

## 2. Derivation

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<b>Subject</b>	<a href="#">Theoretical Linguistics » Morphology</a>
<b>DOI:</b>	10.1111/b.9780631226949.2001.00005.x

### 1 Derivation versus inflection

Unlike inflectional morphology, which specifies the grammatical functions of words in phrases without altering their meaning, *derivational morphology* or *word formation* is so named because it usually results in the derivation of a new word with new meaning. This traditional definition, however, has failed to secure a distinction between the two types of morphology, and the reasons for this failure have become matters of considerable discussion. Before proceeding to the question of what is derivational morphology, therefore, it makes sense to first attempt to locate the inflection–derivation interface.

### 2 The derivation–inflection interface

Chomsky (1970) proposed a sharp modular distinction between lexical and syntactic processes, known widely under the rubric of *Lexicalism*.<sup>1</sup> According to the Lexicalist position, words are derived in the lexicon and emerge with an internal structure to which syntax has no access (*Lexical Integrity Hypothesis*, Postal 1969). Sentences like *I speak Russian though I've never been there*, are thereby ruled out, since the pronoun *there* is syntactically coindexed with a lexeme–internal morpheme, *Russia*, which has no independent status in the syntax. Sentences, on the other hand, are generated by the principles of syntax, to which lexical operations have no access. This rules out phrasally based lexical items such as *over-the-counter* in *over-the-counter sales*, widely held to be extragrammatically generated.<sup>2</sup>

Lexicalism entails a set of diagnostics which distinguish derivation from inflection. First, if inflection is relevant only to syntax, the output of inflectional rules cannot be listed lexically. Derivation, on the other hand, is purely lexical, so the output of a derivation rule is a new word which is subject to lexical listing. Listing allows lexical but not inflectional derivatives to semantically idiomatize or lexicalize. Even though *went* has been phonologically lexicalized for centuries, semantically it has remained no more than the past tense of *go*. *Terrific*, on the other hand, has lost all semantic contact with its derivational origins in *terror* and *terrify*, despite its residual phonological similarity.

Second, if lexical operations precede syntactic ones, and if derivational operations map isomorphically onto marking operations (see section 6 for alternatives), inflectional markers will always occur outside derivational markers, as in Russian *lēt-ʹik-a fly-AGENT-GEN* 'the flyer's (pilot's)', where the derivational agentive marker *-(š)čik* precedes the inflectional case marker *-a*. Third, since inflection is purely syntactic, it cannot change the lexical category of a word; derivation can. The agentive suffix in this example changes the verbal base to a noun, but the case ending does not affect that nominal status.

Finally, since inflection specifies syntactic relations rather than names semantic categories, it should be fully productive. If an inflectional stem is susceptible to one function of a paradigm, it is

susceptible to them all. No verb, for example, should conjugate in the singular but not the plural, or in the present but not the past tense. The productivity of derivation, however, is determined by semantic categories, and we would expect derivation to be constrained by less predictable lexical conditions.

Unfortunately, each of the Lexicalist diagnostics is vexed by some aspect of the data. Derivation does change the meanings of words so as to allow the derivate to become a lexical entry in the lexicon. Case functions, however, also lexicalize. In Russian, for example, the Instrumental never marks punctual time with the odd exception of instances involving temporal nouns which form natural quadruplets – for example, *utr-om* ‘in the morning’, *dn-em* ‘in the afternoon’, *večer-om* ‘in the evening’, and *noč-ju* ‘at night’. There is simply no way to derive punctuality from the major or minor functions of the Instrumental: that is, manner, means, vialic, essive. Punctuality is productively marked by *v* ‘in’ + ACC in Russian, e.g. *v to vremya* ‘at that time’. The instrumental time nouns apparently must be lexically marked, even though punctuality is a case function.

Under most current grammatical theories, lexical selection occurs prior to agreement operations and the amalgamation of functional categories under INFL. If derivation is a lexical process, inflectional operations must apply subsequent to lexical ones. Assuming again an isomorphic relation between form and function, it follows that inflectional markers will emerge in surface structure outside all derivational markers. However, inflectional markers occur widely inside derivational markers. For example, the derivation of verbs by *preverbs*, prefixes which often share the form of an adverb or adposition, is considered derivational, since these derivates often lexicalize semantically. In English these derivations are marked with *discontinuous morphemes*: for example, *bring (someone) around*. In Sanskrit, however, similar derivations prefix the base: for example, *pari=nayat*, literally ‘around he.leads’, the present active for ‘he marries’. The imperfect is derived by inserting a marker between the idiomatized prefix and stem: that is, *pari=a-nayat*. Georgian exhibits a similar tendency: for example, *mo=g-klav-s* PREVERB=2OBJ-KILL-3SUB ‘He will kill you’.

