7 Phonological Constraints on Morphological Rules

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Pieces of morphological material, when strung together or combined, can affect each other phonologically, as Spencer (Morphophonological Operations) makes clear. But phonology can have a more radical influence on morphology than that, in that it can determine whether some pieces of morphological material are combinable at all. This is because some morphological processes (of affixation, reduplication or whatever) are restricted to bases with certain phonological characteristics, and cannot apply to bases without those characteristics, even if they are appropriate on other grounds (syntactic, morphological and semantic).

Phonological constraints of this sort can be found in both derivation and inflection. Here are some derivational examples:

(1) The English suffix *-al* which forms abstract nouns from verbs, as in *arrival*, *committal*, *referral*, *refusal*, is restricted to bases with main stress on the final syllable. Evidence for this is the non-existence of nouns such as **abolishal*, **benefital*, **developal*, **examinal* (Marchand 1969: 236–7; Siegel 1979). (One apparent exception is the noun *burial*.) The restriction does not apply to the adjective-forming suffix *-al*, as is shown by the acceptability of *occasional*, *procedural*, *fanatical*, etc. This shows that such restrictions need not reflect any general phonological characteristic of the language in question, unlike many of the morphophonological operations described by Spencer.

(2) The English suffix *-en* which forms verbs from adjectives, as in *blacken*, *dampen*, *redden*, *loosen*, *stiffen*, is restricted to bases ending in obstruents. Evidence for this is the non-existence of verbs such as **coolen*, **greyen*, **thinnen*, **puren* (Marchand 1969: 271–3; Siegel 1979). Again, this restriction does not reflect any general phonological characteristic of English, because it does not apply to the adjective-forming suffix *-en* (as in *woollen*), or to the past participle, or passive, suffix *-en* (as in *swollen*).

(3) The Turkana suffixes for forming abstract nouns from intransitive verbs of state are distributed mainly on the basis of stem shape; for example, the suffix *-(i)si* (and its vowel-harmonic variants) seems to be productively attachable only to verbs with the stem shape CVC (Dimmendaal 1983: 270).

Here now are some inflectional examples:

(4) The English comparative and superlative suffixes *-er* and *-est*, as in *redder*, *calmer*, *happiest*, are restricted to short bases. Among two-syllable adjectives, individual speakers differ over precisely which examples are acceptable, but nearly all adjectives of three or more syllables consistently lack these forms: for example, **curiouser*, **sensitivest*, **motherlier*.

(5) The Hungarian second-person singular present indicative indefinite suffix *-(a)sz* [-ɒs], as in *ír-sz* 'you write', *mond-asz* 'you speak', cannot be attached to bases (verb stems) ending in [s, z, ʃ] (coronal strident segments). Hence a form such as **olvas-asz* ['olvɒʃɒs] 'you read' is unacceptable (Bánhidi et al. 1965: 87).

(6) In Classical Attic Greek, perfect stems of verbs were regularly formed from a base identical with the present stem, by reduplicating the first consonant and inserting *-e-*. Examples are *pe-paideu-* from *paideu-* 'train' and *te-ti:me:-* from *ti:ma:-* 'honour'. Reduplication could not, however, apply to bases beginning with a vowel or certain consonants including *r* and *h*, and was avoided with stems beginning with consonant clusters, especially *sC-* clusters. Forms such as **se-spa-* from *spa-* 'draw (sword)' and **he-haire-* from *haire-* 'take' were therefore unacceptable (Smyth 1956: 147; Schwyzer 1939: 649–50).

(7) In Classical Attic Greek, the third-person plural perfect indicative passive suffix *-ntai*, as in *pe-paideu-ntai* 'they have been trained', was not added to consonant-final bases. From a perfect stem such as *te-tag-* 'have (been) drawn up' we find forms such as first-person singular *te-tag-mai*, third-person singular *te-tak-tai*, etc., but we do not find a form such as third-person plural **te-tag-ntai* 'they have been drawn up' (Smyth 1956: 132).

