A Study in Word and Paradigm Morphology

A critique of the major concepts of Word and Paradigm Morphology in theory and in application to language data.

Steven Powell Roberts

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Declaration

Except where otherwise indicated
this thesis is my own work.

Steven Powell Roberts
March 1990
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Chapter 1
INTRODUCTION

The purpose of this dissertation is to develop and implement a workable model of Word and Paradigm morphology. In doing so I intend to criticize existing models of Word and Paradigm morphology. This will provide guidance in the modification of Word and Paradigm methodology. Following this I will illustrate that the Revised Word and Paradigm model to be developed can do the work of another model of nonconcatenative morphology, Autosegmental Morphology. I will go on to show that there are good reasons for adopting the Word and Paradigm morphological approach.

In this dissertation I shall take for granted the need for a model of Word and Paradigm morphology for the analysis of fusional languages. That there are some problems with the use of such a model, even with languages of this typological grouping, cannot be denied.

Throughout this work I will make reference to a typological grouping of languages or phenomena labelled fusional. This term is often associated with purely phonological fusion. Other terms for these languages or phenomena are either ambiguous with other meanings (eg inflectional) or refer to too specific kinds of phenomena (eg symbolic). I shall use the term fusional for the class of languages or phenomena often dubbed inflecting, synthetic, fusional and symbolic. Thus I use the term fusional to refer to languages or phenomena that are morphologically complex and non-agglutinating or non-concatenative. The terms non-agglutinating and non-concatenative could include isolating languages or phenomena so I have specified morphological complexity. Nonconcatenative is often associated with Autosegmental theory and thus symbolic morphology.

Later in the dissertation I shall criticize Extended Word and Paradigm Morphological Theory for providing morphological analyses of morphology that is often non-fusional and agglutinating despite being of typologically fusional languages. This criticism is aimed at particular details of Extended Word and Paradigm Morphological Theory that emphasize the concatenative aspects of a language’s morphology. This same criticism could be aimed at Word and Paradigm Morphological Theory in general. Typologically fusional languages often have much morphology that is not fused or obscured. I shall not address these issues beyond the next paragraph.

It should suffice to say that the methods of morphological typology are by no means rigorous or
exacting. Typological classifications of languages are often impressionistic and too general to be of much service. A single label, or a few, such as inflectional or agglutinating just cannot capture the morphological characteristics of a whole language's morphology. In this perspective, it is probably more appropriate to not apply morphological models to typological language groupings. The obvious alternative is to apply morphological methodologies to the domains or specific instances in the morphology of individual languages that display the characteristics representative of particular typologies and are suited to particular models. Word and Paradigm methodology certainly has a role in such an approach to morphology.

Having proceeded with the above excursus I shall again re-iterate that these issues will be discussed no further. Therefore I start from the assumption that there are fusional languages and that Matthews (1972, pp41-156) has proven that a Word and Paradigm approach is the most appropriate model to use with such languages.

The nature of this proof lies in the problems encountered with the concatenative morphological models applied to fusional data. Morphemes in this context develop undesirable characteristics. These include zero realizations, replacives, infixes, fusion of formatives, cumulation of portemanteau meaning in morphemes, empty morphs, intrusive elements, extended exponence of meaning across a number of morphemes, morphemic overlapping and the arbitrariness of a concatenative segmentation of the word (see Matthews, 1972, pp56-103).

While some have criticized the basis of Word and Paradigm tenets such criticism has generally been naïve. Jenson & Strong-Jenson (1984) have criticized Word and Paradigm morphology but particularly Extended Word and Paradigm Theory. Some of the criticisms are valid for Extended Word and Paradigm Morphological Theory but not Matthew’s (1972) model. However some are directed at Word and Paradigm Theory in general and are unsound.

Jenson & Strong-Jenson (1984) address old English verbal ablaut claiming that one doesn’t have to analyze the roots and suffixes that mark tense and subject person/number as simultaneously involved in extended exponence (ie both affix and ablaut marking the same meanings). Ablaut alternations have consistently been analyzed as morphologically conditioned allomorph of the root in past morphological theory. Jenson & Strong-Jenson (1984) analyze the roots as marking the tense features and subcategorizing for certain affixes. This is simply a reversal of the traditional approach and solves no problems.

Example: [+past] bæ:r-

[+2per] -e / Vb[+past]_

(see Jenson & Strong-Jenson, 1984, p485)

The /e/ suffix given actually has a wider distribution than shown in the rule above. But in the context of the whole analysis the above combination creates a well-formed Old English word. The above rule accounts for what might be called one occurrence of the suffix. Jenson & Strong-Jenson (1984) create separate rules for different occurrences. There is no reason to believe that
these actually constitute separate suffixes. The /-e/ suffix seems to be an unmarked form in the present and past singular.

Example: / -e /  
Preterite Indicative 2Sg  
Optative Sg  
Present Indicative 1Sg  
Optative Sg  
(see Jenson & Strong-Jenson, 1984, p484)

Word and Paradigm morphology makes the claim that such analyses as the above example of allomorphy are inappropriate. Had the suffix been restricted to the 2per Past there would be no reason to expect the suffix did not signal both 2per and past tense. One would almost certainly find weak verbs that had no stem alternation for tense, yet had the suffix and on the basis of this managed to keep the tense alternations.

Word and Paradigm morphology challenges traditional preconceptions of reductionism in morphological theory. To challenge the Word and Paradigm model one must reaffirm the appropriateness of morphemes for inflectional languages. Simply reanalyzing inflectional data in a morphemic model does not do this. The existence of a number of morphemic analyses for the same example highlights the arbitrariness implicit in a morphemic analysis of such data. This final point is especially valid since one may not find complete agreement amongst morphologists committed to morphemes as to the appropriateness of any given analysis.

1.1. AIMS

In chapter 2 I intend to describe the major characteristics of Word and Paradigm Morphological Theory as it has developed to date. Initially I shall describe the original Word and Paradigm concept of Matthews (1972). Then the expanded model of Anderson (1977, 1982, 1988ab) will be shown to concur with that of Matthews (1972). The model of Extended Word and Paradigm Morphological Theory goes into greater detail about the specifics of a Word and Paradigm morphology. The nature of the Extended Word and Paradigm Morpholexical rule system, the details of how the Extended Word and Paradigm organization of the grammar effects the relationship of the morpholexical rules to the rest of the grammar in general and the syntax in particular, and the nature of these relationships will be drawn out.

In chapter 3 I shall criticize the model of Extended Word and Paradigm Morphological Theory on theoretical grounds. There are consequences of this model that can only be illustrated with reference to a morphological analysis of a fusional language. This will follow later.

The majority of theoretical problems with Extended Word and Paradigm Morphological Theory stem from the organization of grammar described in chapter 2. Proposed characteristics of the components are proven dubious and some undesirable consequences of the organization are found.

Chapter 4 will present a Revised model of Word and Paradigm morphology. This model will
differ significantly from the Extended Word and Paradigm Morphological model of Anderson (1982), described in Chapter 2, particularly in the placement of a single morphological component inside the lexicon. The morpholexical rules will more closely resemble the rules of Matthews (1972) but will have the transformational power available to Anderson's (1982) rules.

The modifications made to the model of Revised Word and Paradigm morphology in chapter 4 are not all justifiable in terms of the criticisms in chapter 3. Some are made with foresight towards issues that will be raised in chapter 5 where the models are compared.

In chapter 5 the models of Extended Word and Paradigm Morphological Theory and Revised Word and Paradigm Morphological Theory are applied to language data from Gahuku, a Gorokan Language of the Eastern Highlands of Papua New Guinea. This approach will illustrate those failings of Word and Paradigm morphology that can only be drawn out in the context of an analysis of morphological data.

In applying these models to language data it is necessary to ensure that the data used is of fusional type. It would be no surprise to find that the Word and Paradigm models discussed proved inadequate to describe a proto-typical agglutinating language. Thus a portion of chapter 5 will be spent describing the data in a Generative-type analysis and pointing out the problems this morphemic approach creates. This will justify the typological label of fusional for the language Gahuku as far as such typological classifications can be trusted.

Chapters 6-8 are of a different nature to the previous chapters. Having established a Revised model of Word and Paradigm the purpose of these chapters is to illustrate the scope of Word and Paradigm Morphological Theory.

The model of Autosegmental morphology has recently established itself at the forefront of morphological analysis of segmental non-concatenative morphology. There is obvious overlap in the domain of Word and Paradigm and Autosegmental morphological models. Many of the morphological phenomena described in Autosegmental terms have until the advent of Autosegmental morphology been considered processes of some sort. The relevance of Word and Paradigm morpholexical rules is obvious.

Chapter 6 describes the model of Autosegmental morphology as it has developed recently and the method by which it is applied. This is not intrinsically obvious from the Autosegmental formalism.

Chapter 7 criticizes the model of Autosegmental morphology and provides justification for the purpose of addressing alternatives to the Autosegmental treatment of phenomena open to such treatment.

A comparison of Autosegmental and Word and Paradigm models of morphology is undertaken in chapter 8 by the application of both models to language data. A similar approach to that in
chapter 5 is used. The language data is from Arabic. Since Semitic data has long been a problem for morphological theory the analysis of Arabic (McCarthy, 1981) is at the basis of much of Autosegmental theory. Much other data analyzed in Autosegmental terms could be analyzed differently and often represents just fragmentary analyses of small data sets. The purpose of chapter 8 is to show that the Arabic data can be analyzed in Word and Paradigm terms and that there are good reasons for doing so.

In the conclusion I hope to draw together the major points of the previous chapters. I shall map out the most important reasons for preferring a Word and Paradigm Morphological Theory approach to non-concatenative morphology and a Revised model of Word and Paradigm Theory. Following this I hope to propose some further areas for development in the field of Word and Paradigm morphology.
Chapter 2

WORD AND PARADIGM MORPHOLOGICAL THEORY

2.1. MATTHEWS’ WORD AND PARADIGM MORPHOLOGY

The model of Word and Paradigm morphology developed in Matthews (1972) is particularly vague as to how this inflectional rule system relates to the syntactic component of the grammar. Matthews (1972, p4) claims that the theory he is developing is not an integrated theory of morphology and syntax. This is an obvious contrast to Extended Word and Paradigm Morphological Theory where the relationship between syntax and inflection is clearly mapped out. Word and Paradigm morphology, as created by Matthews (1972), is thus not inconsistent with a number of views concerning the organization of a grammar.

Matthews (1972, pl2) states that in his model the syntax specifies particular morphosyntactic formulas and the morphology acts on these. This may not be the direct syntactic manipulation of morphology it seems to be. The syntax may merely create the set of possible morphosyntactic property combinations and the morphology creates corresponding forms.

The procedure for the derivation of word forms in Matthews’ Word and Paradigm is not a direct construction of the morphosyntactic representation and word form from a root.

Matthews (1972, pp175ff) begins his derivation with a lexeme and a grammatical representation much as Extended Word and Paradigm Morphological Theory does. These input into the rule component of the grammar and there a search is applied. The result of the search procedure is a list of all rules necessary to the derivation of the appropriate word form for the grammatical representation and the particular lexeme. Once a list of rules is arrived at, a root is selected on the basis of the lexeme and the grammatical representation. Finally, the rules apply to the root giving a morphological word coupled with a lexeme and a grammatical representation.

This morphological derivation procedure is not incompatible with that of Extended Word and Paradigm. In Extended Word and Paradigm Morphological Theory the inflectional rules exist outside the lexicon, are provided a morphosyntactic representation by the syntax and a lexical root or stem by the lexicon. The procedure of Matthews (1972) is accessible to this sort of grammar organization with the lexeme and root (or lexical stem) supplied by the lexicon and the grammatical representation supplied by the syntax.
Neither is Matthews' (1972) organization inconsistent with a lexically based placement of the morphological derivation procedure. One can envision a lexicon that allows a paradigmatic choice of grammatical representations and then derives the morphological word form. Matthews (1972, pp160-97) gives no hint as to how a grammar associated with his morpholexical rule derivation might be organized with respect to this. However he does advocate the maintenance of a strict morphology/syntax division.

2.1.1. MORPHOLEXICAL RULES

The morpholexical rules of Word and Paradigm morphology proposed by Matthews (1972) have the appearance of an Item and Process methodology. This is despite the model's larger Word and Paradigm approach. Each rule is an operation on the form of its input to produce an output. The operation may be a simple affixation or something more complex (eg metathesis, reduplication, ablaut, etc). The input to the rule component is a root (or lexical stem), an operation applies to this to produce a first stem, to which another rule might apply to create a further stem, and so on till a termination is reached. The output of each rule becomes the input of its subsequent rule.

Diagram:  
\[ X \rightarrow Y \]
\[ Y \rightarrow Z \]
\[ Z \rightarrow \ldots \text{ etc} \]

This is quite different from the Item and Process approach adopted by Lexical Phonology and its predecessor Generative Phonology. In these theories morphemes are concatenated in a linear sequence. Processes that apply to these 'items' are purely phonological and apply across the boundaries of adjacent morphemes.

Diagram:  
\[ X + Y + Z \rightarrow X' + Y + Z \]
\[ \rightarrow X' + Y + Z' \]
By:  
\[ X \rightarrow X'/y \]
\[ Z \rightarrow Z'/y' \]
where \( y \) is some property of \( Y \) and ' is some effect on \( X \) and \( Z \) caused by \( Y \).

Generative Item and Process morphology is essentially Item and Arrangement methodology allowing phonological processes between items.

The morpholexical rules of Matthews (1972, pp160ff) consist of components specifying Operand, Reference, Limitations and Operations (ie input, output, morphological restrictions on rule applications and process rules, respectively).

The Operand/input specification includes the stems or roots that may input into a particular rule. This might specify certain morphological properties or just a level in the order of derivation. Tense rules might only be affixed on stems inflected for aspect or voice, for instance.

The reference/output component provides the output of a rule, the meaning or the features for which the rule is a signal. This may include elements of the input since the rules may be restricted to certain co-occurrences with other rules and mark the same properties. The morpholexical rule may thus act as an on-going record of the properties already signaled in previous rules (see Matthews, 1972, pp170-197).
The Limitations component provides information regarding lexical classes or other morphological restrictions that apply to the morpholexical rule. It seems quite possible to include this in the input component of the rules.

The Operation component gives the details of the change affected by the rule. These are often written, "Infix Nasal" or "Lengthen" (Matthews, 1972, p279). More concatenative examples may be schematically represented as " +i: " (Matthews, 1972, p176), that is "Suffix i: ". This representation closely resembles morphemic representations but is an abbreviation of the rule form " Operand -> Operand + i: " (Matthews, 1972, p176). All of the operations can be regarded as of this form eg Lengthen Operand's vowel, Operand with Infixed Nasal, Suffix i: to Operand, etc.

Matthews (1972, pp176ff) does provide a means by which the rules in his approach may be abbreviated.

Example: (8) [ S1, PA-P ] T; +t, R.  
(Matthews, 1972, p179)

Here the 'R' represents the input/operand component, 'T' limitations on the scope of the rule, the '+t' is the operation, the square parentheses [ S1, PA-P ] enclose the output/reference of the rule.

Example: OUTPUT- [ S1, PA-P ]  
 INPUT-  
 LIMITATIONS- T  
 OPERATION- +t  

So- [ OUTPUT ] LIMITATIONS; OPERATIONS, INPUT.

This rule abbreviation is only a notational shortening. The rules still require more components and terms than Extended Word and Paradigm rules. These abbreviations must be explained at some stage in the analysis.

2.1.2. WORD BASED EXPONENCE

Implicit in the development of the Word and Paradigm model of Matthews (1972, pp86-103, pp105-109, pp160-197) is the concept of word based exponence. That is, the morphological word is in some way the basic marker of its own morphological properties. This is inconsistent with the Item and Process-like rule system developed for the Matthews' Word and Paradigm morpholexical rule component.

The rules themselves are Item and Process type, show recurrent alternations of form and meaning below the level of the word, and each signal the presence of particular morphosyntactic properties. So one might regard the label Word and Paradigm and the principle of word based exponence with some skepticism.

I use the term exponence in a slightly different manner to that used by Matthews (1972). Here I use the term to signify the signaling relationship between morphological form and meaning. Matthews (1972) calls this realization and for him exponence is the relationship between a rule formative and its output features.
In order to justify the label Word and Paradigm morphology one must examine the model more thoroughly. Derivation is started with a lexeme and a grammatical representation. Rules provide the morphological word form and this is the exponent of the lexeme and grammatical representation. The Item and Process rules can be seen as a derivational path by which a word form is provided for the paradigmatic choice of grammatical representations. This is not process exponence since the grammatical representations already exist.

Consider the following passage from Matthews (1972, p173).

"(1) A Verb-form is derived from its Primary Stem by the Suffixation of i: provided that the word which it realises has all the properties Pf, Pr-Ind, 1st and sg."

It is obvious from this passage and others like it that Matthews has the exponence relationship between morphological word, lexeme and grammatical representation. Not between process rules and morphosyntactic properties.

Still, the identification of recurrent patterns in properties and processes suggests process exponence. In the attempt to show the recurrent relationship between form and meaning at a lower level than the word, the model casts some doubt on the appropriateness of word-based exponence and highlights process exponence. This is necessary for an analysis of the data.

2.1.3. MORPHOPHONEMICS

The position of morphonemics in Word and Paradigm morphology is firmly established by Matthews (1972) and Sommerstein (1975). Both discuss extensively the criteria by which alternations should be considered morphonemic as opposed to morpholexic (eg phonetic similarity of alternants, phonological conditioned, etc).

2.1.4. CONCLUSION

Matthews' Word and Paradigm is not a complex theory of morphology. It involves a set of realization rules for creating the exponent words of lexemes and their grammatical representations. Though this is quite compatible with a grammar organization similar to Extended Word and Paradigm Morphological Theory the model does seem lexically based. Matthews (1972) does maintain that this is a theory of inflectional morphology without justifying the inflectional/lexical morphology dichotomy.

2.2. AN EXTENDED WORD AND PARADIGM FRAMEWORK OF MORPHOLOGICAL THEORY
2.2.1. INTRODUCTION

The aim of this section is to develop a standard model of morphology within the Extended Word and Paradigm framework for the purpose of later criticism. It is not my intention to knock this 'straw man' down, as my own commitment lies with word-based morphology. Still, it is necessary to keep this description as identical to the standard theory as possible. In doing this information must be gleaned from a number of sources, most notably Anderson (1977, 1982, 1988ab) and Thomas-Flinders (1981).

Later criticism will be aimed at much of the methodological and theoretical baggage that now accompanies Extended Word and Paradigm morphology. I will not attack the basic theoretical underpinnings. Thus I take the work of Matthews (1972) as having established the necessity for a Word and Paradigm plus morpholexical process approach to morphology. This for at least the group of languages classified typologically as fusional, and synthetic or polysynthetic. Needless to say the starting point of Extended Word and Paradigm theory is the use of Word and Paradigm morpholexical methodology on languages on which it is deemed appropriate. Extended Word and Paradigm methodology might be regarded as an item and process approach to morphology despite the name. Anderson (1986, pp11f) labels his model a process approach.

Among the foremost concerns to Extended Word and Paradigm Morphological Theory adherents, particularly Anderson (1982, 1988ab), is the distinction between inflectional (ie morphosyntactic) and derivational (ie lexical) morphology. Anderson (1982, p587) redefined 'inflection' recognizing traditional definitions were inadequate for his purpose. Under his definition inflection is morphology relevant to syntax and so shares its theoretical primes (Anderson, 1982, p587). Rules that refer to, or are referred to by, syntactic rules are thus inflectional under this definition (henceforth Anderson's Inflection). Lexical morphology is thus negatively defined as not Inflection.

It can be seen that traditional 'inflections' may not qualify under this definition of Inflection. Specifically, verbal tense and aspect need not be syntactically relevant (Anderson, 1982, p588). Inherent syntactic agreement features (eg person, number on nouns) are included as Inflectional (discussed later).

The thesis that Inflection and lexical morphology are separate is a major theoretical premise of the Extended Word and Paradigm Morphological framework. It is on the basis of this dichotomy that the organization of an Extended Word and Paradigm grammar is founded. The model proposed by Anderson (1982) is as follows:
2.2.2. THE LEXICON

All lexical morphology in an Extended Word and Paradigm Morphological framework is within the domain of the lexicon. The lexicon consists of a list of all uninflected insertable words, stems and roots including some inflected stems.

Within the lexicon is an inventory of Word Formation Rules, for partially (or fully) systematic relations between forms, similar to those of Jackendoff (1975).

Example: English Causative

\[
\begin{align*}
&[[/X/ \leftrightarrow \text{"make s.o. Y"}] & \leftrightarrow \text{"Y"}] \\
&+NP(NP")_ \rightarrow +NP' \ NP(\NP")_ \rightarrow 
\end{align*}
\]

(Thomas-Flinders, 1981c, p168)

Inflectional morphology that is irregular, idiosyncratic or internal of lexical morphology resides in the lexicon. Inflected irregular stems are marked for their inflectional features and forms in the lexicon. These stems are disjunctively ordered with regular lexicon-external Inflectional rules by an Elsewhere principle (Anderson, 1982, p593). The subcategorization frame of roots, stems and words is provided by inherent features and lexical morphology. Lexical insertion proceeds on the basis of matching frames to syntactic nodes.

Anderson (1988, p189) considers that compounding may involve "a genuinely syntactic combination of lexical elements below the level of the word". Presumably compounds are lexically derived by lexicon internal syntactic principles. Component words and structures rarely

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1For discussion of the lexicon in Extended Word and Paradigm Morphological Theory see Anderson, 1982, p591-5; also pp606-9; also 1988b, pp184-88
 prescribe a compound’s complete actual meaning. Compounds are not sentences, phrases or clauses. Their meaning is greater than that of the syntactically combined parts (ie a blackbird is not just a black bird but a particular type of bird that is black). If compounds were syntactically predictable then they would constitute well formed syntactic phrases, etc. Their meanings certainly do not indicate this.

The lexicon is not an important part of the theory of the Extended Word and Paradigm Morphological framework beyond the above minimal description. Anderson (1988b, pp148ff) attributes the following properties to rules in the lexicon:

1. structure preserving, since they must be inserted into the same set of base syntactic structures.
2. may relate items from distinct lexical classes.
3. are local, only referring to material in the sub-categorization frame of an item.
4. have access to Theta roles.
5. don’t apply to outputs of syntax.
6. have arbitrary lexical exceptions.

The connotations of this claim seem to be that Inflectional rules outside the lexicon do not have these properties.

2.2.3. PHONOLOGY AND INFLECTION

As demonstrated by the diagram above, the Inflectional component of morphology is placed with the phonological component in an Extended Word and Paradigm grammar. Phonological rules may precede, follow and mix with the Inflectional rules. In the light of Lexical Phonological theory there must presumably be phonological rules in the lexicon too (see Mohanan, 1982; Kiparsky, 1982; Mohanan & Halle, 1985; Rubach, 1984). It is Anderson’s opinion that morphologically conditioned phonological rules should probably be eliminated as most effects of such rules can be included in a morpholexical process (morpholexical processes discussed later; see Anderson, 1988b, p181)

As a consequence of the positioning of Inflectional rules, they follow lexical insertion. Lexical roots, stems and words are inserted into phrase structure nodes minus Inflection (usually). The advantage of this arrangement is that it allows Inflectional rules direct reference to a word’s syntactic context, positioning and the features of other words in co-occurrence. Obviously lexicon-internal Inflection, like irregular morphology, is inserted at lexical insertion combined with roots, stems or words. Thus these may not reference syntax in rule descriptions and cannot be manipulated by syntax.

---

2For proof that phonological rules must precede some Inflectional rules; see Anderson, 1974. This proof is unconvincing since the rules can be reordered in most cases. However the ordering is unimportant since phonological rules in the lexicon are widely accepted in modern morphological theory.

3If rules even exist for particular Inflected forms that are irregular, idiosyncratic or internal of lexical morphology.
Another consequence of the positioning of the Inflectional component amongst phonology is (as shown in the diagram in the introduction) that Inflection occurs simultaneously and separately to Interpretation and Logical Form operations. The syntax and lexical morphology provide the input to Logical form independent of Inflection. The ramifications of this is that Inflectional morphology may not affect meaning.

2.2.4. INFLECTION

Having defined Inflection as morphology relevant to the syntax it remains to clarify this. Morpholexical rules that need to refer to syntactic structure or features are included as Inflection. The definition qualifies the following sets of phenomena:

1. clitics.
2. configurational properties.
3. agreement properties.

All clitics are not ordinarily necessarily included as inflection but are here captured by the definition given in Anderson (1982, p587). They must in the Extended Word and Paradigm framework occur with Inflection to allow reference to their syntactic domains.

Simple clitics are elements of normal word classes appropriately syntactically placed but morphologically joined to some adjacent word. Anderson (1988, pp165ff) regards these as words deficient in prosodic structure (ie phonological word-ness) and thus not really relevant to "Inflection".

Special clitics, however, have position determined by some independent ordering principle referring to a particular syntactic constituent (eg initial, final, second, penultimate, adjacent to head of NP, VP, S etc) and are affixed to an adjacent word. Special clitics must be affixed (generally) by morpholexical rules with special reference to syntactic context. That is, they act like affixes to phrases, instead of words (Anderson, 1988b, p177). The analogy to other morphology can be carried further since there can be distinguished lexical special clitics (ie particles) and Inflectional special clitics, with the former often internal of the Inflectional clitics (Anderson, 1988b, p177).

In the interests of cohesive treatment it seems logical to treat simple clitics in a similar manner to special clitics. This would involve affixing them to the immediately adjacent constituent in the desired position. Here the simple clitic's own sub-categorization features would be decisive in positioning, as opposed to those of another constituent for special clitics; ie "affix simple clitic Y on any X next to Y's node" as opposed to "affix special clitic Y on a particular X or a position relative to X."

One might not wish to claim that simple clitics lack prosodic structure since lack of independent stress and other phonological traits of words might be a consequence, not a cause, of cliticization.
One wouldn't wish to posit a lack of prosodic structure for any simple clitic that didn't lack certain characteristics of phonological words. English clitics have full word alternants (e.g., 's & is, n't & not, etc) so one might claim speakers optionally subtract prosodic structure, perhaps for reasons of speed, expedience, etc.

Configurational properties are those that are assigned by reference to structural or syntactic features. Thus amongst these are included morphological marking of syntactic (non-lexical) passives on verbs, structural case on nouns, etc. Anderson (1988b, p175) includes amongst these lexically governed case (as in Icelandic; see Andrews, 1982) where a subject or object is assigned a certain case dependent on properties of the verb. The cases attributed need not be nominative or accusative and if they are may not be in the expected pattern. These seem more akin to agreement phenomena by their lexical prescription of features than to the syntactic prescription of other configurational properties. It is still within Anderson's (1982, p587) definition of Inflection though.

Agreement properties morphologically marked on sentence constituents are those that require particular reference to other sentence constituents' inherent properties. Positioned as it is after lexical insertion, Inflection may have direct access to the inherent properties of surrounding constituents in the morpholexical rule descriptions. Inherent properties of agreement (e.g., person/number of a noun) are included amongst Inflection (Anderson, 1988b, p169). Agreement phenomena include the agreement of adjectives and genitive NPs with their head noun and verbs with arguments using features of number, person, gender, class, etc.

2.2.5. THE MORPHOLEXICAL RULE COMPONENT OF AN EXTENDED WORD AND PARADIGM TREATMENT OF INFLECTION

The general nature of the treatment of morphology in Extended Word and Paradigm Morphological Theory has now been mapped out. It is thus left to specify the exact nature of the Inflectional rule component in an Extended Word and Paradigm Morphological framework.

Inflectional rules apply to a pair \( \{M,S\} \) where \( M \) is a morphosyntactic representation and \( S \) is a lexically inserted root, stem, or word (a fully lexically derived product of the lexicon) or the output of another Inflectional rule. Inflectional rules must necessarily refer to lexical categories such as verb, nominal, etc (see Anderson, 1977, pp25ff). This information is available from phrase structure nodes so no access to lexical information is allowed.

The morphosyntactic representation consists of an unordered conjunction of binary features. Any ordering on the morphosyntactic representation should be avoided. Such allows subsequent rules access to word internal structure. Unless this is explicitly required by the data such power should not be available to Inflectional rules. A basic tenet of Word and Paradigm morphology is that the fully inflected word is the basic marker of its own morphological properties. Any trace of constituent structure in the morphosyntactic representation might be taken to represent the
existence of constituents below the level of the word. Thus the morphosyntactic representation must be unordered and the features conjoined only.

The above arguments have led to the positing by Anderson (1988b, p178) of the following principle.

CONSERVATION OF FEATURES-The only change a syntactic rule can make in a morphosyntactic representation is to add feature specifications to it.

That is, the syntax prescribes the syntactic features but may not change them once added to the morphosyntactic representation. Thus Anderson precludes ordering (except in one specialized case), manipulation of order, and manipulation of pre-existing features by Inflectional rules.

The form of the morpholexical rules used in Extended Word and Paradigm Morphological Theory vary between fully specified transformational rules and lesser specified rules generally lacking the numbering conventions of transformations. These rules are combined with a feature specification bundle that contains the morphological conditioning of the process. The rules do not add features but apply as a result of syntactic features.

Morpholexical Rules: Old Provencal [-pf, -pres, +ind]

\[ X + a / \rightarrow / X + a + va / \]

\[ (+pf) \]

\[ X / \rightarrow / X + e / \]

(Platt, 1981, p61)

Modern Hebrew [+Vb, cpast, b+pres, γfut, +passive]

(CV) C(a, i) C(C) (e, i) C

\[ \rightarrow 1 2 3 4 5 6 \]

Condition: \( (α, β, γ) = + \)

(Horvath, 1981, pp243ff)

Within the framework of Word and Paradigm morpholexical process morphology, a conditioning morpheme (and the features marked by such) is as much signaled by the conditioned allomorph (in Structuralist terms) as by the actual conditioning morpheme (see Matthews, 1972, p92). If an alternate occurs only in a specific environment, for instance particular morphosyntactic features, there is no reason to believe the alternant doesn’t signal that environment. As a result, a morpholexical process in Extended Word and Paradigm Morphological Theory may have portomanteau feature specification. Since the syntax, and not morpholexical rules, actually creates these features it is somewhat nonsensical to discuss signaling and portomanteaux in this context.

Rule ordering is achieved in Extended Word and Paradigm Morphological Theory by a few devices. Firstly morphological processes may be extrinsically ordered by the numbering of rules. However rules may be placed in disjunctively ordered blocks so principled choices of paradigmatic alternants at the same rule level can be made. Finally, the Elsewhere condition of Kiparsky (1973) applies to these disjunctively ordered blocks. Thus the most specific rule, with the most detailed phonological or morphological specification of the input form, applies to the input form if it fits the rule description of more than one rule.
2.2.6. SYNTACTIC PRESCRIPTION OF FEATURES

While the basis of Extended Word and Paradigm Morphological Theory is that Inflection exists outside the lexicon to allow syntactic accessibility, it seems the interests of Extended Word and Paradigm adherents lie mostly with morphology (naturally!) and syntactic conditioning is often only implicit in the analyses. Adherents generally demonstrate the syntactic or lexical (via syntactic co-occurrence) prescription of features for some rules by feature manipulation on syntactic trees. Further syntactic conditioning for other rules is left implicit (see Hammond, 1981; Thomas-Flinders, 1981c; Platt, 1981; Anderson, 1982; etc). Tuller (1981) fully syntactically specifies all her nominal Inflectional rules.

Syntactic rules develop morphosyntactic representations as terminal nodes of phrase markers. Phrasal node features are assigned from outside or projected up from the head. Heads receive their features by downwards percolation of features from the phrasal node. Non-head elements inherit features from the parent phrasal node.

Feature Manipulation

\[
\begin{align*}
\text{Feature Manipulation} & \quad \text{NP}[\alpha \ F] \quad \text{NP}[\alpha \ F] \\
& \quad \text{NP} \quad \text{NP} \\
& \quad \text{N}[\beta \ G] \quad \text{N}[\beta \ G][\alpha \ F] \\
& \quad \text{(Hammond, 1981, p108)}
\end{align*}
\]

Anderson (1982, pp578-9) also includes another method of syntactically prescribing morphological material. He actually creates verbal subject agreement pronominals in the subject node and moves them onto the verb by a late rule. This is not feature manipulation.

The potential for or existence of contradiction in the features of a morphosyntactic representation has led Anderson (1977, pp21f) to allow a principle of ordering or hierarchical precedence within these representations. This principle embeds a previous layer of morphosyntactic features inside a layer of subsequent features. This is achieved by the addition of an outer set of parentheses.

\[
\begin{align*}
& [+F [ -F, +G]] \\
& (Anderson, 1977, p22)
\end{align*}
\]

"Layering Convention: When a rule of the grammar assigns features to an element, and that element already carries specification for those features, then (unless of course the rule is explicitly stated so as to change the features involved, rather than to add them) the result is not that the new features and the old merge within the same complex, but rather that a new layer of structure is created, taking the old feature complex as its 'base'."