The third entailment of lexicalism, that derivation changes the category of a stem while inflection does not, also faces a variety of problems. The first is a practical one: a dearth of research on lexical and grammatical categories. Whether N, V, A, for example, are lexical or syntactic categories has never been resolved. It has been common to presume that they are both and to ignore the fact that this presumption violates the strict modularity of lexicalism. Assuming that these categories are lexical, they are not changed by derivations like *violin: violinist*, *cream: creamery*, *zip: unzip*. A diminutive does not alter the referential category of its base, even though it changes its sense, very much as does inflection. Thus Russian *dožd* ‘rain’: *dožd-ik* ‘a little rain’: *dožd- ič-ek* ‘a tiny little rain’ – all refer to rain, even though they might express varying judgments and attitudes of the speaker towards a particular instance of rain.

There are also ostensible inflectional functions which belong to categories other than that of the base. Participles like English *talking* and *raked*, for instance, freely reflect the inflectional categories of aspect, tense, and voice, as in *John is talking* and *the leaves have been raked*. They also serve the relational adjectival function of attribution – for example, *the talking boy*, *the raked leaves* – and agree adjectivally in languages requiring agreement – for example, Russian *govorjašč-ij mal'čik* ‘talking boy’, but *govorjašč-aja devuška* ‘talking girl’. The diagnostics of lexicalism, therefore, remain fragile until contradictions like these are resolved. Nonetheless, an intelligible picture of derivation emerges from the data underlying them.

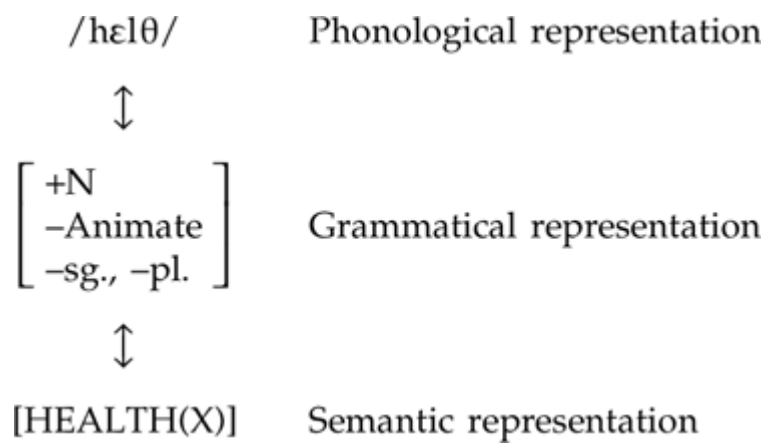
### 3 The nature of derivation

Three accounts of derivation have emerged in the recent literature.<sup>3</sup> The first considers derivation simply a matter of lexical selection, the selection of an affix and copying it into a word-level structure. Others see derivation as an operation or set of operations in the same sense that Matthews and Anderson see inflection. A derivational morpheme on this view is not an object selected, but the processes of inserting or reduplicating affixes, vocalic apophony, etc. Finally, Jackendoff and Bybee argue that derivation is a set of static paradigmatic lexical relations. In light of the lack of agreement on the subject, a brief examination of each of these three accounts would seem appropriate.

It is common to assume that the lexical entries (*lexemes*) upon which derivational rules operate

comprise at least three types of features: a phonological matrix, a grammatical subcategorization frame, and a semantic interpretation, all mutually implied. For future reference, let us illustrate these relations with the hypothetical entry for English *health* in (1).

