

3 *Is morphology really about morphemes?*

As the discussion in chapter 1 showed, there are historical reasons for the fact that contemporary thought about word structure is so close to the position developed by American structuralist morphologists. In the early days of generative phonology and syntax, the assumptions of structuralists about the nature of words and their component parts were not so much attacked or embraced as ignored; and when morphology came to be studied again, these basic notions were simply taken over unexamined as defining the subject matter. In fact, however, the structuralist ontology was not just a simple and obvious set of postulates, but rather, a carefully constructed theory of word structure, arrived at after a great deal of discussion; and this theory presented notable problems, as recognized explicitly by its developers. We sketch its premises here for this reason, as well as because of the exemplary explicitness of structuralist theorizing about morphology.

3.1 **Classical morphemes**

The basic fact which a theory of word structure must account for is the observation that complex words show partial phonetic/semantic resemblances to one another. Thus, *unreasonable-ness* resembles *red-ness*, *un-reasonable* resembles *un-true*, *reason-able* resembles *break-able*, etc. It is this set of partial phonetic-semantic resemblances that suggests the decomposition *un-reason-able-ness*. The theory of morphology is basically an attempt to provide principled grounds for such an analysis.

The starting point for the structuralist discussion of such problems is Bloomfield (1933), whose goal was to provide a firm procedural basis for the analyses linguists arrive at. These procedures were to be based (at least in principle) on a notion of 'contrast' and on the study of the distribution of linguistic elements. In analyzing a language, one was supposed to collect a large corpus of utterances, and then identify the similarities among them, while also determining which utterances 'contrast' with one another. The fundamental principle of such analysis was that non-identical utterances may

still be *partially* similar to one another in form and meaning. A basic task of linguistic analysis (and of morphology in particular) is thus to characterize these similarities precisely.

The elemental unit of morphological analysis is the **morpheme** – “a linguistic form which bears no partial phonetic-semantic resemblance to any other form” (Bloomfield 1933: 161). The thrust of this definition is the requirement that phonetic and semantic resemblances be correlated. In other words, it is at the point where further division of the form would destroy the correlation of phonetic with semantic resemblances that the analyst has arrived at its constituent morphemes.

A problem which this approach leaves unsolved (but which was noted in the literature of the period) was the status of “phonæsthetic” elements, such as the *gl* sequence in English *glitter*, *gleam*, *glow*, etc. Such sound sequences within words certainly meet the criterion of constituting a minimal phonetic-semantic unity internal to larger forms. Most linguists have, however, resisted calling them ‘morphemes,’ for reasons that are not entirely clear. They appear to meet all formal criteria for morpheme-hood, and so the counterintuitiveness of assimilating them to other morphological units would actually seem to throw some doubt on the claim that the basic intuition underlying our sense of the elements of word structure is that of the recurring phonetic-semantic partial. Nonetheless, it was (and still is) assumed that the extension of the term ‘morpheme’ can somehow be restricted appropriately.

A postulate of morphological analysis for many writers was (and continues to be) that every form is made up entirely of morphemes. In consequence, when we identify a morpheme within (but not coextensive with) some word, it should follow that the residue after extracting this morpheme is another morpheme (or sequence of morphemes). If this residue occurs nowhere else (as for example *huckle*, *boysen*, etc. in the infamous English *-berry* words *huckleberry*, *boysenberry*, etc.), the result is a so-called ‘bound morph.’

A morpheme, then, was to be a “minimal same of form and meaning” – an indivisible stretch of phonetic (or phonological) material with a unitary meaning. While this notion is often identified with that of the Saussurean **sign**, it is in fact a particularly limited view of the sign relation, as compared with that maintained by de Saussure himself (see Anderson 1985b). He apparently held that the domain of the sign relation (the scope within which phonological form is consistently associated with its semantic content) was the word or complex form, not the morpheme or simple form; but this subtlety went essentially unnoticed in developing the observation that correlations can exist between parts of a form and parts of its meaning.

Bloomfield’s own use of the notion of ‘morpheme’ assumes a determinate phonological content, and is thus closer to later use of the term **morph** or

allomorph. His actual practice, though, is often at variance with his definitions, in that he allows diverse phonological content to be ascribed to the same morpheme (in cases such as *duke/duchess*, for example, which are said to share a morpheme). A series of subsequent papers within the American structuralist tradition (including Harris 1942; Hockett 1947; Nida 1948, among others) developed and refined Bloomfield's notion to the form in which it is familiar today.

For these later authors, the morpheme came to be seen as an abstract name for a class of 'morpheme alternants' or 'allomorphs.' Each of these is required to have a determinate phonological form and to be associated with the same meaning. All of the allomorphs assigned to the same morpheme are required to occur in complementary (or at least non-contrastive) distribution with one another. Some of these 'morphs' were allowed to be rather abstract objects, such as phonologically null sequences ('zero morphs'), the substitution of one content for another ('replacive morphs', as in **Ablaut** phenomena), the deletion of phonological material (as on Bloomfield's analysis of French Adjectives, where the masculine is derived from the more basic feminine by the addition of a 'subtractive' morph which removes the final consonant), grammatically significant reordering without change of phonological content (metathesis), copying of phonological material (as in reduplication), etc.

From this discussion, a consensus emerged on the substantive parallels between the role of morphemes in word structure and that of phonemes in sound structure. Just as utterances could be regarded as built by concatenating the atoms of sound structure, phonemes, so words were regarded as formed by the concatenation of morphological atoms, or morphemes. The basic properties of this classical morpheme were the following:

Morphemes are homogeneous and indivisible atomic units of linguistic form.

Each morpheme in a given word is phonologically represented by exactly one morph, and each morph represents exactly one morpheme.

The morphs themselves are consistently and uniquely (though not necessarily biuniquely) related to surface phonemic form.

The morphemes are arranged into a structure of Immediate Constituents, which yields a sort of Phrase Marker as the analysis of a word's internal structure.

Words are exhaustively composed of morphemes.

The morphology, on this account, is a set of statements about how these abstract elements are distributed with respect to one another and organized into Immediate-Constituent structures (the morphotactics); and about how

each is realized, in terms of its morphological and/or phonological environment (the statements of allomorphy). Argumentation generally accepted this picture of the relevant units, and focused on issues such as how the statements were to be organized with respect to each other, and how to define procedures for discovering morphological units. While the assumptions of structuralists about these latter issues have generally been disregarded, their underlying ontology was adopted with surprisingly little discussion in initial generative treatments.

The intuitive appeal of the structuralist morpheme is not hard to see, of course. Any linguist who has had the task of explaining morphological structure to an introductory class has probably had the experience that after seeing only a small number of examples of words analyzed into morphemic constituents, most students can readily extend this analysis to new words, even in unfamiliar languages. Of course, the cases that are readily comprehended are those in which the morphological structure fits naturally with the assumptions above: basically, the kind of structure traditionally called 'agglutinating.'¹ Other, more problematic structural types are much more difficult for students to accommodate to this picture – as indeed they were for the structuralist theoreticians of the 1940s and 1950s.

