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0. Introduction

This paper will try to sketch a coherent account of Quechua word structure, clearly separating it from phrase structure. As such it will try to contribute to answering the traditional question of defining the border between syntax and morphology, a question which has particularly vexed students of Amerindian languages. Kenneth Pike, in a 1949 paper, claimed that the border cannot be defined, on the basis of an analysis of Mixteco morphology. In fact, he proposed:

For the description of some languages it is not accurate or helpful to postulate a sharp morphology-syntax dichotomy. (Pike, 1949)

Here I would like to argue in detail that it is both accurate and helpful to postulate that dichotomy. I will do this by presenting a lexicalist analysis of Quechua verbal morphology, arguing that it is generated by word formation rules of the familiar type (cf. Aronoff, 1976).

To illustrate the kind of problems that we will have to deal with, consider a form such as (1):

(1) maqa-ra- yki
    hit   past 2s
    You hit.

In the model developed in Chomsky (1965) and Chomsky and Halle (1968), with the additional refinements imposed on it in Selkirk (1972), there are at least two ways in which this form could be presented in phrase structure:
In (2a) the occurrence of the stem, the tense marker, and the person marker are accounted for by phrase structure rules, in (2b) by some morphological process such as word formation rules. I will argue here for an analysis of Quechua verbal morphology such as (2b), by investigating the properties of Quechua words, and showing that these properties do not hold for Quechua phrases in the same way.

In this way, this paper will contribute to a theory of morphology. Only an explicit and sufficiently elaborate theory of syntax and morphology can provide the basis for making a clear-cut division between the two. The development of generative theory, and particularly of lexicalist syntax, has made analyses possible which were not available to Pike (1949), given the rather minimal theoretical framework existing at that time.

Once a reasonably clear separation of morphology and syntax has been accomplished, it is necessary to explore the consequences of an autonomous morphology. What properties does Quechua word structure have? How does morphology interact with syntax and semantics? These questions cannot be answered here in full. This paper does no more than discuss some of the issues involved in an exploratory fashion. I intend to demonstrate, however, that systematic study of the word structure of a morphologically complex language such as Quechua in a generative framework can yield a rich and autonomous morphological component. This paper is based almost entirely on the careful descriptive work on a Peruvian
Quechua dialect, Tarma Quechua, by Willem Adelaar (1977).

Before concluding this introductory section, an informal account needs to be given of Quechua verbal morphology, the topic mostly dealt with here, and the structure of the paper needs to be sketched.

Within the Quechua verb form, we can distinguish the following categories:

(3) \[
\text{ROOT} \quad \text{(MODAL)} \quad \ldots \quad \text{(MODAL)} \quad \begin{cases} \text{MA} \\ \text{SHU} \end{cases} \quad \begin{cases} \text{TENSE} \\ \text{TAXIS} \end{cases} \quad \text{PERSON} \quad \text{INDEPENDENT}
\]

The category ‘independent’ refers to a number of class-free suffixes of negation, emphasis, etc. The category ‘person’ refers to a small set of person markers, to be discussed in detail later in this study. ‘Tense’ and ‘taxis’ refer to an elaborate system of tense and subordinating markers. The suffixes /-ma-/ and /-shu-/ refer to a personal object of the verb, in conjunction with the person markers. Here the term ‘modal’ is used in a very loose sense, to refer to a wide variety of suffixes indicating plural, aspect, reflexive, reciprocal, causative, directionality, etc.

The examples in (4) may illustrate (3) a little:

(4) a. mancha-ku- rka- n-chu
   fear    RE PL  3 NEG
   \text{They are (not) afraid.}

b. wila-ma- nki
   tell   lob  2s
   \text{You must tell me.}

c. usha-ya- chi- n
   end   DUR CAU 3
   \text{He makes it end.}

d. chari-pa- naku- ya- q
   hold DIR REC DUR AG
   \text{grasping out towards each other}

e. aywa-ru- ra- y (ki)
   go    PER PA 2s
   \text{You went.}

These are the types of data that a theory of Quechua word structure will have to explain. Additional examples will appear throughout this paper. The meaning of the abbreviations used in the glosses is given in an appendix.
This paper is organised as follows:

In section 1 a general theory of word formation in Quechua is sketched, a theory which leads to a number of criteria which can be used to distinguish elements of phrase structure from elements of word structure.

Section 2 treats of a number of class-free 'independent' suffixes. It is argued that they are not generated by word formation rules, but by phrase structure rules, and then cliticised to the element on their left. Here use is made of the criteria developed in section 1.

In sections 3, 4, and 5 we turn to a number of typical properties of morphological phenomena in Quechua which should characterise the behaviour of the suffixes (other than the independent suffixes discussed in section 2) if the distribution of these elements is controlled by WFRs rather than PSRs.

Section 3 discusses the relevance for Quechua morphology of the subjacency condition (Siegel, 1977), arguing that WFRs and output filters are constrained by subjacency but also providing some potential counter-examples.

In 4 I try to show that morphological readjustment rules, such as allomorphy and truncation rules, are constrained by c-command: the conditioning element must c-command the affected element.

Section 5 briefly sketches some consequences for semantic interpretation of the theory of morphology adopted in this paper. I argue that interpretation of Quechua complex words proceeds cyclically, starting from the base. Again, examples are given of some potential difficulties for cyclical interpretation.

In 2 it was argued that one set of Quechua suffixes, the independent suffixes, are generated by PSRs; in section 6 I try to provide arguments that the suffixes constituting the Quechua verbal paradigm; person, number, and tense, are generated by WFRs. The argument, which is rather complex, draws upon the theory of morphology developed in sections 1, 3, 4, and 5.

In 7, the final section, the arguments presented so far are summed up, and some alternative solutions to the problems noted are briefly discussed.

1. The General Properties of Quechua Words

Setting apart the independent suffixes, this paper makes the claim that the major part of Quechua morphology is generated by word
formation rules of the type described by Aronoff (1976) and Siegel (1978):

(5) \[ [x] \Rightarrow [y[x] p] \]

Here a base, \([x]\), is embedded in \([y]\) by the addition of a suffix \(p\). The affixation of \(p\) is conditioned by a number of properties of the base.

It is argued that (2b), repeated here in a slightly modified form as (6), is indeed the correct structure for the verb form /maqa-ya-yki/ (you hit (past)). There is a separate level of word structure, and every terminal node of the phrase tree dominates a word tree. The morphological tree is independent of the phonological trees as described in Halle & Vergnaud (1978). Note, for instance, that in Quechua the word tree and the stress tree are generally mirror images of each other:

(6)

\[
\begin{array}{c}
\text{W} \\
\downarrow \\
\text{W} \\
\downarrow \\
m\text{aqa} \\
\downarrow \\
r\text{a} \\
\downarrow \\
y\text{ki} \\
\downarrow \\
S \\
\end{array}
\]

In the sections 3, 4, and 5 a number of claims are made regarding Quechua word structure. These claims are logically independent, perhaps, of the general implications of a conception of word structure as outlined here.

1.1 Different Branching Properties

The main differences between trees in morphology and trees in syntax are due to the ways in which they are formed. Syntactic trees are unconstrained as to the number and type of branchings involved, while in morphology we find two conditions constraining branchings, conditions which are due to the definition of WFRs:
Quechua Word Structure

(7) a. at any given node, only three branchings or less can occur;
b. of any given set of sister nodes, only one can be branching;
c. of any three sister nodes, only the middle one can be branching.

It is easy to see how this follows from the definition of word formation rules. Their general format is:

(8) \[ x \ldots \rightarrow [y \alpha [x \ldots] \beta] \]
where \( \alpha \) or \( \beta \) or both may be null.

In the case that \( \alpha \) and \( \beta \) are not null in any of the WFRs which has applied, we get a structure of the type:

\[ W^j \]
\[ W^i \]
\[ W \]

Any less complex tree results from leaving out some of the branchings.

In a structure of this general type, any more exterior suffix \( c \)-commands any more interior suffix, where exterior and interior are defined in terms of brackets. Likewise, every branching node \( W^j \) is superior in (9) to a branching node \( W^i \). The subjacency condition, which will be discussed in the next section, is relevant for the relationship between any two nodes in the tree. The general properties of morphological trees, it is argued in this paper, are the same as those of phrase structure trees, but since word trees are of a more restricted type, the locality principles have a slightly different effect. The principles of \( c \)-command (discussed in (4)), subjacency
(discussed in (3)), and cyclicity (discussed briefly in (5)) may be general principles of hierarchical structure in language, rather than being limited to syntax and morphology.

1.2 No W Convention

One similarity between PS-rules and WF-rules may be that word-internal elements may show the same kind of ordering restrictions as those to which words are subject, and which in the case of constraints on PS-rules are commonly referred to as the X convention. Note, for instance, that there is no obvious way in Aronoff's theory to account for the fact that in a language such as Quechua all WF processes are suffixation processes, and that, with one possible minor exception, prefixing does not occur.

It is tempting to formulate a kind of morphological X convention, which may be called W convention:

\[
W \rightarrow [X + \text{w suffix}^*]_w
\]

For English presumably a convention such as (11) would hold, following the general framework of Siegel and Aronoff:

\[
\begin{align*}
W & \rightarrow [[\text{prefix}^* \ [# X #]_w \text{suffix}^*]_w \\
\bar{W} & \rightarrow [[\text{prefix}^* \ [ + X + ]_w \text{suffix}^*]_w
\end{align*}
\]

General patterns of infixation, etc. occurring in particular languages could be accounted for in the same way. Note that the success of conventions such as (10) and (11) depends, as does the X convention in syntax, on the ease with which the structures existing in a particular language may be generalised into a single pattern across categories.

