Word boundaries

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Morphology

Ein internationales Handbuch zur Flexion und Wortbildung
An International Handbook on Inflection and Word-Formation

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40. Word boundaries


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40. Word boundaries

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1. Introduction

The main problem to be discussed in this article can be illustrated by asking the question: How many words does its very title, viz. the sequence *word boundaries*, consist of? The answer obviously depends on what we mean by *words* (cf. 1.1 and Art. 26). And in order to clarify the notion of *word boundaries* (cf. 1.3), its relations to other linguistic *boundaries* should be considered (cf. 1.2).

1.1. Words

Most ordinary people who have gone through an elementary school education undoubtedly identify the notion *word* with orthographical *word*, which can be informally defined as an unbroken sequence of letters, viz. a sequence which contains neither blanks, or spaces, nor commas, parentheses or the like. In that sense, the sequence *word boundaries* consists of two words. This is quite straightforward, but what if we add a hyphen: *word-boundaries*? Most people would probably agree that now there is only one word, although nothing else seems to have changed; this appears unproblematic, however, since the definition can easily be adjusted to the effect that a hyphen is allowed within the letter sequence of a single word.

But there can be meaningful (as well as meaningless) discussions on this aspect of orthography: To take just one example, should both *in so far* and *insofar* be allowed? In such a discussion the argumentation transcends orthography, involving e.g. semantics (is the meaning composed of the meanings of *in, so* and *far* as is the case with normal words forming syntactic phrases - or not? cf. 2),...
morpho-syntax or distribution (can in, so and for occur in any other order, or can anything else be inserted into the sequence? cf. 3), or phonology (is the sequence pronounced with a common ("unifying") accent, for example, or does it in some way depart from the normal phonological or phonetic makeup of normal single words? cf. 4).

It is already clear from the few examples given up to now that different criteria need not give the same result: Sequences which are phonologically, stylistically and semantically indistinguishable (like word boundaries, word-boundaries) may be different orthographically with respect to the number of words they consist of, and sequences which are orthographically and/or phonologically alike may be semantically and/or syntactically different with respect to "wordness". To take just one example: Danish jeg går (e.g. after a full stop), which means either 'yesterday' (normally written with a minuscule i, however) or 'you (pl.) walk' (written with majuscle I in standard orthography), are pronounced alike (with primary or "main" stress on the syllable går, and an unstressed first syllable except when the pronoun jeg has special emphasis), but the former is one word and the latter two words according to distributional criteria (cf. 3), and according to semantic criteria only the former is not obviously divisible (cf. 2). This incongruency between semantics, syntactic, orthography and/or phonology can also be seen when one compares the sequence word boundaries with its German and French equivalents which consist of one and three orthographical words, respectively, although there is scarcely any systematic difference in meaning: Wortgrenzen and frontières de mot.

In this article we shall concentrate on spoken rather than written language, which means that the word forms involved will be mainly phonological words (cf. 4 and 6.1), rather than orthographical words. The distributional criteria to be discussed in 3 also concern word forms and not grammatical words in the technical sense used in this work, although the criteria seem more closely related to syntax and morphology than to phonology. The perspective will be dominantly syntagmatic, and paradigmatic issues, like inflectional paradigms, and categories of lexical items, will only be dealt with in passing.

1.2. Boundaries
As the name suggests, word boundaries can be considered a subclass of boundaries (or perhaps as manifestations of boundary phe-

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omena) in general. This class also contains e.g. phrase boundaries and morpheme boundaries (to mention two further types of sign boundaries, one "above" and one "below" word boundaries), as well as e.g. syllable boundaries (which are purely phonological). Boundary phenomena have something interesting in common regardless of the kinds of units they delimit, and sign boundaries can in principle be studied both semantically (cf. 2), grammatically or distributionally (cf. 3), and phonologically (cf. 4 and 5). Significant parts of the study of such boundary phenomena concern the interaction between different "levels" or "components".

1.3. Word boundaries
The topic of this article is word boundaries understood as the demarcation (or delimitation, or separation) between consecutive words in the speech chain. The term word boundary, however, has also been used in a more specific sense within Generative Phonology (cf. Chomsky & Halle 1968: 366), viz. as the name of a specific juncture, symbolized as #.

The syntagmatic problem of delimiting adjacent words is relevant for word forms, which belong to the expression of language in the terminology of Hjelmslev, viz. in particular phonological words (see 4 and 6.1); for the content of language (see 2); and for words as signs (see 3); cf. Hjelmslev 1943. It must be emphasized, though, that the sign relation is also relevant for the study of the expression and content (otherwise, for example, the study of the expression would not be phonology but "pure phonetics").

