

Numerals and Incorporation in Nootka

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The Nootka language, spoken on the West coast of Vancouver Island is a morphologically complex language which makes use of both polysynthesis and incorporation to a high degree.¹ It also has an interesting number system which may be described as split decimal/vigesimal. The most fascinating aspect of these properties is the interaction between them, i.e. the possibility of incorporating numbers into the verb and the mechanism whereby this occurs.

Polysynthesis in Nootka

Nootka makes great use of the process of suffixation in creating new lexemes, far beyond that of most languages. The sentences in (1) are typical.

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|-----|--|--|
| (1) | ʔuuqłhuk ^o ałatquuč
ʔu -'aqł -huk ^o -'ał -'at -quuč | 'if one is holding a stick'
REF -inside -in hand -NOW -PASS -3s.CND |
| | hiniicsk ^o ispiłikqa
hina -iics -k ^o is -'ipił -ik -qa' | 'he will pull (the slave) out of the house'
LOC -take...along -take out of... -in house -FUT -SUB |

Iteration of derivational suffixes is possible allowing, in theory, for infinite recursion. This distinguishes them further from inflectional suffixes which occur only once in a form. However, in practice, speakers are constrained by the usual limitations on cognitive processes, i.e., memory limitations, co-indexing of arguments, etc., thus:

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|-----|-----------------------|-------------------------------|
| (2) | qic- | 'mark, scratch' |
| | qic -'yak | 'tool for marking = pencil' |
| | qiic -'yak -iił | 'make pencil(s)' ² |
| | qiic -'yak -iił -'yak | 'tool for making pencils' |

Given this propensity for derivational complexity, it should perhaps not be surprising that an additional strategy employed in the language is the use of incorporation.

1 Data for this paper are drawn from the published and unpublished work of Edward Sapir, including Sapir & Swadesh 1939, 1955 and Sapir ms. I would like to thank Steve Matthews and Joel Nevis for their comments on an earlier version of this paper.

2 The length of the root vowel here and following is determined by the suffix. Vowel length changes in Nootka for a number of reasons, none of which are directly relevant to the issue at hand. /' indicates variable vowel length. For further discussion, see Stonham (1990, 1994).

Incorporation in Nootka

Incorporation of various constituents is a common concomitant of polysynthetic languages. In this respect, Nootka bears all of the expected properties of such a system, including movement of the object into the verb, generic reading of the incorporated object, and a change in transitivity of the verb.

Incorporation is often combined with polysynthesis as a single morphological type, contrasted with isolating, agglutinative and fusional, but Comrie (1989) is careful to distinguish the two:

Although these two terms [i.e. polysynthesis and incorporation – JTS] are sometimes used interchangeably, it is possible and advisable to make a distinction between them. Incorporation refers to the possibility of taking a number of lexical morphemes and combining them together into a single word. ... Polysynthesis, however, refers simply to the fact that, in a language of this type, it is possible to combine a large number of morphemes, be they lexical or grammatical, into a single word ... We thus see that incorporation is a special case of polysynthesis (Comrie 1989:45)

This would seem to suggest that where there is incorporation there will necessarily be polysynthesis and Nootka is no exception to this. Nootka disallows the possibility of more than one root occurring within a single word, defined in terms of the domain of a single primary stress and bounded on the left by 0-2 reduplicative copies of the root and on the right by a set of inflectional morphemes and, possibly, clitics. This prohibition means that compounding is impossible in the language, as the facts bear out. Thus the following examples can be seen to contain a single root element (underlined> combined with various suffixes and/or reduplicative prefixes.

