectives

This brings us to the third and final type of plural marking, namely plural marking on noun modifiers; let us focus specifically on the case of adjectives. Many (though not all) adjectives have plural forms, and plural marking on attributive adjectives is unrestricted by noun class.[5] We see a plural adjective modifying a human-class noun in (4b) above. In (15), the same behavior is seen with nouns of the non-human animate class. (Note that plural marking in (15a) appears on more than one adjective, as is common in concord systems.)

(15) Non-human animates

a. ki-kuckuc ci-cmux-ci-cmux picpic
PL-small PL-black cat
small black cats

b. yu's-me 'iceyeeye
poor-PL coyote
poor coyotes

Unlike the other forms of plural marking, concordial plural on adjectives is compatible with nouns of the inanimate class, as we see in (16).

(16) Inanimates

a. ki-kuhet ti-tíyaw'ic wix̂si'likeecet'es
PL-tall PL-sturdy chair
tall, sturdy chairs

b. 'ilex̂ni ki-kuckuc capaaqt'awka's
a.lot PL-small towel
a lot of little towels

[5] The adjectives without plural forms appear to be an idiosyncratic class, including *'iyeq'is* 'hot', *hatok'ic* 'expensive' and *lammat'ic* 'annoying'. Adjectives that do show plural take the same affixes as nouns do: *-me/ma*, in a few, listed cases (e.g. *yu's-me* 'pitiful$_{PL}$') ; *he-* otherwise for nouns beginning with glottal segments (e.g. *he-hete'ew* 'valuable$_{PL}$'); otherwise *Ci-*, where C reduplicates the initial consonant (e.g. *qi-qepsi's* 'bad$_{PL}$'). There is one suppletive pair of singular and plural adjective: *himeeq'is* 'large$_{SG}$' ∼ *titilu* 'large$_{PL}$'.

Note that many adjectives are fully reduplicated in the singular, e.g. *yoosyoos* 'blue', *'ilp'ilp* 'red', *likoylikoy* 'slender'. As Aoki (1963) observed, many of these adjectives take the plural prefix on each reduplicant. Thus the plural of *yoosyoos* 'blue' is *yi-yos-yi-yos* and the plural of *'ilp'ilp* 'red' is *he-'ilp-e-'ilp*.

These facts put us in a position to assess whether (holding noun class constant) mass and count nouns are distinguished by their ability to combine with plural. What we find is that they are not. Nominals with mass nouns allow plural adjectives just as readily as their counterparts with count nouns do. When mass nouns combine with plural adjectives, the resulting interpretation is one best rendered in English with a pseudopartitive.

We see this first for a nominal headed by the mass noun *mayx* 'sand'. This sentence might be uttered in a craft store in requesting materials for an art project.

(17) yi-yos-yi-yos **mayx** wewluq-se-∅
PL-blue sand want-IMPERF-PRES
I want quantities of blue sand.

It is tempting to think of this example as involving packaging of a mass denotation, as perhaps might occur with *blue sands* in a similar context in English. Crucially, this is not the only type of context that supports plural adjectives with mass nouns; the co-occurrence of mass nouns and plural adjectives indeed quite generalized. The following sentence, for instance, might be asked in a fabric store. Speakers did not feel that the question presupposed the existence of prepackaged pieces of fabric or any sort of standardized measure; nor did they feel that the question inquired about new fabric kinds.

(18) Weet wi-w-se-0 ki-kimti **samq'ayn**?
Y.N DIST-have-PRES PL-new fabric
Do you have any new pieces of material?[6]

A third example demonstrates most clearly of all the possibility of apportionment into quantities which correspond neither to packages nor to subkinds. This example was elicited in discussion of how spots of mud can make road construction slippery in bad weather. The plural here goes along with apportionment of mud into discrete areas or puddles on the road.

(19) he-'ilp-e-'ilp **sitx̂** hii-we-s x̂uysx̂uys 'iskit-pe
PL-red mud 3SUBJ-be-PRES.SG slippery road-LOC
There are red muddy spots that are slippery on the road.

These examples provide a first indication of the partial concealment of the mass-count distinction in Nez Perce, and of the generalized apportioned readings that mass nouns are able to show in this language. These themes recur in the combinations of nouns with numerals, and will be given an analysis in section 6.

[6] This example contains a distributive verbal affix, which typically indicates a plural argument. See Deal (2010, 73-78).

3 Nouns and numerals

The structure of noun-numeral combinations is an area where languages vary quite notably, with two major typological classes standing out. In languages like English, mass nouns do not combine with numerals directly, but count nouns do. By contrast, in classifier languages of the type common in east Asia, neither count nor mass nouns combine with numerals directly. There must always be a classifier between the numeral and the noun.

Nez Perce occupies a middle ground between these two types. On one hand, its numeral constructions present no outward sign of any distinction between mass and count nouns. Both combine with numerals in the same order and with the same numeral morphology. On the other hand, the language does not possess a classifier system – or so I will argue. To make this point we will need to consider the details of the morphological structure of Nez Perce numerals.

3.1 Basic facts

Let us first consider the basic facts on noun-numeral combinations and their interpretation. Examples with count nouns are given in (20). The numerals here are bimorphemic; each obligatorily bears a suffix *-(V)t*.

(20) a. lep-it nicka'niicka'
two-SUF strawberry
2 strawberries

b. puutim-t piswe
ten-SUF rock
10 rocks

Mass nouns combine with numerals presenting the same bimorphemic composition. Once again, mass nouns show apportioned readings, and this apportionment need not reflect packing or sorting. In the following, decontextualized example, the consultant suggests that counting of sand be carried out by grains.

(21) 'iin-im wee-s lep-it **mayx**
1SG-GEN have-PRES.SG two-SUF sand
I have two (pieces of) sand
Comment: "That doesn't sound like much! Two little grains."

In the following examples, clay is counted by the salient pieces or lumps present in the local environment. The speaker was toying with two nearly identical pieces of white modeling clay during the elicitation session, which furnished a natural context of apportionment.

(22) 'ee wee-s lep-it **'itx̂**, kii kaa yox̂.
2SG.CLITIC have-PRES.SG two-SUF clay, this and that
You have two pieces of clay, this one and that one.

(23) hipinwees-pe lep-it xˆi-xˆay-xˆi-xˆayxˆ **'itxˆ** hii-we-s
table-LOC two-SUF PL-white clay 3SUBJ-be-PRES.SG
'inik-iin'.
place-PASSIVE.PART
There are two pieces of white clay placed on the table

A final case is contextualized in a discussion of a nosebleed. In this context, blood is readily counted by drops.

(24) lep-it **kikeet** hi-sew-n-e.
two-SUF blood 3SUBJ-fall-P-REM.PAST
2 drops of blood fell.

Semantically, these examples are of a piece with their counterparts involving mass nouns in combination with plural. Morpho-syntactically, they are parallel to the examples in (20), which feature numerals in combination with count nouns, along with a consistent numeral suffix, *-(V)t*.

What is the nature of this persistent suffix? Its basic distribution with numerals 1 to 10 is shown below.

(25) General forms of low numerals

naaqc	*one*	'oylaaqc	*six*
lep-it	*two*	'uyneep-t	*seven*
mitaa-t	*three*	'oymaata-t	*eight*
piilep-t	*four*	k'uyc	*nine*
paaxˆ-at	*five*	puutim-t	*ten*

The forms given in this table are the citation forms of numerals, and can be used for counting with nouns of any animacy class. There is a morpho-phonological generalization to be made. Every general numeral either ends in the affricate /c/, or bears the suffix *-(V)t* we have seen above.

Alongside the general numerals is a distinct class of numerals used only for counting humans. These numerals are strictly bimorphemic; the numeral root (regardless of its phonology) bears a suffix replacing *-(V)t*. The most consistent allomorph of this suffix is *we*.

(26) Human forms of low numerals

naaqc-wa	*one*	'oylaaqc-wa	*six*
lep-u'	*two*	'uyneep-we	*seven*
mitaa-w'	*three*	'oymaat-oo	*eight*
piilep-u'	*four*	k'u'ic-we	*nine*
paaxˆ-loo	*five*	puutim-we	*ten*

Nouns in the human class may be counted either with forms in (25) or with forms in (26).

3.2 *Against a classifier analysis*

To understand the nature of apportioned readings for mass nouns in combination with numerals, we must understand the semantic contribution (if any) of the numeral suffixes. There are two initially plausible ways the Nez Perce pattern of numeral morphology could be described.

On one hand, the facts meet the basic definition of classifiers routinely offered in the typological literature (e.g. Gil 2011): numerals and nouns only combine in this language with an additional morpheme in between. We might thus consider that *-(V)t* and *-we* instantiate, respectively, general and human classifiers. This indeed is how numeral suffixes are described in the major reference work on Nez Perce, Aoki (1994)'s *Nez Perce Dictionary*.

An alternative is also plausible, though. There is independent reason to think that Nez Perce has morphosyntactic rules of concord, which spread the features associated with a noun throughout the nominal projection.[7] And we have encountered some reason to think that Nez Perce singles out a subset of nouns as belonging to the human noun class. These observations together suggest that human numerals might be analyzed as numeral words simply showing noun-class concord for the feature [human]. Such an analysis draws a connection between Nez Perce numeral forms and other cases of noun-numeral concord in noun class. In the Bantu language Chichewa, for instance, numerals from one to five agree in gender with the noun, which may belong to any of a lengthy list of classes (Corbett 1991). Compare class 6 noun *mapiri* 'mountains' with class 8 noun *zipewa* 'hats':

(27) Noun-numeral concord in noun class: Chichewa (Corbett 1991, 107)

a. mapiri a-wiri
mountains 6-two
two mountains

b. zipewa zi-wiri
hats 8-two
two hats

This type of pattern is also found in a more limited way in Romance and Germanic languages, where the numeral 'one' shows distinct masculine and feminine forms.