2. Semantic criteria
It is clear from what was said in the preceding section that semantics alone cannot decide whether we are dealing with one word or a sequence of two words. Further examples of other kinds illustrate this point, e.g. when comparing German Ich esse 'I eat (or: am eating)' with Italian mangio, which has the same sense (at least in terms of what is relevant for word delimitation), nobody would deny that the German example consists of two words and the Italian of one word only. It is also clear that phrases can be lexicalized semantically, i.e. acquire or possess a special sense which cannot be derived exclusively from the sense of the constituents.
combined with the semantic contribution from the grammatical structure in question, e.g. *kick the bucket* in the sense of ‘die’. The whole question of lexicalization, involving idioms, iconicity and other complex matters, cannot be dealt with here at all (cf. Art. 30).

A particularly clear case illustrating the impossibility of making word delimitation purely on semantic grounds can be seen in examples like the: *artificial florist, old maidish, French jemenfschisme* (‘I don’t give a damn’ attitude, from the expression *je m’en fiche* ‘I don’t give a damn’), and German *reitende Artillerie­kaserne* ‘barracks for riding artillery’ (Togeby 1949: 110). The point of these examples is that, semantically, the derivative ending, or (in the last example) second part of the compound, belongs to the preceding phrase as a whole, although, phonologically, it is just part of the last word of that phrase, the phrases in question being *artificial floc(we)r, old maid, je m’en fiche,* and *reitende Artillerie.* Syntactically, the constructions as a whole seem to be single words, according to the criteria of interruptability, movability, etc. (cf. 3).

It is thus clear that semantics cannot offer the defining criteria for word delimitation. According to approaches prevalent in modern linguistics, such criteria must be sought in grammar, more specifically in syntax, or distribution.

3. Distributional Criteria

We are now moving from the content of signs to the signs themselves, considered as units of both content and expression. The criteria which come into play are distributional, in traditional linguistic terminology grammatical, i.e. syntactical and morphological: the tactics of signs (cf. the treatment of phonotactics in 4.5).

3.1. Minimum Free Forms

According to a famous definition, words are the "smallest items which are spoken by themselves, in isolation" or "forms which occur as sentences" (Bloomfield 1933: 178), in short, *minimum free forms or minimum utterances* (cf. Harris 1947: 54).

This is an influential characterization of the word, and it certainly hits something central. If one tries to apply the definition to difficult cases, however, problems immediately arise. We shall discuss a few of these below, taking our point of departure in some of Leonard Bloomfield’s own examples. He asks whether e.g. *the, a, is, and* are ever spoken alone, and he (implicitly) answers in the affirmative:

1. “One can imagine a dialogue: Is? – No; was. The word *because* is said to be a woman’s answer. An impatient listener says And? We can imagine a hesitant speaker saying *He was un...*, or someone asking (in French) *Elle a dit redistribuer ou re-?* And it would clearly be erroneous to draw the conclusion from such examples that (English) *un-,* or (French) *re-,* are words. In order to save the definition, one could resort to additions like "any fraction that can be spoken alone in *normal speech*" (Bloch & Trager 1942: 54, emphasis added), but the concept "normal" is too vague to make this an acceptable solution.

Bloomfield does not consider word forms as merely observable entities “at the surface”, but includes the derivational history as well:

2. “The forms [z] in *John’s ready,* [m] in *I’m hung­ry,* or [nt] in *Don’t!* are unpronounceable in English, but we have to class them as words, for they are merely alternants of the pro­nounceable forms *is, am, not.* In French we have even the case of a single phoneme representing two words: *an [o]* in a phrase like *au roi [o rwa] ‘to the king,’* arises by phonetic modification of the two words *à [a] ‘to’* and *le [l] ‘the’;* this [o] is homonymous with the words *eau* ‘water’ and *haut* ‘high.’” (Bloomfield 1933: 180)

This abstract view of word separation makes impossible a unique segmentation of a string of phonemes into a clearcut string of words. It seems preferable to have clear word separation and then account for the relation between *au, à, le* by other (“processual”) means. A further difficulty stems from the fact that it is strictly speaking impossible to pronounce a word in absolute isolation, since there will always be some accompanying inflection, which is bound to the utterance, not to the word (cf. Hockett 1947: 277). One last problem with this definition of the word should be mentioned here: In the very many languages which have monosyllabic words,
and/or syllables consisting only of a vowel, is the "minimum utterance" not the syllable or the vowel? In a sense, the answer to this question could well be "yes, indeed!": if the definition is taken seriously and literally, it seems fair enough to recognize that a single vowel, or a single syllable, can be a minimum utterance (or minimum free form), just like a single word (although, normally, utterances consist of several syllables and several words). A little more detailed answer to the question would have to take account of two points. First, the "minimum utterance" is not just the vowel, but the whole syllable, which only accidentally can have empty margins; secondly, not just any syllable can occur in isolation since in many languages there are restrictions on vowel quality, or length, etc. But it must be admitted that neither of these answers completely refute the original attack on the proposed definition of the word. Cf. further Art. 39 and 42, and — for the phonotactical aspects — Art. 44.