3.2 **Classical problems with morphemes**

As soon as the consensus picture of morphological structure presented in the preceding subsection was formulated, linguists realized that it hides a number of residual problems.² One difficulty, of course, is that the identification of zero, subtractive, replacive, metathesizing, and other "ill-behaved" morphs in a corpus by any sort of mechanical procedure is obviously a "a difficult manœuvre, however desirable" (Hockett 1947: 323f.). An approach to linguistic structure not based on the formulation of discovery procedures does not encounter all of the same difficulties, but these phenomena are still puzzlingly at variance with the overall notion of what morphemes are supposed to be like.

A variety of problems flow from the principles of morphemic structure cited above, when the full range of the word-formational phenomena found in the languages of the world is considered. These can be roughly broken down into two sorts of difficulty: cases in which the internal decomposition

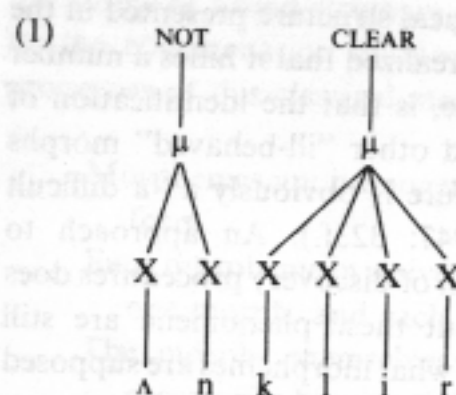
¹ Chapter 12 below will address the relation between traditional typological terminology of this sort and the structure of morphological theory.

² Both the overall structuralist account and the main points of the critical commentary here are insightfully presented, with much further detail, in Matthews 1972.

of words into morphemes seems to be at variance with the correspondence that 'ought' to exist between components of form and components of meaning; and cases in which some of the apparent components of word form do not seem to correspond to the isolable substrings of segments assumed by the definition of the morpheme. We survey instances of the first kind of difficulty, problems in the relation between form and meaning, in this section.

On the morphemic picture, a complex word is a word form which is made up of a number of formal elements or **morphs** (the *signifiants* in Saussurean terminology), and whose sense involves a number of separable components of meaning (the Saussurean *signifiés*). If the classical notion of the morpheme is appropriate, we should be able to line these up in a well-behaved way. Conceivably, some of the *signifiés* correspond to more than one element among the *signifiants* (if the sign is complex, like a 'circumfix'); or more than one *signifié* might correspond to the same *signifiant* (where the meaning of a sign is decomposable on some grounds other than those of the morphology). This ought to be the limit of complexity in the mapping between the two, however, if words are indeed composed exhaustively of morphemes drawn from a lexicon of items each of which has a formal part and a semantic part.

Suppose we say that a word has two representations: one as a string of abstract morphemic units (μ 's), linked to components of meaning; and one as a string of phonological positions (Xs), linked to actual phonetic content. Then we can draw lines associating the one with the other. The word *unclear* (phonetically [ʌnklɪr]) might have an analysis like this:



In terms of this sort of analysis, we could represent the classical form of the hypothesis about morphemes as involving the claims in (2):

- (2)
- Every X is linked to one and only one μ ;
 - Every μ is linked to at least one X; and
 - The lines between Xs and μ 's do not cross.

A number of cases, though, present problems in finding, delimiting, and identifying the morphemes in complex words in a way consistent with these

requirements. We usually have a good sense of the fact that a word has certain formal components, and certain components of its meaning, but these are situations in which the two do not line up well – contrary to the notion that words are made up exhaustively of morphemes, and that an analysis into morphemes *is* the analysis of a word's internal structure.

One such type of problem is presented in **infixes**, as in Latin *rumpō* 'I break.' Here the nasal infix interrupts the continuous substring of the form corresponding to the root $\sqrt{rup}$; cf. *rūpī* 'I broke.' The difficulty here lies in the fact that the lines linking segments to the morphological unit $\sqrt{rup}$ must necessarily cross lines linking the nasal infix to its associated μ .

The other side of this coin is the case of **circumfixes**, which involve simultaneous prefixation and suffixation that correspond to a single unit of morphological form. The similarity rests in the fact that both infixation and circumfixation result in discontinuous morphological units within a complex form. This particular type of affixation is particularly well developed in some Indonesian and Philippine languages. For example, in Indonesia *ke-...-an* seems to constitute a unit, as indicated by the fact (see MacDonald 1976: 63) that the prefix *ke-* 'is seldom used, except in conjunction with the suffix *-an*.' Thus, *kebisaan* 'capability' is derived directly from *bisa* 'be able' rather than by prefixation of *ke-* to a hypothetical **bisaan*, or by suffixation of *-an* to an equally hypothetical **kebisa*. This circumfix can in fact be applied to more complex bases, as in the case of *ketidakmampuan* 'impotence,' derived from *tidak mampu* 'not be able' (cf. *mampu* 'be able'). Its component parts are only marginally and unproductively attested as independent affixes, and not with these roots. The same circumfix also appears in formations like *kehujan* 'be caught in the rain' (cf. *hujan* 'rain') and *kelihatan* 'be visible' (cf. *lihat* 'see') where the verbal status of the derivatives is completely incompatible with any claim that the prefix and the suffix represent independent processes that happen to be cumulated in these forms.³

A somewhat different problem is that presented by the existence of **empty morphs**, or subparts of a form that lack any content whatsoever. Such cases include the thematic vowels that occur in some (but not all) forms of verbs in Romance languages, where all of the categories expressed by the verb are marked by some other part of the form and the theme vowel is simply necessary

³ This is because both *ke-* and *-an*, in the limited circumstances in which they are independently attested as affixes, produce Nouns from various sorts of bases. Corbin (1987: 121–139) argues at some length against the formal possibility of circumfixation (or 'parasyntesis') as a unitary process. Even if one accepts the large number of unattested intermediate forms required to maintain her alternative (namely, the view that apparent circumfixes are always combinations of suffixation with independent prefixation), this sort of categorial mismatch shows that it cannot be applicable in all cases.

"morphological glue." In French *pens-e-r-ai* "I will think," *sent-i-r-ai* "I will feel," etc., the theme vowel (/e/, /i/) makes no contribution to the meaning ROOT-FUT-1sg. It would appear, therefore, that some of the Xs in a diagram like (1) may not be linked to any μ at all.

Superfluous morphs are similar, except that they have a meaning – one that is irrelevant or even incompatible in the form in question. For instance, French *doucement* is morphologically *doux* "sweet" + FEMININE + *ment* "–ly," but there is no basis for identifying a component "feminine" in the meanings of these adverbs. An English example is provided by words like *lengthen* and *strengthen* which appear to be based on the de-adjectival nominals *length* and *strength* despite the fact that their meanings ("make longer," "make stronger") are apparently based on the underlying Adjectives, not the Nouns derived from these. In these words the nominalizing formative *-th* (with accompanying vowel change) is something of an embarrassment in the analysis of what would otherwise be a straightforward derivation of causative Verbs from Adjectives. Thus, it seems either that some of the Xs in such formations are linked to no μ or else that the μ they are linked to is not associated in any way with the meaning of the complex form.