If the human numeral suffix *-we* is analyzed as a concordial class marker – i.e., a piece of inflection resulting from morphosyntactic rules applying in the nominal projection[8] – an only slightly different analysis is required for the alternative suffix, *-(V)t*. The general numerals containing this suffix are acceptable with nouns of any noun class, so the suffix presumably does not reflect any particular class feature. It seems plausible that it instead serves as a morphological default, appearing to support bound numeral roots when the human concord suffix does not appear. On this approach, the

[7] We've seen this for plural; it also holds for case, as is shown in Deal 2010, pp 33-34.

[8] The nature of concord rules is explored by Baker (2008) and Norris (2011).

morphophonological generalization takes center stage: all numeral roots in the language either are bound roots, or end in /c/.

There is a straightforward argument to be made in favor of this second approach over the classifier analysis. The argument turns on the complementarity between classifiers and measure nouns in classifier languages.

Research on classifiers frequently observes a relationship between the classifiers that appear when counting by units (sometimes called "sortal classifiers") and the measure nouns used in pseudopartitive constructions (sometimes called "mensural classifiers"). In Mandarin, *ke* is a sortal classifier appropriate for counting cherries; but cherries may also be counted by boxes or pounds, using appropriate measure nouns.

(28) san ke / bang / he yintao (Jiang 2012)
three CL_{unit} / pound / box cherry
three cherries / three pounds of cherries / three boxes of cherries

Sortal classifiers and pseudopartitive measure nouns are in complementary distribution. Each may occur only once per numeral-noun combination.

(29) * san { ke ke } / { ke bang } / { he bang } yintao
three { CL_{unit} CL_{unit} } / { CL_{unit} pound } / { box pound } cherry

This combinatoric restriction can be explained by the semantics of classifier and measure constructions on various approaches. On Krifka (1995)'s approach, for instance, a classifier denotes a function which takes a number as its argument and returns a property of individuals. The combination *san ke* of numeral and classifier therefore denotes a property of individuals – not a denotation that a further classifier or a measure noun can tolerate for its complement.

All this makes it quite telling to observe that Nez Perce pseudopartitive constructions show no complementarity or competition between measure nouns and the suffix *-(V)t*. This suffix remains entirely obligatory in pseudopartitives, provided the numeral does not end in /c/. The following examples show this fact in counting with the measure word *temiinewit* (used for all units of weight) and with *'ipselipt* 'handful'.

(30) mitaa*(-t) temiinewit nicka'niicka'
three-SUF weight.measure strawberry
three pounds of strawberries

(31) lep*(-it) 'ipselipt nicka'niicka'
2-SUF handful strawberry
two handfuls of strawberries

The morphological approach gives a straightforward analysis to these facts. The suffix *-(V)t* is required in these examples simply because numeral roots

mitaa- 'three' and *lep-* 'two' are not morphologically well-formed words of Nez Perce. They are bound roots, requiring morphological support. *-(V)t* itself has no semantic content, and thus there is no reason to expect it to disappear in the context of a measure word.

This analysis has the consequence of bringing Nez Perce in line with a crosslinguistic pattern discussed by T'sou (1976), Chierchia (1998) and Borer (2005). These authors note that classifiers and number marking are typically in complementary distribution both within and across languages. In Armenian, for instance, both plural marking and classifiers are optional in numeral constructions, but the two may not be present at the same time.

(32) Complementarity of plural and classifier: Armenian (Borer 2005)

a. Yergu hoanoc(-ner) uni-m
two umbrella-PL have-1SG
I have two umbrellas.

b. Yergu (had) hovanoc uni-m
two CL umbrella have-1SG
I have two umbrellas.

c. * Yergu had hovanoc-ner uni-m
two CL umbrella-PL have-1SG

Nez Perce numeral suffixes do not behave like Armenian classifiers in disappearing when plural is present. Rather, nouns with plural forms consistently take those forms when combining with numerals higher than one. The numerals show their standard morphology; in the following examples, they show human markers.

(33) mitaa-w' pi-pit'in hi-pa-'ac-∅-im-a
three-HUM PL-girl 3SUBJ-S.PL-go.in-P.ASP-CISLOC-REM.PAST
Three girls came in.

(34) hi-nees-hex-te-nu' lep-u'-ne ha-'ayat-ona
3SUBJ-O.PL-see-go.to-PROSP two-HUM-OBJ PL-woman-OBJ
She will go see two women

Plural marking on adjectives is similarly possible with numerals higher than one. In the following examples, plural adjectives co-occur with numerals suffixed *-(V)t*.

(35) lep-it ki-kuckuc picpic haacwal hi-wewluq-se-∅
two-SUF PL-small cat boy 3SUBJ-want-IMPERF-PRES
The boy wants two little cats

(36) Context: a discussion of production of various batches of frosting

wi-hany-∅-a lep-it yi-yos-yi-yos tiipip
DIST-make-P-REM.PAST two-SUF PL-blue frosting
Speaker: "You made two bowls of blue frosting."

These facts make it clear that numeral suffixes and plural marking are not in complementary distribution. If the T'sou-Chierchia-Borer generalization holds up on a universal basis – a proposition which has engendered some controversy[9] – then this pattern furnishes an additional argument against a classifier analysis of the numeral suffixes.

We move on from numeral constructions now with several conclusions in hand. We have seen that the ways that nouns combine with numerals does not differ in Nez Perce between mass and count nouns. Nouns of all stripes combine with numerals directly, in the sense that a classifier is not involved. The road we have had to take to that conclusion points to a more general moral concerning the ways that classifiers and classifier languages can be diagnosed. The Nez Perce facts remind us that there are multiple reasons why languages might require morphemes to appear between numerals and nouns. In some languages, like Mandarin, these reasons are plausibly semantic. In other languages, like Nez Perce, it is morphosyntactic and even morphophonological factors that play the leading role. In a slogan: Not everything that is needed between a numeral and a noun is really a classifier!

4 Quantifiers and cumulativity

The stage is now set for the investigation of quantificational constructions – an area in which the mass-count distinction finally shows its face.

Quantifiers in English diagnose the mass-count distinction in two ways. First is a pattern of selection: quantifiers like *many* and *few* occur only with count nouns, whereas *much* and *little* occur only with mass nouns. There is no pattern like this in Nez Perce. What is found in Nez Perce is the second pattern found in English: selective imposition of plurality requirements. This pattern is seen in English with the quantifiers *all* and *most*. These quantifiers combine with both mass and count nouns, but require only their count noun complements to be plural.

(37) a. all sand / sofas / *sofa b. most blood / bikes / *bike

Similar facts are found with a range of quantifiers crosslinguistically. In French, for instance, a mass or plural complement is required with quantifiers including *combien* 'how many/much', *moins* 'fewer/less', *peu* 'few/little' and many others, as Doetjes (1997, ch 4) discusses.

There is a natural basis to this grouping of mass nouns and plural count nouns together. We know from Link (1983) that mass properties and plural

[9] On theoretical grounds, Bale and Khanjian (2008) propose an analysis of the Armenian facts which predicts that classifiers and plural may in principle co-occur within the same nominal. On empirical grounds, Vázquez Rojas Maldonado (2012) and Dalrymple and Mofu (2012) argue that this situation obtains in Purépecha and Indonesian.

count properties are those that support inferences of cumulativity – that is:

(38) *Cumulativity.*
A property P is cumulative iff for any x and y that are P, the sum of the two, $x+y$, is also P.

The shared property of cumulativity has led to both mass and plural count denotations being standardly described in terms of join semilattices.[10] That is to say that these denotations, first, are structured by a part-of relation $\leq$, and second, contain a unique maximal element (the supremum) as identified by this relation. There is an interesting and difficult question as to which aspects of this structure are decisive in determining the behavior of quantifiers like *all* and *most*. Regrettably, I have little to add on the lexical semantics of those quantifiers and others that are like them in requiring plural or mass complements.[11] What I want to demonstrate instead is that every non-numeral quantifier of Nez Perce is a member of this cumulativity-requiring class.

Nez Perce has a variety of quantifier words, which are like numerals in showing noun-class agreement for the feature [human]. Two of these are universal quantifiers (the difference between which is not immediately clear); others are translation equivalents of 'a lot', 'a few' or 'a little', 'how many' or 'how much', and a partitive 'some'.

(39) General forms

'oykala	la'am	'ileχ̂ni	mil'ac	mac	tato's
all$_1$	all$_2$	a lot	a few/little	how many/much	some (of)

(40) Human forms

'oykal-o	la'am-wa	'ilχ̂nii-we	mil'ac-wa	mac-wa	tato's-ma
all$_1$	all$_2$	a lot	a few	how many	some (of)

All of these quantifiers combine with all nouns, mass and count alike. When a quantifier combines with a noun possessing a plural form, the noun must take that form. Given the distribution of plural forms for nouns, this is a pattern we see only in the human noun class.

(41) 'oykal-o ha-'aayat/*'aayat
all$_1$-HUM PL-woman/*woman
all the women

[10] See Link (1983), Landman (1989), Pelletier and Schubert (1989/2003).

[11] In principle, a particular quantifier might require either of the two definitional attributes of a join semilattice. A quantifier that operated over the part-whole structure of its complement could simply require that a relation $\leq$ be non-trivially defined for its complement. Alternatively, Matthewson (2001) has proposed that quantifiers like *all* and *most* are those that operate over natural kinds, which are naturally related to the suprememas of cumulative properties. To tell these explanations apart, it will be necessary to probe in some depth the lexical semantics of the various quantifiers that require mass or plural complements.

