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Word Demarcation

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ABSTRACT

The word plays an important role in phonology. It is the single most important grammatical unit for the statement of distributional constraints and boundary phenomena. It is the primary accentual unit used by languages characterized by stress. It is the most widespread grammatical unit characterized by phonological prosodies. After surveying all of these phonological correlates of the word, a close look is taken at how the word relates to other grammatical and phonological units and their boundaries (pause, phrase, syllable, morpheme, and internal word). In the course of this study a constraint limiting the number and specifying the nature of word-internal grammatical boundaries is proposed and justified. The weakening of internal word to morpheme boundaries as the result of lexicalization and grammaticalization is also discussed, and illustrated from a number of languages.

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CONTENTS

1. Introduction

Although elusive, and barely definable at best, the word plays an important role in the phonologies of many of world's languages. For whatever reason, language users tend to build utterances out of grammatical/semantic units known as words, which in turn have effects on the sound structures of languages. In this paper an attempt is made to survey the phonological effects of word units, their demarcation within larger units, and their relationship to other phonological and grammatical units used in structuring utterances. It will be demonstrated that phonological properties are extended to the word-unit both from above (e.g. from the utterance level) and from below (e.g. from the syllable level). The term 'word demarcation' will refer to any phonological consequence of the word, whether or not it can be demonstrated that this consequence serves the function of demarcation in the Prague School conception.

2. The Word in Phonology

The word as a linguistic unit has a long, and at times distinguished history in the field. It has been approached in a number of different ways, with definitions always falling somewhat short of perfection. It nonetheless maintains great intuitive appeal, and provides the starting point for several models of grammar, as well as models of phonology. It is not possible here to summarize the different views and definitions represented in the vast literature existing on the subject. Several studies already provide historical statements on the study of the word. A comprehensive bibliography is available in Krámský 1969. For our purposes, it is sufficient to acknowledge that the word has been defined as a grammatical unit, as a semantic unit, as a phonological unit — or any combination of these. It has been dealt with as a concrete reality, as well as an abstract idealization. Needless to say, there is only partial agreement on how to incorporate it into a linguistic framework.

We will address ourselves in this section to the various phonological approaches to the word. Phonological definitions of the word are basically of two kinds. The first definition attempts to relate the word to pauses or to potential pauses, e.g. "...it may be proposed that the presence of potential pause be employed as an independent definition of the word-unit" (Greenberg 1965: 70). This definition is compatible, if not identical, to the notion of the "isolatability" of words. That is, a word within a larger utterance could have conceivably been an utterances of its own, without

affecting its relationship to the grammatical and semantic subsystems. As an example, the FRENCH utterance je te le donne 'I give it to you' (Žirmunskij 1966: 68) consists of four orthographic words. However, since je, te and le are the reduced or cliticized forms of these pronoun, only one of the four candidates for wordhood can appear in isolation. Consequently, one might argue in this framework that this sequence represents one single word. Of course, the corresponding ENGLISH gloss would be analyzed as consisting of four (if not five) words, since each can occur in isolation.

The second definition attempts to formalize the word unit as having a phonological coherency, whence the term "phonological word," which may or may not coincide with the notion "grammatical word," depending on the language, and depending on the example. This approach is characteristic of Firth's prosodic analysis (Firth 1948) and Pike's hierarchical approach to language (Pike 1967), although it is not limited to them. To take the Pikean model, which is the most attractive for our purposes, a word is a unit within a grammatical hierarchy, which, however, sometimes interacts with, or penetrates the phonological hierarchy. The overlap which results is sometimes perfect, sometimes only approximate. Thus, in a given utterance, a phonological word (a unit of phonology, but having at least some grammatical basis) can in some cases include parts of a preceding, and parts of a following grammatical word or words.

The phonological coherency of words in at least some languages is demonstrated in the following ways:

1. A word can function as a unit in the statement of distributional constraints.

2. A word can function as a unit in the statement of boundary phenomena.

3. A word can function as a unit in the statement of accentual phenomena.

4. A word can function as a unit in the statement of phonological prosodies.

We take up each of these in turn.

2.1 Distributional constraints

The term 'distributional constraints' is used to cover constraints on sequences, normally contiguous, as well as the timing characteristics found to characterize grammatical units (Lehiste 1964/73, 1970). It also seems to be appropriate to cover the kind of constraints reported for ɻJQ by Williamson (in press), who noted a statistical bias of certain consonants occurring in the first vs. second vs. third syllable of polysyllabic words. It is a well-known fact that languages exhibit constraints in the distribution and combination of their various sound segments. These constraints occur on both underlying or phonemic representations, as well as on the surface or phonetic level. They are stateable in terms of surrounding segments, but also in terms of grammatical units and their boundaries. In Kim and Hyman 1973, we addressed ourselves to the questions of whether distributional constraints of both the underlying and surface variety are needed (answered in the positive), as well as the question of what grammatical unit they are best stated in terms of. The answer to the second question was that distributional constraints likely to have any consequence for language users (i.e. likely to be "psychologically real" in generative terminology) are properties of the word, as well as the syllable, a phonological unit (cf. also Vennemann 1974; Hyman 1975: 194-5; Hooper, in press). A well-known example which can be stated only in terms of the word is the fact that the sound [ž] can not occur at the beginning of an ENGLISH word. Similarly, in BAMILEKE, a glottal stop cannot occur at the beginning of a word, while fricatives can only occur at the beginning of a word (Hyman 1972). Thus, there are at least two reasons why the sequence [yū$^{?}$ fə̀ʉ] 'hear the chief' must be divided into the two words [yū$^{?}$] 'hear' and [fə̀ʉ] 'chief.' A third reason is that no word allows a consonant cluster (with the exception of consonant-final verbs having the -si suffix). Thus, the sequence [$^{?}$f] would, as any other CC sequence, indicate that a word boundary intervenes.

