CURRENT ISSUES IN MORPHOLOGICAL THEORY

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By
John Stonham
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I certify that I have read this thesis and that in my opinion it is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

Paul Kiparsky
(Principal Advisor)

I certify that I have read this thesis and that in my opinion it is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

William R. Leben

I certify that I have read this thesis and that in my opinion it is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

William J. Poser

I certify that I have read this thesis and that in my opinion it is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

K.P. Mohanan

Approved for the University Committee on Graduate Studies:

Dean of Graduate Studies
Abstract

The aim of this thesis is to address several related issues in current morphological theory. Primary among these issues is the use of non-combinatorial processes in morphological theory. In this dissertation, I claim that all morphology can be reduced to a single process of combination which may operate on multi-tiered representations of the form, yet on a strictly local basis. This notion of combination includes the operations of concatenation of affixes on one or more levels and compounding. I show that the use of processes which employ non-local, string-dependent, structure-changing machinery often leads to misanalysis, loss of generalisations, and overgeneration of forms due to its excessive generative capabilities and its insensitive application to morphological forms. These difficulties may be seen in the cases presented here, including Nitinaht reduplication, Nootka hypocoristic formation and various cases of metathesis.

Another, related issue is the relationship between cyclicity and stress assignment and erasure. In the chapter on Interior Salish stress, we encounter instances of cyclic affixes which do not erase stress and of non-cyclic ones that do. This case serve as a counterexample to the view that only cyclic affixes may erase stress.

In addition to the examination of these issues, I propose a modified conception of syllable structure for morphological operations that is based on the mora and yet incorporates characteristics reminiscent of
a more traditional view of the syllable as a hierarchical structure. In addition, I propose a principle of **priority unification** which merges the characteristics of several templates into a single one. I directly apply these proposals to the analysis of certain cases that have been treated as involving morphological process such as metathesis, truncation and reduplication, and show how looking at these cases in a different light suggests a simpler treatment in terms of combination.

The cases which I have chosen to elucidate this thesis include morpheme-based reduplication in Nitinaht, stress assignment conditioned by suffixes in Interior Salish, variable-length vowels and hypocoristic formation in Nootka, and grammatically-conditioned metathesis in several languages.
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Chapter 1

Introduction

1.1 Sources and Goals

Current theories of morphology place much importance on the distinction between the contrasting notions of morpheme and process. The distinction, and its accompanying implications and results, is at the heart of the philosophies of current models of morphological theory, especially the theories of Lexical Phonology and Morphology in most of its versions, as described in Kiparsky 1982, 1985, Mohanan 1982, 1986, Pesetsky 1979, and others (henceforth LPM), and the Extended Word and Paradigm model of morphology as advocated in Anderson 1982, 1988, Matthews 1972, Zwicky 1985 (EWP), although this issue alone does not clearly distinguish these two models.

The prime points of contention among these models involve the machinery employed to account for the data (i.e. combinatorial morphemes versus processes) and the implications of these choices for linguistic theory in general. But how, in fact, do these theories
differ? What exactly are the conflicting assumptions maintained by them? Does derivation necessarily involve more powerful mechanisms than simple combination? How do we represent such mechanisms?

The aim of this dissertation is to address the issue of non-combinatorial processes and their value within a constrained model of morphology. By providing accounts for certain of the core problems involved here within a framework of LPM, modified by means of principles I will introduce, I intend to provide evidence that such processes are not only unnecessary for morphology but that they mask the nature of its object of study.

For closer investigation, I have chosen cases which involve Native American Indian languages, principally of the Northwest Coast, to exemplify my arguments, for several reasons. Firstly, I have worked with a number of these languages. In addition, theoretically-oriented morphological studies of these languages has appeared in the linguistic literature, but often inadequately substantiated and therefore open to misinterpretation. Providing accurate and pertinent data on these languages will be another objective of this work. The languages discussed herein are for the most part moribund and, therefore, it is of the utmost importance to disseminate as much data as possible to provide materials for the ongoing study of morphology and linguistics more generally.

My approach here will be to first present an overview of the current state of morphological theory and what I see as the important issues within the competing theories. I will next spell out the ways in
which the examples I have chosen pertain to and, more importantly, help decide among these competing views of morphology. Following this I outline the theoretical machinery, some standardly accepted, some more radical, that will be important to this analysis and its relationship to the problems at hand. Finally, I will offer my own exposition and accounts of the data in a framework which relies on a theory employing constraints on representations working in conjunction with principles of rule ordering and cyclicity as assumed in one or another version of the theory of LPM (Kiparsky 1982, Mohanan 1982, 1986), the use of autosegmental and non-concatenative approaches to word structure (e.g. McCarthy 1979, 1981, Marantz 1982), the concept of unification as has been described and employed in syntax in, for example, Kay 1985, Shieber 1986, Pollard and Sag 1988, and the theory of Prosodic Phonology and Morphology as argued for in McCarthy and Prince 1986, Selkirk 1980, 1984, Itô 1986, and elsewhere.

1.2 Theoretical Background

While morphological theory in some shape goes back at least to the time of Pāṇini (Cardona 1988, Kiparsky 1979, 1982), for our purposes it will begin with the work of Charles Hockett and in particular his influential article in *Word*, entitled 'Two models of grammatical description' (Hockett 1954). The reason for this choice of departure points is that the proposals found there describe the possible directions in the focus of morphology and anticipate the genesis of a
new variety of morphological theory, that which attempts to explain linguistic phenomena, the generative paradigm. This is in stark contrast to the Structuralist school of linguistic thought, whose goals were not to account for the generation (i.e. production) of morphological units, but merely to describe their form.

Hockett outlines a scheme of description for two models of morphology, labelled the Item and Process model and the Item and Arrangement model, both of which have, in the form described by Hockett, fallen from favour with current theories of morphology but which were in a very different situation at the time of Hockett's article. Hockett argues for a re-examination of the merits of the Item and Process model as compared with the more strongly advocated Item and Arrangement model by arguing that IP need only be properly formalised in order to show that it is as theoretically adequate as the already extensively formalised IA model and he proceeds in the article to offer a tentative formalisation of the IP model.

More interestingly for us, he alludes to yet another possible model of grammatical description, a model which he refers to as the Word and Paradigm model, which he declares to be distinct from either of the other two. Hockett does not delve any further into this last model, but it has been taken up in more recent times by other linguists including R.H. Robins (e.g. Robins 1959).

Actually, for Hockett the issues were very different from those of interest to linguists now. Concepts of underlying representation and rule ordering were not of concern to Hockett and the labels that have
been carried over from Hockett by others seldom relate in any clear fashion to what was originally intended by Hockett. For example, the term 'process' as employed by Hockett refers to both phonological and morphological processes. The focus of this dissertation is on the use of morphological processes in language only and the place of phonological processes is not at issue here. Furthermore, the Extended Word and Paradigm model as subscribed to by various linguists such as S.R. Anderson, P.H. Matthews, A.M. Zwicky, etc., can hardly be considered to be an extension of Hockett's Word and Paradigm model. There are few similarities and even fewer relationships between the two.

It is this newer theory, the Extended Word and Paradigm model, and its recent offspring, Amorphous Morphology (AM, see Anderson, ms.), that will be of interest to us in this dissertation. This theory, which advocates non-combinatorial processes in morphology, stands in direct contradistinction to the combinatorial model subscribed to by the majority of LPM morphologists, which is the topic of the next section.

1.2.1 Lexical Morphology

LPM, which will serve as the theoretical model within which I will couch my arguments against non-combinatorial processes, originates with the work of D. Siegel (Siegel 1974, 1977) and M.R. Allen (Allen 1978). It relies on quite different assumptions from EWP/AM regarding the nature of word structure and word-building operations. The
lexicon is seen as the repository of information on morphemes, and it consists of a collection of underived morphemes serving as input to an ordered set of levels, each containing rules of its own, the earlier level feeding into the later and the result emerging at the end of the lexical module to feed the syntactic, postlexical and phonetic implementation modules of the grammar.

Pesetsky 1979 introduced the notion of cyclicity into this model in order to deal with certain problems involving the interaction of phonological and morphological rules. Mohanan 1982 and Kiparsky 1982 further enriched the model with their own particular adaptations, including the notion of stratum as distinct from level in the sense of level of representation, the use of blocking in conjunction with the Elsewhere condition, and refinements of the concepts of cyclicity and level-ordering and structure preservation.

Other linguists have addressed the task of accounting for cases where there appears to be discontinuity among morphemes, and out of this work grew the model of Templatic Morphology, as advocated in McCarthy 1979, 1981, which allows for a separation of morphemes on different tiers linked through a skeleton, explaining apparent violations of the OCP and accounting for the spreading of segments within a word.

Investigations into the prosodic structure of language, originating with work on tonal effects in language and developing into a theory of syllable structure are to be found in the work of Selkirk 1982, 1984, Itô 1986, and Inkelas 1989, etc., which may be subsumed under the theory of Prosodic Phonology.
This brings us more or less up to the current situation as it will concern us, with various linguists pursuing different directions in the LPM model in order to account for particular problems encountered in the investigation of natural language phenomena. While the preceding has suggested that LPM is a combinatorial model, the reader should note that there is nothing inherently combinatorial about this model and it is possible to envisage a version of LPM that employed non-combinatorial processes.

1.2.2 Zwicky on Processes

It may be instructive here to examine one version of the EWP theory in more detail. I will present what I understand to be the claims made regarding this theory in Zwicky 1988. Zwicky presents what he describes as a clarification of "what is involved in a process-based, rather than a morpheme-based, approach to morphological description...".

Zwicky expresses concern over the division of labour in describing the roles of the phonology and morphology of a grammar. He states that the 'processes' of Natural Phonology (e.g. Donegan and Stampe 1979) fall on the phonological side of this division, but not the 'non-automatic' rules which appear to correlate with the traditional notion of morphophonemic rules. He claims that in a process-based approach, these rules reflect generalisations about the relationship between the phonological and the semantic components of what he refers to as 'input' (= base) and 'output' (= derived form). On this
view, the morphology is simply the coordinator of activities involving the phonological and semantic components of the grammar.

Zwicky refers to 'a pure morpheme-based morphology, in which all morphology is combinatorial' and concedes that non-combinatorial morphemes such as infixation, reduplication, metathesis, etc. might be reduced to combinations on separate tiers, or, perhaps are tied to certain affixes, but that subtractive or metathetical operations without overt 'triggers' cannot be accommodated in such a theory. He suggests that the only way to account for such phenomena in a combinatorial model is to posit empty affixes which condition the process and states that '[i]f there are any valid examples [of the latter J.S.] at all, though, the data favor a process-based approach over a morpheme-based approach as a general framework for morphological description...'.

In describing the process-based approach, Zwicky claims that all phonological effects, including affixation, 'are on an equal footing'. Morphemes consist of morphological rules combined with phonological operations which apply to the input, thus substituting the notion of morphological rule/operation for that of morpheme.

Zwicky represents the morphological component of a grammar as a dichotomous system containing two independent modules, one containing the operations available for describing the changes undergone by a form (= Zwicky's Morphological Operation Inventory (MOI)) and the other, a set of morphological rules consisting of Derivational Rules (DR's), Inflectional Rules (IR's), and Morphophonological rules (MPR's). A member of the latter contains pointers
to the operations that it employs, but there is no further relationship between them. A benefit for this approach according to Zwicky is its ability to 'relate the phonological effects of one morphological rule to those of another'.

Zwicky claims that while process-based morphology doesn't assign word-internal structure to every word, instances of combinatorial processes like prefixes and suffixes can. This guarantees the availability of morpheme boundaries necessary for certain morphophonological rules.

In addressing the issue of excessive power, Zwicky appeals to the idea that rather than constraining the possible set of morphological rules, it is better to constrain the possible set of operations through the use of a universal set of operation types. These operation types would include reduplication, metathesis, affixation, etc. In addition to this, there must be a set of locations, and of orderings of segments involved in these locations.

Zwicky's claim is that if one accepts this view of operation types and their concomitants, then the question of excessive power is removed from the arguments against process-based morphology.

In terms of this investigation the division of labour between phonology and morphology may be determined along the lines of processes, phonology possessing them whereas morphology does not. Those rules of the grammar that utilise processes must belong to the phonology of the language and are not involved as grammatical devices. At this point this statement appears to be merely definitional, but it
will become apparent throughout the dissertation that processes such as subtraction or metathesis appear only secondarily in morphology, as the reflexes of conflict resolution due to violations of phonotactic constraints, the sonority hierarchy, the imposition of prosodic templates, etc.

I will further show that there is no need to posit empty morphemes in order to account for cases of subtraction or metathesis, but that it is simply a matter of looking at the cases in a different light, either as the adherence to a specified template, as the result of unification of constraints, or as a combination of these.

I would further contend that all of Zwicky's phonological effects are not on an equal footing and that purported cases of phonologically-conditioned affixation may be the result of other restrictions on the base, such as weight or shape requirements on the base.

I believe that the issue of excessive power is a particularly problematical one, both for 'process-based' models and for others that employ mechanisms such as transformations in realising morphological categories. Zwicky's first attempt at constraining the model by positing a universal set of operation types is an enlightening one and has lead me to a further development, the reduction of the processes involved in morphology to a single process: combination.

1.2.3 Amorphous Morphology

Amorphous Morphology is another theory which subscribes to the idea that non-combinatorial processes are a necessary part of morphology.
It has been developed by S.R. Anderson from the earlier EWP model and appears to retain its commitment to non-combinatorial processes in morphology. This is a nascent theory and as such has not yet been fully worked out. I will attempt here merely to outline what I see as Anderson's view of morphology. One indicator of this is the nature of the problems which he presents in support of his theory, as in the following quote:

"It is probably the case that neither infixes nor reduplication pose other than mechanical problems for the basic nature of the morpheme, but the same cannot be said for other apparent "morphemes" with problematic form. The best established case of this sort is of course that of segmental (or suprasegmental) replacement, or Ablaut. Alternations such as that of English man, men or sing, sang, sung represent the formation of grammatical categories by the simple change of one form to another, without the addition of any segmentable material to the form. While the English examples could be said to be isolated, in the sense that these formations are limited and unproductive alternants of morphological categories expressed in productive classes by segmentable suffixes, this is clearly not a general property of Ablaut rules. ... A final class of formally problematic cases, discussed by Thompson & Thompson (1969), involves grammatical categories that are marked by reorganization of the phonological material making up the basic form - in particular, reordering or metathesizing some parts of it. ... In some languages, metathesis serves directly as the marker of certain grammatical categories." (Anderson 1983:8-9)

Indicative of the theory is the commitment to processes such as reduplication, infixation, ablaut, and metathesis, which seem to
involve non-combinatorial markers of grammatical categories. This view is similar to Zwicky's, although not as well articulated in terms of theoretical machinery assumed or employed. On the other hand, the class of cases dealt with are more varied and more demonstrative of the views of the theory in many ways.

Among the examples that Anderson presents to argue his case are instances of ablaut and truncation as well as the case of Saanich aspectual formation which I will deal with in chapter 5.

One aspect of Anderson's theory which I will not investigate here, and which I consider to be totally independent, is the claim that all derivation precedes inflection.

1.3 Theoretical Assumptions
In this section I outline the theoretical assumptions upon which I will base my analyses and arguments against non-combinatorial processes.

1.3.1 The Shape of the Syllable and the Status of the Mora
There have been numerous proposals in the literature regarding the shape of the syllable and its status in the grammar of a language. All of them have certain merits and certain difficulties. In the following, we will examine some of the foremost proposals and see where each fails. I will then propose a representation in which the mora is fundamental, yet which allows a hierarchy above the mora, including the nucleus, and extensions of it.
The traditional view of the syllable is that it consists of an onset, a nucleus, and a coda. The prototypical constituency of the syllable under this view is given in (1) below.¹

(1)

```
\sigma
/   \
Onset   Rhyme
     \   /
     Nucleus Coda
```

This structure allows distinctions to be made between the initial consonant elements of the syllable (= onset) and the remainder (= rhyme), between the head of the syllable, i.e. the nucleus, and the final consonantal elements (= coda), or distinctions between consonants in the beginning of the syllable and those at the end of the syllable. In addition, it allows one to relate members of these classes, including all the consonants of the syllable before the head, all the members of the syllable except the initial consonants,² the constituents of the nucleus, or all of the consonants after the head.

What this structure does not allow is the grouping of the consonants at the beginning of the syllable with (a) those at the end, or (b) the head. In the first case, it seems that this is the desirable result: no rule should apply to the onset and coda to the exclusion of the nucleus. However, the latter grouping, that between onset and

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¹ The basic ideas originate with Kuryłowicz 1948, Hockett 1955, and Pike and Pike 1947.

² For arguments against the rhyme as a constituent, see Clements and Keyser 1983. Arguments for the rhyme may be found in Steriade 1988.
nucleus is important in a number of rules, especially in many cases of reduplication where it is just the initial C's and first V which are copied. A further consideration here is the difficulty with isolating the units within the nucleus or between the nucleus and immediately post nuclear position in cases of quantity sensitivity. This failing of the syllable structure-based model has served as the impetus for the second possibility to be considered here, the mora-based model of syllable structure.

In the mora-based model (e.g. McCawley 1968, Hayes 1981, Hyman 1985, Zec 1988, et al.), syllable structure is based on the nature of the weight-counting units of the syllable, the mora. Un morifiable segments are attached to the syllable at the appropriate position by some mechanism of capture or stray adjunction, as determined by the rules of the grammar, which specifies what may or may not be syllabic or moraic. The structure is presented in (2) below.

\[ \sigma \]

\[ \mu \ (\mu) \ (\mu) \]

Syllables may contain one, two, or possibly three moras, decided by the number of allowed moraic segments in the language. Non-moraic segments at the beginning or end of the unit are linked according to regular rules of the language. Segments unattached at the end of the derivation are erased, thus not appearing on the
surface. This account of syllable structure allows one to capture the relationship of onset and following vowel, such as in the case of CV reduplication by saying that it is the first mora which is copied. It also allows the description of differences in syllable weight, yet it fails to make a distinction between types of heavy syllables, where one is heavy by reason of vowel length (= VV) and the other due to moraic consonants (= VC), even though there are numerous cases in the literature where this distinction figures prominently (Steriade 1990). Examples include the reduplication of nucleus with onset, but not moraic consonants in languages where moraic consonants counts for weight but not for reduplication.

A third account of syllable structure, argued for in Clements and Keyser 1983 and defended in Davis 1985,3 posits the structure as in (3) where the syllable is flat, consisting of three independent constituents, onset, nucleus, and coda. This type of syllable structure seems to be the most permissive, yet it claims that there are reasons to have constituents such as onset and coda, although these distinctions are not obviously necessary. For instance, there are no rules which apply only to the onset as a unit or to the coda as a unit, although there are rules which involve the onset and nucleus or the nucleus and coda. Take the case of French nasal deletion and concomitant nasalisation which has been described as occurring when the nasal is in the coda. However, this is not the case when the nasal occurs in the second position in the coda, as in the words borne

3 See also Pike 1947. A similar structure is proposed by Clements and Keyser 1983.
'milestone' or *orne* 'elm' where the vowels are not nasalised (Steriade 1988). Or the case of Sanskrit reduplication, where only one element of the onset is reduplicated and not the entire constituent, e.g. paprach < vprach, šišři < vśri (Whitney 1889). These cases argue against the unity of constituents of onset or coda.

This analysis is capable of capturing the case of onset-nucleus reduplication, but only as an artefact of the flat structure and not because of any unity in the objects. This representation fails to predict any asymmetries in syllable structure at all.

(3)

\[ \sigma \quad \text{Onset Nucleus Coda} \]

Furthermore, it offers no account for the central importance of the nucleus within the syllable, with regards to quantity or to the fact that the nucleus is the one unit which must be present to license the syllable and for many languages it may be the only constituent present. It appears that this primacy is merely accidental, or perhaps an artifact of the inherent linearity (i.e. its non-peripheral position). In addition, this structure does not explain the asymmetry with respect to weight that is attested in language after language regarding the relationship between nucleus and onset versus nucleus and coda. In other words, there is no obvious reason, given this account of syllable

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4 On this analysis, forms such as *homme* or *borne* would not be nasalised because they occur under \( N' \) just as the nasals in *borne* and *orne* do. Nasals in *bon* or *honte*, on the other hand occur under \( N' \) and thus affect the nucleus. The optional rule of schwa insertion would apply only to forms under \( N' \).
structure, for why it shouldn’t be the combination of onset plus
nucleus which adds weight to the syllable and the coda which does not
contribute to weight (cf. Hyman 1985).

As we have seen, there are positive and negative sides to all of
these theories of syllable structure, leading us to suspect that they all
represent in part the actual structure necessary, but that none of them
accurately represents the entire construct.

In what follows I will suggest a somewhat different conception of
the syllable, one in which the mora is a primitive, yet which contains a
more highly structured representation of mora-based syllable
configuration than is normally presented. I will furthermore argue
that this structure accounts for all the widely diverging cases of
syllable-based templatic morphology and that it is still highly
constrained and well motivated.

The structure which I propose is given in (4). It consists of a
mora-based nuclear position followed by further expansions of the
syllable that allow us to see the relationship of onset and coda conso-
ant s to the nucleus. It explains the observation made in Hyman 1985
regarding the non-moraic status of onsets and allows for the various
types of copying templates discussed previously. The use of
X'-notation in syllable structure originates with Levin 1985 although
her theory does not involve the use of moras, which I consider crucial
for the representation of the syllable. In addition, this proposal avoids
the criticisms of Levin's proposal made by Zec 1988 concerning the

5 Originating with Trubetzkoy 1939.
distinction between moraic C's, which can add weight, and non-moraic ones, which don't.

\[ \sigma = N'' \]

This diagram represents the structure of the syllable as derivative on the mora, since head of the syllable is determined by head of \( N'' \) which will be the most sonorous element, the head syllabic segment according to Zec 1988. The immediately preceding syllabifiable consonants will also occur within this unit, accounting for both their lack of contribution to the weight of the syllable and for their occurrence in CV-type reduplication, where it will be just the first mora that is copied, subject to sonority constraints, extrametricality, etc. (Steriade 1988). I am also assuming some type of minimal distance condition on syllable structure to account for distributional properties of onsets and codas such as that proposed in Selkirk 1984 (attributed to Harris 1982) which specifies a minimum difference in sonority between adjacent positions in order to rule out extensive and repetitive sequences of segments of the same sonority within the onset or the coda. Onset-Nucleus types of reduplication, as described in chapter 2 will be N reduplication, where N may contain one or two
moras depending on the number of moras in the original melody. CVR-types of reduplication, as discussed in Boas 1947, Zec 1988, and in chapter 4, will be $N'$ reduplication, where $N'$ represents the node containing all moraic segments, which will necessarily differ for languages. Full syllable reduplication, including all members of the coda, will be $N''$ or $\sigma$ reduplication, involving both moraic and non-moraic segments. The distinction between $N$ and $N'$ will also allow us to differentiate between CVV and CVC syllables, where both contribute weight but may pattern differently in other respects.

Let us begin by examining the motivation for the onset occurring under the first mora node. There is a pattern of reduplication in Nootka in which the onset and the following vowel are copied as in (5) below.

(5) a. ?u?u+'i-?h 'hunting it'
    N-it-hunting...

b. ta·ta·k'a+'i-?h 'hunting only that'
    N-only that-hunting...

c. ćićims+'i-?h 'hunting bear'
    N-bear-hunting...
No coda consonants are copied in this pattern and the quantity of the copied vowel reflects the quantity of the original vowel.\textsuperscript{6}

However, Nootka requires that a portion of the coda (= a moraic consonant) be considered with the nucleus for purposes of stress assignment, although the onset is not involved. This suggests that there is a unit which is copied that involves onset and nucleus to the exclusion of coda, yet another structure which concerns stress assignment, involving the syllable head and following segments. Since the onset does not take part in the assignment of stress, it must either be ignored or already part of some weight unit. Because of the copy facts, I will argue that it is part of the first mora and so does not contribute anything more than the head of the syllable already does, i.e. a single mora.

The example in (5b) indicates the status of the second vocalic segment in the syllable in the case of long vowels. Here we can see that the two moras are copied in those cases where they are both under the N node. On the other hand, moraic segments which are not under the N node are not copied, even though they take part in the rules of stress assignment, as shown by (5c).

This brings us to the special status of N' constituents, specifically the moraic segments. In Nootka, resonants are moraic and contribute to stress assignment, but other consonants are not. However moraic consonants do not appear in reduplication of the N-type. For this

\textsuperscript{6} For arguments concerning the placement of consonants in the coda, see Chapter Four.
reason, such segments must be outside the N yet within a larger unit, N', that does not include the other consonants. N' is the domain for stress assignment and a variety of other rules in Nootka, as discussed in the section on variable length vowels. Furthermore, it is the domain for metathesis in Saanich, where there are no long vowels and thus no second mora under the N node, yet weight may be added under N' where this is necessary, as in the formation of actual aspect discussed in chapter 5.

N" or σ is the maximal level of the syllable and is important for many morphological and phonological rules. It is active in the formation of hypocoristics in Nootka as argued for in chapter 4 and in some types of reduplication found in Nitinaht. It serves as the unit for any syllable-dependent operations and is the immediate daughter of the foot.

This conception of the syllable allows one to describe morphological operations such as reduplication, hypocoristic formation, or metathesis as the manipulation of units and restricts the possible units more than the alternatives presented above do. It predicts that operations will not appeal to only the set of consonants at the beginning or the end of the syllable, but also that operations will not affect just the head vowel and the final consonants, but will include the second or later moras as well. In addition, it explains why a superheavy syllable cannot involve three V-slots, but rather two V's and the following moraic C, that is N'.
This characterisation of the syllable predicts that we will encounter a certain class of groupings within the syllable, including the onset with the following vowel, the entire nucleus, the nucleus with following moraic segments, etc. There appear to be cases where all of these groupings are necessary, leading us to a typology of languages based on their adherence to these groupings. The simplest type of case will be the language that has only a single mora per syllable. This type would appeal only to the head mora of N for stress placement and would not involve N' in its stress rules. The language Maranungku, discussed in Hayes 1981, fits this description. The next class would be for languages which make a distinction between monomoraic and bimoraic syllables. This class would contain two subclasses, the class where only long and short vowels count for purposes of stress assignment and that where other non-syllabic segments are moraic. The former would include languages such as Nitinaht where only vowel length figures, the relevant level being N, while the latter would include Nootka, where N' is the domain and sonorants may also add weight. A further class would be those languages possessing super-heavy syllables, such as Hindi or Japanese, where these must contain bimoraic nuclei followed by non-syllabic moraic segments appearing under N'.

One would expect that if a language employs these distinctions in configuration, they will appear somewhere in the morphological operations of the language, and that is exactly what happens in the examples under discussion. The case of languages which allow only
mono-moraic syllables provide little evidence, but the case of languages with bimoraic syllables are more interesting. Nitinaht, Nootka, and K'įkala provide appropriate examples of the distinctions within this class. In Nitinaht, only N is available for stress assignment whereas in Nootka, N' is available, so the stress patterns of these two closely related languages differ along these lines. However, in both languages it is N which is important for reduplication. Thus, the moraic segments that occur outside of N in Nootka do not appear in reduplication. In K'įkala, another related language, a slightly different situation exists. K'įkala patterns with Nootka, considering the N' as the domain of stress assignment, but it differs from both Nootka and Nitinaht in also considering N' the domain of reduplication. In this way it reduplicates non-syllabic segments under N' along with the nucleus. The final possibility is that a language may employ N' in order to maintain three moras within the syllable, and this is the case in Japanese, as demonstrated in Poser 1990.

Feet will be built on the basis of mora-counting, following a prescribed direction and language-particular rules of construction. Under this analysis, we must have specific rules for linking moras to segments on the one hand, and to higher units of structure on the other. These rules will spell out the direction of linking and the principles for determining the head of the syllable. Language specific

7 While K'įkala appeals to N' for stress placement, it scans the entire word from left to right whereas Nootka scans only the first foot as is discussed in chapter 4.
conditions on phonotactics and on the availability of bimoraic and trimoraic syllables will exist and will determine the final outcome of the application.

I am assuming here the principles introduced in Zec 1988 for creating the base structure of the syllable, including the characterisation of extension and the algorithm for morification as given in (6).

(6) a. Extension:

Segment A is an extension of segment B iff all feature specifications in B are also found in A.

(from Zec 1988: 99)

b. Morification:

Given a sequence S of unlinked segments s₁, s₂,..., sᵢ, ..., sₙ, link S to μ iff

a. s₁ is an extension of sᵢ₋₁
b. sₙ is a member of the set of moraic segments
c. sₙ is an extension of the immediately following segment, if any.

(from Zec 1988: 103)

This algorithm serves to identify the potentially moraic segments in a string and links them to moras, assuming that the head of the syllable is the most sonorous and that sonority declines outward from it. (6a) states that in order to be included under the same mora, the following segment (sᵢ) must not be less sonorous than the preceding...
segment. (6b) requires that the rightmost segment ($s_n$) must be a member of the set of (language-particular) moraic segments, and (6c) requires that $s_n$ must be at least as sonorous as the immediately following segment, i.e. the following segment may not be more sonorous.

With all the preceding segments linked to the mora as long as they follow the sonority hierarchy, it remains to link the segments that follow the head of the mora. Thus, the following example:

(7)

In the case of the coda consonants /nk/, the nasal must constitute a second mora which is linked up to $N'$, since this is what is called for in English syllabification. The /k/ is linked directly to $N''$ and not under any moraic position.

The creation of the superstructure for the syllable must be accomplished by rules that involve the linking of moras into larger units or the capture of stray segments not subsumed under the morification algorithm. I will propose the further algorithms given in (8) and (9), which must be employed in order to realise these options.
(8) **Coda capture:**

Given a sequence $C$ of unmorified segments $c_1, c_2, ..., c_i, ..., c_n$
link $C$ to the $N''$ iff
a. $c_{i-1}$ is an extension of $c_i$
b. $c_n$ is an extension of the immediately following segment, if any
otherwise, link $C$ to the following syllable.

(9) **Mora linking:**

Given a sequence $M$ of moras ..., $\mu_{i-1}, \mu_i, ..., $ link $M$ to $N$ iff $\mu_i$ is
an extension of $\mu_{i-1}$ and $\mu_{i-1}$ is an extension of $\mu_i$, otherwise
link $M$ to $N'$. ($\mu_1 = \mu_2$)

The first rule is intended to capture the case where there is
unmorified material in the coda of a syllable in standard terms, and
the second case to join moras under the nucleus.

The proposed shape of the syllable allows us to capture such
diverse phenomena associated with syllabic templates as reduplic-
ation, stress, and template-based hypocoristic formation in a unified
treatment involving a restrictive model of the structure of the syllable
and its constituents. The mora is considered a primitive within this
framework, building up from it to the syllable ($=N''$) in progressively
larger units.
1.3.2 Unification

The principle of unification involves the merger of units of arbitrarily large order based on the shared characteristics of the two templates that are unified. Reduplicative templates can be unified to render a single copy in cases such as the hypothetical example in (10). We have examples such as the following where two templatic copies of a base are called for independently but the final output is a single template, containing the significant elements of both required copies.

\[(10)\quad \begin{array}{l}
\text{First Copy} \quad \text{Second Copy} \\
\text{a.} \quad N + N \rightarrow N \\
\text{b.} \quad N + \overset{9}{\mu \mu} \rightarrow \overset{9}{\mu \mu} \\
\text{c.} \quad \overset{\mu \mu}{\wedge} + N \rightarrow \overset{\mu \mu}{\wedge} \\
\text{d.} \quad \overset{\mu \mu}{\wedge} + \overset{\mu \mu}{\wedge} \rightarrow \overset{\mu \mu}{\wedge}
\end{array}\]

The case in (10a) is that where the branchingness of the nucleus is unspecified, and therefore the branchingness of the output is also unspecified. (10b) illustrates the situation where the first copy is

---

8 For a more detailed exposition of unification, see Shleber 1986.
9 This representation requires that the \(N\) be branching and is indicative of one pattern of reduplication that may occur which requires that the vowel be long.
unspecified for branching but the second copy requires a branching nucleus, and consequently the result is an obligatorily branching nucleus. (10c) provides the mirror image of this. (10d) shows the result where both copies are specified to be branching and the result is therefore also branching. There is a further possibility which might occur, the case where one copy is specified to be non-branching and the other is specified to be branching, as shown in (11).

(11)  
\[ \frac{N}{\mu \mu} \cup \frac{N}{\mu} \rightarrow *N \]

The result of unification of these two templates would be failure of the unification. yet this pattern is never found to occur, i.e. there can be no failure for the construction of a valid morphological form since the absence of morphological information, in this case a copy, does not serve to convey the necessary meaning, hence the resolution must be in terms of the priority of one structure over another in those cases where failure would occur. This is the basic idea behind the notion of priority unification. This notion, suggested in Shieber 1986\textsuperscript{10} and modified here to accommodate this morphological theory, would assign priority to one morphological structure over another in those cases where the failure of unification would result in the impossibility of constructing an expected form. The determination of priority

\textsuperscript{10} Shieber attributes the notion to researchers in the area of LFG but provides no references to sources on the subject. My characterisation here may or may not be in keeping with these sources.
would be based on the importance of new information, the dominance
of marked patterns, and other criteria contributing to the
enhancement of morphological forms.