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|-----|---|--|
| (3) | a. <u>maatcaas</u>
ma -atca -'as | 'house against wall on the ground'
dwell-at upright surface-on ground |
| | b. <u>paapaatah</u>
[R]- pa -atah | 'ready to potlatch'
to potlatch-ready to, trying to get ... |
| | c. <u>ʔuʔuʔutah</u>
[R]- [R]- ʔu -atah | 'whaing here and there'
DIST-ITER-REF-ready to, trying to get ... |

What is possible, however, is the incorporation of an external element, typically root + derivational affixes, into the verb. Syntactically, the language is basically verb-initial, with some variation in the order of arguments and other elements. Pronominal reference is marked on the verb by members of a number of alternative paradigms, although in some cases of the 3rd person there is no overt marking, as in the following examples.

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|-----|---|---------------------------|---|
| (4) | <u>ʔunaakšiʔał</u>
ʔu -na ^o -šił -'ał | [ʔaheʔis]Obj
ʔaħa -ʔis | 'And then she got children'
REF -having...-MOM -NOW child -DIM |
| | <u>ʔaħanak</u>
ʔaħa -na ^o | | 'He had a child'
child -have... |

In a paper on incorporation, Mithun (1984) provides examples of Nootka as an incorporating language, but fails to take into account the existence of a necessary neutral base to which suffixes may be attached, just in case there is no incorporation. By 'neutral' we understand that such a base makes no obvious contribution, either in subcategorisation or semantics, to the final output, serving as a referential base, typically substituting for an incorporated object. This would predict that this base should never occur without some derivational suffix that acts as the predicator. Compare the examples in (5a) and (5b), where this base, *ʔu-*, occurs in the first example (5a), but not in the incorporated form in (5b).

- (5) a. *ʔunaakweʔin* [*hʷiiqsu*]_{Obj} *haak^oaalʔi* 'The girl had a father'
ʔu -na^k -weʔin *hʷiiqsu* *hak^oaλ -ʔi*
 REF -have... -3s QUOT father young woman -DEF
- b. *hʷiɕiɕahʔapikin* *yaa naʔaqaakʔi* 'We'll have that baby look for his father.'
hʷiiqsu-ha^h-ap -ik -in *yaa naʔaqaak -ʔi* father -seek...-CAUS -FUT -1p IND there baby -DEF

Incorporation will thus always be optional syntactically, since it will always be possible to make use of the so-called referential base, *ʔu-*, with derivational suffixes instead of incorporating an overt object. Investigating the exact motivation for incorporating in Nootka would take us well beyond the scope of this paper and so we will restrict our investigation to the hows rather than the whys of incorporation here.

Nootka Numbers

The Nootka number system is fairly complex though relatively transparent. Numbers from 'one' to 'five' are simplex (6a), while those from 'six' to 'nine' are composed of two elements, the roots for either 'one' or 'two' together with the suffixes *-pu* 'more than' and *-k^oaʔ* 'less than' (6b), giving us:³

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|-----|----|--------------|---------|----|----------------------------|---------|
| (6) | a. | <i>ɕawaa</i> | 'one' | b. | <i>hʷupu</i> | 'six' |
| | | <i>ʔaλa</i> | 'two' | | <i>ʔaλpu</i> | 'seven' |
| | | <i>qaɕɕa</i> | 'three' | | <i>ʔaλak^oaʔ</i> | 'eight' |
| | | <i>muu</i> | 'four' | | <i>ɕawaa^oaʔ</i> | 'nine' |
| | | <i>suɕa</i> | 'five' | | | |

'Ten' and 'twenty' are morphologically simplex, whereas the multiples of 'ten' fall into two categories, either single words or syntactic constructs, without overlap. They are formed by the use of the suffix *-iiq* '...score' in combination with the syntactic construction *ʔiʃ hayu* '... and ten'.