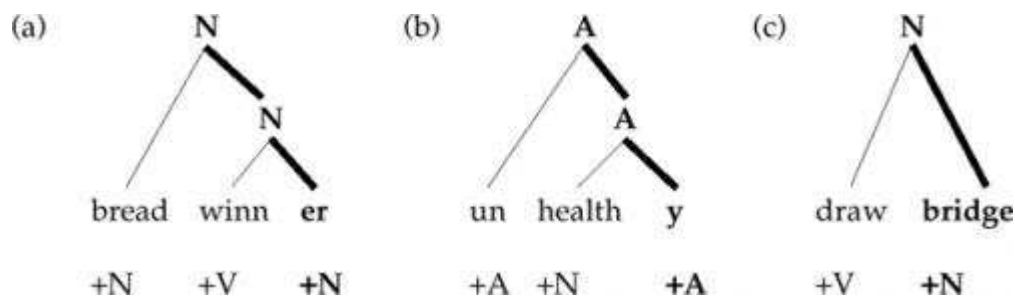
(1)



There is general agreement on these three constituents of a lexical representation, and that they mutually imply each other in the Saussurean sense; that is, no one such representation occurs without the other two, as indicated by the double-headed arrows in (1). Current disagreement centers on whether lexemes comprise only open open-class morphemes (N, A, V stems) or whether they include grammatical (functional) morphemes as well. We will return to this issue further on.

### 3.1 Derivation as lexical selection

Advocates of *Word Syntax*, including Selkirk (1982), Lieber (1981,1992), Scalise (1984), and Sproat (1985), reduce derivation to the selection of an affix from the lexicon (see Toman, WORD SYNTAX). This particular view of derivation is dependent upon the existence of word-internal hierarchical structure: that is, below the X0 level. Lieber (1992) claims that this structure in no way differs from syntactic structure, so that words contain specifiers, heads, and complements, just as do clauses. If words contain their own structure, and if affixes are regular lexical entries like stems, then derivation, compounding, and regular lexical selection may all be accomplished by a single process: lexical selection. (2) illustrates how compounds and derivations might share the same structure.



Derivational affixes are not distinguished from stems, but share the same classification, *morpheme*, defined as a classical linguistic sign. That is, derivational morphemes have the same mutually implied phonological, grammatical, and semantic representations as do lexemes. According to Lieber, the grammatical representation contains the category and subcategorization of the affix, plus any diacritics, such as its *Level Order*, the level at which an affix applies under Lexical Phonology (Kiparsky 1982b). The semantic representations of the stems and affixes in (2), for example, compose under the scope conditions provided by the structural hierarchy and the head-dominance principles. In (2), the rightmost lexical item dominates and assigns the grammatical and semantic categories to

the derivate or compound, as indicated by the boldface branches. The simplicity of the Word Syntax theory of derivation is achieved by the assumption that affixes are regular lexical items, and as such may serve as heads of derivates. However, morphology involves far more types of marking than simple affixation, and most of these types represent problems for Word Syntax.

### 3.2 Derivation as morphological operations

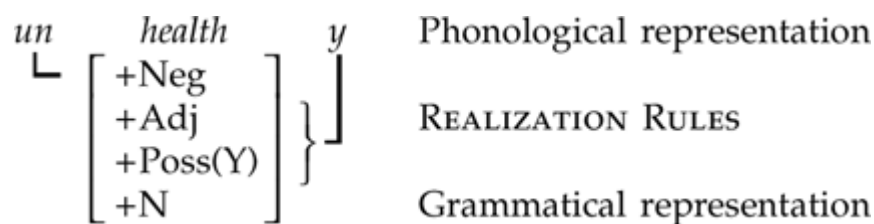
Anderson (1992), Aronoff (1976, 1994), and Beard (1981) have extended the notion of grammatical morphemes as operations developed in Matthews's WORD-AND-PARADIGM (see Stump, INFLECTION) theory to derivation. Process morphology addresses first and foremost those types of morphology other than external affixation. For example, both inflectional and derivational morphology are characterized by *reduplication*. Reduplication is a process which copies all or part of the phonological representation of a stem as an affix: for example, the Dakota de-adjectival verbalization: *puza* 'dry':

*puspuza* 'be dry', *č<sup>h</sup>epa* 'fat': *č<sup>h</sup>epč<sup>h</sup>epa* 'be fat'. Notice that reduplication presupposes the prior existence of some lexeme, making it difficult to classify this process as a lexical item as Marantz (1982) proposes. Whatever reduplication is, it must take place subsequent to lexical selection, and hence cannot be accounted for by lexical selection itself, unless that process is enhanced in an ad hoc fashion.