One clear instance of the need for priority unification may be seen
in the use of the Head Feature Convention, which determines the
features on a form by percolating them up the tree from the head.
Thus, a feature which is found on the head of a word, as in the
following example, will be relayed up to the top of the tree and will
determine the feature for the entire form (cf. Lieber 1980).

(12)

```
[ masc ] [ pl ] [ gen ]
```

```
[ masc ] [ pl ]
```

```
Hund -e
```

```
[ masc ] [ pl ] [ gen ]
```

In a language such as German, the gender of the word is inherent
in the base in examples such as: der Mann 'the man', die Frau 'the
woman', and das Buch 'the book'. The choice of inflectional markers
of gender and number is determined by the inherent gender of the
base. Classical examples of the violation of natural gender include the
neuter forms, das Knabe 'the boy' and das Weib 'the woman' and show
that gender must be encoded on the base. The addition of inflectional
morphology to these forms does not alter the gender of these forms,
but the addition of the derivational suffixes -chen or -lein, both
diminutives, does. The outcome of adding these suffixes is the change of the gender to neuter, thus das Männchen 'the manikin' or das Fräulein 'the young woman'.

(13)

It is clearly the case that the suffix determines the gender in these cases but it is also clear that the base has its own gender. How is this apparent conflict to be resolved? We must appeal to priority unification in order to obtain the proper output in this case. That is, the gender is determined by the suffix, which overrides the gender specification of the base, regardless of its gender.

As we will see in Chapter 2, this example is virtually identical with the case of reduplication in Nitinaht. A further example of the usefulness of this machinery comes from the coalescence of vowels. The unification of features in this case results in the most fully specified vowel appearing as the result, as in (14).

(14)
Thus the resultant vowel is always the most fully specified one. A case such as this occurs in Nootka and is discussed in Chapter 4.

A further instance of priority unification is the case of templatic satisfaction in Nootka Hypocoristic formation. In this operation, a maximal syllable template is unified with the existing structure of the name in question, the result being based on the structure of the original name but conforming to the requirements of the innovative template, since it is providing the new information, i.e. the hypocoristic form which is a derivative of the original name. If strict, unprioritised unification were employed here, it would always fail, since the only opportunity for success would be where the original name and the hypocoristic form were identical. This also seems to be the case in the formation of Arabic Broken Plurals discussed in McCarthy and Prince 1988, where the prosodic structure of the base is maintained as long as it is not in conflict with the new template, in this case, the plural.

With these cases in hand, I will now provide a more detailed account of the unification apparatus. Unification is basically an information-combining operation. The information to be combined comes in the shape of set of constraints containing feature-value pairs. It is these feature-value combinations that unification may act upon. These templates may contain only partial information, in other words, templates may be underspecified. When this happens, there are several possible outcomes. One theoretically possible result is that the
structure will fail since it is indeterminate.\footnote{It is not unification which fails here, but rather that the structure is unrealisable due to a lack of information.} This would only be the result where unification failed to provide sufficient information for resolution of the indeterminacy. There are, to my knowledge, no examples of this possibility to be found in language. Another is that the indeterminate structure will be filled in by default rules, thereby licensing it. Alternatively, there may be a merger of this indeterminate template with another template which may or may not also be underspecified. This is where unification comes into play.

If the two templates contain information that is completely compatible, then the unification will be successful and the result will be a single template with the features of all the input templates, as in (13a) below. However, if the templates contain conflicting information, there are two possible outcomes: (i) the unification fails and the form is rejected as in (13b), or (ii) there is a priority established which allows one of the templates to override the other, resulting in a partial unification with some values assigned by the dominant template, as in (13c). Cases of all three types exist.
The first case (15a) may be illustrated by the example of unification of reduplicative templates provided in (10), while the second case is found in syntax but apparently not in morphology (cf. Pollard and Sag 1988). A hypothetical and, I believe, unrealisable example of a morphological case (15b) might be if a morpheme requiring a short copy were combined with one requiring that the copy be long, resulting in failure of unification. What actually happens in such instances in morphology, however, is that this case is resolved in another fashion (15c), since the need for representation of the morpheme would override the prohibition on the coexistence of two suffixes requiring conflicting outcomes. This is the result with priority unification in hypocoristic formation discussed in chapter 4. The two templates involved are the hypocoristic template, which has partially specified information and the regular template which contains fully specified information. If unification were applied to such a case in a totally blind manner, it would always fail, but this
cannot be the result as the hypocoristic template represents new information and it must have some means of expression. Therefore, there must be a principle of priority which allows the hypocoristic template to determine the result of unification, retaining as much of the original information as possible in line with the new template.

Priority unification makes use of two further assumptions that I am making here, i.e. the existence of templates and constraints, and the need for success in constructing linguistic forms. Actually, my proposal views templates as sets of constraints. The avoidance of failure through the use of priority unification seems to be a property of linguistic systems which rely on information from more than a single source in constructing the final shape of a form, e.g. in hypocoristic forms that are based on the altering of some original shape. These ideas will be discussed in the next two sections.

1.3.3 Templatic Morphology and CV Segregation
There can be no doubt that the use of templates has enabled linguists to account for many previously intractable problems in terms of neat, intuitively plausible multi-tiered representations such as that provided by McCarthy 1979 for Semitic root-and-pattern morphology. The template will be of great importance in this dissertation and will appear in a number of cases of varying form. The template may involve units from the foot all the way down to the mora and will be shown to provide all the necessary machinery for capturing cases of
reduplication, metathesis, and truncation that occur. I will argue that, in fact, it will account for all cases that may occur.

While segmental slots will be represented by C's and V's here, this is only for purposes of exposition and I do not assume any theoretical importance for such entities. My main concern will be with the mora and larger units, the sub-moraic constituents being included for ease and clarity of presentation. This templatic approach provides a principled account of reduplication in Nitinaht (chapter two), hypocoristic formation in Nootka (chapter four) and cases of metathesis discussed in chapter five. I will also be assuming a version of CV segregation as suggested by McCarthy 1989.

McCarthy 1989 has suggested that there are several reasons for looking at languages as employing a separation of consonant and vowel tiers, as is commonly encountered in Semitic root-and-pattern morphology. One is the prototypical case of separate morpheme on a separate tier, as is found in Arabic.

But this is not the only class of cases that are subject to separation of tiers. Archangeli 1984 has argued convincingly for a similar status for the Yawelmani dialect of Yokuts, based on the imposition of templates by various affixes of the language. This case does not actually involve separate morphemes as much as a constraint imposed be one morpheme on another, similar to the case of morpheme-based reduplication as discussed in chapter 2 here.

A further possibility concerns those languages where syllable structure is completely predictable and highly constrained, and
therefore amenable to a treatment where the C's and V's are separately encoded, C's only ordered with respect to each other, and V's likewise. The ordering of C's with V's is then accomplished by the language-particular constraints on syllable shape.

This notion of CV segregation will play an important part in the analysis of 'metathesis' in Straits Salish which will be discussed in chapter 5.

1.3.4 Constraints in Morphology

A further consideration in this thesis is the distinction between rule and constraint. Simplistically, rules do things, constraints see that they are done. It will be the view of this work that it is preferable to employ constraints to ensure that a structure conform to a particular shape rather than a rule to alter the shape of the form, as shown in the alternative representations of the prohibition of glottalised segments from occurring in the coda of the syllable in Nootka, as in (16) below.


It is possible to have either a positive constraint as in (16a) above, or a negative constraint as in (17).

(17) Negative Constraint: * [+gl] / lN' → lN''
Rules of the type in (16b) are structure-changing and as such employ the full power of transformations to produce the desired output. Constraints, on the other hand, only operate to ensure that the output is as desired, never invoking a change in the structural description but merely rejecting any output which does not conform to their requirements. While such powerful mechanisms as the rules of (16b) seem necessary in phonology, they are not obviously required in morphology.

Constraints may operate with underspecified segments to produce the final outcome of rules such as the intervocalic voicing rule that follows, where a constraint against voiceless segments occurring between vowels operates in tandem with a feature-filling procedure to create the fully specified output.

(18) a. Constraint:

b. /p/ : [−vd]
   /b/ : [+vd]

c. //tapi// → /tibi/

(18a) provides the constraint against voiceless segments appearing intervocalically and (18b) gives the relevant feature specifications for the two phonemes, /p/ and /b/. Usually, /p/’s feature will be filled in
with the value [-vd] at the end of the derivation, but in the appropriate environment, that is intervocally, the constraint in (18a) will ensure that /p/ will be realised as /b/. This operation, far from being structure-changing, can be seen as structure-building, simply filling in unspecified features instead of altering existing ones.

It will be assumed that some version of underspecification theory is at work here, determining the output of unification of feature complexes and the correctness of templates. Constraints can be used to ensure that the proper outcome of reduplication or other templatic phenomena appears in the final output without having to resort to structure-altering transformational rules, which are a necessary part of the EWP program.

1.4 Overview

The primary goal of this dissertation is to present a theory of morphology in which the only morphological operation which exists is combination. In doing this I adopt an enriched notion of affix that allows the inclusion of autosegmental tiers including separate consonantal and vocalic tiers in the class of languages described by McCarthy 1989. Further enrichments include the incorporation of prosodic material as argued for in McCarthy and Prince 1986, and the use of constraint-based templates. I propose a slightly different version of the structure of the syllable, which pertains directly to morphological structure, as well as the use of a principle of unification of templates that operates in a certain class of cases.
As is stated in Zwicky 1988, the reduction of morphological operations to a class of operation types is a step toward constraining the theory, but my contention is that the step can be carried to its logical conclusion, i.e. there is only one operation type in morphology, combination. This would be the most constrained version of the theory and the one for which I argue here.

It seems that EWP loses an observation in that the class of operations to which it subscribes are actually reducible to two classes: one class consists in the rule of combination, including affixation and compounding, and the second class, containing everything else, is a subset of the regular class of phonological rules.12

One of the best ways to isolate the key issues in a theory is to examine the classes of cases that are considered to be crucial or problematical for a particular model, i.e. problems which cannot be handled by the competing models, either at all or at least in a less motivated fashion. What appear to be the key issues in this case involve reduplication, long-distance dependencies or action-at-a-distance, truncation, ablaut, and metathesis. The reasons for this choice of cases is straightforward: all these cases involve some aberration from the 'classical' definition of morpheme.

In the case of reduplication, the formative or phonological form of the morpheme concerned has no melody of its own but relies on some

12 Paul Kiparsky has pointed out to me that there is one case which seems problematical here. In Chukchee, there appears to be a rule of reduplication that serves only to provide a proper foot, thus a phonological rule of reduplication. This is the only case of this sort of which I am aware.
portion of the base word to supply its melody, for which reason it has sometimes been referred to as a 'chameleon morph', as in Hockett 1955. In Nootka, there are cases of reduplication such as the following,

(19)  

<table>
<thead>
<tr>
<th>Word</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>?ack?ack</td>
<td>'jumping'</td>
</tr>
<tr>
<td>ciqciq</td>
<td>'talking'</td>
</tr>
<tr>
<td>mitxmitx</td>
<td>'turning'</td>
</tr>
</tbody>
</table>

where the underlined portion is the root and the reduplication precedes it.13 In Nootka, there can be one and only one root per word, so this cannot be a compound. The morpheme signifies a repetitive aspect and is represented in each instance by a different sequence of phonemes identical to the phonemic melody of the root. Such cases are common in languages, yet difficult to capture in an account that views the affix as a simple sequence of phonemes linked to a morpheme, since the melody of the morpheme is variable. If this so-called morpheme has no single melody of its own, then how can it constitute an affix? On the simple-minded view of an affix as just a sequence of phonemes there is a problem, but an account employing a morphological rule such as: do reduplication, will encounter no such difficulties. This, in a rather simplistic form, is the view of process-based accounts.

Long-distance dependencies are another thorny case. They involve what might appear at first glance to be discontinuous affixes, one part

13 Note that this case is illustrative of the N"-type of reduplication which copies the entire syllable regardless of its constituents.
occurring at a point separated from the other by intervening material, as in (20), where the variables separated by hyphens represent separate formatives, but $X$ and $Z$ represent a single morpheme.

(20)

$$X - Y - Z$$

Relationships of this kind require machinery which is powerful enough to relate the forms, yet which is constrained enough not to grossly overgenerate forms. Again, this is not within the realm of the traditional conception, which views affixes as pearls on a string, one following the other, relationships obtaining only between adjacent members. For this reason various linguists, including Siegel 1977, Allen 1978, and Broselow 1982, have proposed locality conditions in terms of adjacency, such as the Adjacency condition of Allen 1978:

(21) (= Allen's (215)) The Adjacency Condition (revised):

"No rule of word-formation can involve $X$ and $Y$, unless $Y$ is uniquely contained in the cycle adjacent to $X"."

This condition has been challenged in recent work (e.g. Carstairs 1983), but it continues to retain its value as a predictor of morphological availability.

On the other hand, a rule-based approach need only relate the two parts by means of a process which has two loci and the rest will follow naturally. Notice that it seems to be impossible to maintain a locality condition with more than vacuous validity in a theory that sees
affixation as being 'on an equal footing' (Zwicky 1988) with all other operations. It would require considering combination to be a distinct operation from the rest, since the remainder, by definition, cannot involve locality.

Subtractive morphology involves yet a further consideration in a typology of morphological types, that is, is it possible to have an affix which consists of the removal of material, as is shown in (22)?

(22) \[ X - Y - Z + W \rightarrow Y - Z - W \]

It is improbable that one could be justified in labelling such a phenomenon 'combinatorial', since the primary characterisation of an affix is as a (possibly zero) formative which is added to a base, not one which removes material from the base, a characterisation to which I also subscribe. On the other hand, it is important to determine what exactly the base is, so that one does not misinterpret the operation as truncation when, in fact, it is combination. For this reason, cases of subtractive morphology must be carefully examined to ensure that what occurs is really removal of material. Given that the case is valid, a model which employs the powerful machinery of structure-changing rules is well suited to the treatment of this problem and therefore, truncation of this type argues for a process-based approach to morphology.

Ablaut refers to the conditioning of the shape of some portion of a base in relation to some morphological category change in the form.
illustrated in (23) below. Again there is the problem of an affix which does not fit into the usual conception of ‘affix’.

(23) \[ X Y Z \rightarrow X W Z \]
\[ [+ F] \quad \text{where } Y \neq W \]

Finally,\(^{14}\) there is the case of metathesis, which is possibly the most difficult case to handle in a combinatorial account of morphology since it involves a morpheme which transmutes segments, reversing their order in some regular fashion as in (24).

(24) \[ W X Y Z \rightarrow W Y X Z \]
\[ [+ F] \]

Such cases would necessarily require the use of a transformational rule to account for this permutation, since it is virtually impossible to motivate a rule-ordered combinatorial account which does not appear ad hoc and awkward. Rules of this nature are conducive to a processual model of morphology such as EWP and, therefore, these cases are particularly important for this dissertation and will figure prominently here.

We should note that we refer here in all instances to cases which involve actual instances of morphemes rather than simply sequences of phonemes that may result from later rules of the phonology or phonetic implementation. For example, metathesis as a phonetic

\(^{14}\) That is, finally for the purposes of this investigation, since there may be other cases which arise and which will require attention in the future.
concomitant of sonority restrictions is not of the same class as metathesis employed as a grammatical marker, the latter being the case of interest in this dissertation.

The problems which I have chosen to elucidate this thesis include morpheme-based reduplication in Nitinaht, stress assignment conditioned by suffixes in Interior Salish, variable-length vowels and hypocoristic formation in Nootka, and grammatically-conditioned metathesis in several languages.

In Chapter Two I will examine the nature of reduplication in its most complex form, i.e. when there are both long-distance dependencies involved and multiple occurrences of the phenomenon. The problem that I will present is that of seemingly non-local effects of copying on roots in Nitinaht and the occurrence of a single copy where one would expect more than one if it were simply a matter of strict affixation. This situation appears to argue for a transformational account as suggested for Tagalog by Carrier-Duncan 1984, but in reality it can be reduced to a local operation on a base which constrains its shape, explaining the occurrence of only a single copy regardless of the number of suffixes that require a particular form.

This actually argues against a rule of reduplication which would apply mindlessly to give you as many copies as required in whatever configuration desired, and argues for a theory based on templatic constraints, which are subject to the unification of information. Here we encounter the first instance of the utility of unification in comparing and uniting templates into a single entity.
I show that reduplication must be treated as a relationship between this required shape of the base (i.e. as reduplicated in some fashion) and the morphemes which require the shape. A further concern is the fact that these morphemes need not be adjacent to the root but may be separated from it by other, intervening morphemes. However, the operation is on the base and requires only that it conform to the required shape, regardless of the intervening material. The concept of unification is introduced here as a necessary part of the account of Nitinaht reduplication. Multiple copies appear as only a single surface version bearing the features of all the input copies. The conclusions of this chapter are that reduplication must be treated as a form of constraint satisfaction, involving the realisation of a single base reflecting the exigencies of all of the morphemes involved.

Chapter Three contains a treatment of stress assignment in a group of Interior Salish languages which appears to pattern like Vedic Sanskrit pitch accent in many ways, yet is realised as stress, with its phonetic correlates of vowel reduction and deletion. This case deals with the seeming non-locality of the stress assignment rules which shift stress arbitrarily across the word, depending on the affix attached. This arbitrariness can, in fact, be reduced to a pair of features which operate in the languages, extrametricality and stress blocking, that work together to produce the proper assignment of stress in the languages. The non-locality is reduced to a chain of local relationships feeding the stress rules, thus obviating the need for a long distance rule of stress shift.
This case also involves long-distance dependencies and requires that one regard combination as obtaining at more than simply the level of the melody. It will be seen that here again the structure of the word is affected by morphemes of certain classes, which attract the stress from weaker roots and bases, and this, coupled with the assignment of extrametricality to certain of these morphemes accounts for the results described.

Chapter Four concerns the formation of hypocoristics, or terms of endearment, in Nootka. Pet names are created through a complex interaction of truncation of elements of the melody, in conjunction with both quantitative and qualitative ablaut of the stem. This example is a prime candidate for a process-based treatment employing 'subtractive' morphology, however it will be shown that it is also amenable to a more restrictive, constraint-based account if we allow ourselves to move beyond the level of the segmental melody when describing morphemes. There is a prosodic template of hypocoristic formation which constrains the shape of the melody of the name and which operates in a fashion reminiscent of reduplicative copying but without the retention of the original input. This analysis makes the case appear much more like constraint-satisfaction along the lines of McCarthy and Prince 1988's treatment of Arabic Broken Plurals rather than subtraction.

The case of hypocoristic formation in Nootka is an important one for several reasons. First it presents a superficial example of truncation at work in morphology, arguing for a process of subtraction. I
say superficial since it is only truncation at the surface level and
cannot even be explained at that level in terms of truncation, since
there is in actuality no unified sequence of segments, syllables or
other unit of language that is removed. Quite the opposite, it is a
perfect example of the operation of templates in language, in this case
a partially specified foot which links from left to right, taking its
melody from that of the original word and filling in where possible.
The further concern of vowel ablaut, frequently considered to be
indicative of a process at work, can be seen to be a straightforward
element of a partially specified template unifying with an
underspecified class of vowels, resulting in the apparent mutation of
the input vowels.

Chapter Four will also contain an exposition of the phenomenon of
variable-length vowels in Nootka, which will serve to establish the
syllable structure of the language. This case is highly reminiscent of
cases of ablaut, in this case quantitative rather than qualitative ablaut,
which have been put forward in the literature as counterexamples to
the notion of combination. However, the resolution of this problem
relies on the assumption that there is a special structure for certain
vowel-glide sequences in the languages combined with other effects
triggered by the prosodic structure of the first foot of the word.
Nootka variable vowel length has previously been dealt with by means
of a tripartite division of vowel length or by metrical rules of stress
assignment. The former is unsubstantiated in the language elsewhere
than in this case, and is not found in language in general, and evidence
about stress assignment in these languages will show that the latter is undesirable and most probably incorrect. A treatment will be offered in terms of a different structure for certain surface long vowels, based on a historical difference regarding long vowels versus vowel-resonant sequences as is still found in the Northern Wakashan languages.

In Chapter Five, the phenomenon first described as grammatical metathesis by Thompson and Thompson 1969, and presented by Anderson 1988 as an argument for the Extended Word and Paradigm model is described in detail. Examination of several putative cases of morphological metathesis leads to the conclusion that there are no valid cases of this operation in morphology.

The first class of cases which I will resolve are those involving sonority hierarchy violations and other constraints on the occurrence of sequences of phonemes. Such cases are purely phonological or phonetic in nature and do not involve morphemes at all and therefore are not within the scope of investigation.

Then I will present a case of the affixation of a morpheme which results in the violation of the previously mentioned constraints, showing that this also is not 'grammatical', after which I will explore a class of cases which involves the separation of tiers, and thus no violation of crossing association lines but merely the effect of conflation to a skeleton in two distinct orders.

Finally, I will examine in detail the strongest case, that of a language which appears to transmute vowel and consonant in order to represent an aspectual shift. I will argue for a template-based account
of the morpheme involved. This reanalysis shows that the case is really one of combination, but to the prosodic structure of the form rather than to the melody or skeleton. However, this analysis is inconsistent with the claim that only languages with long vowels have syllable quantity (cf. Zec 1988). I will shown that this apparent counterexample merely requires looking at Zec's hierarchy as one parameter in a more complex system which involves parochial considerations of implementation, including the means to encode additional weight, which may be encoded by vowel-length, gemination, metathesis, or various other attributes.

It will be the conclusion of this dissertation that adequate machinery already exists to deal with currently known morphological phenomena in the form of combination in conjunction with constraint-satisfaction and unification, without the need for process-based mechanisms of truncation, metathesis, and the like, and that operations such as these are best looked at as instances of the interaction of other, less powerful morphological operations with the phonology, where such operations may exist. As such we should never require non-local, structure-changing transformational rules of the sort envisaged in process-based morphology.
Chapter 2
Reduplication in Nitinaht

2.1 Introduction

Reduplication in its various forms has been the topic of much discussion in the linguistic literature recently. Linguists have argued variously for reduplication as a rule (Aronoff 1976) or a process (Anderson 1988, Carrier-Duncan 1984) and as an affix (Marantz 1982). I argue here for a constraint-based, templatic approach to reduplication.¹ This approach is akin to the affixal proposal of Marantz 1982, yet incorporates current advances in the area of prosodic morphology as suggested in the work of Steriade 1988 and McCarthy and Prince 1986, and permits the unification of template-based copies which co-occur on the same level.

The basis for this claim involves the morphological principle of reduplication as it is found in the Nitinaht language. It will be shown here that this operation presents at least three major problems for

¹ This treatment is not entirely in keeping with McCarthy 1979’s original use of templates, where they carried their own significance and are not merely part of the process of affixation. The term template is itself a confusing one. It is sometimes used to designate a set of constraints that a form must satisfy, e.g. a syllable template; at other times it signifies a morpheme skeleton without any melodic content. The usage in this dissertation is more in keeping with the former.
current approaches to morphology: first, the problem of non-locality as shown by the reduplication triggered by nonadjacent affixes; secondly, the application of phonological rules (in this case, vowel lengthening) in a morphological context, independently to either the base form or to the copy or to both; third, the unification of copies resulting in only a single surface copy, where an affixational account would predict as many copies as demanded by the suffixes requiring them; and, finally, and most importantly, the fact that reduplication of the type described here cannot be adequately handled by rule-based treatments such as that of Carrier-Duncan 1984 nor by the strictly affix-based approach as found in, e.g., Marantz 1982, but rather by an extension of this latter approach based of constraint-satisfaction.

The issue of non-locality arises through the concatenation of certain derivational suffixes of the language which require the simultaneous appearance of reduplication on the root to which they are attached. They may be separated from the root by a number of other suffixes and still require the reduplication of the root. Other forms, identical except for the pertinent affix, do not show the reduplication. Any theory which restricts cyclicity to applying at the end of the level cannot account for the effects of these suffixes and they violate any notion of subjacency which equates the level with the cycle. On the other hand, if the cycle applies at every instance of affixation on a level, erasing brackets in its wake, there would be tremendous overgeneration of reduplicative copies attached to the root.
On the application of vowel lengthening to the vowel of the root or to the copied vowel of a reduplication, problems concerning ordering of rules arise due to the interaction of the rules of vowel lengthening and reduplication, both triggered by different affixes in the same form. One must order the rules in some fashion so as to avoid lengthening ineligible vowels in one case and so as to induce lengthening in another case where it is necessary. This notion of a rule of vowel-lengthening is itself problematical for an affix-based model, since the rule applies to change the shape of the nucleus, much like a quantitative ablaut rule. However, in a constraint-based model, this is not viewed as a rule, but as a requirement on the shape of the nucleus which must be met in order to satisfy the constraint.

Another problem which occurs here is the appearance of multiple reduplication-requiring suffixes of varying types, which combine in a certain fashion to realise the final result. The result is a single copy, unexpected in an affixational account such as Marantz 1982, which reflects the features required by all of the suffixes that appear. This form of reduplication-triggering has not been described previously in extant examples such as the case of Tagalog from Carrier-Duncan 1984. Furthermore, neither a strictly affixational account nor a rule-based account explain this behaviour, whereas on a constraint-based approach this is what is expected, given that all that is required is that the base reflect the exigencies of the suffix which is attached to it.

The final problem presented here, and the most complex, is the issue of how to capture the generalisations regarding the application
of reduplication and vowel lengthening in the cases mentioned in a fashion which doesn't do injustice to either the data or to theoretical considerations. It will be seen that the only way to accomplish this is to abandon the notion of strictly rule-governed applications and the idea that reduplication attaches an affix to a base, and to follow the view that both reduplication and vowel lengthening are imposed as constraints on the shape of the base. This is the approach of this chapter. Thus, reduplication in Nitinaht is not a morpheme in itself, but rather merely an effect induced on the base by the exigencies of one or more morphemes.

In the following section I will provide the background necessary to the argumentation of the remainder of the chapter. Following this I will present the patterns of reduplication which constitute the basis for the arguments for a constraint-based approach advocated here and then a presentation of alternative models of reduplication which fall short of accounting for the data. The need for a constraint-based treatment of affix-triggered reduplication emerges from this exposition and is presented in the penultimate section, which ends with a summary and the presentation of further issues to be investigated in Nitinaht reduplication.

2.2 Background

Nitinaht is a member of the Southern Wakashan group of the Wakashan family which includes the Northern Wakashan language, K'ak'ala, along with several other, lesser known languages, and the
remaining Southern languages, Nootka and Makah. Word structure in Nitinaht is very complicated, or in Sapir's terms 'polysynthetic', employing suffixation to a great extent. There are no prefixes in the language and the only element that may appear preposed is a reduplicative copy of the verb root, which itself supports the view presented here that reduplication is not simply affixation. Words consist of roots, defined as the leftmost, non-reduplicative, non-infixal, single morpheme, which may not stand on their own, bases which are really extended roots, built from roots plus any number of derivational affixes, and suffixes which combine with the former to form complete stems or 'words' containing some form of aspectual marking, either inherent or overtly marked in some fashion. This classification mirrors the typology of morpheme types proposed by Inkelas (1989:101):

(1)  

<table>
<thead>
<tr>
<th>Prosodically dependent</th>
<th>Morphologically dependent</th>
<th>Not morphologically dependent</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>affix</td>
<td>clitic</td>
</tr>
<tr>
<td>Root</td>
<td>root</td>
<td>stem</td>
</tr>
</tbody>
</table>

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The shape of roots is typically CV(•)C\textsuperscript{3},\textsuperscript{2} although there are some bisyllabic and, arguably, a handful of trisyllabic 'roots'.\textsuperscript{3} To the root are suffixed morphemes of several different categories: (I) lexical, serving to enhance or expand the lexical content of the root in some fashion; (II) aspectual, involving a number of different morphemes indicating aspect; and (III) inflectional, involving the categories typical of inflectional systems. I and II are subsumed under the category 'derivational suffixes' and occur in the word before category III suffixes.

Lexical suffixes consist of approximately 400 basic morphemes which may be further subdivided into (a) governing and (b) restrictive suffixes.\textsuperscript{4} The former serve as potential heads of the word, determining both the syntactic category and the primary semantic value of the form (i.e. predicates) and are indicated in glosses by means of an ellipsis (...) signifying the position and type of their argument(s), while the latter merely modifies the form either by

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\textsuperscript{2} The use of C and V here and throughout should be viewed as serving for the purposes of expediency, typographical ease, and descriptive clarity. It should not be seen as a claim regarding the structure of the skeleton, which I consider to be composed of X-slots linked to moras/syllables, as described in Chapter 1.

\textsuperscript{3} Trisyllabic roots are only encountered as the result of lexicalisation of an earlier, root-suffix combination which appears to be formed of the root 'ba- 'dwell' plus the suffixes '-ixq '?' and -ac 'belonging to...', or as the result of a borrowing, as in the word for 'boy', be?ixa?ac which appears to be formed of the root 'ba- 'dwell' plus the suffixes '-ixq '?' and -ac 'belonging to...', or as the result of a borrowing, as in the word for 'sheep', labatu < French 'le mouton', possibly through Chinook Jargon.

\textsuperscript{4} This distinction may be an unnecessary one but I will not investigate this idea here and I will simply accept traditional descriptive terminology as encountered in Sapir and Swadesh 1939 on the closely related Tsishaaht (diSa-?atH) dialect of Nootka. Cf. Andrade 1933, Boas 1947, Bybee 1985.
specifying the location, manner, attitude or other deictic attributes modifying the head. Examples of both of these are given in (2).5

(2) Governing:

\[ ?aX+i4 \] 'make two'
\[ two-make... \]
\[ ?aX+aVa?sa' \] 'want two'
\[ two-want... \]

Restrictive:

\[ ?aX+i?z \] 'two on the beach'
\[ two-on beach \]
\[ ?aX+padaC \] 'two moving about'
\[ two-move about \]

In these examples, forms such as -i4 'make ...' and -baVsa 'want to ...' create a verbal element from a verbal or non-verbal element and forms such as -i?z 'on the beach' or -padaC 'moving about' merely modify an existing base. Note that the second example under the restrictive category does not mean 'move two about', which is a verbal notion.6

The aspectual suffixes of Nitinaht serve to determine the status of a form with respect to state, repetition, momentaneity, graduativity, etc. There are about a dozen different aspectual possibilities realised by

5 Forms are given in strictly morphological shape, i.e. without accompanying phonological rules of sandhi, cophresthes and deletion in order to illustrate the various suffixes. However, certain other rules must apply in order to derive the surface form in most examples. Henceforth, I will follow the convention of underlining the root in its basic form, leaving a gap where vowel length is not inherent, thus \[ Xi-X \] 'laugh', where vowel length is inherent, \[ XiX \] 'red', where it is not.

6 For further elucidation of this point in a related language, see Rose 1982:292 et seq. on Kyuquot.
individual suffixes and combinations of suffixes, including -$ix$
Momentaneous (MOM) and -$uk$ Durative (DUR), which create the
principal distinction of action versus state, similar to the
imperfective-perfective distinction as found in Slavic, Straits Salish,
and many other languages. These aspectual affixes cannot be
distinguished from the derivational ones on the basis of location in the
word, as they occur in the same positions as the latter.

The final group of affixes are the inflectional suffixes, which are the
last or outermost suffixes to attach to a form. These suffixes specify
mood, tense, person, number, voice and other similar categories and
occur in a fixed order after the other classes of affixes as opposed to
the derivational and aspectual suffixes, which are relatively free in
their order of occurrence.

Instances of the various possible combinations of different types of
suffixes may be seen in (3), where lexical, aspectual, and inflectional
affixes all appear.

(3) pi:sat+uk+a$\varphi$a+xtaq+$s$i+dij$+$ix+id 'We will run repeatedly from
(separate) points'
run-DUR-continuously-from-MOM ITER-FUT-1 pl
(from Haas and Swadesh 1932)

qi:c+i$\varphi$ak+i$+$a$\varphi$e$+$y$k+aba$\varphi$sa$+$a 'He wants to tend to dislike
making pencils'
mark-instr for..-make..-dislike..-tend to..-want to..-3 INDIC

Iteration of derivational suffixes is possible, allowing for infinite
recursion, in theory. 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, indexing of arguments etc., thus:

(4) $\text{qi}^c$-

- $\text{qi}^c+i\text{yak}$  
- $\text{qi}^c+i\text{yak}+i^+$  
- $\text{qi}^c+i\text{yak}+i^{++}i\text{yak}$  
- $\text{qi}^c+i\text{yak}+i^{++}i\text{yak}+i^+$  

'mark, scratch'
'tool for marking = pencil'
'make pencil(s)'  
'tool for making pencils'
'make tool(s) for making pencils'

The primary concentration here will be on a specific class of reduplicative patterns in this language and their implications for current theories of morphology. The next section of this chapter will outline the various types of reduplication which will concern us, as well as give a basic introduction to Nitinaht word formation processes necessary for this exposition. Then, we will examine the various interactions possible among reduplicative patterns, followed by a discussion of the problems involved in describing the Nitinaht system in terms of current theoretical devices. I will conclude with some suggestions for treating reduplication in this language and in other languages with similar traits.