It is often the case that such constraints characterize syllables as well as words, and in some languages such as BURMESE (Sprigg 1957, Okell 1969), where words tend to be monosyllabic, it may be difficult to determine how such constraints should be stated. Since syllables and words do not always line up (e.g. ENGLISH can have a syllable beginning with [ž], e.g. he sees you [hiy.siy.žə]), we know that there is a need to distinguish the two units for phonological purposes. There is, however, some question as to whether any distributional constraints should be stated in terms of morphemes. The case against morpheme structure conditions has been

accelerated over the past few years (Shibatani 1973; Kim and Hyman 1973; Vennemann 1974; Clayton 1976; Hooper 1976 -- but see also Kaye 1973, 1974; and the discussion in section 3.2).

2.2 Boundary phenomena

In addition to distributional constraints, languages often exhibit phonological processes (or "rules") which occur at word boundaries. These processes, together with the "static" distributional constraints, constitute the class of boundary signals of Trubetzkoy (1939/69), which were said to have a "demarcative" function. The languages which devoice final consonants and/or vowels fall into this category, as do the languages which, for example, insert a glottal stop before a word-initial vowel. Again, it is not always easy to determine whether such processes are to be attributed to the syllable or to the word. Examples such as in 1.,

1. Jagd [ya:kt] 'hunt' cf. Jäger 'hunter,' jagen 'to hunt,' with [g]
   Jagden [ya:gdən] 'hunts'

where the /g/ of Jagden becomes devoiced word-internally (and even before a voiced consonant) suggest that final-devoicing is a syllable property in STANDARD GERMAN. As we shall see below, many such processes have their roots in pre-and post-pausal phenomena which become "narrowed" to either word or syllable boundaries.

2.3 Accentual phenomena

Many languages have a regular stress placement rule of the type: place primary stress on the first syllable, or the penultimate syllable, or the final syllable of a given accentual unit. Often that unit is the word. Accent (of which stress-accent is a particular instance) is so strongly identified with the notion of the word that Garde (1968:18), for one, suggests that languages which do not have accentual phenomena do not have words (i.e. they do not have any unit intermediate between morphemes and phrases). Pulgram (1970), on the other hand, shows that what may be a word in one language might correspond to some other unit, e.g. the phonological phrase or phonological word in another language, and proposes the dichotomy between "nexus" (where words in junction keep their word properties) and "cursus" (where words in junction give up their word properties, e.g. accent, to form a larger unit). FRENCH, with its "groupes rythmiques" is an example of a cursus language.

Having word-final accent is, of course, quite similar to having word-final devoicing, since both are conditioned by the same boundary. Unlike accent, word-final devoicing, say, of consonants, may not be a reliable demarcator of words. Since in many languages when /b, d, g, etc./ become [p, t, k, etc.] word-finally, they actually merge with /p, t, k, etc./, it is not the case that the presence of voiceless consonants necessarily means that we are at the end of a word -- nor can we phonologically determine that devoicing as a process has occurred. If voiceless vowels are found only word-finally, this is much more reliable, since the likelihood of an underlying contrast between voiced and voiceless vowels is slight.

Even accent, however, is not entirely perfect as a demarcator. Martinet (1954) wishes to call penultimate accent an imperfect demarcation, since the demarcating property does not occur adjacent to the demarcated boundary. This may or may not be a relevant distinction to make. But far more serious is his demonstration (Martinet 1960/64: 87) that those languages which have syllable-weight phenomena, such as LATIN, do not always allow one to unambiguously determine where the word boundary lies. The example Martinet cites is [bónacalígula], which according to the LATIN stress placement rule could be, on the basis of the accent alone, segmented either as [bónaca] plus [lígula] or as [bóna] plus [calígula]. It is the meaning of the sequence which tells us that the second segmentation is the correct one. Thus, in such examples, one can assign accent on the basis of word boundaries (and some segmental information), but one cannot assign word boundaries on the basis of accent alone.

In many languages accent is not used demarcatively, since there is no general rule always assigning the accent to the same syllable within a word. Rather, a number of languages have systematic phonemic or "lexical" stress, where the placement of stress must be indicated in the lexicon. A language can also have contrasting surface (phonemic) stresses because of grammatical processes, e.g. the ENGLISH distinction between pérvert, a noun, and pervért, a verb. In either case we cannot unambiguously determine where a word boundary is on the basis of the accent alone. One can, however, determine how many word units are present in an utterance, if the principle of one stress per word is maintained throughout. In this sense the stress maintains a culminative function: we know how many word units there are, but not where they are divided. In Hyman 1977 it was suggested

that nondemarcative stress normally derives from demarcative stress as a natural historical process. The one complicating factor is the possibility of developing phonemic stress from the stem-affix dichotomy. Thus, in a language with stem-initial stress, pátu would receive initial stress, while pa=tú (where =tú is the stem) would receive second-syllable stress. If the second instance of pa- were to cease to be a prefix, we could derive the contrast between pátu and patú with no synchronic basis for predicting the accent.

2.4 Prosodies

The London School, whose approach to phonology emphasizes the syntagmatic or prosodic aspect of sound systems, has noted that a given phonological stretch can require an agreement with respect to some phonetic property. The most common instances are vowel harmony, nasalization and "flatness" (glottalization or pharyngealization). These prosodies do not always coincide with the word, but to the extent that they do, they demonstrate the coherency of that grammatical unit. And there is no denying that such a tendency exists.

In IGBO, for instance, there is a harmony between the following vowel sets in most dialects (Welmers and Welmers 1968):

2.