(Activity, 1977, pp21f)
A later modification in the convention saw the embedding of only those features that are capable of contradiction of each other.

\[
[[ \text{-me, -you, -plural} \ [+\text{me, -you, -plural}]] +\text{iSeries, +pres/fut, -perfective}]
\]

(Anderson, 1982, p598)

The potential contradiction mentioned above occurs in the representation of subject/object verbal agreement features in a verb. Anderson, as in the example above, differentiates the features by the layering principle only. The use of layering in this manner and not specific labelling is common to much of the Extended Word and Paradigm morphological literature (see Hammond, 1981; Thomas-Flinders, 1981c). Further uses of layering include the differentiation of possessor agreement features from inherent, agreement gender on adjectives with inherent gender, etc.

### 2.2.7. CONCLUSION

Presented above is what I hope is a fairly standard model of Extended Word and Paradigm morphology. I have mentioned any major abberations from the standard theory, pointed out areas of vagueness and, in some small instances, taken the liberty of elaborating the theory where such seemed like natural consequences of the model or I felt the elaborations were not relevant to my later criticisms. It would not be fair to criticize parts of a model that didn’t actually exist.
Chapter 3
CRITICISM OF EXTENDED WORD AND PARADIGM MORPHOLOGY

3.1. INTRODUCTION

The problems with the Extended Word and Paradigm model of morphological theory are manifold. These will be explicated below under the headings of ten sections. Within these sections argumentation will proceed by way of sub-topics drawing out the most problematic properties of Extended Word and Paradigm Morphological Theory.

Theoretical problems with the model will range from such central issues as the defining characteristics of Inflection to less important and damaging criticism of such proposals as Anderson’s (1988b, p189) positing of syntactic principles for compounding.

3.2. ON THE USE OF FEATURE SPECIFICATIONS IN EXTENDED WORD AND PARADIGM MORPHOLOGY

The use of binary, privative features for the specification of morphosyntactic properties in morphology has some interesting ramifications. These are rarely mentioned, probably unrecognised and are perhaps discouraging. The fashionable nature of feature systems (particularly binary privative), since their development in phonology, has led to a widespread use of phonological, morphological, syntactic and semantic features.

It is widely accepted that lexical (ie derivational) morphology is not accessible to a feature description. This particular morphology is often held to be idiosyncratic and constructed of categories that are not able to be divided into feature systems. Or they may only be divided in part. Generally, features cannot represent the full force of the meaning changes that lexical morphology performs.

An immediate and obvious consequence of a feature specification of morphological properties is a formal dichotomy between morphosyntactic and lexical morphology; that is, processing of those featurized categories by rules sensitive to features. These might be in a separate component to rules not using features. The latter rules might also be of a formally different type (eg Jackendoff’s (1975) redundancy rules). Hence in Extended Word and Paradigm Morphological Theory lexical morphology is relegated to the lexicon while morphosyntactic morphology is
processed on the phonological component. In Extended Word and Paradigm theory lexical
morphology uses redundancy rules. The use of features reinforces the Split Morphology
Hypothesis of Extended Word and Paradigm Morphological Theory.

Morphological distinctions often don't translate into binary features well (e.g., case [± erg], [±
acc]). These case features can represent a ternary case system rarely found in the world's
languages, even amongst those with a split case system. The features actually give rise to a
quinary distinction, one combination in which is impossible [± Acc, ± Erg].

3.3. AFFIXES

One of the major faults with Word and Paradigm morphological theory in general is the fact of its
application to so-called fusional data. The morphology of many "fusional" languages is often
largely affixing. The appropriateness of process rules to non-affix morphology is often somewhat
balanced by the inappropriateness of these rules to the affixes in these languages.

This inappropriateness is not as real as it appears. Affixes are not islands. Affixes aren't units
independent of words and neither are they independent of ordering or co-occurrence constraints.
Thus they can be regarded as operations on a root or stem. A morpheme /X/ might more
appropriately be described as an affix /X/ that is suffixed on stem Y, for instance. The similarity
to morpholexical rules is obvious.

Certain characteristics of the model of Extended Word and Paradigm Morphological Theory
encourage the affix-like appearance of certain morphological phenomena. This is not a good
property for a Word and Paradigm model.

In particular morphological rule form and interaction, definition of Extended Word and
Paradigm Inflection, and the layering of features in the morphosyntactic representation contribute
to the concatenative nature of Extended Word and Paradigm morphological analyses.

3.3.1. RULE FORM AND INTERACTION

Observation of the Extended Word and Paradigm morphological literature (particularly Thomas-
Flinders, 1981) leads one quite quickly to a startling revelation. The vast majority of
morpholexical rules in the language analyses take a form similar to the following-

\[ [\alpha F] X \rightarrow X + Y \]

where X is a root or stem and Y is an affix.

It is obvious from this representation that the rules may be characterized as concatenating. This is
a problem for all Word and Paradigm models. But this observation is in need of some
qualification. Many rules can be seen to take the forms as follows-

\[ [\alpha F] Xp \rightarrow Xp + Y \]

or \[ [\alpha F] p \rightarrow p + Y \]

where p represents some specification as to
the phonological nature of the stem being affixed.
This can be seen as a move closer to the fusional ideal that languages analysed in the Word and Paradigm algorithm are supposed to represent. However these rules can be divided into two types:

1. genuinely phonologically conditioned morphological rules.

2. morphologically conditioned morphological rules making use of the phonological specifications of previous affixes or stems that condition the rule.

A case of the latter type occurs in Platt (1981, p52). Old Provencal verb roots of a certain conjugation are marked by /a/ for imperfective. Subsequent rules often apply to an environment /X+a/ -> .... (Platt, 1981, pp69f; Rules 1,6,14). To hide this quite blatant conjugation and morphological conditioning of these rules, the initial [-pf]/X/ -> /X+a/ rule is arbitrarily relegated to the lexicon. Other rules that attribute perfectivity values apply in the Inflectional component (Platt, 1981, pp69f; Rules 3,4,5).

The result of the above dubious procedure is that Inflectional rules apply without reference to conjugations. This might be more aesthetically pleasing to Platt (1981) but to take such an approach within Extended Word and Paradigm Morphological Theory is confusing as conjugations might easily be used. The recognition of conjugalational differences would be more appropriate to the data. The problem is that syntax could not attribute lexical classes to morphosyntactic representations as is the usual procedure for feature prescription in Extended Word and Paradigm Morphological Theory. Any other approach besides one similar to the approach above is impossible in Extended Word and Paradigm Morphological Theory.

The above example serves to demonstrate that apparent phonological conditioning of morpholexical processes is not always actual in Extended Word and Paradigm morphological analyses. Thus true morphological fusion and extended exponence is treated as less problematic phonological conditioning and fusion. Phonological fusion is perhaps less of a challenge to morphemic analysis.

This turns discussion to the place of morphological conditioning of morpholexical processes in Extended Word and Paradigm Morphological Theory. In Word and Paradigm morphology rules are not considered to be conditioned. As mentioned in the previous chapter, if a rule is restricted to a morphological environment\(^1\) then it marks the features of that environment as clearly as the conditioning formatives do. In Word and Paradigm terms it is more enlightening to think in terms of portemanteau formatives with sometimes overlapping function. Thus we get Extended Word and Paradigm Morphological Theory rules of the form-

\[[\alpha A, \beta B] X \rightarrow ...\]

\[[\alpha A] X' \rightarrow ...\]

Portemanteau exponence with overlapping function.

\(^1\)an allomorph in Structuralist terms
3.3.2. INFLECTION AND NATURAL MORPHOLOGY

The research of Bybee (1985) has some interesting ramifications for Extended Word and Paradigm Morphological Theory. The observations therein, regarding relative semantic relevance, proximity and fusion to the root of a word are particularly of note. While obviously not the basis for universal rules, the broad sample used by Bybee (1985) provides interesting generalizations. These demonstrated that categories traditionally regarded as inflection generally occur further from and less fused to the word root due to their lesser semantic relevance. I think one can safely take less fused to mean more concatenative and regular.

Anderson’s definition of Inflection (1982, p587) is more restrictive than the traditional definition. Syntactically relevant Inflection, such as case marking or subject person/number agreement, is obviously less semantically relevant to a word root than lexical morphology. Stem internal, or lexical morphology internal, Inflection is outside the domain of Extended Word and Paradigm analysis. Such Inflection can’t occur after lexical insertion and in the lexicon where lexical morphology applies. Irregular, idiosyncratic and suppletive morphology is not addressed in Extended Word and Paradigm analysis.

The above restrictions in domain invariably mean that the morphology studied in Extended Word and Paradigm morphological literature is constrained usually to the least fusional (as a tendency, not a rule). The domain of Extended Word and Paradigm analysis is exactly the wrong one. More appropriate use would come of using morpholexical rules wherever fusion is reflected in language data.

3.3.3. LAYERING OF FEATURES

The major function of the Layering Principle (Anderson, 1977, pp21ff; 1982, p598) is the disambiguation of subject/object agreement features on verbs, and similar situations, without the use of explicit labelling. The order of layers is determined by the closeness of the complement that is encoded in agreement to the agreement host. For verbal agreement the object is a closer complement to the verb, being in the VP, than the subject so its pronominal features will be prescribed first and appear on the innermost level. The order of layered features given by Anderson (1982, p598) for verbal agreement is as follows-

```
[[Object] IndirectObject] Subject
```

Genitive agreement would see a nominal’s inherent number features encoded in an inner layer with those of the possessor on the outer layer.

```
[InherentNumber] Possessor Number
```

This order of constituents would almost certainly be reflected in the morphology. Genitive agreement marking must occur outside of inherent number morphology in most languages. This correspondence between layering order and morphological formative order is probably also true for verbal agreement in a large number of languages with agreement for subject, object, etc.
Productive phonology and morphophonemics must apply to formative boundaries, so the word form will be also partitioned. Structure within the morphosyntactic representation also reflected in the word structure allows recoverability of previous morphological levels by subsequent rules. The power to access previous levels of morphological structure should not be available unless proven necessary. An often quoted example is that morphological rules do not treat deverbal nouns different in some manner to other nouns. Furthermore these correspondences in layering order and the structure of the word form show more similarity to morphemic segmentation than is desirable in a Word and Paradigm approach.

3.4. DEFINITION AND CHARACTERISTICS OF EXTENDED WORD AND PARADIGM INFLECTION

The definition of Extended Word and Paradigm Inflection as syntactically relevant and the characteristics associated with this Inflection raise a number of issues that are problematic. The purported characteristics include regularity of Inflection, meaningless Inflection and the local nature of agreement.

3.4.1. SYNTACTICALLY RELEVANT

Anderson (1982, p587) delimits the domain of Extended Word and Paradigm morphological analysis by his definition of Inflection. Accordingly morphology not in the Inflectional component relates morphologically related forms by redundancy rules, not by morpholexical rules.

The definition and analysis of Inflection is an important part of Extended Word and Paradigm Morphological Theory. It seems however that the adherents of the theory in actuality tend to analyze many of the categories traditionally associated with inflection. These do not necessarily form part of Anderson’s (1982, p587) Inflection. Anderson (1982) gives examples of rules deriving Sanskrit perfect stems and German past and past subjunctive verbs. Other authors analyze tense, aspect and status (realis, etc) forms in various languages (see Thomas-Flinders, 1981bc; Hargus, 1981; Horvath, 1981; Platt, 1981; Hammond, 1981). Anderson (1982, p587) specifically states that tense and aspect need not be Inflectional. In English tense resides in the Infl node of Government and Binding Theory and so is syntactically relevant and Inflection.

Extended Word and Paradigm should adhere to the definition of Inflection if the Inflection/lexicon dichotomy is to be maintained. The distinction is important to the position of Inflection outside the lexicon and subsequent interaction with the syntax. So the morpholexical analysis of morphology should be restricted to Inflection proper in Extended Word and Paradigm Morphological Theory and the categories so analyzed should be demonstrably syntactically relevant or obviously so. Even the latter obviously relevant type should probably be justified. Verb agreement features in Pawnee represent as much an aspectual distinction as an agreement phenomenon.
/wa:/ -distributed activity or state, iterative action, distributive plural object or a dual or plural subject. (Parks, 1976, p279; quoted in Bybee, 1985, p104)

This example must reference syntactically relevant agreement features but also possible verbal derivational features. Aspect need not be Inflectional (Anderson, 1982, p587) in Anderson's model.

A consequence of the analysis of non-Inflectional, but traditionally inflectional, categories in Extended Word and Paradigm Morphological Theory can be seen. It is demonstrated that morpholexical rules are just as applicable to these and almost certainly some lexical derivations as well.

3.4.2. REGULAR INFLECTION

Inevitably we must tum to a definition of regularity, or irregularity to evaluate decisions to relegate, or not, certain Inflections to the lexicon. Certainly Anderson (1982, 1988ab) in a model designed to explicate morphological opacity cannot mean phonologically inextricable fusion as irregularity. Suppletion is the obvious extreme of irregularity, but in its definition this will not do the work required.

Suppletion—systematically semantically related forms, established as such by the alternations of parallel regular forms, that are formally unrelated or dissimilar.

Obviously suppletion is irregular but all of the phenomena that are to be defined irregular in Extended Word and Paradigm Morphological Theory are not suppletive.

Anderson (1988b, pp184ff) only admits sub-regularity in the lexicon and implies that productivity is generally only a characteristic of Inflection. Thus in Extended Word and Paradigm Morphological Theory the definition of regularity is reduced to one of productivity. Even a definition of productivity is not unproblematic.

Various definitions of productivity could apply. Sheer weight of numbers of forms that use a rule is not entirely satisfactory but must be seriously considered. Rules that apply across word classes or across classes within these parts of speech must be considered more productive than those that don’t, all other factor being equal. Anderson (1988b) claims that rules restricted to a limited class of words are necessarily unproductive. However this could be productivity within a precise domain. Certainly application to new forms must be considered a measure of productivity. Not just morphemes of large open classes apply to new forms. Additions to smaller restricted classes can cause productive use of rules restricted to those classes.

Example: [NonPast] squeeze : squoze [Past]
shit : shat

As pointed out by Halle (1973) the Russian second conjugation verbs lack first person singular nonpast forms. Since no irregular forms exist these cannot be disjunctive with the regular Inflectional rules of other conjugations. The morpholexical rules must be restricted from applying to second conjugation verbs. Irregular formations in Extended Word and Paradigm
Morphological Theory are usually attributed to the lexicon. But irregular lack of expected forms illustrates that irregularity in the Inflectional rules is involved. The stipulation of Inflection as regular and productive as a necessary criterion is both problematic in definition and apparently contrary to the reality of certain situations.

Conversely regularity and productivity is not the sole possession of Inflection. For example, the English gerund /-ing/ completely productively creates nominals from verbs for every English verb.

The thesis that all lexical and lexical stem internal morphology is irregular or idiosyncratic without exception is one that will prove difficult to defend against the weight of evidence. Particularly of note is McCarthy's (1981) explication of Arabic stem internal inflection. A morpheme based account of this phenomenon says much for its regularity.

3.4.3. MEANINGLESS INFLECTION

The ordering of the Inflection outside the lexicon and parallel but separate to the Logical form component disallows meaningful Inflection (Anderson, 1982, p609). As mentioned in previous sections this prediction does not seem a completely invalid one. Of course, features originating in the syntax may input to the Logical Form component.

Inherent person and number features of nominals are considered Inflectional in Extended Word and Paradigm Morphological Theory. These pronominal features must be attributed in the morpholexical rule component. Obviously the syntax cannot be allowed to determine the pronominal features of an argument. Since the Inflectional component may not input into the Logical Form component the features decided on in Inflection cannot be meaningful. So agreement must be meaningless and just a coordination device.

English nominal plural formation, as an inherent number feature, is an Inflection. The "s" plural formations should be regarded as completely productive in the sense of number of forms, new forms, etc and so definitely part of the Inflectional component.

<table>
<thead>
<tr>
<th>Example:</th>
<th>[Plural]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>XS -&gt;</td>
</tr>
<tr>
<td></td>
<td>XC -&gt;</td>
</tr>
<tr>
<td></td>
<td>X -&gt;</td>
</tr>
</tbody>
</table>

There is no way by which inherent number could be regarded as meaningless in English. It is used independently of subject agreement as shown by its occurrence on sentence objects.

The principle of meaninglessness when applied to clitics, also outside the lexicon, appears blatantly false. Anderson (1988b, p177) draws a distinction between derivational particles, with concrete semantic content, as opposed to inflectional clitics. The particle clitics being derivational must effect meaning and yet in a Extended Word and Paradigm model cannot input into the Logical form component. These clitics by definition follow Inflection and so may only be placed in the lexicon if the Inflection is also placed there.
3.4.4. REFERENTIALITY

The essential difference between agreement and pronominal incorporation, recognized by Sapir (1911), is only tacitly acknowledged by Anderson (1982). Pronominal incorporation, which is referential, actually replaces an argument in a clause leaving an empty NP node. Agreement, which is not referential, links an argument in a clause or phrase to the agreeing argument and perhaps some concomitant associated role (e.g. Subject).

In Anderson's (1982, pp578f) analysis of Breton agreement the crossreference is actually referential, may bind the empty node in co-indexation and absorb the verb's government of the subject (following Lapointe, 1983). No prescription of "agreement" features or feature manipulation is necessary here. The features originate in the incorporated pronominals. An empty node could not prescribe features that do not originate there. Anderson (1982) generates subject agreement at the subject N node and moves the pronominal to the verb by a late rule. This is not the usual feature manipulation of Extended Word and Paradigm but is rather a syntactic transformational rule. The relative merits of such an abstract analysis are at least dubious.

Some languages have obligatory crossreference but optional referentiality for this. Referential pronominals must be meaningful and thus in the lexicon. A lexical model of agreement would treat referential and agreeing pronouns the same and check for contradiction where an explicit argument exists. An Extended Word and Paradigm model of agreement must recognize two sets of identical crossreference pronouns. These would be an Inflectional syntactically prescribed set and a lexicon-internal meaningful referential set of pronouns.

The above leads to a similar issue that is obviously related. Discourse tracking in the morphologically complex languages, like those of Northern Australia, often involves no explicit mention of an NP. Pronominal crossreference on the verb may be the only tracking of a referent for many clauses.

Example: Nunggubuyu

```
...wu-la=la lagi:- ?-ni
ANAA-Rdp="lift"-REFL-PAST2
"... it kept rising up

wu=wayama-n#i-maga:
ANAA="proceed"-PAST2-MAGA:
it went along

ana-win?ig
ANAc="small"(SG)
small one

wu=lhan#adjba-n#i
ANAA="emerge"-PAST2-MAGA:
it emerged

wan#gu=na-ni.
ANAA/3PLa="see"-PAST
it saw them."

(Heath, 1980, p17)
```

Discourse principles are required to provide crossreference information across clauses. The above example shows the necessity of treating some "agreement" phenomena as referential and thus not syntactically relevant in the sense of Anderson (1982, p587). The alternative is a
proliferation of empty nodes in a Government and Binding type analysis. The explicit use of NPs
in Nunggubuyu often only serves the function of introducing new information, re-introducing old
and other discourse and syntactic functions not directly involved in the main predication of the
clause.

3.4.5. LOCAL AGREEMENT

Anderson (1988b, p176) claims agreement is a purely local phenomenon which occurs within one
clausal or predicational domain. This claim is factually incorrect. The anticipatory subject
pronouns of switch reference marking in Papuan and other languages are obviously not "local"
agreement (see Foley, 1986, pp185-89). Roberts (1988) argues that such agreement is a discourse
device, and is not purely syntactic in application. If this proves to be the case, as it seems to be for
some Papuan languages, the structural assignment of such features that Extended Word and
Paradigm Morphological Theory demands would be pointless. Since these markers are generally
the outermost suffixes on the verb in Papuan languages, this morphology and all that internal of it
might not be considered Extended Word and Paradigm Inflection.

3.5. APPLICATION OF IRREGULAR MORPHOLOGY

The theory of Extended Word and Paradigm defines Inflection in a way that includes
morphological phenomena that cannot take part in the Inflectional component. Irregular and stem
internal Inflection is thus relegated to the lexicon. This raises questions concerning the regularity
of stem internal Inflection, the Elsewhere disjunction between Irregular morphology and the
Inflectional rules, and the coordination of irregular Inflection with syntax.

In this section I will use the term irregular Inflection to designate those Inflectional processes
that Extended Word and Paradigm Morphological Theory relegates to the lexicon. This is despite
reservations that the terms regularity and productivity are completely defined in the theory and
that processes can be discretely classified as regular or not.

3.5.1. STEM INTERNAL INFLECTION

Anderson (1982, 1988ab) describes Inflection, or the the morphology derived by the Inflectional
component, as being regular and lexical morphology external. Conversely, Inflection which is
irregular, idiosyncratic, suppletive or internal of lexical stems appears in the lexicon. Obviously
only genuinely phonologically placed infixation can be ordered inside of stems and lexical
morphology by rules outside the lexicon.

Inflection inside the lexicon in Extended Word and Paradigm Morphological Theory is
generally labelled irregular without any justifying proof. Stem internal Inflection cannot be part
of rules that occur after insertion and apply in reaction to syntactic features on their node. Such
morphology, if regarded or proven regular, constitutes a strong counter argument to Extended
Word and Paradigm claims. A most damning argument against Extended Word and Paradigm Morphological Theory is that it is precisely the irregular, idiosyncratic and internal of lexical morphology Inflection that a morphological model designed for fusional data should be explicating. At least the less obscure of these forms should be analyzed (as are in Platt (1981); see Horvath (1981) for an excellent explication of Hebrew Vowel Patterns).

3.5.2. DISJUNCTION OF IRREGULAR INFLECTION

On the issue of Elsewhere disjunction between regular morpholexical rules and irregular forms. It is formally unconstrained and counter-intuitive to have disjunctions occur between rules in separate components. That is, between rules in the Inflectional/phonological component and the lexicon. While certain syntactic rules proscribe co-occurrence of certain morphological rules, we do not disjunctively order these together (eg an active sentence will not take a passive morphological marker). Disjunction between rules only in the same component of a grammar seems much less offensive.

Irregular stem formation may input into regular Inflectional rules. Disjunction between regular rules and irregular stems is obviously too strong a constraint.

Example: English

\[
\text{[Past]} \quad \text{sold} : \text{sell} \quad \text{[NonPast]}
\]
\[
\text{heard} : \text{hear}
\]
\[
\text{told} : \text{tell}
\]
\[
\text{did} : \text{do}
\]
(Note- English past suffix /-d/)

Lexical Phonology uses the Elsewhere condition (Kiparsky, 1973) and "Avoid Synonymy" principle (Kiparsky, 1983; cited in Jenson & Strong-Jenson, 1984, p487). In Extended Word and Paradigm Morphological Theory the Elsewhere condition is used to account for some disjunction. Anderson (1977, pp20f; 1982, pp20ff) considers this phonological principle of disjunction to be applicable to morphology but not adequate to account for all the cases treated by disjunctive blocks of rules. The "Avoid Synonymy" principle would make a good replacement for the disjunction between irregular lexical forms and regular Inflectional rules. "Avoid Synonymy" restricts regular rules from creating forms already irregularly produced. This creates the desired disjunction between irregular and regular forms without disallowing regular inflection on irregular stem formation.

Example: [Past] fled : flee [NonPast]
\[
\text{shod} : \text{shoe}
\]
\[
\text{said} : \text{say}
\]
(Note- English Past suffix -d)

The majority of irregular forms would need to be restricted from having the application of regular rules occur.

Anderson (1986) and Perlmutter (1988) provide solutions to situations similar to the English verbs given above with combined regular/irregular Inflection. These analyses consist of treating
regular/irregular Inflecting stems differently from other irregular stems which results in the application of regular rules to regular/irregular stems. Anderson (1986) marks the present stem as [-past] in the lexicon so the past stem has no feature to exclude it from the regular past rule. Perlmutter (1988) dubs regular/irregular stems as stem suppletion, which doesn’t preclude regular rules, and irregular stems as full suppletion.

These solutions claim the irregular alternations of the two stem types are of a different nature and this causes the disjunction, or not, of the stem with the regular rules. Different solutions for the irregular Inflection of regular/irregular stems and irregular stems denies the fact that the difference between these types is in the presence, or not, of external Inflection. The distinction between the two types is external of the stems and the lexicon. The solutions are lexicon internal and attribute the distinction to abstract stem internal differences.

It is possible that the regular/irregular stems could be treated as full suppletion, including their regular Inflection, with some loss of generality. I have seen no proof that the Inflection of regular/irregular stems is somehow different to that of other stems whether irregular or regular. Under these circumstances there is no reason to treat the stem alternations or regular Inflections differently from others.

3.5.3. COORDINATION OF IRREGULAR INFLECTION

The Extended Word and Paradigm approach to Inflectional agreement does not adequately capture the facts of agreement phenomena. Irregular agreeing forms Inflect correctly for agreement features despite existing in the lexicon. They obviously couldn’t be accessed by feature prescription while in the lexicon before lexical insertion.

The dogs are here.
The dog is here.

There is no access for syntactic features into the lexicon to achieve such an operation. Yet the above sentences are grammatical. The irregular verb is always properly coordinated with nouns marked for plurality.

The existence of irregularly Inflected forms in the lexicon allows the adherents of Extended Word and Paradigm Morphological Theory to address the issues of how ideally the regular Inflection is prescribed by the syntax. Features are manipulated to be placed at the correct node entering the morphosyntactic representation of the lexically inserted root, stem or word at that node and driving the correct morpholexical rules.

The irregularly Inflected forms are produced or listed in the lexicon and thus cannot undergo this procedure. Anderson (1982, p593) has irregularly Inflecting words given a complex lexical entry which includes the irregular stems. This complex entry is inserted and the proper stem chosen according to the features at its node.

Irregular stems are often the most common. If an algorithm needs to exist for the proper
insertion of "irregular" stems out of the lexicon then surely such a device could apply to all Inflection. The above procedure is not all that dissimilar to that of Halle (1973) which inserts paradigms for all inflectional morphology. To insert whole paradigms or complex lexical entries for all Inflection seems somewhat inefficient. Irregular Inflection is usually the morphology one expects to be most common and so inserted and Inflected most efficiently. Extended Word and Paradigm treatment of irregularity would have the irregular Inflection working least efficiently.

It is possible to conceive of a procedure that inserts roots or lexemes with a method of accessing a paradigm in the lexicon from which the syntax may later choose a form appropriate to its syntactic context. This is a more interactive model of the lexicon than given above but could be used for both regular and irregular Inflection.

### 3.6. PROOF OF THE SPLIT MORPHOLOGY HYPOTHESIS

#### 3.6.1. SPLIT MORPHOLOGY

Anderson (1988b, p171) provides some interesting lines of argument regarding the reality of the Split Morphology Hypothesis (ie Inflection outside the lexicon).

It is claimed by Anderson (1988b) that aphasic agrammatism involves impaired ability of sufferers to construct and manipulate both syntactic structure and Inflectional morphology. This of course would in some sense prove the unity of syntax and Inflection as opposed to lexical morphology.

Research in deBleser and Bayer (1988) shows that in aphasic agrammatism inflectional morphology is in fact well formed but placed in incorrect syntactic context. This suggests that the problem originates in the syntax and involves coordination (of Inflection and syntax) principles quite separate from the inflectional word formation. Anderson's Extended Word and Paradigm model predicts malformed Inflection might accompany confused syntax. The facts suggest a unity of well formed morphology in the lexicon. Further tests to determine whether formative order, morphological conditioning, conjugational conditioning, etc can be confused would be a point of interest. However deBleser and Bayer (1988) attest no morphological malformation.

Anderson (1988b, p171) further claims that portemanteau morphs of lexical morphemes are rare and never occur between Inflectional and lexical morphology. Bybee (1985, pp34f) reports many instances of fusion of tense and aspect in her sample. Neither tense or aspect, as a rule, should be automatically considered syntactically relevant (see Anderson, 1982, p588). Crosslinguistically, independent pronouns have a tendency to occur fused or as portemanteaux and are obviously not Inflectional. Case marking often is fused to such portemanteaux pronouns. The status of pronouns is problematic. One wouldn't wish to call the person or number marking a root and affix, neither two roots or two affixes. The solution does not matter here but only that the fusion found within independent pronouns must be treated as lexical morphology.
Anderson (1988b, p171) quotes work by Bat-El (1986) on Modern Hebrew. Word formation in Hebrew often takes place on the basis of a consonantal root and lexical affix extracted from an existing word to form a new word, not a systematically derived one, by semantic shift of the complex unit. The new word will have a different prosodic template. A tri-consonantal root plus consonant affix might become a four-consonantal root. But the vowel marking of various inflectional categories is never extracted. The inflectional vowel marking is so productive the previous pattern of alternation is dropped and a new pattern appropriate to the root consonantalism is adopted despite its being internal of the root. Anderson (1988b, p171) claims it is the root and derivation that is extracted and the Inflection that is left. He claims that this proves the separateness of the Inflectional component and the lexicon.

The evidence from Hebrew in no way supports Anderson’s model (1982, 1988ab). The vowel alternations of Hebrew are stem and lexical morphology internal. These also involve inflectional categories that might not fit the definition of Inflection in Extended Word and Paradigm Morphological Theory (eg aspect, tense; see Anderson, 1982, p588). The Binyan prosodic template is also not extracted in the above derivations. The prosodic shape alternations are as much involved in the aspectual and other lexical alternations (eg causatives) as are the vowel changes. The unextracted morphology is not the exact class of Inflectional categories in Hebrew, but some Inflection and lexical morphology including categories traditionally regarded as inflection. The unextracted morphology is also remarkably productive for lexicon internal processes which in Extended Word and Paradigm Morphological Theory are regarded as irregular, etc.

3.7. ORDERING IN EXTENDED WORD AND PARADIGM MORPHOLOGICAL THEORY

The organization of an Extended Word and Paradigm Morphological Theory grammar has repercussions in the area of ordering. The Inflectional component is outside the lexicon, placed with the phonological component, and parallel with the logical form component. Resulting from this the order of lexical morphology inside of Inflection is predicted. Certain previously unattested orderings between phonology and Inflection are possible. The organization also makes a universal claim about the ordering of process types and insertion that is disturbing.

3.7.1. DERIVATION INSIDE INFLECTION

The Split Morphology Hypothesis in Extended Word and Paradigm Morphological Theory depends on the condition that crosslinguistically the pattern of marking regular Inflection is external of lexical morphology. Anderson (1982) must regard this pattern to be a universal rule to encode it in the organization of his grammatical model.

I do not believe the pattern deserves the status of a universal rule. Perhaps it is a strong tendency for most languages. The Arabic and Hebrew data is discouraging. Likewise the data of
Athapaskan Slave (Rice, 1985) and Hopi (Goddard, 1911), but also Siouan Dakota (Boas and Swanton, 1911; Mohanan, 1982) presents verbal person and number agreement inside of lexical categories. To dismiss all such examples as irregular would be a misuse of the term by any definition. Such dismissal would give the above languages the status of morphologically irregular languages despite the fact that we have seen no proof of idiosyncratic or suppletive morphology. To create a model of Inflection that cannot cope with whole languages’ Inflection is surely a serious omission.

Many languages conform to the general pattern of inflection outside of lexical morphology. The Australian Pama-Nyungan languages Nyungar (Dench, p.c.) and Ngadjumaya (Von Brandenstein, 1980) have developed verbal number agreement (probably from derivational suffixes) inside of inflectional suffixes for aspect, mood, status, and tense. The burden of proof in such examples lies upon the adherents of Extended Word and Paradigm Morphological Theory to prove this Inflection is not followed by non-Inflection.

I suspect that crosslinguistically many examples of general adherence to the principle of external inflection might result in problems for the Extended Word and Paradigm model. Almost certainly a clear majority of languages do not disprove the Split Morphology Hypothesis. Neither do they prove it. Ordering principles do not necessarily require a division between morphological domains. To reiterate, I feel the ordering generalizations of Extended Word and Paradigm Morphological Theory are a tendency not a universal rule. These are thus not principles on which to structure a grammar.

3.7.2. ENGLISH COMPOUNDS

Churma (1983) claims the Split Morphology Hypothesis cannot be maintained in the face of evidence from English compounding. The claim there in is that a relatively small, but significant, class of compounds contain inflections within their compound components. That is, inflectional processes apply to the components before being compounded. Examples are drawn mainly from plurals inside compounds.

Examples: Mothers-In-Law; passersby; menservants, etc.