(42) la'am-wa ha-'aayat/*'aayat
all$_2$-HUM PL-woman/*woman
all the women

(43) 'ilex̂ni ha-ham/*haama
a.lot PL-man/*man
a lot of men

(44) mil'ac-wa ha-ham/*haama
few/little-HUM PL-man/*man
a few men

(45) tato's ha-'aayat/*'aayat
some PL-woman/*woman
some of the women

(46) mac-wa ma-may'ac/*miya'c wee(s)?
how.much/many-HUM PL-child/*child have.PRES.SG
How many kids do you have?

Must mass nouns also be plural when they combine with quantifiers? Our discussion of number morphology teaches us where we must look for the crucial data. An adjective must be present to serve as a host for plural marking. The next set of examples therefore compares count and mass inanimate nouns in quantifier-adjective-noun configurations, which proves to be the decisive data set in establishing a mass-count distinction in Nez Perce. The pattern is highly consistent. When a quantifier is combined with a mass noun modified by an adjective, speakers provide a singular form of the adjective (a examples). But when a quantifier combines with a count noun plus adjective, speakers either prefer or require the adjective to take its plural form (b examples).

(47) a. 'oykala ta'c hipt, 'oykala cimuuxcimux sitx̂
all$_1$ good food, all$_1$ black mud

b. 'oykala ??k'uupnin' / k'i-k'uupnin' tiim'en'es
all$_1$ broken / PL-broken pencil

(48) a. la'am x̂ayx̂ayx̂ 'ipeex̂, la'am tiiwenin' c'ayn
all$_2$ white bread all$_2$ stinky manure

b. la'am ??kuckuc / ki-kuckuc tiim'en'es
all$_2$ small / PL-small pencil

(49) a. 'ilex̂ni cimuuxcimux samq'ayn, 'ilexni yoosyoos tiipip
a.lot black fabric a.lot blue frosting

b. 'ilex̂ni ??tiyaaw'ic / ti-tiyaw'ic wix̂si'likeecet'es
a.lot sturdy / PL-sturdy chair

(50) a. mil'ac cimuuxcimux lalx̂, mil'ac x̂ayx̂ayx̂ mayx
few/little black coffee few/little white sand

b. mil'ac ??ta'c / ti-t'ac wix̂si'likeecet'es
few/little good / PL-good chair

(51) a. tato's ta'c hipt
some good food

b. tato's ??himeeq'is / titilu laatis
some big.SG / big.PL flower

(52) a. mac 'ilp'ilp samq'ayn
how.much/many red fabric
how much red fabric

b. mac ??'ilp'ilp / he-'ilp-e-'ilp 'aatamoc
how.much/many ??red / red.PL car
how many red cars

The somewhat graded unacceptability of singular forms in the (b) examples here contrasts with the clear unacceptability of singular forms for nouns showing N-level plurals. It seems plausible that this difference reflects a small degree of optionality in the morphosyntactic process responsible for spreading a plural feature to adjectives. It should not be taken to reflect inconsistency in consultants' judgments on the crucial facts: the preference for plural adjectives with count nouns is consistent between the two consultants, across elicitations conducted in 2012 and 2013, and across a range of count nouns, adjectives and quantifiers. It makes for a clear difference between mass and count nouns.

One consistent attribute of the mass-count distinction across languages is that it is somewhat elastic. In English, count nouns may take on the syntax of mass nouns in contexts supporting Pelletier (1979)'s "universal grinder". Having found an area of Nez Perce grammar where count and mass nouns differ, we can now see that the same obtains in this language. In the following example, *tamsaswaako's* 'tomato' describes a substance (tomato matter) and behaves as a mass noun in taking a singular adjective in combination with the quantifier.

(53) Context: you were cleaning up a tomato with some good bits and some bad bits, and you accidentally threw away some good bits along with the bad bits.

mil'ac ta'as-na tamsaswaako's-na
few/little good-OBJ tomato-OBJ
'e-wqii-n-e
3OBJ-throw.away-P.ASP-REM.PAST
I threw away a little bit of good tomato.

In a context where *tamsaswaako's* 'tomato' describes individual tomatoes, the preference for a plural adjective re-emerges.

(54) Context: you were throwing away some bad tomatoes, and you accidentally threw away some good tomatoes with them.

mil'ac ti-ta'as-na tamsaswaako's-na
few/little PL-good-OBJ tomato-OBJ
'e-wqii-n-e
3OBJ-throw.away-P.ASP-REM.PAST
I threw away a few good tomatoes.

Because foodstuff nouns lend themselves readily to grinding contexts, consultants' judgments on adjective plurality with quantifiers and foodstuff nouns are sometimes flexible. Matters are different for nouns like *tiim'en'es* 'pencil' (47/48), *wix̂si'likeecet'es* 'chair' (49) and *'aatamoc* 'car' (52). These are count nouns which require highly unusual contexts for grinding interpretations, and with these nouns, the preference for plural adjectives with quantifiers is consistently observed.

There is also flexibility of mass nouns in Nez Perce, and this is of a type that will by now be familiar. Consultants accept plural adjectives in combination with quantifiers and mass nouns only when asked for quantification over mass nouns that are apportioned. Thus a plural form of *cimuuxcimux* 'black' is rejected in quantifying over black fabric directly, but accepted when quantifying over apportioned quantities of that substance:

(55) a. 'ilex̂ni cimuuxcimux samq'ayn
a.lot black fabric
lots of black fabric

b. 'ilex̂ni ci-cmux-ci-cmux samq'ayn
a.lot PL-black fabric
a lot of pieces of black fabric

The contrast in interpretation of these examples comes as no suprise in view of what we have seen on the interpretation of plural mass nouns in Nez Perce. These facts complete the picture on combinations of quantifiers and number marking: mass nouns, modulo apportionment, combine with quantifiers within singular NPs, whereas count nouns, modulo grinding, always occupy plural NPs when they combine with a Nez Perce quantifier.

Overall, what quantificational constructions with adjectives show us is a set of properties familiar on multiple grounds. Nouns for substances are typically found in one type of morphosyntactic arrangement and nouns for individuals are typically found in another. There is a certain amount of flexibility in both directions when the context supports it. All this sounds very much like a mass-count distinction.

5 Ramifications for linguistic universals

The bottom-line message from quantificational constructions is simple: Nez Perce does not falsify Cheng & Sybesma and Chierchia's proposed universal of Encoding. It distinguishes mass and count nouns. This distinction may not be visible in the distribution of number marking or in the combination of nouns with numerals, but it is nevertheless observed in quantificational constructions with adjectives.

This situation poses a clear puzzle for language acquisition. Faced with a language like English, the child is confronted with a variety of clues to the mass-count distinction. In addition to the facts of number marking and numerals, mass nouns may appear bare in argument positions, for instance, whereas singular count nouns may not. Children become sensitive to these distinctions around the age of 2 1/2, and subsequently, as much research has shown, they make extensive use of them in zeroing in on the meaning of mass and count nouns.[12] The child acquiring Nez Perce is faced with a learning challenge that is considerably more difficult. This language lacks articles, and nominals of all types overwhelmingly consist of only a single N; number marking is of no help; neither are constructions with numerals. Nevertheless, adult Nez Perce speakers have somehow figured out that substance nouns are distinguished in the grammar of their language. That knowledge comes out in elicitation of quantifier-adjective-noun combinations, which are extraordinarily rare in conversation and corpora. It also, as we will see in section 8, comes out in the rare pseudopartitive construction, and this in an even more subtle form. It is hard to imagine how children could have exposure to these constructions and their various nuances that would be sufficient to let them learn the mass-count distinction from linguistic input alone.

Where, then, does Nez Perce speakers' knowledge of the mass-count distinction come from? Chomsky (2005) writes of two additional types of factors which shape linguistic competence, beyond what can be learned from the input to the individual acquirer. One is the narrowly linguistic genetic endowment which is essentially invariant across humans and encodes information that need not be in any sense acquired or learned. The other is "principles not specific to the faculty of language", to include, for instance, principles of data analysis that might be used in language acquisition.

The first type of analysis is hardly plausible for the case of mass and count – that is, the genetic endowment could hardly specify, without any need for further learning, that words for sand are mass, words for people are count, words for rabbits are count, words for blood are mass, and so on for the entire range of possible nouns. Beyond the mere inelegance

[12] See Gordon (1985), Soja (1992), and many others following.

of such a proposal, there is a body of facts demonstrating far more arbitrariness and crosslinguistic variation than such a view leads us to expect. Chierchia (2010) observes, for instance, that *hair* in English is mass, whereas its translation equivalent *cheveux* in French is count; Rothstein (2010) points out a similar contrast between *advice* in English, which is mass, and its Hebrew translation *etza*, which is count. These facts underline the challenge in treating the mass-count distinction as a linguistic universal in any fully hard-wired sense of that term.

What is much more plausible is that the distinction arises due to the second type of innate knowledge: acquisition strategies that are common to human beings, but also sensitive to factors external to language proper. An experimental investigation of such strategies was conducted by Soja, Carey, and Spelke (1991). Their experiments demonstrate that 2-year-olds acquiring English make decisions about word meaning based on physical properties of the stimuli which are paired with novel nouns. Children come to the task of language acquisition with a basic cognitive distinction between objects and substances already in place, they propose, and this distinction forms the basis for two central acquisition procedures:

(56) Procedure 1

> Test to see if the speaker could be talking about a solid object; if yes, conclude the word refers to individual whole objects of the same type as the referent.

Procedure 2

> Test to see if the speaker could be talking about a non-solid substance; if yes, conclude the word refers to portions of substance of the same type as the referent.