### 2.3 Reduplicative Patterns in Nitinaht

A certain subset of the lexical suffixes in this language require that certain effects on the shape of the root be manifested, either length

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7 The length of the root vowel here and following will be discussed further on in the paper. For the moment it should suffice to say that it results from the affixation of the affix represented by $-i^+$. 

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on the root vowel, reduplication of some portion of the root, or some combination of the above. The reason for treating these suffixes as requiring this is the fact that whenever they occur in a word, as above, the appropriate effect also occurs. However, in an identically formed word lacking only the particular suffix, this effect is not found. We can isolate the approximately forty reduplicative suffixes of this class as in (5) below.

(5)  a. xic+ak
     xixic+xikituk
     'whiteness'
     white-DUR
     'flour'
     CV(=μ) - white- resembles...

     b. tu-X+apt
     tu-tu-X+ubq+aRuk
     'Spruce var.'
     scare-plant
     'Juniper-leaved Hair moss (= looks like a spruce tree)'
     CV-scare-plant-resembles...

However one wishes to look at the occurrence of this reduplication, it seems impossible to deny the connection between a subset of suffixes and these effects. The long vowel-requiring suffixes may be isolated in similar fashion:
(6) a. ygaq+'aq 'the one who...
   REL-DEF
   yaq+'aiuk+'aq 'the one who he likes'
   REL +L(engt) - like...-DEF

b. ?ust+aʔs 'on the ground'
   LOC-on ground
   ?ust+ap 'up in the air'
   LOC +L - up above

Simple reduplication and vowel length may also occur together:

(7) a. hita+quʔ 'face'
   LOC-at the face
   hihi-ta+ʔacuʔ 'foot'
   CV+L- LOC- at the foot

b. wik+aʔ 'It's not...
   not-3 INDIC
   ?u-caʔtaksa 'bare feet'
   CV+L-not-at the foot

Here the suffix -ʔacuʔ requires that the root be both reduplicated and long.

A further theoretical possibility is that a suffix may require reduplication with length, not of the root vowel, but of the copy vowel. This possibility is also manifested in Nitinaht:
The fourth logical possibility is that of a suffix requiring reduplication of the root, and length on the vowels of both the root and the copy. This also occurs in Nitinaht.

(9) a. yaq+quy 'the one which...
REL-COND
ya·ya·q+tiš+a·w+quy 'the one to use as guide' 8
CVV+L-REL-use...as guide-should-COND

b. ?u+k′aq+?a tic+līb 'It's called a mat'
REFER + call...+3 INDIC mat
?u·?u·+uk+tiš+a?x+a 'she was using it as a guide'
CVV+L- REFER- DUR- use...as guide- now- 3 INDIC

The length and reduplication required by these suffixes can appear across intervening, neutral suffixes, as shown in (10).

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8 In this example and the following one, I have been unable to find examples of a more perspicuous nature, i.e. without the additional affixation, due to the relative rarity of the trigger suffixes. However, it is clear from comparison with other examples where the extraneous suffixes occur that it is not these which trigger the phenomena.
Thus we can see that we have what appear to be discontinuous morphemes, that is a morpheme which consists of two parts, one a reduplicative copy of part of the root and the other, a suffix with overt phonological form. Note that in these examples, the vowel of the 'copy' is long, in addition to being reduplicated.

The affixes in (7-10) require the following types of reduplication.

One pattern is that in which the reduplicated copy consists of the onset and nucleus of the root. The length of the vowel of the copy is identical to the length of the vowel of the root whether this is short or long.

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9 I will argue against this analysis on the basis of data introduced further on in this paper.

10 Note that there are no word-initial clusters in Nittinaht, all roots being CV initial, although quite complicated clusters may occur word-internally, as, for example, in the word for mussel shell, \( \text{ku}\text{čč}k\text{č} \) or the one for harpoon-head folder, \( \text{ba-kidk}^{\text{č}} \).
(11) **Reduplication of the onset and nucleus of root ([R]):**

a. ?u+k'aq+?a  ticlib  'It's called a mat' (INDIC)
   REFER+call...+3INDIC  mat
?u?u+ruk  'he resembled him'
   CV-REFER-resemble...-Ø Subj/Obj

b. pi'la'q  'liver'
   pi'pi'la'q+ruk  'resembles liver (=yellow pond lily)'
   CV-liver- resemble...

Another type of reduplicative pattern requires that the vowel of
the copy be long regardless of the length of the root vowel. We
encounter forms such as in (12) where the quantity of the root vowel
does not participate in the determination of the length of the copy
vowel.

(12) **Reduplication plus lengthening of reduplicated V ([RL]):**

a. ?a? + i?  'two on the beach'
   two-on beach
   ?a? ?a? + i?  'two in a group'
   [RL]  two-in group

b. ?i?xpai  'six'
   ?i?i?xpai+ïïï  'six in a group'
   [RL]  six-in group

Note that vowels which are already long do not undergo further
lengthening and so do not show any difference from the pattern in
(11b). This is because Nitinaht allows at most two moras per syllable.
and, perhaps, because no language allows triply-long vowels (see p. 22).

Another class requires the root vowel to be long, resulting in forms such as those in (13). Again, forms with inherently long root vowels, as in (13b) are not further lengthened.

(13) **Reduplication plus lengthening of root V ([R+L]):**

a. dač+aʔ
   - to read
   - look-on flat surface
   dadač+uʔk’
   - looking about
   - look-all around

b. wiʔq+siʔ
   - storm
   - stormy-thing
   wiwiʔq+uʔk’
   - stormy weather
   - stormy-all around

Finally, there are forms where the suffix requires that both root vowel and copy vowel be long, again vacuously as in (14b). Suffixes of this type are quite rare (four or five perhaps).

(14) **Reduplication plus lengthening of root V and reduplicated V ([RL+L]):**

a. hukʔat+aʔ
   - flying
   - fly-DUR
   huhukʔat+ataʔ+aʔ
   - he is ready to fly
   [RL+L]
   - fly-ready to ...-INDIC

b. sa·nti·
   - Sunday
   sa·sa·nti·+ataʔ
   - Saturday (= about to be Sunday)
   [RL+L]
   - Sunday-ready to ...

In all of these examples the (a) forms have short root vowels while the (b) forms have long root vowels inherently, i.e. as they enter from
the lexicon before any modifications or rule application. Also, the vowel length of the copy mirrors the vowel length of the root in those cases where the latter is inherently long, regardless of the exigencies of the suffix.

2.4 Possible Models of Reduplication

In this section we will examine some of the current models proposed for the representation of reduplication in various languages and their shortcomings in regards to the problem at hand. One possible account of these facts is to posit transformational rules as suggested by Wilbur 1973, Aronoff 1976 and reinforced by Tagalog data in Carrier-Duncan 1984 which are highly reminiscent of the case at hand. A rule of the form:

(15) a. \[ XCVY \rightarrow 123234 \]
    \[1234\]

b. \[ XCVY \rightarrow ?u?ukuk \]
    \[?ukuk\]

would be capable of handling what I describe as R-type reduplication in Nitinaht and other emendations would capture the other possibilities. But at what cost? As Marantz 1982 states, it would be just as easy to posit mirror-image reduplication rules as in (16) using a transformational analysis, but these are unattested in languages of the world.
Clearly, a transformational account such as this is much too powerful and unconstrained for the purpose at hand and should only be resorted to, all else failing. Its power masks the nature of the operation and confuses the relationship of the parts to the whole in that it can produce virtually any permutation of existing segments with little regard for the existing structure. It is blind to the prosodic relationships that exist in cases of reduplication as suggested in McCarthy and Prince 1986 or Steriade 1988, for instance. Furthermore, as will be discussed later, such an account would overgenerate in cases where there is more than one trigger for reduplication in the same form, since the rule would presumably apply in mechanical fashion, insensitive to the nature of the requirements of the suffix attached.

Another possible account of the facts might follow the line of McCarthy 1981 and Marantz 1982, which extends the analysis provided for Semitic root-and-pattern morphology to handle reduplication. This treatment assumes that reduplication is merely another form of affixation, with the exceptional quality of having only a skeletal tier specified. It furthermore assumes that the affixation is of a morpheme, i.e. the copy represents a morpheme. It is not obvious how such an analysis would handle the data encountered in Nitinaht,
where there is an integral connection between an overt suffix, the root, and a copy of the root. This entire unit represents the requirements of the morpheme, and so the copy itself is clearly not a morpheme on its own but merely part of one. This is obviously something other than affixation to a base. Take the simplest example, that of R-reduplication of a monomoraic root which would be treated as in (17) under a strictly affixing account of reduplication.

(17) \[ ?u \ 2u \ uk \]
\[ CV + CV + CVC \]

How do we account for the relationship between suffix and copy? The problem is exacerbated in more complicated reduplicative patterns such as (18). In this pattern, there is a further mora added to the root vowel after the application of reduplication. Not that if the reduplication applied after the addition of vowel length, the results would be different and, furthermore, incorrect.

(18) \[ dač \ dač \ uk \]
\[ CV + CVC + VVC \]
\[ * dačaču·k \]
\[ vs dačaču·k \]

In Marantz 1982, there are no examples of this type of process and there does not appear to be any way to account for the length of the root vowel in such an account without some additional machinery. We cannot just impose some Semitic-type template which contains a long vowel, as this misrepresents the nature of the process which involves
a reduplicative copy, a lengthened root vowel and a derivational suffix, possibly at some distance from the root. Furthermore, what would the affix signify, if it were one, given the diverse nature of the output?

One could, of course, posit some sort of infixation to handle the long vowel, but it would stand out as the only instance of true infixation in this or any other language of this group and would not help the more general problems of the status of reduplication as affixation or the non-occurrence of multiple copies. Furthermore, the appearance of vowel length would have to precede the reduplication in order to apply to the proper vowel, i.e. the root vowel and not the vowel of the copy. Yet this is not possible since the copy made reflects the vowel length of the inherent root vowel, and not a long version of it, as would be the case if reduplication followed vowel length.

In addition to the arguments stated above, there is the fact that if reduplication were to be treated as an affix, it would have to be a prefix here. However, it would, in fact, be the only prefix attested in the language, or, for that matter, in any Nootkan language. This seems highly unlikely in view of the otherwise entirely sufffixing nature of the language. Then there is the question of the contribution of this affix to the word. As far as I can see, there is no clear derivational function served by this type of reduplication and it must be derivational since,

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11 The use of the term infix with regard to occurrence of certain consonants between the root and copy found in some descriptions of the languages of this group does not constitute an exception to this generalisation and is merely an inappropriate use of the term.
as we have seen, all of this occurs inside of, and therefore prior to, inflection.

An extension of Marantz' analysis of reduplication has been suggested by Archangeli 1983 in order to handle instances of root vowel modification in Yawelmani Yokuts. In Yawelmani, certain suffixes (termed ‘class 2’ affixes by Archangeli) appear to require that their roots conform to a particular shape regardless of the shape of the root in its default form. In order to account for this, a ‘template pool’ is posited as follows:

(19) (= Archangeli’s (51)) Template Pool for Yawelmani:

\[
\text{CVCC} \quad \text{CVVCC} \quad \text{CVCVVC}
\]

Class 2 affixes will require the root to conform to one of these patterns. If there is no class 2 affix present, then the root will conform to a specified ‘default’ template.

While the notion of a template specifying the entire base shape might be necessary to handle the data in Yawelmani, where the possible shapes are strictly limited, it is clearly too powerful a construct for Nitinaht, which possesses many possible base shapes. Thus, the template pool in Nitinaht is increased greatly and the formation of bases from root plus suffix increases it even more. For example, it is necessary for the template to allow for vowel length in bisyllabic roots of the shape CVCVC- as in the root ?inux- ‘small’, but this same shape may also be produced by the affixation of a suffix to a \( CV(\cdot)C_0^3 \)-mono-syllabic root, deriving a bisyllabic base. Similar cases in Yawelmani are not discussed by Archangeli although there appear to
be suffixes which could fit the description if any of them may co-occur. If this template were applied to such a base, the wrong results would be given due to the confounding of root and base and the great number of possible base shapes. Since the affixes requiring reduplication and vowel-length need not be contiguous with the root, this is a very real possibility in Nitinaht.

\[(20)\]

\(a. CVVCVC \quad b. CVVCVC\)

\[?i\, n\, u\, x' + a?dk' \quad h\, a\, \dot{c} + u\, pq + a?dk'\]

[CVVCVC] [CVVCVC]

\[?i'\, nux' \quad a?dk'\quad * \, ha\, \dot{d}upa?dk'\]

[CVCVC]

\[vs \, ha\, \dot{d}upa?q?a?dk'\]

The example shows a possible template pattern assigned by the suffix \(-a?dk'\) to roots to which it attaches. This suffix requires that the root vowel be long. If the template is to account for the shape of the whole root then it must distinguish between those cases where the root is bisyllabic and those where a monosyllabic root is suffixed prior to the concatenation of the length-type suffix. Assuming bracket erasure at the end of every cycle, it would be impossible to specify the root-templates required by a suffix given the number of possible root shapes, intervening suffixes and other effects on the root.

If, on the other hand, bracket erasure occurs only at the end of the level, then the templates should apply as many times as there are affixes requiring them. This would lead either to massive overgeneration of copies or to irresolvable clashes when more than one affix of the reduplication or lengthening type appears.

12 The reduplication triggered by the suffix \(-a?dk'\) has not been included here as it is not germane to the issue at hand.
It should be clear at this point that the ability of suffixes to condition root shape across intervening suffixes poses a problem for theories which advocate the use of bracketing and bracket erasure. It stands in direct contradiction to Siegel 1977 and Allen 1978's Adjacency Condition (21), since there may be several intervening cycles between reduplication-triggering suffixes and the root, as shown in (10) for example.

(21) (= Allen's (215)) The Adjacency Condition (revised):

"No rule of word-formation can involve X and Y, unless Y is uniquely contained in the cycle adjacent to X."

Regardless of bracket erasure, it should now be clear that there is ample evidence that rules of word formation in Nitinaht must make access to material which is not contained on adjacent cycles.

Furthermore this phenomenon directly contravenes Broselow 1982, 1983's use of subjacency within the word which prevents the copying of material across two bounding nodes, where 'word' and 'stem' (= root plus any affix) are bounding nodes for Broselow.

(22) (= Broselow 1982's 17c)

"Reduplication may involve copying only that phonemic material which is uniquely contained in the cycle immediately adjacent to the affix with which the copied material is to be associated."

(23) [eit-]Root +iyuqStem +patStem  'square'

[hu-][hup2-]Root +abaixaStem +'eykStem 'he's always wanting
[RL] to help'
As can be seen from the examples in (23), adjacency of cycles is not a necessary condition for reduplication in Nitinaht, and the number of bounding nodes is not a barrier to reduplication or to root vowel length appearing.

This brings us to the truly problematic cases which arise from a further fact about affix-based phenomena in Nitinaht — affixes requiring reduplication and/or vowel length may co-occur. This is illustrated by the following examples, where more than one of these suffixes occurs in a form.

\[ (24) \]
\[ \text{a. } xu\cdot xuq^+a\cdot ?d+a\cdot p \quad \text{'his legs are really big'} \]
\[ [R] [RL] \]
\[ \text{b. } sa\cdot sa\cdot tq^+'aqsil+a\cdot p \quad \text{'His eyes were really itchy'} \]
\[ [R+L] [RL] \]
\[ \text{c. } ba\cdot ba\cdot aski+yab+a\cdot p \quad \text{'He's really cold on his shoulders'} \]
\[ [R] [RL] \]
\[ \text{d. } xi\cdot xi\cdot daq^+aqs+ib+uk \quad \text{'resembles whale's baleen'} \]
\[ [L] [RL] \]

Notice that in these patterns, where there is co-occurrence of these suffixes, the root \( N \) is copied only once (24a) but other effects such as vowel length may also appear, according to the patterns of the suffixes (24b). Furthermore, the effects on the final form are those required by all the suffixes with the exception that only a single copy occurs. These patterns are unaffected by separation from the root as shown in (24c, d).
If one compares these forms with those given earlier, it becomes clear that it is not only the innermost suffix which acts upon the root in order to arrive at the final output, nor is it only the outermost. This interaction of suffixes and root and the means to capture it will constitute the discussion in the remainder of this chapter.

In this section we have examined various treatments of reduplication and have seen that all of them fall short of accounting for the data encountered in Nitinaht reduplication. Rule-based accounts seriously overgenerate forms and conceal the nature of the operations involved, accounts which treat reduplication as a morpheme lose the relationship between copy and suffix, and treatments which consider reduplication to be simply affixation have no answer for the failure of the suffixes to require multiple copies when the environment for it exists. Furthermore, analyses which make use of adjacency or subjacency must address the difficulties with both discontinuity and the interaction of vowel length and reduplication with the base.

In the following section I offer a solution to the problem which employs the notion of constraint satisfaction combined with the transfer of values from root to copy and a principle of copy unification to arrive at the proper result.

2.5 The Treatment of Reduplication in Nitinaht

Having examined possible treatments of reduplication which do not appear capable of handling the reduplicative patterns of Nitinaht in a suitably succinct and general fashion, I propose in this section a
solution involving the use of a version of ‘transfer’ as suggested in Clements 1985 and an analysis of root copying which applies cyclically, ahead of the requirement of vowel length. Actually, the ‘copying’ is simply satisfaction of the constraint on the shape of the copy required by the suffix. This treatment also makes use of a device which I will refer to as ‘priority unification’ and which is employed to merge or unify the constraints imposed by the various suffixes.13

This procedure of priority unification will result in the conflation of all the specifications on the reduplicative copies that appear on a level into a single copy which contains the characteristics exhibited by all of the copies. The concept of unification is employed in this fashion to unify attribute-value matrices containing values for the features assigned to the phonemes by the constraints. Features may be underspecified and the null set will unify with anything. Thus, a vowel unspecified for height will unify with one specified as [+hi], whereas it will not unify with a consonant since they will differ at least as far as certain features are concerned. As mentioned above, this will be used in conjunction with a constraint-based templatic model for vowel length on the root which applies cyclically in advance of the copying in order to arrive at the correct result. Unification in this use may be thought of as a system for combining constraints to yield a completed form. Motivation for placing reduplication on a separate tier has

---
13 For further information on the nature of unification as it is applied to syntax, the reader is referred to Kay 1985, Shieber 1986.
already been discussed in the previous section and the reader may refer to the arguments there.

This system of ordered interaction between templates and pattern transfer captures the facts of Nitinaht suffix-based processes in a concise fashion as the following examples demonstrate:

(25) **N=nucleus (long or short)**

a. Reduplication of the [R] type requires a constraint that the root onset and nucleus and its copy agree completely, regardless of length of the nucleus vowel.¹⁴

\[
\begin{array}{c}
? \ u \ \kuk & \rightarrow & ?u \ \kuk & \rightarrow & ?u?u\kuk \\
N & [R] & N & N & \text{Root Template} \\
\end{array}
\]

b. Reduplication of the [RL] type requires a constraint that the root onset and its copy agree completely, and that the nucleus of the copy vowel be long regardless of the original length of the root vowel.

¹⁴ The notational equivalents of these prose descriptions of the constraints may be written in the following format although I make no strong commitment to any particular model of formal representation:

a. [R]: \( N_{\text{Root}} \rightarrow N_{\text{Copy}} + N_{\text{Root}} \)

b. [RL]: \( N_{\text{Root}} \rightarrow N_{\text{Copy}} + \mu + N_{\text{Root}} \)

c. [R+L]: \( N_{\text{Root}} \rightarrow N_{\text{Copy}} + \mu N_{\text{Root}} \)

d. [RL+L]: \( N_{\text{Root}} \rightarrow N_{\text{Copy}} + \mu \mu N_{\text{Root}} \)

75
c. Reduplication of the [R+L] type requires a constraint that the root onset and its copy agree completely, and that the nucleus of the root be long regardless of the original length of the root vowel.

\[\text{Root Template} \quad \text{Reduplication}\]

\[\mu \mu\]

\[\text{Vowel Length}\]

\[\text{Root Template} \quad \text{Reduplication}\]

\[\mu \mu\]

\[\text{Root Template} \quad \text{Reduplication}\]

\[\mu \mu\]

\[\text{Root Template} \quad \text{Reduplication}\]

\[\mu \mu\]

\[\text{Root Template} \quad \text{Reduplication}\]

\[\mu \mu\]

\[\text{Root Template} \quad \text{Reduplication}\]

\[\mu \mu\]

\[\text{Root Template} \quad \text{Reduplication}\]

\[\mu \mu\]

\[\text{Root Template} \quad \text{Reduplication}\]

\[\mu \mu\]

\[\text{Root Template} \quad \text{Reduplication}\]

\[\mu \mu\]

\[\text{Root Template} \quad \text{Reduplication}\]

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\[\text{Root Template} \quad \text{Reduplication}\]

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\[\text{Root Template} \quad \text{Reduplication}\]

\[\mu \mu\]

\[\text{Root Template} \quad \text{Reduplication}\]

\[\mu \mu\]

\[\text{Root Template} \quad \text{Reduplication}\]

\[\mu \mu\]
of the morphology there is one and only one realisation of reduplication because all that need happen is that the constraint imposed by each suffix that requires reduplication be fulfilled by the copy and the shape of the copy is determined by a special principle of priority unification. This unification would apply at the end of each level. Thus, two reduplications will produce the following possible results for the copy shape and, similarly, for the root vowel shape as well.

(26)  First Copy               Second Copy

a. N + N \rightarrow N

b. N + N \rightarrow N

15 This representation requires that the N be branching and is indicative of one pattern of reduplication that occurs in Nitinaht which requires that the vowel be long.

c. N + N \rightarrow N

\[\mu \mu\]

d. N + N \rightarrow N

\[\mu \mu\]

We can tell that both suffixes are involved in the process by the effects of vowel length on the root in conjunction with the reduplication. The further possibility of more than two reduplicative suffixes occurring in a form, although unattested in the available data, would be predicted to apply in similar fashion.
First introduced into the literature in a slightly different format by Clements 1985, the use of transfer as a technique for explaining reduplication, which does not involve straightforward affixation but rather, parallel transfer of the root melody to an unspecified template which is then concatenated to the root, has the advantage in this case of isolating the reduplication from the skeleton. This allows for a neater treatment of the cases where reduplication of the root occurs in tandem with length of the root vowel, in which case the copy vowel remains short. This is just what you would expect if the reduplication applied simultaneously with or immediately before the requirement of vowel length, as in (27).

\[(27)\]

\[
\begin{array}{c}
\mu \\
N \\
\end{array} \quad \begin{array}{c}
\text{Vowel Length} \\
\begin{array}{c}
d \quad a \quad \varepsilon \quad +u\cdot k \\
N \end{array} \\
N \\
\end{array} \quad \begin{array}{c}
\text{Melody} \\
\text{Reduplicative tier} \\
\end{array} \\
\rightarrow dada\cdot \varepsilon u\cdot k
\]

Stemberger 1981 presents a number of cases of what he refers to as morphological haplology, a process fairly common among languages of the world whereby identical occurrences of sequences of morphemes may be realised as a single occurrence on the surface. This phenomenon would be another candidate for treatment by unification, unifying the templates required by the morphemes, depending on the particular rules of the language. For example,
Stemberger discusses the case of English plural-possessive haplology as in (28) below from Stemberger 1981's (1-2).

(28) a. the man's/boy's bike  
     b. the men's/children's bikes  
     c. the boys' bikes (*the boys's bikes)

In this case, it is possible for the singular to occur with the genitive (28a) and for the irregular plural to occur with the genitive (28b). But it is not possible for the homophonic plural and genitive to co-occur (28c). In a unification analysis of these facts, one would say that there is a constraint imposed on the shape of the word by the plural morpheme and a shape imposed by the genitive morpheme. When the constraints on these are identical, they may unify, resulting in only a single version. The key here is that the constraints must be imposed by the morphemes and not merely be sequences of phonemes, since it is quite possible to have a form such as the Joneses, where two identical sequences of phonemes occur. This is a simplification of the facts, but one that suggests the direction to be taken in the use of unification in this area.\(^{16}\)

In order to account for the root vowel length caused by the affixation of certain suffixes, either in conjunction with reduplication or not, I propose the use of a template acting as a constraint. The constraint would apply on the cycle in which the triggering suffix is contained, ensuring that the base conforms to the expected vowel length as in (29).

\(^{16}\) For a different analysis of this particular case, see the discussion in Halpern 1990.
If a root vowel is already long, then the constraint would be satisfied and there would be no further requirement of length, otherwise the vowel appears as long to conform to the constraint.

Note that the inherently long root vowel must be kept distinct from the suffix-required long root vowel until reduplication has been effected, since the resulting outputs are different in the two cases as shown in (30).

(30)  ha·c+a
      long-3 INDIC 'It's long.'
     ha·ha·c+a+kspuʃ 'long-legged'
      long-at the leg
   vs.
   xiX+a+bɿ 'salmonberry'
     red-round thing
   xiX+i·X+a+dɿ 'carrot'
     red-all along

One way that this may be achieved is to order reduplication before lengthening in the same cycle. This falls out straightforwardly from a transfer account of reduplication wherein, according to Clements 1985:2: 'affixation and copying constitute a single step, thus no rules (phonological or morphological) intervene between them.' Note, however, that reduplications required on subsequent cycles must have access to the template imposed on an earlier cycle as there is a
lengthened copy vowel in these cases, as shown in the following example.

An alternative to this is to view this operation as one of constraint-satisfaction and not copying, as proposed here. Under this view, the results are as expected without the need for ordering of the rules.

\[(31) \quad \{\text{x}i\cdot([\text{x}i\cdot\text{dq}]+\text{aq}]+\text{ib}]+\text{kuk}\} \quad \text{`Dogtooth lichen (=resembling whale's baleen)}\]

N-rubbery skin- in...layer(s)-...thing-resembling...

Step 1:
\[
\begin{array}{c}
\text{Vowel length constraint applied} \\
\text{after affixation}
\end{array}
\]

\[\text{x}i \cdot \text{dq}+\text{aq}+\text{ib}\]

Step 2:
\[\text{x}i \cdot \text{dq}+\text{aq}+\text{ib}\]

Step 3:
\[\text{x}i \cdot \text{dq}+\text{aq}+\text{ib}+\text{kuk}\]

\[\text{Reduplication}\]

Step 4:
\[\text{x}i \cdot \text{x}i \cdot \text{dq}+\text{aq}+\text{ib}+\text{kuk}\]

This system of ordered interaction between constraints, transfer of melody and unification captures the facts of Nitinaht suffix-based operations in a concise fashion as the following examples demonstrate:
2.6 Further Issues in Nitinaht Reduplication

In the previous sections, the reduplicative patterns dealt with have been restricted to those required by certain suffixes which may also require a long root vowel. These, however, are not the only possible patterns of reduplication in the language. There are, in fact, a number of other possible patterns, one of which I will outline here because of its interest for the analysis presented here.

In this pattern, a reduplicated copy, again N, appears, however this time without any suffix. This pattern indicates distributivity of an object or action, as in the following examples.
In addition to examples such as (33), there are also instances of double copying, as in (34) below, where the suffix -atax ‘hunt...’ is an [R]-type suffix.

(33) a. ?i+?i·i+ib
     'A bunch of old ones'
     DISTRIB + 'old' + '...thing'

     b. xi+xix+a·
     'There's red ones all over the rocks'
     DISTRIB + 'red' + 'on the rocks'

Examples such as these would appear to contradict the analysis given in section four which predicts only a single copy of the root N. The difference, however, lies in the level at which this reduplicative process applies.

This morpheme, indicating plurality of a certain type, appears in complementary distribution with other plural morphemes which consistently occur following all lexical suffixes in the word. One solution to this problem is to consider all internal structure on the first level to be erased and therefore inaccessible to second level derivation. That is, there is no indication that any reduplication has happened once the first level brackets are removed and the tier is conflated. An alternative to this is to consider that the morphemic status of this affix requires a separate slot in the template, necessitating a separate copy which does not unify with the copies of the previously discussed case. There is little evidence for the latter
and it is not in keeping with the general findings of this investigation
and so I will concentrate on the former.

In order to justify the separation into levels it will be necessary to
show that there is obvious motivation for these distinct levels. Much
of the work required to prove this has been done already in the
literature in Haas and Swadesh 1932, where the distinction is made in
terms of stem-suffix versus word-suffix. Haas and Swadesh 1932 state
that stem-suffixes include derivational and aspectual suffixes, while
word-suffixes include modal, temporal, passive, and other suffixes of a
similar, inflectional nature. There are several reasons for positing this
distinction. First, derivational or level one suffixes do not occur in any
specific order and may occur more than once, whereas inflectional or
level two suffixes occur only once in a single, rigid position in the
word. In addition, there is a rule which inserts a so-called inorganic,
or epenthetic vowel before stem-suffix glottalised consonants but not
before word-suffix glottalised consonants and there is also a rule that
inserts a vowel before the last stem-suffix consonant of the word when
the consonant is followed by a word-suffix beginning in a consonant.

Further evidence for the two-level system of derivation in Nitinaht
comes from the phonological processes of hardening and softening
which have been described in a number of places in the literature, e.g.
Haas and Swadesh 1932 for Nitinaht, Boas 1947 for the related
K'aK'ala. I will not give a full description of them here but refer the
reader to these sources for further information. However, there is one
aspect of these processes which will interest us at this point. There is
a distinction between those hardening suffixes which cause lenition of the preceding fricative and those which do not. The distinction is made on the basis of whether or not the suffix causing the process is a derivational or an inflectional one, as illustrated below:

(36) a. Xi-wida?pid
   Xi+x+’id+a?p+id
   vs. yai-tefiidaq
   yai+taq+’id+a’aq
   ‘we are laughing at him’
   laugh-make...sound-CAUS-1pl
   ‘where the sound came from’
   where-from...-make...sound-DEF

b. SapaCaq
   Sapa+’aq
   vs. ?i-Xaq
   ?i+’aq
   ‘the canoe’
   canoe-DEF
   ‘the big one’
   big-DEF

c. ?i-wa?x  suCaS
   ?i+’a?x  suCaS
   ‘big tree in canoe’
   big-in vessel tree

As can be seen in (36a), the suffix -’id ‘make...noise’ is of this type, causing lenition of /x/ to /w/ and hardening of /q/ to /v/. On the other hand the suffix -’aq DEF in (36b), while causing glottalisation of preceding stops and affricates, has no effect on preceding fricatives. In (36c), we have a further example of the type illustrated in (36a). The most straightforward means for accounting for this difference in applicability of lenition is through a difference in the applicability of the rule due to a different level of derivation. All in all, these facts lead us to posit two distinct levels, one more or less equivalent to a derivational level, the other an inflectional one.
This level-ordered analysis also accounts for the one possible exception to the earlier characterisation of first level, suffix-triggered reduplication, which is given below. The suffix \texttt{-ata\textsuperscript{R}} 'hunt...' is a level one reduplication-triggering suffix and there is no further, level two reduplication.

(37) \texttt{mu-mu-smus+ata\textsuperscript{R}} 'hunting cows'

The word \texttt{mu-smus} 'cow' is an indirect borrowing, possibly from Cree \texttt{mustus}, through Chinook Jargon, a trade language which has borrowed liberally from many sources. The word for 'cow' is not a native Nootkan form and as such is opaque as far as this reduplication is concerned.

Contrast this with a native reduplicated root, \texttt{kakawad} 'killer whale' which has been partially lexicalised\textsuperscript{17} and we see that here the word is not opaque to reduplication and therefore continues to block first level double copying.

(38) \texttt{kakawad+ata\textsuperscript{R}} 'hunting killer whales'

vs. * \texttt{kakakawad+ata\textsuperscript{R}}

Therefore Nitinaht allows double reduplication only in those instances where either the copies appear at different levels or where the first copy is opaque at level one as in the case of borrowings.

\textsuperscript{17} The morphemes involved are: ka- 'object protruding' and -wad \textsuperscript{[R]} 'at the middle', referring to the upright dorsal fin of the killer whale.
2.7 Conclusion

What we have examined in this chapter is the possibility of one or more morphemes, located at some distance from the root, affecting that root in a fashion which is not easily captured using the devices currently available to models of morphology. We have seen that models appealing to transformational treatments of reduplication exhibit an excessive and, I would hope, undesirable amount of power. On the other hand, models which attempt to account for the facts strictly by rule ordering and the use of cyclicity fall into their own difficulties when confronted with the interaction of multiple reduplication or vowel-length suffixes with the root.