The fact that Anderson (1988b, p169) includes the inherent number of nominals amongst Inflection makes these compounds problematic for Extended Word and Paradigm Morphological Theory. These plural markers inside compounds undergo normal alternations for number and coordinate properly with verbal agreement.

Examples: Mothers-in-law complain incessantly.
Mother-in-law complains incessantly.

So these compounds cannot be regarded as lexically created idioms derived from whole phrases. Thus we see English Inflection inside of compounding which violates Extended Word and Paradigm Morphological Theory ordering of lexical morphology inside of Inflection.
3.7.3. PHONOLOGY AND INFLECTION

In the light of the theory of Lexical Phonology (see Mohanan, 1982; Kiparsky, 1982; Mohanan & Halle, 1985; Rubach, 1985) the ordering of phonological rules before Inflectional rules can not be taken as proof of Inflection’s existence outside the lexicon. In Lexical Phonology the morphology is systematically interspersed with phonology. The ordering of a phrasal phonological rule before a morphological rule would be proof of Inflection’s existence after lexical insertion. Thomas-Flinders (1981b) presents just such an example.

Many phonological rules reputed to precede Inflectional rules can often be reformulated in an alternative ordering.

Example: Tagalog (data from Anderson, 1974)

putul 'to cut'
puputul 'to cut repeatedly'
pamutul 'that used for cutting'
pamumutul 'a cutting in quantity'

Proposed rule ordering

1) prefix pang-
2) ng > m / _p
3) p > ∅ / m_
4) reduplicate

Alternative ordering

1) prefix pang-
2) reduplicate
3) ng > m / _p
4) p > ∅ / m_

The choice here is between a marginally more complex reduplication and a perhaps undesirable rule order. It has been proposed by Marantz (1982) that the alternations above (eg ngp > m) have been lexicalized and no longer represent productive phonological rules. My own investigations of Tagalog morphology have convinced me this is true. In which case there is only a morphological process preceding the reduplication in the first solution.

The analysis of Leurbost dialect Scots Gaelic complementizers in Thomas-Flinders (1981b) orders a phrasal phonological rule before a morphological process.
Example:  
kuδ 'put, sow' (3sgImperative)  
gəN "kuδəγy 'that s/he will sow' (3sgConditional)  
 xuδəγ 'put' (3sgConditional)  
(Thomas-Flinders, 1981b, p76)

Nasalization resultant from the complementizer's co-occurrence (ie gəN)  
must precede morphological lenition to restrict the lenition's application.  
1) k > "k /N_  
2) [+Cond] k > x  
Note- N refers to the nasalizing property of /gəN/ and isn’t a  
phoneme.  
Alternative: 1) [+Cond] k > x  
2) x & k > "k /N_  
(Prenasalized fricatives  
are extremely rare)

An alternative ordering is not possible because of the falling together  
of other lenited consonants.  
So: 1) d' > "d'/ N_  
2) [+Cond] d' > j  
And: 1) g' > "g'/ N_  
2) [+Cond] g' > j  
The alternative ordering gives an ambiguity not present in  
the original rules because both /d'/ and /g'/ become /j/ in the  
Conditional. A reversed order would have /j/ with a choice of  
change to /d'/ or /g'/ after /N/ and no criterion on which to base  
the choice.  
Alternative: 1) [+Cond] d' & g' > j  
2) j > "d' & "g'/ N_  
Obviously this ordering of Inflection after phrasal phonology can’t be  
escaped by manipulating rule order.

It’s immediately obvious from the data that the Nasalization could in fact be an agreement  
phenomenon with the complementizer /gəN/. Especially so since the complementizer has no  
final nasal in phonetic or phonemic reality. Or the entire complementizer /gəN/ could be a  
morphological prefix on the verb. Crosslinguistically, complementizer morphology is not rare.  

The Nasalization rule must precede the Conditional morphological rule. The status of the  
Nasalization as a phonological rule is by no means certain.  

The above situation parallels that found in Irish Gaelic and reflects the same phenomenon. Irish  
has morphological complementizer and relativizer marking on its verbs which are traditionally  
regarded as particles. Their morphological status is demonstrated by the irregular alternations  
some verbs demonstrate with these markers.  
Example: Two copulas  
1a. aL bhl 'that was'  
b. goN raibh 'that was'  
2a. aL tá 'that is'  
b. aN bhfuil 'that is'  
(McCloskey, 1979, pp13, 15, 39 & 48)  
aL is the direct relativizer and aN the indirect. The capitaled letters  
are not phonemes.  
The N & L need not cause phonological nasализation or lenition but seem to represent
morphological alternations that involve mutation processes. These are usually nasalization and lenition, respectively. To differentiate the relative particles it is perhaps necessary to include them in the morphology of the verb.

In general it is preferable to have phonology apply en bloc after the morphological rules except where ordering demands otherwise in the fashion of Lexical Phonology. Lexical insertion must precede phrasal phonology and much lexical morphology must precede insertion. Generally phrasal phonology appears to follow all morphology. Phonological rules must be restricted from applying before morphology because this would create abstract analyses (cf Strict Cyclicity Principle). These constraints mean that ordering of phonology after morphology is most desirable. The presence of phonology before Inflection does not prove that Inflection is outside the lexicon and in the phonological component.

3.7.4. UNIVERSAL ORDER

The organization of Extended Word and Paradigm Inflection with phonology does not enshrine the ordering principles in the arrangement of the grammar in the manner one might want to. The association of independent meaningful units (ie words) by lexical insertion into syntax before the association of dependent meaningful processes (ie Inflections) by morpholexical rules in Extended Word and Paradigm Morphological Theory is counterintuitive.

Research in Bybee (1985) shows crosslinguistically that there is a tendency for the increase in distance of a morph from the word root to be accompanied by decrease in semantic relevance and morphological fusion to that root. The resultant order of Extended Word and Paradigm organization seems to be-

Lexical morphology -> Insertion -> Inflection
(likely fusion) (independent association) (likely agglutination)

Extended Word and Paradigm organization seems to make the above tendency from Bybee (1985) seem strange and unmotivated. One would expect periphrastic Inflection from this organization and a tendency to decreasing fusion. The organization of all morphology in the lexicon before insertion makes a more natural claim about order-

Lexical morphology -> Inflection -> Insertion
(likely fusion) (likely agglutination) (independent association)

3.8. SYNTACTIC COMPOUNDING

Anderson (1988b, p189) states that compounding may involve "a genuinely syntactic combination of lexical elements below the level of the word". This proposal is not an important one in the Extended Word and Paradigm framework. So criticisms should be taken as damning of this proposal not the entire model.

The above position regarding compounds seems somewhat tenable, at least for English. The evidence of phrasal and prepositional verbs supports the notion of syntactic compounds. English
compounds do seem to conform to the patterns of syntactic phrases/sentences, etc. Counter examples can be found. The combination of object noun then verb is not syntactic in English but compounds like "maneating", "sightsee" and "springclean" exist. A simple concatenation of nouns is not normal syntax in English yet compounds of form "windmill", "frogman", "ashtray" are common (examples from Quirk & Greenbaum, 1973, pp444ff).

In addition to the above English counter-evidence there is evidence from other languages that the above proposal need not be true. Sora, a Munda language of India, has noun incorporation order in verbs of VOS. Yet Sora has a proto-typical Indian syntactic word order of SVO (Steevers, 1986, p275).

Compounds often resemble syntactic phrases because they often result from historically lexicalized phrases. Syntactic principles cannot be the only processes combining compounds. If this were so then the combination of syntactic principles and lexical items would produce well formed syntactic constructs. Compounds, with their lexicalized meanings, are certainly not that. Thus in Extended Word and Paradigm Morphological Theory compounds should be regarded as concatenations of lexical stems combined by compounding principles. Similarities to syntactic constructs can be regarded as an accident of their historical production from syntax.

### 3.9. INTERPRETATION OF LAYERS

The layering, without labelling, of pronominal features for agreement, etc in Extended Word and Paradigm Morphological Theory is problematic. The ordering of verbal agreement layers is generally as follows-

```
[[[Object] IndirectObject] Subject]
```

(Anderson, 1982, p598)

Anderson (1982) gives an example of Georgian subject/indirect object/object verb agreement that undergoes a reversal of layering order in the future tense (see also Anderson, 1977, p32; Potawatomi Inversion). Obviously some interpretation mechanism would be necessary to disambiguate layered features and attribute them to the the right argument.

The obvious place for a interpretation of the layered morphosyntactic representation is in the Logical form component. Extended Word and Paradigm agreement features cannot input into this component. Anderson (1982, p567) in his attempt to restrict the proliferation of features, that may only actually represent language specific labels, has created a more complex grammar.

### 3.10. EXTRINSIC ORDERING

With reference to the ordering of morphological rules in Extended Word and Paradigm Morphological Theory. The use of extrinsic ordering and disjunctive ordering of rules is a formal power that should not be available unless absolutely necessary. Morphological ordering is often not as tightly constrained as the Extended Word and Paradigm rule numbering system (see Halle,
The Word and Paradigm approach of Matthews (1972) achieves the same results by specifying rule input and output. Rule ordering issues will be discussed in greater detail in chapter 5.

3.11. SYNTACTIC PRESCRIPTION

The structural attribution and general feature manipulation of the Extended Word and Paradigm Inflectional algorithm appears to be based on the ideal of a language not dissimilar to English. That is, the possibility of structural attribution, etc depends on the existence of a hierarchically organized phrase structure representation. Syntactic subjects and objects must be identified structurally to receive case marking, prescribe agreement, etc.

Many languages can only be justifiably construed as having flat phrase structure due to free word order or an order that is not conducive to the extraction of a VP node (eg VSO). Nunggubuyu (Heath, 1986) provides a good example of a nonconfigurational language. In many such languages it is case marking, agreement, etc that clarifies the syntactic roles. Without making arbitrary decisions about underlying phrase structure and employing scrambling or movement rules, structural assignment of features in such languages would prove difficult. Such methodology is not well motivated except that it derives the proper surface structure. Why should a language arbitrarily scramble or move arguments in order to disguise the underlying structure?

3.12. CONCLUSION

It could be argued, due to the use of English examples in some parts of the above paper, that some of the argumentation therein is not relevant to fusional languages and Extended Word and Paradigm Morphological Theory. The Extended Word and Paradigm model was not created to deal with the morphological vagarities of relatively agglutinating languages.

The morpholexical rules of Word and Paradigm morphology are built for predominantly fusional data. The organization of the grammar in Extended Word and Paradigm Morphological Theory might be something the adherents would wish to generalize to all languages. Syntactic prescription of Inflectional features would still be a desirable aim of this view even were the Inflection morphemic.

A consequence of the above extention of Extended Word and Paradigm theory grammar organization to agglutinating languages is the need for general rules of morpheme attribution (ie suffixation, prefixation, etc) and principles of order in the Inflectional/phonological component since morpholexical rules for each morpheme might not be desirable. But loose morphemes, without associated rules, does not seem a desirable thing outside the lexicon.

- /X/
- /Z/
- phonological rule A
Individual morphemes having their own affixation rules is tantamount to using morpholexical rules.

A strongly Word and Paradigm approach might extend morpholexical rules to agglutinating morphology. The fact that morphemes are not independent of ordering constraints, may involve different processes (ie of prefixation, suffixation, infixation and possible discontinuity), and have morphological conditions of co-occurrence etc might justify such an approach. However many linguists might claim that predominantly agglutinating languages involve mainly one process (for instance, prefixing or suffixing) and that ordering and co-occurrence restrictions are peripheral to the few general rules of affixing. Morpholexical rules in Extended Word and Paradigm Morphological Theory represent meaningful processes, not morphemes. For a host of morphemes, how can the one or two processes of an agglutinating language represent so many meaningful distinctions? Simply, it is the identity of the formatives and the principles of ordering and co-occurrence that are distinct. It could be argued that it is almost certainly the morpheme identity that is meaningful and contrastive with other morphemes. This shows that a Word and Paradigm approach to agglutinating morphology would be at least contentious.

The above discussion has entered the realms of speculation and perhaps should not be taken seriously. Extension of Extended Word and Paradigm Morphological Theory to agglutinating languages is not undertaken in any of the literature. But I have demonstrated that the motivations for Extended Word and Paradigm grammar organization apply to agglutinating languages and yet this grammatical organization will not tolerate a morphemic analysis of Inflection. The application of a Word and Paradigm model to agglutinating data may not be considered appropriate.
Chapter 4

REVISED WORD AND PARADIGM MORPHOLOGY

The major problems of the model of Extended Word and Paradigm Morphological Theory stem from two sources. One is the position of the Inflectional component with regard to the syntax and lexicon. The other source of problems is the form and interaction of the morpholexical rules.

The problems with the rule forms and interactions have not been fully explicated as yet. These involve the rigid order of Extended Word and Paradigm extrinsic ordering, optionality, feature contradictions, the use of layering and similar issues discussed previously. The problems encountered with these issues will be discussed in the next chapter in more detail with regard to the explication of Gahuku language data.

In this chapter I intend to propose a model of Word and Paradigm morphology that is an improvement on previous models. I will call this model the Revised Word and Paradigm model.

4.1. THE ORGANIZATION OF THE MORPHOLOGICAL COMPONENT

The organization of the grammar I perceive as an improvement on the Word and Paradigm models of Matthews (1972) and Anderson (1977, 1982, 1988ab) is based on a model of the lexicon developed in Halle (1973).

Due to the problems illustrated in the previous chapter all morphology is placed in the lexicon. Inflectional and derivational morphology may be in any order despite the general pattern found in most languages. Morphology may input into the semantic component. Another method of coordination of morphosyntactic morphology with the syntax must be used besides that of feature prescription.

Halle (1973) proposes that the productive morphology of the lexicon produces forms which pass through a filter. This filter disallows non-occurring words. The filter takes the form of a dictionary, arranged paradigmatically, which consists of a list of all the actual occurring words of a language. These paradigms are the basis on which historical paradigmatic reformation occurs and by which speakers perceive generalizations and create productive rules. I regard these paradigms as a complex of redundancy rules, like those of Jackendoff (1975), linking words to a number of related forms.
The paradigms can account for idiosyncratic and suppletive forms in the lexicon. Irregularities are lexically associated with their morphosyntactic or semantic properties. But classes of irregular forms might also have morpholexical rules parallel with the regular rules (if large enough classes). These need not be disjunctively ordered with the regular rules as they sometimes apply in conjunction.

Example: Ablaut and suffix past on English verbs

The dictionary simply provides the correct form.

Halle's (1973) model was morphemic, but in the Revised Word and Paradigm Model the productive morphology will be morpholexical rules.

As mentioned in the previous chapter, I see no good reason for the treatment of lexical morphology by formal rules in any way different from those of inflectional morphology. The range of operations available to both kinds of morphology is essentially the same. However I leave open the issue as to whether the properties and meanings should be treated separately. It seems perhaps that different notations are needed for these though there is much similarity also.

Halle makes an interesting statement regarding the role of the dictionary and morphology in this model of a grammar "... it is possible to suppose that a large part of the dictionary is stored in the speaker's permanent memory and that he needs to invoke the word formation component only when he hears an unfamiliar word or uses a word freely invented."(Halle, 1973, p16). This seems a little extreme. A more likely proposal is one that has a core of often used, and possibly irregular words, listed in paradigms while less used or new words are freely created. This would seem to be supported by the maintenance of irregular word forms especially in the high frequency of use categories. However it also allows room for regularization and paradigmatic reformation.

4.2. MORPHOLOGY AND THE SYNTAX

It is possible to envision a version of Extended Word and Paradigm Morphological Theory in which Inflection does take place in the lexicon. No extension of the theory is necessary for the handling of configurational and clitic properties unless they involve agreement features. Simply the manipulation of syntactically and structurally assigned features occurs before lexical insertion. The appropriate nodes are labelled for case, etc. Lexical insertion must then perform the correct insertion by checking the Inflected word's morphosyntactic representation is not contradictory of that on the node. Such a device must operate between the subcategorization frame of a word and its node's category features in order to ensure correct insertion under normal circumstances anyway.

Lexical Insertion: Given node A in sentence S and fully derived word a inserted at A; S is ungrammatical if the features at A and in the morphosyntactic representation and subcategorization frame of a are contradictory.

Lexical Insertion above involves actual insertion, grammaticality checking, rejection if incorrect, then another attempt and so on. An Elsewhere principle is needed within this rule to ensure the most specifically appropriate form is always inserted.
The clarifying of agreement phenomena seems to be a major function of the Extended Word and Paradigm model of Inflection. It does seem at first glance that the co-occurrence of agreeing arguments within a clause or phrase is necessary to ensure well formed agreement. Thus the Extended Word and Paradigm morphological model takes the properties of the prescriber argument, manipulates the features into the node of the agreeing argument, and then triggers the appropriate Inflectional agreement processes.

It is possible to conceive of a model of agreement where fully inflected forms are derived in the lexicon. Subsequently ordered lexical insertion could insert feature prescribers first, allowing feature manipulation to agreeing arguments’ nodes, and then the insertion of the prescribees. This method of achieving agreement is flawed in the same way as the Extended Word and Paradigm approach. Agreement occurs despite ambiguities in the prescriber, thus the prescriber cannot be said to be actually prescribing features.

A more promising approach to agreement is proposed by Lapointe (1980). All morphology is derived in the lexicon. Agreement phenomena are checked for consistency and lack of contradiction in the Logical Form (or semantic) component of the grammar. Inconsistency of agreement is rejected as ungrammaticality. Anderson (1988b, p169) points out that semantically arbitrary noun classes or gender are hardly semantic categories, but syntactic devices, and don’t merit treatment in the semantics. This criticism is not completely fair as these classes and genders are lexically assigned. The procedures in the Logical Form component need not interpret the class content to ensure the consistency of marking of such on an agreeing pair.

Perhaps the best way to deal with agreement phenomena is a principle that checks the consistency of agreement marking in the syntactic component. This is not open to the criticism that gender or noun class agreement of some languages is not semantically based. The Unification theory discussed in Shieber (1986) embodies such an approach.

Unification is a syntactic principle that works on the relationship that exists between agreeing arguments. The essence of Unification is that the agreement features of the agreeing arguments are unified. This is best typified by sharing. The unified feature specification will contain the sum of the arguments’ specifications. Conflicting feature specifications in the unified set result in an ungrammatical clause or phrase.

Example: Consistent

\[
\begin{align*}
\text{[cat: NP]} & \quad U \quad \text{[Agreement: [Number: Singular]]} \\
\text{Agreement: [Number: Singular]} & = [\text{cat: NP}]
\end{align*}
\]

(Shieber, 1986, p18)

Example: Inconsistent

\[
\begin{align*}
\text{[cat: NP, Number: Plural]} & \quad U \quad \text{[Agreement: [Number: Singular]]} \\
\text{Number: Plural} & = [\text{cat: NP}]
\end{align*}
\]

A syntactic principle checks the consistency of the agreement and rejects inconsistent values.
Of the strategies possibly employable for the correct coordination of syntax and morphology only a few are acceptable. The approach of Lapointe (1980, 1983) raises questions as to the semantic salience of certain Inflectional properties. An ordered insertion might leave, for example, a verb waiting on an argument's agreement properties and the noun waiting for the attribution of case (such a situation might be found in Icelandic where verbs agree with subjects and assign quirky non-structurally attributed case; see Andrews, 1982).

The proper coordination of structural syntactic properties with the morphology does not seem a problem if these features are manipulated to terminal nodes as they are in Extended Word and Paradigm Morphological Theory and Government and Binding theory. Just as insertion must insert a nominal on a N node, an algorithm for insertion that ensures subjects enter subject node, etc could be proposed.

The theory of Unification in Shieber (1986) seems the most promising approach to agreement. Whether regular or irregular the properties of agreeing constituents must be non-contradictory. This makes feature prescription unnecessary. Syntax, including agreement, treats all morphology the same whether regular or not. The form of morphology is invisible to the syntax. The different treatment of regular and irregular morphology in Extended Word and Paradigm Morphological Theory causes one to expect some realization of separate treatment in grammar.

The assignment of special clitics remains a problem. Clitics often must have detailed information about the syntax to be morphologically attached to the correct constituent (eg cliticize to second element, regardless of word class, of the sentence). Such information cannot exist until insertion takes place unless treated as independent words themselves. Perhaps clitics are assigned outside the lexicon, but must be able to input into the logical form component as they can be meaningful. It is interesting that the positioning of special clitics (eg first, second final constituent of ...) does not involve what would be proto-typically regarded as syntactic information alone. That is, syntax rarely counts constituents except with clitics.

4.3. RULES

The morpholexical rules of the Revised Word and Paradigm Model will create a morphosyntactic representation that will consist of categories and properties belonging to the morphology of the language analysed. These rules may well include lexical morphology in their sphere of application. The morphosyntactic representation will be fully explicit (ie pronominal features marked for the sentence constituent to which they belong like subject, object, etc) and completely unordered or unlayered. Properties in morpholexical rule Outputs are added to the morphosyntactic representation. Once a property is added to the morphosyntactic representation it remains unless explicitly changed.

The form of the rule component I shall propose for the Revised Word and Paradigm Model has not been justified as yet. I have not shown the problems inherent in the rules of Extended Word
and Paradigm and Matthews' Word and Paradigm Morphological models. These points will be
drawn out as a consequence of the analysis of language data in the next chapter.

Unlike the rules of Extended Word and Paradigm, the Revised Word and Paradigm Model will
follow Matthews' Word and Paradigm in having an Input component for each rule. The
Limitations component of Matthews' Word and Paradigm model can generally be encoded in the
Input.

In general, the Output of a rule can be regarded as its meaning or result. However, if a rule is
limited to a certain conditioning input it can be seen as marking this also. Usually these can be
encoded in the output as well.

This method of derivation, like that of Anderson (1988b, p178), will need a principle like
"Conservation of Features". Thus when a rule attributes a property that property remains
associated with the word form unless explicitly changed. The "Conservation of Features" of
Anderson (1988b, p178) only allows for feature adding while his "Layering Convention"
(Anderson, 1977, p21f) mentions the possibility of feature change if explicitly allowed for.
Feature change is a simple function of changing the features in the output of a Revised Word and
Paradigm Model rule.

   Example:          Output:  + F1
               Input:   - F1
                Operation: ...

The rules of Anderson (1977, 1982, 1988ab) allow no algorithm by which features may be
changed even though theoretically the possibility is allowed for.

For reasons that will become apparent later I allow the rules of the Revised Word and Paradigm
model to use full transformational power. Some sort of evaluation metric is necessary since one
must be wary of a too powerful algorithm that produces abstract analyses. Thus I propose that a
rule is less highly valued to the extent that it uses numbering or labelling conventions for
constituents and uses phonological specification of constituents.

   Example:     X Y Z → Z Y X   or   CV CV CV → 3 2 1
               1 2 3

   But: X → X

The more outlandish examples of too powerful transformations, like full reversal of order, which
are not possible in real language are less highly valued. For some operations, like metathesis and
partial reduplication, numbering and phonological specification of input constituents may be
necessary. But less highly specified rules are always preferred.
4.4. ABBREVIATIONS

A number of abbreviations are foreseeably possible for the rules of the Revised Word and Paradigm model as presented. Firstly the rule abbreviations of Matthews (1972) are possible.

Example: [Output] Limitations; Operations, Input.

Secondly, the number of stems that may input into a single rule is potentially quite large. Listing all the stem names in one Input component could be too long. It is possible to list the rules (giving these as rule numbers), that input a rule, in the input component. This should not be extrinsic ordering but merely a simplification whereby the rules listed are those whose output stem are the basis for the next rule. This procedure represents an abbreviatory notation and the actual rules must be presumed to contain real stem names (even though these are not given in the input). Arbitrary stem labels and strata (see Matthews, 1971, pp171ff) might also be used to similar effect.

Finally, a suggestion by Koch (p.c.) proposed that some of the rules be organized paradigmatically with respect to each other. This would be a perceptual aid to identifying the paradigmatic choices available at a level of derivation. With the specification of Input, Output and Operation in the Revised Word and Paradigm model rules this might not be conveniently done.

It is possible to combine numerous rules under the heading of one and organize the Operations paradigmatically if they have similar Input and Output.

Example: OUTPUT: class 1 benefactive stem
INPUT: Rules 4 & 5
OPERATIONS: Beneficiary

<table>
<thead>
<tr>
<th></th>
<th>sg</th>
<th>nsg</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>suffix /-nimik/</td>
<td>suffix /-limik/</td>
</tr>
<tr>
<td>2</td>
<td>suffix /-gimik/</td>
<td>suffix /-likimik/</td>
</tr>
<tr>
<td>3</td>
<td>suffix /-mik/</td>
<td>suffix /-kimik/</td>
</tr>
</tbody>
</table>

The parameters of the paradigm must be regarded as part of the meaning (and thus Output component) of the specific rules. An unabbreviated explication should show this.

4.5. MORPHONEMICS

The position of morphonemics in Word and Paradigm morphology is firmly established by Matthews (1972) and Sommerstein (1975). Both discuss extensively the criteria by which alternations should be considered morphonemic as opposed to morpholexic (eg phonetic similarity of alternants, phonological conditioned, etc).

Anderson (1988b, p181) argues that "... it is generally possible to incorporate all of the phonological 'side effects' of a given category in the first place" and "... it is probably desirable to eliminate reference to morphological categories from phonological rules altogether". He thus encodes morphologically conditioned phonological rules in the morpholexical rules.
Obviously encoding morphonemics in morpholexical rules is going to lose much generality. This can be justified to a certain extent. "Historical phonetic alternations may become fossilized in the morphemes though the alternants have become phonemic, thus phonological environments appear for allomorphic variation." (Allen, 1972, pp27ff). But Anderson (1988b) seems to be advocating that only morphologically conditioned (ie by an affix, process, etc) phonological rules should be incorporated into the morpholexics. Anderson (1988b, pp181-184) seems generally in favour of a Lexical Phonology like interspersal of morpholexical rules and phonological rules. Perhaps however this arrangement would not go to the same level of detail or abstraction in explicating phonological alternations as Lexical Phonology does.

It appears a simple interspersal or a level ordered cyclic application of phonological rules is the best method of treating morphonemics in Word and Paradigm morphology. This was not foreseen by Matthews (1972).

If one wishes to explicate morphonemic alternations one must have boundaries to act upon. The theoretical status of morphonemics need not be high in the Word and Paradigm framework and the rules are often encodable, with less generality sometimes, in the morpholexical rules. The relative generality of explicating truly general non-abstract morphonemic rules as morphonemic rules, not in morpholexical rules, is enticing. A lexical phonology-type approach is perhaps called for. This would have morpholexical rules attributing formatives, complete with boundary symbols, plus an immediate cyclic application of morphonemic rules including the subsequent erasure of boundary (so no later rules can refer to the stem internal structure).

The morpholexical rules of Extended Word and Paradigm Morphological Theory and the abbreviated ones of Matthews (1972) provide affixation symbols that could be taken as boundaries for the application of morphonemics.

Example: /X/ -> /X+t/ OR /X/ -> /Xt/

Extended Word and Paradigm rules may, but need not, provide these symbols. The same can be said of Matthews (1972) approach.

Example: OPERATION-’+t’ OR Suffix /t/

Morphonemics must apply to boundary symbols in the interaction of formatives. In Word and Paradigm terms, where a boundary is provided, a morphonemic rule must apply to the input stem and new material across the boundary. Morphonemic rules should not apply independent of boundaries and morpholexical rules. This would violate various versions of the Strict Cyclicity Constraint (eg Kiparsky, 1982, p154) causing undue abstractness.

There are reasons for disliking the use of boundaries in a Word and Paradigm framework and in morphological theory generally.

Boundaries would not be appropriately placed in cases of morphological processes, like metathesis or ablaut, that involve no affix.
The derivation of words by morpholexical rules in Word and Paradigm theory leads to suspicions that the exponence of morphosyntactic properties is more appropriately analyzed as Item and Process exponence. The presence of boundaries would tend to indicate that the formatives of process rules are best thought of as exponents of the properties they signal. This might indicate word based exponence is not appropriate to the representation of morphological words that are so divisible and that item exponence is more so.

Modern morphemic approaches such as Lexical Phonology use algorithms like the Bracket Erasure Convention or the Opacity Principle. These destroy morpheme boundaries once morphonemic rules have applied across them and before subsequent morphemes affix. This is to constrain subsequent morphological operations from applying or referring to previous morphemes and boundaries. A word’s internal constituent structure is opaque to each subsequent level.

This is an important principle of modern morphological theory. Rules that can refer to the morphemes (and their boundaries) of morphological words do little extra work and are capable of more powerful derivation than is provable for actual languages.

Example: Prefix A + Prefix B + Root

A string of affixes such as the above would normally be derived by linear outward concatenation from the root. Boundaries, and the segments they enclose and identify, allow any imaginable order.

Example: 1) Root a. \([\alpha F] X \rightarrow A + X\)
2) \(A + A + \text{Root}\) b. \([\beta G] A + X \rightarrow A + B + X\)
3) \(A + B + \text{Root}\)

or 1) \(\text{Root}\) a. \([\alpha F] X \rightarrow A + X\)
2) \(A + \text{Root}\) b. \([\beta G] X \rightarrow A + B + X\)
3) \(B + A + \text{Root}\) c. \([\alpha F, \beta G] B + A + \text{Root} \rightarrow A + B + \text{Root}\)

There is no reason to believe languages perform such operations as c in the latter example when the linear approach is possible and surface real. The operations described not only involve unjustified abstractness but also promote a segmental division of morphological words incompatible with word based exponence.

4.6. EXPONENCE

The productive regular rules of the Revised Word and Paradigm model that create less common or new words which do not pass through the paradigmatic filter must be regarded as mechanisms of process exponence. However the paradigmatic filter must be regarded as a direct relationship between word form and meaning.

The ability of language users to subconsciously analyze and generalize on the basis of alternations in form and function is represented by the presence of rules that input into the filter. It is possible that these rules may carry some of the signaling load borne by the word form especially if they create new or less common forms also. The morpholexical rules that input to the
filter must be regarded as a set of processes that provide the construction of word forms and potentially signal meaning.

The domains of process and word exponence seem better defined than in Matthews (1972). In Matthews (1972) both exponence types seem to apply to each word form ambiguously. With no paradigmatic filter and morpholexical rules generally specified for morphological properties Matthews’ (1972) word-based exponence might be regarded with some skepticism.

A comment of constructionist versus reactivist morphology is necessary here. Matthews’ (1972) and Anderson’s (1977, 1982, 1988ab) morhosemantic representation is supplied by the syntax. As the morphological properties exist before the morpholexical rules apply these rules can’t be regarded as actually signaling the properties. The rules could be regarded as the means of providing the word form. Thus the models might be regarded as more word-based than initially argued.

The Revised Word and Paradigm model builds a word form and meaning, or simple provides word form and associated meaning in the case of the paradigmatic filter. True marking of meaning, by words or processes is involved here in a constructionist type model.

I have proposed that rules be provided for all morphological alternations, including both derivation and inflection, within the bounds of common sense. Rules should be given for word forms provided by the paradigmatic filter. The only issue remaining is the size and scope of the filter. This is an issue that must be resolved language specifically. The filter is not something I expect to formalize and so might remain implicit in analyses. The extent of its influence is perhaps a problem for psycho-linguistic testing and it may only deal with a small set of irregularities or its influence may extend to many regular formations.

4.7. CONCLUSION

The model of morphology proposed in this chapter is a lexicon internal model. It confers no special status on the inflection/derivation dichotomy that is so important to the model of Extended Word and Paradigm Morphological Theory and has only one morphological component, the lexicon.

Morpholexical rules in the Revised Word and Paradigm model generate word forms in a similar manner to those of Matthews (1972). Yet words produced in this manner must often pass through a paradigmatic filter of actual occurring words. In a similar proposal Halle (1973, p16) claimed that only freely created or newly heard words need utilize the word formation component, most words being stored in speakers’ permanent memory.

My less extreme proposal is that a core vocabulary of most common and irregularly derived or inflected words, organized paradigmatically, is stored and makes up the above filter of actually occurring words. Lexemes and word forms not represented in this filter are produced freely even
if not new. Regular rules will create new and less common words. Common but regularly derived/inflected words might be represented in the filter despite the productive nature of the applicable rules. Thus the Revised Word and Paradigm model lexicon has both productive and static aspects.

Note that this model of the lexicon does not consist of roots, listed word forms and regular rules only. All word forms are created by application of rules, both regular and irregular, but some must pass through a filter. Forms will be disallowed if not conforming to the word form in the filter. In this model of the lexicon disjunctions would rarely be necessary as the forms in the filter prescribe allowable combinations of rule derivations. Thus irregular and irregular/regular derived word forms are accounted for. Occasional additions to small irregular classes are accounted for by the existence of morpholexical rules for such classes.