There are several reasons for wanting to exclude the W convention from a theory of morphology, however. First of all, the information that a language such as Quechua only has suffixes needs to be independently stipulated in the list of suffixes in the morphological lexicon. The generalisation could be made as a redundancy rule on affixes, and thus no generalisation is lost by abandoning the W convention. In the second place, making WFRs similar to PS rules by adopting a W convention has the consequence of giving morphological theory a power that it does not appear to have. Thus PS rules such as (12) specify that in a given language two NP positions are available in the VP:
I know of no case where similar restrictions hold for the number of prefixes that a word may have; if we assume that rules similar to phrase structure rules operate, we could find languages with only two suffix positions available. For this reason we want to distinguish between the process of word formation, in which a single suffix is added to a base, and the process of phrase structure generation, in which a string of elements may be formed. In the third place, the subjacency condition which will be outlined in subsequent sections of this paper can be formulated more simply in a theory in which complex words are formed by the successive application of WFRs, than in one using PS rules, which define the order of strings of elements. We will return to this point later.

1.3 All Word Formation Rules Are Optional

One of the distinctions which could be made in Quechua verbal morphology is that between obligatory elements in the verbal form and optional elements. Thus, in subordinate clauses, the subordination marker is obligatory, and in all clauses but /-r/, /-y/, and /-q/ clauses, person marking is obligatory. On the other hand, suffixes such as /-la-/ (delimitative) or /-ca:ri-/ (experimental action) cannot be called obligatory, in that there are many verb forms without them. Note, however, that in both cases of obligatoriness, subordinate markers and person markers, we can appeal to independently motivated conditions of well-formedness on sentences (or alternatively, interpretive person and taxis agreement rules) to assure them being present in the verb form. Thus we can maintain that all word formation rules are optional.

Explaining the obligatoriness of subordination and person markers as a syntactic, not a morphological matter, removes the lack of parallelism between nominal and verbal inflection. In many languages, verbal stems cannot appear by themselves, while nouns often can. By claiming that the obligatoriness of certain suffixes is a function of the input to the agreement rules, the difference between nominal and verbal morphology is explained, since verbs enter into structures of obligatory agreement more often than nouns. In fact, in certain complex NP structures in Quechua, nominal agreement is also obligatory. However, nouns can also occur by themselves. There is in fact one case in which the verb appears without any inflection, by itself. This is the case of a 'serial' comparative
construction which exists in Ecuadorian Quechua. A verb *surpass* appears in a VP complement inside another VP, but only the matrix verb is inflected, since it appears in the right configuration:

(13) \[\text{nuka \{[kan-da \_yalli]_VP \text{purinini}_VP\}}\]

I - you AC exceed walk 1s

*I walk faster than you.*

Thus, rather than being an anomaly, the case of Ecuadorian Quechua (13) shows that the obligatoriness of person marking on the verb is not a morphological fact, but rather a syntactic or semantic one.

The foregoing discussion has made Aronoff's claim that the base of a WFR is always an independently occurring word rather meaningless, since the definition of 'independently occurring word' has been made dependent upon syntactic considerations. I assume that the definition of word can be expanded to include the type of stems that has been described and will leave the matter rest.

1.4 The Unitary Base Hypothesis

One of the possible criteria which can be used for deciding on the possible status of a given suffix derives from adopting the unitary base hypothesis (Aronoff, 1976), which claims that the base for a morphological operation can always be specified coherently with one set of features. Thus, processes which operate either on adjectives or on transitive verbs are excluded, since presumably these two categories cannot be specified coherently together with one set of features.

Thus we could argue that suffixes which can be attached to any kind of constituent cannot be derived by WFR.

1.5 The Major Category Restriction

Typically, word formation processes operate on major categories, such as nouns or verbs, not on pronouns or particles (Aronoff, 1976). This generalisation has been formalised as the Major Category Restriction, which can be stated as follows:

(14) The Major Category Restriction:

Only elements dominated by the categories N, A, V can serve as the base in a WFR.
On the basis of this principle we can argue, then, that suffixes attached to minor categories are not generated by WFRs.

1.6 Non-transferable Categorisation

Word formation rules take an element of a given category as their base, and result in elements of a specific category as well, which may or may not be identical to the category of the base. We assume the categories of the base and the derived form to be constants, and do not allow the category of the derived form to be a function of the category of the base. Specifically, transferable categorisation is ruled out.

Suffixes which apply to several base categories and for which the category of the base is transferred to that of the output can therefore not be derived by WFR. On the other hand, cliticised elements generated by PSR are typically dominated by the same category as the element to which they are cliticised. Often, for instance, Romance clitics are represented as dominated by V, while the element to which they are cliticised is dominated by V:

\[
\begin{array}{c}
\text{da} \\
-\text{me} \\
\text{ámé} (\text{give me})
\end{array}
\]

If these clitics were generated by WFR, the rule involved would need to have the characteristic of transferable categorisation.

1.7 Summary

To sum up at this point, a theory of word structure is assumed here which has the following features:

(a) morphological structure is created by word formation rules of a well-defined type. For this reason word trees have more restricted branching properties than phrase trees (cf. 1.1);
(b) there is no equivalent of the X convention constraining the
operation of morphological rules. Generalisations about suffix order will have to be stated elsewhere (cf. 1.2);

(c) all word formation rules are optional (cf. 1.3);

(d) the category of the base of a word formation rule must be specified in a unitary way (cf. 1.4);

(e) the base functioning as the input to a word formation rule must be of a major category, i.e. N, A, or V (cf. 1.5);

(f) the category of the output of a word formation rule must be independent from the category of the base (cf. 1.6).

2. The Independent Suffixes

In Quechua, the independent suffixes mentioned in (6) can occur with all types of constituents:

(16) a. ali- m A
good AF
(It is) good.
b. nanay-wan- mi P
pain with AF
with pain
c. wayna-:- mi N
lover 1s AF
my lover
d. puri- :- mi V
walk 1s AF
I walk.

Their semantics relates to the phrase as a whole in which they appear, and not to the particular word to which they are attached: they express negation, contrast, conviction, hearsay, conjecture, emphasis, inclusion, motivation of statement, or condition for realisation.

I will argue here that they should be generated by phrase structure rules, of the following kind:

(17) $\overline{X} \rightarrow \ldots \overline{X} \text{ IND}$

where IND stands for the particular independent suffix involved.

Note that here the generalisation that the last element within a
given phrase is its head is presented with a counter-example, and we should see whether any evidence for phrase structure generation of the independent suffixes can be found. This can be done using some of the criteria developed in section 1, and we can see that they all suggest that a phrase structure rule such as (17) is part of the grammar of Quechua.

2.1 The Unitary Base Hypothesis

The Unitary Base Hypothesis would predict that the base for a word formation rule affixing the independent suffix would need to be specified in a unified way. In fact, the data given in (16) suggest that it cannot be so specified. Consequently, we can argue that the independent suffixes cannot be generated by word formation rule, and must have a syntactic source.

2.2 The Major Category Restriction

If we assume that derivational processes can only involve the major category nodes N, A, and V, then we can exclude from the inventory of derivational affixes a number of suffixes which occur with words of minor categories as well as with words from the major ones. Not surprisingly, only independent suffixes can occur with words belonging to a minor category:

(18) a. kay- chu-
    this Q
    This one

     b. na:- mi
    already AF
   Already!

     c. ama-m
       not AF
   Don't (exhortative)'

Thus the ‘major category restriction’ provides additional evidence for the ‘unitary base hypothesis’ in that both lead to the same result in excluding the independent suffixes from the category of elements derived by word formation rules.

One would still have to show, of course, that the lexical elements used as examples in (18) belong to a minor category. This question is all the more relevant since most of the categories referred to as minor in the Western European languages are part of morphology in
Quechua, and the specific phonological processes which Selkirk (1972) describes for minor categories are found with the independent suffixes such as /-mi/, and not with words like those in (18), which I have assigned to minor categories.

An argument for saying that /kay/ (this) belongs to a minor category is the existence of a related lexical item /chay/ (that), if one accepts the argument presented in Emonds (1978) that only items belonging to minor categories can be affected by suppletion. One could say that /kay/ (this) and /chay/ (that) form a small paradigm in which partial suppletion occurs.

Similarly, /ama/ (not (exhortative)) alternates with /mana/ (not (indicative)), and some kind of semantic rule has to filter out specific sequences:

\[
\begin{align*}
(19) & \quad *\text{mana} \quad V \\
& \quad [+\text{neg}] \quad [+\text{neg}] \\
& \quad [+\text{ind}] \quad [+\text{exh}] \\
& \quad *\text{ama} \quad V \\
& \quad [+\text{neg}] \quad [+\text{neg}] \\
& \quad [+\text{exh}] \quad [+\text{ind}] 
\end{align*}
\]

One could plausibly argue that only lexical items belonging to a minor category can be inherently specified for features that participate in agreement rules of the type presented in (19).

2.3 Non-transferable Categorisation

In section 1.6 it was noted that the category created by a WFR should be logically independent of the category of the base forming the input to that WFR. We may wonder what kinds of brackets the independent suffixes would confer on their base, if they were derived by WFR. To insure proper lexical insertion, we would have to assume that they are label-preserving for all features characterising the base.