Another difficulty in the relation between semantic and morphological form is posed by **cumulative morphs**, where more than one apparently independent dimension of a paradigm is expressed by a single formative. For instance the *-ō* in Latin *ferō* "I carry" marks both first-person singular Subject and present tense (cf. *feram* "I will carry," etc.). Since other paradigmatic forms of the Latin Verb represent Subject agreement and tense by distinct components of form,⁴ we presumably want to represent these elements by distinct components of meaning. But then it would seem that multiple *signifiés* are borne by the same μ , contrary to the notion that these elements correspond to minimal signs.

Related to this is the problem of overlapping or **portmanteau morphs**, as in French *du* "of the (= *de* + *le*)." Similarly, in Breton *e dad* "his father" vs. *e zad* "her father" vs. *tad* "father," we might regard the initial consonant of the Noun (/d/ vs. /z/ vs. /t/) as functioning simultaneously as part of the signal for the possessor and that for the possessed ("father"),⁵ where the portions of the form corresponding to two distinct morphemes exhibit a relation of

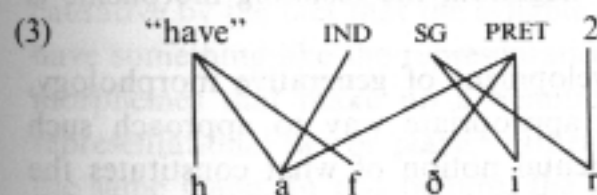
⁴ Thus, *veniēbam* "I was coming" is morphologically /veni + e:b + am/, as shown by comparison with *veniēbat* "he was coming" and *veniam* "I will come."

⁵ Of course, in this case, most generative phonologists would analyze these facts by saying that "father" is simply /tad/ in all cases, and that there are two different possessive pronouns (both phonologically /e/) which happen to trigger distinct morphophonemic effects (or 'mutations') in the root-initial consonant. The overlap indicated here would still be a problem for a structuralist account, where morphs are presumed to be made up of phonemic, and not morphophonemic, material.

overlap or inclusion rather than being disjoint. In such a case, some or all of the Xs must be linked to more than one μ .

Another type of disparity between the formal and the semantic analysis of forms is discussed in considerable detail in Aronoff 1976. This can be referred to as the existence of structure without corresponding meaningful morphemes, as in English prefix + stem combinations like *refer*, *receive*, *defer*, *deceive*, etc. Here all of the conditions for a formal analysis into morphemes *re* + *fer*, *de* + *ceive*, etc., are present, but no sensible meaning can be assigned to the component parts. It would thus seem that such forms contain more than one μ formally, but that each of the constituent μ 's is linked to the entire meaning of the form rather than to some proper subpart of it.

The English prefix + stem Verbs represent an extreme case of the common situation sometimes referred to as **reciprocal conditioning**, as in Icelandic *tek-ur* 'you (sg.) take' vs. *tók-st* 'you (sg.) took.' Here each of the two components of the form (the stem and the ending) simultaneously depends both on the tense and on the person and number of the subject. Such overlapping of the material representing different categories is in some sense the essence of the morphological type referred to (rather misleadingly) in traditional typological schemata of the nineteenth century as 'inflecting' languages. In fact, in languages like Icelandic, the correspondence between components of the meaning of a word and those of its phonological form may be quite complex, as in the following example:



The word *hafðir* can be regarded as having five constituent elements that contribute to its phonological shape: the stem /h(a)f/, the vowel of this stem (a), and the suffixed elements /-ð/, /-i/, and /-r/. The lines between elements of the meaning of this form and these formal units are shown in the diagram above. Each line represents a dependency such that a change in the category involved could result in a change in the phonological identity of the associated formal unit.⁶ This sort of formal structure is clearly inconsistent in fundamental ways with the idealized picture of morphological analysis assumed in the traditional model.

This collection of problems is perhaps somewhat heterogeneous, but the frequency with which such situations are met with in the languages of the

⁶ Cf. *hafði* 3sg. pret. ind., *höfðuð* 2pl. pret. ind., *hefur* 2sg. pres. ind., *hefðir* 2sg. pret. subj. in support of the links indicated.

world suggests that the principles underlying the structuralist notion of the morpheme must be at least revised, if not abandoned. In the next section, we consider the ways in which the conditions of that model could be relaxed to accommodate such examples.

3.3 Generalizing the structure of the morpheme

A number of the problems cited in the previous section revolve around cases in which some apparent "morpheme" does not correspond to a discrete, continuous substring of the segments making up forms in which it apparently occurs. This is the case, for example, with infixes (where the infix itself breaks up the string of segments corresponding to whatever other element it is infixed into), and with circumfixes. Some cases of superfluous morphs could be analyzed as discontinuous morphs as well. Consider, for example, negation in Choctaw Verbs, as in the pair *shiipa* "it's stretched" vs. *ikshii'po* "it's not stretched." The single category NEGATIVE is marked here by (a) a suffix *-o* at the end of the Verb, resulting in the loss of the stem-final vowel; (b) glottalization of the penultimate vowel; (c) prefixed */k-/*, separating the stem from (d) a member of a distinct set of pronominal agreement prefixes. If we regard these formal components as independent morphemes, some are clearly superfluous from the point of view of marking negation; but if we regard them as a single combined marker of negation, the resulting morpheme is not a continuous one.

In an important paper for the development of generative morphology, McCarthy (1981) suggested that the appropriate way to approach such problems was by revising the fundamental notion of what constitutes the morphological analysis of a form. The classical model sees morphemes as units, composed of phonological material and concatenated to create full forms. McCarthy proposed that we should instead view the morphological and phonological representations of a form as co-ordinate but independent analyses of it. That is, instead of representing the morphological decomposition of a word by a series of internal boundary elements delimiting its constituent morphemes (as was common both in structuralist and in early generative work),⁷ we can give its phonological material a simultaneous analysis as a collection of (possibly, but not necessarily, sequentially ordered) morphological units.

Parallel to the theory of Autosegmental Phonology, McCarthy suggested that each such morphological unit (represented as a μ on the morphological

⁷ See chapters 9 and 10 for a review of the issues surrounding such quasi-segmental boundary elements in phonology.

tier of the representation, as in (1) above) is linked by lines of association to some of the phonological material in the form. In these terms, the classical model of morphological structure corresponds to a strong form of the well-formedness conditions on autosegmental representations (Goldsmith 1979). Assuming all of the morphological elements (the μ 's) constitute a single autosegmental tier, the association of these units with phonological material in a language with only "classical" morphemes would satisfy the conditions in (2), a direct translation of the corresponding requirements on phonological form.

McCarthy's insight was (in essence) that many of the problems confronted by traditional views of the morpheme could be seen as relaxations of these conditions. For example, one of the classic puzzles for morphological analysis is the verbal system of Semitic languages, in which roots apparently consisting only of consonants are "interdigitated" with patterns consisting only of vowels marking categories such as tense and aspect, and the whole is related to a canonical syllabic structure which serves (in part) to identify categories such as voice, transitivity and/or causativity, etc. With the exception of a small number of prefixes and suffixes, virtually none of the morphological structure of such forms conforms to the classical picture of continuous, discrete morphemes.