If strategies along this general line reflect a universal of language acquisition, it is no longer a mystery how Nez Perce speakers could have arrived at a special representation for substance nouns in the absence of either useful linguistic input or lexical hard-wiring. They have simply followed an innate strategy of language acquisition which predisposes them to adopt distinct semantic profiles for individual- and substance-denoting nouns.

The particular way the mass-count distinction shows up in Nez Perce is compatible with a simple and conservative conclusion about what these profiles boil down to. What we see in quantificational constructions in this language is that mass nouns are cumulative either in the singular or in the plural, whereas count nouns are cumulative only in the plural. This state of affairs is readily handled on the view we inherit from Link (1983) and many others. Count noun roots denote sets of ordinary, non-overlapping individuals (and thus are not cumulative); singular is simply an identity function, and thus singular count nouns are not cumulative, either. Con-

sider the count noun *picpic* 'cat': [13]

(57) $TR(\sqrt{\text{PICPIC}}) = TR(\text{SG}\ \sqrt{\text{PICPIC}}) = cat$
$[\![cat]\!] = \{Tiger, Felix, Barney, Calvin, \ldots\}$

Since Nez Perce quantifiers require cumulativity, they cannot combine with singular count nouns. Plural changes the picture by taking the closure of the noun root's denotation under sum. This provides for cumulativity, allowing plural count nouns to combine with quantifiers.

(58) $TR(\text{PL}\ \sqrt{\text{PICPIC}}) = {}^{*}cat$
$[\![{}^{*}cat]\!] = \{Tiger, Felix, Barney, Calvin, Tiger + Felix, Tiger + Barney,$
$Tiger + Felix + Barney, Tiger + Felix + Barney + Calvin \ldots\}$

All this is simply an application of Link's view on count nouns.

Mass nouns are different in that they come from the lexicon already cumulative, possessing the structure of a join semilattice. In combination with singular (which contributes only an identity function), they retain this structure. Consider *mayx* 'sand'.

(59) $TR(\sqrt{\text{MAYX}}) = TR(\text{SG}\ \sqrt{\text{MAYX}}) = sand$
$[\![sand]\!] = \{\ldots, s_4 + s_{19} + s_{41}, s_4 + s_{18} + s_{19}, s_{23} + s_{29}, \ldots\}$

Mass nouns may therefore combine with quantifiers in the singular, where their inherent cumulativity simply shines through. This explanation draws on a proper part of Link's view about mass nouns – the inherent cumulativity of these nouns being the only crucial factor in the explanation of Nez Perce quantificational constructions.[14]

Only a slight restatement of the Soja et al. acquisition procedures is needed to accommodate the Linkean approach. The child uses a new noun's relationship to things in the world, along with various of those things' physical properties, to infer whether or not the noun's denotation shows cumulativity:

[13] The "root" notation here is borrowed from the tradition of Distributed Morphology. I use it merely to indicate the distinction between a noun itself and the noun in combination with singular morphology.

[14] An important aspect of Link's view that I leave aside here concerns the question of whether mass nouns and count nouns denote in the same domain, or whether (as Link proposes) mass nouns draw their denotations from a separate domain of "portions of matter". See Chierchia (1998) for discussion. The issue is related to a long-running debate on whether mass denotations are merely cumulative or whether they are also divisive, in the sense that any element in a mass denotation has proper parts which are also in that mass denotation. A helpful discussion of what is at stake can be found in Gillon (1992).

(60) Procedure 1′.

> Test to see if the speaker could be talking about an ordinary object; if so, conclude that the extension of the noun root is a set of atoms of the same type as the referent (i.e., conclude that the noun root is count)

Procedure 2′.

> Test to see if the speaker could be talking about a substance; if so, conclude that the extension of the noun root is cumulative, a join semilattice of stuff of the same kind as the referent (i.e., conclude that the noun root is mass).

This formulation follows very closely the restatement of the two procedures by Chierchia (1994).

In a language with ample syntactic clues to the mass-count distinction, the strategies in (60) are capable in principle of being overruled or complemented by language-specific choices that a child can learn from the input. An English-speaking child must somehow learn, for instance, that *rice* is mass but *bean* is count. It may be that language-specific choices emerge here due to the borderline status of rice and beans as concerns the folk-physical distinction between individuals and substances; or, as Clausen et al. (2010) have discussed, cultural factors could be involved. This makes room for some arbitrariness in the mass-count distinction, along with the persistent connection between this linguistic distinction and the cognitive difference between substances and individuals. If, in the absence of evidence to the contrary, learners simply apply the strategy in (60), the result will be that every language has some count nouns and some mass nouns, and that the difference tracks the cognitive distinction in broad terms, but nothing further – as seems correct.

6 Accounting for apportionment

It is time to turn directly to the major novelty of the Nez Perce facts: generalized apportionment of mass nouns. We have seen a variety of examples of this apportionment already in the discussion of number, numerals and quantifiers. These examples make it clear that the apportionment of mass nouns in Nez Perce is more general than its most immediate counterpart in English, namely packaging and sorting of mass nouns. Mass nouns may be apportioned in a broad variety of ways in Nez Perce. It will be helpful to review this variety on our way to an analysis of apportionment.

Example	Context summary	Gloss	Free translation
(17)	Art store	blue.PL sand	quantities of blue sand
(18)	Fabric store	new.PL fabric	new pieces of material
(19)	Road construction	red.PL mud	spots of red mud
(21)	(decontextualized)	two sand	two grains of sand
(22)/(23)	Playing with clay	two (white.PL) clay	two pieces of (white) clay
(24)	Nosebleed	two blood	two drops of blood
(36)	Batches of frosting	two blue.PL frosting	two bowls of blue frosting
(55b)	(decontextualized)	a.lot black.PL fabric	a lot of pieces of black fabric

Table 1: Nine initial examples of apportionment for mass nouns

6.1 The nature of apportioned readings

The nine examples of apportionment we have seen thus far are summarized in Table 1, along with the elicitation contexts (if any) that speakers were presented with. These examples show that substances may be apportioned in various ways, depending in part on contextual factors. Sand, for instance, is apportioned into reasonably sizable quantities when it is for sale in an art store; but in an out-of-the-blue context, a speaker suggests instead that sand be apportioned by grains. This pair of examples is indicative of a broader pattern in the interpretation of apportioned mass nouns. The way a mass noun is apportioned is not fixed, but flexible. It is constrained only by contextual factors and world knowledge.

The impact of context and world knowledge is seen in the following pair of examples using the mass noun *'ipeex̂* 'bread'. In an out-of-the-blue context, the speaker apportions bread by loaves. But when making sandwiches, a request for two portions of bread is naturally understood as involving apportionment by slices.

(61) a. Out of the blue:
'iin-im wee-s piilep-t 'ipeex̂
1SG-GEN have-PRES.SG four-SUF bread
lit. I have four bread.
Linguist: Would you think I have four slices or four loaves?
Speaker: Four loaves.

b. Context: we are making sandwiches and I say:
pii-'ni-m lep-it 'ipeex̂!
2/1-give-CISLOC.IMPER two-SUF bread
lit. Give me two bread!
Linguist: What would you give me?
Speaker: If I heard that, I'd probably figure you wanted slices.

What holds for bread also holds for blood. In the context of a nosebleed,

blood is naturally apportioned into drops; that's what we saw in (24). But when the workers at a bloodbank apportion blood, they might naturally do so by kinds.

(62) Context: a bloodbank

wi-siix lep-it kikeet, O kaa A
have-PRES.PL two-SUF blood, O and A
We have two blood types, O and A

Water, likewise, may be apportioned by drops (as in discussing a roof leak); but out of the blue, a speaker suggests that apportionment could equally well be done by puddles or streams.

(63) a. lep-it kuus hi-sew-n-e
two-SUF water 3SUBJ-fall-P.ASP-REM.PAST
2 drops of water fell.
Speaker: "Like from a leaky roof!"

b. ki-kuckuc kuus
PL-small water
Speaker: "Like little puddles. Little streams."

This broad range of apportionments makes it no surprise that Nez Perce mass nouns can indeed be apportioned in the way their English counterparts can – by kinds and by packages. *Mitaat qahas* 'three milks' may describe three identical containers of coffee creamer; it may also describe three kinds of coffee creamer, packaged in more than three total containers.

(64) a. wi-siix mitaa-t qahas
have-PRES.PL three-SUF milk
We have 3 things of creamer

b. wi-siix mitaa-t qahas peneˆsep (kiinewit)
have-PRES.PL three-SUF milk different (taste)
We have three creamers of different tastes (three kinds of creamer).

In this last example, the sub-kind reading is facilitated by the modifier *peneˆsep (kiinewit)* 'different (in taste)'. Apportionment into kinds without such a modifier is seen in (62) above.

6.2 Variables over partitions

The best English translations of Nez Perce apportioned mass nouns feature pseudopartitive constructions. One way of describing the variation we see between Nez Perce and English is that Nez Perce expresses with no overt marking a reading which in English typically requires the pseudopartitive.

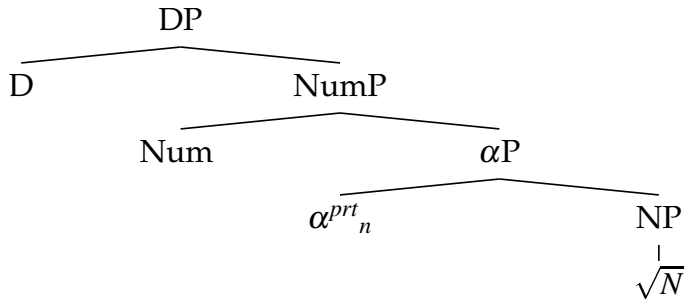
What then does the pseudopartitive do? The types of pseudopartitive constructions which appear as translations of Nez Perce apportioned mass nouns are those that Brasoveanu (2008) and Chierchia (2010, 2013) have approached in terms of apportionment by partition functions. A partition function is a function Π of type <et,et> which, when applied to a property P, meets the following conditions:

(65) a. $\Pi(P) \subseteq P$
b. $+\Pi(P) = +P$
c. $\forall x, y \in \Pi(P).\ x \neq y \rightarrow \neg\exists z[z \leq x\ \&\ z \leq y]$

This is to say that (a) the partition of a set is a subset of the original set; (b) the sum of the partition is the sum of the original set; and (c) (most crucially) no two members of the partition overlap.