A typical WFR, the one for /-mi/ (affirmative) would be:

\[
\begin{align*}
(20) & \quad [X]_{\alpha F_{\beta F}} \Rightarrow ([X]_{\alpha F_{\beta F}} \text{mi})_{\alpha F_{\beta F}} \\
& \quad \beta F_{\beta F} \quad \beta F_{\beta F} \\
\end{align*}
\]

where \(F_1, F_2\) stand for syntactic features such as \(\pm N, \pm V\), etc.

This type of WFR, introducing variables, would considerably expand the power of the word formation component. For word
formation processes in languages other than Quechua, it has not been necessary so far to use these rules as a descriptive device. If we reject rules of type (20) we have a principled basis for excluding the independent suffixes from the word formation component.

This result coincides with that of applying the Unitary Base Hypothesis and the Major Category Restriction to the derivation of the independent suffixes: following all three criteria the independent suffixes must be generated by the PSRs.

2.4 A Potential Problem

The phonetic shape of some of the independent suffixes is conditioned by the elements preceding them. This could constitute a problem for the analysis of the independent suffixes as generated by PSRs, if the phonetic conditioning would turn out to be morphological or morpho-phonological in nature. It would be plausible to limit morphologically or morpho-phonologically conditioned sound alternations to the domain of the output of the word formation component.

When we consider the independent suffixes /-mi/ (affirmative), /-shi/ (hearsay), and /-chi/ (conjecture), it appears on first sight that their phonetic shape is not purely phonologically conditioned. We find that these suffixes have two forms:

\[(21) \begin{align*}
\text{a. } & [m] \text{ after (i) long vowels; } \\
& \quad (ii) \text{ after consonants; } \\
& \quad (iii) \text{ after /pi/ (who); } \\
& \quad (iv) \text{ after short vowels but not word-finally.}
\end{align*}
\]

\[b. \ [m] \text{ after short vowels word-finally.} \]

Similarly for /-shi/ and /-chi/.

With a few minor exceptions, there are no other cases of final vowel deletions in Quechua, either in stems or in suffixes:

\[(22) \begin{align*}
\text{a. } & *\text{wayi-mi} \\
& \text{house AF} \\
\text{b. } & \text{wayi-m} \\
& \text{house AF} \\
\text{(23) a. } & \text{wayi-ta} \\
& \text{house AC} \\
\text{b. } & *\text{wayi-t} \\
& \text{house AC} \\
\end{align*}\]
This would suggest that the alternation is limited to a specific class of suffixes, /-mi/, /-shi/, and /-chi/, and that would be a problem for the analysis proposed here for these suffixes as being separately generated by PSRs hence not subject to morphologically conditioned alternations.

I will argue here, however, that the rule causing the alternation is not morphologically conditioned, but determined by Quechua stress patterns. In Quechua the penultimate syllable is stressed, unless the final syllable is long in which case the latter is stressed. Thus we have:

\[
\begin{align*}
\text{(25) a. } & \text{ wayi } & [\text{wáyi}] \\
\text{1s} & \text{ wayi-: } & [\text{wayi:}] \\
\text{c. } & \text{ wayi-n } & [\text{wáyín}] \\
\text{3} & \\
\end{align*}
\]

Assume that stress assignment takes place initially in the domain of the output of the word formation component, as in (25a–c), and assume a final vowel deletion rule as in (26):

\[
\text{(26) } i \rightarrow \emptyset /[-\text{stress}] \# C ----- \# \#
\]

This rule will have the following result in the different types of environments:

\[
\begin{align*}
\text{(27) a. } & \text{ wayi-:-mi } & [\text{wayi:mi}] & (=21aii)) \\
\text{b. } & \text{ wáyi-n-mi } & [\text{wayinmi}] & (=21aiii)) \\
\text{c. } & \text{ pi-mi } & [\text{pimi}] & (=21aiii)) \\
\text{d. } & \text{ wáyi-mi- qa } & [\text{wayimíqa}] & (=21aiiv)) \\
\text{AF TOP} & \\
\text{e. } & \text{ wáyi-m } & [\text{wáyím}] & (=21b)) \\
\end{align*}
\]

In the first column in (27) the stress is indicated before /-mi/ has been affixed. In the second column the final result.

If one interprets rule (26) as specifying that the unstressed syllable in the left environment must be open, then it yields the right results. If one assumes the number of consonants closing the unstressed
syllable to have been left unspecified, (27b) is the wrong result. There the final vowel should have been deleted, since it is preceded by an unstressed syllable. There is an independently motivated restriction, however, on word final consonant sequences:

\[(28) \ *C_2^0 \neq \#\]

This restriction will block the application of deletion rule (26), which should be formulated without reference to consonant sequences, after a closed syllable.

In the case where /-mi/ is followed by /-qa/, a topic marker, the deletion rule cannot apply because the right context is lacking. Stress is shifted to /-mi/ in these cases:

\[(29) \ aywa-nki-mi-qa \rightarrow \text{[aywankimiqa]} \quad (\text{cf. (21d)})\]

*You go*

If a way can be found to describe stress reassignment coherently, the final vowel deletion rule (26) can be maintained. Since it is clearly phonological in nature, the hypothesis that /-mi/ etc. are not generated by WFR but rather by PSR can be maintained. In fact, the adoption of the hypothesis that /-mi/ etc. are not generated by WFR leads to a new formulation of the final vowel deletion rule, not in terms of morphological constraints but in terms of stress patterns.

3. The Subjacency Condition

After sketching a general theory of morphology in section 1, and setting apart the independent suffixes from the suffixes derived by WFR in section 2, we now turn to some additional constraints that might be imposed on morphological processes in Quechua. In this section I discuss subjacency.

In Siegel (1977) a version of the subjacency condition is proposed and argued to be applicable to morphology. It can be stated as follows:

\[(30) \ \text{In a structure of the type:} \]
\[x \ ]_v \ldots ]_w \ y \quad \text{or} \quad x \ [v \ldots [w \ y] \]

no WFR may refer to both \(x\) and \(y\), where \(x\) and \(y\) are properties of affixes, and \(V\) and \(W\) are cyclic nodes within the word.
I claim here that all word formation processes in Quechua are subject to the subjacency condition. Immediately a host of counter-examples appears, although some positive evidence can be found as well. I will argue that these types of counter-examples can be independently motivated as being ruled out by independently needed constraints on semantic interpretation. First of all, some evidence for the subjacency condition.

We find a striking example in Quechua of this limitation on co-occurrence restrictions in the case of the delimitative nominal suffix /-la-/ (just, only). In nouns, it precedes the person marker:

(31) wayi- la -:
house 1s
my house only

and follows the plural marker:

(32) pay-kuna-la
he PL
only them

Since the plural follows the person marker, a combination of the three suffixes would lead to an ordering paradox.

What we find is that /-la-/ can both precede person and follow plural or appear in either position, when the three are combined:

(33) kiki-la-n-kuna
self 3 PL
kiki-n-kuna-la
kiki-la-n-kuna-la
just themselves

In the latter case, the double /-la-/ is interpreted as one /-la-/. Notice that the meaning of /-la-/ is so indefinite that this presents no problem. The three alternatives in (33) show that the presence of one /-la-/ cannot 'control' the presence or absence of another one, since they are separated by two cyclic nodes. The same phenomenon occurs when certain postpositions are combined, so that it is not a specific property of the plural and person markers.

3.1 Problem I: Causatives

That semantics plays a significant role in this respect is shown by the interaction of the causative and reciprocal markers in verbal morphology. Causative can both follow and precede reciprocal:
Disregarding the semantic interpretation for a moment, to which we will return in section 5, we can state that /-chi-/ and /-naku-/ can occur in either order. Presumably, this fact can be stated in our theoretical framework by not including /-chi-/ in the environments in which /-naku-/ cannot occur, and by not including /-naku-/ in the environments in which /-chi-/ cannot occur.

But now a major problem arises: how can we exclude the following types of sequences?:

(36) ... -chi-naku-chi-naku- ...

These are clearly out, but not ruled out by the morphological theory presented here.

We will follow the 'overgeneration' strategy sketched in Hale et al. (1977), and assume that the rules of semantic interpretation operating on words are so restrictive as to exclude double combinations of causatives, reciprocals, reflexives, etc. (but not double delimitatives; cf. (33)). This assumption is by no means implausible, and there is some support for it from double causatives in Ecuadorian Quechua.

While in most Quechua dialects sequences of the form:

(37) ... -chi-chi- ...

are ruled out, in Ecuadorian Quechua we do find double causatives, but only in some circumstances, as the following forms show:

(38) wañu-chi-chi-
die
to have someone kill
?rikú-chi-chi-
see
to make someone show
??apa-chi-chi-
take
to make someone load
*awa-chi-chi-
weave
to make someone make someone else weave

While it is possible that the difference in acceptability between these four forms is due to the degree of lexicalisation of the leftmost /-chi-/, there are no stress or other phenomena which would lend independent support to the differential lexicalisation hypothesis (with the exception of the contraction of /wañu-chi-/ to /wañ-chi-/ in certain dialects). Therefore we will assume that the difference in acceptability between the forms of (38) is due to the ease with which the action resulting from the combination of the root and the leftmost /-chi-/ can be conceived of as a coherent whole, subject itself to being 'caused'.

The overgeneration strategy followed here will have to find support when a more precise theory of semantic interpretation for causatives is sketched; we will return to it then.

3.2 Problem II: Plurals

A more serious problem for the subjacency hypothesis in morphology can be found with respect to plural marking in Quechua. There are three plural suffixes /-rka-/, /-pa:ku/ and /-ri-/; their distribution is determined by their morphological environment. In most cases, only the immediate environment is relevant, so that for the most part plural marking offers no problem for the subjacency constraint. There is one case, however, which involves more than the immediate environment.