Data from Nitinaht have been shown to highlight certain difficulties with current theories of morphology, including problems with bracket erasure, subjacency, ordering within the cycle, the collapsing of reduplicative copies within a level, and the relationship of vowel length and reduplication to suffixation.

Contrary to claims that reduplication is just another form of affixation, in Nitinaht reduplication is, in many cases, tied to both a suffix and to vowel length and as such must be viewed as a constraint on the shape of the root required by the suffix and not as an affix on its own. Furthermore, it is possible to have multiple occurrences of reduplicative suffixes all requiring their own particular pattern. If reduplication were merely affixation then there would be no reason not to expect that each affix would require its own particular brand of
reduplicative copy and thus that there could be more than one copy on a form with more than one reduplicative suffix. The actual result is that a single copy conforming to the requirements of all of the suffixes present appears attached to the root and the root exhibits the changes required of it by whatever affix is involved.

It is clear that the best way to account for the facts of affix-based reduplication and, probably, for all reduplication, is through the use of a model which employs constraints on the shape of copies which must be fulfilled in order for the forms to be sanctioned. Furthermore, making use of the notions of 'unification of copies' and a separate constraint on root shape for vowel modification, in conjunction with rules of constraint satisfaction and repair, we can arrive at a neat and general account of the facts of Nitinaht reduplication.
Chapter 3
Accent in Interior Salish

3.1 Introduction

The aim of this chapter is to examine the assignment of word stress through the use of certain features inherent in the morpheme in order to account for the interaction of affixes with stress assignment in Interior Salish. The languages of exemplification will be Spokan-Kalispel-Flathead (hereafter S-K-F), an Interior Salish language group spoken in eastern Washington state.1 The problem will be to account for the phenomenon of shifting stress in S-K-F and thereby facilitate the description of various phonological rules at the lexical and post-lexical level in this language complex.

In S-K-F, the verb root typically has the shape CVC(C)- and both prefixes and suffixes may be attached to it, as well as certain clitics, to form longer words. Root is defined as a single morpheme, member of

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1 Data for this paper are taken from Carlson 1972 a, 1972 b, 1976, Reichard 1958 and Vogt 1940 a, b. S-K-F is a member of the Southern branch of Interior Salish which also includes Coeur d’Alene, Columbian and Okanagan-Colville. The northern branch consists of Lillooet, Shuswap and Thompson. These languages are spoken in southern British Columbia, northeastern Washington state and northwestern Idaho.
a major word class, i.e. verb, noun, adjective, possibly free-standing, although this is not common in languages such as these which exhibit a high degree of polysynthesis, to which no morphological process has applied, such as reduplication, epenthesis, schwa insertion, etc. This definition excludes affixes, which may never stand on their own, bases, which are the result of the application of various processes (e.g. reduplication) and clitics, which do not belong to major word classes. This classification fits exactly into the typology of morpheme dependence proposed by Inkelas 1989, whereby roots are morphologically dependent but not prosodically dependent, as shown in the diagram below, extracted from Inkelas 1989:101.

(1)  

<table>
<thead>
<tr>
<th>Prosodically dependent</th>
<th>Not morphologically dependent</th>
</tr>
</thead>
<tbody>
<tr>
<td>affix</td>
<td>clitic</td>
</tr>
<tr>
<td>root</td>
<td>stem</td>
</tr>
</tbody>
</table>

Examples of roots in S-K-F are given in (2) below.2

(2)  
ciq- ‘dig’ as in: činesanciqale?xî ‘I am digging (in earth)’  
hem- ‘fog’ as in: eshempami ‘It gets foggy’  
piq- ‘white’ as in: ipiqalx ‘a white house’

2 I will henceforth follow the convention of underlining root forms, thus pul-s-te-s.
Previous accounts of stress assignment have posited a three-way distinction among suffixes. **Inherently stressed** or **strong** suffixes are stressed over all other morphemes in a word. **Variably-stressed** suffixes may or may not have stress depending on a number of factors, while **unstressed** suffixes, as their name implies, never bear stress. A further distinction pertinent to suffixes is made along the more familiar lines of derivational versus inflectional morphology. While there is no ordering of suffixes according to their stress characteristics, such ordering does occur with respect to the derivational/inflectional dichotomy, with derivational suffixes being placed before inflectional suffixes in the word. Furthermore, derivational suffixes are not intrinsically ordered, while inflectional suffixes are, with respect to each other.

Interacting with these suffixes are roots, which are divided into those roots which are **stress retentive** and those which are **stress-shifting**. The former retain the stress in combination with either variable or unstressed suffixes but lose the stress to inherently stressed suffixes, whereas the latter shift the stress to both inherent

3 Carlson 1972a suggests the further possibility of roots which are variable, sometimes acting as stress retentive and sometimes as stress-shifting. Note that this increases the possibilities twofold. There is no explanation given for this and it is unclear what evidence mitigates such a split. Carlson offers the following example:

- **Variable root (acting strong)—variable derivational suffix**
  \[ \text{?upn-ččst-qčn} \rightarrow \text{?opččstqčn} \quad \text{'one hundred'} \]

- **Variable root (acting weak)—variable derivational suffix**
  \[ \text{?upn-ččst-ččče?} \rightarrow \text{?upčččtéče?} \quad \text{‘ten animals’} \]

The first example is a lexicalised form combining the number for ten, ?opččst, with the suffix for 'head, top'; the meaning is hardly transparent. In the second example, the number ten is combined with the suffix for 'animal', producing a regularly interpreted form 'ten animals'.

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and variable stressed suffixes. When a root occurs alone or in conjunction with a prefix, the root retains the stress and its vowel remains unreduced. However, when roots and suffixes come in contact there is an interaction between them which determines whether or not the root or the suffix vowels will be reduced, depending on the status of both root and suffix.

The previous accounts of stress assignment such as in Vogt 1940a or Carlson 1972a have been obliged to allow a number of exceptions to their posited stress rules due to apparent irregularities involving multiple occurrences of suffixes of supposedly equal levels of strength.

This case of stress assignment is theoretically important for several reasons. First, it constitutes an example of dependencies which appear to exist at a distance, affecting information which has been encoded prior to the concatenation of the later morphemes. As such it is a potentially problematical case for combinatorial models of morphology which rely on cyclic rule domains to account for stress placement. This kind of association challenges the idea that all relationships should be local at some point in the grammar.

A second theoretical concern for this example is the nature of the rules that obtain and their realisation as stress on the final form. Extrametricality has been previously motivated by a number of linguists for other members of this class of phenomena which involve stress assignment, and here it is only necessary to determine what version of extrametricality is at work. The second feature to be proposed here is more complex. One question that arises is whether
it is necessary to employ a rule which **erases** stress from a word and reassigns it elsewhere. This would certainly be a very powerful mechanism to introduce into a formalism and it does not seem in keeping with the spirit of the remainder of this dissertation. It would seem more appropriately couched in an E WP analysis of the phenomenon, where powerful machinery is not only commonplace but is quite often advocated over more constrained possible treatments, as in the case of Saanich metathesis to be discussed in Chapter Five.

A further consideration in this analysis is the apparent ternarity of strengths that have been posited in previous accounts of this phenomenon coupled with an apparent derivational/inflectional split in the assignment of stress. The resolution of this complex situation may be found in the combination of two independent parameters that exist in the languages.

In the following section I will describe the structure of the word in S-K-F with the aim of outlining the interaction of roots and suffixes, along the lines of earlier descriptions. After that we will examine the various types of suffixes which exist and their characterisation. The final section will attempt to offer a detailed account of stress assignment in S-K-F through a reanalysis of the data and the assignment of two features to morphemes in lieu of the traditional analysis involving a complex collection of rules and designated types which must still allow a number of exceptions.
3.2 The Structure of Spokan-Kalispel-Flathead

3.2.1 Phonemic Inventory

The phonemic inventory of S-K-F includes a basic five vowel system with length playing a marginal role in the grammar and a large number of consonants as is typical of languages in this part of the world. It appears that vowel length arises as the result of vowel coalescence and, perhaps, due to syllabification of glides; vowel-vowel combinations are described by Vogt 1940a as heterosyllabic (:16). The appearance of schwa is completely predictable and is thus non-phonemic in all cases. It only occurs as a phonetic realisation of vowel reduction due to the absence of stress or epenthetically before resonants, both postlexical rules. The vowel system is as in (3).

\[
(3) \quad \text{i, u, e, o, a}
\]

The consonant inventory is large, with seven points of articulation and the languages employ features such as affrication, glottalisation, labialisation, and laryngealisation to expand this inventory, which is presented in example (4) below.
There are numerous phonological and morphophonological rules applying to these consonants, including dissimilation, assimilation, and metathesis. Some of these rules will feature in the following description and will be described as they pertain in the body of this chapter.

The following section will examine the basics of morphology in S-K-F necessary for discussion of stress assignment.

3.2.2 Root and Affix

In this section we will discuss the interaction of different root and suffix types with the aim of outlining the facts in a descriptively adequate fashion. The canonical word shape in S-K-F from a morphemic point of view is as follows:

(5) Clitic = Prefix - Root - Derivational Suff. - Inflectional Suff. = Clitic

Examples of forms containing proclitics (k'u=), prefixes (n-), roots (sil-, taq-), derivational suffixes (-ews,-sin) and inflectional suffixes (-te, -m, -n, -x) are given in (6).
The nucleus of a word is a single root morpheme, a member of a fairly restricted class with the basic form CVC(C)-. There may be only one root morpheme per word. These roots may combine with pronominal proclitics and prefixes indicating certain locative, aspectual and nominalising functions, as well as with both derivational and inflectional suffixes and a few enclitics. Neither clitics nor prefixes participate in the stress assignment rules. Clitic and prefix-root combinations are given in (7).

Derivational suffixes constitute a class of approximately one hundred suffixes which contribute lexically significant content that combines compositionally with the meaning of the root. These suffixes typically describe such notions as bodypart terminology, location, shape, descriptive terms, natural phenomena and various other meanings, as illustrated in (8).
Inflectional suffixes are of the familiar type, indicating person, tense, aspect, voice and, perhaps, certain other categories. These occur after derivational affixes and may be followed by certain enclitics.

This summarises the morphology necessary to understand the operation of stress-shifting in S-K-F. The next section will examine
this phenomenon in greater detail with a view to outlining the problems to be addressed here.

3.2.3 Stress

Stress in S-K-F is of the culminative type, as described in Hyman 1977:38. There is one primary stress per ‘word’, defined as a morphologically complete, free-standing form, excepting certain minor class forms and clitics, which do not bear stress. This fits the description of Inkelas 1989’s notion of stem, that is neither prosodically nor morphologically dependent. Secondary stress may appear in long words according to Carlson 1972a, but there is no information about it in any of the available descriptions. Vogt 1940a describes stress in Kalispel as follows:

“In every word with the exception of some particles, one vowel stands clearly out by its special role in the morphology (:182). This vowel has a weak stress and is pronounced on a higher note than the other, unstressed, vowels.”

Vogt discusses one example of a minimal pair distinguished only by stress:

(10)  squ?úś  ‘dust’
     squí?uś  ‘yellow-jacket’

The analysis of these forms will be left until the introduction of the rules for assigning stress in order to elucidate the nature of this minimal pair.
In describing the quality of stressed vowels, Vogt makes the following statement (1940a:14):

"The stressed vowels vary in quantity according to position. They are shortest in absolute final position, where unvoicing of the last part often gives the impression of final aspiration. The vowels are pronounced long, often with a characteristic pulsation accompanied by falling tone, before non-glottalised sonants belonging to the same syllables."

The realisation of stress on a single nucleus in the word, in conjunction with the reduction of the majority of unstressed vowels at the postlexical level when unprotected by certain phonologically conditioned environments argues for the treatment of this phenomenon as culminative stress as opposed to tone or pitch accent. The presence of a single primary stress per word lends support to this hypothesis.

It should be noted in passing that Chilliwack Halkomelem, a related language of the other major branch of Salish, the Coast Salish branch, has been described by Galloway 1977 as a tone language. This is the only language of this fairly large family which has been so described in the literature and it appears to be the innovator in this case.

3.2.4 Phonological Processes

When roots and suffixes occur together in a form, there is a complex interaction between them, resulting in assignment of stress and deletion or reduction of unstressed vowels. The effects of this
interaction of root and suffix are most easily seen in the form taken by a particular morpheme under certain conditions. Thus, when a weak root combines with a strong, inherently stressed suffix the stress is placed on the suffix and the vowel of the root is deleted or reduced to [ə]. When a strong root combines with weak suffixes, it is the root which retains the stress and the suffix vowels which are affected. Possible combinations of root and suffix are given in (11) below.

(11) a. Strong root – variable suffix
    \( \text{púl-s-te-s} \rightarrow \text{púlsc} \)  ‘He killed it’

    b. Strong root – strong suffix
    \( \text{púl-s-te-sút} \rightarrow \text{palscút} \)  ‘He killed himself’

    c. Weak root – variable suffix
    \( \text{šil-n-te-s} \rightarrow \text{šalántés} \)  ‘He chopped it’

    d. Weak root-strong suffix-variable suffix
    \( \text{šil-nú-n-te-s} \rightarrow \text{šalánúys} \)  ‘He managed to get it chopped’

A number of phonological rules interact with the stress assignment rules, including rules of vowel deletion and epenthesys. In certain environments, vowels are protected from undergoing these processes, especially when adjacent to glottal consonants. The following example illustrates the environment for vowel deletion, which applies mainly to unstressed vowels.

100
(12) \( v \rightarrow \emptyset / \_ \) \\
 [-stress] 

a. púlsć \\
púl-s-te-s \\
'he kills it'
kill-CAUS-CTRL-3sg 

b. cnx'íst \\
čin-xúy-ist \\
'I walk'
I-go-REFL 

c. tqáncín \\
taq-n-te-si-n \\
'I hit you'
hit-TRANS-CTRL-2OBJ-1SUBJ

One of the environments where this rule does not apply is where an unstressed vowel is adjacent to a laryngeal or pharyngeal consonant, as exemplified in (13).

(13) te?mín \\
te?-min \\
'(It's a) pounding stone'
pound-INST 

\( *u?mín \) \\
\( *u?-min \) \\
'(It's a) spear'
stab-INST 

\( *o'yáncút \) \\
\( *o'y-n-te-sút \) \\
'He laughs'
laugh-TRANS-CTRL-REFL

Note that the unaccented vowel that is adjacent to a laryngeal in these examples does not reduce to schwa. Epenthesis of \([a]\) occurs before all resonants and /?/ (14), and between a glottalised obstruent and a following consonant, as in (15). Note that this only applies if there is not already an overt vowel in this position, e.g. the /i/ in /šalámín/ preempts the introduction of \([a]\) before the final /n/.
The following section will examine the treatment of stress assignment offered by Carlson 1972a and Vogt 1940a with the aim of highlighting the various permutations of root and suffix which interact to arrive at the eventual stress placement.
3.3 Stress Assignment: the Description

According to the descriptions of stress assignment in the literature, stress may appear on the root or on certain suffixes, depending on the circumstances of occurrence. In the absence of stress-bearing suffixes, stress always appears on the root, never on a prefix or proclitic as shown in (16).

(16) a. ṭepsameʔém
    ṭept-s-mʔém
    ‘He has a wife’
    have-NOM-woman

b. qeʔeriʔáp
    qeʔ-ʔeʔ-iʔáp
    ‘We went back’
    we-back-arrive

c. scaʔitn
    s-s-ʔitn
    ‘(they’re) groceries’
    NOM-NOM-eat

d. haqsanĉalé
    han-ʔt-s-n-ĉalé
    ‘He’s going to be your coyote’
    your-IRR-NOM-LOC-coyote

This could be explained by stating that stress appears on the rightmost morpheme in the word. However, complications arise when suffixes appear, giving conflicting stress assignments such as the following:

(17) a. pûlsc
    pûl-s-te-s
    ‘he kills it’
    kill-CAUS-CTRL-3sg

4 Note that we cannot say ‘the rightmost nucleus in the word’, given roots such as Ḑûxes ‘run (pl)’ and several others where it is the first vowel of the root which is stressed.
\( It'ul'antx' \) 'You did it'
\( It'ul'-n-te-x' \) make-TRANS-CTRL-2sg

b. escáq
es-caq
caq-nten
caq-n-te-n

'It is placed'
RESULT-place
'I placed it'
place-TRANS-CTRL-1sg

c. pelscút
púl-s-te-sút
\( k'ul'anún \)
\( k'ul'-nú-n-te-n \)

'He killed himself'
kill-CAUS-CTRL-REFL
'I managed to do it'
make-manage-TRANS-CTRL-1sg

In the examples in (17a) we can see the interaction of a strong root (pul-, \( k'u' \)) with various suffixes of a lesser degree of strength, resulting in the stress remaining on the root, just as we observed with the previous examples. However, (17b) shows that this is not always the case. A suffix bears the stress in the second example, forcing us to distinguish between roots which retain the stress and those which do not. The examples in (17c), where one suffix (-sút, -nu) attracts the stress from others, apparently without regard for position in the word, force the hand even further, requiring a three-way distinction among suffixes. This is the system of the descriptive accounts mentioned earlier and exemplified below.
Note the ternary representation of strength in suffixes. Such a distinction is undesirable and indicates the need for an alternative means of representing the assignment of stress. For one thing there is no straightforward way to represent the distinction phonologically. In addition, we have no account for why the roots should only possess a two-way split while the suffixes split three ways.
A further variable in the description of stress placement is the derivational-inflectional dichotomy which would appear to play a role in accounting for the data. Witness the following examples:

(19) a. nčənáʔusqən
    n-čin-éws-qin  'I grab him by the hair'
    LOC-grab-in middle-head

    b. qspəčéstaməncən  'I won’t let you go'
    qɪ-pɪx-éčst-m-n-te-si-n  IRR-pull-hand-MID-TR-CTRL-
                           2 Obj-1 Subj

In (19a), we have an example of a strong derivational suffix winning over a variable derivational suffix even though this places the stress on the leftmost suffix, while (19b) is an example of a derivational suffix attracting the stress rather than an inflectional one.

Basically, this is the account of stress provided in the available descriptive grammars. The following section will examine the problems inherent in such a treatment with the aim of clarifying the need for a different solution to stress assignment in S-K-F.

3.4 Problematic Areas of Description

Inherent in the descriptive accounts of stress assignment in S-K-F is the assumption that suffixes are of one of three types: (i) strong, (ii)
variable or (iii) weak. Given this ternary division of suffixes it is impossible to account for differences in stress assignment among members of any one group, e.g. one variable suffix receiving stress over another variable suffix, other than by stipulating a direction and then treating irregularities as exceptions.

(20) **Fluctuation in stress assignment to variable suffixes:**

- **tqəncín** 'I hit you'
- **taq-n-te-si-n** hit-TRANS-CTRL-2OBJ-1SUBJ
- **kətʃənáŋqəntəm** 'He grabbed him by the back of the head'
- **kət-čin-ep-qin-te-m** ?-grab-base-head-CTRL-MID
- **kətənápoʔsqən** 'he has a big mouth'
- **kətənép-éwəs-qin** big-base-middle-head
- **stək'cənétkʷ** 'It's lying by the shore of the river'
- **s-tukʷ-cin-ektkʷ** NOM-lay-mouth-water

Across the board declarations such as "the rightmost/leftmost wins" fail:

(21) a. **skətʃəmcanéɛst** 'wrist'
    **s-kət-čm-cin-eɛst** NOM-?-body part-mouth-hand

    vs b. **čaʔucínʔsən** 'He washes his ankle'
    **čaʔu-cin-šin** wash-head-foot

Furthermore, derivational suffixes do not always have priority over inflectional suffixes:
Another unexplained fact is that the rightmost (i.e. last) inflectional suffix capable of bearing stress receives it (23), which is not what one would be lead to expect given the more general tendency for a derivational suffix, which is always to the left of the inflectional suffix, to win over it (24), arguing for a leftwards assignment of stress.

(23) **Rightmost inflectional suffix wins:**

   a. cqāntén
      caq-n-te-n  'I placed it'

   b. tqāncin
      taq-n-te-si-n  'I hit you'

(24) qsp̪Xéčstom̪exancan
    q̪-piX-éčst-m-n-te-si-n  'I won't let you go'

Problems such as these lead one to suspect some underlying principles other than those suggested by previous descriptions such as Vogt 1940a or Carlson 1972a.

### 3.5. An Analysis of Stress Assignment

In this section, I will offer a solution to the problem of stress assignment in S-K-F, employing certain tools of current phonological theory, including the use of extrametricality, default rules, and cyclicity as
current in most versions of lexical phonology, e.g. Kiparsky 1982, 1985 or Mohanan 1982, 1986. I will also make use of certain notions posited for the analysis of Japanese and Vedic pitch accent as proposed by Poser 1984 and Kiparsky 1986, respectively.

In accounting for the differences between so-called 'stress-retentive' and 'stress-shifting' roots, I will propose that the distinction is based on a feature of extrametricality, as currently employed in metrical accounts of stress assignment for numerous languages, as an inherent part of some morphemes. The difference between stress-retentive and stress-shifting roots will depend on whether or not the nucleus of the root is available for stress assignment on its cycle. Since even stress-shifting roots appear stressed when there are no suffixes present, or only suffixes without syllabic nuclei underlyingly, we expect such roots to lose their extrametrical status before assignment of stress by the SBAP as outlined below, i.e. when they are no longer peripheral in terms of bracketing.  

7 This is my own modification for S-K-F of the BAP first proposed by Kiparsky and Halle 1977.

**Basic Accentuation Principal (SBAP):** Accent rightmost nucleus if there is no accent on word at end of lexical derivation (last level before postlexical).

In addition to the SBAP, we must have a regular rule of stress assignment formulated along the following lines:
**Basic Stress Assignment Rule (BSAR):** Accent the right-most nucleus available on a cycle, if no stress is present.

Stress assignment requires that a nucleus be visible on the cycle at which it applies, whether it be cyclic or by default assignment. The characterisation of default assignment will be by means of the SBAP. Cyclic assignment will apply to only those morphemes which may be stressed, i.e. those which contain a syllabic nucleus which is visible on the pertinent cycle. If a nucleus is invisible on the stress assignment cycle, then it will not be assigned stress on the next cycle, but may receive stress by the SBAP at the end of the derivation. Assignment of stress to so-called ‘stress-shifting’ roots will proceed as follows, assuming the final syllable of such roots to be extrametrical:

(25) ?e̞psa̞ma̞ʔé̞m 'He has a wife.'
    ?e̞p̣-s-mʔé̞m have-NOM-woman
    [(mʔem)] First cycle: no stress assigned, root
    extrametrical.
    [[?e̞p̣[s[mʔem]]]] Second cycle: extrametricality erased,
    stress assigned by BSAR

Since the word would be ill-formed if it appeared on the surface without stress, there must be a point at which the extrametricality no longer obtains, resulting in default assignment of stress. For stress-retentive roots, which are not extrametrical, cyclic application of the

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8 I will assume for the purpose of simplicity and space conservation that the prefixes attach to the root on a single cycle of application. Although I do not have any clear evidence of this, it does not appear to affect the analysis.
stress rules will result in the proper assignment of stress to the root vowel.

(26)  haqsančelé  'He's going to be your coyote.'
han-qi-s-n-čelé  your-IRR-NOM-LOC-coyote
[čelé]  First cycle: stress assigned by BSAR
[han [qí [s [n [čelé]]]]]  Final cycle: stress remains on root

Note that the root vowel must be specified in some fashion in order for stress placement to apply properly in the case of bisyllabic roots, such as the following examples, where in the first case the stress is on the second vowel of the root, whereas in the second case, it is on the initial syllable of the root. The assignment is reached in the first case by direct right-to-left assignment on the first cycle and in the second by the same means applied to an extrametrical root in my account, but arbitrarily marked in earlier treatments.

(27)  a.  qe?e+i?áp  'We went back.'
qe?-e+i?áp  we-back-arrive
[i?áp ]  First Cycle: stress assigned by BSAR
[qe? [e+i?áp ]]  Final Cycle: no change

b.  k"úxeš  'They run'
k"úxeš  run (pl)
[k"ú(xeš)]  First Cycle: stress assigned to visible nucleus by BSAR
[[k"ú(xeš)]]  Final Cycle: extrametricality erased

In contrast to the simple use of extrametricality for the treatment of roots, to arrive at the correct results for suffixes we must invoke a further feature, assigned to each individual morpheme. The features
involved are two then, [± extrametrical] and [± unstressed]. The first of these, as its name implies, differentiates between those suffixes which are extrametrical when on the periphery of the form and those which are not. This parameter effectively parallels the use of extrametricality for dealing with roots, and results in the suffix being unaccented on its own cycle, equivalent to the treatment of roots that are similarly marked, yet it allows for the assignment of stress by the SBAP, should the proper environment be provided.\(^9\)

The second parameter has a very different function. It ensures that no previous accent obtains on the word through priority unification of its pattern with that of what precedes and allows for the initialisation of an accent on its own cycle.\(^10\) This may be interpreted as analogous to delinking in tone languages where, for example, a high tone may delink a prior linked low tone as a result of a spreading rule and a constraint against one tone-bearing unit being linked to more than one tone (cf. Pulleyblank 1986:35), however the results are achieved in a quite different fashion. In conjunction with extrametricality, [± unstressed] allows for the total eradication of accent on a form, which will subsequently be accented by the BSAR on a later cycle or the

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\(^9\) This assumes that it is the syllable and not the morpheme which is extrametrical and that the morpheme may still relay information regardless of whether it is on the periphery and is thus extrametrical.

\(^10\) Note that this feature may also be playing a covert role in the root system, where it would apply across the board, resulting in stress never being assigned to a prefix, although the formulation would necessarily be quite different, since one would presume that the prefixes apply after the root, temporally. I have no suggestions for this at the present time and will assume that all prefixes are extrametrical and hence do not receive the accent on the cycle at which they apply. Thus, the SBAP assigns stress to prefix-root combinations.
Examples of suffixes having the various parameters are given below.

(28) Extrametrical
+ 
+ -elde? -nu
Unstressed
- -ene? -te

A partial list of suffixes and their values for these parameters is given in Appendix I. Note that that this list is incomplete due to a lack of data necessary for determining the exact values of a number of suffixes. However, the parameters as given correctly predict the outcome for all the data dealt with here.

To turn to the data, let us examine instances of stress assignment exemplified in this paper with the aim of accounting for the exceptional cases as well as the more straightforward ones. In (29), we have an example of stress being assigned to a strong inflectional suffix over a strong derivational one, this distinction playing no part in the current analysis as opposed to earlier treatments where it played a role but required further stipulation.

(29) yesenliəu?scútəm 'I tie it around my waist'
[čin-hec-(lič)] First cycle: no stress assigned

In (30), the stress is placed on the leftmost derivational suffix in contrast to the expected result on the standard descriptive account.
Finally, an example of a 'variable' suffix winning over a 'strong' one, again unexplained in previous accounts.

(31)  k'tanápo?sqan  'he has a big mouth'
[k'tún]  First cycle: stress assigned by BSAR
[[k'tun]ép]  Second cycle: stress erased, reassigned by BSAR

3.5.1 Derivation vs Inflection

The distinction of derivational versus inflectional affix is a common one in morphological systems. In languages making use of lexical suffixes, i.e. those derivational suffixes which add compositionally to the meaning of the root, it is to be expected that the suffixes would combine cyclically, in a one-by-one fashion just as their semantics combines. Thus, we have the following example:

(32)  nɪɣpamépu?sqan  'I run in between his legs'
 n-ɪɣup-m-ep-ews-šin  LOC-run away-FORM-back-between leg
What this example shows is that there are three individual suffixes combining in order to render the notion of 'back between someone's legs'. Thus the cycle seems to play a role in the semantics of derivation and it would not be surprising if the morphology mirrored this choice.

Inflection, on the other hand, is a process of all or nothing. Intransitive verbs are marked for subject, transitive ones for object and subject. While the valency of the verb is often determined by the derivational morphology, it is merely obeyed by the inflectional morphology. Furthermore, order of affixes is rigid in inflectional morphology while it is reasonably free within the derivational component. It should not be surprising then if the inflectional suffixes combine on a single cycle, after the last derivational cycle. This is what is expected in S-K-F, and it will be assumed here.

This reflects the claims of Halle and Vergnaud 1987aå propos cyclic versus non-cyclic rules and their tendencies toward stress-deletion. Halle and Vergnaud maintain that phonological rules apply to every affix in a cyclic stratum, whereas they apply only once at the end after all morphological rules, in a non-cyclic stratum.

This distinction between the cyclicity of derivational suffixes and the non-cyclicity of inflectional ones manifests itself in the assumption that there are two different strata at play here. The theory of lexical phonology makes use of just this kind of distinction in accounting for differences in stress assignment in English and it applies equally well to the case of stress assignment in S-K-F.
3.5.2 The Minimal Pair

At this point I would like to offer an account of the examples of a minimal pair offered by Vogt and discussed earlier on in this chapter. Here are the examples provided in Vogt 1940a (= 10):

(33) a. squú?út
   b. sqú?uút

    'dust'
    'yellow-jacket'

Their differing accent is due to the difference in morphology and the status of the suffixes involved, as shown below. Their similarities are due to the rule system of S-K-F.

(34) a. squú?út
    s-qaút- + -?-
    [s[qaút]]
    [[[s[quú?út]]]

    'dust'
    NOM-dusty- + BEING(state)
    First Cycle: stress assigned by BSAR
    Postlexically: glide syllabified

    b. sqú?uút
    s-quaút
    [s[quúút]]
    [[[s[quú?uút]]]

    'yellow-jacket'
    NOM-yellowjacket
    First Cycle: stress assigned by BSAR
    Postlexically: echo vowel inserted

11 This infix is described by Carlson 1972a:117 as indicating a 'development to a state or quality.' It is attested in the related Interior Salish language, Shuswap, in Gibson 1973:30 as signifying 'impermanence, instability or fluctuation'. Further examples in that language include: q6e-t 'is warm' --> q6o?ec 'being warm', xé?k 'is deep' --> x6o?ëk 'being deep'.

12 The syllabification of /u/ to /w/ may be a postlexical or phonetic process. Carlson talks about the syllabification of initial /w/ but does not discuss it in the context of labialised consonants.

13 This phenomenon, common to Interior Salish, is described in Vogt 1940a:19. Carlson 1972a:10 describes the echoed vowel by saying: 'when /?/ occurs directly after a stressed vowel, the aspirated release is heard as a voiceless vowel of the same quality.'
These examples show that the use of a set of features on individual morphemes in conjunction with a set of ordered phonological rules allows for the distinction between such minimal pairs in a precise and theoretically plausible fashion.

3.6 Stress and the Cycle

In a series of works investigating the nature of stress and its interaction with the cycle, various linguists (e.g. Halle and Vergnaud 1987a, b, Halle and Kenstowicz 1989) have proposed a theory of stress assignment which relates the notion of stress erasure to the presence of cyclicity on an affix. Central to their claim is the idea that cyclic affixes erase stress assigned on previous cycles, and that non-cyclic affixes never erase stress.

As we have seen in this chapter however, this does not appear to be the case for S-K-F. There is counterevidence to both sides of this claim: first, there are cyclic affixes which never erase stress and, secondly, there are non-cyclic affixes which always do.

The fact that certain derivational affixes may occur in various orders within the word suggests that they apply in cyclic fashion, yet we can see in Appendix I that only a subset of the entire class of derivational affixes actually affect the erasure of stress, i.e. those that are [+ unstressed]. But there are many other members of this class which do not erase stress and there is no evidence that these particular affixes are any less cyclic than the former. For those that erase stress to be just those that are cyclic and none of the others,
would be an amazing coincidence, given that all the suffixes of this class operate identically as far as other, phonological rules are concerned.

On the other hand, the class of suffixes which I have referred to as inflectional are non-cyclic in their nature, never varying in order, nor in undergoing phonological rules. Yet within this group, the suffixes -ist MID REFL and -sut REFL, do erase stress from the word, requiring it to be reassigned by the SBAP, since there is no cycle within this class of affixes.

Further evidence that there is something more at work here than a simple relationship between cycle and erasure may be found in the erasure of pitch accent in Vedic Sanskrit (Kiparsky 1986). This leads to the suspicion that any relationship between cyclic affixes and their stress properties must be on a much deeper level than suggested so far in the literature.

3.7 Conclusion

As the derivations above have shown, it is possible to account for the assignment of stress to words in S-K-F by appealing to some basic principles of phonology in conjunction with the use of [+ unstressed] and [± extrametric], which are an inherent part of the morpheme. Their combination allows for the variation in stress placement much more accurately and succinctly than the earlier three-way distinction among suffixes and the dichotomous designation of roots.
Furthermore, the new system provides an explanation for forms previously assumed to be exceptional.

