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Lexical Phonology and Morphology

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Lexical and Postlexical Phonology

The term 'lexical phonology' is used for two different but related purposes. First, it refers to the range of phonological processes or constraints in a language that pertain to the domain of the word. In this use, it is a synonym of 'word phonology,' and stands in opposition to the term 'postlexical phonology' or 'phrasal phonology.' With the latter term we denote the processes or constraints that apply across the board, not only within the domain of the word, but also across word boundaries in the domain of larger constituents such as phrases. The distinction between these two domains of phonology can be illustrated by means of the following example. In Dutch, obstruents

(stops and fricatives) are always voiceless at the end of a syllable (a generalization referred to as final devoicing). This constraint is part of word phonology, as illustrated by the following minimal pair:

vind-er [vɪn.dər] 'finder'
vind er [vɪn.tər] 'find her'

The first example is a noun ending in the suffix *-er* derived from the verb *vind* 'to find'. Final devoicing is not applicable here since the stem-final /d/ is syllabified as an onset (syllable boundaries in phonetic forms are indicated by dots). In the second example the clitic pronoun *er* /ər/ 'her' forms one prosodic word with the preceding verb. However, the /d/ is realized as [t], showing that it must have been in coda position at the presyntactic level, before this word was combined with the clitic pronoun. This shows that final devoicing is a constraint that is part of the word phonology of Dutch, whereas the syllabification of the verb and the following clitic as one prosodic word belongs to the domain of phrasal (postlexical) phonology. As this example illustrates, rules of word phonology must apply before phrasal phonology. Another example of this distinction is that Dutch simplex and derived words do not have geminate consonants. The past tense form *eette* /e:t-tə/ of the verb *eet* 'to eat', with the past tense suffix *-te*, for instance, is realized as [e:tə]. Hence, there is an obligatory rule of degemination as part of the word phonology of Dutch. Across word boundaries, however, geminate consonants do occur, but they may be reduced to one consonant in casual or fast speech. Thus, the same process may function as an obligatory rule at the level of word phonology, and as an optional rule in phrasal phonology.

The term 'lexical phonology' is also used to denote a particular theory about the interaction between morphology and phonology, in which the distinction between word phonology and phrasal phonology discussed above plays an important role. This theory will be discussed in the next section.

Lexical Phonology and Morphology

Lexical phonology is a theory about the interface between phonology and morphology developed by Paul Kiparsky (1982, 1985) and a number of other phonologists. The basic issue is to what extent and how the morphological structure of words determines their phonetic realization. Lexical phonology may be qualified as a set of related but independent hypotheses about the morphology–phonology interface (see Booij, 2000 for a detailed survey).

The basic claim of lexical phonology is that morphology and the rules of word phonology apply in tandem. Given a word with its underlying phonological form, the relevant rules of word phonology are applied to that word. You may then apply a morphological rule to that word in its derived phonological form. This creates a new domain of application for the rules of word phonology. Thus, we derive the lexical phonetic forms of words. These words will subsequently be combined into phrases and larger constituents by the rules of syntax. Postlexical phonology is accounted for by a component of postlexical phonology that applies after syntax. Thus, the organization of the grammar is proposed as in Figure 1.

Suppose we want to compute the phonetic form of the 1.sg. form of the Dutch verb *vind* /vɪnd/ 'to find', which is *vind* [vɪnt]. The stem for *vind* is first fed into morphology, which has no phonological effect since there is no overt morphological ending for 1.sg. verbs. The form is then syllabified, as one syllable (vɪnd). To this form, the rule of final devoicing applies, resulting in the form [vɪnt]. This is the form that is fed into syntax. At the postlexical level, this form may undergo further phonological rules such as assimilation.

We do not have to label the rule of final devoicing explicitly as a lexical rule. Instead, we might assume the principle 'apply a rule when possible.' Thus, the rules of syllabification will apply to a word. Subsequently, the presence of syllable structure will trigger application of the rule of final devoicing to voiced obstruents in syllable-final position.

When we derive the deverbal noun *vinder* with the phonetic form [vɪn.dər] we might proceed as

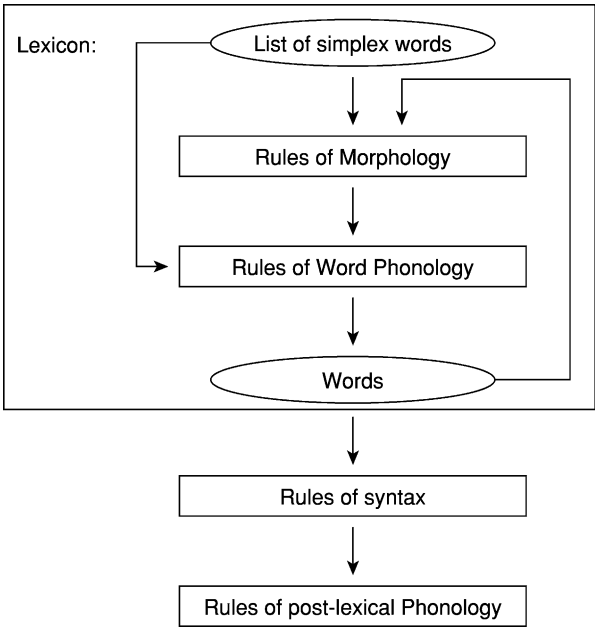

Figure 1 Lexical phonology.

follows. On the assumption that stems do not trigger the application of phonological rules, the stem *vind* is fed into morphology, where the noun *vinder* is created. Subsequently, this word will be syllabified as *vin.der*. The /d/ is now in onset position and hence it will not be devoiced, as required. This word is then, with this computed phonological form, available for lexical insertion into syntactic structure.