3.2. Uninterruptability
The criterion of uninterruptability, viz. that "a word cannot be interrupted by other forms" (Bloomfield 1933: 180), is clearly related to the notion of minimal free form (cf. 3.1). Roman Jakobson characterizes words as the "minimal actually separable component" of the sentence (Jakobson 1949 [1971: 104]). Also this definition is not without its problems (cf. Togeby 1949: 106). There is a relation between the criterion of uninterruptability and the potential for pausing (cf. 4.1).

A consequence of adhering to such a definition of the word would be that the infinitive marker in Swedish att 'to' would be a separate word, as opposed to its exact Danish parallel at, although Swedish and Danish are very closely related (both being East North Germanic): Swedish att ga, att icke ga vs. Danish at ga, ikke at ga, cf. the corresponding phrases in English to go, not to go and German zu gehen, nicht zu gehen (cf. Hammerich 1935: 66). This should not be considered a problem for the definition, however, only a consequence; the requirement for any proposed definition must be that it gives the desired result in clear cases and can decide unclear cases (cf. 3.4).

Another consequence worth noticing relates to verbs with separable prefixes in German. A "naked" infinitive form like anfangen 'begin' is "interruptable" as shown if one adds the infinitive marker zu 'to': anzufangen 'to begin'. According to the definition of uninterruptability, an and fangen should thus be a sequence of two words. This conclusion is supported by the behaviour in finite forms like the present tense: er fängt an 'he begins', cf. the criteria discussed in 3.3 and 3.4. Also, the preterite participle form angefangen 'begun', with inserted preterite participle marker between an and fangen, points to an analysis of an and fangen as separate words. On the other hand, from the semantic point of view these separable verbs behave like words: their meaning is not compositional (the meaning of anfangen cannot be determined on the basis of an and fangen, and such expressions can feed derivation, e.g., Anfänger 'beginner' (cf. Booij 1990, Steibels & Wunderlich 1994).

Another difficult case is the Portuguese future tense where the word farei 'I shall do' has the form faro-oi when the pronoun lo 'it' is added, i.e. far-lo-oí, with the pronoun inserted between the stem and the inflectional ending (Togeby 1949: 106). This is a special case (cf. the corresponding Italian form lo farei), but it must, of course, be taken into consideration when general definitions are being evaluated. Several logical possibilities present themselves when attempting to reconcile borderline cases of these and other types with different kinds of word definitions: The lexical unity of certain elements must be given up or relaxed (e.g. so that certain pronouns and particles have homonyms of which one is an independent word and the other is not); it must be recognized that the same lexical item can enter into different constructions both below and above the traditional word; and/or the existence of borderline cases must be recognized more generally, as is being done within certain so-called cognitive models operating with prototypes etc.

3.3. Fixed order of constituents
An essential property of words is that the order of their constituents is fixed (cf. Hjelmslev 1943: 66). For most cases, this criterion seems unproblematic; for example, in the Danish word mandlighe-der-gen 'man-ly-hood-DEF-GEN (of the manliness [manhood])', no other order of the morphemes is possible.

A consequence of such a definition is that whole phrases in a polysynthetic language like Eskimo (cf. Art. 128) be single words also. Something similar might apply to sequences of bound pronouns in Romance languages, e.g. no other order is possible in a French example like que je ne me le demande

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Morphologically, compounds also have some Janus characteristics: their parts can be formed productively but which apparently points to a different concept. Thus Otto Jespersen’s word criterion of movability is so to speak the other side of the same coin: The word is characterized in relation to larger units as being the smallest movable one, and in relation to smaller units as being movable (cf. Jespersen 1924:92–95). A similar approach has been suggested in American structuralism:

(3) “Whether or not two orders of the same words have different meanings, they serve to emphasize words as shiftable units; whereas order within the word (excepting compounds) is automatically because it is automatic.”

(Wells 1947:99)

The important thing is that the order of elements within the word is not contrastive (cf. Toegby 1949: 107), which solves the problem of Portuguese farloei (cf. 3.2).