This four-way distinction of stress properties offers a tidier class of categories than the divisions of previous accounts, yet explains more of the data than those treatments do. In addition, the properties are common to both roots and affixes, capturing a generalisation that earlier analyses did not even allude to. Furthermore, the notions of extrametricality and erasure are not new to phonological theory. Extrametricality is generally accepted in some fashion or other by most linguists as playing a part in the grammars of languages. The notion of erasure may be more controversial, but is motivated on the grounds of similar treatments of phenomena encountered in the area of tonal phonology and in recent work such as Halle and Vergnaud 1987a, b. Similar to this is the notion of deletion of accents proposed by Poser 1984 for Japanese and Kiparsky 1986 for Vedic Sanskrit, both languages of the pitch-accent variety.

This analysis shows that there are more similarities between tone and stress systems than one might expect and that, perhaps we should re-examine our views on the two systems in light of this.

Further theoretical importance of this chapter comes in the form of treatments of long distance dependencies as series of local dependencies, making use of the cycle to account for the adjacency. It should be noted that within the inflectional module, where there is only a single cycle, stress always occurs on the rightmost vowel, indicating that there is only a single unit there.
This observation regarding the non-cyclic nature of the inflectional suffixes, coupled with the ability of certain of them to erase previous stress, presents a counterexample to the claim that there is a direct relationship between the cyclicity of an affix and stress erasure, as proposed in e.g. Halle and Vergnaud 1987a, b.
Chapter 4
Hypocoristic Formation and the Syllable in Nootka*

4.1 Introduction
In the Nootka language of Vancouver Island there is a strategy for forming hypocoristic names or terms of endearment from the normal form of the name by a combination of truncation, vowel mutation and affixation. The nature of this formation is highly suggestive of the type of morphology described by many linguists as subtractive. In this chapter, however, we will show that what actually occurs is a pattern of template-filling based on the prosodic structure of the language, in other words, an approach which builds itself off the structure of already existing forms, much as reduplication does. It will be argued that the building of hypocoristic forms is, in fact, similar to reduplic-
ative strategies employed in this language as argued for in chapter two for the closely related Nitinaht language, the difference being that reduplication subsequently concatenates with the structure it has drawn from, while Nootka hypocoristic formation abandons the original structure, retaining only the copied melody required for the template.

Before investigating the nature of hypocoristic formation let us first examine certain aspects of Nootka structure, knowledge of which will be important to a clear understanding of the problem and its solution. In order to provide a clear idea of the syllable structure of the language I will provide an analysis of a related problem, that of variable-length vowels, which will support the proposed structure of the syllable and the foot.

4.2 Syllable Structure and Variable-Length in Nootka
The phenomenon of variable-length vowels in Nootkan is an important example of the need for a distinction between vowels and glides as moraic segments in language. Furthermore, it argues for the special status of the first foot in Nootka words, as proposed in Wilson 1987. Described in Sapir and Swadesh 1939, the issue of variable-length vowels continues to elude a viable theoretical explanation in the linguistic literature. Solutions based on a tri-partite division of vowels in the language pose more problems than they solve. Suggestions that it is tied to the stress system of the language fall far off the mark. The aim of this paper is to provide a solution to this problem in terms of
syllable configuration, prosodic structure, and a treatment of the first metrical foot of Nootka words as special in its behaviour.

Nootka is a Wakashan language spoken on the west coast of Vancouver Island. The consonant inventory is quite complex, involving 7 points of articulation (labial, alveolar, palatal, velar, uvular, pharyngeal and glottal), and secondary articulations involving glottalisation and labialisation. There are full series of stops, plain and glottalised, fricatives and affricates, including laterals, as well as plain and laryngealised nasals and glides, as shown in (1).

(1) Labial Alveolar Palatal Velar Uvular Phary. Glottal

<table>
<thead>
<tr>
<th></th>
<th>p</th>
<th>t</th>
<th>c</th>
<th>k</th>
<th>q</th>
<th>?</th>
</tr>
</thead>
<tbody>
<tr>
<td>θ</td>
<td>t</td>
<td>c</td>
<td>x</td>
<td>ḵ</td>
<td>ζ</td>
<td>?</td>
</tr>
<tr>
<td>θ</td>
<td>t</td>
<td>c</td>
<td>x</td>
<td>ḵ</td>
<td>ζ</td>
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<td>s</td>
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<td>s</td>
<td>x</td>
<td>x</td>
<td>h</td>
<td>h</td>
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<td>m</td>
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<td>n</td>
<td>y</td>
<td>w</td>
<td></td>
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</tr>
<tr>
<td>m</td>
<td>m</td>
<td>n</td>
<td>y</td>
<td>w</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The vowel system is quite simple, involving just the three basic vowels i, u, a, and a length distinction, [± long], as shown in (2). The language, which has been described as heavily polysynthetic, employs almost exclusively suffixation to expand the word. In addition to suffixation, reduplication and vowel quantity changes occur to indicate a variety of distinctions.

(2) i u i' u'

a a'
In Nootka, roots have a fairly rigid syllable structure. All roots begin with one and only one consonant, which may be any of the consonants of the language, and words must contain one and only one root. /h/ can occur only root-initially and in the reduplicative copy of the /h/-initial root. The onset of the syllable, which must contain one and only one consonant, is followed by a vowel which may be long or short. Following this, there may be from zero to three consonants in the coda. This is the same for later syllables with the exception that /h/ does not occur.

For the purposes of exposition, we posit the syllable structure to be as in (3), where [± glottal] is an informal feature representing some characteristic such as constricted glottis, intended to include any glottalised stop or affricate (Č), laryngealised resonant (ț), or the phonemes ?, and ţ. [± son] is as in standard use. This is not intended to be a definitive characterisation of the structure of Nootka but will serve as a basic description of the facts.

(3) **Nootka Syllable Structure:**

With this information in hand, we will now examine the nature of the problem or variable-length vowels in Nootka, first observing the three-way distinction as suggested by Sapir and Swadesh 1939, then a
possible treatment suggested by the work of Wilson 1985, and, finally, the proposed solution, which involves elements of all three.

4.2.1 Variable-length Vowels

The analysis of variable-length vowels in Nootkan bears upon questions of the nature of the prosodic structure of roots and affixes and the possible types of morpheme-dependent rules that may be available in language. Is it possible for long vowels in a single language to be represented by two disparate prosodic structures, one a branching nucleus, the other a branching rime? Certainly both of these alternative forms of representation have been proposed for different languages, but can they co-exist in one language? Can a morphological rule of concatenation impose prosodic structure on its target?

Furthermore, this phenomenon appears to constitute a case of quantitative ablaut, that is the mutation of a segment in a particular environment. This would then be a case for the use of a process rather than strict affixation. However, we shall see that this case is eminently amenable to a solution based on the prosodic geometry of the form in question, and thus, not a necessary candidate for a process of ablaut.

Solutions based on an abstract, tripartite division of vowel length in the language (e.g. Sapir and Swadesh 1939) pose more problems for linguists than they solve. They introduce multivalent features into the system, utilise them to arrive at the correct output, and then reduce the feature to a binary one for the surface output. No other language to
our knowledge possesses a valid three-way, phonemic distinction in vowel length, just as no language has surfaced that employs three-consonant gemination (trigemination) and we do not expect any language to exhibit either of these properties.¹

The unrelatedness of this phenomenon to stress can be seen when we examine further evidence showing that the placement of stress is much freer than had previously been thought. It has been suggested by Wilson 1985 that stress in Nootkan is tied to the first foot of the word, appearing on the first syllable unless it is light and the second is heavy. However, further data taken from Sapir’s unpublished notes suggest that stress may appear on a later syllable, whereas this is not the case with the occurrence of variable-length vowels.

The argument for variable-length vowels takes the following form. Nootka has a phonemic distinction between long and short vowels as mentioned above and as exemplified by the following minimal pairs:

(4) a.  

<table>
<thead>
<tr>
<th>nootkan</th>
<th>English</th>
</tr>
</thead>
<tbody>
<tr>
<td>yač-</td>
<td>'dogfish'</td>
</tr>
<tr>
<td>wa-</td>
<td>'to coil'</td>
</tr>
<tr>
<td>mas-</td>
<td>'healed up'</td>
</tr>
<tr>
<td>ta-</td>
<td>'drifting'</td>
</tr>
<tr>
<td>yač-</td>
<td>'warped, bent out'</td>
</tr>
<tr>
<td>wa-</td>
<td>'to say'</td>
</tr>
<tr>
<td>maš-</td>
<td>'baking on open fire'</td>
</tr>
<tr>
<td>ta-</td>
<td>'pole-like object sticking up'</td>
</tr>
</tbody>
</table>

b.  

<table>
<thead>
<tr>
<th>nootkan</th>
<th>English</th>
</tr>
</thead>
<tbody>
<tr>
<td>'as</td>
<td>'on the ground'</td>
</tr>
<tr>
<td>-uk</td>
<td>Durative Trans.</td>
</tr>
<tr>
<td>-iš</td>
<td>'sleeping with...'</td>
</tr>
<tr>
<td>'as</td>
<td>'at the wrist'</td>
</tr>
<tr>
<td>-u⋅k</td>
<td>'all over'</td>
</tr>
<tr>
<td>-i⋅t</td>
<td>'to make...'</td>
</tr>
</tbody>
</table>

¹ For the case of Estonian vowel length see Prince 1980.
The examples in (4a) are roots which are distinguished only by length, either long or short, while the examples in (4b) are of suffixes, both derivational and inflectional, again either long or short.

In addition to examples such as those in (4), the vowels of certain morphemes vacillate, appearing sometimes long, sometimes short. It is generally agreed upon that this chameleon-like behaviour is tied to the position of the pertinent vowel within the word. A variable-length vowel, which is long in the first two syllables of the word, is short when it is in the third or later syllable of the word, as shown in the following example, where /ː/ represents variable length.

(5) ?unaːk 'possessing it'
    ?u-naːk REFER-possess...

    čapacnak 'possessing a canoe'
    čapac-naːk canoe-possess...

Given this third possibility, we would expect to find minimal triplets, where there is a three-way distinction in vowel length. And we do, in fact, encounter this readily among the suffixes, as is shown in (6) below.

(6) -'as 'on ground' -aːs 'daughter of ...' -'aːs 'at the wrist'
    -i 'quality of ...' -iː Durative -i Incep. Iter.
    -ʔaː 'aware of ...' -ʔaːː 'on a surface' -ʔaː 'to come off'
    -uː 'place of ...' -uːː 'on the face' -uː Iterative

While this distinction has been primarily discussed in terms of suffixes, Morris Swadesh, in an unpublished manuscript (Swadesh
ms.), has suggested that it can also be a property of certain roots. The difficulty with detecting such roots is that they must undergo double reduplication in order to be placed in the third syllable of the word, where the distinction may be observed. Swadesh provides the following examples of this phenomenon:

(7) a. \( ?i\text{-}h\text{-}tu\text{-}p \)
\( ?i\text{-}h\text{-}tu\text{-}p \)  
'whale (= big thing)'
big-...creature, being

\( ?i?i?i\text{-}\text{y}i\text{m}\text{t} \)
\( \text{CV-CV-} ?i\text{-}h\text{-}\text{y}i\text{m}\text{t} \)
'big-shouldered [distrib]'
DISTRIB-CV-big-at shoulder[R]

b. \( ya\text{-}k\text{si}\text{-}a\text{x}\text{-}at \)
\( ya\text{-}k\text{si}\text{-}a\text{x}\text{-}at \)  
'broke
sore-MOM-TEMP-PASS

\( ya\text{ayayaksu}\text{-}h \)
\( \text{CV-CV-ya\text{'}k\text{-}su\text{-}h} \)  
'sore-eyed [distrib]'
DISTRIB-CV-sore-at eye

We can see from these examples that variable length may be a property of the root vowel as well as the suffix, although it has not proved possible to find minimal triplets among the roots. But how do we describe such a property?

In summary, the solution offered by Sapir and Swadesh (1939) is to allow a three-way distinction among vowels, representing them as short /\( V /\), long /\( V^\prime /\) or variable /\( V^\prime /\). While this accounts for the data, given a rule which shortens or lengthens the variable-length forms depending on position, we would prefer not to allow a three-way phonemic distinction in vowel length, since this is unattested in the
languages of the world and is not evident in the surface form of Nootka vowels where we only find a two-way distinction of long versus short.

Another possible solution to the problem is in terms of stress placement, saying for instance that the vowel appears long when stressed and short when not. However, we cannot appeal to the stress system of the language as it operates independently of this phenomenon and unstressed vowels are found to occur both long and short, and in any position in the word. Furthermore, variable length vowels do not necessarily correlate with the stressed vowel of a word.

Before we delve into the intricacies of variable-length vowels it will be necessary to examine the status of sonorants in the syllable structure of Nootka in more detail. This is the purpose of the following section.

4.2.2 Nasals in Nootka

Wilson 1985 has observed a relationship between K’aK’ala /a-Nasal/ sequences and Nootka /i-Nasal/ sequences that leads him to reconstruct a relationship between K’aK’ala /a/ and Nootka /i/. His analysis places the nasals of these sequences in the nucleus of the syllable, accounting for the absence of /i'-Nasal/ forms. Thus, the syllable in Nootka could appear as in (8), but not as in (9).
Although Wilson's account seems attractive at first assessment, there are some gaps in this analysis. Firstly, there are certain processes which occur in the language which provide counter-evidence to a treatment placing nasals in the nucleus of the syllable. There are a group of suffixes in the language which require reduplication of the onset and nucleus of the root when they occur with it.\textsuperscript{2} Thus, the examples in (10a) show what occurs when a root with a short nucleus occurs with one of these suffixes and (10b) shows the same suffix occurring with a root with a branching nucleus.

\textsuperscript{2} See Sapir and Swadesh 1939 for the basic facts and Stonham 1988 for a more detailed description of this phenomenon in the related language, Nitinaht.
In (11) we have a representation of the reduplication of a form with a long vowel. As can be seen from (11a), the entire nucleus is copied.

(11) a.

\[ \text{N reduplication} \]

b.

In (12) we see what happens when the same suffix occurs with a root containing a nasal.

(12) \( \text{čičimsčiti} \) \quad 'naming a bear'

\( \text{CN-čims-čiti} \) \quad CN-bear-naming...
As can be seen from this example, what is reduplicated in this case is the onset and the vowel, that is the syllabic mora, but not the nasal. This leads us to suspect that vowel-nasal sequences have a different status from long vowels in the structure of the rhyme, one that relates the two yet differentiates them.

Compare this with the facts in K'ak'ala suffix-triggered reduplication, as shown in (13) below.

(13)  (Handle{adzaK 'to chop beforehand'
       CN-təmq'adzaK CN-to chop-beforehand[R]

The root of a form such as this may be represented in the following fashion, indicating the moraic status of nasals in the language:

(14)

Given this shape for the root, reduplication of the onset and nucleus produces the following results:
Thus, there is convincing evidence that \textsuperscript{K}a\textsuperscript{k}ala involves nasals, and, actually, all sonorants, in its rules of morification, as discussed in Zec 1988, where it is shown that stress is placed on the rightmost heavy syllable, including the combination of short vowel and tautosyllabic sonorant but not short vowel-obstruent, but the evidence in Nootka does not appear as conclusive. In fact, it appears that Nootka has moved off in a different direction from \textsuperscript{K}a\textsuperscript{k}ala in this respect, banishing nasals from the nucleus.
On the other hand, nasals in Nootka do appear to attract stress, acting as long vowels do in this respect. For example, the forms in (16a) show the placement of stress in words with long vowels in them, and (16b) shows the situation when it is a short vowel followed by a tautosyllabic nasal. This cannot be the result of default placement since the placement is different in both cases, and you can also see that the short vowel followed by a nasal wins over the long vowel, whereas the short vowel in the first syllable loses to the vowel nasal sequence.

(16) a. nú·taswe?in 'they are going to play the hoop game, it is said'
    rá·csa·kwé?in 'They looked at her, it is said'
    hawá·takwe?in 'after eating, it is said'

b. ŋúmsmít 'Son of Bear'
    ŋumímsiqsak?i 'her brothers'

So how are we to account for these effects? The solution lies in the special status of sonorants in the syllable geometry of Nootka and will be discussed in the following section.

4.2.3 Sonority Constraints on Nootka Syllable Structure

What the previous section suggests is that in K'ak'ala the inventory of moraic segments include all of the following, all of which play a role in stress assignment and in reduplication in the language:

134
(17) nasals
   liquids
   glides
   vowels

   In Nootka, on the other hand, the moraic segments are limited to a subset of these, since the nasals pattern differently with respect to reduplication. Excluding the nasals, that leaves us with those in (18):

(18) liquids
    glides
    vowels

   Moreover, there are no liquids to be found in Nootka, reflexes of Proto-Wakashan liquids surfacing as nasals in Nootka. Therefore, we must revise our inventory of moraic segments as follows:

(19) glides
    vowels

   Distributionally, glides are never found in the coda of a syllable in Nootka, only in the onset. Thus, in a survey of some 1200 lines of textual material, 101 occurrences of the sequence /iy/ were found, none of them tautosyllabic. Likewise, 55 occurrences of /uw/, none of them tautosyllabic. This would lead us to one of two possible conclusions: (a) that glides are proscribed in the nucleus and the coda, or (b) that they surface in another form, perhaps as the equivalent vowel in terms of place of articulation. Let us first explore option (a). We have already seen that nasals seem to have some correlation with the distribution of long vowels before them. While the evidence for nasals
being in the nucleus is less than overwhelming, it seems that we must allow them to appear in a restricted position in the coda at least: they may only appear in the immediately post-nuclear position in the syllable. This being the case, it seems odd that glides, which have a higher status with regards to the moraic hierarchy, as argued for in Zec 1988 and elsewhere, should not also be allowed to occupy this position.

There is one possible solution to this inconsistency: that they do appear in the post-nuclear position, but are merged with the nucleus, resulting in a lengthened vowel. This is the second (b) possible conclusion. We say 'lengthened' vowel, because they are not inherently long, but rather, positionally long, the difference being indiscernible on the surface.

There is further evidence for the nature of these forms from comparative work in Wakashan. The following forms from K'akala and their Nootka equivalents are adapted from unpublished notes by Edward Sapir. Notice that where there is a sonorant following the vowel in K'akala, there is a long or variable length vowel in Nootka.3

3 Unfortunately, very little work has been done on the historical reconstruction of Proto-Wakashan and the available examples are few and less than perfectly clear. There are more or less regular correspondences between liquids in K'akala and nasals in Nootka, since there are no liquids in the language.
These forms suggest that, at least historically for Nootka, sonorants had weight and the distinction between long vowels and short vowel-sonorant sequences extended beyond nasals. Furthermore this evidence lends further support to the thesis that variable-length vowels are somehow different from long vowels and that this difference is one of syllable structure.

It has been suggested in the literature, as in Levin 1985, that the difference between glides and vowels may be reduced to their position within the syllable, but I will propose here that, for Nootka, and, according to Waksler 1990, for many other languages also, the distinction between them is a crucial one, and their representations must differ, as shown in (21).

---

4 The fact that both long and short forms for the Nootka morpheme are recorded indicates that there was some uncertainty about the status of this vowel. This may indicate that informants disagreed or that there was some error in transcription. Nevertheless, the fact that it vacillates seems highly suggestive of the variable nature of this vowel.
This is not the only possible way to account for the difference, but it seems to us to be the most plausible. An alternative to this would be to represent the second mora as distinct only in terms of syllabicity, as in (22), but this seems much less attractive to us, for reasons presented in Levin 1985, Zec 1988.

Actually, the situation is more complicated than this since the treatment of nasals must be incorporated into the solution as well. Remember that nasals do not participate in reduplication, as shown earlier. Neither do variable length vowels, as can be seen in the following examples:
This suggests that a similar treatment is in order for both vowel-nasal sequences and variable-length vowels, resulting from their underlying similarities as shown below.

(24) a

\[
\begin{array}{c}
N'' \\
| \\
N' \\
| \\
N \\
| \\
X \\
| \\
N \\
| \\
X \\
\end{array}
\]

b.

\[
\begin{array}{c}
N'' \\
| \\
N' \\
| \\
N \\
| \\
X \\
| \\
N \\
| \\
X \\
\end{array}
\]

This modification of Nootka syllable structure also explains another distributional fact about nasals in the language. The fact is that there are never more than two consonants in the coda of a syllable contain-
ing a vowel-nasal sequence, but there are up to three consonants in a syllable containing either a long or a short vowel nucleus. Thus,

(25)  ?u·c?u·wimthwe?in
      kicinkthim
      ?apwingu?i
      ?i·hck?isaqa

Due to the paucity of roots exhibiting variable-length vowels, it is difficult to test the same distinction, but the same generalisation appears to hold true for syllables containing variable length vowels, that is they pattern with nasals. The need to explain the other facts discussed above further supports a similar analysis for both tautosyllabic vowel-nasal sequences and variable-length vowels. Furthermore, the apparent absence of nasals after variable-length vowels in the language is explained if they both must occupy the same position, placing them in obligatory complementary distribution, thus:

(26)

\[
\begin{align*}
X & \rightarrow \mathrm{\{Nasal\}} X \\
N & \rightarrow N' \\
N' & \rightarrow N'' \\
\mu & \rightarrow \mu
\end{align*}
\]

In addition, nasals seem to inhibit vowel length in the morphemes in which they occur, while glides simply do not occur, vowel length being the only indicator of their presence. This is explained on the view that they occur in the same position and that the difference
between them is due to a rule of syllabification that applies only to
glides in Nootka and that interacts with a positional restriction on the
occurrence of glides in the rhyme of the syllable.

4.2.4 The Foot in Nootka
But how do we capture these effects in a suitable fashion? And why do
things operate in the manner encountered here? I will first take a
look at other phenomena of the language which involve the first two
syllables of the word in order to motivate the special status of the first
foot in the language. I will then introduce a constraint, tied to certain
morphemes, which imposes a pre-determined shape on the
realisation of the variable-length vowel, depending on its position vis-
à-vis the first foot.

4.2.4.1 Vowel Coalescence and the First Foot in Nootka
One phenomenon which has some bearing on the nature of the first
foot in Nootka is the issue of vowel coalescence. In most cases, vowel
coalescence, at least from the point of view of quantity, is best
represented as a simple unification of nuclei, the result mirroring the
length of the largest nucleus, either long or short. Remembering that
variable-length vowels are long only in the first two syllables of the
word, any coalescence occurring after that point will necessarily result
only in short vowels, the reflex of both short and variable-length
vowels, or long ones appearing on the surface. So we have the follow-
ing results in the case of vowels coalescing outside the first foot of the word:

\[
\begin{align*}
V + V &= V \\
V^+ + V &= V^+ \\
V + V^+ &= V^+ \\
V^+ + V^+ &= V^+ \\
V^+ + V^+ &= V^+ \\
V^+ + V^+ &= V^+ \\
V^+ + V &= V^+ \\
V^+ + V &= V^+ \\
V^+ + V &= V^+ \\
V^+ + V &= V^+ \\
V^+ + V &= V^+. \\
\end{align*}
\]

However, in the first foot, i.e. in the first two syllables of the word, there is a special, additional consideration: the result of coalescence cannot be shorter than variable-length. What this means is that two short vowels coalescing in the first foot result in a variable-length vowel, which will appear long unless later reduplications push the form into the third or later syllable. Thus, we have examples such as the following, where (28a) is an example of two short vowels coalescing between the first and second syllables, (28b) is an example of the same situation with unlike vowels, (28c) is a case of coalescence between the second and third syllables, and (28d) is a case where the coalescence is in the third and fourth syllables, resulting in a short vowel. Notice that in (28e) we have a case of a variable-length vowel coalescing with a short one in the third syllable. The result is a short vowel.5

5 I will not address the issue of vowel quality here as it is not germane to the issue at hand.
(28) a. ma·iča·s
    ma-aिडa- 'as
    'house against wall on the ground'
dwell-at upright surface-on ground

b. wi-s
   wi-as
   'failing to reach'
not-reaching to

c. ḫa·ta·tah
   ḫa-atah [R]
   'ready to potlatch'
to potlatch-ready to, trying to get ...

d. ?u?u?utaŋ
   CN-?u-atah[R]
   'whalers here and there'
DISTRIB-referential stem-ready to,
trying to get ...

e. q·aŋamiyaŋ
   q·aŋama·-iyaŋ[R]
   'singing thus many songs'
thus many- singing ... song

This leads us to the observation that coalescence in the first and
second syllables is different from that in later syllables, and that it may
be tied to the difference in syllable structure between the first foot
and later feet.

4.2.4.2 Glottal Stop Deletion and the First Foot

A further difference between the first foot and later feet comes from
the treatment of sequences of V?V, where V= a short vowel. If this
sequence occurs in the first foot of the word, nothing happens. That
is, the sequence remains intact. If, however, the sequence occurs
later in the word, then the /ʔ/ disappears and the vowels coalesce
according to the rules of coalescence stated above. Thus,
(29) a. ḱaʔas
   ḱa-ʔas
   'sticking up on the ground'
   stick up-on ground

   b. ḱaʔas
   ḱaʔ-ʔas
   'go in order to eat'
   eat-go in order to...

   c. ?uwiʔtas
   ?u-wiʔtaʔas
   'he is in the lead on the ground'
   REFER-at the head-on ground

In (29a), the sequence occurs in the first foot and nothing happens.
In the second case (29b), VV appears between the second and the third syllables and the /ʔ/ disappears, with the vowels coalescing according to the regular rules into a variable-length vowel. In (29c), the same thing happens between the third and fourth syllables and the result is a short vowel.

4.2.4.3 Stress Placement in Nootka

The final piece of evidence presented here for the special status of the first foot is that described in Wilson 1985 regarding the assignment of stress in Wakashan in general, and more specifically in Nootka. Wilson maintains that while Northern Wakashan assigns stress over the whole word based on weight, Nootka restricts stress to occurring in the first foot of the word. This suggests that the first foot is some sort of domain for stress assignment and therefore that it has special status in the language. While the present author is not completely convinced about the restriction of stress to the first foot, it is clear that in the vast majority of instances, this is the case.
This serves as yet another argument for the special nature of the first foot in Nootka word structure.

4.2.4.4 The First Foot

If we accept the position that the first foot, or the first two syllables, are in some way special, then we have an account for the anomalies described above. We envisage the first foot to be structured as in (30) below, and later feet to be as in (31). Given this distinction of an extra position, we can account for the nature of variable-length vowels by placing them in the coda, but linked to the nucleus in the first foot. If they occur later than this, then there will be no link for them and they will be left in the coda. This produces two possible scenarios: (a) in the case of nasals, they remain in the coda and surface as coda consonants, but have no effect on the preceding nucleus; or (b) in the case of glides, they disappear due to a restriction on their appearance in this position, as supported by the fact that there are no diphthongs in the language.

(30)
Note that the representation provided here for second and later feet is specifically for short-vowel nuclei, but the only difference between this representation and that for long vowels will be in the branching of the nucleus.

4.2.5 The Analysis

Now let us take a look at a unified analysis which will account for all the various phenomena discussed above. This is based on the foot distinction of (32) and (33). First, vowel coalescence can be handled in the following fashion: if the coalescing vowels occur within the first foot, then they may be linked, just as a nucleus may be linked with a following sonorant, thus:
However, if the vowels occur after the first foot, linking cannot occur, therefore the positions are completely merged instead, the resultant length being due to the longest component, e.g.

As for ñ-deletion between vowels, the first position protects the /ñ/ by linking it to the nucleus, whereas this is not possible later on in the word and therefore the /ñ/ drops, allowing the vowels to undergo merger as above.
Now for the case of variable-length vowels and nasals. As in the previous two cases, if the vowel is in the first foot of the word, it can link to the nucleus, allowing it to appear as a long vowel, but if it is in a later foot, then if cannot link and, thus, disappears as shown below.

(34) **In first foot:**

(35) **After first foot:**

Now for the case of variable-length vowels and nasals. As in the previous two cases, if the vowel is in the first foot of the word, it can link to the nucleus, allowing it to appear as a long vowel, but if it is in a later foot, then if cannot link and, thus, disappears as shown below.

(36) **In first foot:**
4.2.6 Conclusions

So we can see that the same generalisations hold for all three cases. In addition, stress can be assigned to the first foot and appear on the head of the first branching nucleus or on the first nucleus if neither branches. This gives us a unified account of these phenomena and a motivated explanation for the behaviour of the so-called 'variable-length' vowels in a fashion which lends systematicity and generality to the description.

Now that we have a clear view of the nature of the syllable and foot in Nootka and of the various rules which obtain in it, we will move to the subject at hand, the nature of hypocoristic formation in Nootka.

4.3 Hypocoristics in Nootka

The hypocoristic form is used as a term of endearment in familiar company and may be formed from any proper name, including the names of tribes or peoples as well as relationship terms. Names in Nootka are typically, possibly always, morphologically complex,
containing a single root as in all words in the language, and from one to theoretically any number of suffixes, as shown in (38) below.

(38) \begin{align*}
\text{tux}^*\text{S}i\text{x} & \quad \text{'he jumps (Sechaht Jackson)'} \\
\text{tux}^*\text{S}i\text{x} & \quad \text{jump-MOM(entaneous aspect)} \\
\text{?an}i\text{miyi}^*\text{a}\text{s} & \quad \text{'woman going alone on the beach'} \\
\text{?an}i\text{ma}^*\text{t}^*\text{?}i\text{s}^*\text{a}\text{s} & \quad \text{alone-move -on beach -...woman}
\end{align*}

As can be seen from the examples above, names are usually analysable by speakers and the meanings are typically transparent. In forming terms of endearment, normal names are transformed in a certain fashion into hypocoristic forms such as in (39).

(39) \begin{align*}
\text{Normal Name} & \quad \text{Hypocoristic Form} \\
\text{hapu}^*\text{t} & \quad \text{he}^*\text{p}^*\text{is} \\
\text{k}^*\text{a}^*\text{c}^*\text{a}^*\text{p}^*\text{i} & \quad \text{k}^*\text{e}^*\text{c}^*\text{is} \\
\text{hu}^*\text{hink}^*\text{k}^*\text{ap} & \quad \text{ho}^*\text{h}^*\text{is} \\
\text{x}^*\text{i}^*\text{h}^*\text{a}^*\text{a} & \quad \text{x}^*\text{e}^*\text{h}^*\text{is}
\end{align*}

There are several changes which forms undergo in order to arrive at the final output: names are shortened, suffixed by -?is and the root vowels are mutated and, if not already long, lengthened.

On examining further instances of hypocoristic formation it is possible to arrive at a tentative description of the facts such as the following:
Hypocoristic Formation: “Truncate name immediately before second vowel, changing remaining vowel to mid, either front or back depending on the roundness of the original vowel, lengthen if not already long and affix -?is.”

This characterisation accounts for all of the following instances of hypocoristic formation, including those with one (41a), two (41b), and three (41c) consonants in the coda of the derived form. Notice that these examples include a case (41d) of a presumably unanalysable foreign name, ‘Sapir’, which illustrates the productivity of the process.

(41) a. ?oːk?is ?uːk?iːru?a
   hoːy?is huːyaːmis?aqs
   moːw?is muwaːtath

   b. kʰeːsp?is kʰispisiːs
      meːtκʼ?is maːtkʼəyapšiːt
      meːks?is maːksisaːiap
      toːcʰ?is łuːčhaːaqs

   c. teːmt.s?is limt.siːat
      weːstq?is waʃtqaːa

   d. seːp?is sapir

Note that this process of truncation does not appeal to morpheme boundaries at all, as can be seen by the following examples, where either more than a single morpheme is involved (42a), or less than a
single morpheme (42b), or an unanalysable form, as for ‘sapir’ in (41d) above.6

(42) a. we-štq?is < waš-tqa?-a (ẖiʔi-ki·k) is called-under-on rocks
    ṭo-čh?is < ṭuč-ḥa?-aqs wife-buy....woman

    b. te-t?is < ṭatatwaq-'i·h speckled trout-hunter of ...
    mo-w?is < muwač-'ath deer-...tribe

A description such as that in (40) above accounts for a large number of the cases involved but it also misses a number of cases as well as a generalisation about the nature of the entity which represents the hypocoristic. In Swadesh’s unpublished account of this phenomenon (Swadesh ms.), he divides the cases up into a number of types. The criteria he chose were: (i) simple name versus reduplicated name; (ii) suffix -ʔis or -is; and (iii) first medial cluster ending in m,n,y,w. It will be seen as we proceed through this account that all of these criteria are a result of the template that is used to create the hypocoristic and there is actually no need to mark various forms on the basis of their shape or environment.

Examples of cases which do not fit the description in (40) include those of the following groups:

---
6 Morpheme boundaries are indicated by / - /.
The cases in (43a) above contain glottalised stops or affricates as the final member of the derived form. Remember that [+glottal] consonants may not occur in the syllable coda according to the constraints in (3) above. Note that when the affix -?is is attached, only part of it, the rhyme -is, appears. Likewise, in (43b) for the laryngealised glottal stop which is also considered [+ glottal] and in (43c) for the laryngealised sonorants. In (43d) not all of the consonant cluster after the first vowel is copied, /m/ being [+ son] and therefore not allowed after /x/ in the coda of a syllable.