An example is Classical Arabic *kuutib* "was caused to write," where "write" is represented by k-t-b; the perfective passive by the vowels u-i; and the causative by the fact that the syllable structure is CVVCVC. Graphically, we have something like the representation in figure 3.1. We can, then, view the morphemes that make up a Semitic Verb as each constituting a distinct representational tier or **plane**,^{*} rather than considering them all to occur on the same plane. In this picture, the nature of the interdigitation of vocalic and consonantal elements no longer violates the requirement that lines of association from elements on one plane (that corresponding to a given morpheme, for example) to another (the phonological representation) must not cross.

The syllabic structure of a form may constitute an independent aspect (or tier) of its phonological representation that is distinct from the tiers where its actual phonological feature content appears. In this way, the association within one morphemic plane between the form's "binyan" (the traditional terminology for its derivational category) and this syllabic structure no longer

* Recent work has tended to use the word 'tier' to indicate a purely phonological dimension of representation, such as the set of specifications for tongue-root position in a form; and to use the word "plane" for a morphological dimension, such as the part of an Arabic Verb that corresponds to its consonantal root. We will generally follow this distinction here.

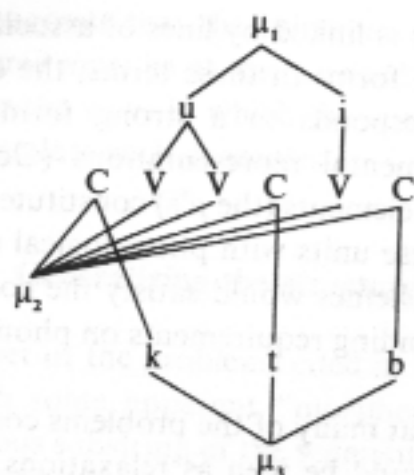


Figure 3.1 Multiplanar analysis of an Arabic verbal form

presents a formal problem, despite the fact that on other planes (the root-morpheme plane and the vowel-pattern plane) other morphological units are linked to the segmental material which are organized by this syllabic structure. The unusual aspect of Semitic structure, then, consists in the fact that (some of) its morphemic elements appear on distinct planes of representation. From this, together with (a) the independently motivated autosegmental phonological structure of the form, and (b) the well-formedness conditions, the rest of the properties of Semitic verbal inflection can be reconciled with a morphemic model.

An influential series of subsequent papers by McCarthy and others (e.g. McCarthy 1982, 1983, 1986; Yip 1982; Archangeli 1983; Cole 1987) have pursued the analytic possibilities provided by this approach to what has come to be known as **non-concatenative** morphology (as opposed to traditional, purely affixational or 'concatenative' morphology).⁹ Most of this work has focused on the analysis of discontinuous elements in morphology, but it has also extended to some other problems as well. A particular area of activity has been the treatment of reduplication, which will be considered in the following section.

The autosegmental approach to morphology thus revises the traditional view of the phonological structure of the morpheme, to allow morphological elements to be associated with discontinuous parts of a form and/or subparts of the phonological content of individual segments. By interpreting the relation between morphological and phonological content as a matter of associations within and among the planes of a complex representation (rather than as the

⁹ We return in chapter 10 to the question of whether multiplanar representations of morphologically complex forms are motivated, and particularly the question of whether such representations are accessible to rules of the phonology or morphology of language.

concatenation of phonologically instantiated morphological units), at least some of the morphological problems noted by, for example, Hockett (1947) and Matthews (1972) find a satisfying account.

3.4 Items vs. processes in morphology

If we generalize the relation between morphemes and their phonological content along the lines of the preceding subsection, do we therefore evade all of the difficulties for the structuralist notion of morpheme noted in the earlier literature? Manifestly, this approach accommodates infixation, circumfixation, and related problems. By further relaxing the well-formedness conditions, we can describe portmanteau morphs (if phonological material is required merely to be linked to "at least one" μ rather than to "exactly one").

Another class of examples, however, poses puzzles of a rather different kind for the usual notion of the morpheme. The difficulties for traditional morphemic analysis that we have just been considering involve either mismatches between the analyses of form and of meaning, or the existence of discontinuous constituents of form. A different set of problematic cases are those in which there does not seem to be any plausible analysis of some morphological element in terms of an isolable, identifiable 'affix' that could constitute the phonological shape of the morpheme.

One such set of examples, noted already by Harris (1942) and Hockett (1950) as requiring special treatment, is provided by morphemes of reduplication (called "chameleon morphs" by Hockett). The problem posed by reduplication for the traditional view of morphemes is simply that the content of reduplicated material is apparently not constant: it is instead a copy of (some portion of) the material to which it is attached. Thus, the reduplicated syllables (in bold face) in the Tagalog verbs *mag**l**alakbay* "to travel (intensive)," from *maglakbay* "to travel," and *pag**b**ubuksan* "to open (intensive)," from *buksan* "to open" have no actual phonological segments in common, but nonetheless represent the same morphological element: the 'intensive.'

An account of reduplication in terms of the notion of multiple morphological planes was suggested already in early work of McCarthy (1981). In the description of reduplication, the advantage of this approach is that it admits an association of a particular morphological element μ with only a portion of the phonological content of the form. In particular, by analogy with the recognition that Semitic syllabic-structure templates may themselves constitute morphological markers (indicating the binyan to which a given Verb belongs) in a way that is independent of their phonological content, it

is possible to propose that it is precisely the segmental (or syllabic) structure of the reduplicated material which is the content of a reduplication morpheme, with the associated phonological "melody" supplied by convention. The Tagalog intensive marker is simply the skeletal pattern "CV," added to the stem (following an initial prefix such as *mag-* or *pag-* in linear sequence). The process by which the melodic material of the stem's first consonant and vowel comes to be associated with the C and the V of the affix is not, strictly speaking, a part of the affix itself, which can thus be assigned a constant form.

The precise analysis of reduplicative phenomena is not yet firmly established. One analysis, which derives from McCarthy's, is pursued in Marantz 1982, and a variety of alternative views (all based on notions of multiple morphemic planes) have been discussed in the recent literature. Of course, if it is to be maintained that reduplicative morphemes have constant content under this analysis, the crucial point that must be argued is that the actual melodic material associated with this content in any given instance can be supplied by sufficiently general conventions as to eliminate the statement of the association from the description of specific morphemes. This is not at all straightforward, though it has come to be widely accepted in current work that there are enough possibilities for an affixal account that we should no longer regard reduplication as specially problematic for the basic idea of the morpheme.

The correctness of this claim is far from self-evident, since reduplicative formations with essentially the same skeletal form can derive their melodic content from different parts of the base form. Prefixed reduplication, for instance, typically copies material from the beginning of the base form; but in the Austroasiatic language Temiar (Benjamin 1976: 177f.) there is a class of expressive adjuncts formed from bisyllabic Verbs by prefixing a syllable of the form $/C_1\epsilon C_2/$, where C_1 represents the initial consonant of the root and C_2 represents the root-final consonant, as in the examples in (4).