The suffix /-rpu/- is in most circumstances followed only by /-pa:ku-/. After the suffixes /-rku-/ (which has several different meanings) and /-yu-/ (inward direction) and (special attention), we find alternatively /-ri-/ and /-pa:ku-/. When /-rku-/, /-yu-/ and /-rpu-/ (downward direction) are preceded by a suffix which ends in /-...ku-/, only /-ri-/ is allowed. Schematically:

(39) a. /
   rpu ——> pa:ku

   b. /
   \{rku\} \{yu\} ——> \{pa:ku\} \{ri\}

   c. /...ku + \{rpu\} \{yu\} ——> ri
Thus the obligatory occurrence of /-ri-/ is dependent, in (39c), on a morphological specification involving two cyclic nodes.

There are two conceivable solutions to this problem, both of them rather unsatisfactory. First of all, one might want to claim that the element /-...ku-/ is a part of the following suffix, or somehow forms a lexicalised combination with it. This is highly implausible because both /-rku-/ and /-yu-/ have several specific meanings, and worse yet, /-...ku-/ can be part of several different suffixes, none of which can be combined very easily in a lexicalised combination with /-rku-/, /-rpu-/, and /-ri-/.

Secondly, we might wish to argue that the impossibility of /-pa:ku-/ in the last context follows independently from a constraint on double /-ku-/ within one word. While historically this may be the explanation for the impossibility of /-pa:ku-/ here, there are several problems with this explanation. It does not explain why we cannot have /-ri-/ after /-rpu-/ when it is not preceded by /-...ku-/.

Also, the constraint on double /-ku-/ would also have to be formulated across two cyclic nodes, which leaves us with the same problem for the theory. Thus the problem of plural marking remains for the time being as a potential counter-example to the subjacency condition.

### 3.3 Problem III: The Suffix /-rku-/

A further problem with the subjacency condition involves the sequential suffix /-rku-/. /-rku-/ is very restricted in its use, in that it only occurs with the subordinating suffix /-r/, which indicates adverbial clauses:

\[(40)\] maki- n-ta kutu-rku- r  
\hspace{1cm} hand 3 AC cut SEQ SUB  
\hspace{1cm} after cutting off her hand

The suffix /-rku-/ is used for indicating a close temporal relationship between the events referred to by a subordinate verb and the verb to which it is subordinated, the former being shortly prior to the latter. (Adelaar, 1977)

The problem for the subjacency condition arises because /-rku-/ and /-r/ need not be adjacent:

\[(41)\] muyu-rku- chi- r  
\hspace{1cm} turn SEQ CAU SUB  
\hspace{1cm} after making it turn
Given the subjacency condition, the presence of /-rku-/ cannot control the formation of /-r/ verbs.

In this case, the violation of the subjacency condition may not be so serious, because the close semantic relationship between /-rku-/ and /-r/ makes it possible that a semantic constraint on /-rku-/ interpretation is involved: it can only occur meaningfully in the context of /-r/.

3.4 Problem IV: The Past Potential Marker

Yet another possible counter-example to the subjacency condition is the potential marker in Quechua, which is part of verbal morphology. We find:

(42) aywa-nki-man
    go  2s POT
    you would go

In Quechua tense markers appear between the verb and the person markers, as in:

(43) aywa-ra-yki
    go    PA 2s
    You went.

Now the past form of the potential, which is interpreted as an irrealis mood, is not:

(44) *aywa-ra-yki-man
    you would have gone

combining the preterite marker and the potential marker, but rather a complex form involving the auxiliary /ka-/:

(45) aywa-nki-man ka-ra-n
    go  2s POT be PA 3
    you would have gone

We need to claim that (44) is out, not for morphological reasons, but for semantic ones. Otherwise the ungrammaticality of (44) would be a direct counter-example to the subjacency condition defended here. Given the fact that there is a separate preterite form of the potential mood with the auxiliary /ka-/, the needed semantic motivation is less than straightforward.
3.5 Why Then Subjacency?

In sections 3.1–3.4 I showed some of the potential counter-evidence that one could adduce against the subjacency condition in the word formation component, and I tried to argue that in many cases one can invoke independent semantic conditions to deal with apparent violations, conditions which would not be part of word formation themselves. Still, a few difficult cases remain.

Why then was the subjacency condition argued for in the first place? First of all, the majority of the conditions on word formation processes in Quechua can be stated in terms of subjacent elements. Secondly, the adoption of the subjacency condition limits the power of the word formation component considerably. I will return to the problem of subjacency in the last section of this paper.

4. Readjustment Rules and C-Command

There are several instances in Quechua morphology where the affixation of a suffix causes elements in the base of the word formation rule of which it is part to undergo a change. Generally these changes can be represented as follows:

\[(46) \quad XaYbZ \Rightarrow Xa'YbZ\]

These readjustment rules are not bound by subjacency: note the intervening variable between the element affected by the change, \(a\), and the element triggering the change, \(b\).

They are constrained, however, by the notion of c-command or c-superiority: the affected element, \(a\), is always in the c-domain of the triggering element, \(b\):

\[(47) \quad W^n\]

\[
\begin{array}{c}
W^n \\
\downarrow \\
W \\
\downarrow \\
a \\
\downarrow \\
b
\end{array}
\]
This result is trivial within the theory of word formation sketched here, since $b$, being added by a WFR, is always attached to a higher node than element in the base, and hence c-commands all elements in the base.

Suppose, on the other hand, that we adopted a theory of morphology in which the word contained different complex nodes, such as an inflectional node dominating tense, person, etc. Consider a tree configuration as in (48):

(48)  
```
    W^n
   /   \
  /     /
W  INFL
   /   /
  a   b
```

Here the c-command assumption would predict that the affixation of $b$ could not trigger the change affecting $a$.

Here first a few examples will be given of readjustment rules, in sections 4.1 and 4.2. Section 4.3 explores the implications of the c-command condition for the independent suffixes, and section 4.4 describes a potential counter-example.

4.1 /-ku-/ Deletion

The first example of a readjustment rule involves cases of /-ku-/ deletion. There are several suffixes in Quechua which include this syllable:

(49)  
```
    ku characteristic action
    ku characteristic quality
    ku reflexive
    naku reciprocal
    paku mutual benefit
    čaku multiple object
```

(Only those suffixes where /-ku-/ appears alone or as the second
syllable are listed here; those where /-ku-/ is preceded by a consonant are not, since they do not appear to be involved in the process.)

The double /-ku-/ constraint is manifested in the following ways:

(a) Sequences of double /-ku-/, e.g. /-naku-ku-/ (reciprocal + characteristic action), are possible but avoided:
   naku naku

(b) /-čaku-/-ra+ku => /-ča+ra+ku/
   paku paku

Examples are:

(50) rika-čaku- to wake up, to look around
    rika-ča-paku-mu-n
    He woke up with a start.

(51) qapa-čaku- to shout
    qapa-ča-ra-ku-n
    He shouts continuously.

(52) rika-čaku- to look around
    rika-ča-naku-rka-ya-n
    They are looking around for each other.

Although the situation is not entirely clear, at first sight it appears that there is a /-ku-/ deletion rule in operation, which could be stated roughly as follows:

(53) CVku + CV (+) ku ⇒ 1 0 3 4

Presumably, the deletion affects /-čaku-/ in the context /CVku-/, but not in the context /-ku-/, because in the latter case no trace would be left of the deletion. Also, following the same reasoning, the suffix /-ku-/ would not be affected since no trace would be left of it after deletion.

In any case, the deletion rule (53) cannot be stated locally, since the conditioning /-ku-/ appears to be two cyclic nodes away from the deleted /-ku-/. Again, one might suppose that /-ra-ku-/ in (51) is really one suffix, similar to /-pa-ku-/ and /-naku-/. This supposition is made implausible by the fact that /-ra-/ undergoes the normal process of lengthening of a suffix-final vowel, while the /a/ in /-naku-/ and /-paku-/ does not. The /-ku-/ deletion rule is constrained, of course, by the c-command configuration.
4.2 Vowel Lowering

A second example of a non-local readjustment rule is exhibited in the rule of /u/ → [a] affecting certain verbal suffixes. Roughly the rule can be stated as follows:

\[ X \quad [q \ldots V \quad ] \quad Y \quad [p \text{ suffix}] \quad Z \]

\[ [+\text{high}] \]

\[ [+\text{back}] \]

\[ 1 \quad 2 \quad 3 \quad 4 \quad 5 \Rightarrow \]

\[ [-\text{high}] \]

The suffix labelled [p] here belongs to a designated set of controlling verbal suffixes. The suffix [q] stands for a number of derivational suffixes ending in /u/.

I have represented the process here as a rule of allomorphy rather than in terms of optional insertion combined with a negative filter of the following type:

\[ *X \quad [q \quad V \quad ] \quad Y \quad [p \quad] \quad Z \]

\[ [+\text{high}] \]

The latter type of solution is undesirable because when the [p] suffix is not present, only the [+high] vowel can appear. We would need a supplementary filter:

\[ *X \quad [q \quad V \quad ] \quad Y \quad ~[p \quad] \quad Z \]

\[ [-\text{high}] \]

This filter would introduce the powerful device of a negative context specification.

Whatever formulation is given for the process, note the crucial intervening variable Y, boldface in the following example:

\[ \text{piča-rk} \underline{\text{U-la:}}-\text{ma:}-\text{nqa} \rightarrow \text{[pičarkala:manqa]} \]

He will clean me a little.