Perhaps disjunction between rules is needed for competing regular rules. Of course, morpholexical rules representing mutually exclusive morphological categories will be disjunctive but this can be encoded in rule input/output.

The issue of exponence is a confused one. Matthews places the exponence relationship between the lexeme, grammatical representation and the word form (ie word-based exponence). Yet his individual morpholexical rules, that provide the word form, assign particular morphological properties. Thus we can regard Matthews' (1972) model as a mixed word/process exponence model. It is not clear to me that the ideal of word-based exponence can actually be preserved with the process exponence in this model. Both exponence types seem to apply to each word form in conjunction.

Anderson (1977, 1982, 1988ab) doesn't mention word-based exponence and has called his model a process approach (Anderson, 1986, p2). There seems little suggestion of word-based exponence despite the name Extended Word and Paradigm Morphological Theory.

At the other extreme of Word and Paradigm approaches is the model mapped out by Bauer (1988, pp151-163) in which exponence is completely word-based. Morpholexical processes are given arbitrary labels (eg A,B,C...), though appropriate ones could be used, then for any particular lexeme and grammatical representation an ordered list of rules is assigned. These will build a word form with no particular reference to morphosyntactic properties. The rules simply supply a path between root and complete word form.

In the Revised Word and Paradigm model I shall leave the signaling relationship between form and function slightly ambiguous. The most pragmatic course is to allow whatever a language dictates is the most appropriate exponence type. Thus exponence is by means of regular rules, for new and less common words, and by words for common and irregular words. Processes that are screened by the filter may or may not be individually associated with morphosyntactic features and might bear some of the exponence relationship, especially if also used for new or less common words.
Chapter 5
A WORD AND PARADIGM EXPLICATION OF GAHUKU VERB COMPLEXITIES

5.1. GAHUKU

Matthews (1972) has demonstrated that the most appropriate approach to the analysis of synthetic morphology is often a non-morphemic treatment. In this he recognized a number of problems such as infixation, ablaut, fusion, extended and cumulative exponence. These may accompany a morphemic analysis of fusional data.

The Gorokan languages of the New Guinea Eastern Highlands display some of the above characteristics in a morphemic analysis. I hope to demonstrate the appropriateness of a morpholexical process and Word and Paradigm explication for the verbal morphology of Gahuku. I will show that while the data is segmentable a morpheme-based approach is not appropriate to the Gahuku facts. Following this I will propose a reanalysis using the morpholexical rules of both Extended Word and Paradigm Morphological Theory and the Revised Word and Paradigm model and compare the resultant analyses pointing out the problems with each.

Hua, a sister language of Gahuku in the Gorokan family, has more complex morphology than Gahuku, concatenatively and paradigmatically, yet it derives its formatives in a more rule-driven manner. Its more regular ablaut alternations make it a good example of the morphological type that characterizes both Gahuku and Hua. The idiosyncracies of Gahuku ablaut need a more detailed explication.

### Hua:

<table>
<thead>
<tr>
<th></th>
<th>sg</th>
<th>dl</th>
<th>pl</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>hu+bau+e</td>
<td>hu+bau+e'</td>
<td>hu+bau+ne</td>
</tr>
<tr>
<td>2</td>
<td>hu+bai+ne</td>
<td>hi+bai+'e</td>
<td>hi+bai+e</td>
</tr>
<tr>
<td>3</td>
<td>hu+bai+e</td>
<td>&quot;do&quot;+Prog+Indic</td>
<td></td>
</tr>
</tbody>
</table>

*I am doing* etc

(Haiman, 1980, p55)

The final suffix or desinence undergoes alternations for subject person and number. The suffix preceding a desinence undergoes predesinential ablaut for the same categories.

#### Predesinential ablaut

- V -> [-front] / 1per subject
- V[-front] -> [+low] / 2per, 3sg subject
- V -> [+front] / 3sg subject

(Haiman, 1980, pp49f)

All suffixes preceding predesinential ablaut take general ablaut.
General ablaut
\( V \rightarrow [+\text{front}] / 2/3\text{msg subject} \)
(Haiman, 1980, p55)

Thus every component of the verb marks the pronominal properties of the subject.

In contrast to Hua, the ablaut of Gahuku alternates for the class of the preceding adjacent morpheme as well as the subject’s person and number properties.

Gahuku is a Papuan language of the Eastern Highlands of New Guinea belonging to the Gorokan family. This is one of the better studied language groups of New Guinea (See Foley, 1986, pp236f). In terms of typology, Gahuku is not atypical of the Gorokan family and Papuan languages in general.

The phonology of Gahuku is typically Papuan having a four place voiceless stop series and a parallel lenited voiced series of mainly fricatives (but including a apical rhotic flap). Gahuku has two nasals /m/ and /n/ and two strident fricatives /s/ and /z/.

Gahuku Phonemic Inventory

<table>
<thead>
<tr>
<th>p</th>
<th>t</th>
<th>k</th>
<th>q</th>
<th>Orthography</th>
</tr>
</thead>
<tbody>
<tr>
<td>v</td>
<td>l</td>
<td>g</td>
<td>h</td>
<td>q: glottal stop</td>
</tr>
<tr>
<td>m</td>
<td>n</td>
<td>z</td>
<td>s</td>
<td>v: voiced bilabial fricative</td>
</tr>
<tr>
<td></td>
<td></td>
<td>g: voiced velar fricative</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>l: retroflex rhotic flap</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The vowels of Gahuku create a five place system with back vowels being unrounded.

<table>
<thead>
<tr>
<th>i</th>
<th>u</th>
<th>u: high back unrounded vowel</th>
</tr>
</thead>
<tbody>
<tr>
<td>e</td>
<td>o</td>
<td>o: mid back unrounded vowel</td>
</tr>
<tr>
<td>a</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The Gahuku syllable is typically open but may be closed by a glottal stop, has at most a single consonant onset and may have two vowels.

Much of the work done by syntax (i.e. in the restricted sense of word order and interaction) in English is achieved by morphology in Papuan languages (see Foley, 1986, pp167-205). Gahuku word order is always verb final. This is a common characteristic of Papuan languages that exhibit medialization of clauses.

Medialization refers to a method by which one or more clauses are subordinated to a superordinate clause. The superordinate clause is always final and subordinate clauses generally precede in an order of temporal or causal sequence. Specialized morphology on the dependent
medial verb of the subordinate clauses marks whether the subject is different or the same as that of the final verb. Often Papuan languages have anticipatory pronominal suffixes on medial verbs that pre-empt the identity of the final verb’s subject, though Gahuku does not. Medial verbs are often dependent on the final verb for tense, aspect and modal specification. Gahuku medial verbs may have aspectual morphology of their own but no future tense marker.

The word final desinences of Gahuku verbs mark a wide range of modal and/or switch reference categories. Switch reference is restricted to medial verbs, while the modal categories usually occur on independent (ie final verbs or those not involved in medialization). The desinence is obligatory for each verb phrase on the last verb of the phrase.

### Indicative

<table>
<thead>
<tr>
<th></th>
<th>sg</th>
<th>du</th>
<th>pl</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 [nonfuture]</td>
<td>-uve</td>
<td>-usive</td>
<td>-une</td>
</tr>
<tr>
<td>[future]</td>
<td>-ove</td>
<td>-iqive</td>
<td>-une</td>
</tr>
<tr>
<td>2 [class 2]</td>
<td>-ene</td>
<td>-esive</td>
<td>-eve</td>
</tr>
<tr>
<td>[class 1/3]</td>
<td>-ane</td>
<td>-asive</td>
<td>-ave</td>
</tr>
<tr>
<td>3 [class 1]</td>
<td>-ave</td>
<td>-aseive</td>
<td>-ave</td>
</tr>
<tr>
<td>[class 2]</td>
<td>-ive</td>
<td>-asive</td>
<td>-ave</td>
</tr>
<tr>
<td>[class 3]</td>
<td>-ive</td>
<td>-asive</td>
<td>-ave</td>
</tr>
</tbody>
</table>

Note: in the future tense du / si / -> / qi .

Other desinences need not follow the indicative pattern.

### Interrogative

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<tr>
<th></th>
<th>sg</th>
<th>du</th>
<th>pl</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>-uhe</td>
<td>-usihes</td>
<td>-upe</td>
</tr>
</tbody>
</table>

....follows indicative pattern.

### Medial Different Subject Nonfuture

<table>
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<tr>
<th></th>
<th>sg</th>
<th>du</th>
<th>pl</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>-ugo</td>
<td>-usigo</td>
<td>-uko</td>
</tr>
</tbody>
</table>

....follows indicative pattern.

### Medial Same Subject Nonfuture

<table>
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<tr>
<th></th>
<th>sg</th>
<th>du</th>
<th>pl</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>-uke</td>
<td>-usike</td>
<td>-unike</td>
</tr>
</tbody>
</table>

....follows indicative pattern.

### Medial DS Future

<table>
<thead>
<tr>
<th></th>
<th>sg</th>
<th>du</th>
<th>pl</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>-ugo</td>
<td>-usigo</td>
<td>-uko</td>
</tr>
<tr>
<td>2</td>
<td>-ako</td>
<td>-isiko</td>
<td>-iko</td>
</tr>
<tr>
<td>3</td>
<td>-iko</td>
<td>-isiko</td>
<td>-iko</td>
</tr>
</tbody>
</table>

### Medial SS Future

<table>
<thead>
<tr>
<th></th>
<th>sg</th>
<th>du</th>
<th>pl</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>-inake</td>
<td>-isinake</td>
<td>-inake</td>
</tr>
<tr>
<td>2</td>
<td>-oko</td>
<td>-ikake</td>
<td>-iki</td>
</tr>
<tr>
<td>3</td>
<td>-oko</td>
<td>-ikake</td>
<td>-iki</td>
</tr>
</tbody>
</table>

### Imperative

<table>
<thead>
<tr>
<th></th>
<th>sg</th>
<th>negsg</th>
<th>(neg)du</th>
<th>(neg)pl</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 [class 1]</td>
<td>/-ozo /</td>
<td>/-o /</td>
<td>/-alizo /</td>
<td>/-alo /</td>
</tr>
<tr>
<td>[class 2]</td>
<td>/-ezo /</td>
<td>/-e /</td>
<td>/-ilizo /</td>
<td>/-ilo /</td>
</tr>
<tr>
<td>[class 3]</td>
<td>/-ozo /</td>
<td>/-o /</td>
<td>/-ilizo /</td>
<td>/-ilo /</td>
</tr>
<tr>
<td>3</td>
<td>/-ino /</td>
<td>/-ino /</td>
<td>/-isino /</td>
<td>/-ino /</td>
</tr>
</tbody>
</table>

(Deibler, 1976, pp23-35)

Serialization is often used as an alternate term for medialization. However I have found it useful to have a second term for a similar yet separate phenomenon. Thus within the Gahuku verb
A phrase of a single clause a number of verbs may be serialized to create a single idiomatic verbal meaning (see Deibler, 1976, pp38f). The final verb carries the desinenence. All previous verbs occur in what might be called the infinitive form. Yet this "infinitive form" includes subject and possibly object pronominal inflection but no desinenence or tense/aspect inflection.

Serialized verbs- Vb + Infin Main Verb

eg l o a m i it imoq
"say"+Inf 3sgOb+"give"+ Fut + Topic3sgSubj
"S/He will tell her/him" (Deibler, 1976, p38)

There are also aspectual distinctions apart from the normal that can be expressed on a verb while an auxiliary verb follows and bears the desinenence in a serialization type construction (Deibler, 1976, pp53-62).

Auxiliary complex- Vb + Aspect Main(Aux) Verb

eg v inigi ni ave
"go"+ Intent 'be'Prog + Indic2/3p1Subj
"They/you will surely go" (Deibler, 1976, p54)

Obviously the combination is not idiomatic and the aspect marked verbs are not in the "infinitive". The Gahuku verb phrase may include a nominal adjunct which precedes the verb to create an idiomatic meaning in this combination.

Adjunct- Adjunct Main Verb

eg goniq no ive
"trial" 'be'Prog + Indic3sgSubj
"S/He is on trial" (Deibler, 1976, p36)

Gahuku is a morphologically complex language marking subject, object and beneficiary on the verb. Aspectual and tense categories are also marked on the verb as prefixes or suffixes before the desinenences mentioned above.

(Prog)+ (Obj)+ ROOT +(Ben) +(Perfv) +(Neg) +(Perf) +(Fut) +MOOD
(see Deibler, 1976, pp12, 144f)

The object pronominals of Gahuku verbs are prefixed to the root for those verbs that take these. One verb infixes the pronominals but their occurrence is not obligatory for this verb. The benefactive affix is suffixed to the root and includes beneficiary pronominals that are virtually identical to the object pronominals except for their being suffixes. The benefactive and all subsequent non-desinenence affixes are not obligatory.

Only verb phrase final verbs may use the general set of aspectual and tense affixes, and the future suffix may only occur on non-medial verbs. Aspectual affixes include a perfective suffix and a progressive prefix. A negative suffix follows the perfective. Tense suffixes include a perfect and a future suffix.

The tense, aspect and negative affixes when absent negatively specify their features. That is,
lack of a perfect affix marks non-perfect tense. The progressive prefix is mutually exclusive of the perfective, negative and perfect suffixes (Deibler, 1976, p145). Lack of any co-occurrence of the object pronominals and the benefactive suffix leads me to believe that these are possibly mutually exclusive.

The marking of subject pronominal features on the verb in Gahuku is achieved by ablaut of strong verb roots, ablaut of non-desinence affixes and ablaut but also consonant mutation in the desinence (Deibler, 1976, pp11-41). Weak verb roots don’t undergo ablaut but their affixes do. The negative suffix doesn’t alternate for subject pronominal properties. Suffixes, including desinences, undergo ablaut for the class of the preceding verb or affix.

The patterns of marking the pronominal features in Gahuku are interesting. The usual ablaut pattern is 2/3nsg opposed to all else. Desinence ablaut tends to oppose all 1per to 3sg to 2/3nsg. This latter 2/3nsg set usually combines with 2sg to form an unmarked class, though 2sg and 3sg are sometimes combined. The consonant mutation of the desinence generally combines the 1pl and 2sg in opposition to all else. Duals are marked by an infix in the desinence. The object and beneficiary pronominals show the 3sg to be the less marked alternant. The 2nsg is a combination of the 1nsg and 2nsg pronominals in these.

The affixes of Gahuku may act as auxiliaries in the auxiliary complex discussed above. They also can be used as main verbs eg Future "climb, rise, enter". This explains the triggering of ablaut for each affix conditioned by the class of the previous verb or affix. Each affix is a verb with a verb class, except the object pronominals, benefactive suffix and the desinences.

**5.2. GAHUKU MAIN VERB**

The main verb is final in the verb phrase and may be independent or medial in a medialization of clauses.

\[(\text{Prog})+(\text{Obj})+(\text{ROOT})+(\text{Ben})+(\text{Perf})+(\text{Neg})+(\text{Perf})+(\text{Fut})+(\text{MOOD})\]

(see Deibler, 1976, pp12, 144f)

There is negative specification of features by absence of affix. The progressive is mutually exclusive of the perfective, negative and perfect suffixes. The negative and perfect suffixes are mutually exclusive of each other. The object pronominal is not attested as co-occurring with the benefactive suffix-cum-beneficiary pronominal. These may be mutually exclusive.

**5.2.1. ROOT ABLAUT**

The ablaut of Gahuku as it applies to verb roots is only found on strong verbs. There is no perceivable common characteristic, phonological or otherwise, of strong verbs apart from the fact of the ablaut’s application.

The verbs and affixes of Gahuku can be divided into three classes 1, 2 and 3. The verb classes are identified by the ablaut they condition in subsequent suffixes.
The verb roots of Gahuku are divided into three types; a, b and c; depending on whether they take object pronominal prefixes or not. These pronominals apply strictly to objects of transitive verbs and the indirect objects of ditransitive verbs. Type a take no pronominal prefixes, type b take pronominal prefixes and type c, of which there is only one member, takes an optional object infix virtually identical to the prefixes. The distinction between the taking and not taking of object pronominals seems to be one of transitivity and animacy. Inanimates are generally third person and their number is often of little consequence in normal conversation. Thus the type a verbs take no object pronominal and tend to take inanimate objects or be intransitive. The type b verbs tend to take object pronominals and have animate objects. This distinction is illustrated by the use of two verbs in Gahuku for "to get".

/ -leqm- / "to get (a person)" group 1b, takes a pronominal object prefix.
/al-/ "to get (a thing)" group 2a, takes no pronominal object prefix.

(Deibler, 1976, pp15-7)

Classes 2 and 3 have no type c members, and class 3 has no type b members. Groups (ie class and type) 2c, 3c and 3b are thus not attested.

- 1a, b, c.
- 2a, b.
- 3a. (see Deibler, 1976, p14)

There are no significant numbers of strong verbs in groups 1c and 3a. The class and type of the verb root determines the form of the ablaut in the root.

<table>
<thead>
<tr>
<th>Class</th>
<th>Type 1a</th>
<th>2a &amp; b</th>
<th>3a</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>...OC</td>
<td>...EC</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2 &amp; 3nsg Subject</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(Deibler, 1976, pp15-8)

Strong verbs tend to finish in a consonant. The strong verbs of group 1a have the morphoneme /O/ as their last vowel, the single strong verb of group 1b has the vowel /e/ and those of class 2 have the morphoneme /E/. The final vowel of the strong verb roots alternate by the following rules of ablaut and assimilation-

Ablaut:  1  O & e > i / 2/3nsg Subject

(see Deibler, 1976, pp15-8)

Morphoneme /O/ and vowel /e/ ablaut to /i/ when the subject of the verb is 2/3nsg.

Assimilation:  2  O > u / _Cu

> o

(see Deibler, 1976, pp15-8)

Morphoneme /O/ assimilates to identity with a following /u/ but otherwise becomes an /o/. Note that assimilation must follow ablaut so the application of ablaut can preclude assimilation’s application. Once /O/ undergoes ablaut to /i/ it does not assimilate by the above rule.

3  E > Va / _CVa

(see Deibler, 1976, pp15-8)

Morphoneme /E/ assimilates to identity with any following vowel.
Ablaut: 1 i > a / class 1 morpheme _ (ie root or suffix) (Deibler, 1976, p20)

Vowel /i/ ablauts to /a/ following a class 1 verb root or suffix.

2 o & e > i / 2/3nsg subject (Deibler, 1976, pp18-23)

Vowels /o/ and /e/ ablaut to /i/ when the verbs subject is 2/3nsg.

3 o & a > e / class 2 morpheme _ (Deibler, 1976, pp18-23)

Vowels /o/ and /a/ ablaut to /a/ when preceded by a class 2 verb root or suffix.

Assimilation: 4 E > Vα / CVα (Deibler, 1976, pp14-18)

Morphophoneme /E/ assimilates to identity with the following vowel. This Morphoneme is found in the class 2 verb roots (discussed above) and object pronominals only.

Also: 5 V > Ø / +a

6 e > o / +u (Deibler, 1976, pp14-23)
The 2nsg pronominal is constructed of the 1nsg and the 3nsg pronominals. However this and subsequent analyses will not make use of this observation because of the problems it causes for any analysis. Is the 1nsg pronominal actually 1/2nsg (and 3nsg actually 2/3nsg)? If so, how do they lose the 2nsg feature when occurring alone (By an unattested zero morph?)? If not, how are the features changed when the pronominals occur in portemanteau? In the object prefix, is the 1nsg prefixed on the 3nsg? The 2nsg optional object infix of type c verbs? In the nearly identical 2nsg benefactive pronominal suffix /-leket/ (see below) is the 3nsg suffixed on the 1nsg?

The /E/ morphoneme of the non-3sg object pronominals assimilates to the following vowel, as can be seen in the following example.

<table>
<thead>
<tr>
<th>sg</th>
<th>nsg</th>
</tr>
</thead>
<tbody>
<tr>
<td>/ni-mive/...me&quot;</td>
<td>/li-mive/...us&quot;</td>
</tr>
<tr>
<td>&quot;S/He gave it to...</td>
<td>&quot;S/He gave it to...</td>
</tr>
<tr>
<td>/gi-mive/...you&quot;</td>
<td>/liki-mive/...you all&quot;</td>
</tr>
<tr>
<td>/a-mive/...hir/him&quot;</td>
<td>/ki-mive/...them&quot;</td>
</tr>
</tbody>
</table>

(see Deibler, 1976, p17)

The /o/ and /e/ vowels of the benefactive undergo ablaut to /i/ when the subject of the verb is 2/3nsg. The initial /o/ vowel, failing the alternation just mentioned, will ablaut to /e/ following a class two morpheme. Neither case applies in the example. Both rules are given above.

The benefactive construction resembles a serialization of verbs mentioned earlier in this chapter. The example below shows an analysis of the benefactive along these lines. Beneficiary pronominals are represented as object prefixes in this analysis.

Example: /huk-onet-ave/ 'cut' -Inf 1sgObj-?-Indic
"S/He cut it for me"

Unfortunately, there is no verb /t/ independent of the benefactive and the beneficiary pronominals
do not undergo the assimilation of the object prefixes. The serialization obviously represents the historical source of the morphological construct.

**Progressive Prefix**

The progressive prefix has been assigned no class because it is never followed by a class sensitive ablauting affix except when used as a copula verb root. In this case the class of the root is indeterminate because of irregularity. This is not surprising for a copula.

Progressive Prefix /no-/

/no-vive/    /ni-vave/
Prog+’go’+Indic    Prog+’go’+Indic
"S/He is going"    "They are going"

(Deibler, 1976, p13)

The /o/ vowel of the progressive prefix alternates by the ablaut rule given above for subject person and number. However the prefix is never preceded by affixes, in the same word, so does not alternate for the class of any preceding morpheme.

**Perfective suffix**

The perfective suffix is a class three morpheme.

Perfective Suffix [class 3] /-ono/

/mol-on-o-itive/    /venaq hamoq al-ene-uve/
'put'+Perfv+Fut+Indic    'wife' 'one' 'get'+Perfv+Indic
[cl 1]    [cl 2]
"S/He will put it"    "I got one wife"

/gil-ini-ave/    /al-em-uve/
'sense'+Perf+Indic    'get'+Neg+Indic
[cl 2]    [cl 2]
"They sensed it"    "I did not get it"

(Deibler, 1976, pp21f)

The ablaut alternations to /e/ and /i/ from /o/ by the rules above are demonstrated here.

**Negative suffix**

The negative suffix is a class three morpheme. The underlying /a/ of this suffix only alternates for the class of the preceding morpheme to /e/ by the rule above.

Negative Suffix [class 3] /-am/

/v-am-ive/    /al-em-uve/
'go'+Neg+Indic    'get'+Neg+Indic
[cl 3]    [cl 2]
"S/He did not go"    "I did not get it"

(Deibler, 1976, p20)

**Perfect suffix**

The perfect suffix is a class one morpheme. The /o/ vowel undergoes the ablaut alternations to /i/ and /e/ stated above.
Future suffix

The future suffix is a class three morpheme. The /i/ vowel undergoes the ablaut alternation to /a/ after a class one morpheme shown in the rule above.

Future Suffix [class 3] /-it/

/v-it-ive/ /al-it-ive/ 'go'+Fut+Indic 'get'+Fut+Indic [cl 3] [cl 2] "S/He will go" "S/He will get it"

/huk-at-ive/ 'cut'+Fut+Indic [cl 1] "S/He will cut it"

(Deibler, 1976, pp20f)

Only desinences follow the future suffix and these take ablaut for subject and the class of the preceding morpheme that are different to the rules given above. Desinences treat the future suffix separately from other affixes and there is reason to perhaps treat it alone as a separate class.

5.2.3. MOOD AND SWITCH REFERENCE MARKERS

The mood or switch reference desinence alternates for subject person and number and the class of the preceding morpheme.

<table>
<thead>
<tr>
<th>Number</th>
<th>sg</th>
<th>du</th>
<th>pl</th>
</tr>
</thead>
<tbody>
<tr>
<td>Person</td>
<td>Class</td>
<td>Tense</td>
<td>NonFuture</td>
</tr>
<tr>
<td>1</td>
<td>1/2/3</td>
<td>uve</td>
<td>ove</td>
</tr>
<tr>
<td>2</td>
<td>1/3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>1</td>
<td>ave</td>
<td>asive</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>ene</td>
<td></td>
</tr>
</tbody>
</table>

(see Deibler, 1976, pp23f)

The initial vowel of the desinence undergoes ablaut alternations conditioned by the preceding
morpheme and the pronominal properties of the subject. The dual is infixed after this vowel and alternates for the preceding morpheme by consonant change. The final consonant of the desinence takes part in consonant mutation for alternations in subject person and number.

### 5.3. GAHUKU DATA IN A MORPHEME-BASED ANALYSIS

#### 5.3.1. INTRODUCTION

The Papuan languages of New Guinea are usually thought of as agglutinating. "Papuan languages are commonly characterized by quite complex morphologies, especially in the verb. Morphology is generally on an agglutinative pattern." (Foley, 1986, p12)

It remains to be proved that Gahuku is a fusional language.

Matthews (1972, pp56-103) proposed a number of problems that may accompany an Item and Arrangement analysis of fusional data. These are as follows:

- zero morphs
- replacives
- infixes
- fusion
- cumulation
- empty morphs
- intrusive elements
- morphemic overlapping
- morphological conditioning and extended exponence
- arbitrary segmentation

Although the problems are not so formally entrenched, they apply equally to Generative Item and Process analyses of such data.

To illustrate that Word and Paradigm morphology may be appropriately applied to Gahuku data one must show that the data is fusional. The above problems, if attested for the previous morphemic analysis of Gahuku, should constitute reasonable evidence that the data is perhaps inappropriately analyzed in terms of morphemes, can perhaps be dubbed fusional and should be addressed in other algorithms to test their appropriateness.

#### 5.3.2. ZERO MORPHS

Few linguists are theoretically enamoured of this particular abstract device for representing paradigmatic gaps today.

Deibler's analysis of Gahuku contains some few zero morphs.
Example: Benefactive3sg / huk-o<ge>t-ave / 'cut'+Ben2sg+Indic "S/He cut it for me" (Deibler, 1976, p19)

Copula 'be' / ni-0-ave / Prog+'be'+Indic "They are ..." (Deibler, 1976, p54)

In Generative Phonology terms, it is difficult to see how a zero realized surface form can signal the presence of a morpheme. Only in its paradigmatic and syntagmatic context can the absence of a formative in a certain slot be regarded as meaningful.

While not analyzed as zero morphs by Deibler properties such as non-future, non-perfect, etc are signaled by the absence of an overt future marker or perfect marker. This constitutes the same problem for morphemic analysis though.

5.3.3. REPLACIVES

Ablauting vowels of both affixes, desinences and roots are replacives.

Example:  non2/3nsg  non2/3ns  2/3nsg
          /-ono/   /-ene/   /-ini/
Perfv     Perfv     Perfv

Morphological alternations within morphemes do not fit neatly into a morphemic representation.

The above examples could be argued to be allomorphic variants conditioned by subject person and number. However there is no suffix that marks subject pronominal features as its primary function. The obvious candidate for such a suffix is the initial vowel of the desinences. These are obviously part of the desinences though as they differ markedly and idiosyncratically between desinences\(^1\). The most appropriate analysis is to regard each morphemes subject pronominal alternations as a replacive operation.

5.3.4. INFIXES

Above I have left out any detailed mention of class 1 type C verbs of which there are only a few. These take optional animate object pronominals infixed into their stem.

Example:  /aqnig-ave / or / aqni<na>g-ave / 'see'+Indic 'see'<1sgObj>+Indic

"They/you see me"

Continuous realization still seems to be a desirable property of the morpheme in Generative Phonology.

\(^1\)This could not be allomorphy of the vowels conditioned by desinences
5.3.5. FUSION

This term refers to fusion of morphological realizations of different adjacent morphemes. This may be either morphonemic or sporadic.

When adjacent the combination of benefactive and perfect represent a case of sporadic fusion.

Sporadic-  
/o<leke>t/+ /ok/ -> /o<liki>m+ik/  
Ben Perf BenPerf  
(Deibler, 1976, pp19, 22)

All vowels, except the initial vowel of Ben, change to /i/ (also avoiding ablaut) and the /t/ of Ben is replaced by an /m/.

Example:  
/huk-ogimik-ave/ not /huk-oget-ok-ave/  
'cut'+Ben2sgPerf+Indic  
"S/He has cut it for you"  
(see Deibler, 1976, p19)

Morphonemic-  
V -> /a/  
(Deibler, 1976, p14)

The phonotactics of Gahuku allow this combination of vowels except across a morpheme boundary.

Example:  
/ni-a-pel-eve/ -> /na-pel-eve/  
Prog+3sgObj+'hit'+Indic  
"They/you are hitting her/him"

Only on some abstract level can the fused morphemes be considered separate especially if one regards morphonemics as historically fossilized phonetic alternations. The fusion of morphemes represents syntagmatic blurring of morphemic exponence.

5.3.6. CUMULATION

This represents the cumulation of more than one morphological property in a single morpheme. In Gahuku many morphemes may carry a portemanteau meaning. The worst of these is probably the desinences, and the suffixes with ablaut for subject and class.

Example:  
Medial Verb Different Subject Same Tense,etc  
/-ako/  
2sgSubject

Cumulation is an obvious breakdown of the one to one correspondence of form to meaning that morphemes ideally represent.
5.3.7. EMPTY MORPHS

These are morphs that occur in particular morphological environments yet cannot be identified with any of the occurring morphemes. No empty morphs in Gahuku main verbs.

5.3.8. INTRUSIVE ELEMENTS

Intrusive elements are morphemes that occur in and yet do not attribute their meanings to the word.

Gahuku has no true examples of intrusive elements. However the 2nsg object and beneficiary pronominals represent a similar case. The 2nsg form consists of a concatenation of the 1nsg and 3nsg forms.

Example: 1nsg /le-/  
2nsg /leke-/  
3nsg /ke-/  
(Deibler, 1976, p14)

You can consider the 1nsg and 3nsg forms to be 1/2nsg and 2/3nsg but this causes problems when alone. Alternatively 2nsg can be seen as a fused occurrence of the two forms that combine for a quite different meaning, that is, two intrusive elements in portemanteau. Intrusive elements do not qualify well for the label of morpheme.

5.3.9. MORPHEMIC OVERLAPPING

Overlapping occurs when distinct morphemes have identical surface realizations. The disambiguating of the formatives can only take place with reference to the syntagmatic environment of the morphemes and sometimes not then. In the context of the word confusion is rare.

The identity in some situations of the pronominals for Object and Beneficiary is clear overlapping. The ambiguity as to whether a given pronominal is a mark of object or beneficiary must be signaled by the position in which it occurs in the word. This is not morphemic signaling of meaning alone.

5.3.10. MORPHOLOGICAL CONDITIONING AND EXTENDED EXPONENCE

This can be regarded a good example of blatant non-morphemic exponence. The fused Benefactive Perfect formative shown above is a case in point.

Example: 'cut'+Ben+Perf+Indic  
/huk-o<gi>ni-ik-ave/  
(see Deibler, 1976, p19)

The /m/ that occurs in this fused formative can be regarded as an alternant of the Benefactive suffix, in which the /t/ is replaced, conditioned by the adjacent occurrence of Perfect. It can be
said that this alternant marks as much the meaning of Perfect as does the formative of Perfect. Along with the stipulation of adjacency, this alternant will only occur in the Perfect tense. Thus a morpheme may be marked by more than one formative in a word and a formative may signal more than one morpheme. This is extended exponence.

Gahuku has extended exponence that is independent of conditioning. Subject person/number in Gahuku is marked by an example of extended exponence that is independent of morphological conditioning. The desinence and ablaut pattern spread subject exponence throughout the length of the word.

Example: 2/3plSubject /mιl-i<gi>t-imi-uk-ave/ 'put'+Ben2sg+Perfv+Perf+Indic 1sgSubject /mol-o<ge>t-ono-ok-ave/ 'put'+Ben2sg+Perfv+Perf+Indic (see Deibler, 1976, pp16, 22, 38)

The desinences, or their initial vowel, cannot be regarded as a subject suffix that conditions the above alternations. The pronominal alternations of the individual desinences are idiosyncratic to themselves so no subject suffix can be identified.

5.3.11. ARBITRARY SEGMENTATION

In the light of the above problems—particularly fusion, replacives, intrusive elements, morphological conditioning and extended exponence—any segmentation of the Gahuku data must seem a little arbitrary. The vowel alternations of Gahuku verbal suffixes for class of previous adjacent morpheme, considering their generally initial position, could be segmented as part of the previous morpheme.