- (4) a. *bəybəguy* < *bəguy* "to waft (smoke)"
 b. *rəgrəwēg* < *rəwēg* "to stand conspicuously upright"
 c. *gengerlət* (phonologically $/g\epsilon tgerlut/^{10}$) < *gerlut* "be long and thin"

In the related language Semai (Diffloth 1976), there is a very similar process that forms expressives from Verbs by prefixing a vowel-less "minor" syllable consisting of the stem-initial plus the stem-final consonants (e.g., *dldyǝl* "appearance of an object which goes on floating down a river," from the root *dyǝl*). When the stem contains only two consonants, however, the fixed element

¹⁰ Voiceless stops at the beginning of medial clusters become nasals by a regular phonological process in Temiar.

/r/ constitutes the second consonant in the reduplication: thus, *hrhâc* "the sound of dragging something," from *hâc*. It seems difficult to imagine a set of general conventions for melodic association that will have this effect without requiring a specific stipulation as part of the description of such processes, and such a stipulation would pose difficulties for a strictly affixational account of reduplicative morphology.

Other problems for the notion that all morphemes correspond to separable and determinate subparts of the phonological content of a form¹¹ are even more lacking in obvious solutions. The simplest case of this kind is that of zero morphs. These obviously have no content at all, which would require us to relax the second condition as well in (2) above. This is not a trivial result: for instance, the assumption that any information which is not overtly signalled nonetheless corresponds to some zero morpheme leads to the formal problem of assigning a place in the structure (and in linear order) to all of these zeros. Thus, the free positing of zero morphs allows us to say that Latin *amo* "I love" represents "LOVE + CONJ1 + INDIC + ACTIVE + PRES + 1 PERS + SG," but in which order (from among the 7!, or 5,040 possible orders)? The formal problems associated with morphological zeros (among others) are discussed at some length by Pullum and Zwicky (1991).

More fundamentally, perhaps, we have apophonic relations (Ablaut, Umlaut, and other morphologically significant vowel or consonant mutations¹²). A familiar example is presented by English *sing* vs. *sang* vs. *song*; or *mouse* vs. *mice*. Here it is not the actual content that signals present vs. past (or Verb vs. Noun), or singular vs. plural, but rather a systematic relation between two or more forms. However, the question immediately arises of what the content is of 'morphemes' such as {PAST}, {PLURAL}, etc. in these cases.

It is possible to construct a 'non-concatenative' analysis, in which the small subset of English in which such apophonic relations appear is treated as analogous to, for example, Classical Arabic. On this line, the Verb *sing* involves a consonantal root morpheme ($\sqrt{s-V-n}$) which occurs with one of two vocalic patterns (/i/ marking "present" and /æ/ marking "past"), while the Noun *song* is built by combining the same root with a vocalic melody /o/. The Noun *mouse* on this view contains another consonantal root ($\sqrt{m-V-s}$) that occurs with vocalic patterns /aw/ "singular" and /aj/ "plural."

¹¹ Or as this is sometimes put, that all morphology is 'affixation.'

¹² Terms such as 'Ablaut,' 'Umlaut,' etc. refer to the historical background of such an alternation, not to its synchronic character. We will in general use the neutral word "apophony" to refer to synchronic vowel alternations of this type, without regard to their historical source. This is not because the history is unknown, but rather because it is irrelevant to the synchronic characterization of morphological rules.

This analysis is not obviously wrong (that is, there is no reason to believe it cannot in principle describe the facts), but it is noteworthy that there does not appear to be any substantive evidence in its favor (as there clearly is, for example, for something like McCarthy's analysis of Arabic and other Semitic languages). Most analysts find it counterintuitive, though that hardly constitutes evidence. If we are required to provide an analysis that enumerates the morphemes that make up a form, however, and that associates each of these with some determinate phonological content (as on the classical view, augmented by McCarthy's enriched notion of the nature of this correspondence), this or something very like it is what we must come up with (as structuralist morphologists like Bloch, Hockett, and Nida recognized).

In fact, this mode of description also leads to complications elsewhere in the grammar of English. How, for instance, are we to describe the fact that the Verb *dive* can form its past as either *dived* or *dove*? The existence of the latter suggests that the stem of this Verb should be something like $\sqrt{d-V-v}$, with infixes /aj/ "present" and /ow/ "past." In that case, however, we have no way to describe *dived* as simply the regular formation involving suffixation of /-d/ to a stem: we must rather treat it as involving the addition of a superfluous morph /aj/ "present" to the stem, followed by regular past suffixation. On this account, the regularized form *dived* becomes morphologically more (rather than less) complex than the "irregular" form *dove* which it replaces – surely a bizarre conclusion.

Consider another possible account of the relation, however. Suppose that instead of saying, for example, "/æ/ is the realization of {PAST} in *sang*" we say "the PAST form of *sing* is formed by replacing /ɪ/ with /æ/." On this description, what represents {PAST} in *sang* is not the segment /æ/ but rather the *relation* between *sang* and *sing*, expressed as the **process** by which one is formed from the other.

The choice between these accounts is a familiar one, raised (in one form) in Hockett 1954. The standard view of morphemes, inherited from structuralism, treats them as (phonologically realized) entities or (lexical) items. The alternative suggested in the preceding paragraph, however, treats morphological material as represented by relations (between word forms) or processes (by which one word form can be constructed from another). How might we decide between these two accounts, other than on the basis of an *a priori* preference or commitment to one over the other (the only basis for a preference, according to Hockett 1954)?

If a morphological process necessarily involves some change in the phonological content of a form other than the addition of some (possibly discontinuous) phonological material, it cannot naturally be reformulated as an item whose positive presence in the form marks the category in question.

Another way of putting the issue is the following: is it possible to reduce all of morphology to affixation (admitting the rich notion of 'affix' that follows from autosegmental accounts of the nature of morphemes)? If not, the item-based theory should probably be rejected.

On grounds of descriptive coverage, it seems clear that the process view is (potentially) less restrictive than the item-based view. This is because the presence of any given formative marking a particular category can always be described as a process that adds the relevant phonological material to a more basic stem in the presence of that category; but the opposite does not hold. If we admit morphological processes from other than the limited class of rules of simple affixation, we run the risk of weakening the theory; and this calls for further investigation of the precise formal limits of morphological systems.

One response to the problem of what rule types should be theoretically sanctioned (and which excluded) might be to impose maximally narrow constraints on the expressive power of the rule formalism, so as to exclude rules whose formal character is not instantiated in natural languages. This is a standard form of argument in linguistics, but it may well not be warranted logically in at least some instances. The range of things that are actually attested in natural languages is determined not only by the possibilities made available by the human cognitive-linguistic ability (which linguistic theory attempts to characterize), but also by contingent facts about the world.

For instance, the fact that there are only a finite number of attested human languages obviously means that some theoretically possible systems are nowhere instantiated. More interestingly, constraints from other domains may conspire to reduce the set of attested possibilities. A possibility entertained in chapter 13 is that some rule types are unattested not because they are beyond the bounds of human linguistic capacity, but rather because there is no coherent sequence of possible historical changes that could give rise to them; or at least because such a sequence of changes is so unlikely as to provide in itself an explanation for the absence of rules of the given type. In fact, we find in the phenomena of 'secret languages' or 'language games' a wide range of process types which are not found in natural languages,¹³ but with which speakers seem to be able to acquire considerable fluency.