There are typically many distinct partition functions that can be applied to a particular property. In pseudopartitives, various types of partition functions are associated with various measure nouns; *handful* in *two handfuls of strawberries* partitions the set of strawberry-pluralities into handfuls, *pile* partitions it into piles, and so on. Nez Perce apportioned mass nouns do not specify particular partition functions, as we have seen in the previous section. The partition applied to a mass denotation is a function of the context and of world knowledge. That suggests that Nez Perce nominals contain *variables* over partition functions. If free variables are generally introduced by pieces of syntactic structure, we will need a partitioning head in the nominal projection. As we will see, a natural place for that head, which I call α^{prt}, is immediately above the noun root in NP.

(66)



The semantics of α^{prt} itself center on the introduction of a variable, Π_n, which ranges over partition functions.

(67) $TR(\alpha^{prt}{}_n) = \lambda P.\Pi_n(^*P)$

This translation is essentially equivalent to Chierchia (2010)'s analysis of English *quantity of*. (The difference is the Linkean star, which I'll justify in section 7.) It is notable that Nez Perce does not have any words like *quantity* or *unit* which may be used in pseudopartitives with generalized apportioning

readings. What is done by these very general pseudopartitives in English is simply done by α^{prt} in Nez Perce.

Here is an example to clarify how this analysis works. Let us take a mass noun like *samq'ayn* 'fabric'. The denotation of such a noun is a cumulative property.

(68) $TR(\sqrt{\text{SAMQ'AYN}}) = fabric$
$[\![fabric]\!] = [\![^*fabric]\!] = \{a,\ b,\ c,\ a+b,\ a+c,\ b+c,\ a+b+c\}$
(where a, b, c stand for potentially non-atomic elements)

To produce the apportioned reading, this noun root combines with α^{prt} bearing a particular index. In context, this index determines the partition function that will be applied to the NP denotation. In one case, we might find $\Pi_1(^*fabric)$, denoting $\{a+b,\ c\}$; in another, $\Pi_2(^*fabric)$, denoting $\{a,\ b,\ c\}$. These are denotations for αP, and serve as input to the compositional semantics of number and higher heads.

The result of combining the mass noun with a partition function is a denotation which presents important parallels to that of a count noun. Like a count noun denotation, a partitioned mass denotation is not closed under sum. This means it can be non-trivially pluralized, just like a count noun can be.

(69) a. $TR(\text{SG}\ \alpha^{prt}{}_1\ \sqrt{\text{SAMQ'AYN}}) = TR(\alpha^{prt}{}_1\ \sqrt{\text{SAMQ'AYN}}) = \Pi_1(^*fabric)$
Let $[\![\Pi_1(^*fabric)]\!] = \{a+b,\ c\}$
b. $TR(\text{PL}\ \alpha^{prt}{}_1\ \sqrt{\text{SAMQ'AYN}}) = {}^*\Pi_1(^*fabric)$
$[\![{}^*\Pi_1(^*fabric)]\!] = \{a+b,\ c,\ a+b+c\}$

The most useful partition functions divide a set into at least two cells; for any such function Π, $\Pi(^*P)$ and ${}^*\Pi(^*P)$ will not be equivalent. This makes for a crucial respect in which apportioned mass nouns contrast with non-apportioned mass nouns. Mass nouns come from the lexicon cumulative, inherently closed under sum. If singular is an identity function, and plural takes closure under sum, then both the singular and plural of a non-apportioned mass noun will have the same denotation as the mass noun root itself.

(70) a. $TR(\sqrt{\text{FABRIC}}) = fabric$
b. $TR(\text{SG}\ \sqrt{\text{FABRIC}}) = fabric$
c. $TR(\text{PL}\ \sqrt{\text{FABRIC}}) = {}^*fabric$
d. $[\![fabric]\!] = [\![^*fabric]\!] = \{a,\ b,\ c,\ a+b,\ a+c,\ b+c,\ a+b+c\}$

The preference for singular over plural with non-apportioned mass nouns presumably reflects a preference for the more transparent route to this invariant denotation – a preference for singular, which is *always* an identity

function, over plural, which is only an identity function when applied to (non-apportioned) mass nouns.[15]

A partitioned mass denotation is also like a count noun root denotation in that it is a set whose members do not overlap – an essential condition for counting. No surprise, then, that apportioned mass nouns, unlike non-apportioned ones, may combine with numerals. We see this for *'itx̂* 'clay' in (23), for instance.

(23) hipinwees-pe lep-it x̂i-x̂ay-x̂i-x̂ayx̂ **'itx̂** hii-we-s
table-LOC two-SUF PL-white clay 3SUBJ-be-PRES.SG
'inik-iin'.
place-PASSIVE.PART
There are two pieces of white clay placed on the table.

We see here that the numeral combines with a mass noun in combination with plural. The essentials of a translation for this example are given in (71).

(71) $\exists x\,[placed.on.the.table(x)\ \&\ {}^{*}\Pi_{n}({}^{*}white\text{-}clay)(x)\ \&\ |x| = 2]$

The sentence tells us that there is an entity placed on the table which is a member of the pluralized partition of white clay and which consists of two elements which are atomic in terms of that partition.

The essential thing in this analysis is that the presence of a partitioning element in the syntax immediately above the noun fully semantically obscures the mass-count distinction for higher structure – for number marking, that is, and also for numerals. As far as everything above the αP level is concerned, an apportioned mass noun is semantically indistinguishable from a count noun that did not combine with α^{prt}.

Variation between Nez Perce and English thus can be described in either of two ways. On one hand, what divides the languages is a simple matter of lexical inventory: α^{prt} is present in the lexicon of Nez Perce, but not in the lexicon of English. Alternatively, the variation can be seen in terms of how variables over partitions are lexically encoded. English uses general functional nouns like *quantity*, which appear in pseudopartitive constructions, as Chierchia (2010, 2013) discusses. Nez Perce arrives at the same readings via a different syntactic configuration – one that features α^{prt}.

Overall, the variation at stake can be described in terms that localize language differences in a familiar place – in the syntax, and in the lexicon. That distinguishes the present analysis from a potential alternative that replaces the head α with a type-shifting rule, operating purely in the semantics as N combines with other material. Given that apportionment of the Nez Perce

[15] This is a variant of the approach from Chierchia (1998), who reasons that mass nouns do not combine with plural because they are already lexically plural.

style is not universally available, this type of alternative requires us to extend the theory of variation to include variation in type-shifting rules in addition to variation in syntax. By contrast, adopting the syntactic approach allows us to maintain the strong hypothesis that compositional operations purely internal to the semantics are invariant across languages.[16]

7 Apportionment of count nouns

Is the presence of α in the nominal a generally available possibility in Nez Perce? Or is apportionment via α a kind of repair strategy, akin to coercion, which is called on when mass nouns are faced with number and numeral structures with which they cannot otherwise compose?

One way to show that apportionment is not a repair strategy is to show that it may be used for both mass and count nouns. In English, count nouns and mass nouns alike may be partitioned in pseudopartitive constructions featuring words like *unit, group* and *quantity*. Nez Perce lacks such words. In Nez Perce, mass and count nouns alike may be variably partitioned with the help of the covert αP structure. For count nouns, this allows counting by aggregations, or non-natural atoms. This strategy is explored in this section and compared to the pseudopartive in section 8.

Counting by aggregations is easily observed in the case of objects that come in pairs, such as gloves or shoes. Consider sentence (72), uttered in a context where someone is faced with a pile of shoes. Consultants report that the most natural interpretation of this sentence is that the speaker has two pairs of shoes in the pile, not two individual shoes.

(72) kii wee-s ʼiin-im lep-it ʼiléepqet
DEM have-PRES.SG 1SG-GEN two-SUF shoe
Those are my two pairs of shoes.

In other cases, the noun *ʼileepqet* 'shoe' may be counted by individual shoes. This reading becomes more plausible to consultants in cases where not all salient shoes are paired.

(73) mitaa-t ʼiléepqet wee-s, lep-it wepsúuxkinʼikay(-ʼayn)
three-SUF shoe have-PRES.SG, two-SUF right(-for)
kaa naaqc cáky'axkin'ikay
and one left
I have three shoes, two for the right and one for the left.

The count noun *ʼiléepqet* 'shoe' thus may be counted either by natural atoms (individual shoes) or by salient non-natural ones (pairs of shoes).

[16] Antecedents of this hypothesis are discussed by von Fintel and Matthewson (2008, §3).

Counting by non-natural atoms is also readily observed for small objects like cherries and strawberries which are frequently handled in aggregations. In examples (74) and (75), attributive measure phrases are used to help bring out the desired readings. It is of course much more plausible that an aggregation of cherries should weigh a pound than that a single cherry should.

(74) wee-s lep-it naaqc temiinewit tims
have-PRES.SG two-SUF one weight.measure cherry
I have two 1-lb things of cherries

(75) wewluq-se-∅ naaqc paaxˆ-at temiinewit nicka'niicka'
want-IMPERF-PRES one five-SUF weight.measure strawberry
I want one five-lb thing of strawberries

Here, too, the context matters. While aggregations are salient in some contexts, natural atoms are always salient, too. Examples like these therefore also show the rather absurd, non-aggregated readings.