Compounds pose special problems with regard to the distributional definition of the word under consideration here. There is no space in this article for a detailed discussion of compounds (cf. Art. 87), but let us briefly signal some of their typical properties with respect to “wordhood” in a couple of well-known European languages. Semantically, compounds can be formed productively but they can also be lexicalized, i.e. form separate lexical items (cf. 2). Syntactically, compounds are only movable as wholes, which speaks in favour of their being considered words according to a distributional definition; the other side of this coin, however, is the fact that the order of the elements of compounds is not always fixed, and can be contrastive (cf. tourist island, island tourist), which apparently points to a different conclusion. Morphologically, compounds also exhibit some Janus characteristics: its parts may have some independent morphology, but there are also cases where the compound has a quite different morphology than a corresponding phrase (e.g. in French grandes routes ‘highways’ where grand seems — synchronically speaking, of course — to lack inflection altogether, cf. the phrase grandes routes ‘large roads’ where grand has its normal inflection in agreement with the head noun routes). Phonologically, compounds in Germanic languages have the typical “compound stress pattern” (cf. 4.4) which both sets them apart from non-compounded words (except certain “heavy” derivatives) and from phrases; such a stress pattern does not generally occur in Romance languages, for example. The conclusion seems to be that compounds are single words in the syntactic sense, but may be sequences of words in the phonological sense, i.e. consist of more than one phonological word (cf. 4).

A further question of levels often mentioned in connection with word definitions and word delimitation can be illustrated by means of the example The king of England’s daughter. It has been argued from such examples that ‘s is added to the entire phrase without changing its character: “Obviously, ‘s is no longer entirely a ‘bound form’ in Modern English” (Penzl 1943: 419). Of course, ‘s is a bound form since it cannot occur alone, but there are bound forms at different levels (cf. Hall [Robert A.] 1946: 450). One can distinguish between four levels in West European languages like English and French: English -ize, -tion (and French -ment) are derivationally bound, English -s ‘plural’, -s ‘3SG’ ed, -ing (and French -ons) are inflectionally bound, English ‘s (in The king of England’s daughter), the, a (and French le) are phrasally bound, and English atomic that (and French que) are clausally bound. It is interesting to compare this early suggestion from the great era of structuralism with much more recent proposals within Lexical Phonology and Morphology (cf. Art. 22).

3.4. Conclusion

In order to test the different criteria for delimiting words discussed above, one isolates (3.1), breaks into (3.2), and moves around with (3.3) chunks taken out from the chain of speech (mentally speaking, normally not physically except for certain phonetic or “phonology laboratory” experiments); the new speech chain is then evaluated with respect to grammaticality (in the broadest sense) and compared to the original one to see whether semantic differences have occurred, or whether it is still “the same string” (apart from the change being tested, of
Such a criterion of (some sort of) constancy is commonplace in linguistic practice (although it is often not explicitly recognized in theoretical writings), for example, in syntactic work whether transformational, sentence-positional or other.

The most interesting question with regard to such tests of word delimitation is the following: Are the operations of 3.1–3.3 all different in principle, or do they amount to the same thing in the end? It appears obvious that 3.2 (uninterruptability) and the two subcriteria of 3.3 (fixed order of constituents, and movability as a whole) are essentially the same: In all cases, the important thing is whether the chunk to be tested for "wordlessness" can be manipulated (in a natural way, of course) without involving its neighbouring chunk(s). This also suggests an essential identity with the criterion in 3.1 (isolation): Only a chunk which can be manipulated (still in a natural way) without involving its neighbours chunk(s) can be isolated. This points to the position that we are dealing not (only) with a linguistic construct, but with an entity which has some "psychological reality" (cf. Art. 162), at least in the weak sense that it has behavioral consequences (which therefore can be tested).

4. Phonological criteria

We have already seen (in 3) that the basic criteria for the delimitation of consecutive words in the speech chain are distributional. In this section we shall examine a range of phonological and phonetic manifestations of the boundaries between (distributionally defined) words.

It is well known that different languages do not manifest word boundaries in the same way or to the same extent. For example, in Romance languages word boundaries are manifested less often and less clearly than in Germanic languages, at least as a general principle. Take French as an example: In a sequence /uɛʁ/ it is, under normal circumstances, not possible to hear whether there is a word boundary before /ɛʁ/, after /ɛʁ/, or none at all (cf. ou rôter ‘or roast’, pour ôter ‘for taking off’, bourreaux ‘hangman’). A particular technical term, viz. *enchaînement*, has even been coined for the pronunciation of a word-final consonant as the onset of the following syllable when the following word begins with a vowel (thus ignoring the word boundary, e.g. with a syllable-initial /ɛʁ/ in pour ôter, quoted above).

The phenomenon of *enchaînement* is particularly noteworthy for speakers of, for example, Germanic languages where word boundaries are manifested more often than in Romance. This is, however, only a difference of degree and not an absolute one: For instance, in French, some word boundaries are sometimes manifested in ways which are quite parallel to what we find in Germanic languages (there may thus be a distinction — quite apart from a slight possible difference in the quality of the first vowel — between *cette roue* ‘this wheel’ and *ces trous* ‘these holes’); and word boundaries are often not manifested at all in Germanic, as the following example will show.