Such rules, we suggest, are possible in these artificial systems precisely because these 'languages' are not the product of natural historical evolution. Since they are not constrained by the limits on historical change, they are freer to exploit the limits of human linguistic capacities. Since it is these capacities that a theory of language seeks to characterize, and not the adventitious set that we find utilized in the actual languages of the world, we

¹³ For a comprehensive survey of the phenomena attested in such systems, see Bagemihl 1988.

should be careful not to exclude in principle phenomena whose absence is in fact due to the interaction of linguistic capacity with other factors.

These considerations ought to make us reluctant to construct the theory of word structure so as to debar relations that can only be described in processual terms, since such relations can occur as the basis of secret language or language-game systems. Of course, if it could be demonstrated that in fact there is no need to adopt a richer theory of morphology than one limited to rules of affixation, this would be an empirical finding of considerable interest. However, since it is precisely the correct description of *prima facie* instances of relational, rather than affixational, morphology that is at issue, we should not decide the question on a purely *a priori* basis if we can help it. We should therefore look to see whether there is other evidence bearing on the possibility that non-affixational processes are among the possibilities encompassed by human linguistic capacities.

Phenomena such as apophony in English do not really resolve this issue either way. An affixational analysis is possible; but in the absence of positive evidence, it is not obviously correct, and it seems (to many, at least) to do violence to the facts. Another area where traditional views saw an argument for non-affixational morphology was reduplication; but as we have seen above, reduplication was argued in McCarthy 1981 and Marantz 1982 to be fundamentally affixational rather than processual in character, when correctly analyzed. There remain some objections to the claim that a comprehensive affixational account of reduplication in, for example, Tagalog is available (see Carrier-Duncan 1984); other problematic examples were noted above. It is also true that the reduction of reduplication to affixation is not complete even on the view of, for example, Marantz (1982), since the (non-trivial) mechanism by which melodic content is associated with the skeletal reduplicative affix must still be specified. Nonetheless, reduplication cannot be said to falsify the claim that all morphology is affixation. Among the problems (traditional and otherwise) for an item-based view of morphemes, however, there are others for which an affixational analysis seems much less likely.

Some languages exhibit 'subtractive' morphs – morphological markers whose formal reflection is in the *deletion* of phonological material – despite the apparently counterintuitive nature of such an 'anti-iconic' (see Dressler 1985, 1987) way of marking a morphological category. Bloomfield's proposed example of this, gender marking in French Adjectives, is surely not valid (virtually all analyses of French agree that there is no morphologically determined deletion of final consonants to form the masculine from the feminine), but other cases are known. One such is the formation of imperatives in Danish from the infinitive by the truncation of a final schwa (see Anderson 1975 and references cited there, as well as section 9.2 in chapter 9 below).

Crucially, Danish imperatives show phonological properties which follow from general rules if the infinitive is taken as the basic form, but which require that the rule marking the imperative consist not in the addition but the deletion of phonological content.

Similarly, there is a class of action Nouns in Icelandic which are derived from verbs by deletion of the *-a* of the infinitive (e.g. *hamr* "hammering," from *hamra* "to hammer," itself from *hamar* "(a) hammer"). A number of clear phonological criteria¹⁴ show that these Nouns are formed by a rule of morphology whose sole formal effect is to truncate the final vowel from the base infinitive.

Another instance of subtractive morphology is found in the Uto-Aztecan language Papago (Tohono 'O'odham). As described by Zepeda (1983: 59ff.), in this language "in most cases the perfective can be derived from the imperfective by dropping the final consonant of the imperfective for both singular and plural forms." In a few Verbs, even more material is lost in this formation. Examples of Papago perfective truncation include those shown in (5).

(5)	<i>Imperfective</i>		<i>Perfective</i>			
	<i>Singular</i>	<i>Plural</i>	<i>Singular</i>	<i>Plural</i>		
	him	walking	hihim	hi:	walked	hihi
	hi:nk	barking	hihink	hi:n	barked	hihin
	hikck	cutting	hihikck	hikc	cut	hihikc
	gatwid	shooting	gagtwid	gatwi	shot	gagtwi
	'elpig	peeling	'e'elpig	'elpi	peeled	'e'elpi
	hukšan	scratching	huhukšan	hukša	scratched	huhukša
	hehem	laughing	hehem	hehe	laughed	hehe
	cipkan	working	cicpkan	cipk	worked	cicpk
	med	running	wo:po'o	me:	ran	wo:p

This truncation of a final consonant appears to be quite productive in Papago, failing only in (a) Verbs that end in a vowel, which show no truncation (e.g., *cicwi* "playing, played"), and (b) Verbs, such as the last two in (5), which show truncation of additional material.

Apart from these examples, and others mentioned in Dressler 1987 and Mel'čuk 1989, an interesting case of subtractive morphology has recently been described in some detail in Martin 1988, on the basis of work by Broadwell (1987). Languages of the southwestern Muskogean group show a process of 'syllable (or rhyme) dissociation' illustrated below:

¹⁴ Including the distribution of vowel length; the failure of *u*-epenthesis in final *-Cr* clusters; the preservation of final post-consonantal *-j*, etc. See Orešnik and Pétursson 1977 and Kiparsky 1984 for details and discussion.

- (6) a. Alabama
 (i) balaa-ka "lie down (sg.)"; bal-ka "lie down (pl.)"
 (ii) batat-li "hit once"; bat-li "hit repeatedly"
 (iii) kolof-li "cut once"; kol-li "cut repeatedly"
- b. Choctaw
 (i) bonot-li "roll up (sg. Obj.)"; bon-li "roll up (pl. Obj.)"
 (ii) bakaaf-li "split (sg. Obj.)"; bak-li "split (pl. Obj.)"
- c. Koasati
 (i) atakaa-li "hang (sg.)"; atak-li "hang (pl.)"
 (ii) lataf-ka-n "kick (sg.)"; lat-ka-n "kick (pl.)"

Martin shows that the operation involved in these forms is one which derives the plural (or iterative etc.) form from the singular by dissociating the final syllable from the prosodic pattern and then reassociating its onset consonant melody into the preceding rhyme (if this is possible, consistent with the syllabic structures permitted in the language). Such a process has no apparent (coherent) reformulation as the addition of an affix or other overt 'morph' to the form.

Obviously, if the 'content' of a putative morpheme is the loss (rather than the addition) of phonological material, there is no way to parse the surface form of a word containing this category so that some (possibly discontinuous) subpart of its structure constitutes the morph in question. It should then follow that the existence of such examples furnishes strong evidence in favor of a morphological theory that recognizes processes other than affixation.

Similarly, if the content of a proposed morph consists not in some subset of the features of a form, but rather in an aspect of their arrangement, there is no obvious way to provide an affixational analysis for it.¹⁵ Such is the case with proposed instances of (morphologically motivated) metathesis.