3 The root *hʷu(p)-* 'one' alternates with the root *cawa^o* 'one' in a number of different contexts.

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|-----|------------------------|----------|-------------------------|-----------|
| (7) | <i>hayu</i> | 'ten' | <i>qaɕɕiiq</i> | 'sixty' |
| | <i>caɕiic</i> | 'twenty' | <i>qaɕɕiiq ʔiʃ hayu</i> | 'seventy' |
| | <i>caɕiic ʔiʃ hayu</i> | 'thirty' | <i>muyiiq</i> | 'eighty' |
| | <i>ʔaλiiq</i> | 'forty' | <i>muyiiq ʔiʃ hayu</i> | 'ninety' |
| | <i>ʔaλiiq ʔiʃ hayu</i> | 'fifty' | <i>suɕiiq</i> | 'hundred' |

Units between the tens are formed by the use of *ʔiʃ* 'and' with the appropriate unit and decimal indicators, thus:

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|-----|--------------------------|----------------|
| (8) | <i>hayu ʔiʃ ɕawaak</i> | 'eleven' |
| | <i>hayu ʔiʃ ʔaλ</i> | 'twelve' |
| | <i>caɕiic ʔiʃ qaɕɕa</i> | 'twenty-three' |
| | <i>ʔaλiiq ʔiʃ ɕawaak</i> | 'forty-one' |

Multiples of *one hundred* are formed in one of two ways: (a) by continuing the use of *-iiq* '... score' in conjunction with the conjunctive *ʔiʃ*, or (b) by the use of the appropriate unit combined with a suffix *-pit* meaning '...times' followed by the form *suɕiiq* 'hundred'. Given the consistency of the former set with the lower numbers we will assume that it is the original one and that the alternative system is a calque based on the English number system, i.e. 'two hundred, three hundred, ...'.

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|--------|--------------------------------------|--|
| (9) a. | <i>hayuuq</i> | 'two hundred' |
| | <i>hayuuq ʔiʃ suɕiiq</i> | 'three hundred' |
| | <i>ʔaλʔituuq hayuuq</i> | 'four hundred' |
| | <i>qaɕɕʔituuq hayuuq</i> | 'there were six hundred Kiihin men' ⁴ |
| b. | <i>ʔaλʔit suɕiiq</i> | 'two hundred' |
| | <i>qaɕɕʔit suɕiiq</i> | 'three hundred' |
| | <i>muuʔit suɕiiq</i> | 'four hundred' |
| | <i>hʷupuʔit suɕiiq</i> | 'six hundred' |
| | <i>ʔaλak^oaʔʔit suɕiiq</i> | 'eight hundred' |

Multiples of 'one thousand' are formed with the appropriate unit designator followed by a suffix *-pit* '...times' followed by the borrowed word *taawisin* 'thousand', again clearly calqued from English.

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|------|--|-----------------------------|
| (10) | <i>hʷʔit taawisin</i> | 'one thousand' |
| | <i>ʔaλʔit taawisin</i> | 'two thousand' |
| | <i>ʔaλʔit taawisin ʔiʃ muuʔit suɕiiq</i> | 'two thousand four hundred' |

4 In all cases encountered in the data, the combination of a number + *-pit* '...times (= multiplier)' combined with *hayuuq* results in the preceding number also bearing the suffix *-uuq*, which is otherwise unattested. In the case of *hayuuq*, it is analysed as *hayu + -iiq* 'score'.

There is no overlap between root and suffix within the Nootka number system, unlike in other areas of the grammar, where one may encounter morphemes with similar meanings, one of which is a root and the other a suffix. For example, *hawá* 'eat' and *-iis* 'consume ...' or *nač* 'see' and *-uʔaʔ* 'perceive...'. Among the numbers, all are either roots or roots combined with derivational suffixes which perform other tasks elsewhere, with the exception of *-iiq* '...score' which only occurs with the roots from two to ten.