In addition to external affixation, languages also widely exhibit *infixation*. The inchoative de-adjectival verb in Tagalog infixes the base; for example, *ganda* 'beautiful': *gumanda* 'become beautiful', *gising* 'awake': *gumising* 'awaken'. Processual morphology handles infixation with the same sort of rules employed in accounting for external affixation. Structures like (2) cannot adequately explain infixation without special phonological rules which determine the position of infixes but not prefixes and suffixes. The issue between Word Syntax and process morphology then reduces to the question of whether such special operations differ qualitatively from other phonological operations.

Whether affixes are copied from stems to which they are attached, or whether they are written external or internal to the lexical base, are matters of indifference if affixation is a process, rather than the selection of a lexeme. This interpretation of derivation distinguishes operations on the grammatical representation of the lexical base from phonological modifications of the base such as affixation. (3) illustrates how affixation is realized on the derived base for unhealthy on this hypothesis.

(3)



Affixation applies after morpholexical and morphosyntactic rules have provided the base with derivational features. Since no grammatical or semantic operations are involved, affixation becomes a set of purely phonological modifications of the phonological representation of the base conditioned by the grammatical features. The head of such derivations is the lexical base. The crucial factor determining the order of affixes is not structural relations, but the order in which they are attached. Scope relations are determined by autonomous semantic operations which follow the order of grammatical features in the base.

### 3.3 Derivation as lexical relations

Jackendoff (1975) and Bybee (1988) have argued that derivation is simply a static set of lexical relations. Jackendoff argued that all derivates must be listed in the lexicon since they are subject to lexicalization. Derivational rules are *redundancy rules*, rules which state the single redundant relation

“is lexically related.” The nominalization rule for assigning *-ion* to Latinate verbs would then have the form (4):

(4)

$$\left[ \begin{array}{l} /y+ \text{ ion}/ \\ +N \end{array} \right] \leftrightarrow \left[ \begin{array}{l} /y/ \\ +V \end{array} \right]$$

Separate semantic rules are similar in that they express the same redundancy relation between the meanings of the base and the affix.

$$\left[ \begin{array}{l} +N \\ +[NP_1's ((P)NP_2)] \\ \text{ABSTRACT RESULT OF} \\ \text{ACT OF } NP_1's \text{ Z -ING} \\ NP_2 \end{array} \right] \leftrightarrow \left[ \begin{array}{l} +V \\ +[NP_1 \text{---} ((P)NP_2)] \\ NP_1 \text{ Z } NP_2 \end{array} \right]$$

Jackendoff proposed that such rules as (4) and (5) could be applied generatively in speech to create neologisms; however, generation is not their purpose in the competence model. Jackendoff also left open the question of how such regularities arise in the lexicon in the first place if they are lexically superfluous. Bybee offers a psychological answer to that question.

Bybee argues for a connectionist theory of morphology, inflectional and derivational, based on the theory of parallel distributed processing by Rumelhart and McClelland (1986). In her view, lexical rules have no status “independent of the lexical items to which they are applicable. Rather, rules are highly reinforced representational patterns or schemas.” Schemas are abstractions from memorized lexical items which share semantic or phonological properties. One such schema results from the association

of verb pairs like *cling: clung, sling: slung, sting: stung*.<sup>4</sup> A derivation rule on Bybee's account is simply a relationship which is more strongly represented, where “strongly” refers to the number of representations a pattern has in long-term memory. In the instance just cited, the phonological relation /lŋ/: /ʌŋ/ is more strongly represented than /kl/: /si/ or /sl/: /st/. The more recurrent phonological relation is therefore more likely to be associated with the past tense than the less frequent ones.

When speakers add the past tense innovatively, they simply search their memories for phonological relations associated with the past tense and choose one analogically. Following recent connectionist theories, the most highly reinforced relation is most likely to be selected for the neologism. The relation /lŋ/: /ʌŋ/, for instance, will not be as strongly represented in the semantic schema for past tense as  $\hat{o}$ : /d/. Speakers are therefore more likely to add /d/ to a neologism than to replace a stem vowel /l/ with /ʌ/. If the neologism ends in /ŋ/, however, the probability that this method will be selected increases.