Advanced tongue root		Retracted tongue root	
i	u	ị	ụ
e	o	a	ọ

It is normally the case that all of the vowels occurring within the same word will be chosen from the same set, either the advanced tongue (or "clear") vowels on the left, or the retracted tongue (or "pharyngealized") vowels on the right. This produces a number of common alternations, for example, the verbal noun prefix /A/ which has two realizations, as seen in 3.

3. /sí/ 'cook' ⟶ [èsí] 'cooking'
   /sị́/ 'say' ⟶ [àsị́] 'saying'

However, sometimes when verb stems are compounded, no vowel harmony takes place, e.g. /gá/ 'go' plus /fè/ 'cross' becomes [gáfè] 'go across,' not *[géfè]. This compound does represent one word, however, since it takes only one set of verbal suffixes, as in [gáfèrè] 'go across for (someone).' We propose an internal word

boundary (#) to capture this fact, i.e. /gá#fè/, so that vowel harmony is blocked. What this means is that whatever occurs to the left of # will have the same harmony properties, as will whatever occurs to the right -- but the two will not necessarily agree. The boundary in [èsí] and [àsị́] is a simple morpheme boundary (+), which does not have the ability to block harmony. To the extent that speakers maintain the independent lexical status of each of the components of /gá#fè/, harmony will not creep across the boundary. If we look at another suffix, however, /tá/ 'towards the speaker,' we find differences among individuals. For the verb /bú/ 'carry on head,' some will say [bútá] 'bring,' and some will say [bútế]. The reason is that the historical # of /bú#tá/ is becoming weakened to a + boundary, the reason for this being that /tá/, formerly an independent verb, has become grammaticalized. Thus, /bú#tá/ is coming to be treated with /tá/ phonologically subordinated to /bú/.

One final prosody of increasing importance in phonological studies is tone. Leben (1971, 1973) has attempted to argue for tone as a suprasegmental feature characterizing grammatical units, e.g. morphemes and words. One argument which he gives is that words are sometimes characterized in a language by a limited number of tonal patterns, which occur independently of the number of syllables in the word. While Leben has based much of his argument on MENDE, an equally impressive case is built up for KUKUYA by Paulian (1975). In this language high and low tones form sequences which can be stated without reference to the length of a word: "Ces deux tonèmes se combinent pour former cinq schèmes, unités de même niveau que ce que nous avons appelé 'mot phonologique' et qui peuvent tous se superposer à ce dernier, quel que soit son nombre de voyelles..." (Paulian 1975: 138, our emphasis).

The second argument for treating tone as a prosody of some grammatical unit, perhaps the word, is that tonal alternations sometimes affect whole grammatical units. Leben (1973: 133-4) gives a convincing example from HAUSA. Similarly, Elimelech (1976) has shown for ETSAKO that when two nouns are joined in a genitive construction, X of Y, when X consists solely of low tones, all of these are raised to high, no matter how long the word is. In certain tenses, a verb consisting entirely of high tones may go down to all low tones, regardless of its length. Such examples illustrate that words may be undergoing tonal processes as units.

3. The Word and Higher Units

Having demonstrated the ways in which the word can have phonological consequences, we now turn to the question of how the word

relates to other, larger units. It has often been pointed out that the word constitutes a unit bounded by potential pause. It is therefore not surprising to find that at least some of the phonological properties of words — in particular, those which have their effect at a word boundary — are also characteristic of the pause environment. In this section we shall first address ourselves to the origin of word demarcation as a "narrowing" from pause position, and then deal briefly with the combination of words into phrases and the differences that are found in how "word junction" is treated in various languages.

3.1 Words and pauses

In this section we would like to illustrate how distributional constraints, boundary phenomena, and accentual phenomena may have their origin in pause-related phenomena, and that the word is thus, phonologically speaking, a grammatical unit for which pause phenomena are embedded into a nonpause environment.

3.1.1 Distributional constraints The distributional or sequential constraints which are known to characterize the corresponding pause environment. Thus, if a word cannot begin with a glottal stop, then an utterance also cannot begin with a glottal stop. If a word cannot end in a fricative, then an utterance also cannot end in a fricative. An utterance (pause) boundary is necessarily also a word boundary, though the converse is not the case: many word boundaries do not coincide with utterance boundaries. Since there is a one-way implication only, and since pause provides a phonetic context for phonetic and phonological statements, it is tempting to see the origin of word-determined distributional constraints in the constraints imposed on pre- and post-pause position (cf. below).

3.1.2 Boundary phenomena The relationship between pause and word boundary is much clearer in the case of boundary-induced processes. Vennemann (1974: 364) has noted Schuchardt's (1885/72: 46, 56) explanation of word-final devoicing as having its origin in devoicing before pause. A corresponding hypothesis is also included from Chafe (1959: fn. 23). This process of "boundary narrowing" is quite common. Thus, consider a language which has the phonetically motivated process of devoicing before pause. In this language, a word in isolation will be realized with a final voiceless sound. The same word may, however, be realized with the corresponding final voiced sound when in utterance-internal position. Final-devoicing may then become generalized to new environments, as when a speaker wishes to clearly identify the word boundaries for his listener (or,

conceivably, demarcate a difficult utterance for himself). The result is that devoicing now characterizes voiced segments preceding any word boundary, whether that word boundary coincides with a pause boundary or not. The important point is that the resulting modified rule is not phonetically motivated, since there is no necessary phonetic pause between word boundaries. In fact, word-final devoicing can occur even when the following word begins with a voiced sound, as in GERMAN das Kind geht [das kInt ge:t] 'the child goes.' (The role of the syllable as another way of generalizing pause-related phenomena will be discussed below.)

3.1.3 Accentual phenomena In Hyman 1977 it was argued that word-accent comes from intonation in exactly the same way that word-boundary phenomena come from utterance-boundary phenomena. First, in the case of stress, it was noted that there are no clear phonetic distinctions between those features said to characterize (primary) stress, and those said to characterize intonation. The pitch, duration and intensity variations correlating with stress also correlate with the high points of intonation — which, as often noted, has a tendency to superimpose itself on places of strong stresses.