Such rules were discussed in Thompson and Thompson 1969, where a central example was the formation of the "actual" form of Verbs from the "non-actual" in the Salish language Clallam. The content of the "actual" category (a sort of progressive) is not relevant, but its form is: it is apparently derived for roots of the form CCV by interchanging the second consonant with the vowel (cf. *čk'ú-t* "shoot [non-actual]," *čúk'-t* "shooting [actual]"). As far as the available facts about Clallam morphology and phonology show, the account of this category as derived by a metathesis rule seems correct, though alternatives may exist. For instance, the corresponding category in

¹⁵ A partial exception to this statement is the possibility of treating the entire prosodic skeleton of a word as a separable part of its phonological content, and assigning exactly this content to some morpheme. This is the case, for instance, with McCarthy's treatment of the prosodic skeleton of Classical Arabic Verb forms as the phonological 'affix' marking each binyan. Such an analysis does not, however, seem appropriate for cases of metathesis as referred to in this section.

the related language Lummi is shown by Demers (1974) not to be derived by a metathesis rule. Rather, the relevant roots contain two vowels, and stress is assigned to the first of these in the 'actual' forms but to the second in the 'non-actual.' Whichever of the two vowels remains without stress is subsequently deleted by independently needed rules of the phonology. On a corresponding analysis of Clallam, the root for "shoot" would have the form /čuk^wu/, and assignment of stress to either the first (in the 'actual') or the second (in the 'non-actual') would result in the deletion of the other vowel to yield the observed forms. On present information, it is not clear whether an analysis similar to Demers's account of Lummi could also be motivated for Clallam.

A recent description (Montler 1986) of another Salish language, Saanich, however, makes it clear that in this language a rule of metathesis is indeed responsible for forming the 'actual' of verbs. Montler demonstrates that (a) phonological rules of the sort crucial to Demers's account of Lummi are not motivated in Saanich (and in fact could not apply there); and (b) the roots showing metathesis in Saanich must actually be underlyingly vowel-less. The stressed position which undergoes metathesis with a root consonant is either epenthetic or belongs to an immediately following suffix. The view on which these roots have vowels in both of the relevant positions, and stress falls on one or the other, resulting in the loss of the unstressed one, is thus excluded. Independently of the structure of the metathesizing roots, Saanich in fact preserves unstressed vowels (including schwa), rather than deleting them. The metathesis account of the formation of the 'actual' in this language thus seems assured.¹⁶

If some morphological categories are marked by deleting or reordering existing material, rather than by adding new phonological content, it is surely not possible to reduce all of morphology to affixation without trivializing the problem. Of course, one possible reaction to this is to say that the morphemic model is so valuable that everything ought to be formulated in its terms, no matter what consequences ensue. This leads to the proliferation of zero morphs, some of which have attendant phonological effects (such as triggering rules of apophony, subtraction, metathesis, etc.) which we in fact find in some parts of the literature.¹⁷ But this move constitutes a tacit admission that the analysis of complex words into morphemes is no longer an empirical

¹⁶ Another example of an apparently morphological rule of metathesis is provided by the analysis of Latvian in Halle 1987.

¹⁷ An extensive defense of what used to be called "Item and Arrangement" morphology (see Hockett 1954) along just these lines is to be found in Bromberger and Halle 1989. The comments on this paper in Pullum and Zwicky 1991 bring out the problems with this program, and seem entirely appropriate.

hypothesis about the structure of language, but rather an *a priori* methodological principle of no independent interest.

Other problems, however, also appear for the "affixation only" program. For example, we pointed out in chapter 2 that morphologically conditioned rules (and only such rules – see Anderson and Browne 1973; Janda 1987) can effect an exact exchange of two segment types in comparable environments (for example, making long vowels short and short vowels long, without any differentiation of the environments in which the two possibilities occur). Obviously, such a case poses a problem for an affixational analysis; for whatever phonological content is appropriate for such a putative affix in one class of cases (e.g. the examples with shortening) will be precisely *inappropriate* for the same affix in the other class (those where lengthening occurs). An extension of this line of argument applies in the case of morphological categories marked by a sort of 'chain-shifting' process. Given a category which is marked by (a) voicing or spirantizing a single stop, but (b) degeminating a geminate stop (as in the morphologized residue of formerly phonological consonant gradation in some Uralic languages such as Lappish), there seems to be no consistent phonological content that can be assigned to the hypothesized affix, even on the rather rich notions of what such content can be that are associated with autosegmental views.¹⁸

If we accept the evidence that the range of morphological possibilities in natural languages includes some processes that cannot properly be represented as the addition of an affix, we must conclude that a general morphological theory should admit both affixational and non-affixational rules. Since a process-based approach naturally accommodates affixation, but not vice versa, the alternative we should prefer is to explore a theory of morphological processes. Naturally, this is the starting point rather than the conclusion of the development of such a theory. For instance, even though we must evidently include some processes such as apophony, subtraction, metathesis, and exchange rules, this hardly implies that any process that can be represented in a free transformational formalism should be admitted as potentially part of the morphology of a natural language. The appropriate set of restrictions on the phonological changes associated with morphological rules, however, should not be decided purely on the basis of an *a priori* commitment to

¹⁸ An attempt is made in Lieber 1987 to describe some such cases in terms of affixes that are only partially specified phonetically. Some deficiencies of Lieber's account of Welsh will be noted below in chapter 8, and in any event there does not appear to be any extension of her analysis to instances of 'pure' chain shift. The reason for this is again that whatever phonological content is appropriately added to induce the 'last' link in the chain must not be added to previous links, or the result will be neutralization rather than chain shift. Thus, the Lappish degeminated voiceless stops must not be further voiced or spirantized.

restrictiveness. The remarks above (and in chapter 13) about the interaction between grammatical theory and other constraints such as those on historical change suggest a certain amount of caution in deciding just what portion of the burden of accounting for what is found among the languages of the world should be borne by grammatical theory alone.

If morphology is indeed more adequately represented in the general case by relations or processes than by discrete lexical-item affixes, the consequences are far-reaching. Instead of a lexicon of affixes, the morphology of a language would then consist of a set of rules, each describing some modification of existing forms that would relate them to other forms. If this is the case, some other facts also seem to fall into place. For example, on the view of Lexical Phonology (see chapter 9 below), the rules of the lexical phonology ought to apply to every lexical item. It appears, however, that affixal material must be specifically prohibited from having a phonological cycle of its own (see Kiparsky 1982b), being subject to the lexical rules only insofar as it forms a cyclic domain with some other material. This is exactly what we expect, if the lexical rules apply to the *lexicon*, and affixal material appears in a word only by virtue of a modification made by some morphological rule. Similarly, the notion of a derived environment, important to an understanding of the conditions under which lexical rules may apply, can be unified if we regard both morphological changes (such as the addition of affixal material) and phonological ones as rules modifying the shape of a form (see chapters 9 and 10).