Bybee's suggestion has the advantage of conflating derivation and derivational acquisition. A derivational rule reduces to the arrangement of memorized items in mental storage. Without derivation rules, all morphology may be confined to the lexicon as in Word Syntax, and only one rule, lexical selection, is required to account for morphology in syntax. Moreover, morphological creativity reduces to the general cognitive process of analogy which is commonly used in categorization. So far, however, many of the processes vital to Bybee's model remain undefined, so it is not currently possible to determine this theory's efficacy in accounting for the derivational data.

#### 4 Derivational heads

If affixes are regular lexical items which may be selected for word structures as fully derived words

are selected for phrase structures, they should be able to serve as heads, as do fully derived words. If affixes are the results of processes, however, they cannot be lexical heads, and the traditional assumption that stems represent morphological heads regains credibility. This issue has been a central concern of recent morphological research, so is next on the agenda.

#### 4.1 Affixes as heads

If derived words are structured, the question naturally arises as to whether word structure is the same as syntactic structure. Lieber and Sproat claim that not only are the two types of structure identical, but the principles for composing words are precisely those of X-bar syntax. It follows that morphology may be dispensed with altogether, resulting in yet another major theoretical economy under Word Syntax. A major contention of modern X-bar theory is that the head of a phrase (X) determines the category of the whole phrase (XP). A sound test of Word Syntax, therefore, is whether the head of a derived word determines the category of the whole word. Since the outermost affix of a word is often associated with the category of the whole word, it might be possible to mount a case for affixes serving as the heads of derived words.

E. Williams (1981b) advanced the simplest account of affixes as heads of words: the head of a word is its rightmost element. Thus the head of *breadwinner* in (2a) would be *-er* which, under the premise that affixes are lexical items, is a noun in the same sense that *bridge* in *drawbridge* (2c) is a noun. Both *-er* and *bridge* are nouns which determine the category of *bread-winner* and *drawbridge*. The heads of *redraw* and *unhealthy* (2b), on the other hand, are the bases *draw* and *healthy*, since prefixes in IE languages tend not to change the category of the derivatives to which they adhere.

Some features, however, must be raised from nonheads. Diminutives, for example, usually bear the features of the base rather than the affix. In Russian, for example, both *sobaka* 'dog' and its diminutive, *sobač-k-a*, are feminine; *jazyk* 'tongue' and its diminutive, *jazyč-ok*, are both masculine. This contrasts with German diminutives, which are all consistently neuter: for example, *der Brief*: *das Briefchen* 'letter', *die Lampe*: *das Lämpchen* 'lamp'. To redress this problem, Di Sciullo and Williams (1987) proposed that feature inheritance relativizes the head; that is, features of categories present in the stem but not in the affix determine the lexical categorization of the final derived word. This new variation presumes that affixes, like Russian diminutive suffixes, are unmarked for certain features such as gender; this allows gender features from the next highest node to be inherited by the derivative. The German suffix *-einen*, on the other hand, does bear an inheritable gender valuation, neuter, and so passes this feature on to the derivative.

Unfortunately, relativizing morphological heads renders them radically different from phrasal heads, which are always absolute and never relative. Derived words differ greatly from derived phrases, where *face* is just as good a noun phrase as *a strange face peering through the door*. \*Ist is not just as good a noun as *violinist*. Relativizing morphological heads then defeats the original purpose of postulating affixal heads. This difference between word and phrase heads nonetheless must be characterized in an adequate model of grammar, even though it impedes the reduction of morphology to syntax.

#### 4.2 Head operations

There is another clue to the question of morphological heads. The phonological structures of a wide range of derivations do not isomorphically parallel their semantic structures. English, for example, restricts the comparative suffix *-er* to monosyllabic adjectives or disyllabic stems ending on a weak vowel: for example, *quick*: *quicker*, *hateful*: \**hatefuller* but *happy*: *happier* (see Sproat, MORPHOLOGY AS COMPONENT OR MODULE, for further details). Trisyllabic stems are wholly excluded from the distribution of this suffix, with one exception: disyllabic stems prefixed with *un-*: *unhappier*. This exception is obviated on the assumption that *-er* attaches to *happy* before *un-*; however, the semantic reading of such terms is not 'not happier' but 'more unhappy'. The morphological and semantic structures of such forms are hence "mismatched."