Just as it is not always possible to draw a distinct line between pause- and word-conditioned phenomena (indeed, there is a continuum between all such units, as well as individual variation), it is not always clear whether we are dealing with stress or intonation in a given language. Applegate states for SHILḶA, for instance: "...primary or heavy stress occurs on the last vowel of the stem, provided that the word has no affixes after the stem" (1958: 9). But he later adds in a footnote: "It should be noted that the stress patterns referred to here apply only to utterances consisting of a single word. If the utterance contains more than one word, the stress is reduced slightly on all vowels except those in the final word. It can be said, therefore, that primary stress occurs only at the end of an utterance."

In a language such as SHILḶA, where primary stress is realized only in utterance-final position, it is hard to understand why one should speak of stress, rather than of intonation. Why should one consider such a language to have a word-accent at all? Words are first combined into utterances, and then a strong intonational pitch prominence is placed finally on the last word of that utterance. Applegate's statements represent a confusion which underlines the point being made here: stress not only is intricately intertwined with intonation, but it actually comes from it. We can hypothesize that a stress-accent comes into being when an intonational feature becomes associated with a grammatical unit smaller than a clause

(where a pause and intonation are normally attested). In other words intonation becomes grammaticalized as a word-stress when the suprasegmental features of pitch, duration and intensity that would have characterized a word in isolation (where it gets prominent intonation) are encoded with the word, and thus come to function in words not in isolation. The exact parallel involved when utterance-final devoicing is generalized to word-final devoicing cannot be missed.

In summary, then, there is a strong tendency for utterance-phenomena to narrow their domain to the word unit. If there is a preponderance of word-final phenomena, as opposed to word-initial phenomena (Javkin 1975), it is because much more goes on at the ends of utterances than at the beginnings.

3.2 Words and phrases

The alternative to deriving word properties from utterance properties is to leave utterance properties where they belong. That is, a language can simply choose not to generalize pre- and post-pause phenomena to the word. Such an example is FRENCH, and there are numerous other languages (perhaps including SHILHA) which build on the "phonological phrase" unit. One key to determining what kind of language we are dealing with has to do with syllabification: what does a language do when a word ending in a single consonant is followed by a word beginning in a vowel? The most natural syllabification process would be for that consonant to go onto the following word, as when FRENCH fils unique 'only son' is syllabified [fi.sü.nik]. However, there is an opposing force, namely the coherency of the word, which may block the syllabification of a final consonant onto the initial vowel of a following word. This is most efficiently done by inserting a glottal stop before a word initial vowel, as in the GERMAN das Kind ißt [das kInt ʔIst] 'the child eats.' Not only do we observe the insertion of a glottal stop before ißt, so as to block syllabification, but also the final devoicing said to characterize syllable-final position. If the glottal stop had not been inserted, the final consonant of Kind would have syllabified onto the following vowel-initial syllable ißt. (One can ask whether it would have been a [d] or a [t].) Since the glottal stop characterizes utterance-initial vowels, we can argue that here too the process has been one of generalizing from pause to word boundary.

As was mentioned, languages differ in how they deal with word junction, and part of this difference at least is due to the different concerns languages seem to have for preserving the word as a phonological unit. Thus, in dealing with "internal junctures" as

involved in phrases such as stay out, die Uhr, là aussi and una isla, where two vowels come together across a word boundary, Delattre (1963: 210) points out the differences between ENGLISH, GERMAN, FRENCH and SPANISH: "In English, the second vowel may have a sharp onset or a smooth one. In German the sharp onset, with glottal stop, is much more frequent than in English, but the smooth onset is also heard. In French the smooth onset of the second vowel is the rule. There is no voice interruption between the two vowels, only a reduction of intensity. In Spanish the smooth onset is also the rule; but in addition, the first vowel, if unstressed and not closer than the second, tends to fall" (his emphasis). See also Gårding (1967) for SWEDISH, and Lehiste (1965), who compares FINNISH, SERBO-CROATIAN and CZECH.

4. The Word and Lower Units

In this section we will consider the relationship between words and syllables, on the one hand, and words and morphemes, on the other. We will then turn to the consideration of "words within words."

4.1 Words and syllables

We have already pointed out that there is an intimate relationship between words and syllables. In some languages words are monosyllabic, in which case it is difficult to determine whether a given phenomenon is a property of the word or the syllable. In addition, distributional constraints and boundary phenomena that occur at word boundaries often occur at syllable boundaries as well. Here too, it is sometimes hard to tell whether the phenomenon in question is best stated in terms of the word or the syllable.

An even greater indication of the relationship between the two units is the generalizing of syllable properties to word properties. This is exactly what happens when a language develops a "word prosody." Consider nasalization, which has been treated as a prosody in several languages of the world, e.g. SUNDANESE (Robins 1957), TERENA (Bendor-Samuel 1966), DESANO (Kaye 1971), GUARANÍ (Lunt 1973). Although the exact statement may differ in detail, in general, a given stretch will agree in nasality, either being completely nasal or completely oral. In some cases nasalization may be stopped or ignored by phonological considerations (e.g. no penetration through a supraglottal obstruent), but in other cases nasalization is only checked by a boundary – e.g. a word boundary. Since nasalization is a phonologically motivated

process, it is best treated as a property of segments which first spreads to characterize neighboring segments, and then full syllables. As it spreads from syllable to syllable, it may be checked only by grammatical considerations. Thus, speakers may control the spreading nasalization from one word to another. This is true not only in the languages which have been described with nasal prosodies, but also in phonetic studies. Lehiste (1965:177) thus states for FINNISH: "When the nasal consonant started the word, progressive nasalization of the vowel following the nasal consonant was always present... When a word boundary occurred between a word ending in a nasal and one beginning with a vowel, progressive nasalization was not observed." Thus, in certain cases, prosodies may not only demonstrate the phonological coherency of a word, but also, a change in prosody may signal a word boundary. Since two words in succession may have the same value for a prosody such as nasalization or vowel harmony, this means that the demarcation is not entirely perfect.