More suffixes than one within a word can be affected by the change:

\[ \text{mayla-čak} \underline{\text{U-}}-\underline{\text{ri-}}-\text{n} \rightarrow \text{[maylačakara:rin]} \]

Here /-ri-/ c-commands both /-cakU-/ and /-rU-/., of course.
In (58), the triggering suffix is the 1st person object marker /-ma-/.
Its membership in the group of [p] suffixes, coupled with the c-command requirement, provides an argument against structures of the type (48) at least for object marking. If /-ma-/ were part of an inflectional subtree of the word, it would not c-command the suffixes undergoing the vowel change.

4.3 The Independent Suffixes

The c-command requirement makes the correct prediction that the independent suffixes discussed in section 2 can never trigger a change or deletion in a more interior suffix. Since they are dominated by a separate phrase structure node, they never c-command word-internal suffixes of the word they are attached to.

The converse implication does not hold, of course. No prediction is made that any suffix c-commanding another one necessarily causes it to change. Allomorphy and deletion rules are relatively rare in Quechua.

4.4 A Problem with the C-command Condition

A potential counter-example to the claim that truncation and allomorphy rules are constrained by c-command configurations, in which the triggering element c-commands the element undergoing the deletion or change, is constituted by the past tense paradigm.

The past tense paradigm is identical to the present tense paradigm in its person marking, except in the third person:

(59) present tense past tense
1 V-: v-rqa-:
2 V-nki V-rqa-nki
3 V-n V-rqa-Ø *V-rqa-n
4 V-nchi V-rqa-nchi

The /-n/ 3rd person marker cannot co-occur with the past tense marker. To ensure the correct results, we either formulate a filter prohibiting /-n/ affixation in the context of /-rqa-/, as in (60), or we need a deletion rule, as in (61):

(60) *-rqa-n-
(61) -n-→Ø / rqa-

The first option has the undesirable consequence that, when /-n-/
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has not been affixed at all, person cannot be interpreted. The second option is more plausible, but it violates the condition that a triggering domain c-command the element undergoing the deletion or change:

(62)

At this point, no more can be said about this problem. In Muysken (1977: 46–7) some of the historical causes of the anomaly in question are discussed.

5. Do the Rules of Semantic Interpretation Apply Cyclically?

We may assume that given the structures generated by the WFRs, the rules of semantic interpretation apply cyclically. In many cases, they appear to do so. Consider the examples of the interaction between reciprocal and causative, repeated here as (63) and (64):

(63) maqa-\textit{chi} \textit{-naku}-rka-\textit{n}
    beat \textit{CAU} \textit{REC} \textit{PL} 3
    \textit{They let each other be beaten.}
(64) maqa-\textit{naku}-ya-\textit{chi}\textit{-n}
    beat \textit{REC} \textit{DUR CAU} 3
    \textit{He is causing them to beat each other.}

In (63) the causative interpretation rule operates first, followed by the reciprocal interpretation rule. In (64), reciprocal applies before causative. The cyclic ordering of the two interpretation rules explains the difference in meaning between (63) and (64), and therefore the interaction of causative and reciprocal constitutes an argument for the theory of word formation sketched so far.
A similar case is presented by the interaction of causative and reflexive:

(65) maqa-\textit{chi [-ku]-n}  
\hspace{1cm} \textit{beat CAU RE 3}  
\hspace{1cm} \textit{He lets himself be beaten.}

(66) maqa-\textit{ku [-ya- chi]-n}  
\hspace{1cm} \textit{beat RE DUR CAU 3}  
\hspace{1cm} \textit{He is causing him to beat himself.}

In (65) the causative interpretation rule precedes reflexive, in (66) the reverse is the case. Here again, the principle of cyclical application of semantic interpretation rules makes the correct predictions. (I am using cases in which causative interacts with some other process because there the order of interpretation makes a crucial difference. In other cases, the semantics is much less transparent.)

The interaction of causative and aspect causes serious difficulties for the hypothesis that semantic interpretation operates in a cyclical fashion. Compare the pairs (a) and (b) of the following examples:

(67) a. muyu-\textit{rku- r}  
\hspace{1cm} \textit{turn SEQ SUB}  
\hspace{1cm} \textit{after turning}

b. muyu-\textit{rku- chi- r}  
\hspace{1cm} \textit{turn SEQ CAU SUB}  
\hspace{1cm} \textit{after making it turn, \neq after causing it to have turned}

(68) a. wañu-\textit{ru- n}  
\hspace{1cm} \textit{die PER 3}  
\hspace{1cm} \textit{he has died.}

b. wañu-\textit{ru- chi- n}  
\hspace{1cm} \textit{die PER CAU 3}  
\hspace{1cm} \textit{He has killed, \neq He causes him to have died.}

(69) a. maqa-naku-\textit{ya- n}  
\hspace{1cm} \textit{beat REC DUR 3}  
\hspace{1cm} \textit{They are beating each other.}

b. maqa-naku-\textit{ya- chi- n}  
\hspace{1cm} \textit{beat REC DUR CAU 3}  
\hspace{1cm} \textit{He is causing them to beat each other. \neq He causes them to be beating each other.}

In the (a) cases, which do not contain the causative marker /-\textit{chi-}/,
the sequential, perfective and durative markers modify the verb root, or in the last case, the derived form, preceding it. In the (b) cases, the same would be the case, if semantic interpretation were to apply cyclically. Instead, the aspect marker modifies the causative, which follows it.

A similar problem, albeit a more complicated one, involves person marking and the causative. When the causative verb contains an object marker, that marker can refer either to the underlying object, or to the matrix object:

(70) a. ſuqa-wan Mañuku-ta maqa-chi- ma- n
    I INST Manuel AC beat CAU lob 3
    *He causes me to beat Manuel.

b. Mañuku-wan ſuqa-ta maqa-chi- ma- n
    Manuel INST I AC beat CAU lob 3
    *He causes Manuel to beat me.

Apparently, arguments are assigned to the subordinate predicate on the cycle after causative has applied, and the object marker in the above examples serves only to relate the first person pronoun in the VP to the verb.

A much more detailed analysis of the interaction of causatives, reflexives, object markers and reciprocals appears in Muysken (1979).

6. Inflectional Morphology

Recall the outline of the Quechua verb form given in (3), repeated here as (71):

(71) ROOT — (MODAL) … (MODAL) — \( \{ \text{MA} \} \) —
    \( \{ \text{TENSE} \} \) — PERSON — INDEPENDENT

The category ‘independent’ has been shown to fall outside the domain of the word formation component, but what about all the other positions exterior to what is here called ‘modal’: the object markers /-ma-/ and /-shu-/, the tense markers, and the subject markers? Derivation-like suffixes tend to cluster more closely
around the verbal root, while inflection-like suffixes are affixed more
towards the exterior of the verb form. Also, derivation-like suffixes
tend to form meanings together with the verbal root in some cases,
while the inflectional suffixes only rarely form a lexical combination
together with the root. It is not clear whether these differences are
not due to pragmatic considerations, and to the way the lexicon is
stored in the brain. In any case, the two differences are never more
than gradual ones, and it is not possible to divide the Quechua
suffixes unambiguously into two classes. Rather, we find a con­

If we consider other criteria commonly used to distinguish
between inflection and derivation, they hardly prove conclusively
that such a distinction should be made for Quechua. One claim often
made in the literature is that derivational morphology always
changes the lexical category of the word, and inflection never does
(Reece Allen, 1978). While in English this generalisation holds for a
good number of cases, in Quechua it has no validity.

We find derivational morphology, e.g.

(72) \[v \text{ punu}] \quad \text{sleep}
\[v[v \text{ punu}] \text{ yu}] \quad \text{sleep for a while}

which does not affect the lexical category, while there are also
derivations which do:

(73) \[N \text{ čakwas}] \quad \text{old woman}
\[v[N \text{ čakwas}] \text{ ya}] \quad \text{to grow old (said of women)}

Similarly there are inflectional processes, such as:

(74) \[v \text{ punu}] \quad \text{sleep}
\[v[v \text{ punu}] \text{ n}] \quad \text{he sleeps}

which don’t affect lexical categorisation, and inflectional processes
which do:

(75) \[v \text{ punu}] \quad \text{sleep}
\[N[v \text{ punu}] \text{ na}] \quad \text{that ... will sleep}

In the last example, the nominalising suffix /-na-/ is part of the
tense/taxis paradigm, and would traditionally be classified as
inflectional.
When we consider other formal distinguishing criteria, such as stress assignment or phonological behaviour, no differences between derivation and inflection emerge. While the independent suffixes were found to fall outside the domain of primary stress assignment (section 2.4), the inflectional suffixes do not. While the person and tense/taxis suffixes do not trigger allomorphy changes, the object suffix /-ma-/ does, alongside with a number of modal suffixes (section 4.2).

In this section I will try to argue that not only are there no formal differences between inflection and derivation in Quechua, which would tend to make a distinction between the two unnatural, but also that it is theoretically and empirically preferable to analyse the object, tense/taxis and person markers in exactly the same way as the derivational suffixes: as generated by word formation rules, and subject to all the conditions enumerated so far in this paper.