Classifiers

Nootka makes use of a fairly large number of suffixes which might best be described as classifiers, in the sense that they are based on certain characteristics of the object which they describe. These typically occur in conjunction with a root designating either a number or a member of a small class of quantifiers, including *ʔaya* 'many', *ʔanaʔ* 'few', etc. Examples of these classifiers are:

(11)	ńupqʔiçh	'one year'	ńupyaʔ	'one fathom'
	ńupçiiʔ	'one day'	čawaayiya	'at one time/ one day'
	ńupit	'one time'	čawiista	'one in a canoe'
	ńuptaqak	'one unit'	čaawimʔ	'one in a group'
	ńupqimʔ	'one chunk'	čaawafim	'one at a time'
	ʔaʔsaahtaʔup	'two kinds'	muupinqsak	'repeat four times'
	ńuptaqimʔ	'one group, tribe'	caqiiççiq	'twenty long objects'

The distribution of classifiers such as these with respect to complex numbers will be an important factor in the analysis of the syntax of numbers, to be discussed in the following section.

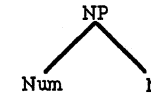
The Syntax of Numbers

A typical noun phrase involving a numeral in Nootka will take the following shape:

- (12) a. ʔaanaasa čitkkʷisçu [čawaak ʔaheʔis] 'Only one child wriggled out.'
 only wriggled out one child -DIM
- b. ʔuucahtaksaweʔin [ʔaʔa haawiihaʔ] 'So then two young men ...'
 and then two young men
- c. ʔuyuʔaʔweʔin kʷatyaat [ʔaʔa haathaakʷaʔ] 'Kwatyat caught sight of two girls.'
 caught sight of Kwatyat two young women

All of these examples suggest that the structure of the numeral plus noun is something like the following:

(13)



What do we expect to encounter in more complex NP's in conjunction with numerals? The following may be illustrative:

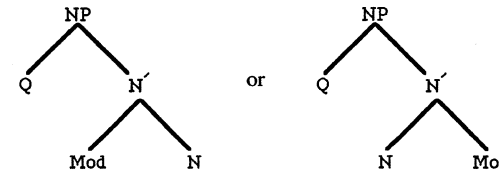
- (14) čuučkwiʔta ʔatquk kuuneeʔi [caqiiçtak ʔapqimʔ ʔisaʔ] ʔiʃ
 čuučk-wiʔta ʔatquk kuunaʔ -ʔiʔ caqiiç-htaʔk ʔapqimʔ ʔisaʔ ʔiʃ
 all -exit canoe goods schooner -DEF twenty -...containers full bale blanket and

[suçiiq ʔaʔiqs ʔaʔaʃkuk] ʔiʃ [ʔayuqumʔ ʃuukʷaa maʔimʔ].
 five -...score box crackers and ten -...unit sugar barrel

'All the goods were unloaded from the schooner—twenty bales of blankets and a hundred boxes of crackers and ten barrels of sugar.'

Such an example suggests that the *entire NP* follows the numeral in the unmarked case and also illustrates how NPs are conjoined. This suggests an alternative structure, with the numeral in COMP position.

(15)



Up till now, the examples we have encountered are of simplex numbers with a noun, but the next question must be what happens when we encounter complex numbers in this situation?

- (16) a. muuyiiq ʔiʃ ʔayu ʔiʃ suča taana '95 dollars'

b. ʔuʔiisʔapsi [ʔayuq ʔiʃ suçiiq ʔisaʔ].
 ʔu -iʔs -'ap -siʔ ʔayu -iiq ʔiʃ suča -iiq ʔisaʔ
 REF -consume...-CAUS -1s ABS ten -...score and five -...score blanket

'I let them consume 300 blankets.'

Clitic Position

These examples should be sufficient to demonstrate the typical syntactic structure involving numerals, that is the number, whether simplex or complex, precedes the noun within the phrase. When the definite article is also involved, we encounter the typical Nootkan pattern of clitic definite article *-ʔiʔ* appearing on the first element of its phrase, whether it is an adjective (17a), a quantifier (17 b), or a numeral (17c.), in complete conformity with Wackernagel's Law.