The most convincing cases of where a phonological prosody has been reinterpreted as a grammatical feature (or words) occurs when segments undergo processes which, when applied to them, are not phonetically motivated. Two clear examples come from BURMESE and AGBO. In BURMESE (Okell 1969:12), when two monosyllabic words are joined to form a compound, the initial consonant of the second syllable may undergo voicing; thus, compare [tè] 'hut' and [boudè] 'rest house.' Okell further points out that "when voicing occurs in the initial consonant of a syllable following a weakened syllable... and when the initial consonant of the weakened syllable is also voiceable, then the voicing may be extended to that consonant as well" (1969:16). Thus, [pà] 'cheek' plus [sa?] 'join' may be pronounced [pǎza?] (with intervocalic voicing) or [bǎza?] 'mouth.' In the latter realization, there is no phonetic explanation — the word-initial consonant has simply decided to undergo voicing as a process applying to the entire word.

In AGBO (Bendor-Samuel and Spreda 1969: 21) a similar observation can be made with respect to a "fortis prosody": "The fortis articulation of a particular consonant in the word is marked by several phonetic features, particularly, the lengthening of the consonant concerned and the shortening of the following vowel. The vowel of the preceding syllable is also shortened. For these reasons this feature is treated as a prosody which has implications for the word as a whole, with a complex of phonetic exponents, focusing on a specific consonant." What is interesting in AGBO is that when a consonant undergoing the above fortis prosody is preceded

by a syllable beginning with a fricative, that fricative will become voiceless. Thus, compare /zoo/ 'find' vs. /esoki/ 'he is finding.' In the latter form, the fortis prosody focusing on the /k/ has also caused the /z/ of the preceding syllable to become voiceless. Again, a prosody is seen to have its affect on an entire word, even when there is no apparent phonetic motivation.

4.2 Words and morphemes

Although there are differences between American and European approaches, the morpheme has been emphasized in phonology in part because it is more tangible and more easily defined than the word. However, many of the uses of the morpheme, as in the statement of distributional constraints, have proven to be inadequate and are better approached within the framework of syllables and words (including stems and "words within words," etc., as will be seen below). Chomsky and Halle (1968: 364) have pointed out that the morpheme boundary (+) never blocks any phonological process. It has, however, been used to condition a process, e.g. in an early analysis (Chomsky 1964/72: 404; cf. Schane 1973: 95), the velar softening rule changing /k/ to [s] (electric-electricity) was said to be conditioned by +, since an internal word boundary (#) will block the process (pick-picking). In Kim and Hyman (1973) and Hyman (1975: 197-8), this use of the + boundary to condition a phonological rule was questioned. In order to evaluate this use of the morpheme boundary, it is necessary to consider, briefly, the relationship between words and morphemes.

Shibatani (1973) has pointed out that distributional constraints on morphemes often differ from those constraints characterizing the word. His example comes from JAPANESE, where a morpheme can end in any of a number of consonants, but a word must end either in a vowel or in a syllabic nasal. When faced with the problem of borrowing ENGLISH words into JAPANESE, it is always the word structure constraints which have the last say: if a morpheme can permit a sequence, but a word cannot, the word wins out (but cf. Kaye 1973).

No one doubts the need for some kind of morpheme unit in linguistic analysis, and few linguists would assert that the morpheme has no reality of any kind for language users. However, its relevance for phonology is open to question. In order to demonstrate the relevance of the morpheme to phonology (and we will only be interested in this aspect of the question, since language users can be aware of morphological structure without using it for phonological purposes), we will need evidence of one of two types. 1) We will need

to demonstrate the reality of some distributional constraint characterizing morphemes, but not words; or 2) we will need some process to be conditioned by a + boundary, which could not have been conditioned by a ## (full word) or # (internal word/stem) boundary.

Kaye (1974) attempts to show the reality of the morpheme for the statement of at least one distributional constraint (the nasal prosody in DESANO) by showing that a DESANO word can have an internal change in nasality, and that each unit having its own nasal prosody is to be identified as a morpheme. Kaye's demonstration proceeds as follows. First, he demonstrates that although a syllable must be either completely nasal or completely oral, there are no morphemes which have one oral syllable and one nasal one. A bisyllabic morpheme will have both syllables either oral or nasal. Thus, the syllable is too small a unit to capture the nasal prosody. On the other hand, the word, he claims, is too large, because there are cases such as [peamĩ] 'he breaks,' consisting of [pea] plus [mĩ], where there is a word-internal change of nasality. Kaye then proposes that the correct unit is the morpheme, with 'he breaks' presumably analyzed as /pea+mĩ/, or conceivably, in a prosodic approach, /pea+bi^{N}/ with the nasal prosody (N) being assigned to the complete morpheme.