6.1 The Two Models

In the following sections, we will explicitly contrast the two approaches sketched in (2a) and (2b), with respect to object, tense/taxis, and person marking. They are repeated here as (76a) and (76b), and will be referred to as the abstract morpheme framework, and the word formation framework, respectively:

(76)  a.  

\[ V \rightarrow \begin{array}{c} \text{V} \\ \text{Tense} \\ \text{Person} \\ \text{+ past} \\ \text{fut} \\ \text{I} \\ \text{II} \\ \text{maqa} \\ \text{ra} \\ \text{yki} \end{array} \]

In the abstract morpheme framework, (a), the agreement rule has as its output a feature matrix. The actual form of the verb is determined by rules that spell out abstract feature configurations as suffixes. In this approach, the following types of rules are needed:
–a phrase structure rule expanding the verb node;
–filters to constrain the output of the agreement transformation;
–spelling out rules to map the features onto suffixes, and possibly readjustment rules to derive the right surface forms;
–an agreement transformation.

(76) b. V Word Formation Framework

\[v[v[v maqa] ra] yki]\n
In the word formation framework the actual verb form is interpreted by an interpretive algorithm to create the feature matrix which functions in the agreement rule. The following types of rules are needed:
–word formation rules;
–constraints on suffix order;
–interpretive algorithms and conditions on their operation;
–filters on interpretations;
–an agreement rule filtering out all but matching feature specifications.

After presenting the present tense part of the Quechua verbal paradigm (section 6.2), the two approaches will be presented systematically, compared, and evaluated (sections 6.3 and 6.4). Finally some additional evidence will be presented for the word formation approach, regarding person marking in agentive and gerundial clauses (6.5), the future tense paradigm (6.6), and plural marking (6.7). A few concluding remarks are given in section 6.8.

6.2 The Paradigm

The present tense paradigm in Quechua consists of nine forms. The relevant distinctions are those between:

(77) first person subject first person object
second person subject second person object
third person subject
first inclusive subject first inclusive object

Given these four persons, it is convenient and plausible to categorise
them with the features [xI], [βII], and [obj]. Thus the categories
above can be represented as follows, where subject is [-obj].

(78) \[-obj \quad +\text{obj}\]
\[
\begin{array}{c|c}
+I & +I \\
-\beta & -\beta \\
-I & -I \\
+\beta & +\beta \\
-I & -I \\
+I & +I \\
\end{array}
\]

Since the object marker occurs to the left of the subject marker, we
will represent the forms in the paradigm as follows:

(79) maqa-ma- nki
hit lob 2s
You hit me.

\[
\begin{array}{c|c}
+\text{obj} & -\text{obj} \\
+I & -I \\
-\beta & +\beta \\
\end{array}
\]

Using this last abbreviatory convention, we can represent the
occurring verb forms as follows:

(80) maqa-:

\[
\begin{array}{c|c}
- & + \\
- & - \\
- & + \\
- & - \\
- & + \\
+ & - \\
\end{array}
\]

subject 1

subject 2

subject 3

subject 4 (first person inclusive)

object 2, subject 1

object 2, subject 3

object 1, subject 2

object 1, subject 3

object 4, subject 3
The paradigm for the past and the sudden discovery tenses, and for all the subordinate forms, are constructed by inserting a tense/taxis marker between the object/person suffixes. (The future tense will be discussed separately, in 6.6.) The most extensive discussion of agreement phenomena in any Quechua dialect is presented in Lefebvre and Dubuisson (1978).

6.3 The Abstract Morpheme Approach

(a) Phrase Structure. Since we find forms such as (81), where suffixes and features can be matched one-to-one, a fair phrase structure rule for the tense and person paradigm would be (82):

(81) maqa-ma-ra-yki
    hit 1ob PA 2su
    You hit me. (past)
(82) V → V_root [+obj] [tense] [−obj]

Both the + and the − objective morphemes would then include

\[
\begin{bmatrix}
  \alpha I \\
  \beta II
\end{bmatrix}
\]

(b) Agreement. A preliminary version of the agreement transformation involved may be:

(83) \[ [v] \rightarrow \begin{bmatrix} \alpha obj \\ \beta I \\ \gamma II \end{bmatrix} / \begin{bmatrix} \alpha obj \\ \beta I \\ \gamma II \end{bmatrix} \]

In the formulation of this agreement rule, which collapses subject and object agreement, the case feature of the noun phrase, ± objective, is related to the feature of the abstract morpheme inside of the verb form. The [+obj] position in the verb is sensitive to the [+obj] NPs (i.e. those NPs occurring in the domain of the verb), and the [−obj] position is sensitive to the [−obj] case of the subject.

(c) Filters. A number of feature specifications which might have been transformationally derived have to be ruled out. The most important filter is the one on reflexivity. Any positive specification for either person in both positions is ruled out:

(84) *\([+F_1]\) [tense] \([+F_1]\)
This filter rules out all but the nine admissible feature combinations given before.

(d) Spelling-out Rules and Readjustment Rules. Every feature matrix has its own spelling out rule. We may fairly assume the following cases:

\[
\begin{array}{c|c}
-\text{obj} & +\text{obj} \\
+I & -\text{II} \\
-\text{obj} & +\text{obj} \\
-\text{I} & -\text{II} \\
+\text{II} & +\text{II} \\
-\text{obj} & +\text{obj} \\
-\text{I} & -\text{II} \\
-\text{II} & +\text{II} \\
+\text{I} & +\text{II} \\
\end{array}
\]

A combination of these suffixes in the way specified by phrase structure rule (82) yields, disregarding the tense suffix, the following combinations:

(86) \textit{Predicted:}

\begin{itemize}
  \item \textit{\emptyset}: \emptyset-
  \item \textit{\emptyset-nki} \emptyset-nki
  \item \textit{\emptyset-nchi} \emptyset-nchi
  \item \textit{ma-nki} ma-nki
  \item \textit{ma-n} ma-n
  \item \textit{*nchi-n} Correct: ma-nchi
  \item \textit{*shu-:} q
  \item \textit{*shu-n} shu-nki
\end{itemize}

In the three last cases, the combination of spelling out rules leads to incorrect results. Worse is, however, that there is no principled basis for a conversion rule giving the proper results on the right. After some analysis it becomes obvious that the forms in the right column have to be independently stipulated, being irregular. The question is precisely how, since we are dealing with a non-local environment here, in which the tense markers can intervene.
Note that adopting an approach which allows for context-sensitive spelling out rules does not improve matters a great deal, since the context which would have to be specified would still be a non-local one. To account for the last form, for instance, to take the simplest case, we could formulate the spelling out rules as follows:

\[
\begin{array}{c}
\text{obj} \\
\text{I} \\
\text{II}
\end{array}
\rightarrow \text{nki/shu X} \quad \text{(or} \quad /shu \{\text{tense}\} \quad \text{)}
\begin{array}{c}
\text{obj} \\
\text{I} \\
\text{II}
\end{array}
\rightarrow \text{n, elsewhere.}
\]

We would still have to specify a variable or the intervening tense/taxis position in the rule. An additional disadvantage is that the rule is entirely arbitrary. The relation between /-shu-/ in the context and the choice of /-nki-/ has to be postulated. The other two cases of misgeneration would be even more complicated to handle, but they would not need any additional apparatus.

6.4 The Word Formation Rule Approach

(a) Word Formation Rules and Interpretive Algorithms. We need a series of word formation rules, applying individually to the verbal base, and a series of associated interpretive rules, applying cyclically. The relevant sets of rules can be stated as follows:

\[
\begin{align*}
\text{(88) a. } & [\text{V X}] \rightarrow [\text{V[V X]} -:] \\
& \text{interpretation: the subject of the verb in the domain of } /-:/ \text{ has the features } [+I, -II] \\
\text{b. } & [\text{V X}] \rightarrow [\text{V[V X]} -\text{nki}] \\
& \text{interpretation: the subject of the verb in the domain of } /-\text{nki/} \text{ has the features } [-I, +II] \\
\text{c. } & [\text{V X}] \rightarrow [\text{V[V X]} -\text{n}] \\
& \text{interpretation: the subject of the verb in the domain of } /-\text{n/} \text{ has the features } [-I, -II] \\
\text{d. } & [\text{V X}] \rightarrow [\text{V[V X]} -\text{nchi}] \\
& \text{interpretation: the subject of the verb in the domain of } /-\text{nchi/} \text{ has the features } [+I, +II] \\
\text{e. } & [\text{V X}] \rightarrow [\text{V[V X]} -\text{ma-}] \\
& \text{interpretation: the object of the verb in the domain of } /-\text{ma-/} \text{ has the feature } [aI]
\end{align*}
\]
f. \[v X\] → \[v[v X] -shu-\]
   interpretation: the object of the verb in the domain of
   /-shu/ has the features \([-I, +II]\]

g. \[v X\] → \[v[v X] -q\]
   interpretation: the subject of the verb in the domain of
   /-q/ has the features \([+I, -II]\), and the
   object of the verb has the features
   \([-I, +II]\]

These seven word formation rules and interpretive rules provide
most of the information needed in the paradigm. At this point, no
constraints on their application have been formulated, however.

(b) Constraints on Suffix Order. To ensure the right output, we need
several negative output filters. Here the feature \([+F_m]\) will stand for
the suffixes \{/-ma-/, /-shu-/\}, the feature \([+F_n]\) for the suffixes
relating to tense, and the feature \([+F_o]\) for the suffixes \{/-:/, /-nki/,
/-n/, /-nchi/, /-q/\}. These features can be thought of as morpho­
logical features specifying classes of suffixes, similar to the feature
assigned to all suffixes which trigger vowel lowering in section 4.2.
Given the features, we need a number of filters:

\[
\begin{align*}
(89) & \quad a. \ *[+F_n] \ [+F_m] \\
    & \quad b. \ *[+F_o] \ [+F_n] \\
    & \quad c. \ *[+F_o] \ [+F_m] \\
    & \quad d. \ *[+F_i] \ [+F_i], \text{ where } i \text{ ranges over } \{m, n, o\}
\end{align*}
\]

Filter d. would be local, as formulated here, since a. through c.
would filter out non-local configurations of two identically marked
suffixes.