While some abstraction is required for the initial vowels of some suffixes to participate in this analysis, it is just as valid as the one postulated above. The boundary between one morpheme and another is an arbitrary decision made by the linguist. In terms of actual exponence the formatives are less clearly segmental than morphemic approaches suggest.

5.3.12. CONCLUSION

I hope to have shown that the Gahuku data is not purely agglutinating and that a word-based morphological approach is at least worthy of consideration for this data. The problems for morphemes apparent in Gahuku seem typical of Gorokan languages.
5.4. GAHUKU DATA IN EXTENDED WORD AND PARADIGM AND REVISED WORD AND PARADIGM MORPHOLOGICAL ANALYSES

5.4.1. ANALYSIS OF GAHUKU DATA

The simplest perceivable morpholexical analysis of the Gahuku data given is one that acts as one might expect a Generative explication to. This would include the affixation of all relevant morphology then the application of ablaut and morphonemic rules.

It soon becomes obvious that this analysis is impossible. Weak roots do not undergo ablaut for 2/3nsg subject despite having the vowels /o/ and /e/ that in affixes and strong roots do change. General ablaut rules applying after affixation has been completed must thus identify roots and apply to those verbs that are not weak. For reasons discussed in the previous chapter it is not usually considered desirable for morphological, morphonemic or phonological rules to act on and analyze the internal morphological structure of an already created stem.

Similar problems are found with the fused Benefactive Perfect formative. It has the vowel /i/ that is elsewhere (ie in the Future affix) involved in an ablaut change to /a/ next to a class 1 affix (eg i > a / 01 _). In the Benefactive Perfect fused formative the perfect is always in this environment, benefactive being class 1, and adjacent to the left of the Perfect affix. The benefactive can potentially be proceeded by a class 1 root also. The /i/ vowels of this fused formative never undergo ablaut change. The operations involved in deriving these forms after all affixation are subject to the same criticisms as above.

The morpholexical analyses proposed below thus derive the ablaut form of each affix and root as it is added to the morphological structure. Essentially a choice of affix forms will be given depending on the morphological context and conditions. For instance, a 2/3nsg subject conditions a /i/-ablauted alternant in most affixes. The analyses will thus resemble a Item and Arrangement explication of the Gahuku data. Yet Item and Arrangement morphology does not allow for the exponence of conditioning properties in, and only in, the form of the allomorphs conditioned. That is, subject person/number conditions the ablauted alternants of most affixes but is marked only in these alternants. It has no actual morphological marking of its own in morphemic terms.

5.4.2. EWP ANALYSIS

Extended Word and Paradigm Morphological Theory allows only the layering of pronominal features of different arguments. This keeps them separate but does not label them. The layering of verbal agreement features specified by Anderson (1982, p598 ) is as follows-

[[[Object] IndirectObject] Subject]

This order of layers is specified by their syntactic prescription. The innermost layer is prescribed.
by the closest complement to the verb, the next layer by the next closest complement, etc. Thus the object is generally innermost and the subject is outermost.

Gahuku encodes Direct and Indirect Objects with the same crossreference so no differentiation need be made. However there are beneficiary pronominals which I have placed in the Indirect Object slot. Gahuku Pronominal layering is thus as follows-

[[[Object] Beneficiary] Subject]

Obviously, Object includes both direct and indirect objects. I have specified at each numbered level what clause argument is marked at that level in pronominal crossreference and given stem names for each level. This lends a little coherency to the proliferation of pronominal features.

Parenthesized class features inside the feature specifications of rules refer to conditioning class features of the previous affix.

There is Elsewhere disjunction at each numbered level.

Root Ablaut
1) Lexicon- Stem internal morphology.

Subject

[2/3 nsg, class 1, strong ] X {e, O} C -> X i C

The ablaut of verb roots is stem internal and so should probably be in the lexicon of an Extended Word and Paradigm Morphological analysis. Strong roots, of class 1, with the vowel /e/ or morpheme /O/ change these to /i/ for a 2/3nsg subject.

Object Pronominal Stem

2) Object

[Type B, X -> nE + X
[[[ 1 sg ]]]]

[Type C, Opt: XC -> X nE C
[[[ 1 sg ]]]]

[Type B, X -> gE + X
[[[ 2 sg ]]]]

[Type C, Opt: XC -> X gE C
[[[ 2 sg ]]]]

[Type B, X -> a + X
[[[ 3 sg ]]]]

[Type C, Opt: X -> X
[[[ 3 sg ]]]]

Object pronominals are prefixed to the verb for type b verbs and optionally infixed, before the last consonant, for type c verbs.
Benefactive Stem

3) Subject

[[[2/3nsg] Type A, Benefactive] X -> X + i
[[Class 2] Type A, Benefactive] X -> X + e
[Type A Benefactive] X -> X + o

The Benefactive only occurs on verbs of type a which take no object pronominal. The vowel affixed is dependent on the person and number properties of the subject and the class of the preceding verb. The Elsewhere condition and disjunction between rules at the same level ensures the subject and the verb class ablaut takes precedence over the general rule. It seems we must rely on ordering to provide the precedence of subject over class ablaut that the data dictates. The Benefactive stem precedes the beneficiary pronominals of the next level obligatorily.

Beneficiary Pronominal Stem

4) Beneficiary and Subject

[[[1sg]] Ben, Perf, Class 1] X -> X + nimik
[[[1sg]2/3nsg] Ben, Class 1] X -> X + nit
[[[1sg]] Ben, Class 1] X -> X + net
[[[2sg]] Ben, Perf, Class 1] X -> X + gimik
[[[2sg]2/3nsg] Ben, Class 1] X -> X + git
[[[2sg]] Ben, Class 1] X -> X + get
[[[3sg]] Ben, Perf, Class 1] X -> X + mik
[[[3sg]2/3nsg] Ben, Class 1] X -> X + kit
[[[3sg]] Ben, Class 1] X -> X + t
[[[3sg]] Ben, Class 1] X -> X + ket

The Beneficiary pronominals alternate for subject pronominal features of the previous layer (in parentheses). Obviously one can’t have contradictory features for different arguments on the same layer. Ambiguity would be rife since labelling of pronominal features is not allowed in Extended Word and Paradigm Morphological Theory. These pronominals also differ for a verb that occurs in the perfect tense. This change takes precedence over subject ablaut. The Beneficiary pronominals change the class of the stem to class 1.
**Perfective stem**

5) Subject

- [[[2/3nsg]]]
  - Perfective, Class 3
    - $X \rightarrow X + ini$

- [[Class 2]]
  - Perfective, Class 3
    - $X \rightarrow X + ene$

- [Perfective, Class 3]
  - $X \rightarrow X + ono$

The Perfective aspect creates a class 3 stem. It alternates for subject person and number and for the class of the preceding stem.

**Negative and Perfect Tense Stems**

6) Subject

- [[Class 2]]
  - Negative, Class 3
    - $X \rightarrow X + em$

- [Negative, Class 3]
  - $X \rightarrow X + am$

- [[[2/3nsg]]]
  - Perf, Class 1
    - $X \rightarrow X + ik$

- [[Class 2]]
  - Perf, Class 1
    - $X \rightarrow X + ek$

- [Perf, Class 1]
  - $X \rightarrow X + ok$

The Negative creates a class 3 stem. It alternates for the class of the preceding stem.

The Perfect tense creates a class 1 stem. It alternates for subject person and number and for the class of the preceding stem. The Negative and the Perfect are mutually exclusive and so are disjunctively ordered at one level.

**Progressive stem**

8) Subject

- [[[2/3nsg]]]
  - Prog
    - $X \rightarrow ni + X$

- [Prog]
  - $X \rightarrow no + X$

The Progressive alternates for subject person and number.

**Future Stem**
The Future alternates for class of the previous stem.

**Indicative Termination**

10) Subject

- [[[I]1sg] Fut, Indicative] $\rightarrow X + \text{oive}$
- [[[I]1du] Fut, Indicative] $\rightarrow X + \text{iqive}$
- [[[I]1sg] NonFut, Indicative] $\rightarrow X + \text{uive}$
- [[[I]1du] NonFut, Indicative] $\rightarrow X + \text{usive}$
- [[[I]2sg] Class 2, Indicative] $\rightarrow X + \text{ene}$
- [[[I]2du] Future, Indicative] $\rightarrow X + \text{aqive}$
- [[[I]2sg] Class 1, Indicative] $\rightarrow X + \text{aive}$
- [[[I]2/3du] Class 2, Indicative] $\rightarrow X + \text{esive}$
- [[[I]2/3sg] Indicative] $\rightarrow X + \text{ive}$
- [[[I]2/3du] NonFuture, Indicative] $\rightarrow X + \text{asive}$
- [[[I]2/3pl] Class 2, Indicative] $\rightarrow X + \text{ave}$

The Indicative termination alternates for subject person and number and the identity of the preceding stem. This generally takes the form of class conditioned alternations but if the preceding stem is the Future\(^2\) then a special form of the desinence is sometimes called for.

**Morphonemic Rules**

Morphonemics: $E \rightarrow \underline{V}_a / \_CV_\alpha$
$O \rightarrow \underline{u} / \_\underline{Cu}$
$\rightarrow \underline{o} / \_\text{elsewhere}$
$V \rightarrow \underline{\varnothing} / \_\underline{+a}$
$e \rightarrow \underline{o} / \_\underline{+u}$

**Diagram**

\[ \text{ROOT} \rightarrow \text{OBJECTc} \rightarrow \text{OBJECTb} \rightarrow \text{BENEFICIARY} \rightarrow \text{PERFV} \rightarrow \text{NEG} \rightarrow \text{PROG} \rightarrow \text{FUT} \rightarrow \text{INDIC} \]

\[ \text{(rule2)} \quad \text{(rules3,4)} \quad \text{(rule5)} \quad \text{(rule6)} \quad \text{(rule8)} \quad \text{(rule9)} \quad \text{(rule10)} \]

\(^2\)Future, if it occurs, always precedes the desinence because of the rule order and is of class 3.
Sample Morpholexical Rule Derivations

/ al-ene-am-it-ive /
'get-Perfv-Neg-Fut-Indic
"S/he will not get it"

/ al / 'get' [class 2, type a, weak verb]
Rule 5- / al-ene /
Rule 6- / al-ene-am /
Rule 9- / al-ene-am-it /
Rule 10- / al-ene-am-it-ive /

/ huk-oget-at-ive /
'cut'-Ben2sg-Fut-Indic
"S/he will cut it for you"

/ huk / 'cut' [class 1, type a, weak verb]
Rule 3- / huk-o/
Rule 4- / huk-o-get /
Rule 9- / huk-o-get-at /
Rule 10- / huk-o-get-at-ive /

5.4.3. RWP ANALYSIS

I have often abbreviated many rules into one using paradigms. So OPERATION components include paradigms which have parameters that belong as part of INPUT, OUTPUT or LIMITATION components.

These rules are not extrinsically ordered! The rules are numbered for easy reference to the rules.
1. OUTPUT: (2/3nsg subject) strong stem
   INPUT: class 1 strong verb roots
   OPERATION: Subject-2/3nsg
   X (O, e) C -> X i C
   Non2/3nsg No Change

2. OUTPUT: pronominal object stems
   INPUT: animate object weak verb roots & strong stems
   LIMITATIONS: type B verbs
   OPERATION: Object
   prefix / nE-/ prefix / IE-/ prefix / IEkE-/ prefix / kE-/ prefix / a-/

3. OUTPUT: pronominal object stems
   INPUT: animate object weak verb roots & strong stems
   LIMITATIONS: type C verbs
   OPERATION: Object
   prefix / IE-/ prefix / IEkE- prefix / kE-/
   infix / nE-/ infix / IE-/
   Note: infixation takes place before the final consonant of root

4. OUTPUT: 2/3nsg subject benefactive stem
   INPUT: weak verb roots & strong stems with inanimate objects
   LIMITATIONS: type A verbs
   OPERATION: suffix / i/

5. OUTPUT: benefactive stem
   INPUT: weak verb roots and strong stems with inanimate objects
   LIMITATIONS: type A verbs
   OPERATION: class 1 suffix / o/
   class 2 suffix / e/

6. OUTPUT: class 1 (2/3nsg subject) benefactive stem
   INPUT: Rules 4 & 5
   OPERATION: Beneficiary
   Subject 2/3nsg suffix / -nit / -git / -t / -lit / -likit / -kit /
   non2/3nsg / -net / -get / -t / -let / -leket / -ket /

7. OUTPUT: class 1 benefactive perfect stem
   INPUT: Rules 4 & 5
   OPERATION: Beneficiary
   suffix / -nimik / suffix / -limik / suffix / -likimik /
   suffix / -gimik / suffix / -likimik / suffix / -kimik /
   suffix / -mik / suffix / -kimik /

8. OUTPUT: class 3 (2/3nsg subject) perfective stem
   INPUT: Rules 1, 2, 3 & 6; type A & C weak verb roots and strong stems
   OPERATION: Subject
   class 1/3 suffix / -ini /
   class 2 suffix / -oni /
   non2/3nsg suffix / -ono / suffix / -ene /

9. OUTPUT: class 3 negative stem
   INPUT: Rules 1, 2, 3, 6 & 8; type A & C weak verb roots and strong stems
   OPERATION:
   class 1/3 suffix / -am / suffix / -em /
10 OUTPUT: class 1 (2/3nsg subject) perfect stem
INPUT: Rules 1, 2, 3, & 8; type A & C weak verb roots and strong stems
OPERATION: Subject class1/3 class2
2/3nsg suffix /-ik/
non2/3nsg suffix /-ok/
suffix /-ek/

11 OUTPUT: (2/3nsg subject) progressive stem
INPUT: Rules 1, 2, 3 & 6; type A & C weak verb roots and strong stems
OPERATION: Subject
2/3nsg prefix /ni-/
non 2/3nsg prefix /no-/

12 OUTPUT: future stem
INPUT: Rules 1, 2, 3, 6, 7, 8, 9, 10 & 11; type A & C weak verb roots and strong stems.
OPERATION: class1
suffix /-at/
class2/3
suffix /-it/

13 OUTPUT: (subject pronominal) indicative termination
INPUT: Rules 1, 2, 3, 6, 7, 8, 9, 10, 11 & 12; type A & C weak verb roots and strong stems.
OPERATION:

<table>
<thead>
<tr>
<th>Person</th>
<th>Class</th>
<th>Tense NonFuture</th>
<th>Future</th>
<th>NonFuture</th>
<th>Future</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1/2/3</td>
<td>uve</td>
<td>ove</td>
<td>usive</td>
<td>iqive</td>
</tr>
<tr>
<td>2</td>
<td>1/3</td>
<td></td>
<td>ane</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>1</td>
<td>ave</td>
<td>asive</td>
<td>aqive</td>
<td>ave</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>2</td>
<td></td>
<td></td>
<td>esive</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>ene</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Morphonemics: E -> Vα /-CVα
O -> u /-Cu
-0 / elsewhere
V -> O /-+a
e -> 0 /-+u

Rule 1 deals with the root ablaut of the class 1 strong verbs. Rule 2 prefixes the object pronominals of type b verbs. The object infixes of type c verbs are dealt with by rule 3. Rules 2 and 3 are disjunctively ordered with each other by the strength of the fact that neither inputs into the other and both have similar inputs\(^3\). Rules 4 and 5 create the Benefactive stem which alternates for subject person and number and class of the input verb. Rules 4 and 5 are the

\(^3\)except for the limitations on the type of verbs taking the rules
necessary inputs into rules 6 and 7 that provide the beneficiary pronominals conditioned by the
perfect tense. The benefactive suffixes and the object prefixes are ordered disjunctively. Rule 8
provides the perfective stem which alternates for subject pronominal features and the class of the
preceding stem. Rule 9 creates the negative stem, rule 10 the perfect, rule 11 the progressive and
rule 12 the future. The progressive is mutually exclusive of the perfective, negative and the
perfect and so these do not contain it in their input, and vice versa. Similarly the negative and
perfect are mutually exclusive. The Indicative desinence has a complex paradigm of alternations
for the categories of subject pronominal features and preceding class.

Diagram

Sample Morpholexical Rule Derivations

/al-ene-am-it-ive /
'get-Perfv-Neg-Fut-Indic
"S/he will not get it"

/al/'get' [class 2, type a, weak verb]
Rule 8- / al-ene /
Rule 10- /al-ene-am /
Rule 12- /al-ene-am-it /
Rule 13- /al-ene-am-it-ive /

/huk-oget-at-ive /
'cut'-Ben2sg-Fut-Indic
"S/he will cut it for you"

/huk/'cut' [class 1, type a, weak verb]
Rule 5- /huk-o/
Rule 6- /huk-o-get /
Rule 12- /huk-o-get-at /
Rule 13- /huk-o-get-at-ive /

5.5. COMPARISON OF
EXTENDED WORD AND PARADIGM MORPHOLOGICAL THEORY
AND THE REVISED WORD AND PARADIGM MODEL

5.5.1. SIMPLICITY

In comparing analyses of the Extended Word and Paradigm Morphological Theory and Revised
Word and Paradigm types for the Gahuku data one is immediately struck by the simplicity of the
Extended Word and Paradigm Morphological Theory analysis. Extended Word and Paradigm
simply requires a feature specification and a morpholexical process for each rule. Revised Word and Paradigm model requires a rule Input, Output and Operation.

I have provided for means by which the rules of Revised Word and Paradigm model can be abbreviated in the previous chapter. The paradigm abbreviation is used above.

Example:
7 OUTPUT: class 1 benefactive perfect stem
INPUT: Rules 4 & 5
OPERATION: Beneficiary

\[
\begin{array}{ccc}
1 & \text{suffix} / -nimik/ & \text{suffix} / -limik/ \\
2 & \text{suffix} / -gimik/ & \text{suffix} / -likimik/ \\
3 & \text{suffix} / -nimik/ & \text{suffix} / -kimik/ \\
\end{array}
\]

However the abbreviated rule form as follows is not. This is because it could easily obscure the nature of the rules.

Example: [Output] Limitations; Operation, Input. (see Matthews, 1972, p179)

While the possibility of abbreviation simplifies Revised Word and Paradigm model notationally to that approaching the rules of Extended Word and Paradigm. The rules still require more components and terms. Simplicity thus acquired is only notational and must often be expanded elsewhere. With abbreviation in the Revised Word and Paradigm model the simplicity of Extended Word and Paradigm Morphological Theory is still greater.

The Word and Paradigm rules above have provided no boundaries to which morphonemic rules may apply. However Extended Word and Paradigm rules have a '+' symbol that could be regarded as providing a boundary to which morphonemics can apply. This is not a problem for my Revised Word and Paradigm model since rules similar to Extended Word and Paradigm rule form can be used. The written form of the rules can be regarded as a notational variant of the transformational type rules.

In neither analysis have I bothered to create a rule that erases boundaries once morphonemics has applied. The cyclic application of morphonemic rules would probably be the most appropriate approach with the immediate erasure of boundaries. A non-morphemic approach to morphology should not leave a residue of concatenative structure (ie boundaries) and should try to keep other rules from applying to word internal structure once created. However these innovations are new to Word and Paradigm morphological theory. Thus the models of Extended Word and Paradigm and Revised Word and Paradigm need not be compared on this point.

5.5.2. WHAT IS INFLECTION IN GAHUKU?

Anderson’s (1982) definition of Inflection as morphology that is syntactically relevant causes one to ask the question “What is Inflection in Gahuku?”. That is, which of the categories explicated above should be analyzed in an Extended Word and Paradigm Morphological approach to Gahuku morphology? I have somewhat pre-empted this question by proposing analyses of all the given morphology.
Most of the affixes above include ablaut for subject, object or beneficiary crossreference. Agreement phenomena are included in the class of syntactically relevant morphology that Anderson (1982, p587) includes in Inflection. Likewise tense and aspect features are often included as part of Inflection. However almost every affix undergoes ablaut according to the class features of the affix or root it is adjacent to. These features are idiosyncratically and lexically associated with the affixes and roots, and so belong in the lexicon. The Extended Word and Paradigm morpholexical rules have no access to lexicon internal information. They are driven completely by the syntactically provided morphosyntactic representation.

The final desinences of Gahuku mark subject person/number and such categories as mood and switch reference. They are obviously Inflection in Anderson’s terms yet these also undergo ablaut for class of previous affix or root. One would not want to exclude the desinences from Inflection. The criterion of class ablaut must be discarded as excluding rules from Inflection. There is no reason to not include all the Gahuku affixes discussed in the Extended Word and Paradigm analysis above and regard them as Inflection.

5.5.3. MORPHOLOGICAL CONSTRUCTION OR SYNTAX DRIVEN MORPHOLOGY

The Gahuku object and beneficiary pronominals seem to be mutually exclusive. No examples of co-occurrence were found in Deibler (1976). There is no sound morphological reason for this. They do not compete for the same affix position. The object pronominals are prefixes and the beneficiary pronominals are suffixes.

This can be explained in terms of a prevention of complexity and proliferation of pronominal features beyond a certain level. Especially as verbs are also marked for subject pronominal features.

Such an explanation makes little sense in an Extended Word and Paradigm analysis. The syntax drives the morphological rules by feature prescription, the morphology does not construct the morphosyntactic representation and the pronominal features must exist in the morphosyntactic representation regardless of their being marked on the verb or not. Thus complexity is not avoided.

5.5.4. STEM ABLAUT

The ablaut in strong roots of Gahuku must be initiated in the lexicon. This is the organization provided for all stem internal alternations in Extended Word and Paradigm Morphological Theory.

Such a situation provides no scope for generalization that the ablaut of some roots, particularly auxiliaries, is in some aspects identical to that of affixes. The auxiliaries are in fact these forms
used as roots or conversely the auxiliaries are used as affixes. The ablaut is surely the same phenomenon in both uses.

Neither the Extended Word and Paradigm Morphological Theory nor Revised Word and Paradigm model analysis of Gahuku have addressed auxiliaries and some modification would be necessary for each to do this. However the Extended Word and Paradigm Morphological analysis would have ablaut rules and auxiliaries/affixes that are quite similar both inside and outside the lexicon.

5.5.5. OPTIONALITY

Anderson (1977) uses a notation as follows to denote optionality in morpholexical rules.

Example: \[ [_{\mathrm{u}}] \]

\[
\text{Obl: } / (o, u) \quad X/
\]

\[
\text{Opt: } C \quad X/
\]

\[
1 \quad 2 \quad \rightarrow \quad /t^+ \quad 1 \quad 2/
\]

(Anderson, 1977, p43)

This rule obligatorily prefixes a /t/ before a /o/ or /u/ vowel but optionally prefixes before a consonant. The implications of this formalism are that features still exist despite the non-application of the rule (in that option). This follows from the syntactic prescription of morphosyntactic features.

A nonsensical situation is created with the Gahuku optional object pronominal infixes where a number of homophonous forms exist each with a separate feature specification. For class C verbs, all these infixes are optional. So for the six possible pronominal combinations (ie 1,2,3 per and sg,nsg) there is a non-affixing option that will remain homophonous for six pronominals.

An alternative is to consider the Inflectionally unmarked option as semantically unmarked for the pronominal features.

Perhaps the right way to treat such optionality is to make the whole process optional. Then a form without an affix has no particular feature specifications. This is possible in Revised Word and Paradigm model by allowing the inputs of rules subsequent to the optional rule to include both the output of the optional rule and the rule preceding the rule.

Example: Rule X (Input: .....
Rule Y (Input: rule x)
Rule Z (Input: rule x or y)

Thus rule Y is optional. No special notation is required. In Extended Word and Paradigm Morphological Theory such an approach is not possible as rules do not have Input components. Extended Word and Paradigm Morphological Theory must arbitrarily mark certain rules as optionally applying.
5.5.6. OBLIGATORINESS

Most of the affixes discussed in the above analysis are not obligatory in the sense that they must appear. Non-perfect is marked by the absence of the perfect affix. Conversely, the desinence, marking mood or switch reference, is obligatory and the speaker must choose from a range of terminations to complete a verb. This final level is absolutely obligatory.

Features prescribed by the syntax must include non-future, non-benefactive, etc on occasion in an Extended Word and Paradigm analysis. The given Extended Word and Paradigm morphological rule system has no rules for these features and so must stall at the first occurrence of an unaffixed feature. The same is not true of a Revised Word and Paradigm model analysis since the rules given create the morphosyntactic representation.

A rule for each non-affixing circumstance is needed for the Extended Word and Paradigm analysis. The only formalism available to cope with this in Extended Word and Paradigm Morphological Theory is the zero rule.

Example: \([\text{Non-Perfect}] X \rightarrow X\)

This suggests that a process on the word form takes place with no visible effect. The suggestion that a form is replaced by itself with no evidence of a process having taken place is untenable. This is obviously too abstract and thoroughly unprovable. One would actually want to say that features are attributed despite no process applying, a static rule.

In Revised Word and Paradigm model the rules can, and do, pass rules without their applying. This is accomplished by specification of Input/Output components as shown in the previous section. This will not attribute negative feature specifications so perhaps a set of default features are necessary. Alternatively, negative feature specifications could be achieved by morpholexical rules with Operations specified as 'no change'.

5.5.7. UNMARKED MORPHOLOGICAL PROPERTIES

The use of a zero rule was suggested above to account for the derivation of morphologically unmarked properties as the only device open to Extended Word and Paradigm Morphological Theory for such circumstances. The fact that little morphological literature exists on the issue of unmarked properties is indicative of the confusion surrounding the topic. Since the discarding of Structuralist zero morphs (and other methodological baggage) few linguists have considered how morphologically unmarked properties should be treated.

Hammond (1981, p108) uses a zero process:

\[
(95)a. \quad ((+\text{pl} ) - \text{me, - you, +dual}) +\text{lat}) \quad /X/ \rightarrow /X/
\]

Anderson (1977, p35) uses a similar rule. No other mention of zero alternacy is made in the Extended Word and Paradigm Morphological Theory literature.

This methodology is as unconstrained as the zero morphs mentioned above (see Matthews,
1972, pp61f; for discussion). The abstraction and irrefutability of processes or morphemes that make no perceivable change to a word form can not be tolerated in a Extended Word and Paradigm analysis. Zero morphs were one of the problems found to occur with item approaches to fusional language data in Matthews (1972, p61). Word and Paradigm morphology is an attempt to provide a less problematic solution to such circumstances and should not commit the same errors. While some rule or principle must attribute the features of the unmarked property there is no reason to believe there is any effect or process on the form of the word.

It may be possible to allow unmarked features to fall out from the lack of application of morpholexical rules in an Extended Word and Paradigm analysis. Thus a form not taking a rule is by default an exponent of the unmarked feature specification.

Though zero processes are not viable, perhaps a non-process rule representation can be formulated -

\[ [+A,+B] \ X \rightarrow X + Y \]
\[ [-A,+B] \ X \]

The non-process approach to unmarked morphological features does the desired work and formalizes what would otherwise be a spurious zero process or simply unformalized in Extended Word and Paradigm analyses. Similarly the Revised Word and Paradigm model can simply have rules with an operation specified as 'no change'.

5.5.8. NUMBERED RULE ORDER

The strict numbered order of Extended Word and Paradigm morpholexical rules does not appropriately deal with the real situation in Gahuku affix order. Revised Word and Paradigm model morpholexical rules can be written so as to prefix the progressive and object prefixes at any point within the derivation of the verb form. Prefixes can be attached before, during or after the attribution of suffix formatives since the relative order between suffixes and prefixes is unimportant. Of course, Object prefix rules should precede progressive prefix rules since the pronominals are inside of the progressive prefix. However object prefixes may be mutually exclusive with beneficiary pronominals and are identical with object infixes suggesting ordering at the same level. The infixes must precede the beneficiary suffixes to be positioned before the last consonant of the root. Likewise progressive is mutually exclusive with perfective, negative and perfect suffixes. There are some grounds for proposing certain principles of order but these are not as strict as Extended Word and Paradigm Morphological Theory numbering.

EWP Analysis

\[
\begin{align*}
\text{ROOT} \rightarrow & \text{OBJECTc} \rightarrow \text{OBJECTb} \\
& \rightarrow \text{BENEFICIARY} \rightarrow \text{PERFV} \rightarrow \text{NEG} \rightarrow \text{PROG} \rightarrow \text{FUT} \rightarrow \text{INDIC} \\
& \text{(rule2)} \text{ (rules3,4)} \text{ (rule5)} \text{ (rule6)} \text{ (rule8)} \text{ (rule9)} \text{ (rule10)} \\
& \rightarrow \text{PERF} \\
\end{align*}
\]
The disjunctions just discussed, if encoded in the analysis, cause considerable problems for Extended Word and Paradigm. Revised Word and Paradigm model encode the disjunctions by proper specification of rule inputs. Extended Word and Paradigm Morphological Theory cannot preserve its numbered order while having one rule disjunctively ordered with many. The major problem with Extended Word and Paradigm rule ordering for Gahuku is not so much the numbering as the inability to disjunctively order one rule with a sequence of rules.

5.5.9. AFFIX CLASS FEATURES

One must keep in mind the vital difference between Revised Word and Paradigm and Extended Word and Paradigm morphology when discussing layering and contradictory features. Revised Word and Paradigm model builds both word forms and grammatical representations with morpholexical rules. Extended Word and Paradigm Morphological Theory syntactically builds morphosyntactic representations and these prescribe certain morpholexical rules.

Immediately one must ask what the syntax is doing prescribing affix class features, these are obviously lexically associated. Yet even final desinences are conditioned by affix class. Extended Word and Paradigm morpholexical rules are driven completely by features in the morphosyntactic representation and have no access to lexical features. One could dub all the morphology internal of desinences as lexical morphology and ignore it in the Extended Word and Paradigm approach. This is not a satisfactory solution since object, subject and beneficiary agreement must be regarded syntactically relevant and most other morphology occurs outside this crossreference. Yet Extended Word and Paradigm morpholexical rules have no access to lexicon internal information.

5.5.10. LAYERING

Three pronominal participants are potentially marked on the Gahuku verb. The subject, object and beneficiary. The subject marking appears in a number of positions.

Given that Extended Word and Paradigm Morphological Theory doesn’t allow the marking of pronominal features as subject, object, etc in rules. The interpretation of rules must control a
number of feature layers.  

Pronominal Layers:  [[[Object] Beneficiary] Subject]  

The order of morphology can be seen to be reflected in the order of the pronominal layering though the feature layering is syntactically prescribed. Object and beneficiary pronominal morphology occurs inside of subject pronominal marking generally as in the layering. Object pronouns can be considered closer to the root, because of possible infixing, than beneficiary pronouns.

Similarly the class features of affixes must be layered.  


There is no good reason to layer these features in any other way than the morphology suggests since the syntax cannot prescribe lexical class features.

Many of the Extended Word and Paradigm morpholexical rules were specified as follows-  

[[Class 2]  
   Negative, Class 3]  
     X -> X + em  

This was an attempt to express that the class of the previous formative conditions the next rule. However the previous formative could be a product of the innermost rule and the conditioned formative from the outermost. The actual generalization is that the first preceding non-empty class layer conditions the rule, where layers are only given a class value if the rule at that layer has applied. I know of no way to encode this in Extended Word and Paradigm morpholexical rules. The formalism I used, with conditioning class features inside a single set of brackets, suggests that rules are conditioned by the innermost class layer (ie the root) which is incorrect.

The above layerings of features would need to be kept track of by some interpretation device in Extended Word and Paradigm theory. Furthermore the structure in the morphosyntactic representation reflects that of the morphological formatives. This is more obvious since the word has boundaries, as a product of morpholexical rules, to aid morphonemics. This comes dangerously close to reflecting item exponence for a process-based approach and certainly permits the possibility of undesirable structure access (see previous chapter).

5.5.11. HUA

As something of an afterword I shall discuss problems that come to light in Hua for an Extended Word and Paradigm Morphological Theory model. This perhaps is unfair criticism as I shall not discuss advantages of Extended Word and Paradigm Morphological Theory analyses on Hua verb morphology. However a similar situation to that in Gahuku exists, minus the inter-morphemic conditioning of verb/affix class ablaut.

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4The Extended Word and Paradigm rules above have been designated subject, object, beneficiary for convenience  

5except for lexicon internal root ablaut of course
The Extended Word and Paradigm treatment of ablaut as a relationship between irregular stems, which is relegated to the lexicon, is not supported by Hua data. Hua ablaut is virtually completely regular (Haiman, 1980, pp.49-55). In Extended Word and Paradigm Morphological Theory only sub-regularity is allowed in the lexicon. The Extended Word and Paradigm treatment of ablaut applied to Hua would create enormous redundancy in the lexicon.

Hua demonstrates an example of an intrusive element not found in Gahuku main verbs. One does however occur in Gahuku auxiliary constructions. The initial Hua example demonstrates this:

Example: \( mi + bai + re + hi + ga + e \)

'give'+prog+perf+hab+fut+indic

"You/They all will be habitually giving" (Haiman, 1980, p.80)

The meaning of this verb does not include perfect. Habitual necessarily occurs with the perfect affix and cannot occur in the perfect tense (see Haiman, 1980, pp.137-8).