Kaye's example fails to be conclusive, since it is not the case that the "morpheme" has a property unknown to the word. In fact it would be entirely possible to claim that 'he breaks' and other such examples actually consist of two "words" within the same word (see section 4.3), in which case we would represent the above example as /pea#mĩ/ or /pea#bi^{N}/. The nasal prosody would be blocked by the internal word boundary, much like the vowel harmony rule in IGBO was blocked in the example /gá#fè/ in section 2.4. Kaye's argument depends crucially on there being a simple + boundary. However, at least one problem with this analysis is that Kaye points out in his earlier work (1971: 38) that there are certain suffixes such as the question particle /di/ (cf. Kaye 1974: fn.8), which assimilate in nasality to an adjacent morpheme or stem, e.g. [ãhsũ-nĩ] 'do you buy?' vs. [wa?a-ri] 'do you go?' (/d/ becomes [r] intervocalically). At least one analysis would recognize underlying /di/, separated from the preceding verb form by a + boundary, i.e. /ãhsũ+di/ and /wa?a+di/, with the appropriate rules changing /di/ to [nĩ] after a nasal form, and to [ri] after an oral form. In this analysis the nasal assimilation rule will not apply across a # boundary, the boundary which we claim to be present in forms such as /pea#mĩ/. The result would therefore be that nasality is a prosody characterizing the environment #...#. But what is this environment? The question

morpheme proves that it is larger than the morpheme, but the example 'he breaks' shows that it is smaller than the full word (##). This might be a case for the "phonological word," which would be smaller than the grammatical word. But the important point is that this unit is not identical to the morpheme. Hence, this fails to be an airtight argument for morpheme structure conditions.

The second kind of argument for the morpheme in phonology consists of postulated phonological rules which must refer to the + boundary in order to apply. All such cases we have investigated have either used the + boundary when the # boundary would have done as well, or have used the + boundary diacritically, and could just as well have used ad hoc boundaries such as $, % or ¢ or referred directly to the morphemes involved. The velar softening rule (later revised in Chomsky and Halle 1968, who recognize the segment /k$_1$/, thereby marking the process diacritically) is a good example, since the only truly productive use of the rule involves words which contain (or seem to contain) the suffix -ic. More important, however, is the absolute need of constraining grammatical boundaries in phonology so that the abuses seen in such works as Stanley (1973), where boundaries are unnecessarily proliferated (cf. Kari 1975 for a more acceptable reformulation of NAVAHO prefix phonology), are controlled. To this end we would like to propose the following constraint: within the word (##) unit. there can be recognized at most two internal grammatical boundari One of these, #, can have phonological consequences, the other, +, cannot. The # boundary, which plays a frequent role in phonology, and is labelled "internal word boundary" (and perhaps is identical to the "stem" boundary in some languages) is justified in one of two ways. 1) In some languages we may have only one word-internal grammatical boundary which is known to have phonological effect; in such a language we do not hesitate to assign the # boundary to it; or 2) in languages known to have more than one word-internal boundary (where both are claimed to have phonological effects), the one which bears a relationship to the full word boundary ## is the one which is recognized as #. The other boundary is either specio or the phonological effects are better treated as conditioned by specific morphemes.

The above constraint is stated slightly differently from the positi taken by Kim and Hyman (1973) that morphemes and morpheme boun aries have no role to play in phonology. This latter claim was mis construed to signify that there would be no phonologically-relevant word-internal boundaries. This is clearly not the case, as was show

with respect to several examples, among which the following KOREAN one. As seen in the derivation in 4.:

4. /kut # i/ ⟶ kuči ⟶ [kuǰi] 'firmly'
"firm" "ly"

palatalization of /t/ to [č] before /i/ takes place across an internal word boundary. However, as seen in 5,:

5. /təti ta/ ⟶ [tədida] 'to be slow'
/əti/ ⟶ [ədi] 'where'

palatalization does not take place where there is no boundary. Thus, the rule can be written as in 6.:

6. t ⟶ č / ____ # i

It is interesting to note, however, that 6. is the result of a restructuring which took place in the history of KOREAN (Kong-On Kim, personal communication). As seen in 7.:

7. *ti > /či/ 'earth'
*ətiy > /əti/ 'where' (pronounced [ədi])

*t did palatalize to č even when there was no boundary. However, a second sound change converting *iy to i has produced new instances of synchronic underlying /ti/ sequences which do not palatalize. Since 'earth' in 7. has been rephonemicized with an underlying /č/, it is only across a boundary that rule 6. will apply. Since the internal word boundary in 6. is independently motivated on the basis of the rules of word formation in KOREAN, we feel that this is the proper use of boundaries in phonological rules.

The strength of the above proposal is that it thus places a necessary second requirement on boundaries in phonology. The first was stated clearly by Chomsky, Halle and Lukoff (1956) as Condition III, cited in Lehiste (1964/74: fn. 6): "Junctures should be distributed in a manner that is significant on higher levels. Specifically, junctures [read: boundaries] should appear only at morpheme boundaries, and different junctures should correspond, by and large, to different morphological and syntactical processes." Our constraint places the requirement that boundaries be necessarily hierarchized with respect to one another. They must bear a consistent relationship to each other which is not language-specific, but rather which is universal. Thus, the very formalization of the internal word boundary as # implies that a rule of the form in 8.:

8. A ⟶ B / ___ #

will also apply to a full word boundary. On the other hand, a rule of the form in 9.:

9. A ⟶ B / ___ ##

will not apply to an internal word boundary, but only to a full one. There are several implications of this approach, not all of which have been investigated as carefully as would seem necessary. The one which we would like to suggest here is that the strengths or "ranks" (McCawley 1968, Stanley 1973) assigned to # #, # and + cannot be violated. Thus, it should not be allowed either that boundaries lower on a hierarchy condition processes not conditioned by boundaries higher on the hierarchy; nor should it be allowed that ad hoc boundaries be treated as part of the system (including the = boundary said to account for a number of word-level processes in Chomsky and Halle 1968). With this in mind we may eventually consider reinterpreting even the KOREAN rule given in 6. above, since the + boundary is too low, and the ## too high on the hierarchy to join in conditioning the palatalization in question. Since only a limited number of suffixes condition the change from /t/ to [č], we might consider the alternative of making specific mention to those morphemes. At the very least the universal boundary hierarchy must be in effect at the initiation of new boundary phenomena.