To circumvent exceptional treatment of such MORPHOSEMANTIC MISMATCHES, Hoeksema (1985) proposed that every rule of derivation has a correlate that applies specifically to heads, but is in all other respects a context-free rewrite rule. Stump (1991) argues that this correlate is the default. English derived verbs exhibit the effect of a head operation in maintaining their conjugations even

when serving as a base in a derivate. The past tense of *understand* is *understood*, and that of *overdrive* is *overdrove*. This seems to indicate that although past tense has scope over the entire derivation (or compound) in these instances, morphology applies strictly to *stand* and *drive*, respectively; otherwise, we might expect the past tense to be the productive *\*understanded* and *\*overdrived*.

Morphosemantic mismatches like *unhappier* are susceptible to the same interpretation; the morphology of the negative adjective applies to the head of the derivate, *happy*, even though the scope of comparison extends to the entire word *unhappy*. Head operations may also be extended to instances of inflection occurring inside derivation, such as the Sanskrit perfect mentioned above, *pāri=nayat* 'he marries': *pāry=a-nayat* 'he married', and to diminutives like the Hebrew loan *xaxom-im-l-ex* 'smart little people' in Yiddish and Breton *bag-ou -ig-ou* 'little boats' (Stump 1991), assuming that diminutive suffixes are grammatically empty and that the stem is the head. On this account the Sanskrit perfect inflection is added to the head (stem) inside the preverb, because the preverb is a phrasal head clitic or semi-discontinuous morpheme. The Hebrew and Breton plural mark both their scope and the head of the derivation, for reasons undetermined.

Head operations remain exceptional so long as affixes may be heads, since semantic evidence indicates that affixes are never themselves affixed. No language exhibits scope ambiguities such that the plural of a locative nominalization like *bakeries* would refer either to an aggregate of places, only some of which are devoted to baking (head marking, the affix the head), or to an aggregate of baking places (scope marking). The scope of all derivational functions is the entire word to which it is added, derived or underived; the only variation is in the placement of affixes marking them. This situation, combined with the failure of theories of affixal heads, endorses the traditional assumption that the morphological head of a word is its root or stem. Morpholexical and morphosyntactic feature operations seem to apply concatenatively to the base lexeme; the distribution of affixes, on the other hand, seems to be determined by language-dependent rules of spellout.

## 5 Synthetic compounds and derivation

If affixes are not morphological heads, the question arises as to whether compounds and derivations are at all related as (2) implies. If they are, it is doubtful that their relation is structural. It is common to distinguish *analytic* from *synthetic compounds* by the presence of affixation. *Drawbridge*, *redhead*, *houseboat* are thereby analytic compounds, while *truck-driver*, *truck-driving*, *redheaded* are all synthetic. There is little evidence that most analytical compounds are related to derivation. Rather, other analytic compounding appears to be a simple process of combining lexemes. The head of those compounds composed of constituents belonging to different categories determines the category of the compound. The right constituent determines the category of English compounds, so that a *houseboat* is a boat while a *boathouse* is a house. However, this description excludes prepositions, since compounds with prepositional modifiers are often adjectives (*inland*, *between-class*, *outboard*), and those with prepositional heads may be anything but prepositions (*sit-in*, *hold-out*, *runaway*). Even most P + P compounds fail the head test: *without* does not imply *out*, and *in* and *on* would seem to be the heads of *into* and *onto*, respectively. The evidence from compounding hence suggests that adpositions are not lexemes in the sense that N, V, A stems are.

The distinction between analytic and synthetic compounds is nevertheless imperfect at best. Synthetic compounds do resemble simple derivations in several respects. For example, they share the same derivational categories often marked by the same affixes: *bearded*: *gray-bearded*, *driver*: *truck-driver*, *driving*: *truck-driving*. Analytic *Bahuvrihi* compounds, like *redhead*, *long-hair*, *hardhead*, for instance, share their derivational function with possessional adjectives like *red-headed*, *long-haired*, *hardheaded*. Indeed, the same possessional function ("having *N*") emerges in simple derivations like *headed* and *hairy*. Parallels like these suggest that synthetic compounding is derivation which allows an optional modifier. Affixation, however, is not a reliable indicator of the distinction between compounds and derivations, since the zero morphology, which is available to simple derivations, is also available to compounds. Indeed, Booij (1988) has shown that synthetic compounds, whose structure is presumed to be [*truck-driving*]<sub>ing</sub>, may be explained with equal cogency as analytic compounds with the structure [*truck*][*driving*]<sub>ing</sub>, given a semantic level capable of resolving morphosemantic mismatches.