There is another set of examples which appear to constitute exceptions to the general case. All of these cases involve name forms which are reduplicated in their normal shape, as in (44).
In the first group, the hypocoristic form patterns after the regular case with the exception that it does not involve the prefixed copy of the name. What we would expect to appear would be something like what is given in (45), but that is not the case.

(45)  
\[ \text{* te·yis} \quad \tauata\text{yup} \]
\[ \text{* te·yis} \quad \tauata\text{yup} \]

The second case, (44b), patterns after the cases in (43a-c) above, which have only the rhyme -is attached, with the further consideration that the reduplicative prefix is not included just as in (44a). In (44c) we have another example where all of the cluster is not copied, as in (43d), and again the copy is not included, and (44d) is an example of a different type of reduplication where again the hypocoristic form does not appear to be based on the full name form but rather on the unreduplicated form. We maintain this based on the fact that the hypocoristic for (44d) does not appear as in (45), which it should if based on the entire name. Note that there is no apparent reason why this form could not appear, given the proper context, on
analogy with forms such as those in (43a), but this is not the case for reduplicated forms. We would, however, expect a form such as (46) if there existed a normal name form such as e.g. ḵat̃ka, where there was no reduplication.

\[(46) \quad * \text{ɾe-}x̃ki\text{s} \quad \text{Kat̃ka-txilwat}\]

This exhausts the various types of seemingly irregular hypocoristic forms. We will now show that the explanation for these widely divergent forms of the hypocoristic rests with the inherent prosodic structure of the language and the constraints which hold in it, rather than with any rampant allomorphy obtaining in the language.

### 4.4 Subtractive Morphology and Nootka Hypocoristic Formation

On first examination, it would appear that the proper treatment of Nootka hypocoristic formation involves an instance of what has been described in the literature as **subtractive** morphology. Such accounts have been posited previously for certain phenomena, as, for example, in Bloomfield 1933 for French adjective derivation or in Anderson 1988 for the formation of Danish imperatives. Cases such as this have been used to argue for the necessity of a process-based model of

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7 There are two additional forms that pose further difficulties. These are the structurally identical forms če-x̃is < čakca-ỹiux and pe-x̃is < pa-x̃a-ỹa?ux. I have at this point no account of these forms, but it is interesting to note that they involve a -x infix which occurs only with the iterative aspect reduplication of strictly CV- roots which accounts for their occurrence in the full name. This appears to be carried over as an indicator in the hypocoristic forms.
morphology along the lines of Anderson 1988, Matthews 1972,
Zwicky 1985, etc. It seems obvious that a morpheme that removes
phonological material can hardly be described as an affix; therefore, a
morphological theory that relies strictly on concatenation will find
these cases particularly troublesome. A process-based account of
subtractive morphology, on the other hand, would employ a rule
similar to that in (47) to realise the output, in conjunction with
whatever grammatical category the subtraction occurred in.

(47) **Subtraction Rule:**

\[ X Y \rightarrow X \]

Another, related treatment, along the lines of Martin 1988 for
Choctaw, would involve the use of the autosegmental machinery of
delinking to achieve the effect of subtraction.

A significant consideration in such treatments is the nature of the
contents of \( X \) and \( Y \) in this rule. In order to employ such a rule it is
necessary to capture the class of things subtracted, for example, a
phoneme, a morpheme, a syllable, etc. But in the case of Nootka
Hypocoristic Formation there is, in fact, no unified class of deletes.
What is removed may be a phoneme, as in (43c), a morpheme as in
the first example in (39), several parts of a form as in the cases
involving reduplication or from just half of a syllable to a number of
phonemes, morphemes, syllables, etc. Thus there is no single entity
which may be dropped in forming the hypocoristic and it is clear
therefore, that to look at this case as involving subtraction is to totally
obscure the regular pattern of derivation that obtains and which will be described in the next section.

4.5 A Unified Account

Taking the previous discussion and our knowledge of the syllable structure of Nootka into account, let us look at a unified treatment of hypocoristic formation in terms of the imposition of a template on a melody containing the entire name, linking, as we would for reduplicative copies, from left to right, one-to-one until all available slots are filled, as in (48).

(48) Hypocoristic Template:

```
\[\begin{array}{c}
\phi \\
N'' \\
N' \\
N \\
\mu X X \mu \mu \mu \mu \\
[- h] [- l] \mu \mu \mu \mu \mu \mu \\
[- t] [- l] \mu \mu \mu \mu \mu \mu \\
\end{array}\]
```

What this template represents is a maximal syllable, containing an onset, a partially-specified nucleus, and a coda containing as many consonants as available, disregarding morpheme boundaries, but respecting the phonotactic requirements of the language. This is followed by a second syllable whose nucleus and coda are fully specified but whose onset is only specified for [+ glottal]. No
phonemes may be skipped in linking to this template, which applies
left to right, one-to-one. Since the vowel of the template is specified
to be geminate, and since there are no diphthongs in the language,
the vowel slot of the original must link to both slots of the template
or, possibly, to a single slot labelled [+ long]. No consonants will be
allowed in the coda if they would violate any of the restrictions
discussed previously, for example a coda containing a glottalised stop
as in (12a), a glottal consonant as in (43b), or a sequence such as
/-xm/ or /-tw/ as in (43d) and (44c) respectively.

Descriptively, there are two means of resolving this possible
conflict. One possible strategy is to place the offending member in
the onset of the following syllable. This is the strategy employed to
repair the forms in (43a-c) and (44b), where the phonemes are [+ glottal]
and therefore may serve in the [+ glottal] onset of the suffix
-?is. The other choice is to drop the offending member of the cluster.
This is the strategy invoked to handle (43d) and (44c), where it is
plain resonants which are disallowed in the coda due to sonority
violations. The dropping of these resonants repairs the sonority
violation, producing outputs which do not contain the sonorants. While
these two strategies would seem at first glance to be unrelated, when
we turn to the theoretical characterisation that involves the linking of
melody to template, we can see more clearly what is actually going on
here.

In the most straightforward case, as in (49), linking is left to right,
until we arrive at the second vowel of the melody, which has no

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available slot in the template. Linking stops there, the partially specified C-slot is filled in with the default consonant, /?/, and we arrive at the final form of the hypocoristic, we-štq?is.

(49)

\[
\phi \\
N'' \\
N \\
N \\
\mu \\
- hi \\
w a s t q a ? a
\]

\[
X X [+Gl] i s
\]

\[
= we-štq?is
\]

This will be the same for all the regular cases such as those in (41). But what about the other cases? First let’s take a look at those cases which involve glottalised obstruents, such as those in (43a). The linking proceeds as in the previous case until we reach the glottalised consonant. It is not allowed to link to the coda of the first syllable since all these slots are specified to be [- glottal]. But it can link to the onset of the following syllable which is specified to be [+ glottal].

This gives us the final output for the form, as in (50).

---

8 This strategy suggests a melody-driven mechanism of linking here.
Now what about the cases involving sonorants following obstruents in the coda, such as in (43d)? We proceed as in all the other cases, linking from left to right until we arrive at the C3 position where it is specified to disallow sonorants. We attempt to link to the next slot but the same constraint obtains. The next position, i.e. the onset of the following syllable does not bar sonorants but it specifies that whatever links to it must be [+ glottal] and /m/ is not. The final two slots are already filled and thus, unavailable. Therefore, the hypocoristic form appears as /to·x?is/:
This template would predict that it is permissible to have a laryngealized sonorant occur in this position, since it would be [+ glottal], and thus, not subject to the same constraints. In fact, that is just the case as can be seen in (52).
An important consideration here is the requirement that sonorants be specified for both marked and unmarked values at this point in the derivation.

This mechanism explains the apparent disappearance of the glottal stop in the suffix -?is in cases like (43) and (44) by allowing an already existing [+ glottal] phoneme to link to it, giving the effect of coalescence.

4.5.1 The Morpheme -?is

The suffix -?is which appears after the template in the hypocoristic form is actually a regular morpheme of the language. It is described by Sapir and Swadesh 1939 as a non-paradigmatic incremental suffix, which indicates that it is a member of a class of suffixes which follows all the lexical suffixes and the aspect suffixes, but which precedes the paradigmatic incremental suffixes, i.e. the regular inflectional suffixes of the language. Schematically, -?is appears in the following position in the word:

(53) Root- Lexical-Aspect- Non-Paradigmatic -?is-Inflection-Clitics

The location of this suffix is pinpointed to this location in an unpublished manuscript by Morris Swadesh on the inflectional suffixes of Nootka (Swadesh ms.). Swadesh states that it occurs after all other non-paradigmatic suffixes and before the paradigmatic suffixes. This locates the suffix right on the border between what we would call derivation and inflection. This explains why no further derivational morphology may occur after the affixation of -?is and also suggests
that this entire process must occur in the lexicon rather than postlexically.

4.5.2 Reduplication and Hypocoristic Forms

In order to arrive at the proper output for the hypocoristic forms of reduplicated names the copy must be made off the melody of the unreduplicated base and not off the copy or the sequence of copy + root. This can be seen in the examples of reduplicated roots given in (44). This argues for a derivation of hypocoristics at a point before the reduplicative copy has been conffated with the rest of the form. This is just the result we would expect if hypocoristics were formed at level one of the morphology of this language.

The suffix -?is which attaches to hypocoristics is a diminutive suffix which applies after the first level of derivation, that is after reduplication and presumably after hypocoristic formation. This would explain why the hypocoristic is formed off of the root and not off of the copy in the cases of reduplication: hypocoristic formation is considered a derivational process which applies at the end of level one after affixation but before tier conflation. Thus, the input to the template will be just the unreduplicated base before conflation of the copy.

This should not be surprising given that later levels of morphology are basically concerned with inflection, which applies, if at all, outside of hypocoristics and does not employ reduplication. Inflectional morphology does, however, employ certain rules which distinguish it from derivational morphology by a separation of levels.
The formation of the hypocoristic form of reduplicated names will be as in (54).

(54)

4.6 Vowel Mutation and Coalescence in Nootka

The representation of the nucleus in the hypocoristic template contains a partially specified matrix for the vowel. The vowel is specified as branching, and as \([-hi]\). These stipulations ensure that the correct vowel is obtained depending on the vowel of the input. The vowels of Nootka must be partially specified as to roundness \([\pm \text{ rnd}]\).

With a tripartite division created by means of underspecification, the system of Nootka can be described as follows:
The remaining features will be filled in by default rules as in (56) below.

\[ (56) \quad [ \_ ] \rightarrow [+ \text{ lo}] \]
\[ [ \_ ] \rightarrow [- \text{ rnd}] \]

Justification for /a/ being the maximally underspecified vowel comes from several sources. Firstly, /u/ cannot be so specified, since it takes part in processes of secondary labialisation of obstruents which can be proved to obtain only at an early stage of derivation prior to the inflectional level where labialisation does not take place. And /a/ appears to be the default vowel in terms of coalescence, which arises when two morphemes are juxtaposed, the first ending in a vowel, the second beginning in one. In coalescence, any vowel conjoined with /u/ yields /u/, any non-/u/ vowel conjoined with /i/ yields /i/ and only /a/ + /a/ yields /a/, exactly what one would expect if /a/ carried no specifications of its own, thus:9

\[ (57) \quad u + u = u \quad i + u = u \quad i + i = i \]
\[ u + i = u \quad a + u = u \quad i + a = i \]
\[ u + a = u \quad a + i = i \quad a + a = a \]

9 These are the facts for the quality of the coalescence. The length of the result remains to be accounted for but is not really germane to the issue at hand.
If coalescence is looked upon as the unification of features with later filling in by default, then the results are as expected if vowels are specified as in (55) above (cf. Inman 1990 and references therein).

In order to be able to use underspecification here, we must account for the full specification of the feature [t glottal], which plays a key role in the linking process, especially since this feature has to have both the plus and minus values specified to determine the linking to the onset of the second syllable of the template. We conclude from this that there must be a cyclic default assignment that applies near the end of level one, filling in the default values.  

4.7 Where does Hypocoristic Formation happen?

4.7.1 Expressive Morphology

Since there are no names which occur with inflection as an inherent part of them, as opposed to inflection to indicate possession, deixis, etc., and since the suffix -?is has been shown to occur at a definite point in the derivation, then hypocoristics must be derived at a point in the derivation immediately preceding the inflectional module, i.e. inside the derivational morphology. If this is the case, then we are left with two choices: (1) that hypocoristic formation is somehow 'special' in its behaviour, accounting for this apparent exception to Structure Preservation, or (2) that it is a regular process of the lexical module of the language, in which case there must be an explanation for the

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10 In actuality, this would also explain why the unrelated rule of 'softening' only applies to segments at level one, before they are fully specified, and not at level two or later.
apparent violation. We will examine these two possibilities in order, beginning with the 'special' treatment of hypocoristics as part of an 'expressive' module of morphology.

The fact that this strategy appears to involve the abandonment of the left-over melody and that it involves the use of mid-vowels, which are not supposed to be phonemic, is suggestive of an operation outside the regular grammar. If this phenomenon were part of the regular grammar of the language, we would expect it to employ regular phonemes of the language. This is not the fact, however. As we have seen above, /e/ and /o/ are not regular phonemes of the language, but do play a role as contrastive vowels in Hypocoristic Formation, as shown by the example below.

(58) ĉe·ʔis < ĉi·ʔakim vs ĉo·ʔis < ĉu·ʔuʔup

Hypocoristic formation does, however, result in other ambiguities due to the truncation of a form before it may be distinguished from another, as in the following example.

(59) kʷe·ʔis < kʷa·sa·nim < kʷa·sa·win

This result would seem to suggest that hypocoristics are in some sense extra-linguistic or at least 'special' linguistically. Taking up on an idea first posited by Zwicky and Pullum 1987, we will examine here the idea that hypocoristics are instances of 'expressive' morphology, a separate module of morphology that involves special cognitive processes which interact with the regular linguistic ones, and which
may include such phenomena as English expletive insertion, various language games and varieties of hypocoristic formations in other languages. As such, Nootka hypocoristic formation has the leeway to establish new phonemic distinctions while maintaining certain requisite constraints on Nootka word-building.

The exact mechanisms of expressive morphology are unclear and, in fact, undeveloped, but we envisage it as a separate but parallel module within the grammar that allows a limited interchange between what we refer to as regular grammar and that which is expressive. This explains the observation that expressive morphology is usually constrained to some extent by regular rules of grammar. However, it contains a set of over-ride rules which take precedence over the regular rules where there is a clash, accounting for violations within a certain set of parameters. If the expressive module is an optional, adjunct member of the grammar, it would also explain why skill levels of certain individuals exceed those of others in, for example, language games, whereas you wouldn’t expect this result for rules of Passivisation or plural formation.

The use of these pseudo- or perhaps semi-phonemes in this case brings us to an interesting question regarding the nature of language. Is it possible to have what appears to be a phonemic distinction between non-phonemic vowels in a language? Or is it possible that /e/ and /o/ are, in fact, phonemic in the language, but skewed as to distribution, along the lines of, say, the English hypocoristic forms
4.7.2 Regular Grammar

There is one piece of evidence that /e/ and /o/ do play a role in the phonemic system of the language and that comes from borrowings. In words borrowed from English or French, there are many cases where /e/ and /o/ appear. /e/ seems to correlate with English /æ/, and /o/ with /oʊ/, /au/ and /ɔ/, as in the examples in (60).

(60) pe:n'ci• < English ‘Frenchie’
     če:m (če:mq-) < English ‘jam’
     mišo:n (mišatq-) < French ‘le châle’
     po:yisín (po:yisinq-) < English ‘poison’

Note that all these examples, and in fact, all examples involving /e/ or /o/ have only the long vowels, never the short versions, and that the words have been otherwise adapted to fit Nootka phonotactics, /p/ substituting for /fr/, /ɛ/ for /ɨ/, etc. Furthermore, these free-standing words have separate combining forms in many cases, just as regular words of the language do, e.g. če·mq-, mišatq-. What this seems to show is that the vowels /e/ and /o/ are now part of the phonemic inventory of the language, whereas previously, they would have existed only as special vowels in the expressive module, used only for the formation of the hypocoristic forms. This gives us the modified phonemic inventory you see in (61) below.

11 Thanks to Paul Kiparsky, who provided this example.
4.8 Theoretical Implications

If hypocoristic formation is a rule of the regular grammar, which is in some sense the more attractive option, then we must address the issues of structure preservation and underspecification in addition to the existence of sub-phonemic vowels.

First, there is good evidence that hypocoristic formation is a member of the regular morphology, based on its order of occurrence, its observance of the rules of the grammar and its adherence to the syllable structure. In fact, the only thing which sets it apart from regular grammar is the fact that the template that it adheres to fails to concatenate with the melody from which it is drawn, unlike reduplication which is virtually identical in formation but does concatenate with its base. No one would suggest that reduplication is 'extralinguistic' in Nootka and so this case is reduced to the non-conflation of tiers in the case of hypocoristics.

This phenomenon is not new to the linguistic literature. In 1981, John McCarthy discussed such cases in Arabic, where they involve quinquilateral melodies, such as the word for 'magnet' (magnatii8), which attach to quadric consonantal templates, as in the verb form for 'to magnetise', given in (62) (adapted from McCarthy 1981:399).
Since copying is eminently amenable to a similar treatment, it should not be surprising that the same thing occurs in the formation of Nootka hypocoristics, where the template is linked to the melody of the regular name.

4.9 Conclusion

In conclusion, we have seen in this chapter that it is possible to have a formation which operates surprisingly like reduplication yet with a very different outcome: only the copy is saved and the remainder, including the original form is discarded. This linking of melody to template follows regular patterns seen in many languages. Hypocoristic formation can be shown to occur within the grammar of the language and yet, it employs vowels which are not typical in the language. The evidence from loanwords seems to indicate that these vowels are now part of the phonemic make-up of the language, most likely due to the influence of their presence originally in the hypocoristic formation being extended beyond this area. Thus we have an instance of a formation that was at one time most likely a part
of the expressive morphology of the language now existing as a regular part of the grammar.
Chapter 5

On Metathesis in Morphology

5.1 Introduction

The use of the term 'metathesis' is widespread in the linguistic literature. There are cases cited of vowel-vowel metathesis, vowel-consonant metathesis, consonant-consonant metathesis and even of non-contiguous metathesis. The vast majority of cases involve various phonetic or phonological rules which conspire to produce the ostensible metathesis effect, thereby satisfying some well-formedness constraint involving the shifting of stress, the necessity of breaking up clusters, the need to adhere to some segmental ordering hierarchy, etc., as suggested by Grammont 1933:339:

"La métathèse consiste matériellement en ce qu'un phonème quitte sa place originale pour aller en prendre une autre à une certaine distance de la première. La cause principale de ce phénomène est le besoin de donner aux syllabes ou aux mots une constitution phonique plus commode."

1 For further information on the possible types of metathesis cf. Ultan 1971.
Ultan adds to this:

“Many metatheses are automatically induced by morphological juxtaposition that results in phonotactically inadmissible sequences.” (Ultan 1971:30)

But rare, isolated cases have been described which appear to employ metathesis as a grammatical device to perform some task more commonly performed by affixation or by the syntax. This chapter examines such putative cases of grammatically-induced metathesis and offers alternative solutions to the analyses which rely on metathesis to realise a grammatical category.

Metathesis is a challenge to theories about the structure of language. It defies the use of concatenative accounts of morphological effects, it violates notions of sequentiality and linearity in language, exhibiting not only problems with discontinuity but also with context-dependent structure-changing and, if real, it would pose a serious impediment to linguists wishing to capture the data in a theoretically interesting fashion without appeal to overly powerful machinery. It has been called upon as a key example of the need for process-based morphology in such works as Anderson 1983, 1988, Janda 1984, and Zwicky 1988. The usual argument is that affixational models of morphology cannot handle processes such as metathesis and, therefore, we must appeal to processual treatments. Thus,
"It is probably the case that neither infixes nor reduplication pose other than mechanical problems for the basic nature of the morpheme, but the same cannot be said for other apparent "morphemes" with problematic form. ... A final class of formally problematic cases, discussed by Thompson & Thompson (1969), involves grammatical categories that are marked by reorganization of the phonological material making up the basic form - in particular, reordering or metathesizing some parts of it. ... In some languages, metathesis serves directly as the marker of certain grammatical categories." (Anderson 1983:8-9)

What I will maintain is that affixational accounts get just exactly the correct results, that is they encounter great difficulty in describing cases of metathesis, just as they should. Metathesis should not be expected to occur as a grammatical marker, and a theory which employs a process of metathesis, as in (1), just as easily as it does one of concatenation masks this inherent complexity of the operation, which is highly marked in morphology and not expected to occur in language to serve this purpose.

(1) \begin{array}{ll}
\text{[- Gr Cat A]} & \text{[+ Gr Cat A]} \\
W X Y Z & \Rightarrow W Y X Z \\
1 2 3 4 & 1 3 2 4
\end{array}

In the first putative case of grammatically-conditioned metathesis, I examine data from Chawchila Yokuts described by Newman 1944 as involving metathesis.² It will turn out that the metathesis in this case

² Thanks to Richard Janda for bringing this case to my attention.
is nothing more than a repair strategy for resolving a violation of phonotactics brought about by the deletion of a vowel and the consequent convergence of two consonants that are not phonotactically permissible in the order that they would occur in.

The second case of metathesis that I will investigate is more complicated. Actually, it will turn out that this case involves the use of templates in a fashion similar to Semitic root-and-pattern morphology. The metathesis is the result of the ordering of the segments of the template, resulting in the consonant preceding the vowel in one instance and following it in the other.

The resolution of this case is more straightforward than the final case, that of the Saanich Actual aspect marker, which surfaces as metathesis in one class of forms. We will see, however, that this case also is amenable to a reanalysis in terms other than those of metathesis. After the reanalysis of these examples, I will move to a typology of metathesis cases and the eventual proposal that metathesis does not exist as a grammatical device in language or even as a grammatically-conditioned device, but only as a residual effect of the phonological constraints imposed on morphological operations.

5.2 Chawchila Metathesis

In the Chawchila dialect of Yokuts as described in Newman 1944, metathesis appears in two noun suffixes when they are found to occur under certain grammatical conditions. In this chapter, however, we will see that the grammatical condition that is met is one of skeletal
form which forces two consonants together that constitute
phonotactically impermissible sequences of the language and the
metathesis which results from this concatenation is merely due to a
language-specific constraint on sequences of phonemes.

The two suffixes are -hâli$ and -ilin in their basic shapes. Newman
describes this case of metathesis as follows (1944:32):

Two noun suffixes of Chawchila, -hal'i$/, consequent
adjunctive, and -ilin/, a form of the intensive possessor,
appear with the I' or I metathesized in the oblique stem
where the last vowel is zeroed, as -ha'y!- and -inl ... The
same process takes place within the unanalyzable noun
theme, Gashowu $u'lin/ and Chawchila $o'lin/, "pine
bur," whose oblique stem is $u'lin- and $o'lin-.

Notice that the stated environment for these cases is in the
'oblique stem', a grammatical category of the language and, therefore,
the metathesis would appear to be connected to some grammatical
condition which exists in the language.

We will now take a closer look at this apparently strong case of
grammatically-conditioned metathesis in an attempt to understand
the workings of this seeming exception to what I see as a theoretically
more desirable general constraint prohibiting the use of metathesis as
a grammatical marker in language.

5.2.1 Yokuts Word Structure

In order to understand the nature of this process in Yokuts, we must
examine portions of the phonology and I will begin with an
examination of the stress system of the language. In Yokuts, words are regularly accented on the penultimate syllable, as in the examples in (2).

(2)  
hooyehána?  ‘messenger-SUBJ’
híwtíñay  ‘while walking’
ʔohyóóhin  ‘searched for’

There are a few exceptional cases of antepenultimate stress involving certain verbal morphology and cases of trisyllabic nouns with so-called strong vowels in their initial syllable but these are not germane to the discussion at hand. A further factor to consider is the domain of stress assignment, which in Yokuts is the phrase and not the word (Archangeli 1984). However, the noun or verb is usually the final element in its phrase and, therefore exhibits the usual pattern of stress assignment in most cases.

Following Archangeli 1984, I observe that there is a syncope rule at play in Yokuts which deletes short rimes just in those cases where the result of such a deletion is resyllabifiable. I will not go into Archangeli’s complex discussion of the matter but will simply accept the relevant portions of her exposition. In Archangeli’s account then, underlying forms of the type (3a) below surface as (3b) after the necessary application of rules of tree construction, resyllabification and bare rime deletion. Further rules of shortening and vowel harmony influence the final shape of the form.
This complicated interaction of rules results in a very different surface shape for forms in Yokuts than exists underlyingly. These complexities will also be seen to account for the case of metathesis under discussion here.

According to Newman, in word formation in Yokuts, there are two types of suffixes which are attached to a root, thematising and final. Thematising suffixes attach to each other as well as to final suffixes to form bases. Final suffixes attach only to roots or to thematising suffixes and produce the completed word.\(^3\) In deriving bases from roots or combinations of root and thematising suffix, Yokuts employs several different forms of the base depending on the nature of the following affix. Newman uses the terms 'reduced', 'normal' and 'regular' stem and, orthogonally, the concepts of 'regular' versus 'oblique' stems in conjunction with the environmentally-conditioned characteristics of pre-vocalic, pre-consonantal and pre-final.

Furthermore, there are a number of different classes to which forms may belong, both as verbs and as nouns. The shape of the root is

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\(^3\) Newman represents this distinction by a slash following the thematising suffix, and nothing following the final suffixes. In the remainder of this chapter, I will follow the convention of placing a hyphen both before and after thematising suffixes, which are non-final, and only before suffixes which are final. It should be noted that Newman employs zero-type final suffixes, represented as -\(l\), resulting in the thematising suffix appearing finally in some cases.
to some extent dependent on the class to which it belongs. Affixes may select for the shape of the base to which they attach (Kuroda 1967, Kenstowicz and Kisseberth 1977, Archangeli 1983, 1984). Archangeli accounts for the distinctive shapes of roots in the Yawelmani dialect by assigning particular CV-templates as a property of individual affixes as in (4), taken from Archangeli 1983.

(4) a. lükli- 'bury' huluus 'sit'
    b. lükliut 'was buried' huloşhun 'sat'
    c. lükooluwsool- 'cemetery' huloşuwsool 'place for reciprocal setting'
    d. lüklexöök 'remain buried!' hülżeexöök 'remain seated!'

The forms in (4a) are the basic form of roots which occur with many suffixes, as is shown by the (4b) forms where a suffix of what Archangeli refers to as class I is attached, allowing for the application of later phonological and phonetic rules which result in the final shape. But when a suffix such as -wsiiöl is attached to the root the result is as given in (4c), a significantly different shape for the root. Other affixes such as in (4d) require still further shapes for the root.

5.2.2. The Shape of Noun Stems

This imposition of templates obtains also in the realisation of stems as Archangeli 1984 shows. In the following examples we can see that the shape of the noun depends in part on the case it is inflected for.
Taking all this information into account, let us now move to the instances of metathesis found in the Chawchila dialect of Yokuts. The suffixes which Newman describes as involving metathesis are ‘-hal’i’y, consequent adjunctive, and -ilin-, a form of the intensive possessor. I will examine these in more detail in the following exposition.

The suffix -hal’i’y- is a thematising suffix as described above and is a form of the adjunctive, whose function is to indicate ‘an entity that stands in the relation of receptor, either direct or indirect, to the activity described in the verb.’ (Newman 1944) Its semantic function will not really concern us here, but suffice it to say that it forms nouns from verbs, which may, actually must, then be marked for case unless there is further affixation of thematising suffixes before the attachment of a final suffix. When this suffix is attached by the subjective case suffix it appears as in the following examples adapted from Newman 1944:165.

(6) a toynew xaya:hal’i’y ?ama? ha’ca-me? taw’ta?
   ‘the one who is placed in the center(is) that young dead woman’

   ‘and at dawn they(dual) fell asleep again’
When, however, the stem containing -hal'i'y- is not in the subjective case but rather in some other case, such as the objective (7a) or the locative (7b), then the form of the suffix is very different, just as it is in the various cases marked on the nouns shown above in (5).

(7) a. xamithayla maaxka "fetch the scythe!"

   "they are digging the ground in the cemetery"

Why do we encounter this curious transposition of elements in the case of these forms? It is clear that the shape of the stem is that required by the addition of the case markers just as it is in the simpler nouns in (5). Take, for example, the shape of the suffix -hal'i't-, Consequent Verbal Noun, which is strikingly similar to -hal'i'y-, both segmentally and structurally. When it occurs in the Subjective case, it appears as in (8a), identical in structure and with the exception of one phoneme, in shape. When this suffix is in the Objective case, as in (8b), it is again identical in structure to the same case marked form of -hal'i'y. However, this form is never found to metathesise and this is quite understandably so: the phoneme sequence /l't/ is found quite freely in the language and there is therefore no need to metathesise the two consonants.
6.2.9 Metathesis as Realisation of Phonotactic Restrictions

In searching through Newman's grammar and other sources, it was not possible to find any instances of a collocation of /l'yll/ or even /l'y/ anywhere in Yokuts. A further search through various descriptions of the language was no more productive until I encountered Gamble 1978's description of the Wikchamni dialect of Yokuts. In his detailed description of Wikchamni, Gamble provides a chart of the consonants which are found to co-occur in clusters based on all occurrences of clusters in his corpus.

While Gamble suggests that gaps in the chart appear to be fortuitous, it would be quite curious indeed if a corpus sufficient in size
to provide material for a reasonably complete grammatical description of a language did not also provide at least a single occurrence of any particular cluster that could occur in the language. For example, the fact that /ɛ/ occurs initially in only three clusters and finally in only six whereas both /ɛh/ and /ɛ/ occur in twelve clusters initially and in eighteen and seventeen respectively in final position seems to be more than fortuitous.

One notable gap in the table of possible clusters is in the area of sequences of /l/ or /l'/ as first element and /y/ or /y'/ as second element. This apparent gap in the paradigm, I would maintain, is more than coincidental. It reflects a phonotactic tendency, possibly even restriction, that exists in the language and which accounts for the effect of metathesis in the case where /l'/ and /y/ are brought together. Both /y/ and /y'/ are found to occur before /l/, /l'/ being ruled out as the second member by the rule of deglottalisation referred to above.

Assuming that this is an accurate picture of the facts, we have clear motivation for the occurrence of metathesis in just those cases where /l/ or /l'/ would be followed by /y/ or /y'/: That is, when a grammatical rule requires the addition of an affix and the templatic structure needs readjustment in order to comply, two consonants are frequently brought into contact. Now, for most consonants there is no problem with this and they maintain their order, but just when those consonants are /l/ or /l'/ as first element and /y/ or /y'/ as the second, a phonotactic rule of the language requires the transposition
of the two, yielding the acceptable string /yl/ or /yl/. This is just the kind of case of metathesis which we expect to find in language, i.e. a case of phonologically-conditioned metathesis resulting from the morphological concatenation of a phonotactically impermissible sequence of sounds.

5.2.4 Allomorphy in Yokuts

Now let us take a look at the other putative case of grammatical metathesis in Chawchila, that of -ilin- metathesising as -inl-. This case is parallel to the previous one in many ways. It selects for the same noun stem as -hal'iỹ-, type IIA in Newman's classification. Again the distribution of phonemes is such that the sequence /ln/ is extremely rare. In a careful search of Newman's grammar, I found only a single Chawchila form containing the sequence /ln/, the word yu̍kulnut, which has the root yu̍kul and the final suffix -nut, where the point of convergence coincides with a morpheme boundary, unlike the case with the single morpheme -ilin-. The phonemic sequence /inl/, on the other hand, is found in such common forms as the word for 'five' which is yitsinil in the regular form and yitsinl in the oblique stem and the word for 'quail', humunlun.

If what has been said regarding the phonotactic restrictions of the language that affect -hal'iỹ- holds for -ilin-, then the answer to this puzzle is straightforwardly due to the phonotactics of the language and is certainly not due to any form of grammatically-conditioned metathesis at work in the language. Note further that such a form of
metathesis would hold only for these two cases in the language and not for all the other instances where different consonants are forced together in these nominal patterns such as in example (5) referred to above. This is a highly unlikely situation at best.

If on the other hand, it is not the case that -inl- is the result of a phonotactic constraint in the language, it is certainly exceptional in other ways. It occurs in a number of different shapes, some depending on the immediately preceding vowel (9c) or consonant as in (9d), others on the syllabic weight of the stem as in (9e) from the Chukchehansi dialect and still others described by Newman as unexplainable forms of the suffix such as the one under discussion when in the already examined shape of the oblique stem (9b).