- (17) a. [sihakʔi naʔaqak] 'the crying child'
 sih -ak -ʔiʔ naʔaqak cry -NOM -DEF baby
- b. hiʔʔiitq [ʔayeʔi quuʔas] '... where there are many people'
 hiʔ-ʔiʔtq ʔaya -ʔiʔ quuʔas LOC -3s.REL many -DEF person
- c. ʔahʔaaʔaʔweʔin hafiisʔiʔaʔ [muuʔii quuʔas] 'Then the four people started to bathe'.
 then bathed four -Def person

Further expansion of the noun phrase may involve post-modifiers such as the following, where we see that the definite article continues to move to the head of the phrase.

- (18) a. sučiiqʔi ʔaʔiqs ʔaʔaʔkuk 'the one hundred boxes of biscuits'
 b. sučaqimʔʔi maʔimʔ šuukʔaa 'the five barrels of sugar'

From this discussion, we can see that the definite article clitic, *-ʔiʔ*, can be used as a test of the domain of the phrase.

Coordination in the Number System

Coordination is used in several ways within the Nootka number system. First, it conjoins units to tens, as can be seen in (8) above. Furthermore, it conjoins scores with tens and units, as in:

- (19) a. hišimʔuupʔaʔsi qʔarhaaʔakqas ʔuʔwaafin caqiiic ʔiʔ hayu
 hišimʔuup -aʔ -siʔ qʔarhaʔ -ak -qaʔs ʔuʔwaafin caqiiʔc ʔiʔ hayu
 assemble -NOW -1s ABS thus many -POSS -1S SUB relatives twenty and ten
 'I gathered together all my relatives, 30 of them.'

- b. ʔaʔpuuq ʔiʔ hayu ʔiʔ muu 'one hundred and fifty-four'

In addition, it can be found to conjoin coordinate NP's which contain numbers.

- (20) hayu ʔisaʔ ʔmučičaʔ ʔameʔi ʔiʔ mucmuhaq
 hayu ʔisaʔ ʔmučič -aʔ ʔama -ʔiʔ ʔiʔ mucmuha
 ten blanket clothed -NOW house post -DEF and bearskin

The post was clothed with ten blankets and a bearskin.

Numeral Incorporation

The number system as described above is already quite complex, but the fact that Nootka allows incorporation of various elements presents yet a further and more challenging level of complexity which we shall now explore. The issue of coordination is interesting because of its interaction with numerals and incorporation, and this will be the focus of the remainder of this paper.

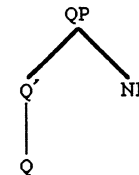
The crucial examples are the following:

- (21) a. hayučihʔiʔaʔ ʔiʔ qačča 'he did it for 13 days'
 hayu -čihʔ -šil -aʔ ʔiʔ qačča ten -...days -MOM -NOW and three
- b. hayuufisuksi ʔiʔ sučiiq 'I spent three hundred (dollars) on him'
 hayu-iiq-ʔiʔs-uk-siʔ ʔiʔ suča -iiq ten-...score -consume...-NOM -1s ABS and five-...score

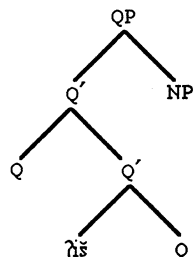
Note that in such examples, there is a complex numeral which is separated into two parts, one incorporated into the verb, the other appearing in situ, preceded by the coordinator, ʔiʔ. Such examples pose an interesting problem for lexical treatments of incorporation, since the two parts of what would appear to be a single, complex numeral are located at a distance from one another. This is the typical form in which incorporation is performed on such elements, and it is always the first element of the complex numeral which is incorporated.

This fact suggests a more articulated shape for the phrase containing a numeral. The idea here is that the phrase acting as object is basically a quantifier phrase in which the head is the numeral that delimits the possible range of numbers, much as we talk about units, tens, hundreds, etc. Should the number involved be complex, then we must have some way to distinguish between the 'head' and the 'complement' members of the number, so that only the head may be incorporated, along the following lines:

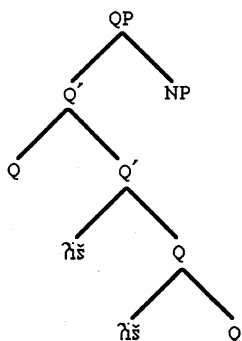
- (22) a.



b.



c.