The critical reader might remark that a. through c. are together
the notational variant of a positive output filter similar to phrase
structure rule (82), i.e.:

\[
(90) \quad [+F_m] \ [+F_n] \ [+F_o]
\]

Note, however, that we would be dealing with a positive output
constraint specifying the order among optional elements. Moreover,
the status of positive output constraints in generative grammar is
not quite clear. I will let the matter rest here since it does not bear
crucially upon the argument.
(c) Filters on Interpretations. Even given these filters, the model as presented so far overgenerates considerably, specifically, the following forms are generated:

(91)  a. *-0-0  
b. -0-:  
c. -0-nki  
d. -0-n  
e. -0-nchik  
f. -0-q  
g. *-ma-0  
h. *-ma-:  
i. -ma-nki  
j. -ma-n  
k. -ma-nchi  
l. *-ma-q  
m. *-shu-0  
n. *-shu-:  
o. -shu-nki  
p. *-shu-n  
q. *-shu-nchi  
r. *-shu-q

Of these 18 forms, only nine actually occur. Furthermore, a simple additive model of semantic interpretation would not make the right predictions. Consider, for instance, k., /V-ma-nchi/. This should be interpreted as [+I, -II object, +I, +II subject]. It actually means [+I, +II object, -I, -II subject]. How do we arrive at these results? First of all, we need a filter ruling out forms without subject marking. I argue in Muysken (1979) that this rule may be a specific instance of the Nominative Island Condition, but that is not relevant here. We would like to make the generalisation:

(92) Verbs without subject marking are ill-formed.

This filter rules out a., g., and m.

Then we need a filter which rules out a positive specification for a person feature for both subject and object, comparable to filter (89d). The major difference between the earlier filter and this one is that (84) was formulated as a filter on base configurations, and was not local in the strict sense, while this filter will be formulated as a
condition on Logical Form, where different locality principles hold.

In any case, this filter would rule out, at least in the present formulation of the interpretive rules, h., k., l., o., q., and r. which would only partially be the right result. How then can we formulate the interpretive rules to ensure the right result?

Two assumptions are needed:

(a) the interpretive rules for subject marking do not refer to subject explicitly;

(b) the two suffixes /-ma-/ and /-shu-/ carry an idiosyncratic feature [+collapse].

Consider the first assumption. It would involve reformulating the interpretive rules (88a-d). I will only give the example of the first one, (88a); the others would be similar:

(93) interpretation: an argument of the verb in the domain of /-:/ has the features [+I, —II]

Now this seemingly has the wrong results. Consider:

(94) maqa-:

hit 1s

This only means *I hit x*, and not *y hits me*. Thus (93) would make too wide predictions. Note, however, that the second interpretation of (94) is independently filtered out by the filter prohibiting verbs without subject marking. Thus the reformulation of the interpretive rules does not have undesirable results in the case of simple subject marking. (We do face the problem that subjects are defined here as potential arguments of a verb.)

The second assumption relates to the feature ‘collapse’, which characterises the suffixes /-ma-/ and /-shu-/.

Consider the cases (91k) and (91o):

(91) k. V-ma-nchi \[+ \quad -\] object 4, subject 3

o. V-shu-nki \[+ \quad -\] object 2, subject 3

Here the subject marking is interpreted as object marking, which has been made possible by assumption (a) above.

The collapsing rule, triggered by /-ma-/ and /-shu-/ collapses the features of the subject marking onto the object marking, leaving the subject specified negatively as \([-I, -II]\):
Rule (95) has the following effect on (91k):

Here the features of /-nchi-/ are collapsed with those of /-ma-/. Note that the collapsing rule needs to be formulated in such a way that the output is not ruled out by the constraint on uninterpreted subjects: when the feature specifications of the two sets of suffixes are collapsed, by convention the subject becomes [—I, —II].

Quite similarly, in (91o), the features of /-nki-/ are collapsed with those of /-shu-/ . Collapsing is only possible if the suffixes involved do not have a non-identical interpretation.

In the case of /-shu-/, this means that it can only be combined with /-nki/, since that form has the identical person features. Thus the ungrammaticality of n., p., and q. is explained. With /-ma-/, the impossibility of collapsing does not lead to ungrammaticality, but to ‘uncollapsed’, separate interpretation. Thus we could say that with /-ma-/ collapsing is optional, and with /-shu-/ it is obligatory.

The only two cases which have not been explained yet are h. and r. h. should be collapsible, but is ungrammatical. I have no explanation for this fact. Quite possibly, r. can be ruled out independently, in that the collapsing rule cannot operate on the feature complex belonging to /-q/.

The word formation approach is superior to the abstract morpheme approach on several counts. First of all, by relying on general conditions of interpretation a great deal of economy is achieved. Second, the arbitrary context specifications in the context sensitive
spelling rules or in the readjustment rules have been replaced by a
general collapsing convention subject to several independent con-
ditions. Third, it is possible to formulate collapsing convention (95)
as operating on the level of Logical Form, where the intervening
tense/taxis variable is irrelevant to locality conditions.

In the sections 6.5, 6.6, and 6.7 additional arguments will be given
for the analysis of inflectional suffixes as generated by word
formation rules.

6.5 Person Marking in Agentive and Gerundial Clauses

Person marking in agentive and gerundial clauses provides inde-
dependent evidence for the reformulation of person interpretation
rules as sketched in the previous section. We find the following
paradigms:

<table>
<thead>
<tr>
<th>GERUNDIAL</th>
<th>AGENTIVE</th>
</tr>
</thead>
<tbody>
<tr>
<td>maqa-shu-r-(ni)-yki</td>
<td>maqa-shu-q-(ni)-yki</td>
</tr>
<tr>
<td>maqa-ma-r-(ni)-yki</td>
<td>maqa-ma-q-(ni)-n</td>
</tr>
<tr>
<td>maqa-ma-r-(ni)-nchi</td>
<td>maqa-ma-q-(ni)-nchi</td>
</tr>
<tr>
<td>maqa-ma-r</td>
<td>maqa-ma-q-(ni)-</td>
</tr>
<tr>
<td>maqa-</td>
<td>maqa-</td>
</tr>
<tr>
<td>r-(ni)-yki</td>
<td>q-(ni)-yki</td>
</tr>
<tr>
<td>r-(ni)-n</td>
<td>q-(ni)-n</td>
</tr>
<tr>
<td>r-(ni)-:</td>
<td>q-(ni)-:</td>
</tr>
<tr>
<td>r-(ni)-yki</td>
<td>q-(ni)-yki</td>
</tr>
<tr>
<td>r-(ni)-n</td>
<td>q-(ni)-n</td>
</tr>
<tr>
<td>r-(ni)-nchi</td>
<td>q-(ni)-nchi</td>
</tr>
</tbody>
</table>

The forms which are not boldface correspond more or less to
parts of the non-subordinate paradigm given above. The boldface
ones show a different pattern however. Let us consider the para-
digms more closely. The suffix presented in parentheses is a
euphonic suffix irrelevant here. The suffixes /-q/ and /-r/ mark
subordination, and their peculiarity is that the subject of the clause
marked by them can be inferred from the arguments of the main
clause. In the case of /-r/, subjects of main and subordinate clauses need to be identical, and in the case of /-q/ a more complicated set of inference relations hold.

The effect of both markers is then that overt subject marking of the subordinate verb (marked with /-q/ or /-r/) is optional. This is precisely the situation in which we would expect ‘subject’ marking (i.e. the class of suffixes {·-nki, -n, -nchi}) to refer to objects, since subject can be specified independently of the person markers (in the above paradigm by X). Indeed the boldface forms in (96) and (97) show that ‘subject’ marking can refer to objects, in those situations where the subject is specified independently.

6.6 The Future Tense Paradigm

While the past tense and the sudden discovery tense are relatively regular, the future tense paradigm is highly irregular, in that tense and person are collapsed; the present tense is repeated here on the right:

\[
\begin{align*}
(98) & \text{ maqa-sha(q) } \quad \text{‘subject 1’} \quad \text{ maqa-:} \\
& \text{ maqa-nki } \quad \text{‘subject 2’} \quad \text{ maqa-nki} \\
& \text{ maqa-nqa } \quad \text{‘subject 3’} \quad \text{ maqa-n} \\
& \text{ maqa-shun } \quad \text{‘subject 4’} \quad \text{ maqa-nchi} \\
& \text{ maqa-sha-yki } \quad \text{‘subject 1, object 2’} \quad \text{ maqa-q} \\
& \text{ maqa-shu-nki } \quad \text{‘subject 3, object 2’} \quad \text{ maqa-shu-nki} \\
& \text{ maqa-ma-nki } \quad \text{‘subject 2, object 1’} \quad \text{ maqa-ma-nki} \\
& \text{ maqa-ma-nqa } \quad \text{‘subject 3, object 1’} \quad \text{ maqa-ma-n} \\
& \text{ maqa-ma:-shun } \quad \text{‘subject 3, object 4’} \quad \text{ maqa-ma-nchi}
\end{align*}
\]

In part this paradigm parallels the present tense paradigm discussed earlier, particularly as far as the distribution of /-ma-/ and /-shu-/ is concerned.