(9)  

a. tih-\textit{inlin}  
   'one with many head-lice'

b. pat\textit{-inl-i}  
   'one with many body lice' (objective)

c. \textit{\textup{p}u\textup{l}-uyun}  
   'one with a large penis' (with vowel harmony)

d. \textit{\textup{t}ap\textup{x}-ixin}  
   'one who is very lame'

e. \textit{\textup{x}at-\textup{t}i\textup{c}in}  
   'one who is always eating'

(Chukchehansi)

Newman describes the occurrence of some of the possibilities as 'irrational', presumably meaning exceptional. The question is then reduced to whether the form -inl- is a member of the regular or of the exceptional cases. Whether this case too is an example of metathesis, either presently or at some earlier stage of the language or merely a case of weird allomorphy, it is clearly not a case of grammatically-conditioned metathesis.
5.2.5 Conclusions

It has been seen that at least one case of Chawchila Yokuts metathesis is nothing more than the straightforward implementation of a strategy to repair the phonotactically impermissible structure of a form created by the imposition of a rule of vowel deletion that forces the two consonants together. The second instance may be simply a case of allomorphy, but it is clearly not an instance of a morphological process at work. There can be no question that this case is not a valid instance of grammatically-conditioned metathesis, but rather an instance of a much higher-frequency occurrence of metathesis due to phonological considerations.

5.3 Metathesis in Sierra Miwok

Another case of metathesis, which appears in the Sierra Miwok language, will be of interest here. This case is an example of purely templatic effects in morphology, analogous to Semitic root-and-pattern forms. The metathesis will be seen to be the result of templatic exigencies on syllable structure, imposed through grammatical selection and accomplished by the linking of C's and V's which are segregated on separate tiers underlingly to the template, giving the appearance of metathesis on the surface.

4 All data presented here are drawn from Freeland 1951.
In this language verbal roots appear in one of several different forms depending on the grammatical class of the stem. There is a primary stem, a second, a third, and a fourth stem for most verbs. Freeland 1951:96 states that,

"This variation in the rhythmic pattern of the verb stem must, I think, be regarded as in some measure having grammatical value in itself, and not being entirely accompaniment of suffixation. For one thing, a given form of the stem may, quite without suffix, serve as a form of the verb .... Also, in a very general way, it is possible to assign certain meanings to the different stem forms. There is no doubt that the primary stem form tends to be associated with the idea of present time; the second stem form, among other ideas, with that of future and past time; the third stem form with habitual or iterative action; and the fourth stem form tends to become a noun."

This is highly reminiscent of the binyanim of Semitic languages, which also indicate certain grammatical categories. While there is no evidence for the separate morphemic status of C's and V's in Sierra Miwok, the rigid, predetermined structure of the stem is indicative of one class of cases of CV segregation as proposed in McCarthy 1989.

One of the patterns in what Freeland calls the fourth stem surfaces as a metathesis of the final vowel and consonant of the stem. According to Freeland, the metathesis is always of the same type, involving the reversal of order of consonant and vowel in the second syllable of a stem. This transposition of elements results in a sequence of closed syllable followed by open syllable in the Fourth stem, as
opposed to the effect in the Primary stem, which has an open syllable followed by a closed one.

(10) Fourth Stem Primary Stem
    kálŋa- ‘a dance’ kalaŋ- ‘to dance’
    ?úmĉu- ‘winter’ ?umuĉ- ‘to approach winter’
    yúpse- ‘to spit’ yu̞pes-i- ‘saliva’

5.3.1 Miwok Phonology

In order to better understand the derivational strategies invoked above, we must first examine some characteristics of the phonology of Sierra Miwok. Both vowels and consonants may occur as single or geminate phonemically or allophonically. A long vowel never occurs before a geminate or even two distinct consonants. There are examples such as the following where the length of the vowel depends on its environment, specifically on the weight of the syllable it occurs in, which must be bimoraic.

(11) waká-li? ‘creek’ wakái-mi? ‘at the creek’
    léppanaŋ ‘he finished’ léppanaŋ-ppu’t ‘they finished me’

Apparently, this rule also holds within the phrase, as indicated by the following examples where a consonant in the following word triggers the shortening of the vowel. This suggests that C’s which are final in the phrase are extrametrical, whereas those within the phrase are not, indicating that the domain is phrasal rather than word-level.

(12) ?iwí’sak pitšé-maŋ ‘eating meat’
    ?iwí’sak, kákččí-p ‘he was eating, they say’
Geminate consonants are degeminated when adjacent to another consonant, observing a constraint against sequences of three or more consonants and ensuring that the syllable canon, as described below, is maintained.

(13) pólluk- + -mmi? → póllukmu?
    kaláŋŋ- + -pa → kaláŋpa

According to Freeland, syllable structure is of the following possible types: CV, CVV, CVC and only in word-final position, CVVC. Actually, the latter is more likely phrase-final, with extrametricality of the final consonant. The final C of the CVC shape may be half of a geminate or an independent consonant. Syllables divide into two groups, light and heavy, on the basis of the number of moras in the syllable. Syllables containing long vowels or short vowels followed by a consonant are heavy, all others are light. Notice that two consonants are required to add a mora to a short-voweled syllable, one in the coda and one in the onset to the next syllable. Stress is assigned to the first syllable of the word if it is heavy, if not, the second syllable is stressed and made heavy if it is not already so. The discussion of secondary stress in Freeland is scanty and inconclusive, and I will propose a rule of primary stress only, applying at the left edge of the word, creating a binary foot which must contain at least three moras. This stress rule is outlined below.
(14) a. Assign a binary foot at the left edge, left branch labelled strong iff it is heavy
   b. otherwise the right branch is labelled strong
   c. The strong branch is heavy

(15) a. 
   \[
   \phi \quad \sigma
   \]
   \[
   \mu \quad \mu \quad \mu
   \]
   CVCCv

These rules account for the assignment of primary stress, which always occurs within the first foot, as in Nootka which was discussed in Chapter Four, the difference being that here there is a rule to ensure that the syllable to which stress is assigned is always heavy.

5.3.2 Verb Stems and Templatic Morphology
Various strategies are employed for word-building in Sierra Miwok, including suffixation, reduplication and so-called ‘prosodic change’. The latter will be the focus of this investigation especially as concerns the changing of syllable structure accomplished by means of metathesis.

At least four shapes exist for bases of verbs, labelled as primary through fourth stem in Freeland 1951. The basic shapes of these forms are highly reminiscent of Semitic root and pattern morphology in that they involve manipulation of the consonants and vowels to produce various configurations. The primary stem varies across four
different classes of verbs, but the other three stems are quite similar across conjugation classes, in fact, virtually identical with the exception of the second stem of the IV class, as shown by the table below.²

<table>
<thead>
<tr>
<th>Class</th>
<th>Primary</th>
<th>Second</th>
<th>Third</th>
<th>Fourth</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>CVCVVC</td>
<td>CVCVCC</td>
<td>CVCCVC</td>
<td>CVCCV</td>
</tr>
<tr>
<td>II</td>
<td>CVCCV</td>
<td>CVCCVC</td>
<td>CVCCVC</td>
<td>CVCCV</td>
</tr>
<tr>
<td>III</td>
<td>CVCCVC</td>
<td>CVCCVC</td>
<td>CVCCVC</td>
<td>CVCCVC</td>
</tr>
<tr>
<td>IV</td>
<td>CVVC</td>
<td>CVCC</td>
<td>CVCCVC</td>
<td>CVCCVC</td>
</tr>
</tbody>
</table>

The reader will no doubt notice the striking similarities in all but the primary stems, which are the apparent determiners for the class distinctions, much as certain binyanim are more irregular than others in Arabic morphology and must therefore be prior. Classes I and II both contain three consonants and two vowels on separate tiers, and differ only in the placement of stress, whereas class III has two consonants and two vowels and class IV has just two consonants and a single vowel specified. The consonant, /ʔ/, and vowel, /i/, fill out the patterns in all unspecified slots.

² The use of C’s and V’s here is merely an expedient and does not constitute any theoretical claim. The representation would actually be along the lines of McCarthy and Prince 1988’s characterisation of Arabic, which involves prosodic templates to which C’s and V’s are linked.
5.3.3 Metathesis in Sierra Miwok

The point of interest in these stems for the present account is in the fourth stem which is realised, at least in classes I through III, as a metathesis of the final consonant and vowel. According to Freeland, this form is only employed with suffixes beginning with a consonant, leading us to suspect some phonological restriction necessary to prevent coalescence of vowels and maintain the shape of the template.

One encounters such suffixes in the derivation of nouns from verbs in Sierra Miwok. One method for deriving such forms is by the suffixation of a /-ʔ/ to the verb stem, giving the results exemplified below.

(17) ?iwiʔi-ʔ ‘food’ < ?iwwi ‘to eat’ (III)
    ?inʔi-ʔ ‘way’ < ?inni ‘to come’ (III)
    kóywoʔ ‘speech’ < koyów ‘to tell’ (I)
    ?uíneʔ ‘myth’ < ?utnéʔ ‘to relate’ (I)

In these cases there is a relationship between the addition of the morpheme represented by /-ʔ/ and the choice of the fourth stem, which may be derived from the primary stem by what would appear superficially to be metathesis of consonant and vowel. This relationship may be one of affix selecting for base as is the case for the distantly related Yawelmani dialect of Yokuts as described by Archangeli 1984 or perhaps it is just a case of affixation to a nominal base, as suggested by Freeland’s statement that ‘the fourth stem form tends to become a noun.’
Whatever the direction of derivation, the fact that consonants and vowels in Sierra Miwok appear to exist on separate planes according to the template patterns we have just seen would allow us to reproduce this superficial effect of metathesis simply by linking the available consonants and vowels to each other in the order demanded by the template in question, in this case the fourth stem template. For example,

(18) /?inī#/  

<table>
<thead>
<tr>
<th>Primary Stem</th>
<th>Fourth Stem</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before</td>
<td></td>
</tr>
<tr>
<td>Melody</td>
<td>? n</td>
</tr>
<tr>
<td>Linking</td>
<td>CVCCV</td>
</tr>
<tr>
<td></td>
<td>i</td>
</tr>
<tr>
<td>After</td>
<td></td>
</tr>
<tr>
<td>Melody</td>
<td>? n</td>
</tr>
<tr>
<td>Linking</td>
<td>CVCCV</td>
</tr>
<tr>
<td></td>
<td>i</td>
</tr>
</tbody>
</table>

Stress is assigned by the regular rules and the forms emerge as described in (18) above. This case of metathesis then is very simply described as an instance of templatic morphology in a language which makes full use of its capabilities without assigning morphemic status to consonantal and vocalic melodies.

If this was the only case of metathesis that occurred in the language it would be a simple matter to allow for, given the possibility of separating consonant and vowel on separate planes when evidence such as obtains here exists. In addition to the formation of a noun by
the affixation of /?/, it is possible to derive simple verbs from nouns by the imposition of a different template on the form of the noun. What actually appears to happen is that the noun is required to conform to the primary stem of one class of verbs, often exhibiting apparent metathesis as a by-product.

(19) ká·wi·n ‘in the middle’ kawí·n ‘to be in the midst of’ (I)
     manik ‘more’ maní·k ‘to do to a greater extent’ (I)
     ?ú·ču- ‘house’ ?účču ‘to live’ (III)
     mi·li- ‘song’ mǐlī ‘to sing’ (III)

Classes I and III appear to be the most common for straight derivation of verb from noun but the other classes also take part although most of them with additional morphology in the form of suffixation. Again, the productivity of the template is evident here and helps to explain the apparent manifestation of metathesis in certain cases of verb derivation as in (20) below.

(20) ?úmču ‘winter’ ?umuc ‘to approach winter’ (I)
     yú·pes-ı- ‘saliva’ yúpse ‘to spit’ (II)

All apparent cases of metathesis in Sierra Miwok appear to be amenable to a treatment such as that provided here. This suggests that once again, a putative case of grammatically-conditioned metathesis admits of a better solution in terms of regular processes of the language. The explanation for the apparent metathesis here is the reliance of the language on a separation of consonants and vowels on different tiers and the imposition of templates to which these
phonemes are linked, resulting in a segmental order determined by the template.

5.3.4 The Primary Stem

The primary stem poses more difficulties in terms of choices of templates than all of the other stems combined. It surfaces in at least four different shapes which seem to be completely unpredictable, whereas the other stems have a single uniform shape. How is this apparent diversity of shapes to be reconciled with the templatic approach? One possibility is to say that the templates for the first stem are arbitrary and that no single template can describe them. However, this is a very unsatisfying proposition and one that is not to be preferred. In what follows, I will propose an alternative to this solution based upon prosodic requirements on the foot and a directional approach to linking to the template. But first, the problem.

Remember that the first stem comes in the following shapes, depending on the class it belongs to.

(21) I II III IV
    \^ \^ \^ \^ 
    CVC\check{V}VC CVCCV CV\check{C}CV CV\check{V}C

Of these shapes, II and III can be seen as in some sense different realisations of the same template, in one case by three different

---

6 The second stem actually arises in two forms but the determining factors are lack of segmental melody and avoidance of confusion with other stem shapes.
consonants and in the other by only two distinct consonants. I and IV also share some properties, i.e. if the first syllable of I is removed, they are identical. Note in the table below that all these classes are realised identically in the third and fourth stems and almost the same, with the exception of the missing first syllable in the second stem.

(22) Class Primary Second Third Fourth

<table>
<thead>
<tr>
<th>Class</th>
<th>Primary</th>
<th>Second</th>
<th>Third</th>
<th>Fourth</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>CVCVVVC</td>
<td>CVCCVC</td>
<td>CVCCVC</td>
<td>CVCCV</td>
</tr>
<tr>
<td>II</td>
<td>CVCCV</td>
<td>CVCCVC</td>
<td>CVCCVC</td>
<td>CVCCV</td>
</tr>
<tr>
<td>III</td>
<td>CVCCV</td>
<td>CVCCVC</td>
<td>CVCCVC</td>
<td>CVCCV</td>
</tr>
<tr>
<td>IV</td>
<td>CVVC</td>
<td>CVCC</td>
<td>CVCCVC</td>
<td>CVCCV</td>
</tr>
</tbody>
</table>

What if the only distinction between these varying forms was in terms of the prosodic specifications on the shape of the foot, that is if the foot must be either a trochee (heavy-light) or an iamb (light-heavy). Then a sequence of three C's and two V's would be realised in one of two fashions, as in (23).

(23) trochaic foot: iambic foot:

```
\[ \phi
   \frac{\n''}{\n''}
   \frac{\n}{\n}
   \frac{\n}{\n}
   CVCCV
\]
```

```
\[ \phi
   \frac{\n''}{\n''}
   \frac{\n}{\n}
   \frac{\n}{\n}
   CVCCV(C)
\]
```

The C in parentheses indicates the extrametrical nature of final consonants, discussed previously. If the consonants and vowels are
linked right to left in a one to one fashion to positions specified for the template, and allowing for certain positions to be pre-specified as geminate, we can reduce the necessary templates for the primary stem to two, CVCVVC and CVCCV obtain the correct results for all cases.

The following case of grammatically-conditioned metathesis is the strongest one that I am aware of. It has been cited in numerous places, including Anderson 1983, 1988, Janda 1984, Thompson and Thompson 1969, and Zwicky 1988 as an argument for the necessity of non-combinatorial processes in morphology, but as will be seen shortly, it, too, is more accurately represented in another manner.

5.4 Actual Aspect Formation in Straits Salish

In this section I will examine another putative case of grammatically-conditioned metathesis which is found in the Saanich language spoken on Vancouver Island. This case has played a central role in arguments for the need for a process-based account of morphological phenomena, especially in the work of S.R. Anderson, as suggested by the quote below.

“A recent description (Montler 1986) of another Salish language, Saanich, however, makes it clear that in this language a rule of metathesis is indeed responsible for forming the 'actual' of verbs. (Anderson 1988:160)

I will show that the data from metathesis in Saanich can, in fact, be accounted for in a more theoretically satisfying fashion without ap-
pealing to the use of metathesis. This treatment is more succinct and less stipulative than any of the previous treatments found in the literature and it will be seen that this account is to be preferred over one which posits the use of metathesis as a rule to describe the phenomenon of 'actual' aspect formation on the grounds that the present account offers greater explanatory capability, simplicity and simple intuitive plausibility, all within a more restrictive theoretical framework.

The data presented here come from a group of languages spoken in the Pacific Northwest and adjoining areas of British Columbia. The languages, Clallam, Lummi, and Saanich, are part of the Salish family, the Coastal Salish branch and are all members of the Straits Salish group of this branch. They all have similar, large consonant inventories and fairly simple vowel systems, without distinctive vowel length. They are highly synthetic in nature and morphologically complex words containing three, four, or even more morphemes are the norm rather than the exception.

The view that metathesis might be used as a grammatical device in these languages was first suggested in an article by L.C. and M.T. Thompson, written in 1969 (henceforth T&T). This case has figured prominently in recent work of a more theoretical nature by other linguists as a prime example of a grammatical process at work in language (e.g. Anderson 1988), which cannot be handled by straightforward concatenative strategies such as affixation, but must be considered as a phonologically empty yet morphologically significant
effect on a word, in this case the re-arrangement of individual phonemes of a form. I will begin with an examination of the phenomenon as described in the primary sources on the subject.

The article referred to above\textsuperscript{7} describes the formation of the 'actual' aspect from the 'non-actual' in the Clallam language, formerly spoken on the Olympic Peninsula in northwestern Washington state. This aspectual distinction is likened by T&T to the imperfective aspect of Russian, its counterpart, the non-actual, to the perfective aspect of Russian. The nature of the grammatical categories does not figure in the following analyses, but I will employ the labels assigned by T&T since they are useful for distinguishing the two groups of forms.

There are several ways to form the 'actual' aspect in Clallam, involving the use of ?-insertion, reduplication, and the apparent permutation of consonant and vowel, which is described as metathesis by T & T. The one which will concern us immediately is the use of metathesis as found in this role of grammatical indicator of aspect. Note the following examples from Thompson and Thompson 1971:

\begin{verbatim}
(24) Non-Actual    Actual    Meaning
    čk'ú-           čúk'-  'shoot'
    čči-            čič-    'scratch'
    ɖqí-            ɖíq-    'restrain'
    čsá-            čás-    'hit'
    ʰk'á-           ʰák'-  'grasp'
\end{verbatim}

\textsuperscript{7} Thompson & Thompson, 1969.
The remaining examples provided of this formation, constituting the large majority of metathesising roots, follow the form of the last two, containing only /a/. This seemingly metathetical construction is not the primary pattern for 'actual' aspect in Clallam, but occurs, according to T&T, in many instances. The metathesis is considered by the authors to be a grammatical device, employed to indicate this aspectual distinction in the language. It is important to note that all other available instances of a root where V* a follow another pattern and neither they nor any other roots of different configurations, that is with a basic shape of CV, CVC, CVCV, etc. metathesise. Furthermore, one should bear in mind that stress is moveable in this language as well as in the other languages to be examined in this paper.8

The solution to the problem of actual aspect formation for T&T, then, would be to posit a rule similar to that in (25) below, which, given the proper conditions, produces the metathesised actual form from the basic non-actual aspect.

(25) Actual Aspect Metathesis:

\[
\begin{align*}
C & \quad CVX \\
1 & \quad 2 \quad 3 \quad 4
\end{align*}
\rightarrow
\begin{align*}
C & \quad CVX \\
1 & \quad 3 \quad 2 \quad 4
\end{align*}
\]

In a paper published five years after T&T, Demers 1974 addresses the same issue of metathesis in actual formation in a closely related language, Lummi, a language spoken on the eastern shores of Puget Sound in Washington state. Demers' tack, however, is quite different:

---

he maintains that one must sometimes take phonological considerations into account in explicating grammatical features. He proceeds from this point by employing various phonological rules already existing in Lummi to derive the actual aspect, thereby producing the results described as metathesis by T&T for Clallam without the necessity of positing the use of metathesis as a rule of the grammar. The apparent presence of metathesis in these forms is merely the result of the interaction of a number of phonological rules with shifting stress in roots of an underlying CeCt shape.

Demers states that the distinction between actual and non-actual forms is derivable from predictable phonological rules involving the number of consonants following the root. He further suggests that the roots involved are in fact of the basic shape CeCt and that 'stress will be on the first syllable of the root unless the following syllable is closed by two consonants', in which case stress is shifted onto the second syllable, by a rule which Demers refers to as Stress Protraction.9

\[(26) \textbf{Stress Protraction: } C \delta [+obs] \delta C_2 -> C \delta [+obs] \delta C_2\]

As in Clallam, the actual aspect may also be formed by the insertion of /ʔ/ after the vowel of the root as shown in (27) below or by CV reduplication, depending on various criteria, e.g. root shape, nature of following segments, etc.

---

9 It is interesting to note that the equivalent examples to those cited by T&T containing full vowels are described in Lushootseed, a related language (Hess 1976) as containing two identical vowels, i.e. CVtCVt, similar to the suggestion by Demers for all roots undergoing metathesis in Lummi.
The previously discussed method of forming the actual is collapsed by Demers with that of ✭-insertion discussed above by inserting the /?/ in the appropriate position, removing the environment for stress protraction, thereby blocking the form from undergoing the rule. The /?/ is later removed by a rule which deletes /?/ between /a/ and an obstruent.

The forms employing ✭-insertion are described as typical of the strong vowel (i.e. non-schwa) verbs in Lummi. For Demers then, the actual aspect appears to be manifested in the form of a glottal stop inserted after the stressed nucleus of the root. Further forms, with roots consisting of a sequence of a consonant followed by a schwa plus a sonorant show instead the presence of glottalisation of non-syllabic sonorants, produced, apparently, by the coalescence of the glottal stop with the following sonorant, presumably a general rule of the postlexical module of this language. Thus we arrive at the following forms:

\[(27) \quad \textbf{Actual} \quad \textbf{Nonactual} \]
\[
\begin{array}{lll}
\text{i?d?ats?n} & \text{i?d?at} & \text{‘hit’ (from Demers 1974)} \\
\text{táma?ts?n} & \text{táma?ts?n} & \text{‘pick’} \\
\text{sáyq?s?n} & \text{sáyq?s?n} & \text{‘dig’} \\
\end{array}
\]

The formation of the actual aspect for these forms appears to be identical to that of the forms just discussed, with the difference in realisation due to later phonetic implementation rules. But Demers takes his analysis a step further and collapses these two sets with the
set containing schwa deletion by showing that the presence of the
glottal stop in the actual forms blocks the stress protraction rule from
taking place, giving the results described above. Thus the actual
aspect morpheme is, in fact, a glottal stop which is inserted after the
stressed nucleus of the root. By ordering the rule of stress protraction
before glottal stop deletion, we achieve the correct results in surface
forms of both types.

Demers offers no treatment of the reduplicative version of the
actual morpheme that would show any relationship to the other two
forms of this morpheme. In fact, this form is not even discussed in
the paper, but I have gleaned a single example from another paper
published subsequently by Demers and Jelinek 1984, showing that
this strategy does exist in Lummi, as in Clallam. Unfortunately, this
latter paper is not primarily concerned with investigating this
phenomenon and the data are less than ideal. I include the example
here for the sake of completeness. 10

(29)  Actual        Nonactual
      ḷ̃əə̃oʔη       ḷəə̃oʔη 'swell'

A third analysis of this phenomenon in yet another related language
appears in a dissertation by T. Montler on the Saanich language of
Vancouver Island (Montler 1986). There are similar options for

10 Stress placement is not given for this example but I would assume that it is on the
non-schwa vowel in both cases. Note that this is an example of a syllable structure
which we have not encountered previously, i.e. with a 'strong' vowel followed by
glottal stop and a sonorant. I do not know if this /ʔη/ sequence is a different
representation of the /ʔ/ sequence seen earlier or if they are phonetically distinct,
but the use of reduplication to form the actual aspect in Lummi is substantiated by
this example.
forming the 'actual', i.e. insertion of \( /\tilde{a} / \), 'metathesis' with accompanying stress shift, and CV reduplication. The results are also the same, however Montler attacks the problem from yet another angle. He claims that the roots of the metathesised forms are underlyingly vowel-less, thereby explaining the necessity for a different approach than that for roots with vowels. This approach allows a distinction between roots with an underlying \(/a/\) and those without any underlying vowel, a distinction Montler claims is necessary for Saanich, although unattested for the other two languages. Montler proceeds through a number of arguments for why Saanich must be treated differently from both Clallam, on the one hand, and Lummi, on the other. I will summarise those arguments here for the sake of completeness.

Firstly, Saanich differs from Clallam, and follows Lummi, in that there are never any non-schwa vowels (in Demers terms 'strong vowels') involved in the cases of actuals derived from non-actuals through the apparent use of metathesis/stress shift. Any cases of metathesis of non-schwas in Saanich are the results of an 'entirely phonologically conditioned process having nothing necessarily to do with the "actual".\(^\text{12}\)

Saanich differs from Lummi in another fashion. As we have seen, both have only schwa occurring in the roots which exhibit the so-called metathesis/stress shift. However, the rules which Demers

\(^{11}\) Montler does not provide any examples of CC\(\tilde{a}\) roots which do or do not undergo metathesis to form the actual aspect distinct from CC roots, raising the question of the motivation for this distinction.

\(^{12}\) op. cit. pg. 119.
employs to account for the phenomenon in Lummi cannot obtain in Saanich. For one thing, the stress protraction rule described for Lummi does not operate in Saanich. There are a number of forms that have a stressed schwa between the second root consonant and a single following consonant, and others that have a stressed schwa in the second syllable when the first is followed by two consonants. Other forms have stressed schwa in the first syllable when the second syllable is followed by two consonants. The following sets of examples are from Montler 1986.

(30)  
$sâqâ.t\; sən$  
$seq\; náx\; sən$  
$tâš\; e\!lt\; sən$  
'I tore it (intentionally)'\(^{13}\)  
'I tore it accidentally'  
'I turned it upright'

Furthermore, /?/ does not delete between /a/ and a following obstruent in Saanich as it does in Lummi, making Demers' schwa deletion rule unworkable in Saanich.

(31)  
$\text{xána}\?s$  
$têta\?sat\; sən$  
'his/her child'  
'I'm trying to learn it'

For these reasons, Montler suggests a third possible treatment of the derivation of the actual aspect in order to account for the Saanich data. He posits the underlying shape of the roots which undergo apparent metathesis to be CC, i.e. underlyingly vowel-less. This is not unheard of as a description of roots in Salish in general, although neither of the other papers alludes to such a possibility, and it has the

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\(^{13}\) The period (.) used in these examples and following represents a morpheme boundary.
merit of allowing a distinction between CeC roots and CC roots, which Montler maintains is necessary for Saanich. He appeals to a rule of /ʔ/ infixation which derives the actual aspect in one class of cases.

'In monosyllabic stems with roots of the shape CV, CVVC, or CVCC or in multi-syllabic stems where an underlying stressed vowel is followed by either /ʔ/ or one or no consonants, /ʔ/ is inserted after the stressed vowel and /ə/ is replaced by /é/.' (from Montler 1986:124)

The metathesis/stress shift cases and the CV- reduplication cases then remain and are collapsed into one group on the basis of both exhibiting a leftward shifting of stress triggered, in Montler’s words, 'by phonological environments complementary to those for the "actual" infix placement...’ which is handled by the rule just stated. So his account requires reduplication to apply in those cases where the stress shift places stress ahead of the beginning of the word, i.e. on a non-existent first syllable which is then realised as a reduplicative copy of the first CV of the root. While Montler states that ‘the precise nature of the mechanism is as yet unclear’, he suggests that the reason for the occurrence of metathesis is similar.

Although his exposition is not clear on this point, it seems to us that he is suggesting that the stress moves towards the beginning of the word, finds no vowel on which to land, and therefore requires the insertion of an epenthetic schwa to create a landing site for the stress. The placement of the schwa may be necessary to break up unacceptable word-initial consonant clusters but Montler posits no such explanation and may have good reason not to in this case - the CC
clusters present in the non-actual are obviously acceptable in the language, why should they be broken up in order to form the actual? Thus, Montler's account, though suggestive, is inadequate for the task at hand.

The three analyses described above for these closely related languages can be differentiated as follows with respect to metathesis-stress shift and to glottal stop insertion:

\[
\begin{array}{|c|c|c|c|}
\hline
\text{Root Shape} & \text{Non-Actual} & \text{Actual} \\
\hline
\text{Clallam} & \text{CVC} & \text{CVC} & \text{CVC} \\
\text{Lummi} & \text{CCc} & \text{CCc} & \text{CCc} \\
\text{Saanich} & \text{CCc} & \text{CCc} & \text{CCc} \\
\hline
\end{array}
\]

The possible treatment of reduplication in these cases is unclear from the expositions presented. The corresponding data in the three languages are as follows:

14 Note that the reason for using \( V \) instead of /a/ in this example is the presence of a handful of examples (five at present count) with a non-/a/ vowel in this position. The overwhelming majority of examples in this language and all examples in the other two languages exhibit only /a/ in this position. Other than in the Clallam pattern (a) where \( V \) may represent any vowel, \( V \) stands for a non-shwa vowel throughout the chart.
As can be seen from these tables, the outputs of all three languages are virtually identical. Pattern (a) is in complementary distribution with pattern (b) based on the status of the underlying root vowel in all but a handful of examples from one language, Clallam, where there is a non-schwa vowel in five attested roots which nevertheless undergo apparent metathesis. Epenthetic /a/ inserted according to various requirements regarding clusters and certain CC collocations is not given in the chart as it is predictable from the environment.

5.4.1 The Theoretical Issues

One current issue of great concern to linguists is that of the choice of models necessary in order to adequately describe the morphological systems of natural language. The choice of one model over the others revolves around the differing views suggested by these models regarding the nature of morphological descriptions of various linguistic phenomena and the power of the models to handle all and

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**Table 33**

<table>
<thead>
<tr>
<th>Language</th>
<th>Root Shape</th>
<th>Non-Actual</th>
<th>Actual</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clallam a</td>
<td>CVC</td>
<td>?šú</td>
<td>čúš</td>
<td>'throw'</td>
</tr>
<tr>
<td>b</td>
<td>CVC</td>
<td>?áë</td>
<td>?áëč</td>
<td>'wipe'</td>
</tr>
<tr>
<td>Lummi a</td>
<td>CaCa</td>
<td>čså</td>
<td>čsš</td>
<td>'hit'</td>
</tr>
<tr>
<td>b</td>
<td>CVC</td>
<td>ščđ</td>
<td>ščđ</td>
<td>'hit'</td>
</tr>
<tr>
<td>Saanich a</td>
<td>OC</td>
<td>čtš</td>
<td>čšt</td>
<td>'crawl'</td>
</tr>
<tr>
<td>b</td>
<td>CVC</td>
<td>ššt</td>
<td>ššt</td>
<td>'dress'</td>
</tr>
</tbody>
</table>

15 The forms given here are the roots isolated from all further morphology for the sake of perspicuity. Also, the forms given are not necessarily related across the languages, but are merely extant examples gleaned from the works noted above.
only the possible morphological phenomena encountered in natural language.

Lexical Morphology (henceforth LM) views morphology as a set of levels, or strata, each consisting of the concatenation of affixes to a base or skeleton, possibly through the use of multiple tiers or planes to account for seemingly discontinuous morphemes as in the case of templatic accounts of Semitic word derivation. Structure-changing operations of the classical transformational type are ruled out as being of a potentially non-affixational nature and various uses of cyclicity may be posited to account for ordering constraints on derivation. Cyclicity may be involved, either as a property of an individual rule, of a level or, perhaps, of the whole grammar. Current expositions of this theory include Marantz 1982, Kiparsky 1982, McCarthy 1981, Mohanan 1982, 1986.

The Extended Word and Paradigm model (henceforth EWP), on the other hand, treats morphology as a set of relations between grammatical forms. Words are the result of the sum of grammatical processes triggered by individual morphemes that affect a lexical form. Morphemes may consist of various processes which alter a form, thereby arriving at the final output of a word. There is no restriction or prohibition on the use of structure-changing rules, thus allowing a very powerful model of morphology which can capture virtually any possible phenomenon found in language, and many which are not found. Current expositions of some version of this theory include Anderson 1988, Matthews 1972, and Zwicky 1985.
How then may we decide between these two models of morphology? The fact that the latter view is the more powerful would seem to justify the onus being placed on its supporters to prove that it is necessary to adopt such a model of a grammatical description. Concerns over the overgeneration of forms through the application of these processes are real and it is important to justify the need for such a model through the presentation of actual cases where the alternative models are inadequate for the characterisation of a problem and where the EWP model handles the data/phenomenon in a natural and constrained fashion. Cases such as these have been described in the literature involving such phenomena as ablaut in English and Germanic more generally, subtractive morphemes such as French adjective formation, and, the subject at hand, metathesis in the case of Straits Salish. It is this latter case with which I will be concerned in this paper as it represents a particularly damning case for the LM model if, in fact, it is metathesis which obtains here. Its treatment in a process-based model would be, on the other hand, quite straightforward, invoking as it does the extremely powerful notion of a string-dependent structure-changing rule.