Likewise the Gahuku habitual aspect is preceded by the perfect always.

Example: \( v + ok + akaq \)

'go'+perf+hab

"we go" (Deibler, 1976, p.77)

Extended Word and Paradigm layering does not cancel features attributed by a previous process. Anderson (1977, pp.21f) allows for the possibility of feature change as an alternative to layering. Conservation of features forbids feature changing (Anderson, 1988b, p.178). Revised Word and Paradigm model has no such restrictions.

Another problem of Extended Word and Paradigm Morphological Theory illustrated by Hua is the loose ordering of the progressive affix which may precede, follow or surround the habitual.

Example: \( hu + bai + ro-hu + e \)

'do'+prog+hab+indic

\( hu + ro-hu + bau + e \)

'do'+hab+prog+indic

\( hu + bai + ro-hu + bau + e \)

'do'+prog+hab+prog+indic (Haiman, 1980, p.138)

Similarly the negative /'a'/may precede a verb root, reside inside the habitual complex, or be infixed before the last syllable of a polysyllabic verb (Haiman, 1980, pp.193-5).

Example: \( 'a' + mi + e \) "He did not give it"

\( mi + ro + 'a' + hi + e \) "He did not use to do it"

\( soko + 'a' + hu ... \) "not be good"

\( ra - 'a' - pai ... \) "not be fat"

Extended Word and Paradigm numbered order obviously cannot cope with such loose ordering. Here the numbering of rules, not the disjunctions, are are an ordering problem.

Finally, the medial verbs of Hua come in both coordinate and subordinate varieties (Haiman, 1980, pp.189-91). The latter have no switch reference marking. Both medial types have anticipatory subject pronominals verb finally. It is hard to see how an Extended Word and
Paradigm Morphological model might structurally assign anticipatory subject information that belongs to a different non-superordinate clause. The subordinate clause could easily be embedded below the superordinate and receive features. The coordinate medials would constitute quite separate clauses though.

Gahuku verbs have switch reference between medial and final verbs. Thus access to final clause subject information is necessary. There is no reason to believe the situation in Gahuku should be any different from that in Hua (see Deibler, 1976, pp63-118).
Chapter 6
A MODEL OF AUTOSEGMENTAL MORPHOLOGY

The purpose of this chapter is to describe and define a model of morphology within the framework of Autosegmental morphology. This theory of morphology was developed in McCarthy (1981) and was shown there to be of inconvertible value in the analysis of Arabic non-concatenative morphology.

The basic inspiration for Autosegmental morphology comes from the theories developed as Autosegmental phonology. This phonological theory allows the specification of phonological features independent of and simultaneous with the string of phonemes with which they are associated. Autosegmental morphology extends these possibilities to the realms of morphology. This idea is not a new one and can be seen in a Firthian prosodic analysis of the Tigrinya broken plurals by Palmer (1955).

Underlying this model of morphology lies the basic assumption that meaning is attributed by morphemes. The morphemes however may be discontinuous, suprasegmental and/or consist of a bundle of features of less specificity than a full phoneme. Thus simultaneity, interspersal and replacive phenomena are accounted for within this theory. Still morphemes are discrete units separately identifiable. Autosegmental morphology accounts for at least some of the data Word and Paradigm models purport to address. Thus there is common ground for comparison.

Because Autosegmental morphology is such a new model it is still in its formative stages. Many of the original proposals are now considered contentious (or if uncontroversial, then plain wrong). It seems the best approach in defining this model, to first describe the original proposal. Following this I will attempt to concentrate on those changes most favoured amongst the fold of adherents or those most likely to be in my judgement.

6.1. THE MODEL

McCarthy (1981) defined the morpheme as n feature matrices associated autosegmentally with a root node μ.

Diagram:

```
[ +F1 ]   [ -F1 ]   [ +F1 ]
[ -F2 ]   [ -F2 ]   [ +F2 ]
[ ... ]   [ ... ]   [ ... ]
```

[Diagram: μ connected to feature matrices]
The basis of the model is that morphemes are associated with each other to form words in sometimes nonconcatenative patterns. This is achieved by the mapping together of tiers carrying phonological and morphological information.

There seem to be three kinds of tiers available to the Autosegmental model of morphology. The morpheme tier contains the symbol μ, identifies the morpheme and carries all non-phonological information about a morpheme. A morpheme is both named and defined at this level.

The morpheme tier is associated with phonological feature matrices (or phonemes for simplicity where possible) on the phonological tier. These features make up the realization of the morpheme to which they are associated. The matrices may constitute a fully specified phoneme, a partial phoneme specification or a suprasegmental feature that acts independently of any single phoneme.

In Autosegmental phonology the phonological tiers are restricted to a prespecified group of features. Thus one might for phonological phenomena require a tonal tier, or a roundness tier for vowel harmony. Only the features specified for a tier may be represented and manipulated on that tier.

The situation is quite different for Autosegmental morphology. The phonological tier is morphologically defined and may contain the wide variety of phonological features necessary to specify the realizations of morphemes. Thus a single phonological tier may contain consonant, vowel and suprasegmental features in combination or in separate feature matrices. Because the phonological tier is morphologically defined, each morpheme has a corresponding phonological tier that is exclusively its own. There is a virtual proliferation of tiers making two dimensional representation sometimes difficult and inaccurate.

Example: Hypothetical Language Bwā

```
Example: Hypothetical Language Bwā

('speak')μ
   μ(nonfuture tense)
   b [+ Hi tone]
   CV
   [+ Lablzn] u
   (Prog aspect)μ
   μ(Indic mood)
```

In the above hypothetical situation consonantal and tone but also vowel and labialization appear to be on the same tier respectively. However these are realizations of separate morphemes and represent separate tiers.

It may appear possible to map morphemes onto a few shared phonological tiers. These could be tonal, vowel, consonant, etc tiers that are phonologically cohesive. Adjacent identical realizations on the same tier should be accounted for by spreading as dictated by the Obligatory Contour Principle\(^1\). However separate morphemes may dictate the same realization on a single tier under

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\(^1\)Obligatory Contour Principle discussed later
this proposal. One would not want one realization for two morphemes that subsequently underwent spreading.

Separate morphemes with realizations on the same tier could not be interspersed or interdigitated under certain conditions as this would lead to crossing association lines. Example: Classical Arabic

Binyan 12 'write' Active Perfective /ktawtab/

(\text{write})_\mu \mu(\text{Binyan 12,13})

Consonant tier

\begin{center}
\begin{tabular}{c c c}
\text{k} & \text{t} & \text{w} \\
\text{b} & \text{C} & \text{C} & \text{V} & \text{C} & \text{C} & \text{V} & \text{C}
\end{tabular}
\end{center}

Binyan 12

As will be seen later this is not allowed in Autosegmental theory. The interspersal of the realizations of morphemes is the purpose behind the creation of Autosegmental morphology. A formalism that impedes this is not of much value in the theory. Thus each morpheme must create its own phonological tier.

In many languages there is no good morphological reason to hold vowels and consonants apart.

The third type of tier is of a somewhat different nature to the others. The prosodic template, otherwise known as the CV-skeleton, is generally represented as a string of C and V symbols representing consonants and vowels as seen above. However in the abstract they can be regarded as segmental slots specified for the phonological features [+ segmental] and [± syllabic]. The prosodic template actually only adds the [+ segmental] information. The [± syllabic] feature is usually specified elsewhere but is necessary in the template regardless. While the prosodic template may carry some meaning it is often not associated with a morpheme in the sense that other phonological tiers are (see McCarthy, 1982; analysis of Classical Arabic). The prosodic template is the receptacle onto which all other phonological tiers are mapped.

The prosodic template is sometimes labelled the melody bearing tier and the phonological tiers are said to contain the melodic elements.

McCarthy (1982, pp409f) foreshadows that it may be possible to associate phonological information concerning feet, syllables and phonological words onto the template in order to supply such information to morphological processes like reduplication.
The principles by which phonological tiers are mapped onto the prosodic template are called the "Universal Conventions for Association" (McCarthy, 1981, p382). Due to terminological sloppiness this association could be confused with that of morphemes to phonological tiers. Thus I will use the following convention-

1. morphemes are preassociated with a phonological tier.
2. phonological tiers are associated with (ie mapped onto) a prosodic template.

Convention 1 states a fact of the lexicon that morphemes have phonological realizations. Convention 2 embodies the theory-specific association principles found in Autosegmental morphology.

The Universal Conventions for Association, which associate phonological information with skeleton slots, are as follows (see McCarthy, 1981, p382)-
1. If there are several unassociated melodic elements (feature matrices of the phonological tier) and several unassociated melody-bearing elements (segmental slots on the prosodic template), the former are associated one-to-one from left to right with the latter.
2. If, after application of the first convention, there remains one unassociated melodic element and one or more unassociated melody-bearing elements, the former is associated with all the latter.
3. If all melodic elements are associated and if there are one or more unassociated melody-bearing elements, all of the latter are assigned the melody associated with the melody bearing element on their immediate left if possible.

The diagrams given represent the effects of these conventions.

Diagram:
1) melody bearing
   A B C ...
   melodic  x y z
   becomes  A B C ...
                                       x y z
2)  A B C D
    x y z
    becomes  A B C D
                       x y z
3)  A B C D
    x y
    becomes  A B C D
                       x y (McCarthy, 1981, p382)
Association lines must never cross if associating the same two tiers.

A further condition on the association is the "Prohibition against Many-to-One association" (McCarthy, 1981, pp382f). More than one melodic element, from the same phonological tier, may not associate with one melody-bearing unit. McCarthy (1981, p383) allows this prohibition to be broken language specifically with tone.

Diagram: So A B C but A B C is ill-formed.

The revised Obligatory Contour Principle (McCarthy, 1982, p384) caused a grammar to be less highly valued should it contain adjacent identical elements on any autosegmental tier. Obviously such a situation can, or should, be handled by the spreading of association allowed above in conventions 2 and 3.

Finally McCarthy (1981, p405) proposes a "Morphological Rule Constraint" that limits the power of morphological rules within the theory. He is then able to claim that this morphological model is strongly constrained to produce only a limited set of possible morphological processes. The Morphological Rule Constraint stipulates morphological rules must be of the form:

\[ A \rightarrow B / X \]  

where \( A \) = zero or a single phonological element. 
\( B \) = zero or a string of phonological elements. 
\( X \) = zero or a string of phonological elements.

McCarthy (1981, p405) claims that transformational rules are too strong, potentially allowing arbitrary operations of infinite complexity that don't occur in known languages.

6.2. THE METHOD

While the formalism involved in the theory of Autosegmental morphology is not overwhelming, it is not immediately clear how this can be used to any great effect. Some exemplification is required.

The set of nonconcatenative morphology McCarthy (1981, p373) claims his model is equipped to explicate includes reduplication, infixation, morphologically-governed ablaut and suprafixedation (i.e suprasegmentals used in morphological marking). To this list I shall add metathesis, as McCarthy (1981, p399) provides an analysis of this for Arabic subject pronominal inflected verbs.

Reduplication in McCarthy (1981, pp407-14) is analyzed in a number of ways, sometimes as a natural consequence of spreading but sometimes as a function of two realizations of a phonological or morphological constituent of the word (e.g syllable \( \sigma \) or morpheme \( \mu \)).

The Arabic ninth verbal binyan (i.e derivational class) reduplicates its final consonant (see McCarthy, 1981, p385) as a function of the shape prescribed by the binyan. The analysis provided by McCarthy (1981, p391) is as follows-
Binyan 1 Active Perfective / katab /  
Binyan 9 Active Perfective / ktabab /

Binyan 9  
Assoc Conv 1  
\[
\begin{array}{c}
C & C & V & C & V \\
\text{kt} & \text{b} & & & \\
\end{array}
\]

becomes by  
Assoc Conv 3  
(of spreading)  
\[
\begin{array}{c}
C & C & V & C & C \\
\text{kt} & \text{b} & & & & \\
\end{array}
\]

This reduplication is a natural consequence of spreading.

This reduplication of morphological or phonological constituents is exemplified in McCarthy (1981, pp407-14) by the Hebrew pə al al binyan and Tagalog verbal aspect reduplication.

Example: Hebrew binyan 1 / sə h ar /  
  'to go about'  
  pə al al binyan / sə h ar ar /  
  'to palpitate'

This reduplication of morphological or phonological constituents is exemplified in McCarthy (1981, pp407-14) by the Hebrew pə al al binyan and Tagalog verbal aspect reduplication.

Example: Hebrew binyan 1 / sə h ar /  
  'to go about'  
  pə al al binyan / sə h ar ar /  
  'to palpitate'

pə al al form

Binyan 1 form

Root

"I suggest that it (ie the pə al al Binyan) is derived from the [CVVCVC] template of the first Binyan by the suffixation of the syllable [CVC], and that then the syllables of the first binyan are mapped -as always from left to right- onto the syllables of the new template." (McCarthy, 1981, p409) The Hebrew example represents the reduplication of a phonological constituent, the syllable.

Following is an example of the reduplication of a morphemic constituent.

Example: Tagalog / um-lə ḳ ad / 'walk'  
  / pag-lə ḳ ad / 'walking'

[@ redup]

The CV of the reduplicated form is prefixed to the root morpheme then a copy of the morpheme is mapped -from left to right- onto the prefixed prosody. The unassociated phonemes of the copy remain unassociated by the prohibition against many to one association.

This represents reduplication of a morphemic constituent (ie the morpheme) and partial reduplication.
Note also the analysis of the Hebrew pilpel Binyan given by McCarthy (1981, p408).

Example: Binyan 1 / gā.lal / 'to roll' (intrans.)
pilpel Binyan / gilgēl / 'to roll' (trans.)

The expanded template is provided by the binyan and the root is reduplicated and associated left to right.

Here we see a different formalism for the reduplication of a morpheme similar to that for the syllable above (except minus initial template by which syllables gain phonemes, morphemes already pre-associated).

Mester (1988) has proposed yet another method of handling reduplication in Autosegmental morphology that seems an improvement on previous methods. Quite simply a copy prosodic template is created parallel to and independent of the original so it may be associated with the stems phonological information also.

Example: CV

\[ \text{la} \quad \text{kad} \quad \text{then} \quad \text{la} \quad \text{la} \quad \text{kad} \]

\[ CV \quad CV \quad CV \quad CV \quad CV \quad CV \]

(see Mester, 1988, 178)

At conflation\(^2\) the copy is inserted in the appropriate place still retaining the associated material.

An analysis of infixation in Binyanim 12-15 is provided in McCarthy's (1981, p393) analysis of Arabic verbs. The infixes /w/ and /n/ are specially associated with the prosodic template before the root consonants associate.

\(^2\)Conflation described later.
This approach to this instance of infixation is to some extent justifiable because the infix is a formative of the Binyan, as is the template. Thus the infix is specially associated with the template before the association of the root consonantism.

The analysis of morphologically governed ablaut is the basis for McCarthy's (1981) analysis of Arabic verbs. These verbs alternate for voice and aspect by alternations of root internal vowels. Without a full explication, which will come later, the following are a few examples.

Example: Binyan 2 Perfective Active / kattab /

Then Perfective Passive / kuttib /

Suprafixation is not analyzed in McCarthy (1981), not being relevant to Arabic morphology. However analyses of such phenomenon in the Autosegmental algorithm abound and are relatively unproblematic in this model.

Example: Coatzospan Mixtec kotondɛe: [+ nas]

ie kot ɛndɛɛ (Lieber, 1987, p43)
Finally, the analysis of metathesis of Arabic verbs involving the switching of order of constituents of different tiers, like consonant and vowel metathesis in Arabic, falls out as a natural consequence of the theory.

Example: Binyan 1 / katab /
Binyan 4 / ?*aktab /

The first vowel and root consonant of the fourth binyan form are metathesized. A change in prosodic template, re-ordering constituents, allows normal association in the metathesized order.

The model of Autosegmental morphology, as described, can account for the Arabic verbal derivation for the most part. However there are some added formalisms that complete the derivation.

The transformation "Eighth Binyan Flop" metathesizes a prefix and root initial consonant.

Eighth Binyan Flop: CC -> CC

The rule "Second, Fifth Binyanim Erasure" deletes the initial association of a spread root final consonant so the root medial consonant may spread.

Second, Fifth Binyanim Erasure

The rule "Vowel Association" assures that in a verb's vowel associations the /i/ vowel is always the last and only the last vowel.

These three morphological rules handle principles of association specific to Arabic that are not handled by the general conventions of association.
The changes in Autosegmental morphology since its inception in 1981 have been many and varied, and yet not sweeping. Perhaps the greatest point of contention has been the nature of the prosodic template. In McCarthy (1981) it is a sequence of segmental slots specified for [+ segmental] and [± syllabic]. Consonants associate with the non-syllabic slots and vowels with the syllabic slots. However since then it has been recognized that consonants may be syllabic and vowels non-syllabic (i.e., syllabic consonants and glides). Obviously, totally unconstrained association of vowels and consonants with [± syllabic] slots will destroy proper association.

Example: \[CVCC\]

Syllabicity is not the only issue here though. McCarthy’s (1981, p382) prohibition against many to one association disallows one segment having two values for one feature. This has been found to be too strong a prohibition. Tones may sequentially associate with one segment and a pre-nasalized consonant might be regarded as a sequence of [+ nasal] [-nasal] features.

Example: \[HL (falling tone) [+nas][-nas] V C\]

Thus it has been proposed that association of the same feature to one slot from different tiers be disallowed (see Lieber, 1987, p12). Lieber (1987, p48) has put forward the Duplicate Feature Filter.

Duplicate feature Filter:

\[\star \quad [\alpha F1]\]
\[\star \quad [\beta F2]\]
\[\star \quad [\gamma F1]\]

Simultaneous values for a given feature are prohibited (Lieber, 1987, p20). Thus the following is also prohibited:

\[\star \quad [\alpha F1]\]
\[\star \quad [\beta F1]\]

This allows sequential values on one tier but not simultaneous on two.

The prohibition against the duplication of features simultaneously has led to the dumping of McCarthy’s (1981) proposal to map [± syllabic] phonological tiers to [± syllabic] prosodies.

McCarthy (1981, p409) allows for phonological information (e.g., syllables, feet, words, etc.) to be specified with a template. Later proposals have discarded the [± syllabic] dichotomy and proposed direct prescription of slot characteristics by the syllable (see Lieber, 1987, pp34ff). One proposal has the template defined in terms of syllable Onset and Rhyme-
Another retains CV symbols but labels C as syllable margin and V as syllable peak-

These proposals include the association of consonants and vowels with onset and rhyme or margin and peak in predictable fashion.

The proposal for the template put forward by Lieber (1987, pp39ff) includes the specification of the timing slots for [± syllabic] and [± consonantal]. Thus we have four symbols-

- C consonant
- C syllabic consonant
- V vowel
- G glide

Feature bundles on phonological tiers are associated with C or C if they have the feature [± anterior]. Vowels, which don’t have marked anteriority associate with V or G slots.

All of these versions of prosodic templates are methods of avoiding the redundancy of stating that consonants associate with consonant slots and vowels associate to vowel slots. Which violates the Duplicate Feature Filter.

Association conventions also have undergone some modification. The universal principles explicated in McCarthy (1981, p382) have been shown to be language specific. Association (see Lieber, 1987, pp31ff) may be leftwards or rightwards but must be one to one (this might even be changed by language specific rule). Association is either phoneme or template driven (see Marantz, 1982, pp445-453).

Diagram: Phoneme driven Template driven

Spreading may be in either direction or bi-directional.

McCarthy (1981, p393 & p401), while positing that certain associations precede the regular rules, never actually proposes lexically prespecified associations that take precedence over regular association (by the Duplicate Feature Filter). Early associations have the same effect however. Lieber (1987, pp50ff) allows for prespecification and lexical linking. Prespecification allows a morpheme of one tier to also have associated with it a feature on another tier that is normally associated with another morpheme. This blocks the regular association of values for that feature. Prespecification does not spread. Lexical Linking is when a morpheme with values on
two tiers has a single element on one tier that for other morphemes of the same type would be underspecified but is actually fully specified.

Lexically blocked initial consonant mutation (Lieber, 1987, p52) can be accounted for as lexical linking of mutation features to the consonant. These are normally underspecified on the initial consonant but not on other consonants. Lieber (1987, pp58ff) analyzes the Arabic verbal infixes as templates prespecified for the infixed consonants. Both template and infix mark the derivational class of the verb.

Infixed (Lieber, 1987, pp62ff) in other languages, but also affixation in general, is achieved by affixes prespecifying their own prosody plus an insertion rule. Similar to how reduplication is portrayed.

Example: Tagalog um sulat \+~ -> sumulat
\VC CVVCVC CVVCVC

It is not completely clear how this insertion works. Presumably some form of transformation applies.

An innovation to Autosegmental morphology introduced by Marantz (1982) is the use of Lexical phonology methodology to intersperse Autosegmental solutions of phenomena like reduplication with phonological rules. Also he allows allomorphy of morphemes following the morpholexical rule and subcategorization frame methodology of Lieber (1980). Thus, for instance, reduplication might be preceded by a phonological rule or subcategorize for a different stem (see Tagalog example of chapter 3).

McCarthy (1986) introduces to Autosegmental morphology the principle of "Tier Conflation". This occurs after the morphological component and pushes all the phonological tiers of different morphemes onto one tier. Its role is somewhat like that of "Bracket Erasure" in Lexical Phonology. Once all the phonological realizations of the morphemes are on one tier, segmental phonology can apply. Thus we have pre- and post-conflation phonology analogous to lexical and post-lexical phonology of Lexical Phonology.
Chapter 7
AGAINST AUTOSEGMENTAL MORPHOLOGY

This chapter takes the model of Autosegmental morphology and criticizes it on theoretical grounds. The basis of Autosegmental morphology (described in the previous chapter) includes morphemes, morphologically defined phonological tiers, prosodic templates, conventions of association and spreading, the Duplicate Feature Filter, the Obligatory Contour Principle and the Morphological Rule Constraint. As theories go it is not heavy in formalism, and the recent trend seems to be to loosen the existing constraints on the model (see Lieber, 1987, pp31ff; association conventions compared to McCarthy, 1981, p382). Perhaps this in itself is a criticism. A theory of language (or anything) should be testable. A theory that allows too much freedom is necessarily untestable.

7.1. THE INTEGRATION OF MORPHOLOGY AND PHONOLOGY

One of the major aims of Lieber (1987, pp1-5) appears to be the integration of the formal systems of Autosegmental morphology and phonology. It is Lieber's (1987, p65) claim that the processes of morphology and phonology have pervasive similarities and that labels such as harmony, mutation, reduplication, infixation, etc obscure these.

Lieber (1987) is correct in so far as the Autosegmental model causes the phenomena to appear similar. However there are similarities between the processes of phonology and morphology. These can be explained by the observation that the former is sometimes the historical antecedent of the latter. Shared history seems poor grounds on which to base integrated synchronic representation. There is an important reason to hold phonology and morphology distinct. The two components of grammar serve functionally different ends. The morphology deals with the signaling of meaning while the phonology controls the interaction of sounds.

There is another reason to hold phonology and morphology apart that comes from within the model of Autosegmental theory. McCarthy (1981, p405) proposes a Morphological Rule Constraint that limits the power available to morphological rules. This rule was not extended to phonology because the increased power was needed there and it was perceived that theories of naturalness could constrain the phonological rules. A recognition of the similarities between morphology and phonology and an integration of the formal theory could lead to the dropping of the Morphological Rule Constraint. Morphologists could well develop a theory of natural morphological change and structure (eg natural morphology; see Bybee, 1985). Within
Autosegmental theory such a prohibition against the use of transformations is a desirable constraint since the theory is attempting to posit a viable alternative to transformational approaches to nonconcatenative morphology.

An integrated theory should perhaps be using Autosegmental phonology and morphology hand in hand together as a single approach. One of the perhaps irreconcilable differences between Autosegmental phonology and morphology is the use of phonological tiers. In morphology these are morphologically defined, a morpheme is pre-associated with a phonological tier and each morpheme creates a new tier.

Phonological issues such as harmony and suprasegmentals involve the mapping of two or more phonological tiers onto the prosodic template where there is essentially no morphemic contrast being elucidated. Tonal features might interact on a tonal tier regardless of the morphemes from which they come. Simple allowance could be made within the morphemic theory to allow the pre-association of morphemes with more than one phonological tier to accommodate these cases. That is, morphemes could have both phonemic and tonal specification on separate tiers.

It is not hard to see where this modification might run into problems though. Vowel harmony, for instance, can usually be attributed to one morpheme’s vowel. The initiator has harmony features that would spread to subsequent morphemes. Spreading would handle the harmony of subsequent vowels with the features being essentially pre-associated with the initiator morpheme. Consider the position of neutral vowels though. Morphemes with neutral vowels, unchanged for harmony, would need to be pre-specified for or perhaps pre-associated with the neutral vowel features. The neutral features can not be pre-specified on the harmony tier, since this tier is morphologically defined as that of the harmony initiating morpheme. But if the neutral vowel is pre-associated with the neutral morpheme on a separate morphologically defined tier it will not interact with the harmony because it is on a different tier. Neutral vowels may interact with and block harmony from proceeding to subsequent phonemes (see Lieber, 1987, p131).

Worse still, in Zulu (Lieber, 1987, pp173ff) the stems and prefixes have their own specifications for tone which interact in complex ways. The complex interaction would need to be resolved on one phonological tier. Yet if the tones are are pre-associated to morphemes and have separate tiers this would be impossible.

Morphologically defined phonological tiers of Autosegmental morphology are generally incompatible with the phonologically defined tiers of Autosegmental phonology. Tier conflation merges morphologically defined phonological tiers at the end of morphological derivation. There is no explicit provision for the subsequent creation of phonologically defined phonological tiers. Once phonologically defined tiers are created then the morphological information of morphologically defined tiers would be lost. It is conceivable that subsequent phonological rules might need reference to morphological information which is lost.

The distinction of post- and pre-conflation raises more problems. Pre-conflation phonology is
analogous to lexical phonology or morphophonemics in other models. There is the possibility that pre-conflation phonology might need Autosegmental explication. How can phonologically defined tiers be created before the morphologically defined tiers are conflated? In pre-conflation, there is no allowance for the phonological interaction of morphologically defined phonological tiers in Autosegmental terms.

Within Autosegmental phonology there is need for treatment of features from separate morphemes on the same tier. Within Autosegmental morphology phonological tiers must belong to one and only one morpheme. It seems in Autosegmental phonology there is evidence of the fusion of morphemes in the interaction of features from separate morphemes. This does not bode well for the concept of discrete but nonconcatenative morphemes that Autosegmental has put forward.

### 7.2. ABSTRACTION

The analysis in McCarthy (1981) of Classical Arabic verb forms is notable for its reflecting of the Arabic writing system and traditional Arabic work in grammar. That is, it uses consonantal roots interspersed with inflectional vowel patterns plus assorted affixes. The components of the analysis have no existence independent of the analysis. The morphemes proposed are not possible Arabic phonological strings and only in the context of their Autosegmental combination can they produce such.

Concatenative morphological models generally produce morphemes of acceptable phonological form. This is obviously a comment on the specific nature of a single analysis of Arabic and other Autosegmental analyses need not follow this pattern. Yet any analysis in the Autosegmental model necessarily includes certain abstract traits.

Given that the feature bundles used in expressing phonemes reflect some level of reality. This is already a large assumption at the mostly abstract level of representation that is phonology. An Autosegmental approach to morphology takes this reality and divides it amongst numerous tiers. The features of a single phoneme may be drawn from three or more tiers. Necessarily, the syllabic features being represented on the prosodic template and the other features on the phonological tiers\(^1\), there is a binary split in representations. The templates constructed of syllable constituents are no less abstract. Prosodic syllable characteristics are still separated from the phonological tiers but these also appear as phonological features on the phonological tiers.

If such morphological phenomena as suprafiction, ablaut, mutation or phonological harmony and suprasegmentals are being considered then a ternary, or greater, breakup of featurized phonemes is likely. The ternary division is between template, suprasegmentals for instance, and the actual segmental features. The actual alternations suggest a binary division between

\(^1\)in the original version of the theory
segmental features and suprasegmental features. The underspecified phonemes and suprasegmental feature specifications have no phonological realizations independent of each other.

The proposal in Lieber (1987, pp39ff) has [+syllabic] and [+consonantal] features in the template and phonemes mapped to these on the grounds of whether they contain the feature [+anterior] which is exclusively a consonantal feature. This leads to more underspecified phonemes than other Autosegmental approaches.

The final criticism of Autosegmental approaches to morphology involving abstractness is that of psychological plausibility. Although few theories within linguistics make strong claims regarding this, a theory should still remain accountable on these grounds.

In all morphemic models of morphology the morpheme is an independent unit registered for form and meaning on a list in the lexicon. There would seem little plausibility in a claim that features of suprafaction like [+nasal] (see Lieber, 1987, pp42f; Coatzoapan Mixtec) are listed as a unit of realization of a particular meaning in the lexicon. Each occurrence of the [+nasal] phonological feature might signal this morpheme in such a circumstance. Such suprafaction alternations are a function of the words they modify.

The likelihood of template representations being associated with meaning in the lexicon, following McCarthy’s (1981) analysis of Arabic Binyanim, as opposed to processes manipulating constituent order (eg metathesis) seems dubious.

The phoneme driven association of Marantz (1982) allows the specification of one template for prosodically disparate reduplications. The copied form generally conforms to the prosodic shape of the stem or some part of this. Using a special principle and a single template, rather than two or more templates, to derive differently shaped copies only adds to the abstraction of the Autosegmental model. For a set of reduplications the skeleton need not represent their actual shape.

One must consider that in a partial reduplication a full copy of the reduplicated information is only partially realized in an Autosegmental analysis. This represents further abstraction since there is no reason to expect the unrealized portion exists.

7.3. ASSOCIATION

The principles of association have undergone radical modifications in Autosegmental theory since McCarthy’s (1981, p382) "Universal Conventions". Lieber (1987, p64) allows association both rightwards and leftwards, but still must be one to one. Spreading (Lieber, 1987, p64) is leftwards, rightwards or outwards. The Duplicate Feature Filter (Lieber, 1987, p20) has replaced the "Prohibition against many to one association" (McCarthy, 1981, pp382f). Marantz (1982, pp445-453) has introduced the concept of phoneme driven association, relevant where the
phonological tier does not exactly match the prosodic template. Although created for reduplication the principle has the potential for use wherever templates are not prescribed by the normal shape of the stem and some mismatch might occur (eg Yawelmani stem consonants; Archangeli, 1983, pp375).

There has been some contention regarding the nature of the prosodic template in Autosegmental theory. Basically (sidestepping all the formalism) consonant features associate with consonant slots, and vowel features associate with vowel slots, but consonants are sometimes syllabic and vowels sometimes glides. There seems to be some problem with stating this without duplicating features and violating the Duplicate Feature Filter.

McCarthy’s (1981, p387) proposal to map bundles with features [+syllabic] to template positions that are [+syllabic] is a blatant violation of the Duplicate Feature Filter. The Duplicate Feature Filter wasn’t extant then. However the principle is a desirable one in Autosegmental theory since it constrains simultaneous separate specifications for Autosegmental features.

The prescription of template slots by syllable structure, either margin and peak or onset and rhyme, seems the most successful method of not duplicating features on phonological and prosodic tiers. But surely these are just notational variants of the [+syllabic] feature and disguise the issue without curing it.

The methodology of Lieber (1987, pp39ff) sidesteps the issue by mapping [+anterior] feature bundles at phonological tiers (ie consonants) to [+consonantal, [+syllabic] template positions, and those bundles without a [+anterior] feature (ie vowels) to [-consonantal, [+syllabic] positions. This solution only disguises the problem. Implicationally, [+anterior] $\subseteq$ [+consonantal].

The mapping of anterior and consonantal features still violates the Duplicate Feature Filter. Example: Consonant Mutation

\[
\begin{array}{c}
\mu \text{(root)} \\
\text{[- coronal,} \\
\text{+ anterior,} \\
\text{+ voice,} \\
\text{+ labial]} \\
\text{C} \\
\text{[+ continuant,} \\
\text{+ nasal]} \\
\mu \\
\end{array}
\]

This initial mutation’s phonological tier should have a [$\alpha$ anterior] specification to associate to the consonant position.
So: Consonant Mutation

µ(root)

[- coronal, + anterior, + voice, + labial]

[a]

C V V

[+ continuant, + nasal, α anterior]

µ

This certainly violates the schematic representation of the Duplicate Feature Filter:

* [α F1]
  /|
 [β F2]
  /|
 [γ F1] (Lieber, 1987, p48)

If one regards [α anterior] as a true value for [anterior] then this represents a violation of Duplicate Feature Filter prohibition on simultaneous values for one feature. To map two or more consonant feature bundles from a phonological tier onto a consonant position one must necessarily re-iterate anteriority to enable all bundles to associate. Consonants need the [anterior] feature in order to associate. No matter what features are used for association when more than one phonological tier maps onto the same prosodic position each must have a value for the feature used in association and so violate the Duplicate Feature Filter.