In Danish, two phrases like *hans geller* ‘his gills’ and *han skælder* ‘he scolds’ are normally (but not invariably) indistinguishable and contain the identical sequence [sg] (where [g] is, as in Modern Danish generally, voiceless and distinct from Danish [k] only by being unaspirated). The phrase *hans skælder* ‘his cellar’ is in contrast with the above, normally pronounced with [sk] (with aspirated [k]), the rest of the example being pronounced identically (with main stress on the second syllable). According to normal phonemic principles, a different phoneme (viz. [k]) is involved here; but the sequence [sk] indicates that there must be a grammatical boundary (which is also a syllable boundary, cf. 5) before [k]. This situation is typical: Some word boundaries are manifested, others not; furthermore, some sounds or sequences of sounds indicate the position of a word boundary, or the lack of word boundary, cf. 4.2 and 4.5; and finally, fewer word boundaries are manifested with increasing speech rate, less formality, etc.

The general situation concerning phonological criteria for word delimitation is thus the following (cf. Jespersen 1924: 92–95): Word boundaries are not obligatorily manifested; boundary signals are often not unique, but indicate that between X and Y, say, there must be a word boundary somewhere, or there cannot be any word boundary (in particular instances, such cases may lead to unique determination of word boundaries, of course); and the manifestation of word boundaries is sociolinguistically, stylistically etc. variable. Furthermore, it is obvious that word boundaries can have an important function for speech perception: The more word boundaries manifested, and the more saliently and uniquely so, the easier it be-
comes for the receiver to decode the speech chain, i.e. to do the parsing. This fact is also important when dealing with foreign languages, of course.

4.1. Pauses

Speakers make pauses more often between words than within words (and more often between phrases than within phrases, etc.). Thus the potential for pausing may be used as a criterion for delimiting words (cf. 3.4). But it can be doubted whether this is really a phonological criterion like the others mentioned in 4; not because the absence of sound is not part of the sound signal (for it is), but because the potential for pausing can be taken as a behavioral consequence of the structuring of the speech chain essentially identical with the criterion of uninterruptability (cf. 3.2); and common to uninterruptability and the potential for pausing is precisely their optional character. Furthermore, “filled pauses” or hesitations of all kinds could be mentioned parallel to pauses strictly speaking (i.e. absence of phonation).

4.2. Boundary signals (junctures)

A whole range of phonetic phenomena may characterize word boundaries, from “low-level” automatic ones, like differences in duration between word-initial and word-final allophones of the same phoneme, to more phonological ones like a glottal attack if a word in German starts with a stressed vowel (e.g. ein Esel ‘a donkey’ where the glottal attack before /e:/ indicates the word boundary). Another well-known example is night rate, where the separate articulation of /t/ and /r/ distinguishes it from nitrate, where /tr/ together can be articulated as a kind of affricate.

Daniel Jones gives a detailed typology illustrated with English examples, with the following main types (cf. Jones 1931):

(a) incidence of stress (e.g. an aim, a name);
(b) differences of sound without appreciable differences of length (with many subtypes, e.g. that’s tough, that stuff; missed eight, Miss Tate);
(c) differences in length (with many subtypes combined with aspiration, voicing etc., e.g. selfish, shellfish; make ill, may kill).

The terms boundary signal (German Grenzsignal, cf. Trubetzkoy 1939: 29) and open juncture (cf. Hockett 1947: 277) have been used in approximately this sense (cf. Hyman 1978 for a survey of the issue).

4.3. Sandhi

Phonological changes (in the synchronic sense) occurring when words are juxtaposed are often termed sandhi (borrowing a term from Sanskrit grammar, cf. Art. 5). Most of the phenomena described in 4 could be called a kind of sandhi in the broadest sense (since they are conditioned by word boundaries); but more precisely, sandhi can be limited to changes which are not general phonological processes (thus excluding a general rule of word-final devoicing of obstruents, for example, cf. 5.1 and 5.2). Furthermore, internal sandhi (applying within words) is not relevant here, only external sandhi (applying across word boundaries). Typical examples of such sandhi phenomena are the different forms of the article in the man, the ape; a man, an ape; the “linking r” in (British) my dear aunt; French liaison in e.g. grand ami ‘great friend’ with [ta] (as against grand livre ‘great book’ where grand ends in the nasal vowel), cf. 5.1. Like many other phonological phenomena surveyed in 4, sandhi can be seen as a symptom of the speaker’s structuring (into words etc.) of the speech chain, rather than as peculiar changes in a restricted set of environments (cf. Andersen 1986).