Most of the differences appear in the forms unmarked for object. We notice that the future person suffixes include both the tense and the person specification. In the abstract morpheme framework this fact would have to be expressed through a complex collapsing rule of the following type:

\[
\begin{align*}
(99) \quad \text{Tense Person \quad suffix}_q \\
& \begin{bmatrix} \alpha F \\ \beta I \\ \gamma I \end{bmatrix} \quad \rightarrow \begin{bmatrix} \alpha F \\ \beta I \\ \gamma I \end{bmatrix}
\end{align*}
\]
Presumably in the case of the 2nd person, the future tense feature would be neutralised.

In the word formation framework, we would need interpretive rules of the following type (exemplified here with the 1st person suffix /-sha(q)/):

\[(100) \quad [v X] \Rightarrow [v[v X] sha(q)]\]

Interpret the verb as \[v^{\alpha_F}_{+1} \]

\[[-l_l]\]

In some sense, of course, (99) and (100) constitute mirror-images of each other. Note, however, that in the word formation framework no claims are made about the underlying linear order of the features. Their order in the past and sudden discovery paradigms between object and subject marker would only be a particular morphological fact.

Consider now the 4th person subject and object marker, /-shun/. Again, we find that the 4th person transfers to object marking in the context of /-ma-/ independently of whether the suffix involved is /-nchi/, as in the present tense paradigm, or /-shun/, as in the future tense paradigm. Thus we find another argument for a word formation analysis involving interpretive rules which collapse feature configurations at the level of Logical Form.

6.7 Plural Marking

An example of a process which can be handled easily by a theory of WFR, but not by a theory involving grammatical morphemes, is plural formation. There are three suffixes, which occur in morphologically specified environments, to which I will return later:

\[(101) \quad -pa:ku-\]
\[-ri-\]
\[-rka-\]

One of them is selected within a given context, but they do not occur in the same position in the string of suffixes. /-ri-/ for instance, follows the aspect marker /-ru-/ while /-rka-/ precedes the aspect marker /-ya-/. In other respects the aspect markers among themselves show a similar distribution.
Therefore it is not possible without later shifting rules to generate plural as one category, either preceding or following aspect:

(102) \[ \text{?V} \rightarrow \text{V plural aspect tense person} \]

\[ \text{? aspect plural} \]

The WFR theory, which just affixes the plural markers in (101) in given contexts, and assigns the feature [plural] to the resulting form, encounters none of these difficulties. At the same time it is able to handle the distribution of the aspect markers by involving the feature [aspect] in the context specifications of the relevant WFRs.

Thus we see that the WFR theory is able to handle all the facts adequately without sacrificing the possibility to make the same generalisations that a PS theory with grammatical morphemes can make.

6.8 Conclusion

By allowing a very general rule of person interpretation, which does not make reference to subjects, to interact with two general interpretative conditions, one prohibiting uninterpreted subjects (Nominative Island Condition?), and one prohibiting an identical positive feature specification for both subjects and objects (Disjoint Reference Condition?), we have provided a coherent account of Quechua inflectional processes. While the abstract morpheme framework can only provide ad hoc solutions for the irregular cases in (87), and for the gerundial and agentive paradigms in (96)–(97), the word formation and interpretive model as sketched can give general solutions. Also, the locality principle of strict subjacency can be partially maintained even for person marking, since the constraints formulated under the interpretive model operate on the level of Logical Form (cf. Muysken, 1979) where different locality principles hold.

7. The Internal Structure of the Lexicon and the Position of the Lexicon in the Grammar

The account given above of Quechua word structure has made it quite clear that the lexicon is organised in a way quite similar to syntax; we must distinguish:

(a) word formation rules, the application of which is constrained by local filters, and which create hierarchical structure;
(b) readjustment rules of various sorts, the application of which is constrained by the $c$-command configuration;
(c) interpretive rules, which operate cyclically on the output of the word formation rules.

I would like to argue that the readjustment rules operate independently of the interpretive rules, so that we find the following picture:

(103)  

```
WORD FORMATION

READJUSTMENT

INTERPRETATION
```

An argument for having the morphological readjustment rules (truncation, allomorphy, etc.) apply independently of the semantic interpretation of the verb form is provided by the interaction of medial and causative in Ecuadorian Quechua. There we find /-ri-/ (medial) and /-chi-/ (causative) in forms such as:

(104)  

```
a. riku-n  
         see 3  
    He sees.  

b. riku-ri-n  
    He is seen./He appears.  

c. riku-chi-n  
    He causes to see./He causes to appear.  

d. *riku-ri-chi-n  

e. *riku-chi-ri-n  
```

The ungrammaticality of d. and e., combined with the ambiguity of c., which includes the meaning which d. would have had following the normal rules of semantic interpretation, we may postulate a rule of /-ri-/ deletion in a specific morphological context:

(105)  

```
ri}|v chijy ⇒ ø 2
```

Rule (105) would apply to the already interpreted form. The surface form (c) would have two underlying sources: the causative of both a. and b., and would hence be ambiguous.

Quite similar is the case discussed in section 4.4, where a rule
deleting the 3rd person marker in the context of the past tense marker is formulated. The interpretation of the past tense paradigm proceeds independently of this deletion rule.

In Muysken (1979) the relationship between lexical interpretive rules and the syntactic interpretive rules is discussed. I have nothing to say here about the interaction between morphological readjustment rules and various types of phonological rules. Neither will I enter into the debate about deep versus surface lexical insertion, since the outcome of that depends crucially upon the theoretical assumptions one wants to make. It may be a trivial question.

The central role that word structure plays in the grammar of Quechua appears in the extent to which there is interaction between syntactic and morphological interpretive rules. In this paper I have sketched a strong lexicalist account of verbal morphology in Quechua, arguing that only in the case of the independent suffixes is there evidence for phrase structure generation, and that all other suffixes should be derived by WFRs. It was argued that word formation is subject to a substantial number of restrictions and is tightly organised, following a set of general principles. The principles governing word structure are the same ones that govern phrase structure, and presumably, other types of hierarchical linguistic structure. The particular way in which word structure is created, however, differs from the way in which phrase structure is created, and this difference shows up in the way that the general principles of linguistic structure apply.

While in the generative study of syntax it was possible quite early to distinguish a number of central phenomena (such as Wh Movement) from peripheral ones, the same type of distinction is much harder to draw in the study of morphology. This is probably the reason why the generative study of word structure has barely started on a serious basis. It seems that the basic outlines of word structure, such as have been sketched in this paper and in the work cited, are obscured by at least two factors: lexicalisation and paradigmatisation.

Lexicalisation, the incorporation of affixes into roots, tends to be destructive of hierarchical structure, in the sense that cyclic boundaries disappear. Often, the lexicalised combination assumes an idiosyncratic meaning and shows erratic phonological behaviour. Since morphology is so intimately tied to the lexicon, lexicalisation is quite frequent, to the extent that in some languages most morphological structures are lexicalised. The importance of the study of
Quechua word structure on the other hand, and of the morphology of languages comparable to Quechua, is that is not the case for Quechua. We do find a great many cases of idiosyncratic lexicalisation, but also many processes which do not seem to be determined by the characteristics of individual words.

Similarly, the formation of inflectional paradigms tends to be destructive of hierarchical word structure. We have noticed that the cases where the subjacency and c-command conditions are violated most frequently involve the morphological categories of tense/taxis, person, and number. From the morphological point of view, these categories form a widely disparate set:

\[
\begin{array}{cccc}
\text{PLURAL} & \text{OBJECT} & \text{TENSE} & \text{PERSON} \\
-pa:ku- & -ma- & -ra- & -: \\
rka- & -shu- & -n & -nki \\
-ri- & & -n & -nchi
\end{array}
\]

From the point of view of performance, of speech production and perception, however, they form a coherent class, in that, together, they form the Quechua paradigm, in the widest sense of the word.

From the point of view of the morphological system, which mostly functions to relate individual lexical items to each other, the paradigm constitutes the marked case: a whole set of words is related to each other at once, and therefore subjacency is violated. A number of suffixes tend to be viewed as grouped together, rather than as the product of individual affixation processes. This constitutes a powerful argument for the psychological, though not morphological, reality of the paradigm in Quechua. While most cases of lexicalised and paradigmatised morphology continue to be constrained by general principles of word structure, it is here that we can expect to find most counter-examples.

Note

* Whenever Quechua examples are given in this paper without further specification, they are from Adelaar (1977). A first discussion of some of the issues raised can be found in my thesis (1977), chapter V. I am grateful for profitable discussion of the ideas raised here with Willem Adelaar, Hans den Besten, G. N. Clements, and the members of the seminar on Quechua grammar in the spring of 1979, and particularly grateful to Frank Heny for his extensive comments on several drafts.
References

—— (1979), ‘Quechua Causatives and Logical Form. A Case Study in Markedness’, presented at the GLOW Conference on Markedness, Pisa

Appendix: List of Symbols and Abbreviations Used in The Glosses

1  first person
2  second person
3  third person
4  first person plural inclusive
±I  ± speaker
±II ± listener
AC  accusative
AF  affirmative
AG  agentive
CAU causative
DIR  directional
DUR durative
INST  instrumental
NEG  negation
PA  past tense
PER  perfective
PL  plural
POT  potential
Q  question
RE  reflexive
REC  reciprocal
SEQ  sequential
SUB  subordinate
TOP  topic

With person markings:
ob  object
su  subject
s  singular