If the cases of 'actual' aspect formation described in the section above really involved the utilisation of metathesis as the primary device employed to indicate this grammatical category, this would be an important example for an argument in support of a process-based model of morphology as is currently advocated by many linguists. Such a model is not bound to constraints on the use of structure changing.
operations or to the use of concatenation and can easily make use of a structure changing process linked to a grammatical feature in order to achieve the results desired whether or not the issue is one of metathesis. There is no obvious reason that both (34a) and (34b) in the following examples could not be equally motivated for any particular grammar employing grammatical processes of the kind advocated in Anderson 1988. Yet we would not expect to find an output such as in (34b).

(34) a. [+Actual ]

\[
\begin{align*}
\text{X C C V X} & \quad \Rightarrow \quad \text{X C V C X} \\
1 2 3 4 5 & \quad \Rightarrow \quad 1 2 4 3 5
\end{align*}
\]

b. [+Actual ]

\[
\begin{align*}
\text{X C C V X} & \quad \Rightarrow \quad \text{X C V C X} \\
1 2 3 4 5 & \quad \Rightarrow \quad 1 3 4 2 5
\end{align*}
\]

Along with such an analysis come the concomitant assumptions regarding what is and isn't a permissible rule of language. In this case we must allow a grammatical category to have the power to trigger a string-dependent transformation on a form, an exceedingly powerful mechanism. We also give up all possibility of capturing any relationship between this realisation of actual aspect and the other realisations not involving metathesis since derivation by transformation hardly captures any relationship between diverse options. That is to say, even if all the realisations of actual aspect were derived by process, which can easily be done given the extreme power of the transformational machinery available, it would not in any way
show a relationship between the diverse forms of the actual aspect encountered, and it would certainly not offer any explanation for the choice of forms that occur in a particular environment.

Such a model of morphology is obviously too powerful for the purpose at hand in that it can perform operations which are unnecessary in natural language with as much ease as it can those that are necessary. It thus masks the complexity of various phenomena in a treatment which is unnecessarily powerful for the problem which it addresses.

I would draw your attention at this point to the importance of this example of metathesis for process-based theories of morphology such as that proposed in the works of Anderson, Matthews and Zwicky as cited above. The theoretical consequences of this particular case figure prominently in a recent article by Anderson 1988, in which he argues for the necessity of processes in morphology. And indeed, if this were a case of grammatical metathesis, it would be particularly damning for theories relying solely on locality and concatenation to derive word forms. It is, however, not the case.

On the other hand, it is unclear how one would deal with a phenomenon such as grammatically-conditioned metathesis in a concatenative model of word formation which is limited to the use of structure-building operations and concatenation, and therefore, this type of problem is a crucial one in deciding the merits of either a processual or a concatenative model of morphology. A possible treatment in terms of concatenation could be provided as follows: first, a
copy of the nucleus could be made and inserted after the first consonant of the cluster, thus

\[ CV_1CV_1 \]

then a rule deleting the original nucleus could be employed to remove it, i.e.

\[ CV_1C \]

and, finally, a rule of resyllabification could be called on to produce the final effect,

\[
\begin{array}{c}
\text{S} \\
\text{O} \\
\text{R} \\
\text{N} \\
\text{C} \\
\text{V} \\
\text{C} \\
\end{array} 
\quad \rightarrow 
\begin{array}{c}
\text{S} \\
\text{O} \\
\text{R} \\
\text{N} \\
\text{C} \\
\text{V} \\
\text{C} \\
\end{array}
\]

But the use of adhoc rules in this fashion is highly undesirable and, hopefully, to be avoided at all costs. After all, they leave us with no reasonable explanation for why this happens and even if the rules could be independently motivated in the grammar, their ordering, interaction and subsequent output serves no purpose but to account for the apparent metathesis found in the actual aspect.

If examples such as this can be shown to be analysable in another fashion, employing only concatenation and structure-building rules and operations, it removes such a problem from the forum. In other words, if there is no need to appeal to excessive power or adhoc rules,
then they should not, indeed, must not be called upon. I intend to show that it is this situation which obtains with regard to Straits Salish 'actual aspect' formation. That is to say that this phenomenon does not involve metathesis at all, much less grammatically-conditioned metathesis, but simply independently motivated, language-particular rules of stress shifting, epenthesis, deletion and the use of a prosodic template for the representation of aspect. This treatment will demonstrate the availability of other avenues to pursue when considering such problems as metathesis.

Another putative case of grammatical metathesis has already been reanalysed in a prosodically-based treatment by a number of linguists, including Saito 1981, Besnier 1987, and McCarthy 1989. This is the case of Rotuman vowel metathesis also mentioned in the original article by T&T. There, also, it is found that metathesis is merely a superficial effect achieved through an operation on the syllable structure of the form. I refer the reader to the citations above for further exposition of this point, and suffice it here to say that this case too appears to have been removed from the domain of grammatically-induced metathesis and, hence, the necessity for a process-based treatment.

5.4.2 The Solution
To begin the analysis of the forms of the actual, let us return to the original examples, focusing on the nature of the 'actual' aspect morpheme in these data. First, the preferred pattern for the forma-
tion of the actual from the non-actual, which is considered to be the basic form by all the authors describing this phenomenon, is that involving the insertion of /ʔ/ after the first nucleus of the root. Thus, we have forms such as the following (all data henceforth will be from Saanich, the language with the most extensive coverage including Montler 1986, and Montler 1989 where he introduces a CV template to accomplish the same thing as our mora template):

(35) **ʔ-Insertion:**

<table>
<thead>
<tr>
<th>Non-Actual</th>
<th>Actual</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>né</td>
<td>né-ʔ</td>
</tr>
<tr>
<td></td>
<td>sé</td>
<td>sé-ʔ</td>
</tr>
<tr>
<td>b.</td>
<td>?iʔən</td>
<td>?iʔ-ʔ-ʔən</td>
</tr>
<tr>
<td></td>
<td>wéqəs</td>
<td>wéʔ-ʔ-qəs</td>
</tr>
<tr>
<td>c.</td>
<td>?éčət</td>
<td>?éʔ-ʔ-čət</td>
</tr>
<tr>
<td></td>
<td>čáqʔən</td>
<td>čáʔ-ʔqʔən</td>
</tr>
</tbody>
</table>

Notice that all the roots in this class are stressed and possess a non-schwa nucleus in both the actual and non-actual forms. In addition, the stressed nucleus is in an open syllable in the non-actual aspect. Compare these with the following forms which employ the 'metathesised' version of the actual:

(36) **Non-Actual**

<table>
<thead>
<tr>
<th>Meaning</th>
<th>Actual</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>'X breaks s.t.'</td>
<td>tás</td>
<td>'X is breaking s.t.'</td>
</tr>
<tr>
<td>'X straightens s.t.'</td>
<td>ʔək′ı</td>
<td>'X is straightening s.t.'</td>
</tr>
<tr>
<td>'X breaks (stick)'</td>
<td>ták′</td>
<td>'X is breaking(stick)'</td>
</tr>
<tr>
<td>'X whips s.t.'</td>
<td>šáč</td>
<td>'X is whipping s.t.'</td>
</tr>
<tr>
<td>'X tightens s.t.'</td>
<td>táq′</td>
<td>'X is tightening s.t.'</td>
</tr>
</tbody>
</table>
The most outstanding difference between these forms and the previous ones is that these possess complex onsets in the non-actual, an ideal environment for metathesis of C and V when it is desirable to maintain an onset, whereas the previous examples have simple, single-consonant onsets and no codas in the stressed syllable, assuming just the most basic notions regarding syllabification in language. Furthermore, the vowel in the nucleus is always /a/ in these cases.

The basic shapes for roots in these languages are shown in (37) below and the shape for those roots which undergo metathesis is shown in (38).

(37) **Basic Root Shapes:** CV CCV CVC CVCVC

(38) **Root Shape for Metathesis:** CCV

You will notice that the roots which undergo metathesis are the only ones that have a CC cluster for an onset. Tri-consonantal clusters do not occur in the onsets of roots in these languages.

Following on a recent proposal by John McCarthy (1989), suggesting that there are several classes of languages that may employ a segregation of V's and C's on separate planes, I propose a structure for roots in Straits such as is shown in (39).16

---

16 Again here the use of C's and V's is merely for exposition. The separate segments would be aligned with a mora-based template.
Here, there is no linear ordering constraint between the vowels and the consonants of the root, which are on separate planes. This separation of V's and C's in Straits Salish is a consequence of the impoverished syllable-structure of roots in Straits as is evident from the possible root shapes given in (37). The shape of the root is determined by a specification of the number of moras in the configuration and of the available C's and V's to fill the template. Taking the non-actual as the basic, which has been the case for all previous descriptions as well, if a root is specified to be one mora and it contains two C's and one V, then its configuration will be CCV. If it is specified to be two moras, then it will be CVC, and so on. If the distinction between roots with schwa and those without was found to be necessary, it would be possible to enrich the possible types by including a type with no overt V specified. The mora count would determine the configuration and the default vowel, /a/ could be provided to fill the position where necessary.

5.4.3 A Mora-based Account of Actual Formation

I describe now an account of 'actual' aspect formation which involves the use of a mora-based rule of augmentation which affects the prosodic structure of a root, providing the actual aspect of roots in
these languages. This analysis accounts not only for the metathesis-based forms but for virtually all of the realisations of actual aspect found in Straits.

While the analyses given previously account for the data involved in each individual case, they are somewhat less than satisfying in their descriptions of the rules necessary for the formation of the actual aspect. These treatments depend on a varied and highly dissimilar set of rules to account for the facts, even within a single language, let alone across the group of languages. True, these rules do account for the facts in these languages, but nevertheless, I would be more comfortable with a single, unified account of the facts.

If we look at the problem in another light, however, we see a more theoretically interesting way of describing the data. What if it wasn't a segmental unit which was added or altered, but a prosodic one? The position of the target phoneme in the examples cited in (36) above suggests that the 'actual' aspectual morpheme consists of the addition of a single mora to the root's syllable structure rather than any uniform segmental augmentation, in the shape of a rule such as in (40) below.17

(40) **Actual Aspect Formation:** Augment root by one mora.

---

17 This observation was first suggested to me by Paul Kiparsky in a personal communication. Parenthetically, Roman Jakobson noticed a similar situation in the formation of the Russian imperfective (essentially the same category as the Salish 'actual') a number of years ago, attributing it to some iconic force in the realisation of certain distinctions in language, c.f. Jakobson 1966.
Furthermore, the cases of \?-insertion and reduplication as an indicator of actual aspect which has been alluded to above also involve the addition of a single mora, one achieved by closing the syllable and the other by the addition of a mora in the shape of a CV syllable added to the root, further arguing for a moraic account of the facts at hand.

Such an analysis would explain the seemingly puzzling need to predict the choice of a vowel or a consonant to appear in the root, depending on its configuration, as well as the choice of loci in the different cases. The choice is actually one necessitated by the prosodic structure of the root in conjunction with the languages' phonotactic constraints, not simply an arbitrary adjustment to its segmental configuration. In order to derive the actual, the non-actual must be augmented by one mora, as in (41).

(41) \[
\begin{array}{c|c|c}
\text{Non-Actual} & \text{Actual} \\
\end{array}
\]

\[
\begin{array}{c}
\left[ \begin{array}{c}
t \ s \\
a \\
l \ \mu
\end{array} \right] \rightarrow \left[ \begin{array}{c}
t \ s \\
a \\
2 \ \mu
\end{array} \right]
\end{array}
\]

One means of effecting an augment of one mora in a root with the shape CCV is to transmute the last C and the V, thereby closing the syllable and creating an extra mora, as in (42).

(42) \[
\begin{array}{c}
N' \\
\mu
\end{array}
\]

\[
\begin{array}{c}
X \ X \ X \\
t \ s \ a
\end{array}
\]

\[
\begin{array}{c}
N' \\
\mu \\
\mu
\end{array}
\]

\[
\begin{array}{c}
X \ X \ X \\
t \ a \ s
\end{array}
\]
Although this addition of a mora to the root structure could be achieved in a number of fashions, the one illustrated above is, in some sense, the simplest and most economical from a language-based point of view, since it does not add any new phonemic material to the root but merely modifies the existing material in terms of syllable shape. One would, however, predict a number of possible alternative choices in order to achieve the augmentation of the root by a mora. The possibilities are listed in (43).

(43) Possible changes to root shape to augment root by one mora:
   i. Lengthen the root vowel
   ii. Metathesise C and V of root to close the syllable
   iii. Add a consonant to the coda
   iv. Reduplicate first mora

The first possibility, that is, lengthening the vowel, is not available in these languages, since there is no distinctive, phonemic vowel length to be found in them. Metathesis, the second option has been seen to occur in roots of the shape CCV, that is, those roots which provide sufficient material to effect a change of syllable shape in order to reflect the change of syllable weight while still respecting the language-specific phonotactic constraint against vowel initial roots.

But what about the other possibilities? None of the other root shapes are conducive to a metathesis-based solution to the augment. Roots must begin with at least a single consonant, thereby eliminating the first consonant from consideration in a metathesis-based solution. A root which does not fit into the metathesising class, i.e. one that does
not have a complex onset, must seek another strategy for increasing syllable weight.

One possible means to increasing the weight of a syllable, already witnessed in the case of metathesis, is to close the syllable by adding a consonant to an empty coda. Closing the syllable ensures a bimoraic status for such forms. One with the shape CV, for example, could simply mark the actual aspect by the addition of a C to the coda, resulting in the form /CVC/. And this is, in fact, the strategy manifested by the majority of the remaining cases of actual aspect. The consonant of choice is /ʔ/. Examples are as in (44).

(44) ʔ-Insertion:

<table>
<thead>
<tr>
<th>Non-Actual</th>
<th>Actual</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. né</td>
<td>néʔ</td>
<td>'name s.t.'</td>
</tr>
<tr>
<td></td>
<td>séʔ</td>
<td>'send'</td>
</tr>
<tr>
<td>b. ?íʔan</td>
<td>?íʔ-ʔan</td>
<td>'eat'</td>
</tr>
<tr>
<td></td>
<td>wéʔqas</td>
<td>'yawn'</td>
</tr>
<tr>
<td>c. ?éʔat</td>
<td>?éʔ-ʔat</td>
<td>'wipe'</td>
</tr>
<tr>
<td></td>
<td>čáʔqʔan</td>
<td>'sweat'</td>
</tr>
</tbody>
</table>

The treatment of examples such as these is illustrated in (45), (46), and (47). A mora is added to the root, filled by a glottal stop which closes the stressed syllable and increases its weight by one mora.

(45)
Note that the examples in (44c) are of CVC roots which are followed by vowel-initial suffixes. This brings us to a further consideration in the derivation of the actual aspect, that is the base to which the aspect is added. As these examples show, it need not be a simple root, but may be affected by a following suffix. If the suffix is vowel-initial, it will capture the preceding C for its onset, leaving the root open and monomoraic. If, on the other hand, the suffix is consonant-initial, it leaves the root closed and therefore bimoraic. The principle is the same, but our characterisation must now allow for the influence of immediately following material which may affect the choice of strategies and, hence, the outcome.

There is a further benefit to this account of the derivation of the 'actual' aspect. This involves those other cases alluded to earlier which involve the use of prefixal CV- reduplication to produce the 'actual'. In those roots which are already closed and therefore two
moras, that is, CVC roots followed by a consonant-initial suffix or in word-final position, the augment of another mora can only be achieved by the addition of a further syllable, superheavy syllables being impermissible in these languages. The means to achieve this is by making a copy of the first mora of the root, that is, by reduplication. Clearly, a copy of the second mora would not suffice here, as it would merely add a further consonant to the already closed syllable and therefore no additional weight.

Roots of the shapes indicated in (48) undergo reduplication in order to realise the actual aspect, producing examples such as those in (49). I will set aside discussion of the concomitant laryngealisation of resonants following the stressed vowel, referring the reader to Montler's grammar of Saanich (1986), where he provides a detailed account of this phenomenon.

(48) **Root Shapes for Reduplication:**

\[
\text{CVC + \left\{ \text{C} \right\}}\]

(49) qén 'steal' qé+qə+rì 'X is stealing (s.t.)'
qʰəl 'say' qʰ+qə+l’ 'X is saying'
ṭi̞k’+səri ‘trip’ ṭi+ṭək’+səri ‘X is tripping’ (snag-foot)

The treatment of reduplication involves the adjunction of a CV copy after the first mora of the root. A rule of resyllabification is required in order to comply with a phonotactic constraint of the language against trimoraic (superheavy) syllables and a rule of vowel reduction in
unstressed syllables, pervasive in Salish languages, produces the final shape of the form, as in (50).

(50) Reduplication:

\[
\begin{align*}
&\text{N'} & &\text{N'} & &\text{N'} \\
&\mu & &\mu & &\mu \\
&\text{X X X} & &\text{X X X X X} & &\text{X X X X X} \\
&\text{q e n} & &\text{q e q e n} & &\text{q é q a n}
\end{align*}
\]

There are three basic forms to the actual aspect morpheme then, all involving the augmentation of the root by a single mora:
1. metathesis, which is found in roots of the shape CCV, exactly those roots where the permutation of C and V still allows the root a permissible shape; 2. ?-infixation, which is added to the coda of the open, stressed syllable of the root, adding a mora to the syllable by closing it; and 3. reduplication, found in roots of the shape CVC# or CVC+C where the already existing bimoraic root requires augmentation to three moras, achievable only by the addition of a syllable to the root.

5.4.4 On the Existence of Moras in Straits

In order to justify the use of moras in analysing this problem of metathesis, I feel that I must provide evidence for the existence of moras in these languages. Although this feeling may be misguided, I will offer evidence in the following section to attest to the mora-based status of syllables in these languages. Evidence comes from several
sources. First, there is evidence from related languages. In this case the analysis of stress assignment in Davis 1984 for the Squamish language. Secondly, there is the evidence from minimal words in Straits, which require at least two moras. Finally, there is the evidence from this case, which is in our opinion the strongest evidence in favour of the presence of moras in the systems under discussion.

Davis (1984) shows that stress clash can only be resolved in Squamish by appealing to a distinction involving both the use of moras and grids. In this paper, Davis shows that neither syllable geometry nor metrical grids by themselves can resolve the stress clashes, but only an analysis involving both suffices. While the need for moras in this closely related language does not necessarily demand a similar status for Straits Salish, it adds some force to the argument. Unfortunately, an analysis of the stress systems of these Straits Salish languages remains to be provided.

A further piece of evidence for the existence of moras in Straits comes from the shape of the minimal word. While there exist roots of the shape CV, such as ve, vne, there are no full words of this minimal shape to be found. Particles are all clitics and as such are bound to words. According to Montler 1986, roots of the shape CC in Saanich are found on the surface as #Cae#, never #CCe#, and Montler provides a phonological rule to account for this (1986:30):

\[(51) \quad \emptyset \rightarrow e / \ # \ C \_C \# \]
The fact that they never surface independently as CCV would seem to indicate that roots of the shape CC are required to consist of at least two moras and not simply one syllable in order to stand as words in Saanich, arguing for the necessity of moras in the prosodic structure of the languages.

There is further evidence in the varying shape of forms such as the existential root which occurs both as *naʔ* 'exist' and *niʔ* 'it is'. If the latter form actually consists of *nɪʔ* + *-əʔ* DURATIVE as I suspect, then we can see this constraint against monomoraic words in these examples. The root would be simply *nɪ* and when it stands on its own it is augmented by the default consonant */ʔ/* so as to fulfill the requirement that words be at least two moras. This accounts for the reduction to */ə/, since, as Montler 1986 states, "[i] is often lax and somewhat lower and centralized... preceding */ʔ/* (op.cit.:19). On the other hand, when a suffix is attached to it, closing the syllable, the */ʔ/* is no longer necessary and does not appear.

Finally, the account of the actual aspect given here argues itself for the usefulness of the concept of the mora in explaining the various realisations of this aspectual distinction in Straits Salish. This analysis, depending on a mora-based syllable structure, captures regularities in the realisation of the grammatical category of the actual aspect which have never been described before. This in and of itself should constitute strong evidence for the existence of moras in these languages.
5.4.5 Conclusions

As we have seen above, the potential problem of actual aspect formation through the use of metathesis in Straits Salish has a simple solution in the form of a templatic explanation for the facts. This solution is much more general than any previous account, offers an alternative to the use of processes in this morphological phenomenon and is generally more theoretically satisfying than the other options suggested. Regardless of its implications regarding the choice of models, this account captures generalisations about the relationship between the various categories of 'actual' aspect derivation and offers a unified treatment of these categories based on the use of syllable structure. This analysis reflects the changes in the machinery made available for linguistic analysis since the time of the previous analyses of these data cited in this paper.

Furthermore, this account argues for the importance of prosodic structure in the analysis of morphological framework. An example such as this where there is no overt, phonemic distinction based on vowel length must make us examine our notions regarding the typology of languages that are eligible for the use of moras, yet it can only serve to enrich our ideas regarding moraic structure.

While the analysis presented here accounts only for a single example of grammatically-induced metathesis, its implications are much wider. Firstly, it suggests that if a case such as this which has been widely accepted for twenty years as an instance of grammatically-
conditioned metathesis lends itself so easily to reanalysis, then perhaps other putative cases of metathesis which have not been brought forward as arguments for process-based morphology may also be handled without appealing to the extremely powerful machinery of the process. Secondly, it suggests that current views of planar morphology and prosodic templates are conducive to the treatment of cases apparently involving the permutation of segmental units without losing the relationships among categories. And, finally, a treatment such as that provided here demonstrates the utility of proper theoretical approaches to morphology for the adequate description of phenomena encountered in natural language.

5.5 Prolegomena to a Theory of Restructuring and Metathesis

In the previous discussion I have alluded to and, in fact, made use of an unstated principle of Syllable restructuring which I will now attempt to make explicit. The idea of a hierarchy of syllable restructuring strategies is that different languages will employ different options for restructuring the syllable in order to increase the weight of the syllable. The choice of which strategy to employ will be based on two variables: first, the possible phonological structures allowed in the language, e.g. are long vowels allowed, geminate consonants, what are the possible consonant clusters, etc., and second, the position on the hierarchy of the proposed strategy, as shown in (52).
(52) **A Tentative Set of Syllable Restructuring Strategies:**

i. Lengthen the vowel
ii. Lengthen the consonant
iii. Metathesise C and V to close the syllable
iv. Add a consonant to the coda
v. Reduplicate first mora
vi. Add a vowel after the coda

Further considerations would involve the environment in which the operation occurs and possibly other constraints on the resulting sequence.

A further issue which I would like to address here are the possible motivations for employing metathesis in natural language. As suggested by the previous paragraph, I see one possible reason for its use to be in the resolution of syllable restructuring, particularly in a language which allows neither long vowels nor geminates. There can be several reasons for this restructuring, as shown in (53).

(53) **Motivations for the use of Metathesis:**

a. Conditioned by Sonority Hierarchy restrictions:
   **Zoque**
   
   y + tatah $\rightarrow$ tatah 'his father'

b. Conditioned by phonotactic constraints:
   **Chawchila Yokuts**
   
   -hal'iy- $\rightarrow$ -hayl- e.g. xamíthayla max'la 'fetch the scythe!'

c. Conditioned by syllable weight requirements:
   **Straits Salish**
   
   čkŭ- čūk' 'shoot'
   χčí- χíč- 'scratch'
d. Conditioned by templatic requirements on shape:

**Sierra Miwok**

kálŋa- ‘a dance’  kala·ŋ- ‘to dance’
?úmču- ‘winter’  ?umu·č- ‘to approach winter’

e. Expressive Morphology:

**Sinhala**

hike pulak < puke hilak ‘asshole’
hingiye jalak jalak < jangiye hilak hilak ‘holes in knickers’

In (a), we have an example of the resolution of a sonority violation through the use of metathesis. This is a very common use of metathesis and one where segmental lengthening would not resolve the problem. In (b) we see a similar case involving language particular phonotactic constraints, again irresolvable by means of lengthening. Example (c) involves the increasing of weight and here we have several options available to us. In the case of Straits Salish, vowel lengthening and gemination are not available language-particular strategies and, therefore, metathesis is chosen in those cases where it will achieve the proper results, i.e. in cases where the metathesis of consonant and vowel will still leave an onset and yet will add the weight. The case in (d) illustrates the further possibility that the apparent metathesis is actually the result of the melody being applied to a predetermined (probably prosodic) template. In cases of templatic morphology where the consonants and vowels are separated on different planes, we can see that there is no need for a rule of metathesis to provide the outcome.
The final class of cases comes from the area of expressive morphology, or perhaps preferably, from what Bagemihl 1988 calls 'alternative phonologies and morphologies'. In these cases, such as the Sinhala language game illustrated here, certain conventions of the language may be violated in order to achieve some desired result, as in this case where the metathesis of adjoining onsets and vowels (= N) within the same phrase is intended to conceal the meaning of the phrase.18 There are many such instances described in the literature, although they are not entirely part of the regular grammar of the language and may therefore violate certain rules of the grammar.

The aim in this section has been to provide a first approach to a classification of the types of strategies that may be invoked to restructure a syllable, including the use of metathesis. Further to this, I provide an exposition of the kinds of metathesis which one should expect to find in language and to show that regular morphological operations are not among them.

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18 These examples were provided by Mr. Kapila Boteju.
Chapter 6

Conclusions

The cases presented in this dissertation have been chosen to illuminate the crucial aspects of a theory of morphological operations which in fact may be limited to one: combination. The nature of this operation is actually more complex than this would seem since it employs an intricate model of combination that relies on a multi-tiered representation of the word, allowing concatenation to occur between members of this representation. Current views of this representation constrain the possible relationships that may exist, disallowing, for example, a relationship between the place node of a segment and the tonal tier by separating them on non-adjacent tiers.

The claims of this dissertation are: (a) that all morphology can be reduced to the enriched version of combination of morphemes that permits concatenation to operate on multi-tiered representations on a strictly local basis; (b) that the use of processes that employ non-local, string-dependent, transformational machinery leads potentially to misanalysis, loss of generalisations, and overgeneration of forms due
to its excessive generative capabilities and its insensitive application to morphological forms; (c) that we require an enriched conception of syllable structure for morphological operations that is based on the mora, yet incorporates characteristics reminiscent of a more traditional view of the syllable; (d) that the use of metathesis as a morphological operation never occurs in language; (e) that all cases of morphological truncation that are claimed to exist, may be reanalysed as involving templates, identification of the proper base, or a combination of these; (f) that the relationship between stress and the cycle is much more complex than previously believed; and, finally, (g) that reduplication is more than just simple combination yet does not require the use of non-local, transformational rules to account for its occurrence.

What I have been principally concerned with is the distinction between what may best be called a 'combinatorial' model, such as may be found in certain versions of LPM and a 'realisational' model as advocated by proponents of the EWP model. Claim (a) above argues in favour of the former, while claim (b) argues against the latter. The two go together to support a more restrictive model of morphology which rejects the notion of 'process' as anything more than local combination. The claim in (c) is one of methodology in achieving a restrictive account, while those in (d), (e), (f), and (g) suggest that we might need something more powerful than the model advocated here: the results disprove this and provide evidence against process-based
or realisational models and support for a combinatorial model of morphology.

The term 'model' is used somewhat loosely here as a preferred alternate to 'theory', which is perhaps too lofty or ambitious a term for the situation at present, given the looseness of the machinery employed by these models. What I mean by this is that while the model of LPM described as combinatorial here appears principally concerned with derivational morphology, and the EWP model seems most concerned with inflectional morphology, it cannot be assumed that they are in any way complementary as they stand at present.

Nevertheless, EWP could adopt LPM as a subcomponent, but the question remains: why? Given that the EWP model claims that affixation is just one process amidst many possible ones, it might be argued that it could simply translate the observations of LPM into the framework, as a package. An appropriate analogy might be to compare the Aspects model of syntax, with its powerful and often arcane transformational rules, with more current views, which strive towards a more highly constrained view with non-local relationships reduced to a minimum.¹ To incorporate the latter into the former would not do justice to either and would result in a worse model than either of the other two. While this analogy is not perfect, representing as it does different stages in the evolution of a single theory rather than comparing two contemporary theories, it nevertheless suggests the arguments against non-combinatorial processes.

¹ Thanks to K.P. Mohanan for this analogy.
It might be argued that LPM could adopt the extensions proposed by EWP as a means of explaining presently unaccountable cases, but the result of this would be to remove from the forum valuable cases that shed light on current problems with the model, simply by overpowering them with machinery that is unnecessary and, thereby, retarding the progress of the model. An excellent example of this is the case of metathesis as presented in chapter 5 where we see that a process-based account sweeps the problem under the carpet by positing a rule which applies to only a subset of the instances, in one case, the two Chawchila forms -hal'i̇ẏ-, and -ilin-, and in the other, a single class of forms from the Actual Aspect in Saanich.

All in all, a model of morphology that employs only combination of morphemes, in conjunction with a model of phonology such as currently articulated in LP provides the most restrictive and yet most powerful model necessary for capturing the kind of phenomena encountered in the morphology of natural languages.
# Appendices

## Appendix I

### Suffixes in S-K-F

<table>
<thead>
<tr>
<th>Suffix</th>
<th>Meaning</th>
<th>Extrametrical</th>
<th>Unstressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>-ale?xⁿ⁺</td>
<td>‘?’</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>-cin</td>
<td>‘mouth, food’</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>-etst</td>
<td>‘hand’</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>-elxⁿ⁻</td>
<td>‘house’</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>-e+i de?</td>
<td>‘?’</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>-ene?</td>
<td>‘ear’</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>-ep</td>
<td>‘base, back’</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>-etk⁺⁺</td>
<td>‘water’</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>-e+w s</td>
<td>‘middle’</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>-i</td>
<td>CONT</td>
<td></td>
<td>+</td>
</tr>
<tr>
<td>-ist</td>
<td>‘REFL’</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>-min</td>
<td>‘instrument’</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>-nu</td>
<td>‘succeed’</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>-qin</td>
<td>‘head’</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>-si</td>
<td>2sgOBJ</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>-sqaxe?</td>
<td>‘animal’</td>
<td>+</td>
<td></td>
</tr>
</tbody>
</table>
## Appendix II

### Roots in S-K-F

<table>
<thead>
<tr>
<th>Root</th>
<th>Meaning</th>
<th>Extrametrical</th>
</tr>
</thead>
<tbody>
<tr>
<td>?i:t-n-</td>
<td>'eat'</td>
<td></td>
</tr>
<tr>
<td>?itš-</td>
<td>'sleep'</td>
<td></td>
</tr>
<tr>
<td>caq-</td>
<td>'place'</td>
<td>+</td>
</tr>
<tr>
<td>ciq-</td>
<td>'dig'</td>
<td>-</td>
</tr>
<tr>
<td>ča?u-</td>
<td>'wash'</td>
<td>+</td>
</tr>
<tr>
<td>čsqaq-</td>
<td>'chickadee'</td>
<td>-</td>
</tr>
<tr>
<td>čin-</td>
<td>'grab'</td>
<td>+</td>
</tr>
<tr>
<td>čle-</td>
<td>'coyote'</td>
<td>+</td>
</tr>
<tr>
<td>čm-</td>
<td>'bodypart'</td>
<td>+</td>
</tr>
<tr>
<td>hem-</td>
<td>'fog'</td>
<td>+</td>
</tr>
<tr>
<td>iʔap</td>
<td>'arrive'</td>
<td>-</td>
</tr>
<tr>
<td>k'tun-</td>
<td>'big'</td>
<td>+</td>
</tr>
<tr>
<td>k'uul'-</td>
<td>'make'</td>
<td>-</td>
</tr>
<tr>
<td>K'uxeš-</td>
<td>'run'</td>
<td>+</td>
</tr>
<tr>
<td>ličc-</td>
<td>'tie'</td>
<td>+</td>
</tr>
<tr>
<td>ṭuʔ-</td>
<td>'stab'</td>
<td>+</td>
</tr>
<tr>
<td>ƛix-</td>
<td>'fast'</td>
<td>+</td>
</tr>
<tr>
<td>mʔem-</td>
<td>'woman'</td>
<td>-</td>
</tr>
<tr>
<td>piq-</td>
<td>'white'</td>
<td>+</td>
</tr>
<tr>
<td>pul-</td>
<td>'kill'</td>
<td></td>
</tr>
<tr>
<td>šil-</td>
<td>'chop'</td>
<td>+</td>
</tr>
<tr>
<td>taq-</td>
<td>'hit'</td>
<td>+</td>
</tr>
<tr>
<td>teʔ-</td>
<td>'pound'</td>
<td>+</td>
</tr>
<tr>
<td>tixl'-</td>
<td>'different'</td>
<td>-</td>
</tr>
<tr>
<td>wis-</td>
<td>'high, long'</td>
<td>-</td>
</tr>
<tr>
<td>xʔuy-</td>
<td>'go'</td>
<td>-</td>
</tr>
<tr>
<td>x̣x-</td>
<td>'go up'</td>
<td>+</td>
</tr>
<tr>
<td>ʕac-</td>
<td>'tie'</td>
<td>+</td>
</tr>
<tr>
<td>ʕdy-</td>
<td>'laugh'</td>
<td>+</td>
</tr>
</tbody>
</table>

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