4.4. Stress

Stress is probably the most important phonological criterion for “wordness” in many languages, and in some theories stress is given a privileged position in characterizing the word phonologically (cf. 6.1). As Edward Sapir says:

(4) “In many, perhaps in most, languages the single word is marked by a unifying accent, an emphasis on one of the syllables, to which the rest are subordinated” (Sapir 1921: 36)

An interesting and thorough attempt to define the word phonologically by means of stress has been made by Paul Garde. For him, a word is a kind of accentual “unité significative” (signifying unit) that is larger than “le morphème”, which is the minimal “unité significative”, and smaller than “la phrase” (corresponding to sentence in English, not phrase), which is the maximal “unité significative”. He defines the word as a “syntagme appartenant à un type qui, dans la langue considérée, est normalement accentogène" (‘phrase belonging to a type which, in the language in question, is normally acceptable’; Garde 1968: 19–20); in addition, words can be either acceptable or clitics.
There are at least two problems inherent in any attempt to define the word by means of stress. First, there is the problem of clitics (cf. Art. 41), and more generally, of words which do not have their own main stress (or in other words: of sequences of words with only one main stress). Examples of clitics were given in 3.3, and, according to different definitions of the word, clitics (as bound pronouns in Romance languages, for example) will be either separate words or only part of such words. This is not really a problem for most theories, since clitics can in principle be treated consistently under either view; one could rather call it a fact illustrating that structurings in phonology and grammar need not be, and typically are not, isomorphic.

Cases of one word with two equal main stresses constitute a much more serious challenge to several linguistic theories and models of grammar; some would even consider this a *contradictio in adjecto*. Modern Standard Danish offers several kinds of just such problematic examples (which make it impossible to claim that there must always be a word boundary somewhere between two main stresses): *juleaften 'Christmas Eve', piskemorgen 'Easter Morning' have equal main stress on *jule- 'Christmas', piske- 'Easter' and on *-aften 'evening', -morgen 'morning';* this stress pattern is in general characteristic of phrases in Danish, and not of compounds (which have the typical Germanic stress reduction on non-first components), but in no other respects do *juleaften, piskemorgen* behave as phrases (neither semantically, syntactically nor morphologically); so-called emphatic compounds like *stangdrukken 'bloody drunk', brandfarlig 'bloody dangerous'* also have two equal main stresses, and are thus stress-wise different from normal compounds like *brandfarlig 'inflammable'* (cf. *brand 'fire'), but in no other respects do emphatic compounds behave like phrases (the two examples *brandfarlig* are segmentally identical; and notice that the isolated word *brand* would keep its *stød* when occurring under stress in a phrase, and not loose it as it does in both kinds of compounds).

As illustrated in the case of *brandfarlig* just mentioned, other accents (or prosodies), like the *stød*, and not only stress (which is a dynamic or culminative accent) may be relevant for “wordness”. Tonal accents, for example, can be relevant in this context; e.g. the Swedish and Norwegian tonal (or “musical”) accents characterize a word as a whole, and can thus be used as a criterion for “wordness”.

4.5. Phonotactics

As mentioned in the introduction to 4, phonological criteria for delimiting words, whether they are “positive” or “negative” (cf. 4.2), do not generally give a unique answer; rather they restrict the potential places of word boundaries to a few possibilities (sometimes only one). The same applies to phonotactics (cf. Art. 44). For example, a sequence like *hstr* in Italian must contain a word boundary (before *ls*): *per stranieri* 'for foreigners' because of the phonotactic constraints for Italian words (Basbøll 1974: 36).

In general, there can be very complex interrelations between syllable structure (sensitive to sonority and so on) and grammatical structure. In some languages, there are more phonotactic possibilities at word edges than at syllable edges. Many Germanic languages, for instance, allow for so-called *appendix consonants* at the end of a word. These consonants are coronal obstruents, *ls* and *lt*. In other languages, there are extra restrictions on possible consonants at word edges (cf. Booij 1983; Rubach & Booij 1990).

5. Word boundaries in phonological rules

In 4, a number of different phonological criteria for delimiting words were considered; part of this section dealt with manifestations of word boundaries. We shall now examine a different but related issue, viz. the function of word boundaries in phonological rules. The boundaries in question are phonologically relevant grammatical boundaries typically occurring between (distributionally defined) words. There are two reasons why we cannot simply speak about “word boundaries” here in any precise sense.

First, all boundaries delimiting distributionally defined words do not have the same effect (at least if we include a range of languages): There may, for example, be weaker and stronger word boundaries depending on the kind of words considered, the position in the utterance, accentual conditions, and so on.

Secondly, if the boundaries are defined purely by their phonological consequences, one cannot pick out one specific boundary which delimits exactly distributional words (e.g. the boundary after prefixes, before certain suffixes, or between members of a compound, can have the same effect as some word boundaries). There are in Modern...
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French, for example, certain phonological rules (such as glide formation) which are blocked by the presence of a word boundary or a boundary between a prefix and a stem, but are not blocked (within the same register) by the presence of a boundary between a stem and a suffix: e.g. *binusual* vs. *niourt*, normally pronounced with [j] (cf. Basboll 1978: 151–160).