These phonological restrictions leave morphological 'gaps' which may or may not be filled in other ways. We can distinguish three situations:

(a) The gap is usually filled morphologically, but in unsystematic fashion.
(b) The gap is filled morphologically in systematic fashion.
(c) The gap is filled in systematic fashion by a syntactic periphrasis.

In (1)–(7) we find all three of these situations exemplified: (a) by (1) and (2), (b) by (3), (5) and (6), and (c) by (4) and (7).

Examples of situation (a) (where gap filling is not systematic) are:

(1′)   Most English verbs whose phonology prevents the attachment of noun-forming *-al* have corresponding abstract nouns formed in other ways: for example, *abolition*, *benefit*, *development*, *examination*. As these examples show, however, there is no single alternative for *-al*; nor is there a set of alternatives with a clearly systematic distribution. But that is not surprising, given that corresponding to any one English verb there may be several abstract nouns, formed in different ways and differing more or less subtly in meaning. For example, corresponding to *commit* we find not only *committal* (formed with the suffix in question) but also *commission* and *commitment*.

The lack of any overall system in English deverbal abstract noun formation is confirmed by the existence of arbitrary gaps. That is, for some verbs there is no corresponding abstract noun at all with the expected meaning 'act of Ving' or 'state of being Ved' (apart from a 'gerundive nominal' in *-ing*, which is available for every English verb). This is true both of some verbs which appear to meet the phonological condition for the *-al* suffix, such as *ignore*, and of some which do not, such as *edit*. (The nouns *ignorance* and *edition* do exist, but they do not have the expected meanings 'act of ignoring' and 'act of editing'.)

(2′)   Many of the adjectives which do not meet the conditions for the suffixation of *-en* can be used as verbs without any morphological change, thus illustrating 'zero-derivation' or 'conversion'. Examples are *cool*, *grey*, *thin*. Some use another verb-forming suffix: for example, *purify*. Alongside three adjectives which reject *-en* (viz. *long*, *strong*, *high*) there is a verb in *-en* formed from a corresponding noun which happens to end in an obstruent and therefore meets the phonological condition for *-en* suffixation: *lengthen*, *strengthen*, *heighten*. Nevertheless, some adjectives, whether or not they could appropriately take *-en*, arbitrarily lack any corresponding verb: for example, *cold*, *limp* 'not stiff', *tall*, *wild*; and some which could take *-en* have corresponding verbs formed by other means: for example, *wet* (verb *wet*, not **wetten*) and *hot* (verb *heat*, not **hotten*).

Examples of situation (b) (where gap filling is systematic and morphological) are:

(3′)   In Turkana, every intransitive verb of state (including many items which would be glossed in English as adjectives) has a corresponding abstract noun (Dimmendaal 1983: 270–4). These nouns are formed through a variety of processes, distributed largely on the basis of the phonology of the verb stem, as follows (Dimmendaal 1987: 206):

Stem shape	Suffix	Example
-CVC	-isi *or* -ɪsɪ	a-rɛŋ-ɪsɪ 'goodness'
$-CV_iCV_iC_i$	$-V_iC_i$	a-sɔlɔb-ɔb 'disorder'
$-C_iV_iC_iV_iC$	-u	a-lilim-u 'coldness'

Thus, for any verb which is polysyllabic and is therefore phonologically inappropriate for the *-isi* suffix, some other suffix will be available, and its choice is likely to be phonologically determined.

(5′) All Hungarian verbs whose stem ends in a coronal strident fricative and which therefore cannot take *-(a)sz* in the second-person singular present indicative indefinite take the suffix *-ol* instead: for example, *olvas-ol* 'you read'. The suffix *-ol* is therefore in systematic complementary distribution with *-(a)sz*. Historically, *-ol* belonged to a minority inflection class of verbs which, in modern colloquial Hungarian, is merging with the majority class in all forms except the third-person singular. So the distribution of *-(a)sz* and *-ol*, which was once based at least partly on inflection class, irrespective of stem phonology, has now acquired a purely phonological rationale (Sauvageot 1951: 70–2).