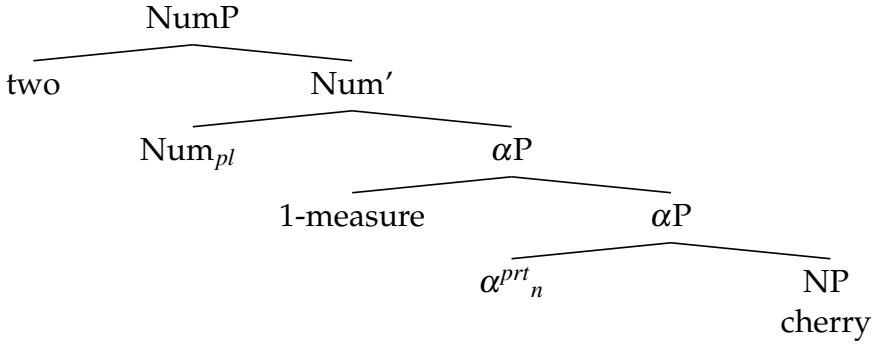
(76) wee-s mitaa-t naaqc temiinewit tiim'en'es
have-PRES.SG three-SUF one weight.measure pencil
I have three 1-lb pencils

(77) naaqc puutim-t temiinewit timaanit
one ten-SUF weight.measure apple
one 10-lb apple
Speaker: "That would be in the Guinness book!"

In general, count nouns may be counted by natural atoms with no contextual support; but in supportive contexts, they may also be counted by non-natural atoms. Such apparently direct counting is the major way Nez Perce speakers produce aggregated readings for count nouns.

The readings of these examples that feature counting by non-natural atoms are produced when α is present. The nominal syntax of (74), along with its logical translation at the αP level, is shown in (78).[17]

(78) a.



[17] This structure follows Longobardi (2001), Watanabe (2006) and Chierchia (2013) in locating numerals in the specifier of the phrase responsible for number marking (NumP).

b. $TR(\alpha P) = \Pi_n(^*cherry)$

The α head introduces a variable partition over the plural cherry property, with the precise partition function to be filled in by context. In a grocery store context, there is a plausible partition of this property that does not involve partitioning into individual cherries, but rather into cherry-aggregates. Similarly, when shoes are paired, there is a plausible partition of the plural shoe property that partitions into pairs, not individual pieces.

There are two ways the natural-atom readings could be derived. On one hand, it could be that αP does not always have semantic content in Nez Perce, or is not always syntactically present in the nominal. When a meaningless version of α is present, or when αP is absent, there will be no way for the count noun to be counted by anything other than its natural atoms. On the other hand, these readings are still derivable even if α^{prt} is present in the relevant structures. Examples like (76) and (77) could, that is, have exactly the syntax of (78a); in that case, their semantics involves the contextual partitioning of the plural pencil property and the plural apple property, respectively. The difference is simply what is salient in the context. A partition of apples into apple-atoms or pencils into pencil-atoms will be plausible and salient in nearly any context. And so it is no surprise that the absurd readings in (76) and (77) should be attested.

When speakers want to be clear about counting by aggregates, rather than by natural atoms, their major strategy is to introduce a nominal modifier such as *'itet'espe* 'in containers, in boxes'. This is the locative case form of *'itet'es* 'box, container', and its syntactic position within the nominal is rather free. It may appear in a variety of positions, including pre-numeral (79), immediately post-numeral (80), and post-noun (81).

(79) wi-siix **'itet'es-pe** mitaa-t naaqc temiinewit ka4ka4
have-PRES.PL box-LOC three-SUF one weight.measure cracker
We have three 1-lb things of crackers, in boxes. (i.e. three boxes of crackers)

(80) wi-siix mitaa-t **'itet'es-pe** naaqc temiinewit ka4ka4.
have-PRES.PL three-SUF box-LOC one weight.measure cracker
We have three 1-lb things of crackers, in boxes. (i.e. three boxes of crackers)

(81) wi-siix piilep-t paqa'pt-it temiinewit tiim'en'es
have-PRES.PL four-SUF fifty-SUF weight.measure pencil
'itet'es-pe
box-LOC
We have 4 50-lb things of pencils in containers

The locative case marking of *'itet'espe* 'in containers, in boxes' gives a first

piece of evidence that these examples are not pseudopartitives. In the pseudopartitive structure, the head noun does not bear the locative case.

(82) a. naaqc 'ipselipt(-*pe) tims
one handful(-*LOC) cherry
one handful of cherries

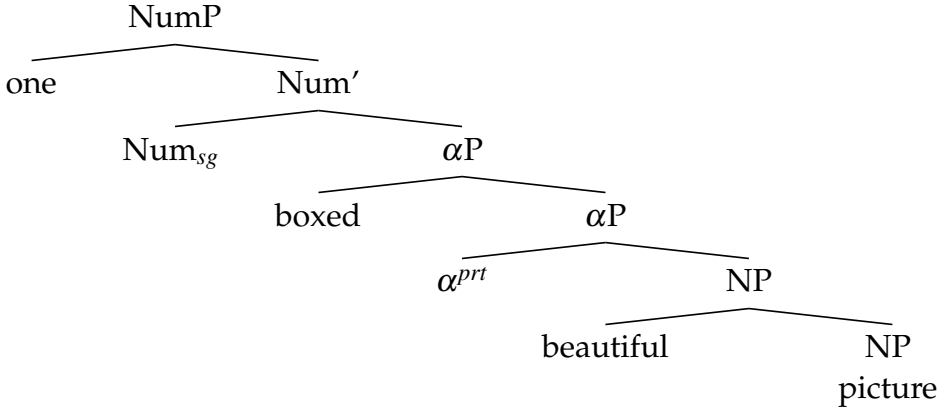
The flexible placement of *'itet'espe* 'in containers, in boxes' is quite similar to what is found with adjectives; more ordering flexibility is seen here than consultants typically allow in pseudopartitive constructions. Overall, this phrase appears to be a modifier, optionally added to clarify the apportioned reading desired for the examples. The apportionment itself is not due to this modifier, but to α^{prt}.

A final crucial detail in apportionment of count nouns concerns plurality. In all examples discussed in this section, it is clearly plural properties that are partitioned, not singular ones. Here, the Linkean star in the denotation of α^{prt} makes itself known. Because pluralization is built in to the contribution of α, no syntactic plural feature need appear in a structure where partitioning is done in this way. This explains why consultants reject plural adjectives in cases like (83) and (84). A basic structure for (84) is given in (85).

(83) Wee-s naaqc 'itet'espe (*ki)-kimti timaanit
have-PRES.SG one box-LOC (*PL)-new apple
I have a box of new apples.
("I have one boxed new-apple aggregation")

(84) naaqc 'itet'es-pe (*si)-sayaq'ic cepeeletp'et hii-we-s
one box-LOC (*PL)-beautiful picture 3SUBJ-be-PRES.SG
There's a box of beautiful pictures.
("There's one boxed beautiful-picture aggregation.")

(85)



While the *semantics* of pluralization is contributed by α, there are no syntactic plural features introduced in these sentences, and thus no source for the plural adjectival forms. This fact is key as we compare the αP partitioning strategy to the pseudopartitive in the next section.

8 A comparison with the pseudopartitive

Nez Perce avails itself of a piece of low nominal functional structure to express certain readings which require pseudopartitives in English. This strategy does not entirely displace the pseudopartive construction, though. While the pseudopartitive is often not the preferred way of expressing partitioning and measure,[18] the construction does exist, as we have already encountered in (30) and (31). Basic examples of the pseudopartitive feature a numeral and two nouns, the first of them describing a measure. The second noun may be mass or count.

(86) lep-it temiinewit nicka'niicka' / mayx
two-SUF weight.measure strawberry / sand
two pounds of strawberries / sand

In the details of this construction, equipped with what we have learned about apportionment of count nouns, we uncover some subtle but confirming evidence for a mass-count distinction in Nez Perce.

Let us first directly contrast pseudopartitives with αP structures. There are two important differences. We have already encountered Chierchia's and Brasoveanu's proposal that pseudopartitives introduce partitions. Semantically, this partitioning strategy is distinguished at least in that the partitions it introduces are not entirely contextually determined, but rather lexically constrained by the measure noun. A further important difference between the αP structure and the pseudopartitive concerns the plural. Whereas the semantics of plural is built in to the partitioning head α, it is not built in to pseudopartitive measure nouns. Rather, these measure nouns combine with nominal phrases which may include syntactically represented plural. This explains the plural adjective in (87). Compare the minimally different αP structure in (88), where no measure noun is present; *'itet'espe* is a modifier.

(87) naaqc temiinewit si-sayaq'ic piswe [pseudopartitive]
one weight.measure PL-beautiful rock
one pound of beautiful rocks

(88) naaqc 'itet'es-pe (*si)-sayaq'ic cepeeletp'et [αP structure]
one box-LOC (*PL)-beautiful picture
one boxed beautiful-picture aggregation

[18] Speakers use verbal constructions instead of pseudopartitives when available:

(i) hi-hilamk-sa kona taam'am
3SUBJ-be.piled.up-IMPERF-PRES there egg
There's a pile of eggs. (lit. Eggs are piled up there.)

Speakers also disprefer pseudopartitives using *'itet'es* 'box' as a measure noun in favor of αP structures containing *'itet'espe* 'in boxes' as a modifier.

This difference shows that generalized apportionment in Nez Perce should not be treated as resulting from an elliptical pseudopartitive construction, as Higginbotham (1994) has suggested for packaging and sorting of mass nouns in English. The pseudopartitive has at least a different syntax than the αP structure, with consequences for the distribution of plural adjectives.