4.3 Words within words

In the DESANO and IGBO cases discussed above we have already referred to the notion of a word within a word. This is, of course, what is implied by the single # boundary. Either both sides of the boundary are a word, or one side of the boundary is a word, and the other side a loosely attached affix or "disjunct" in the terms of Kari (1975). The problem of treating stem-boundaries is one which we will not be able to resolve here, except by noting that although they resemble our # boundary, they may at times involve a directionality, i.e. you have to know which side of the stem you are on (see Langdon 1975 for a discussion of the need of a stem boundary in YUMAN languages).

Nowhere is the notion of "words within words" clearer than in compounding. This process has been studied in great phonetic detail by Lehiste (1964/73: 305-6), who states for ESTONIAN: "A tendency may be observed in the language to assimilate compounds to the canonical phonological shape of noncompound words. In the

course of this assimilation, the word-initial allophone of the initial consonant of the second constituent of a disyllabic compound is replaced by an allophone in one of the three degrees of segmental quantity, and the syllabic quantity of the second syllable is reduced until it resembles that of the second syllable of a noncompound disyllabic word with overlong first syllable." Thus, one of the things which happens in ESTONIAN is that as a compound word tends to become treated as a noncompound, the 9 vowels and 22 diphthongs possible in monosyllables and first syllables of words become reduced to only 4 of the vowels and 3 of the diphthongs in the nonfirst syllable of the emerging noncompound.

In the above process whereby a word consisting of two words comes to be treated exactly the same as a word consisting only of one (multisyllabic) word, we observe a change formalizable as CV#CV becoming CV+CV and eventually CVCV. At the CV#CV stage, the second monosyllabic word has all or nearly all of the properties of a monosyllabic word in isolation. In the second stage these properties gradually fade away (though language users may retain awareness of the bimorphemic structure of the word). Finally, in stage three, even this awareness which had lost its phonological effects is lost, and we no longer speak of any internal structure on any level.

We therefore propose that the boundary changes observed represent a natural, recurring phenomenon in language, summarized as follows:

10. || > ## > # > + > ∅

This represents the historical origin of many boundaries, as well as their relative strength. We have said that pause boundaries (||) include word boundaries — they also contain all of the boundaries to the right of ## in (10). A word boundary contains an internal boundary which in turn contains a + boundary. Qualitatively, when one passes from # to +, one enters into the realm of a morphological boundary which has no phonological effect. Thus, phonologically, CV+CV is equivalent to CVCV.

The narrowing of pause to word boundary is thus similar to the narrowing of full to internal word boundary which is frequently attested. Unfortunately, the natural history of boundaries represented in 10. is often not as transparent as one would wish. One suffix may require a # boundary while another takes a +. Aronoff (1975, 1976) presents a number of convincing arguments suggesting

that the same -able suffix in ENGLISH is sometimes bounded by +, sometimes by #. Pronunciations such as cómparable and préferable indicate an internal + boundary which has no phonological effect and allows these words to appear as if they had no internal structure. Pronunciations such as compárable and preférable betray an internal # boundary, which indicates that these words are not only stressed differently but also that to the left of the # boundary are full words pronounced as they are pronounced in isolation (e.g. with a full vowel in the case of compárable). Aronoff would like to see some semantic consistency in assigning + vs. #, for example, that words with + are lexicalized with special meanings not equivalent to the sum of the parts (morphemes), but is forced to simply say that if there is a meaning difference between two forms A+B and A#B, A+B will tend to wander more from the underlying meaning of the parts than will A#B. An illustration from Aronoff (1976: 128) is seen in 11.:

11. This is the cómparable model in our line.
*This is the compárable model in our line.

The second sentence is starred because it cannot have the "lexicalized" meaning of 'equivalent' but only the literal meaning 'capable of being compared.' In examples such as recollect 'remember' vs. re-collect 'to collect again,' which have the same historical source, we might propose that the former has gone all the way to losing its internal structure. The latter must be represented as re#collect, with its meaning consisting of the sum of the two parts re 'again' and collect.

The historical weakening of boundaries, as when words are joined, or affixes are more closely fused with their stems or neighboring affixes, is summed up as follows by Žirmunskij (1966: 83): "Word combination, in narrow sense of being more or less 'bound up,' arises as a result of a closer grammatical or lexical unification of the group of words as the new meaning of the whole develops (grammatically or lexically) and becomes distinct from the aggregate meaning of its parts. Two trends are possible: 1) towards the grammaticalization (morphologization) of the word combination; that is to say, the group of words is transformed into a specific new analytical form of the word; 2) towards the lexicalization of the word combination; that is to say, the group of words is transformed into a more or less solid phraseological entity constituting a phraseological equivalent of the word in the semantic sense."

It may be necessary to add, however, that a boundary may not only weaken as the result of lexicalization or grammaticalization.

Also, a new combination of the same morphemes may be introduced to contrast with an older, more fused one. Jan Kooij has discussed the differences between DUTCH vruchteloos 'fruitless' and vruchtloos 'fruit-less.' The first has a lexicalized meaning of 'in vain,' while the second is literal and means 'without fruit.' The first pattern is older, carrying the genitive linker, while the second is newer, and for some examples, can be created on the spot. Thus, the word harteloos means 'heartless, without feeling,' while a body found lacking a heart might be described as hartloos. The words with -eloos tend to be lexicalized with special meanings and are formalized with +, while those with plain -loos tend to be more literal and are formalized with #.