One might not regard the use of a [α anterior] feature as a true value for [anterior] and so not a violation of the Duplicate Feature Filter. Then this use is purely an artifice aimed at achieving an apparently right answer with no regard for the facts. There can be no reason to believe the consonant mutation features actually include [anterior] in reality.

The Duplicate Feature Filter seems to create more problems for Autosegmental theory than it does work. Does the theory need a Duplicate Feature Filter?

The Duplicate Feature Filter prohibits associations such as the following:

a. [+ F1]  
   X 
   [- F1]

b. [+ F1]  
   X  
   [+ F1]

Example a is plainly contradictory and cannot be allowed to be formed in any Autosegmental analysis. Example b is simply bad form, allowing two tiers (and thus two morphemes) to prescribe one feature value.

One could propose an evaluation metric labelling Autosegmental analyses as comparatively bad for the simultaneous association of noncontradictory features on one template position. This
would have the effect of labelling all Autosegmental grammars as not the best possible as the necessities of association require such duplication.

It is not difficult to infer that example b above could represent the same feature value on one tier prescribed by two morphemes. This does not fit the Autosegmental model of discrete nonconcatenative morphemes as it looks unsurprisingly like the fusion of two morphemes, and would violate the principle of morphologically defined phonological tiers.

Example:

\[ \mu \quad \mu \]
\[ [+ \text{F1}] \]
\[ X \]

Obviously the Duplicate Feature Filter is necessary to the Autosegmental theory and yet association must violate it to apply in a principled way.

**7.4. MORPHOLOGICAL RULE CONSTRAINT**

The Morphological Rule Constraint was introduced to Autosegmental morphology by McCarthy (1981, pp405-7). Its purpose was to limit the power available to morphological rules since McCarthy (1981, pp405f) recognized transformations were capable of infinitely more complex derivations than languages are.

The Morphological Rule Constraint is obviously too strong a constraint though. McCarthy (1981) has morphological rules that obviously violate this constraint.

Example: Eighth Binyan Flop

\[ \text{t} \quad \text{t} \]
\[ \mu(\text{reflexive}) \]

(McCarthy, 1981, p390)

Lieber (1987) also has morphological rules that violate this constraint.
None of the rules given above conform to the pattern of the Morphological Rule Constraint as follows:

A -> B / X  
(McCarthy, 1981, p405)

A = { 0, 1 } element
B & X = { 0, 1, ..., n } elements

Derivational strength is necessary even in the Autosegmental model of morphology. The process of association and spreading of template and phonological tiers plus Erasure and other morphological rules is capable of just as unlikely permutations as transformations. The following is a possible Autosegmental derivation that is not particularly likely in natural language-

7.5 REDUPLICATION

The morphological rule constraint in the Autosegmental model determines the form of the rule and not necessarily its behavior. Thus there exist the morphological rule constraint which was defined in the example from McCarthy (1981) and Lieber (1987) given above. Constraining the set of transformational processes has been used both to control the language data, and to possible morphological processes and restrictions on features such as the use of duplications.
Example: Hypothetical language 'Badijuidab'

by regular left to right spreading plus Middle delinking.

Middle Delinking

...C V...V C...

Middle Delinking is a quite possible rule of Autosegmental morphology when compared with those above. It is little different from the German Umlaut Delinking shown above.

Power in a morphological model is not necessarily a bad property. More than allowed by the Morphological Rule Constraint was needed in the examples from McCarthy (1981) and Lieber (1987) given above. Constraining the use of transformational power must be done with reference to language data, actual possible morphological processes and commitment to surface real analyses.

7.5. REDUPLICATION

The nonconcatenative phenomenon Autosegmental morphological theory was developed to explain hold a special status in the model. The Autosegmental model compared to the concatenative models of the morpheme is complex. Thus if the Autosegmental approach renders no advantage in these areas of nonconcatenative morphology it is of little worth saving the extra formalism that differentiates this model from the concatenative. Developments in Marantz (1982) have brought Autosegmental and Generative morphology closer together.
Analyses of reduplication are amongst the least coherent in Autos~gmental morphology. Reduplication may be full or only partial, the latter involving as little as one phoneme. Autosegmental treatment of reduplication can be achieved in terms of spreading, normal association, or by a re-iteration of a copied syllable, morpheme, etc. The difference in treatment does not amount to a coherent typology of reduplication though\(^2\). One would expect such disparate methods of treatment of reduplication to amount to a major empirical difference.

Reduplication by association or by spreading is not treated a reduplication by Autosegmental theory. Yet under normal definitions it would be seen as such.

Example: Classical Arabic Binyan 1 /katab/  
Binyan 9 /ktatab/ (rightwards consonant redup.)  
Binyan 6 /takaatab/ (leftwards vowel redup.)

The binyan 9 form is achieved by the spreading of the final consonant into an empty C slot. The binyan 6 form is achieved by the normal association of vowel melody with the first vowel slot rightward.

The vowel reduplication above, or what would be in any other analysis, makes the rather foolish claim that the reduplicated vowel is the base vowel. Reduplication of one phoneme, or one per morpheme is possible\(^3\), is achieved in Autosegmental theory by spreading of some segment of the stem.

Levantine Arabic dialect has a type of reduplication (see McCarthy, 1982, p212) which might be seen as the normal spreading type. That is, the melody of a single consonant fills an empty consonant slot. These forms are not dissimilar to the Classical Arabic Binyan 12 forms.

---

\(^2\)eg partial reduplication by association and spreading, full reduplication by re-iteration would be a nice typological split but doesn’t represent the reality of Autosegmental analyses

\(^3\)eg hypothetical Arabic word /katabab/ by spreading of vowel phoneme from the vowel aspectual morpheme and consonant phoneme from the root consonant morpheme rightwards on a [C V C V C V] skeleton
Example: Classical Arabic Binyan 1 / katab / Binyan 12 / ktaaab /

Such internal reduplication across a consonant occurs in the Levantine Arabic dialects. However the reduplicated consonant is the first of the root and the consonant between the original and the copy is the second of the root.

Example: Levantine Arabic Intensive/Perjorative verb formation
root "fr$h" - /farfa$h/ 'rejoiced'
"b$ba$" - /ba$h,b$a$/ 'sought'
"mr$" - /marmat$/ 'cut unevenly'

(McCarthy, 1982, p212)

While these typologically are similar to spreading across an infix in Classical Arabic, and do only involve one consonant, they cannot be analyzed in this way in Autosegmental theory.

Example:

The association line of the initial consonant must cross that of the second which is prohibited in Autosegmental morphology. The simplest, aesthetically most pleasing and likely process approach would be a simple reduplication and infixing of the appropriate consonant. These forms constitute strong proof that an Autosegmental analysis of Levantine Arabic would be incorrect with respect to this phenomenon. Perhaps the Autosegmental analysis of any Arabic reduplication is misguided.

McCarthy (1982, pp212-14) provides a re-iterative analysis of the Levantine Arabic Intensive/perjoratives that includes two special association rules. McCarthy (1982, p214) requires that all root consonants be mapped once at least onto the prosody. He also provides an association convention-
Intensive/Perjorative Association

\[CVCCC\]

\[\{X|\alpha y\}\]

(McCarthy, 1982, pp213f)

Example: / farfa\~ /

The requirement that all root consonants be mapped onto a prosody is not demonstrated in Arabic use of Quinqueliteral nouns as Quadriliteral verbs.

Example: noun / ma\~na\ t ii \~s / "magnet"

Quadriliteral Binyan 1 \~m\~n / ma\~n / "to magnetize"

The requirement in the Levantine Arabic analysis should be dropped in favour of another association principle specially associating the last consonant.

There are many problems with the above type of re-iterative reduplication. Firstly, the use of three copies of a morpheme to achieve a single reduplication is overly complex and unmotivated. The nature of the association between the three morphemes is unspecified within the theory. Which morpheme actually marks (in this case) Intensive/Perjorative? There are no Intensive/Perjorative morpheme and the root morphemes mark root concepts. In the Arabic case, and in similar Hebrew cases, the Binyan may be associated with a certain template and have meaning (for instance, an Intensive/Perjorative Binyan). This will not work for much non-Semitic data and if templates carry meaning they should be pre-associated with morphemes much like the phonological tiers.

The re-iterative syllable reduplication demonstrated in McCarthy (1981, p49) has problems analogous to those found for reiterative morpheme reduplication. Three syllable copies, the nature of association between syllable copies and the lack of a morpheme that marks the reduplication's meaning.
Example: Hebrew
Pa ?al ?al form

Binyan 1 form

root

(McCarthy, 1981, p409)

A further problem with this analysis is there is no explicit principle by which phonemes may be pre-associated with the template and syllables (as they are with morphemes) to give copies of syllables and template on another tier identical melody. There is no a priori reason to expect that a copy of template portion and syllable in this model includes the phonemes mapped there. Obviously, the morpheme needs copying also.

McCarthy (1981, p413) provides another method by which reduplication may be analyzed.
Example: Tagálog / pag-lalakad / "walking"

This analysis has problems of its own. The reduplicative part of the prosody is affixed with the feature [+redup], then the root morpheme is copied and associated with the affix. Still there is no morpheme marking the reduplication meaning. Furthermore there are no Binyan templates to do this work. Also the feature [+redup] is borne by the CV-affix but what tier does it exist on? It is certainly new to the prosodic and phonological tiers and is not meaningful like [+ Intensive] or some such morphological feature might be. It represents a formal feature of the word form and thus should be at the prosody, yet no allowance is made for such a feature there (ie [+con], [+syl], [+rdup] ?).

The methodology of Mester(1988) of using two parallel templates to create a copy of the reduplicated stem is not as incoherent as the above methodologies.
Example:

The existence of parallel copies of the stem is impossible to prove. The copy must be labelled as a prefix, suffix, etc in some unspecified way. It is possible that both types of reduplication may occur in a language. Conflation becomes a complex morphological operation that must insert these copies in the proper position. Morphology may follow the reduplication, before conflation,
so such insertion must search for or remember the appropriate place to place the copy. In some reduplications this is not always next to the copied stem. Such a conflation may run into problems and is surely too powerful. Access to preceding morphological structure is generally not allowed in modern morphological theory as there is no reason to believe morphemes can be affixed in any order except outwards on the outside of existing structures. This conflation when made more explicit would certainly violate the Morphological Rule Constraint.

Reduplication is best analyzed as a process.

### 7.6. INFIXATION

as with reduplication there is more than one method of describing infixation in Autosegmental morphology. One method applies to Arabic and similar languages that are provided with meaningful templates. The other to languages that don’t have Binyanim or similar meaningful prosodies.

Infixation in the Arabic Binyanim 12-15 is described in McCarthy (1981, pp393f) as the result of the association of the infix before the regular association and spreading of the consonant root.

Example: Binyan 12 /ktawtab/

```
Infix Association

\[ CCVCVC \]

\{(w,n)\}

\( \mu \)

Binyan 12

\[ CCVCVC \]

\( k \)

\( t \)

\( b \)

\( \mu \)

(McCarthy, 1981, p393)
```

This analysis needed to erase the spreading of the /w/ to allow the /t/ to properly spread. Lieber (1987, p61) shows that the subsequent spreading should associate either /w/ or /t/ but not specifically the latter to the emptied slot as is desired.

Example:

```
CCVCVC

\( w \)

(Lieber, 1987, p61)
```

In Lieber’s (1987, pp60ff) analysis the /w/ is lexically prespecified on the template and thus does not spread.
Lieber (1987, pp61-3) further proposes infixation derivations for languages without Binyanim.

Example: Tagalog

\[ \text{um VC} + \text{CV CVC} \rightarrow \text{CV CVCVC} \]

(Lieber, 1987, p63)

Infixes are prespecified with their own template and inserted in the appropriate position. This approach requires a process rule to insert the infix correctly. Lieber (1987, p63) is not completely explicit about the nature of the rule used to infix the affix. Such a rule violates the Morphological Rule Constraint.

**7.7. ABLAUT**

The explication of ablaut is one of the major purposes in McCarthy’s (1981) analysis of Arabic verb patterns. The alternating vowels are represented as the realizations of aspect/voice morphemes interspersed within consonantal roots.

Example:

\[ \mu(\text{perfective active}) \]

The first Binyan is however irregular and requires special derivation with regards to the vowel patterns-

[First Binyan, Active] [CVV]

\[ a \]

(McCarthy, 1981, p403)

This rule attaches the first vowel of the first Binyan which must always be /a/ in the active. The second vowel in this Binyan usually alternates for perfectivity and is lexically determined-

Ablaut

\[ \mu(\text{Imperfective}) \rightarrow \mu(\text{Perfective}) \]

\[ [\alpha \text{ hi}] \sim [-\alpha \text{ hi}, \alpha \text{ back}] \]

(McCarthy, 1981, p403)

There is a group of verbs that take /u/ in both perfective and imperfective as their second vowel. The rule above gives alternations as follows-

<table>
<thead>
<tr>
<th>Imperfective</th>
<th>Perfective</th>
</tr>
</thead>
<tbody>
<tr>
<td>i</td>
<td>a</td>
</tr>
<tr>
<td>u</td>
<td>a</td>
</tr>
<tr>
<td>a</td>
<td>i</td>
</tr>
</tbody>
</table>

(see McCarthy, 1981, p403)

This rule should be represented as unidirectional since a perfective /a/ ambiguously corresponds to an imperfective /i/ or /u/.
Verbs with /a/ in the perfective don’t have a choice of /i/ or /u/ in the imperfective but are lexically determined as one or the other.

- Imperfective: {i, u} → a
- Perfective: a

McCarthy (1981, pp403f) shows that the rule he gives predicts the alternations of the regular vowel morphemes' last vowel.

<table>
<thead>
<tr>
<th>Active- Imperfective</th>
<th>Perfective</th>
</tr>
</thead>
<tbody>
<tr>
<td>u a i</td>
<td>a</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Passive- Imperfective</th>
<th>Perfective</th>
</tr>
</thead>
<tbody>
<tr>
<td>u a</td>
<td>u i</td>
</tr>
</tbody>
</table>

So: Active- Imperfective → Perfective

<table>
<thead>
<tr>
<th>Passive- Imperfective</th>
<th>Perfective</th>
</tr>
</thead>
<tbody>
<tr>
<td>u [- hi]</td>
<td>u [+ hi, -back]</td>
</tr>
</tbody>
</table>

Showing such alternations within morphemes does not bode well for a morphemic analysis as it represents non-morphemic exponence.

Lieber (1987, pp72-129) dedicates a whole chapter to mutation processes (i.e., umlaut, consonant gradation, etc). The processes examined stand out in that most articulatory features are held constant while some one or two are manipulated for some morphological alternation. A word may occasionally not take some or all alternations idiosyncratically. This is explicated by lexical linking or pre-specification of the feature on the word so the autosegment may not associate.

Ablaut is a quite different kind of process. Often all vowel features are changed in an ablaut alternation. Rules may be the exact mirror image of each other, as the Arabic case below can be represented.

Example: [Imperf -> Perf] a → i

One phoneme may alternate with more than one, as the Arabic case below shows.

Example: [Imperf -> Perf] u → a

Ablaut may often be idiosyncratic, not just in blocking (like mutation) alternations, but in having multiple possibilities or reversals of processes. True process formalism is needed for such
operations as is not available to Autosegmental theory. McCarthy’s (1981, p403) Ablaut rule violates the Morphological Rule Constraint but still does not adequately describe the data.

### 7.8. SUPRAFIXATION

Suprafixation manipulates features such as tone, stress, etc. that are addressed in suprasegmental terms and are most often not morphologically determined. Meaningful alternations in these constitute suprafixation.

Few analyses of suprafixation occur in the Autosegmental literature. However, suprasegmentals are the forte of Autosegmental theory. I can see little reason to suspect Autosegmental analyses might not be able to adequately and appropriately represent suprafixation. However, as commented before in the first section of this chapter, if suprafixes are on separate morphologically defined tiers and are expected to phonologically interact this will not be possible until after conflation when morphological information is lost.

### 7.9. METATHESIS

Metathesis poses little problem for Autosegmental theory if a consequence of the mapping together of separate morphemes (e.g.: Arabic consonants and vowels) and template shape.

**Example:**

<table>
<thead>
<tr>
<th>Binyan 1</th>
<th>/katab/</th>
<th>Binyan 4</th>
<th>/ʔaṭab/</th>
</tr>
</thead>
<tbody>
<tr>
<td>Binyan 1</td>
<td>C V C V C</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>k t b</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Binyan 4</td>
<td>C V C C V C</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>k t b</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Even concatenative morphemes could metathesize segments in a Autosegmental analysis.

**Example:** Arabic Binyan 8 /katab/ Hypothetical form /tkatab/  

**Hypothetical Form**

<table>
<thead>
<tr>
<th>Binyan 8</th>
<th>C C V C V C</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>k t b</td>
</tr>
</tbody>
</table>

(see McCarthy, 1981, p390)

Where the metathesized segments map onto the same type of slot some sort of process is needed to reverse their order (see McCarthy, 1981, p390; Eighth Binyan Flop).
Problems arise for Autosegmental formalism if metathesis is morpheme internal.  

Example: Rotuman  
\[
\begin{align*}
\text{/ seseva /} & \sim \text{/ seseav /} \\
\text{/ hosa /} & \sim \text{/ hoas /} \\
\text{/ pure /} & \sim \text{/ puer /}
\end{align*}
\]

(Churchward, 1940, p14) 

Firstly, a process rule derivation is needed. Secondly, such a rule, or any other Autosegmental analysis of morpheme internal metathesis, would result in crossing association lines or incompatible morpheme representations. 

Examples:

\[
\begin{align*}
\text{\textbullet} \seseva & \Rightarrow \text{\textbullet} \seseva \\
\text{CVCVCV} & \sim \text{CVCVVC}
\end{align*}
\]

Or-

\[
\begin{align*}
\text{\textbullet} \seseva & \Rightarrow \text{\textbullet} \seseva \\
\text{CVCVCV} & \sim \text{CVCVVC}
\end{align*}
\]

This latter solution would demand the subcategorization and morpholexical rules\(^4\) of Lieber (1980) advocated in Marantz (1982) for Autosegmental morphology and a zero morpheme for the morphological feature triggering metathesis. This solution obscures the regular process between alternates. Both solutions show Autosegmental formalism alone cannot derive morpheme internal morphological metathesis.

7.10. CONCLUSIONS

From the discussion in this chapter it has become apparent the model of Autosegmental morphology is incompatible with that of Autosegmental phonology. The phonological tiers of the former are morphologically defined. The phonological tiers of the latter are phonologically defined. An integrated analysis using Autosegmental formalism in both phonology and morphology would be impossible under these circumstances.

The abstraction that Autosegmental morphological formalism encourages is not a desirable property of an analysis. Too abstract an analysis proves only that the analysis is possible and says little about the language analyzed or the psychological reality of the analysis.

Association in Autosegmental morphology achieves the mapping of consonants and vowels onto consonant and vowel slots, respectively. To achieve this some feature matching between tiers must take place. This leads to the nonsensical situation where features might be duplicated on separate tiers. Yet duplication of features on separate tiers must be disallowed to stop contradiction or apparent morphological fusion.

---

\(^4\)essentially stem allomorphy
Constraint of the type of rule allowable in a morphological theory does not necessarily stop the ability to create ridiculous permutations. The Morphological Rule Constraint is often violated by Autosegmental analyses of language data using disallowed rule types. The use of the Morphological Rule Constraint seems to only marginally reduce the amount of ridiculous analyses possible.

A theory of nonconcatenative morphology (McCarthy, 1981, p373) should be required to explicate the set of morphological phenomena dubbed nonconcatenative. The theory of Autosegmental morphology does not provide adequate analyses of many facets of morphology such as reduplication, infixation, ablaut, suprfixation, and metathesis called nonconcatenative by McCarthy (1981, p373). The analysis of reduplication is inelegant, complex and inappropriate. Analysis of ablaut, infixation and metathesis require process approaches for common situations met with these phenomena.
Chapter 8

ARABIC AND AUTOSEGMENTAL MORPHOLOGY

While possibly not representative of the full spectrum of Autosegmental analyses, McCarthy's (1981) analysis of Arabic verb forms is at its base. This analysis demonstrates how Autosegmental theory can be used to explicate discontinuous morphemes, reduplication, infixation, ablaut and metathesis. Furthermore the Arabic verb forms represent an entire system of verbal morphology that is accessible to a Autosegmental explication where concatenative solutions were inadequate.

Arabic and other Semitic languages have always been problematic for morphological theory. McCarthy's (1981) analysis filled an obvious gap in modern morphological theory. Semitic languages are one of the few groups that can be analyzed to a large extent by Autosegmental theory.

While Autosegmental methodology can be used on concatenative morphology, the route of simplicity while retaining adequacy and appropriateness would surely lead to a non-Autosegmental morphemic treatment. The few examples of nonconcatenative morphology that occur in any one non-Semitic language could well be described or analyzed in different terms. Thus the analysis of Arabic verb stems in McCarthy (1981) in a sense justifies the existence of Autosegmental morphology.

As I shall argue later the morphology of Arabic verbs can also be analyzed in a different algorithm, that of Word and Paradigm morphology. Word and Paradigm morphology is as much a theory of nonconcatenative morphology as is Autosegmental theory. However it is not a theory of Autosegmental exponence. It is rather, a theory of word-based exponence built by morpholexical process.

It would be possible to attempt an analysis of Arabic in a Word and Paradigm approach that is the exact alter-image of the Autosegmental analysis of McCarthy (1981), for instance, slotting vowels amongst consonants, etc. However I propose to analyze the verb forms in terms of a base root with vowels that alternate by ablaut processes and other stem changing processes. In this I follow the analysis of Horvath (1981) of Hebrew stems.
8.1. AN AUTOSEGMENTAL ANALYSIS OF ARABIC VERB FORMS

I have alluded to various parts of McCarthy’s (1981) analysis of Arabic in the previous chapters to elucidate the methods within the Autosegmental framework of explicating various morphological contingencies. What follows is a full picture of much that is explicated of Arabic verbal morphology in McCarthy (1981). The triliteral Binyanim 1-15 and the quadriliteral Binyanim 1-4 are thus explicated. No proper analysis of the Binyan 1 participles will be given since none is provided (nor the data provided) by McCarthy (1979, 1981). McCarthy merely gives the assertion that they are idiosyncratic in character (McCarthy, 1979, p173). Analysis of these participles will extend as far as the data given in McCarthy (1981).

8.1.1. CLASSICAL ARABIC VERB PARADIGM

<table>
<thead>
<tr>
<th>Binyan Triliteral Roots</th>
<th>Perfective Active</th>
<th>Imperfective Active</th>
<th>Participle Active</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Passive</td>
<td>Passive</td>
<td>Passive</td>
</tr>
<tr>
<td>1 katab</td>
<td>kutib</td>
<td>aktub</td>
<td>kaatib</td>
</tr>
<tr>
<td></td>
<td></td>
<td>uktab</td>
<td>maktuub</td>
</tr>
<tr>
<td>2 kattab</td>
<td>kuttib</td>
<td>ukattib</td>
<td>mukattib</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ukaatib</td>
<td>mukaatib</td>
</tr>
<tr>
<td>3 kaatab</td>
<td>kuutib</td>
<td>ukaatib</td>
<td>mukaatib</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ukaatab</td>
<td>mukaatab</td>
</tr>
<tr>
<td>4 ?aktab</td>
<td>?uktib</td>
<td>u?aktib</td>
<td>mu?aktib</td>
</tr>
<tr>
<td></td>
<td></td>
<td>u?aktab</td>
<td>mu?akttab</td>
</tr>
<tr>
<td>5 takattab</td>
<td>takuttib</td>
<td>atakattab</td>
<td>mutakattib</td>
</tr>
<tr>
<td></td>
<td></td>
<td>utakattab</td>
<td>mutakattab</td>
</tr>
<tr>
<td>6 takaatab</td>
<td>takuutib</td>
<td>atakaatab</td>
<td>mutakaatib</td>
</tr>
<tr>
<td></td>
<td></td>
<td>utakaatab</td>
<td>mutakaatab</td>
</tr>
<tr>
<td>7 nkatab</td>
<td>nkutib</td>
<td>ankatib</td>
<td>munkatib</td>
</tr>
<tr>
<td></td>
<td></td>
<td>unkatab</td>
<td>munkatab</td>
</tr>
<tr>
<td>8 ktatab</td>
<td>ktutib</td>
<td>aktatib</td>
<td>muktatib</td>
</tr>
<tr>
<td></td>
<td></td>
<td>uktatab</td>
<td>muktatab</td>
</tr>
<tr>
<td>9 ktabab</td>
<td>aktatab</td>
<td>muktatib</td>
<td></td>
</tr>
<tr>
<td>10 staktab</td>
<td>stuktib</td>
<td>astaktib</td>
<td>mustaktib</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ustaktab</td>
<td>mustaktab</td>
</tr>
<tr>
<td>11 ktaabab</td>
<td>ktaabib</td>
<td>muktaabib</td>
<td></td>
</tr>
<tr>
<td>12 ktawtab</td>
<td>ktawtab</td>
<td>muktawtab</td>
<td></td>
</tr>
<tr>
<td>13 ktawwab</td>
<td>aktawwib</td>
<td>muktawwib</td>
<td></td>
</tr>
<tr>
<td>14 ktabab</td>
<td>aktanbib</td>
<td>muktanbib</td>
<td></td>
</tr>
<tr>
<td>15 tanbay</td>
<td>aktanbiy</td>
<td>muktanbiy</td>
<td></td>
</tr>
</tbody>
</table>
Quadriliteral Roots
1 da~ raj du~ rij udah rij muda raj
2 tada~ raj tudu~ rj atada~ raj mutada~ rj
3 d~ anraj d~ unrij ud~ anrij mud~ anraj
4 d~ arjaj d~ urrij ad~ arjij ud~ arjaj mud~ arjaj

8.1.2. PROSODIC TEMPLATES

Prosodies
a. C V C V C
b. C V C V C V C
c. C V V C V C
d. C V C V C C V C
e. C V C V C V C
f. C C V C V C
g. C C V C C V C
h. C C V V C V C

(McCarthy, 1981, p386)

8.1.3. BINYANIM AND PROSODIES

Triliteral Binyanim
a. 1
b. 2, 4
c. 3
d. 5
e. 6
f. 7, 8, 9
g. 10, 12, 13, 14, 15
h. 11

Quadriliteral Binyanim
b. 1
d. 2
g. 3, 4

8.1.4. ROOT MORPHEMES

Example:

\[
\begin{array}{c}
\text{k} \\
\text{t} \\
\text{b}
\end{array}
\]
8.1.5. BINYANIM AFFIXES

Binyan prefixes must be associated first to ensure they receive first position in left to right association (ie prefix position). Then root consonants may be associated.

\[ \mu(4) \mu(5) \mu(6) \mu(7) \mu(8) \mu(10) \]
\[ ? t t n t s t \]
\[ \mu(12) \mu(13) \mu(14) \mu(15) \mu(15) \]
\[ w w n n y \]

(McCarthy, 1981, pp388-93)

8.1.6. ASPECT/VOICE VOWEL MORPHEME

\[ \mu(\text{perfective active}) \]
\[ a \]
\[ \mu(\text{perfective passive}) \]
\[ u i \]
\[ \mu(\text{active participle}) \]
\[ u a i \]
\[ \mu(\text{passive participle}) \]
\[ u a \]

McCarthy (1979, p172) derives the participle forms from the Imperfective.

\[ \mu(\text{active imperfective}) \]
\[ u a i \]
\[ \mu(\text{passive imperfective}) \]
\[ u a \]

(McCarthy, 1981, p400-4)

8.1.7. LEXICAL LINKING

These rules precede all other association.

\[ CCVCVC \]
\[ C C V C V C \]
\[ \{w, \ y \} \]
\[ \mu(B12-15, Q3) \]
\[ \mu(B15) \]

Lieber (1987, pp60f) suggests prespecification of the infixes, which does not spread. But spreading of /w/ is needed for binyan 13, so she posits prespecification or lexical linking (Lieber, 1987, pp70f).

a. Binyan 12 \[ CCVCVC \]

b. Binyan 13 \[ CCVCVC \]

w w

\[ CCVCVC \]

(c. Binyan 13

This is all to avoid the ambiguous situation created by McCarthy’s analysis portrayed below. Solution c. still creates this situation in binyan 13. Furthermore, separate solutions for Binyanim 12 and 13 is aesthetically displeasing.
Example:

```
<table>
<thead>
<tr>
<th></th>
<th>k</th>
<th>t</th>
<th>b</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>w</td>
</tr>
</tbody>
</table>
```

8.1.8. ASSOCIATION AND SPREADING

Association - One to one, left to right.

```
A B C
x y z
```

Spreading -

```
A B C D
x y z
```

```
A B C D
x y
```

Vowel Association -

```
A B C D
V C\]
```

(McCarthy, 1981, p401)

8.1.9. MORPHOLOGICAL RULES

Eighth Binyan Flop

```
CC -> CC
```

(\(\mu\) (reflexive))

(McCarthy, 1981, p390)

Second, Fifth Binyan Erasure

```
\(\emptyset\) <- C V C\]
```

(\(\mu\) (root))

(McCarthy, 1981, p392)

Imperfective Prefixation

```
\(\emptyset\) -> C V / [imperfective] \_
```

Normal association fills the vowel slot and subject prefixes that only occur in the Imperfective and aren’t included in this analysis fill the C slot (McCarthy, 1979, p172).
Participle Derivation

McCarthy (1979, p172) derives the participle forms from the Imperfective as follows:

\[ \text{[Imperfective, } - \text{ Binyan 1]} \rightarrow m \]

The participle prefix \( m \) enters the C slot created above disallowing subject prefixes and creating a participle.

Imperfective Active Vowel Deletion

The Imperfective Active does not retain the same vowel throughout the Binyanim. Note that participles do, so this rule must follow Participle Derivation.

\[ \mu(\text{imperfective active}) \rightarrow \emptyset \]

And:

\[ \mu(\text{reflexive}) \rightarrow \emptyset \]

\[ \text{[Imperfective active]} \rightarrow \emptyset \]

\[ \mu(\text{imperfective active}) \rightarrow \emptyset \]

8.1.10. FIRST BINYAN ABLAUT

Association

\[ \text{[Binyan 1, Active]} \rightarrow \emptyset \]

\[ \mu(\text{imperfective active}) \rightarrow \emptyset \]

\[ \mu(\text{perfective active}) \rightarrow \emptyset \]

In view of arguments in the previous chapter and McCarthy (1979, p164) I've made the Ablaut
rule uni-directional. No explicit analysis of Binyan 1 participles is provided in McCarthy’s (1979, 1981) analyses. So all I can do is present a prosodic template and vowel melody for the forms given.

Binyan 1 Active Participle   \[CVVCVC\]
Passive Participle   \[VCCVVC\]

(Binyan 1, active participle)\(\mu\)   (Binyan 1, passive participle)\(\mu\)

8.1.11. PHONOLOGICAL RULE

Syncope   \[V \rightarrow \emptyset / [CVCV_CVC]\]
(McCarthy, 1981, p387)

This derives the seemingly metathesized forms of Binyan 4 and the imperfectives of Binyan 1 from CVCVCVC to CVCCVC. In the case of the Binyan 1 imperfectives the initial CV of the imperfective prefix added to a CVCVC template.

8.1.12. SAMPLE DERIVATIONS

Binyan 1 Active Imperfective

\[
\begin{align*}
\text{Binyan 1} & \quad CV.CV.C \rightarrow \text{-(assoc)-} \\
(k & \quad t \quad b) \\
\text{-(imperf prefix)-} & \quad CV.C [CVCVC] \rightarrow \\
(a & \quad u) \\
\text{(Binyan 1, active imperfective)} & \\
\text{-(spread)-} & \quad CV.CVCVC \rightarrow \\
(a & \quad u) \\
\text{-(syncope)-} & \quad CV.CVC VC \rightarrow \\
(a & \quad u) \\
\end{align*}
\]
Binyan 1 Perfective Active

Binyan 1 Perfective Active (Binyan 1, imperfective active)

Binyan 1 Imperfective Active

Binyan 3 Imperfective Active

Binyan 3 Active Participle
(Binyan 3 Imperfective Active form) ->

(Binyan 3 Imperfective Active form) ->

Binyan 6 Active Imperfective

(Binyan 6) ->

Binyan 6 CV CV CV CV CV

-(assoc) ->

CV CV CV CV CV

-(imperf prefix) ->

CV [CV CV CV CV CV]

-(vowel assoc) ->

CV CV CV CV CV

assoc &

-( ) ->

spread

u deletion &

-( ) ->

spread

i deletion &

-( ) ->

spread
8.2. A REVISED WORD AND PARADIGM ANALYSIS OF ARABIC DATA

The Revised Word and Paradigm analysis of Arabic Verb forms presented will use the traditional formalism of Binyanim, following McCarthy (1981). McCarthy (1981) provides no semantic breakdown of the meanings inherent in each Binyan. The single exception to this is the specification of the /t/ infix and /t/ prefix of Binyanim 5, 6 and 8 as a reflexive morpheme (McCarthy, 1981, p384).