By word boundary phonologists often mean a particular juncture, symbolized by #: this is the case e.g. in the tradition of Generative Phonology (cf. Chomsky & Halle 1968: 366). They operate with three different boundary symbols, viz. #, + (called formative boundary or morpheme boundary) and = (a boundary occurring after foreign prefixes like in-). The three boundaries are cross-classified by means of particular distinctive features. Phonological rules are taken to ignore + in the input string (unless a + is indicated in the structural description of the rule, in which case the input string must contain a + at the relevant place), whereas a # or a = not indicated in the structural description blocks the application of the rule. Sequences of #, but not of other boundaries, occur in phonological strings; syllable boundaries have no place in this theory.

A much simpler system of boundaries in phonology was proposed by James McCawley at the same time (cf. McCawley 1968). He includes the syllable boundary in a complete ranking, i.e. syllable boundary, word boundary, etc., are of different strength but have phonological effects according to the same conventions (cf. 5.1–5.3; cf. Basboll 1981).

Thus the word boundary has been treated in phonological analysis either as one in a linearly ordered set of boundaries which in principle apply according to the same principles (McCawley and followers), or as a boundary entering into complex relations of very different sorts with other boundaries (Chomsky & Halle and followers).

In the more recent model of Prosodic Phonology (Nespor & Vogel 1986), the word boundary used is the prosodic word boundary instead of the grammatical word boundary, which is thus made superficial. In this framework, the potential asymmetry of grammatical and phonological structure, and thus the asymmetry between syntactic words and prosodic words is focused upon. For instance, compounds consist of at least two prosodic words. Clitics are then characterized as elements that form independent grammatical words, but not independent prosodic words: prosodically, clitics form one prosodic word with the preceding or the following word (the host word); cf. Booij (1996).

The relation between grammatical word boundaries and phonological word boundaries also plays a central role in the so-called theory of Generalized Alignment developed within the Optimality Theory of phonology (cf. McCarthy & Prince 1994). In this approach, the alignment of grammatical (morphological) edges and the phonological edges plays a central role in phonological and morphological analysis.

But regardless of the differences in these approaches, some basic phonological functions of word boundaries (in the rather broad sense used in this article) can still be discerned, as will be attempted in the following sections 5.1–5.3.

5.1. Word boundaries in structural descriptions

A word boundary can be properly included in the structural description of a phonological rule. This is the case if, for example, a particular rule applies to a word-final consonant when the following word begins with a particular segment, say a vowel. French liaison is a case in point, e.g. in an example like grand idiot 'big idiot' where the sequence across the word boundary is [t̪i]; compare the corresponding feminine form grande idiote with [di], and a derivative form also containing the morpheme grand: grandir 'enlarge' with [di] as well. The morpheme grand ends in [t̪] only in a liaison-context (which is also subject to certain syntactic/stylistic conditions which cannot be discussed here). The situation where a word boundary is properly included in the structural description of a phonological rule is often called sandhi (cf. 4.3). It is controversial at which level of abstractness such sandhi rules should be described.

A different case which, however, would also normally be described as a word boundary occurring in the structural description is the one where a phonological rule applies to a segment in absolute word-final or absolute word-initial position; i.e. where the word boundary constitutes one of the edges of the structural description. An example could be devoicing of a word-final obstruent, or tensening of a word-initial vowel or glide. According to the convention proposed by Stanley (1973), such examples can be reduced to instances of the general case mentioned in 5.2.
5.2. Rules blocked by word boundaries

According to McCawley's (1968) proposals, every phonological rule is ranked by a certain boundary with the effect that weaker boundaries are irrelevant for the application (or non-application) of the rule, whereas boundaries stronger than, or as strong as, the rank block the application of the rule (i.e. prevent it from applying even though its structural description is otherwise met). Many segmental phonological rules are blocked by word boundaries (they could be called word-level rules). To take an example, the rule which makes a Danish short /a/ grave before a grave consonant does not apply if the grave consonant belongs to a following word, strong derivative, part of compound, or even syllable; e.g. *plæf* 'shoot!' has grave /a/ but *colaflaske* 'cola bottle' has not because /a/ and /f/ are separated by a certain boundary.

The principle treated in this section has particularly strong consequences for word delimitation in the case of phonological rules which apply to long phonological chains (in principle, to strings of unlimited length, i.e. "unbounded"); vowel harmony is an important case in point. But notice that vowel harmony as a rule will not uniquely determine the place of all word boundaries (cf. 5).