The behavior of count and mass nouns in the pseudopartitive mimics what we see in quantificational constructions. Just like in English, the pseudopartitive measure noun in (87) takes a count noun complement which is plural. By contrast, the complement of the pseudopartitive measure noun remains singular when the second noun is a mass noun (modulo apportionment, of course).

(89) naaqc hiik'ay cimuuxcimux / *ci-cmux-ci-cmux mayx
one cup black / *PL.black sand
one cup of black sand

(90) piilep-t sepiinewit yoosyoos / *yi-yos-yi-yos samq'ayn
four-SUF length.measure blue / *PL.blue fabric
four yards of blue fabric

This pattern suggests that measure nouns in the pseudopartitive, like Nez Perce quantifiers, call for a complement which is cumulative. If mass and count nouns differ regarding plurality in the pseudopartitive, then there is confirming evidence for a mass-count distinction in these facts. There is just one wrinkle to the argument showing that this is so.

The wrinkle turns on the fact that pseudopartitive constructions and αP structures are ultimately highly semantically similar. Both structures introduce partitions; both apply to count and mass nouns alike. Generally, whatever can be expressed by the pseudopartitive can also be expressed in the αP structure using an attributive measure phrase. Five pounds of apples is an aggregation of apples that weighs five pounds – less fluently, a five-pound apple aggregation. One pound of broken pencils is also a one-pound broken-pencil aggregation.

Those equivalences are important in view of a difference in count noun behavior between quantificational constructions and measure constructions. In quantificational constructions, plural adjectives with count nouns are reliably preferred to their singular counterparts.

(91) 'oykala k'i-k'uupnin' / ??k'uupnin' tiim'en'es
all$_1$ PL-broken / broken pencil

But this is not so clearly the case in measure constructions. In examples of this type, consultants produce and accept both singular and plural adjectives with count nouns, with no clear difference in interpretation.

(92) 'ipew-itx naaqc temiinewit k'i-k'upnin' / k'uupnin'
find-IMPER.PL one weight.measure PL-broken / broken
tiim'en'es
pencil
Go find one lb of broken pencils!

(93) wee-s paax̂-at temiinewit mi-maacin' / maacin'
have-PRES.SG five-SUF weight.measure PL-rotten / rotten
timaanit
apple
I have five lbs of rotten apples.

This optionality complicates the argument from pseudopartitives for a mass-count distinction. It turns out to be precisely as expected, however, in view of the equivalences discussed above. Examples like (92) and (93) can be parsed either as a pseudopartitive, or as an αP structure with an attributive measure phrase. The pseudopartitive parse requires an adjective modifying the count noun to take the plural form. In structure (94), partitioning is carried out by measure noun *temiinewit* 'pound'. Plural is required in the complement of the measure noun.

(94) Pseudopartitive parse of (92):

[naaqc [temiinewit [k'i-k'upnin' tiim'en'es]]]
[one [weight.measure [PL-broken pencil]]]
one lb of broken pencils

But when the example is parsed with *naaqc temiinewit* 'one pound' as an attributive measure phrase, partitioning is done by αP. In such a structure, like in the unambiguous example (88), there is no syntactic representation of plural; the semantics of plural are built into the contribution of α. The adjective must take a singular form.

(95) αP parse of (92) with attributive measure phrase:

[naaqc temiinewit] [α [k'uupnin' tiim'en'es]]
[one weight.measure] [α [broken pencil]]
a one-lb broken-pencil aggregation

No surprise, then, that both singular and plural adjective forms are admissible in (92), and that consultants do not perceive an important semantic difference.

There is not a similar choice between singular and plural adjectives for mass nouns, and that fact also falls naturally into place. Parallel examples with mass nouns are equally structurally ambiguous between a pseudopartitive and an αP structure with an attributive measure phrase:

(96) Pseudopartitive parse of (89):

[naaqc [hiik'ay [cimuuxcimux mayx]]]
[one [cup [black sand]]]
one cup of black sand

(97) αP parse of (89) with attributive measure phrase:

[naaqc hiik'ay] [α [cimuuxcimux mayx]]
[one cup] [α [black sand]]
a one-cup black-sand aggregation

In the case of a mass noun, this difference does not affect adjective plurality. That is because mass nouns figure in pseudopartitive structures in the singular.

The evidence for a mass-count distinction in measure constructions is quite subtle, then. Preceded by a numeral and a measure noun, both mass nouns and count nouns may appear with singular adjectives. Count nouns are distinguished in that they *may* combine with plural adjectives here – not in that they *must*. And indeed that situation is precisely what we expect to find in a language with both a pseudopartitive construction and an αP partitioning structure.

9 More on the locus of apportionment

I've proposed that partitioning functions are introduced in Nez Perce in two of the various logically possible ways: via a pseudopartitive structure, and via a low functional projection αP. A further logical possibility to be considered is that partitioning is introduced by the plural number head. That is the approach to plural advocated by Borer (2005), and in the present context, it can be seen in the light of arguments by Bale and Khanjian (2008), Gillon (2010) and Dalrymple and Mofu (2012) that there is cross-linguistic variation in precisely what the plural denotes. In Nez Perce but not in English, the plural introduces apportionment along with closure under sum; αP need not be posited – or so the argument would go.

In this section I argue against this alternative on two grounds. The first concerns the semantic consistency within particular languages between partitioning in the plural and partitioning in the singular. The second draws from Schwarzschild's (2006) discoveries concerning attributive measure phrases.

The first argument centers on the fact that apportionment is not restricted to the plural; it is also possible in the singular. We have seen that count nouns may be partitioned into aggregations in the singular in examples like (88). The same is possible with mass nouns like *weeqit* 'rain'.

(98) naaqc weeqi-nm hi-ssewlikeece-∅-ye
one rain-ERG 3SUBJ-fell-P.ASP-REM.PAST
One raindrop fell on me.
Speaker: "One rain drip."

Just as before, apportionment of mass nouns with the numeral *naaqc* 'one' is flexible and context sensitive. This can be seen below for the mass noun *tam'aamiin* 'cake'.[19]

(99) a. 'ew-'ni-∅ naaqc tam'aamiin
3OBJ-give-IMPER one cake
Give me one (piece of) cake.
Speaker: "If you had a cake cut and you said this, you would just infer it's one piece"

b. pit'iin hi-wewluq-se-∅ naaqc himeeq'is tam'aamiin
girl 3SUBJ-want-IMPERF-PRES one big cake
The girl wants one big cake.
Linguist: Does it sound like a big cake, or a big piece?
Speaker: Sounds like a large cake, out of the blue.

If there is no partitioning head α here, and singular number is strictly an identity function, the partition in such examples must be introduced by the numeral. That is what Borer (2005) concludes, in consideration of packaging and sorting examples in English. On her approach, partitioning ("dividing of stuff") for the mass denotation of *beer* has distinct loci in (100a) and (100b). In (100a), partitioning is done by the plural number head; in (100b), it is done by the numeral 'one'.

(100) a. After work we will get beers.

b. I drank one beer.

One would need to conclude that both Nez Perce and English allow both plural and the numeral 'one' to introduce partition functions.

What is not explained on this approach is why the available partitions are consistently restricted in English to pick out conventional packages (or subkinds, in cases of sorting), whereas they are never thus restricted in Nez Perce. If apportionment represented independent facts about plural and the numeral 'one', there would be no reason not to expect a language in which the partitions introduced by 'one' are purely contextually determined, whereas those introduced by plural are restricted to ranging over packages or subkinds. We haven't captured the generalization that partitioning is always up to context and world knowledge in Nez Perce, but not in English.

[19] This Nez Perce word is somewhat different from its English translation equivalent. *Cake* in English has a function as the name of a general shape-based unit (e.g. *a cake of mud*), suggesting a core lexical representation as a count noun. By contrast, *tam'aamiin* in Nez Perce would be most literally translated into English as 'eggy stuff'; it is composed of *taam'am* 'egg' plus the attributive nominalizing suffix *-hiin*, and does not have a role as a shape word.

That generalization is straightforwardly captured, of course, if partitioning in Nez Perce always traces to the presence of α^{prt}, which may occur below either plural or singular. Packaging effects in English like (100) have an alternative source, consistent across the contexts in (100) – most likely a lexical rule applying to noun roots, given the lexical specificity and high level of conventionalization exhibited by packaging effects in English, as well as their restriction to mass nouns.

The second argument in favor of apportionment at the αP level comes from evidence that partition functions are present in the compositional semantics of Nez Perce nominals below the point at which plural is introduced. This argument draws from the findings of Schwarzschild (2006) on the grammar of attributive measure phrases.

Schwarzschild observes that when a measure phrase is used attributively, it must measure on a dimension that does not track the part-whole structure of its sister's denotation. This means that the attributive measure phrases that can be used with mass nouns in English are highly restricted. Consider the examples in (101).

(101) a. some 2-degree water
b. *some 2-gallon water

The attributive measure phrase '2-degree' may be used with 'water' because it measures water on a dimension of temperature, which is not monotonic on the part-whole structure of water. That is to say that the parts of a quantity of 2-degree water are likely also 2-degree water – dividing a quantity of water does not usually affect its temperature. The notion of non-monotonicity at play is defined in (102).

(102) *Dimensional non-monotonicity*
Measurement on a dimension Dim is non-monotonic on the part-whole structure of a property P iff $\forall x, y \in P.\, x \leq y \rightarrow x =_{Dim} y$.

Things are different when we measure water in terms of gallons, as in (101b). Measurement in gallons tracks the part-whole structure of water monotonically in the sense highlighted by (102). Recognizing a correlation between dimensional non-monotonicity and the felicity of attributive measure phrases, Schwarzschild formulates the generalization in (103).