(6′) Attic Greek verbs whose phonology prevents the formation of a perfect stem by means of reduplication regularly form perfect stems by two other means. If there is an initial vowel or *hV-* sequence, the vowel is lengthened, with or without a change in quality, as in *e:ukse:-* 'have (been) increased' and *he:ire:-* 'have (been) taken' from *auks(-an)-* and *haire-* respectively. If there is an initial *r-*, *sC-* cluster or *z-* (probably pronounced [zd-]), then *e-* is prefixed, as in *e-spa-* 'have (been) drawn' from *spa-*, *e-zeug-* 'have (been) yoked together' from *zeug-*. This is sometimes found, instead of reduplication, with other consonant clusters too.

It is clear from comparison with other Indo-European languages that reduplication for perfect stem formation was an old feature, and that it was not originally restricted from applying to *sC-* clusters; thus, we find the Latin perfect stem *spo-pond-* corresponding to non-perfect *spond(-e)-* 'pledge', and Gothic *(ga-)stai-stald-* corresponding to *(ga-)stald-* 'possess'. It is also clear that *e*-prefixation (traditionally called the 'syllabic augment') was originally characteristic of other, non-perfect verb forms, where it is also still found in Attic Greek. What has happened in Attic, therefore, is that a stem-formation process from elsewhere in the verb system (the augment) has had its domain extended to fill the gap left by a new phonological constraint on perfect-stem reduplication which is peculiar to Greek (Smyth 1956: 145–9; Schwyzer 1939: 649–50). (Steriade 1990 offers an explanation for the Attic reduplication 'gaps' in terms of sonority and syllabification.)

Examples of situation (c) (where gap filling is systematic but not morphological) are:

(4′)   For those English adjectives which reject the comparative and superlative suffixes *-er* and *-est*, there is always available a periphrasis with *more* and *most*, as in *more curious*, *most sensitive*, *more motherly*.

(7′)   In the earlier stages of Ancient Greek, a third-person plural suffix *-atai* appeared on those consonant-final perfect passive stems which rejected *-ntai*, as in *te-takh-atai* 'they have been drawn up'. Etymologically these two suffixes are related, and synchronically too one might well regard them as alternants of the same suffix, related morphophonologically. But in Classical Attic Greek the *-atai* form came to be replaced by a periphrasis involving the perfect passive participle in *-men-* and the third-person plural present indicative form (*eisí*) of the copula *eînai* 'be', as in *te-tag-mén-oi eisí* 'they have been drawn up' (Smyth 1956: 132, 183; Schwyzer 1939: 812).

It is notable that for the gaps resulting from all the examples which we have classified as inflectional, (4)–(7), there exists a systematic filler, whether purely morphological or not. On the other hand, of the gaps classified as derivational, (1)–(3), only one is systematically filled. This reflects the importance of the paradigmatic dimension in inflection (see Stump, Inflection; Carstairs-McCarthy, Inflectional Paradigms and Morphological Classes).

Inflected forms fill 'cells' in a paradigm of related word forms appropriate to different grammatical contexts; consequently, if some morphological process is debarred phonologically from applying to some lexeme in some cell, there will be pressure to fill that cell in some other way, so as to avoid the risk that there may be some grammatical contexts from which the lexeme in question is excluded, just for want of an appropriate word form. This pressure to fill 'cells' is not felt in most areas of derivational morphology, though there is evidence that it is felt in some (Carstairs 1988); the Turkana example in (3) above may be one such instance, unless it is classified as inflectional.

Facts of the kind discussed here have recently become more prominent in theoretical debate within the framework of Optimality Theory (e.g. McCarthy and Prince (1993a; *idem*, Prosodic Morphology).