McCarthy (1981, p384) states "...the derived binyanim ... generally involve some special modification of the meaning ..." and "The meaning of any verb is not a composition of the meaning of root and binyan, but there is a reasonable amount of predictability." Because of the "Lexical idiosyncracy" (McCarthy, 1981, p384) no coherent breakdown of the semantic content of each Binyan is given. I intend to follow a similar approach to McCarthy (1981) since my knowledge of Arabic is considerably less. However I feel a semantic analysis of the Binyanim would no doubt be a profitable one and may reveal consistent regularities of form and function between Binyanim. In this both Autosegmental and Word and Paradigm analyses fail.

Underlying forms

| Class 1 | C a C u C |
|         | C a C i C |
|         | C a C a C |

Class 2 | C a C u C |

1 Output: Binyan 1 active perfective ablaut stem

Input: class 1 roots

Operation: X V C  ->  X V C
[α Hi]  [-α Hi, α Back]

Rule 1 ablauts the final vowel of a Binyan 1 active perfective form.
2 Output: Binyan 1 passive participle ablaut stem
   Input: class 1 & 2 roots
   Operation: $XVC \rightarrow XuC$

Rule 2 ablauts the final vowel of a Binyan 1 passive participle form to /u/.

3 Output: Binyan 1 passive imperfective ablaut stem
   Input: class 1 & 2 roots
   Operation: $CVCVC \rightarrow CuCaC$

Rule 3 ablauts the final vowel of a Binyan 1 passive imperfective form to /a/ and the initial vowel to /u/.

4 Output: Binyanim 5, 6 & Q2 active imperfective ablaut stem
   Input: class 1 & 2 roots
   Operation: $XVC \rightarrow XaC$

Rule 4 ablauts the final vowel of a Binyan 5,6 and quadriliteral Binyan 2 active imperfective form to /a/.

5 Output: Binyanim 1 - 10 passive perfective ablaut stem
   Input: class 1 & 2 roots
   Operation: $CVCVC \rightarrow CuCiC$

Rule 5 ablauts the final vowel of a Binyan 1 through 10 passive perfective form to /i/ and the initial vowel to /u/.

6 Output: Binyanim 1 -15 active participle and Binyanim 2-15 active
   Imperfective ablaut stem
   Input: class 1 & 2 roots
   Operation: $XVC \rightarrow XiC$

Rule 6 ablauts the final vowel of a Binyan 1 through 15 active participle form and Binyan 2 through 15 active imperfective form to /i/.

7 Output: Binyanim 2-15 active perfective and Binyanim 2-10 passive participle
   and Binyanim 1-10 passive imperfective ablaut stem
   Input: class 1 & 2 verb roots
   Operation: $XVC \rightarrow XaC$

Rule 7 ablauts the final vowel of a Binyan 2 through 15 active perfective form and Binyan 1 through 10 passive imperfective form to /a/.

8 Output: Binyanim 4, 5, 6, 10 and Binyan 1 imperfective and passive
   participle shape stem
   Input: rules 2, 3,4, 5, 6, 7
   Operation: $CVX \rightarrow VCVX$
   $1 2 3 \quad 2 1 2 3$

Rule 8 reduplicates the first vowel of all Binyan 4 through 6 forms, Binyan 10 forms, Binyan 1 imperfective active and passive forms and Binyan 1 passive participle forms then prefixes this to the verb form.

9 Output: Binyanim 9, 11, 14 shape stems
   Input: rules 6, 7
   Operation: $CVCVC \rightarrow CCVCVC$
   $1 2 3 4 5 \quad 1 3 2 5 4 5$

Rule 9 reduplicates and suffixes the last consonant, also shifting the vowels, of all Binyanim 9, 11 and 14 forms.
10 Output: Binyan 12 shape stem
   Input: rules 6, 7
   Operation: \[\text{C V C X} \rightarrow \text{C C V C X}\]
   \[1 2 3 4 \quad 1 3 2 3 4\]
   Rule 10 reduplicates and infixes the second consonant of Binyan 12 forms.

11 Output: Binyan 13 shape stem
   Input: rules 6, 7
   Operation: \[\text{C V C VC} \rightarrow \text{C C V VC}\]
   \[1 2 3 4 \quad 1 3 2 4\]
   Rule 11 metathesizes the first vowel and second consonant of Binyan 13 forms.

12 Output: Binyan 15 shape stem
   Input: rules 6, 7
   Operation: \[\text{C V C VC} \rightarrow \text{C C V C V}\]
   \[1 2 3 4 5 \quad 1 3 2 5 4\]
   Rule 12 metathesizes the first vowel and second consonant and also the last vowel and consonant of Binyan 15 forms.

13 Output: Binyanim 12, 13 infixed stem
   Input: rules 10, 11
   Operation: \[\text{C C V X} \rightarrow \text{C C V w X}\]
   Rule 13 infixes a /w/ in Binyanim 12 and 13 forms.

14 Output: Binyanim 14, 15 infixed stem
   Input: rules 9, 12
   Operation: \[\text{C C V X} \rightarrow \text{C C V n X}\]
   Rule 14 infixes an /n/ in Binyanim 14 and 15 forms.

15 Output: Binyanim 2, 5, 13 length stem
   Input: rules 5, 6, 7, 11
   Operation: \[\text{X C V C} \rightarrow \text{X C: V C}\]
   Rule 15 geminates the medial consonant in Binyanim 2, 5 and 13 forms.

16 Output: Binyanim 3, 6, 11 and Binyan 1 active participle length stem
   Input: rules 5, 6, 7, 8, 9
   Operation: \[\text{X V C V C} \rightarrow \text{X V: C V C}\]
   Rule 16 lengthens the initial vowel of Binyan 3, 6, and 11 forms and Binyan 1 active participle forms.

17 Output: Binyan 1 passive participle length stem
   Input: rule 2
   Operation: \[\text{X V C} \rightarrow \text{X V: C}\]
   Rule 17 lengthens the final vowel of Binyan 1 passive participle forms.

18 Output: Binyan 15 perfective termination and imperfective and participle stem
   Input: rule 14
   Operation: \[\text{X} \rightarrow \text{X + y}\]
   Rule 18 suffixes a /y/ to Binyan 15 forms.

19 Output: Binyan 4 perfective termination and imperfective and participle stem
   Input: rule 8
   Operation: \[\text{X} \rightarrow ? + X\]
   Rule 19 prefixes a /?/ to Binyan 4 forms.
20 Output: Binyanim 5, 6, 8 perfective termination and imperfective and participle stem
Input: rules 5, 6, 7, 15, 16
Operation: \[ CX \rightarrow CX \]
\[ VX \rightarrow tVX \]

Rule 20 prefixes a /t/ to vowel initial and infixes it in consonant initial Binyanim 5, 6 and 8 forms.

21 Output: Binyan 7 perfective termination and imperfective and participle stem
Input: rules 5, 6, 7
Operation: \[ X \rightarrow n + X \]

Rule 21 prefixes an /n/ to Binyan 7 forms.

22 Output: Binyan 10 perfective termination and imperfective and participle stem
Input: rule 8
Operation: \[ X \rightarrow st + X \]

Rule 22 prefixes /st/ to Binyan 10 forms.

23 Output: Binyanim 5-15 active imperfective termination
Input: Rules 9, 13, 14, 15, 16, 18, 19, 20, 21, 22
Operation: \[ X \rightarrow a + X \]

Rule 23 Prefixes /a/ to Binyanim 5 through 15 active imperfective forms.

24 Output: Binyanim 2-15 imperfective termination and second participle stem
Input: Rules 9, 13, 14, 15, 16, 18, 19, 20, 21, 22
Operation: \[ X \rightarrow u + X \]

Rule 24 prefixes /u/ to Binyanim 2 through 15 imperfective and participle forms.

25 Output: Binyanim 1-15 participle termination
Input: rules 8, 24
Operation: \[ X \rightarrow m + X \]

Rule 25 prefixes /m/ to all Binyanim 1 through 15 participle forms.

26 Phonological rule- \[ V \rightarrow \emptyset / (C) CV \_ CV C \]

Rule 26 is a phonological rule that deletes word medial vowels.

Sample Derivations

Binyan 1 Passive Perfective /kutib /
Underlying form, class 1 root /katub /
rule 5 /kutib /
Binyan 3 Active Participle /mukaatib /
Underlying form, class 1 root /katub /
rule 6 /katib /
rule 16 /kaatib /
rule 24 /ukaatib /
rule 25 /mukaatib /
Binyan 8 Active Perfective /ktatab /
Underlying form, class 1 root /katub /
rule 7 /katab /
rule 20 /ktatab /
8.3. ARABIC AND ABSTRACTION

The Autosegmental derivation of Arabic presented above gives rise to concern over the abstraction in the analysis. The abstraction created is not just that of separation of major class features of the template from those on the phonological tiers. Nor just the distribution of non-template features over more than one phonological tier. Rather, as discussed in the previous chapter, the abstraction of consonant roots, inflectional vowels and derivational template is a problem.

There is no evidence to suggest that the consonants, vowels and shape of an Arabic word have an existence separate of each other. Much the same can be said of any root that obligatorily takes some modifying morphology. The alternations in shape and vowel quality in no way suggest that these are independent of the root consonants as the morphemic model posits.

Further abstraction in this model derives from the nature of the realizations of the morpheme-again the consonants, vowels and template. The morphemes of concatenative approaches are notable as allowable phonological strings combined to make phonological words. Morphemes and roots in these models can often be described in terms of syllables and other phonological word constituents (eg the Vietnamese word root is generally mono-syllabic). The morphemes discussed here for Arabic are completely a-phonotactic. None represent an allowable phonological string of an Arabic word except perhaps the template. But the template is not constituted of actual phonemes and the major class features may not occur alone.

In contrast, each stage in the Word and Paradigm derivation of Arabic verbs is an actual or possible constituent of or a whole phonological word in Arabic. Where a stage does not represent an actual or possible word in Arabic this can be seen as a hiccup in the derivation that needs more consideration. There are some such cases in the Word and Paradigm analysis given.

Example:

12 Output Binyan 15 shape stem
Input: rules 6, 7
Operation: \[ C \ V \ C \ V \ C \ \rightarrow \ C \ C \ V \ C \ V \]

There are no vowel final verb stems yet this shape changing rule creates them before a subsequent rule adds a suffix.

While transformational rules can be seen as too powerful, some of this power is sometimes necessary. By using as little phonological and diacritic specification as possible and only numbering constituents in rules when no other solution is possible the wildest permutations of transformational rules are constrained. Such permutations as complete reversal are not possible if these limitation are applied.
The latter two rules do not create complete reversal of constituents because they lack phonological, numbering or diacritic specification. The restriction of such tools as numbering, diacritics or specification of constituents stops much of the power of transformational rules.

An evaluation metric is possible where by a rule is less highly valued over alternatives if it has a greater extent of phonological specification, diacritic marking or numbering of constituents.

**8.4. ARABIC AND THE MORPHOLOGICAL RULE CONSTRAINT**

The Morphological Rule Constraint is violated by a number of rules in McCarthy’s (1981) analysis of Arabic as shown in the previous chapter. The constraint (ie A -> B / X) is obviously too strong.

The evaluation metric developed above for morphological transformations can limit the power used in a Word and Paradigm approach. Furthermore, a commitment to derivation via non-abstract forms can further delimit the power of rules to actually occurring processes.

While somewhat contentious, an evaluation metric devaluing solutions of greater abstraction seems desirable. This of course would devalue a Autosegmental analysis of Arabic contrasted with a transformational analysis.

The metric concerning rule power might seem to favour Autosegmental morphology. Yet if one regards the principles of association and spreading as morphological rules these involve high phonological specification.

**8.5. ARABIC AND REDUPLICATION, INFIXATION, ABLAUT, AND METATHESIS**

As pointed out in the previous chapter the Autosegmental model creates methodological splits between the way Arabic handles the above processes as opposed to other languages. There is no reason to believe that there is any reality to the split reflected in language typology.
in the Arabic analysis. Reduplication is handled by spreading (generally), infixation by prespecification or lexical linking to the template, metathesis and ablaut by the proper interspersal of morphemes by association. Ablaut and metathesis are also derived by process rules.

In other languages, reduplication is generally handled by re-iteration of a root morpheme, infixation by insertion of infix and infix template, metathesis would usually need a process rule and ablaut would use the mapping of vowels onto a root with an inherent template in a Autosegmental analysis.

The infixation in McCarthy’s (1981) analysis of Arabic, and also the prefixation, depends on the necessary association of these before the root associates. There is no mention of extrinsic ordering in McCarthy’s (1981) analysis. Yet as shown in the sample derivations and Autosegmental analysis order of application of various principles is necessary. The prefixes must associate first in left to right association to remain prefixes and the infixes have a specific rule of association that must place them in a position that would otherwise be filled by root consonants.

McCarthy (1981, p390) provides a rule that metathesizes a prefix and the root initial consonant of the Arabic verb in order to infix it. This is the Eighth Binyan Flop. A process rule is required to achieve this end.

Similarly the ablaut in Arabic is necessarily analyzed by morphological rule. The Autosegmental analysis cannot provide the full combination of idiosyncratic alternations in the Binyan 1 forms. Such alternations are common characteristic of ablaut systems. The alternation of vowels, and not their identity, is meaningful in ablaut systems as shown by the Arabic verbs.

Example: [Imperfective] a -> i
          i -> a

8.6. ARABIC, THE MORPHEME AND AUTOSEGMENTAL THEORY

Since the model of Autosegmental morphology is a morphemic approach it is expected that an analysis of this kind will have problems typical of morpheme-based analysis. However the use of nonconcatenative morphemes creates some special problems of its own.

Overlapping in realizations of morphemes is rarely regarded as a problem for morphemic theory in recent years. Yet if a realization is to signal a particular morpheme and meaning then it must be distinct from the realizations of other morphemes. Otherwise it will be ambiguous.

The Binyanim in the analysis of Arabic are meaningful. Therefore the templates should be considered morphemes and be pre-associated with a morpheme.

The Binyanim in Arabic are marked not only by the prosodic template but by prefixes, infixes and a suffix also. Some of these are shared by more than one Binyan. Could this not be regarded as overlapping? One realization marking more than one meaning.
Perhaps the affixes mark a single meaning common to more than one Binyanim. This is the case with the reflexive /t/ prefix of Binyanim 5, 6, 8. However we have no evidence to support this assumption and so are left with the realizations of Binyan morphemes overlapping.

Example: \[ (\text{Binyan 7, 14, 15}) \] \[ (\text{Binyan 12, 13}) \]

More overlapping problems arise when one considers the templates. Many of the templates are the same for various Binyanim, particularly \[ C C V C C V C \].

Example: \[ C C V C C V C \] \[ \text{Binyanim 10, 12, 13, 14, 15} \] Q3, Q4

How can the same template unambiguously signal seven separate Binyanim?

Binyanim 12, 13 share the same template and infix. There is no way to distinguish them in this morphemic model. In Autosegmental terms, it is the spreading of consonants that seems distinctive.

Example: ktawtab & ktawwab

The canonical formula and morphemes are the same yet the resultant arrangement is different. Prosodic shape is indeed meaningful in Arabic but this cannot be divorced from the phonemes it manipulates.

Finally, being a morphemic model, one would expect Autosegmental analysis to conform to the principles of this concept. A morpheme is a relationship between a meaning and a recurrent form.

Since the various affixes and templates often mark the same Binyanim these should be combined as a single morpheme, especially for those templates and affixes that mark only one Binyan.

Example: \[ (\text{Binyan 4}) \]

There is no justification for separating affixes and template under different morphemes given the present data.

Example: \[ (\text{Binyan 4}) \] \[ ? V C C V C \]

The affixes and templates are held separate in McCarthy's (1981) analysis of Arabic verb forms merely to maintain the appearance of an Autosegmental analysis. This is despite morphological evidence that they are not separate.
Chapter 9

CONCLUSION

The professed aim of this dissertation is to develop a revised and workable model of Word and Paradigm morphology. Implicit in this task is the claim that existing models of Word and Paradigm morphology are not adequate to describe the set of fusional language data. Thus the scope of this work covers the criticism of previous Word and Paradigm models. In demonstration of the utility of a Word and Paradigm approach to morphology the comparison of Revised Word and Paradigm Model with a segmental model of nonconcatenative morphology was undertaken. Reasons were given for preferring the Word and Paradigm analysis.

In chapter 1, the introduction, the above aims and objectives were set out.

In chapter 2 descriptions of existing models of Word and Paradigm morphology were undertaken. Firstly the Word and Paradigm model of Matthews (1972) was described and shown to be inexplicit with regard to its relationship with the rest of the grammar. Following this the more concise model of Extended Word and Paradigm Morphological Theory, which more exactly specifies the relationship and position of its Inflectional component with regard to the syntax, phonology and semantics, is elucidated.

Theoretical criticism of Extended Word and Paradigm Morphological Theory is undertaken in chapter 5 where the major problems with this model are found to result from the organization of the grammar in this model and the properties inferred from this.

The revised model of Word and Paradigm developed in chapter 4 retains the morpholexical rules of Matthews (1972). However it adopts an approach to the organization of the grammar similar to that of Halle (1973). This is perceivably different from that of Anderson (1982) in Extended Word and Paradigm Morphological Theory.

Chapter 5 utilizes Gahuku data, which is demonstrated to be fusional, to illustrate problems of Extended Word and Paradigm Morphological Theory in comparison to a Revised Word and Paradigm Model for the analysis of this language data. Major downfalls of Extended Word and Paradigm Morphological Theory seemed to result from rule form and ordering.

Chapter 6 describes the model of Autosegmental morphology. This task was undertaken with a view to later criticism and comparison with Word and Paradigm approaches to show that the area
of overlap of domain in the analysis of nonconcatenative morphology is best analyzed in Word and Paradigm terms.

In chapter 7 the model of Autosegmental is criticized for characteristics of its model that are theoretically undesirable. Most obvious of these faults is the abstraction of the model’s tools. However the incompatibility of Autosegmental morphology and phonology, and the proliferation of transformational rules in Autosegmental analyses constituted major problems.

A comparison of Word and Paradigm and Autosegmental analyses of Classical Arabic data in chapter 8 illustrates some of the problems raised in chapter 7. In comparison the Revised Word and Paradigm Model analysis is less simple but has fewer problems.

9.1. THE PROBLEM WITH EXTENDED WORD AND PARADigm MORPHOLOGICAL THEORY

The major problems with Extended Word and Paradigm Morphological Theory were found to result from the way in which the grammar is organized in this model, the reactionist nature of the morpholexical Inflectional rules and the rule form and interaction. I use the term reactionist to describe the way Extended Word and Paradigm Morphological Theory morphosyntactic representations are developed in the syntax and trigger morpholexical rules.

The definition of Inflection as syntactically relevant and the specification of certain characteristics as distinctively Inflectional are meant to justify the Split Morphology Hypothesis and the resultant organization of an Extended Word and Paradigm Morphological Theory grammar.

<table>
<thead>
<tr>
<th>Base Rules</th>
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<tr>
<td>D-structure</td>
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<tr>
<td>Syntax</td>
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<tr>
<td>S-structures</td>
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<tr>
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<td>Inflection &amp; Phonology</td>
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<tr>
<td>Phonological Form</td>
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<tr>
<td>Interpretation</td>
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<td>Logical Form</td>
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(Aherson, 1982, p594)

Certain consequences of Extended Word and Paradigm Morphological Theory cause analyses within this model to show a marked affix like tendency. Lack of access to lexical features means morpholexical rules must treat conjugational conditioning as phonological fusion. The definition
of Inflection restricts Extended Word and Paradigm analysis to those categories found by Bybee (1985) to be furthest from and least fused to the root. Layering of morphosyntactic features is often reflected in formative order. Formative boundaries, which are necessary for morphophonemics, in conjunction with formative and feature ordering similarities provide an almost morphemic segmentation of the data analyzed. Word and Paradigm analyses that display strong affixing tendencies dispute the appropriateness of a Word and Paradigm approach to the data.

Defining characteristics of Extended Word and Paradigm Inflection are shown to be somewhat dubious. Productive rules of Inflection, characterized as regular in Extended Word and Paradigm Morphological Theory, may apply irregularly in a manner that allows no relegation of irregular forms to the lexicon. For instance, regular rules failing to apply idiosyncratically for particular words. Non-Local agreement occurs in Papuan languages anticipatory pronouns despite Anderson’s (1988b, p176) claim that agreement is a local phenomenon. Meaninglessness is a consequence of Inflection’s placement in the phonological component and is an incorrect prediction. Inflectional features that don’t exist in the syntax prior to Inflection like inherent number of nominals the meanings of derivations clitics and referential agreement, are not open to interpretation in the logical form component.

Irregular morphology is placed in the lexicon in Extended Word and Paradigm Morphological Theory. A major, but shaky, premise, of Extended Word and Paradigm Morphological Theory is that all stem internal morphology is irregular. The disjunction between Extended Word and Paradigm regular Inflection and irregular stems is undesirable as it spans more than one component of the grammar and is disproved by stems that take both regular and irregular marking for the same property. The coordination of irregular Inflection with syntax is inefficient in comparison to the feature prescription of regular Inflection. One wouldn’t expect inefficiency amongst irregularities which usually include the most common words. If a suitable coordination algorithm can be found for irregular lexicon internal morphology surely all morphology can be placed in the lexicon and so coordinated.

Extended Word and Paradigm Morphological Theory makes ordering generalizations regarding derivation and Inflection that cannot be maintained in the face of language data. Some languages have derivation outside of inflection with no reason to suggest the latter is irregular. English nominal compounds may have number features that prescribe agreement between component words (ie inside of derivation).

Layering of features in Extended Word and Paradigm Morphological Theory is generally in a fixed pattern based on the structural closeness of the prescriber complement to the prescribee. For instance, in verbal agreement the object features are in the innermost layer due to the objects being under VP with the verb, then the indirect object features, and then the subject features. However the pattern may be altered by inversion rules. A semantic interpretation algorithm, to associate pronominal features with arguments, is needed. Inflection can’t input into the Logical Form component which is the obvious place for this device. Extended Word and Paradigm grammar is made more complex by an attempt to avoid labelling pronominal features.
The syntactic prescription of morphosyntactic representations in Extended Word and Paradigm Morphological Theory does not take account of the existence of nonconfigurational languages. Structural attribution of configurational properties or principled feature layering is impossible if such languages are truly structure deficient.

Application of Word and Paradigm methodology to agglutinating languages would be somewhat controversial. The reasoning behind the organization of Extended Word and Paradigm grammar applies to all languages, even agglutinating languages. A morphemic approach in such an organization is not possible. The Extended Word and Paradigm model thus claims that all morphology should be analyzed in Extended Word and Paradigm terms, which is a somewhat bold statement.

9.2. REVISED WORD AND PARADIGM MODEL AND EXTENDED WORD AND PARADIGM MORPHOLOGICAL THEORY

In chapter 4 a Word and Paradigm model of morphology was developed that was superior to the model of Extended Word and Paradigm Morphological Theory in that it did not have any of the previous mentioned problems. Revised Word and Paradigm Model is a lexicon internal model of morphology which does not ascribe any special status to the inflection/derivation dichotomy. Lexical morphology could well be analyzed using this model. Revised Word and Paradigm Model coordinates morphology with syntax by use of Unification Theory and so avoids the difficulties inherent in syntactic prescription. Revised Word and Paradigm Model is constructionist, as opposed to Extended Word and Paradigm Morphological Theory reactivism, the morphosyntactic representation is built by the morpholexical rules. A Paradigmatic filter accounts for common and irregular word forms.

The analysis of Gahuku data in chapter 5 showed quite clearly that the model of Revised Word and Paradigm model produces a more complex analysis than that of Extended Word and Paradigm Morphological Theory. However Extended Word and Paradigm Morphological Theory seemed to pay a cost for this simplicity.

The definition of Inflection in Extended Word and Paradigm Morphological Theory does not seem to exclude any Gahuku morphology from Inflection on any criteria that wouldn’t exclude all Gahuku morphology. Extended Word and Paradigm Morphological Theory disallows conjugal conditioning based on lexically attributed features in Inflection. The conditioning of alternants by morpheme classes in Gahuku is such a phenomenon. Extended Word and Paradigm Morphological Theory Inflection has no access to lexicon internal features. This criterion of alternations for lexical class cannot be used to exclude morphology from Inflection. The obviously syntactically relevant desinences have conditioned alternates for lexical class of the preceding adjacent morpheme. I have no idea how the rules that work on affix class might gain these features.
Gahuku seems to have a constraint against the proliferation of pronominal complexity in its verbal agreement. It will encode pronominal features of subject and either object, beneficiary or neither on the verb. Never more than two clause participants and never less than one are marked on the verb. In the syntax driven model of Extended Word and Paradigm Morphological Theory there seems little sense in the claim that the morphology is avoiding complexity. The features must exist in the morphosyntactic representation regardless of their being encoded in the verb.

The root ablaut of Gahuku verbs is in some cases identical to that of affixes. In an Extended Word and Paradigm Morphological Theory treatment of this ablaut the root internal ablaut must be relegated to the lexicon despite the similarity to affix ablaut.

The numbered order of Extended Word and Paradigm morpholexical rules does not appropriately represent the looser ordering allowed by Gahuku formatives. Furthermore Extended Word and Paradigm Morphological Theory can’t encode the disjunctions between one formative and many found in Gahuku.

Extended Word and Paradigm Morphological Theory relegates root internal morphology to the lexicon where alternations represented as relationships between individual irregular stems. The root internal ablaut of Hua is in no way irregular and thus is a strong counter-argument to this organization.

The syntactic prescription of features in Extended Word and Paradigm Morphological Theory is unequipped to deal with the cross clausal anticipatory subject agreement of Hua. Coordinated clauses have no perceivable hierarchical relationship between clauses though features can be passed between clauses.

9.3. AUTOSEGMENTAL AND REVISED WORD AND PARADIGM MORPHOLOGICAL THEORY

The model of Autosegmental morphology was shown in chapters 7-8 to have a group of problems based mainly on theoretical aspects of the framework. The Autosegmental analysis of Arabic in chapter 8 compared with that of the Revised Word and Paradigm model only served to emphasize these points.

The integration of Autosegmental phonology and morphology proposed in Lieber (1987) does not seem desirable in Autosegmental theory. The morphemically defined phonological tiers of Autosegmental morphology are necessary to the model (see Pulleyblank, 1988). The Morphological Rule Constraint, present only in morphology, is desirable if Autosegmental morphology is to present a viable alternative to transformational analyses of nonconcatenative phenomena.

Analyses within the Autosegmental morphology framework repeatedly violate the Morphological Rule Constraint for reduplication, infixation, ablaut and metathesis processes. The
dual methodology of processes and autosegmental morphemes used in Autosegmental analyses does not represent what can be called a desirable typology of the phenomena analyzed. The analysis of reduplication in Autosegmental morphology is generally incoherent. Multiple copies of roots or syllables are used in order to produce a single reduplicate copy. There is never a morpheme representing the meaning associated with the reduplication, only a copy of the root or syllable.

The Duplicate Feature Filter of Lieber (1987) is necessary for the Autosegmental framework and yet it causes difficulties with the normal association of phonological elements to the prosodic template.

Perhaps the most disturbing aspect of Autosegmental morphology is the abstraction inherent in the model. In any analysis there is at least a ternary division between prosody, and phonological tiers with segmental or suprasegmental features. Evidence for independence of these tiers is usually lacking. The consonant and vowel morphemes of Arabic are completely a-phonotactic and do not represent allowable phonological strings of an Arabic word. I find the possibility of the lexical representation of suprasegmentals or templates as morphemes at least doubtful. If a suprasegmental such as [a nasal] realizes a morpheme, each occurrence of this feature can potentially be associated with the morpheme despite the fact that many occurrences may not be realizations of the morpheme.

The Autosegmental analysis of Arabic in chapter 8 had a number of disturbing qualities for a morphemic approach. Binyanim prefixes and templates overlapped in their signaling of particular binyanim. The templates and prefixes marking the same binyanim should properly be combined as a single morpheme in a morphemic model. Finally the forms in Binyanim 12 and 13 are non-distinct in morphemes and template so can only be disambiguated with reference to their shape as it applies to particular phonological segments.

Chapter 8 proved that a Word and Paradigm analysis of Semitic symbolic (Sapir, 1921, p143) morphology is possible and in fact desirable with Classical Arabic data.

9.4. SUMMATION

Reactivist theories of morphology, like Extended Word and Paradigm Morphological Theory, are based on a single underlying proposal. The morphosyntactic features originate in the syntax and prescribe the morpholexical rules that apply in reaction to those features. In the morphologically complex languages that Extended Word and Paradigm Morphological Theory analyzes, there is little reason to believe in this. Languages can be regarded as marking key syntactic constructions or roles in two ways, by syntax or morphology. Languages of interest to Word and Paradigm morphology tend to be at the morphology dominant end of the continuum. In these languages it can be seen that much of the work done by syntax in other languages is done by morphology. Reactivism makes a claim positing the work is done by both syntax and morphology. This
proposal must be rife with redundancy due to dual marking of each morphosyntactic property in the syntax and morphology. In some poly-synthetic languages one will find precious little syntax to prescribe morphosyntactic features.

The division between inflection and derivation has eluded linguists constantly in terms of a strict definition. The choices for particular processes/morphemes often seem clear cut. The category of Inflection has always been a rather impressionistic grouping.

The Extended Word and Paradigm Morphological Theory definition of Inflection using syntactic relevance as the defining criterion, is no more precise. Again the application of this criterion is guided by intuition and not solid proof. I propose that the distinction between inflection and derivation, if there is one, is a continuum which cannot be easily divided.

9.5. FUTURE DIRECTIONS

The rules of Revised Word and Paradigm Model, while superior to those of Extended Word and Paradigm Morphological Theory, have obvious disadvantages with regard to complexity. Any popular adoption of morpholexical rule analysis would almost certainly see the use of the Extended Word and Paradigm Morphological Theory-type rules. A popular turn to Word and Paradigm is unlikely. Simplicity would almost certainly cause the choice of Extended Word and Paradigm Morphological Theory rules to be made despite their faults.

The application of Word and Paradigm methodology to agglutinating languages will no doubt be contentious. However as argued in various places throughout this dissertation, affixes are rarely as independent as morphemic analysis suggests. Affixes have both ordering and co-occurrence restrictions that show them to be dependent on their morphological context. Ordering in the most agglutinating languages is quite strict with order change, whether meaningful or not, usually limited to a few permutations.

From here one can argue that affixes might be morphological operations on a stem. Alternatively, one can argue that agglutinating languages generally use less than a few processes, these being prefixation, suffixation, and infixation. So the same processes cannot be regarded as meaningful for a number of morphemes. A counter to this might be that each affixation at a different level (ie with different input and output) is a different process.

In opposition to Janda (1983) I do not consider that morpholexical rules should be the only form of morphological device used. Janda argues on the basis of Occam's razor that the morpholexical rules account for the larger range of morphological processes and the use of only one algorithm is simpler than the use of morphemes and morpholexical rules. The arguments of Matthews (1972) regarding the arbitrariness of simplicity judgements and the comparative importance of appropriateness considerations seem relevant here.

The most sensible direction in which morphological theory could probably move towards is a
mixed model, that is, use of morphemes and morphological processes where most appropriate. Instead of using impressionistic typological labels for individual languages, particular morphological phenomena could be evaluated as to the most appropriate treatment, process or morpheme. I am not sure how such a model would integrate such different methods of treating morphological phenomena into one working model. Such a model would almost certainly be completely lexicon internal considering the problems of lexicon external Inflection. The formal aspects of lexical and inflectional processes/morphemes would be treated the same. The inventory of processes, for both inflection and derivation, crosslinguistically is unsurprisingly similar. The representation of inflectional and lexical meaning is worthy of more consideration. Inflection is open to feature treatments. Lexical morphology cannot be fully captured by features. I have no solutions for this here.
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