In concluding this section let us consider the famous problem of /g/-deletion after the velar nasal in ENGLISH. As seen in the forms in 12.:

12. /sɪng##/ ⟶ [sɪŋ] 'sing'
/sɪng# ər/ ⟶ [sɪŋər] 'singer'
/lɔng+ər/ ⟶ [lɔŋgər] 'longer'
/fɪngər/ ⟶ [fɪŋgər] 'finger'

the /g/ of 'singer' has been deleted before an internal word boundary, just as it is deleted before a full word boundary in 'sing.' In 'longer,' on the other hand, although we can establish an internal morphological structure, the word behaves phonologically as if there were no boundary, since the /g/ is not deleted (cf. 'finger,' which has no internal structure). The /g/-deletion rule is stated in 13.:

13. g ⟶ Ø / ŋ ___ #

Since there are dialects of ENGLISH which pronounce 'singer' with an internal [g], it seems reasonable to propose that the generalizing of /g/-deletion from word-final to word-internal position represents an innovation. But why should it hit the agentive -er of 'singer' but not the comparative -er of 'longer?'

While we cannot always provide proof for the explanations of such problems, an argument can be made that words with the comparative -er are more lexicalized-like than are words with the agentive -er. For one thing the comparative suffix is constrained phonologically while the agentive suffix is not. The comparative -er is normally added onto monosyllables and adjectives ending in -ly, though even some monosyllabic adjectives hardly can take -er (e.g. juster? perter? coyer?). It is almost as though one has to know the list

of words taking -er rather than the productive counterpart employing more. The agentive -er suffix can be added onto any verb no matter what the length is, and is constrained primarily by the semantic content of the verb (e.g. be-er is odd). Even though in a few cases an existing lexical agentive may preempt the -er form (e.g. cook instead of cooker), it is almost always possible to produce agentive -er forms (e.g. disambiguater). The comparative -er even has some suppletive forms (worse, better, instead of *badder and *gooder), requiring the consulting of one's lexicon. Finally, the agentive -er seems to be semantically so transparent that a corresponding but nonexistent verb derived from cases where a false analysis is made is easily understood — e.g. burgle from burglar, haberdash from haberdasher, agress from agressor. Thus, if the ## were to generalize into words with internal structure, it would in most likelihood hit the agentive -er before the comparative -er suffix.

5. Summary and Conclusion

In the above sections we have surveyed the various phonological evidences for the word as a linguistic unit. We have seen that distributional constraints, boundary phenomena, accentual phenomena and prosodies all make reference to the word. In addition we have seen that there is a tremendous tendency to narrow down from the pause to the word environment, and, in the case of prosodies, to build up from the segmental and syllable level to the word. Finally, we have seen the tendency for the word to impose its structure within another word, creating the necessity for the internal word boundary.

At a number of points it was necessary to point out that a continuum exists such that it is not always possible to determine whether something is clearly a word (or word boundary) phenomenon or something else. Also, since we have seen the tendency for a distribution or process to change its realm of application (e.g. from pause to word, from syllable to word, from word to internal word), it is not always possible to make a clean statement concerning the appropriate conditioning factor (e.g. final devoicing in terms of words? syllables? words within words?). As a final illustration let us consider some TURKISH data provided by Karl Zimmer (personal communication), where the interplay between all of these units is particularly revealing.

Consider the realization of /b/ in the following forms:

14. a.	/kitab # #/	⟶	[kitap]	'book'
b.	/kitab # lar/	⟶	[kitaplar]	'books'
c.	/kitab # ɨm/	⟶	[kitabɨm]	'my book'
d.	/abla/	⟶	[abla]	'older sister'

In 14.a devoicing takes place before a full word boundary. In 14.b devoicing takes place before an internal word boundary followed by a consonant. In 14.c where the internal word boundary is followed by a vowel, no devoicing takes place. Finally, since /b/ is followed by a consonant but without an intervening # boundary, no devoicing takes place in 14.d. The appropriate rule is formalized in 15.:

15. $[-son] \longrightarrow [\overset{+}{-}voice] / \_\_\_\_ \# \begin{Bmatrix} \# \\ C \end{Bmatrix}$

That devoicing does not simply take place syllable-finally is seen in 14.d which is syllabified [ab.la] (cf. [ib.ne] 'passive homosexual'). However, since the internal word boundary is the same in 14.b and 14.c, it appears that syllabification does have a role to play here. In particular it appears that devoicing has spread from 14.a to 14.b, and since syllable-final devoicing is not a general property of TURKISH, it must be assumed that devoicing in 14.b signals the integrity of the word /kitab/ in /kitab#lar/. The reason why /kitab/ cannot be as readily isolated in 14.c is that the syllabification rules of TURKISH place the /b/ with the following syllable, i.e. [ki.ta.bɨm]. That is, while there has been "analogy" in 14.b on the basis of the [p] in 14.a, this analogical spreading of devoicing to internal word boundaries has been hindered by syllabification processes.

Just how the word fits into the whole picture of syllables, affixes, stems and whatnot is something which we have only made initial stabs at in this study. In particular it will now be necessary to look at some of the phenomena presented in the preceding sections with an eye open to the so-called demarcative function. Do language users choose to mark words phonologically to generalize on pause phenomena and to move word characteristics to within the word so as to help the listener process utterances? Or do language users accomplish these things so as to help themselves (e.g. to keep things straight in their own minds)? Or do people just get confused and make mistakes? It is tempting to see purpose in all that we have said, but the theoretical apparatus is regrettably lacking.

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Intonation Across Languages

DWIGHT BOLINGER

ABSTRACT

The traits of intonation shared by the majority of languages, not excepting tone languages, are both formal and semantic, and cover the two main non-tonal uses of pitch variation: to form closures (descending lines, clause-final falls and non-falls) and to form accents (obtrusions for prominence, mainly upward). Terminals are almost universally low or falling for finality and assertion, and high or rising for the opposite, including yes-no question. Accents are generally set off by contrasting pitch levels, and their position in the sentence indicates both focus and climax. Most deviations from the central tendencies can be explained in referenc to those tendencies. The convergence between language A and language B, and the divergence between dialect a and dialect b, are potentially so striking that intonational typology has to be assigned a special basis, tied to inherent reactions of the human organism. Studies of child language support this view.

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