(103) *Schwarzschild's generalization*
An attributive measure phrase measures along a dimension which is non-monotonic on the part-whole structure of its complement's denotation.

The generalization explains why count nouns in English allow a much broader range of attributive measure phrases than their mass brethren do:

(104) a 2-degree / 2-gallon pool

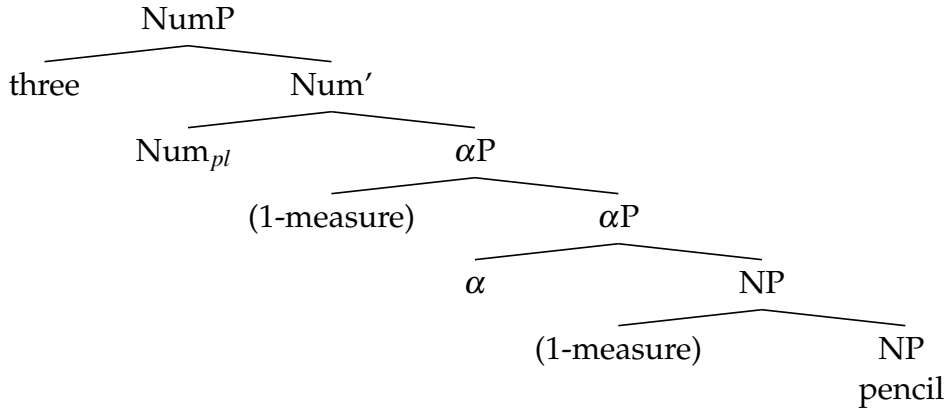
Because a count noun's denotation has only a trivial part-whole structure, measurement along *any* dimension will be non-monotonic on the part-whole structure of the denotation of N.

To use Schwarzschild's generalization to probe for the locus of apportionment in Nez Perce, we must consider the syntax of attributive measure phrases. These phrases reliably appear between a numeral and its noun, as in (105).

(105) wee-s mitaa-t naaqc temiinewit tiim'en'es
have-PRES.SG three-SUF one weight.measure pencil
I have three 1-lb pencils

If numerals occupy the specifier of NumP, then the attributive measure phrase in (105) is located below plural number. If an αP is present, the attributive measure phrase could occupy Spec,αP; otherwise, its position is presumably Spec,NP. The two possibilities are shown in (106).

(106)



Together with Schwarzschild's generalization, structure (106) provides an empirical means of assessing the locus of apportionment. If apportionment is accomplished only at the level of NumP, we expect attributive measure phrases to behave the same way in Nez Perce as they do in English. The difference between the two languages would emerge only at a level (NumP) higher than the one at which attributive measure phrases attach (NP). If, on the other hand, apportionment is accomplished at the αP level in Nez Perce, we expect attributive measure phrases with mass nouns to behave exactly as they do with count nouns in this language. This turns out to be precisely what we find.

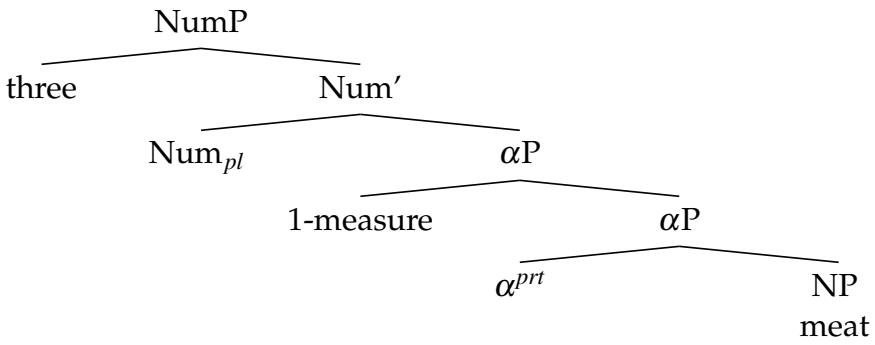
In a first example, the attributive measure phrase *mitaat sepiinewit* 'three length-measures' combines with mass noun *samq'ayn* 'fabric'. The literal English translation of this example is degraded, in keeping with Schwarzschild's findings.

(107) wewluq-se-∅ naaqc [mitaa-t sepiinewit] samq'ayn
want-IMPERF-PRES one three-SUF length.measure fabric
I want one 3-yard (piece of) fabric
cf. *I want one 3-yard fabric.

The same effect is seen in (108) with the mass noun *nuukt* 'meat'. The syntactic representation proposed for this example is shown in (109).

(108) wee-s mitaa-t [naaqc temiinewit] nuukt
have-PRES.SG three-SUF [one weight.measure] meat
I have 3 1-lb servings of meat (cf. *I have three 1-lb meats, *I have 1-lb meat)

(109)



In this structure, the attributive measure phrase *naaqc temiinewit* 'one weight-measure' is forced to adjoin at the αP level, rather than the NP level, in keeping with Schwarzschild's generalization. Attaching above the head α^{prt}, the attributive measure phrase takes a complement whose denotation is a partition of the meat function. Partitioning once again helps a mass noun behave exactly as a count noun would above the αP level. There is only a trivial part-whole structure for the property expressed by αP, and thus nothing to prevent measurement along a dimension of weight.

What I take these arguments ultimately to show is that the locus of variation between Nez Perce and English does not lie in the semantic contribution of plural number. While it may well be that the contribution of plural varies to a certain degree across languages, there is little reason to suppose that plural in Nez Perce makes a contribution different from that made by its English counterpart. Apportionment is independent of plural and carried out structurally lower than the site at which plural number attaches.

10 Conclusions

The recent literature is rife with doubt on the universality of the mass-count distinction. St'át'imcets, Halkomelem and Blackfoot, languages spoken in the general vicinity of Nez Perce, have been argued to lack it by Davis and Matthewson (1999) and Wiltschko (2012). Dalrymple and Mofu (2012) make

an argument to the same effect for Indonesian. Lima (2010) suggests the same for Yudja, a language of the Brazilian Amazon. More radically, Borer (2005) argues on the basis of coercion effects that, so far as noun roots are concerned, even English does not make a grammatical distinction between mass and count. Independent of what might be said about these particular cases,[20] there are two general counterarguments to this literature which are brought into focus by the facts of Nez Perce.

First, Nez Perce shows us that a mass-count distinction may be present in the lexicon of a language even when standard diagnostics like number marking, numeral constructions, and the selectional properties of quantifiers fail to find it. Of course, it is never easy to prove a claim of non-existence. The Nez Perce facts remind us that the empirical task of showing that *nothing* in the grammar of a language respects the distinction may be a significant and sometimes very difficult one.

Indeed, if the distinction between mass and count ultimately arises as a matter of language design in the way I've proposed, it is possible to take this argument one step further. If young children are innately equipped with an acquisition strategy that biases them to adopt distinct semantic representations for substance- and entity-nouns, we should expect that they will do so even in the absence of any compelling signals to the distinction in the linguistic input. There is then no particular reason why morphosyntactic evidence for the distinction would be necessary in any particular language. To put it differently, if the mass-count distinction is built into innate strategies of language acquisition, we need not expect that, as Chierchia (2010, p 103) puts it, "every language encodes [the mass-count distinction] in a number of conspicuous morphosyntactic ways". The way the distinction is encoded in Nez Perce is hardly conspicuous, and what we find in Nez Perce may be suggestive of an even less conspicuous profile in other languages. A hypothetical variety of Nez Perce which lost all marking of plurality on adjectives, for instance, would presumably not display the distinction morphosyntactically in any visible way at all. That would not mean that substance and individuals nouns failed to differ semantically in such a language.

This brings us back to the question of variation in mass and count. The findings on Nez Perce suggest we might think of this variation in either of two ways.

The first way centers on aspects of variation which are familiar from investigation in syntax. Once the question is no longer *whether* a mass-count distinction is made in particular languages, what is crucial to understand is *how* the distinction comes to influence different aspects of the morphosyn-

[20] See, for instance, Lima (2011) and Chierchia (2013) for discussion of the Yudja facts, and the response to Borer's proposals by Rothstein (2010).

tax in different languages. In that respect the parameters that are called for in regulating variation in mass and count are not semantics-internal, but rather center on answers to standard questions of variation in morphosyntax: Is such-and-such functional piece in the lexicon? What syntactic and morphological properties are affected by its presence?

The low partitioning head α^{prt} offers a case study in how variation in mass and count behavior can be traced back to such choices. While English lacks such a head in its lexicon, Nez Perce has it; plausibly the Algonquian language Ojibwe has it too, as Mathieu (2012) as recently proposed. Mathieu identifies the morphosyntactic signature of this head (which he calls the 'singulative') with a gender shift on the Ojibwe noun. If that is so, then Nez Perce and Ojibwe demonstrate how two languages with a low partitioning head may differ along further morphosyntactic dimensions. Where both languages diverge from English morphosyntactically is in the combinatoric respects which flow from the introduction of partition functions low in the nominal phrase – number marking, and combinations of nouns with numerals.

The second way variation in mass and count can be thought of centers on the mapping between natural functions and language lexica. To this point of view, the question is: How are variables over partition functions introduced in different languages? That question is the central one for further investigation in additional languages that allow generalized apportioned readings of their mass nouns. (Yudja is a case in point, as Suzi Lima has carefully shown.) These languages of course might be precisely like Nez Perce in where and how partition functions are introduced into their nominal projections. Yet they might also in principle fall under a version of the alternative analysis discussed in section 9, according to which it is number marking or numerals that introduce partitioning. It will take detailed investigation to tell these approaches apart. That is the type of investigation that will help us better understand the constraints that guide lexicalization of natural functions like partitioning.

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