Stanley (1973) proposed to introduce variables in the structural description of phonological rules, e.g. so that there would be, in the normal case, a variable X at the left edge, and a variable Y at the right edge of the structural description. Accepting this convention, phonological rules applying in absolute word-initial, or absolute word-final, position (cf. 5.1) could be stated simply by omitting the variable to the left or to the right, respectively, thus reducing all cases of 5.1 except genuine sandhi to instances of the general case (viz. that of 5.2).

5.3. Word boundaries delimiting domains

Domains ranked by a certain boundary (i.e. phonological strings having this boundary, or a stronger one, on each side, but only containing weaker ones) not only define the "universe of application" for a phonological rule (cf. 5.2), but can also occur within the structural description. Domains ranked by the word boundary, i.e. approximately "words", can themselves be referred to in the rules, e.g. in the rule for compound stress in Germanic.

6. Concluding remarks

6.1. What might phonological word mean?

A number of different senses can be given, and have been given, to phrases like phonological word. Some of these have already been mentioned, but let us end by briefly indicating three clearly different possibilities.

Two types of proposals should be discarded right away as being very unpractical at best. One is the idea of a simple phonetic entity, as illustrated by the following quotation by Henri Frei: "J'entends par mot phonique toute partie de la chaine parle qui est emise d'un seul souffle" ('I understand by phonic word each part of the speech chain which is made by one single breath of air'; Frei 1941: 51); such proposals would be very interesting if substantiated phonetically, but they cannot be recommended as definitions.

Another non-recommendable proposal would be to let phonological word mean the phonological aspects of a lexical item; while such a notion may well be important (as suggested by studies on the "mental lexicon", cf. Aitchison 1987), the idea of a lexical item is too far from what one normally means by a word (cf. 2) to be acceptable in the present context.

This leaves us with at least three clearly different, and all interesting, kinds of proposals on what a phonological word could reasonably be:

(a) the phonological aspect(s) of a distributionally defined word (cf. 3 and 4.2);
(b) a stress group (cf. 4.4), in particular if its boundaries are not identified by phonetic criteria alone (cf. 5);
(c) a certain phonological domain in the sense of 5.

These different senses are not independent, of course. These different roles of the notion phonological word are discussed in detail in Hall & Kleinhenz (1999, eds.).

6.2. Final comment

It has been argued in this article (cf. 3.4) that the distributionally defined word is a psychologically relevant unit, and that phonological criteria for the delimitation of words are merely consequences of the speaker's structuring of the speech chain (cf. 4). For the receiver, such phonological criteria are clues to make the first analysis of the input, i.e. they help with the parsing. Distributional words are related to, but not identical with, inflected lexi-
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cial items. Diachrony tells us, finally, that the distinction between one word, and a sequence of two words, is not as absolute as most models of linguistic theory seem to indicate.

7. References


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41. Clitics

1. Introduction

Theories of grammar make a basic distinction between words and affixes, but some formative elements manifest analytic difficulties for this binary division of labor—these forms are known as clitics. Clitics reveal an intermediate status between inflectional affixes and independent words. However, it is not entirely clear that clitics constitute a unified class of elements; rather, the label clitic (from Greek 'leaner') covers a variety of phenomena ranging from unstressed words to phonologically bound words and phrasally positioned affixes.

Finnish -han, for instance, attaches suffixally and has a pragmatic function in the sentence conveying textual cohesion in spoken language. Although phonologically appended, it is unlike the affixes of the language in that it is not limited to a single word class (as, say, tense markers are restricted to verbs in Finnish); instead it attaches promiscuously to any word class, as illustrated in (1). There is no restriction on the word class of the phonological host for -han—it can be a noun, adjective, verb, or almost any word class except for certain complementizers and conjunctions. (1a) shows -han attached to olet 'you are'; in (1b) it is suffixed to the adjective uuden 'new'; and in (1c) it is attached to the noun auton 'car'.

(1) (a) Olet-han itse-kin samaa mieltä be:PREs.2.SG-FOC self-too same:PARTIT mind:PARTIT
'You are yourself of the same opinion, you know.'

(b) Uuden-han auton hän osti new:GEN-FOC car:GEN s/he buy:PAST(3.SG)
'It was a NEW car that he/she bought.'

(c) Uuden auton-han hän osti new:GEN car:GEN-FOC s/he buy:PAST(3.SG)
'It was a new CAR that he/she bought.'

The term host designates the unit a clitic attaches to. In (1c), for instance, -han is attached to the phonological host auton 'car', and at the same time to the host phrase uuden auton 'a new car', which is a noun phrase. With both promiscuous host selection and the possibility of phrasal attachment -han does not behave like an affix. Although it is not a typical affix, -han cannot be an independent word either, as its vowel must agree in frontness or backness with the vowel harmony requirements of the host word, just as an affix must show such front/back agreement. Examples in (1) show -han with a back