The theory of lexical phonology in its original form claimed that word phonological rules may apply cyclically, in an outward fashion. The concept of cyclic rule application originates from Chomsky and Halle (1968) (usually referred to as *SPE*), which proposed to apply the stress rules of English in a cyclic fashion. For example, the stress patterns of the word *condensation* in the (deverbal) interpretation 'the act of condensing' and of the similar word *compensation* are derived in two steps. On the first cycle, main stress is assigned to their verbal stems *con**dense*** and ***com**pensate* respectively, which results in main stress on the second and first syllable respectively. The addition of the suffix *-ation* creates a second domain of application of the English main stress rule, with main stress on the first vowel of *-ation*. There is also some degree of stress on the word-initial syllables of these words. These words differ, however, in the phonetic realization of the second vowel. The second, unstressed vowel of *compensation*, which is unstressed on both cycles, is realized as a schwa, whereas the second vowel of *condensation* is pronounced as a full vowel [ɛ] since it still has some degree of stress, a reflex of the stress pattern of its verbal stem *condense*. The difference in phonetic realization of the second vowel of these words thus reflects their derivational history (Chomsky and Halle, 1968: 116).

Whereas in *SPE* cyclic application of the English stress rules is stipulated, in lexical phonology this manner of application follows from the organization of the grammar as outlined above, since the derived phonological forms of words can be fed back into the morphological component. Therefore, it has been proposed that the rules of lexical phonology apply as soon as possible, hence cyclically. An additional advantage of this theory is that it predicts that morphological operations can be dependent on derived phonological properties of words. An example of this kind of dependence is that the English suffix *-al* can only be attached to verbs that bear main stress on their final syllable; hence the difference between *try–trial* versus *organize–*organizal* (the only exception to this constraint is *bury–burial*). If stress can be computed by rule in a cyclic fashion, the grammar will first assign stress to the verbal stems, and subsequently, the word formation rule for *-al* can be applied to verbal stems provided with the required stress pattern.

This proposal raises a number of issues. First, stress is a property of syllables. Hence, if stress is cyclic, syllabification must be applied in a cyclic fashion as well. Affixation may, however, affect the syllabification of the stem. In particular, stem-final consonants will be syllabified as codas, but syllabified as onsets when a vowel-initial suffix is attached to that stem, as in *find–fin.der*. Cyclic syllabification thus implies some form of resyllabification of the stem on the next cycle. Secondly, it has become clear that certain phonological rules should not apply cyclically. This is, for example, the case for the Dutch rule of final devoicing, which should not apply to the stem of the deverbal noun *vind-er* discussed above because otherwise the wrong phonetic form [vɪn.tər] is predicted. Therefore, Booij and Rubach (1987) proposed a refinement of the model of lexical phonology, and introduced a third level, a category of presyntactic word-level rules (also called postcyclic rules) that apply after the set of cyclic phonological rules, but still within the lexicon. Hence, we get three levels of application of phonological rules:

1. Cyclic phonological rules (interacting with word formation)
2. Word-level phonological rules
3. Postlexical phonological rules.

A related hypothesis is that cyclic rules are subject to the condition that they apply in derived environments only. This means that they can only apply in a context created by the application of a previous phonological or morphological operation (see Booij, 2000 for detailed discussion). Furthermore, it has been hypothesized that lexical rules are structure preserving; that is, they only introduce phonological segments that also occur in the underlying forms of words.

In some varieties of lexical phonology one also finds the hypothesis of level ordering. This hypothesis claims that the morphological processes of a language may be organized in two or more levels or strata, each with their own set of phonological rules applying to the complex words created at that level. For English, for instance, it has been proposed that there are two levels. Level 1 is the level of nonnative suffixation, which triggers the application of a specific set of phonological rules such as the main stress rule. Level 2 is the level for stress-neutral (native derivational and inflectional) suffixes. At this level, the main stress rule no longer applies, thus accounting for the stress-neutrality of these suffixes. This level-ordering

hypothesis also predicts that stress-neutral suffixes are peripheral to those that influence the stress patterns of words, such as the stress-bearing nonnative (Romance) suffixes of English. For instance, in the complex noun *contrastiveness* the stress-shifting suffix *-ive* precedes the stress-neutral suffix *-ness*. The level-ordering hypothesis for English is discussed and criticized in detail by Fabb (1988) and Plag (1999), and defended in Giegerich (1999).

Constraint-Based Phonology

To what extent do the insights of lexical phonology carry over to constraint-based phonological theories such as optimality theory (OT)? An important insight of lexical phonology is that morphological structure may determine the domain of application of phonological constraints. This insight has been carried over to OT in the subtheory of alignment (McCarthy and Prince, 1994). In this approach, the boundaries of prosodic constituents such as syllables and prosodic words must be aligned as much as possible with morphological boundaries. Thus, morphological boundaries codetermine the boundaries of prosodic constituents, and hence indirectly the domain of application of phonological rules. The effects of cyclic application of phonological rules within complex words in rule-based frameworks might be obtained by making use of output–output identity constraints that refer to the phonetic form of morphologically related words or word forms (Benua, 2000).

The distinction between word phonology and phrase phonology can be carried over to OT in the form of derivational optimality theory (DOT), as advocated in Booij (1997), Rubach (2000), and Ito and Mester (2001). This means that the evaluation of the candidate phonetic forms of words takes place in two steps, first at the word level, and subsequently at the postlexical level. Thus a restricted form of derivation is maintained. This approach can account for the difference in phonetic form between *vinder* and *vind er* mentioned above.

See also: Generative Phonology; Morphotactics; Rule Ordering and Derivation in Phonology.

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