3.5 Word-based vs. morpheme-based morphology

The notion that morphology is represented by a set of rules rather than by an inventory of items makes contact with another important foundational issue: the claim of Aronoff (1976) that morphology is based on (whole) words, rather than on morphemes, as the domain of the sign relation. Aronoff noted that in the general case, it is only at the level of whole words that form is associated with meaning. Another way of putting this is to observe that both the forms and the meanings of words are potentially internally divisible (disregarding the purely phonological division of word forms into segments, features, etc.); but the relation between categories of meaning and aspects of form is often many-to-many rather than one-to-one. This is the point of a diagram such as example (3) above; it is also the conclusion drawn in Matthews 1972 from points such as those made above in section 3.2. Empty morphs are formatives unassociated with any morphemic content; superfluous morphs are cases where more than one formative is associated with the same category;

cumulative and portmanteau morphs involve more than one category associated with the same formative; and reciprocal conditioning and structure without meaningful morphemes are cases in which a (possibly complex) content is irreducibly linked to several distinct and separable formatives within the complex word. In all of these cases, the one-to-one relation between components of meaning and components of form which is essential to the classical morpheme is violated.

Accepting the conclusion that the basic sign is the word, not the morpheme, Aronoff proposes that morphological rules are also relations between these entities. These **Word-Formation Rules**, on his view, relate one word to another in terms of some specifiable set of changes in properties. A change in the form of the word (perhaps, but not necessarily, the addition of affixal material) is correlated with some change in the syntax (e.g. a change of word class, or of subcategorization requirements, etc.) and/or some change in the semantics of the word. Since the relation between form and meaning exists only at the level of the word, no difficulty is entailed by cases in which a single Word Formation Rule involves multiple changes in a form (as in the case of negation in Choctaw noted above).

The notion that it is words (not morphemes) that constitute lexical entries makes sense of the fact that it is with words (not morphemes) that idiosyncrasies must be associated. Thus, the English word *appreciable* is a perfectly regular formation from the Verb *appreciate* by way of the rule forming Adjectives in *-able* from transitive Verbs; but the meaning is not the expected one ("capable of being appreciated"), but rather "substantial, considerable." One of the most common forms of historical change, in fact, is the accretion of individual, idiosyncratic meaning to particular words, without regard to whether these words are morphologically complex or not.

The claim that words and not morphemes constitute the terms of morphological relations has been rejected by some authors (see Bauer 1979; Lieber 1980; Selkirk 1982; and discussion in Scalise 1984). At least one class of objections to this position can be disposed of fairly directly. If the relevant notion of "word" for a word-based morphology is supposed to be an existing surface word, it is not hard to find abundant counterexamples to such a principle. Consider, for example, formation of Adjectives from Nouns in Latin according to the pattern illustrated by the pair *vir* "man," *virilis* "manly." In this case, the suffix meaning roughly "belonging or pertaining to (Noun)" can be added directly to the occurring nominative singular of the Noun to form the Adjective. But what of other pairs, such as those in (7)?

- (7) a. *vulgus* "common people"; *vulg-āris* "commonplace"
 b. *rēx* "king"; *rēg-ius* "royal"
 c. *mors* "death"; *mort-ālis* "mortal"

In these cases, the base from which the Adjective is derived never shows up as a word by itself: in every occurrence, it is followed by some ending marking case and number. The correct move here would appear to be to say that it is not words but **stems** that function as the base of Word Formation Rules. An appropriately constrained notion of stem, in turn, seems to be "word minus (productive) inflectional affixation." If correct, this provides at least the skeleton of an argument to the effect that the class of (possibly complex) forms representing the output of rules of derivation but prior to the operation of productive inflection has a special status in the grammar: essentially, these are the "lexical items" that are entered in a language's dictionary. We will discuss in chapter 4 the implication that inflectional rules are separable from derivation, in that the latter apply to form lexical items, while the former apply to convert these into surface inflected words.

3.6 Conclusion

With the modification proposed in the preceding section, then, we accept here the proposition that the morphology of a language consists of a set of Word Formation Rules which operate on lexical stems to produce other lexical stems (which, if fully inflected, will be surface words). On this view, the morphological structure of a word is given as a derivation, showing the set of rules by which it is related to other words (and ultimately to a basic lexical entry). Chapter 10 will discuss some other aspects of a comparison of this view with the more traditional one (represented in the generative literature by work such as that of Lieber [1980], Selkirk [1982], Williams [1981b], and others) according to which a word's structure is given in the form of a Phrase Marker indicating constituency relations among its component morphemes. If some aspects of a word's formal structure cannot in principle be represented as concrete morphemes, however, as we have argued above, it is clear that the traditional account cannot be adequate in general.

There is good reason to explore alternatives to the standard view, but we must, of course, require that these account (at least) for all of the things that the concept of the morpheme and a morpheme-based morphology were designed to cover. Recall that there are two basic intuitions underlying the morphemic account of word structure:

- (8) a. Words that are related in meaning are (often) related in form as well. This is captured by saying that they contain the same morpheme(s).
- b. The constituents of a word's form can be organized into a hierarchical structure which also represents the internal organization of its meaning

and relation to other words. This organization can be presented in the form of a Phrase Marker whose terminal elements are morphemes.¹⁹

In revising the picture of word structure based on classical morphemes, we start from the observation that, in the general case, the class of contributors to the form of complex words looks more like the set of changes made by phonological rules than it does like a lexicon of listed word-like elements. An affix, that is, can be represented by a structural change such as $/X/ \rightarrow /X + aff/$, but processes like apophony, subtraction, metathesis, and others cannot be represented as listed elements comparable to $/dɒg/$ "DOG" or $/-z/$ "PLURAL." We thus take the formal constituents of complex words to be not listed morphemes, but rather operations on the form of words. On this view, *dogs* is represented not by concatenating $/dɒg/$ and $/-z/$, but rather by having $/dɒg/$ undergo a rule whose change consists of $/X/ \rightarrow /Xz/$, whenever it represents a Noun with the property of being [+Plural].

The relation in meaning between *dog* and *dogs* is represented by their sharing a base, since *dogs* is derived from $/dɒg/$. The relation between, say, *dogs* and *cats* is represented by the fact that they have both undergone the same morphological process (and of course by their sharing the feature [+Plural]). These rules thus constitute the basis of relations among words within the total vocabulary of a language.

To flesh out this picture, we need to develop several areas;

- (9) a. A theory of how the formal changes that are involved in constructing a complex word are related to the meanings and other properties that the resultant form signals;
- b. A theory of what kind of formal changes can make up the inventory of morphological indicators; and
- c. A theory of how these morphological operations are related to various notions of structure that we might assign to words, and that we might represent on the traditional view by a hierarchical constituent structure.

The next several chapters of this work will address these issues, among others, in exploring a theory of A-Morphous Morphology. Within the general typology provided by Hockett 1954, which continues to be referred to in the literature, this is an 'Item and Process' model of word structure, though, especially in its treatment of inflection, it could also be called a "Word and Paradigm" view. The principal opposition is to "Item and Arrangement" models; and since the dominant, classical picture of word structure based on the structuralist morphemes is firmly of this sort, it is this distinction that is most important to pursue.

¹⁹ Actually, even strongly morphemic theories have some trouble with this. The organization that seems to be motivated by a word's form may be seriously incompatible with the organization motivated by its meaning, giving rise to "bracketing paradoxes." We will return to this issue in chapter 10.