Q' has several possible rewrites in such a system, one containing only the head and the other containing the head along one branch and its complement, containing the conjunction ʔiʂ 'and' together with the remainder. Since this remainder may itself be complex, we must allow for the possibility of recursion.

- (23)
- $$\begin{array}{l} Q' \rightarrow Q \\ Q' \rightarrow Q Q' \\ Q' \rightarrow ʔiʂ Q' \end{array}$$

We may distinguish these two versions of Q' by using a feature such as [±TERMINAL] or something along these lines, giving:

- (24)
- $$\begin{array}{l} Q' \rightarrow Q \\ \quad [+TERM] \\ \\ Q' \rightarrow Q \quad Q' \\ \quad \quad [-TERM] \\ \\ Q' \rightarrow ʔiʂ \quad Q' \\ \quad [-TERM] \quad [\pm TERM] \end{array}$$

Under these conditions, we can now explain how incorporation works in these cases. Firstly, it operates on the *head* of the Object, whether this is an NP or a QP. If it is an NP, then the N is incorporated, as one would expect. But if the noun object is actually within a quantifier phrase, then the head of the QP is the object of incorporation, not the head noun.

A question that arises here is: is it really quantifier phrases, or just numerals that operate in this fashion? The following examples demonstrate that this process is not limited to numerals, although they pose the most interesting problem for this process, since through incorporating the parts of a number may be separated from each other, whereas for other quantifiers that are only single words, the entire word necessarily moves, as in:

- (25) a. *hinuʔatqathʔat* [ʔaya haʔum] 'He pretends to see many fish'
 hina -(y)uʔat -qa'th -at ʔaya haʔum LOC -perceive -pretendedly -PASS many fish

- b. *ʔaya ʔsiik* [e₁ ʕiihati] 'He made a lot of arrows.'
 ʔaya -siik^m ʕiihati many -make... arrow

As you can see from these examples, the quantifier ʔaya 'many' can appear in a similar position to the numerals, preceding the noun, or it can be incorporated into the verb, just as the head numeral can. Also similarly, when it occurs in conjunction with a noun or noun phrase, it is always ʔaya which is incorporated, not the noun.

In addition, the clitic definite article behaves as it does with the numbers, attaching to the quantifier rather than the noun, as in the following example.

- (26) *ʔawaaʔaʔ* [ʔayeʔi ʂiiʔuk] 'the many movers approached.'
 ʔawaʔ -aʔ ʔaya -ʔiʔ ʂiiʔuk near -NOW many -DEF move house

- hiʔʔiitq* [ʔayeʔi quuʔas] '... where there are many people'
 hiʔ-ʔiʔiq ʔaya -ʔiʔ quuʔas LOC -3s.REL many -DEF person

All of this suggests that, like the numbers, other quantifiers occur within a domain containing both the quantifiers and the NP, and that incorporation is sensitive to the head of the larger phrase, whether it be NP or QP, within the sentence.

Conclusion

In conclusion, the proposal here maintains that it is necessary to subsume the object NP within a larger QP when it is associated with any quantifier, and that in such a situation incorporation must necessarily involve syntactic movement from the position of head of QP. This then would seem to suggest that incorporation in general points to a syntactic movement rule or its equivalent, rather than a lexical rule generating the object of incorporation in situ. The result of numeral incorporation in Nootka is a discontinuous element, part of which is found at the head of the clause, and the remainder of which is associated with the syntactic object of that clause.

It would seem that such a situation would be rare in the languages of the world, since it requires a language to have several quite special properties: object incorporation, syntactically complex numerals, and a QP/NP alternation for syntactic objects.

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