Until research better clarifies the subject, it is best to assume that analytic compounds represent an independent lexical means of derivation; however, it is doubtful that those bearing adpositions are compounds (see also Fabb, COMPOUNDING). Analytic compounds in this sense should not be confused with zero-marked Bahuvrihi compounds. Like synthetic compounds, bahuvrihis may be interpreted as derivations with optional modifiers. This area of research is very fluid, however, and Booij has shown how all compounds may be reduced to analytic concatenation.

Morphosemantic mismatches raise another important issue in morphology: the fact that derivational meaning and the affixation marking it are not always isomorphic. Karcevskij (1929) called this phenomenon *morphological asymmetry*. It is an attribute of morphology whose importance is only now being appreciated.

## 6 Morphological asymmetry

Karcevskij noted that while several endings mark the genitive in Russian – *-i*, *-a*, *-u* – each of these endings also has multiple functions. The ending *-a*, for example, also marks feminine nominative singular and neuter plural. The ending *-i* marks feminine and masculine nominative plural, as well as genitive, dative, and locative singular in declension III. In other words, it is common for grammatical morphemes to be *cofunctional* (*-i*, *-a*, *-u* above) and *multifunctional* (*-i*), to use the terms of Szymanek (1989). In addition to cofunctionality and multifunctionality, Matthews (1972) identified *extended* and *cumulative exponence* as morphological asymmetries. In the Latin word *rēxistē* [re:k-s-is-ti:] ‘you (sg.) ruled’, for example, the suffix *-tī*: cumulatively (simultaneously) marks second person, singular, and perfective. The remaining markers, *-s* and *-is* are empty extensions of *-tī*, redundantly marking the perfective, too. The same phenomena characterize derivation. In the adjective *dram-at-ic-al*, *-at* and *-al* are empty extensions of *-ic*; cf. *theatr-ic*. The German suffix *-er* in *Lehr-er* ‘teacher’ cumulatively marks [+subjective], [+masculine], and [declension I]. Finally, *zero* (null) *morphology* reflects morphological asymmetry. While most non-count modalic (instrumental) nominals require either the suffix *-er* (*conditioner*, *softener*) or *-ant* (*stimulant*, *relaxant*), many require no suffix at all: for example, *a rinse*, *a wash*, *a spray*. Again, the relationship between the grammatical and phonological levels is nonisomorphic.

Bazell (1949,1952) argued that these phenomena collectively indicate a fault in structuralist morphology, which he dubbed the *Correspondence Fallacy*, the assumption that an analysis at one linguistic level will isomorphically map onto analyses at other levels. Bazell argued that the phonological analysis of a word need not correspond to its semantic analysis; however, it does not follow from this that no analysis is possible. It is quite conceivable that each level is defined in its own terms, and that mapping from one level to another involves more sophisticated relations than the isomorphic relation of the classical linguistic sign.

To obviate the correspondence fallacy, Beard (1966,1976), Kiefer (1970), and Leitner (1973) proposed what was subsequently called the *Separation Hypothesis*, the claim that the functional and spelling operations of derivation are discrete and autonomous. The Separation Hypothesis assumes that lexical items are restricted to N, V, and A stems, all of which are perfect signs comprising mutually implied phonological, grammatical, and semantic representations, as in (1). It then provides a set of abstract lexical operations on the grammatical representation of a lexical item discrete from operations on the phonological and semantic representations. Algorithms in an autonomous morphological spelling component like those proposed by Matthews (1972) then modify the phonological representation of grammatically and semantically derived stems. By the same token, compounding operations which combine words like *truck* and *driving* mentioned above need not establish the semantic scope of compound constituents. This can be accomplished by autonomous principles of composition based on the argument structure of the phrasal head, in this case, *drive*.

The separation of grammatical and phonological operations allows for a simple account of all morphological asymmetry. Cumulative exponence results from a single-stem modification conditioned by several grammatical features, while extended exponence is the collective marking by several stem modifications of a single feature. Cofunctionality and multifunctionality are explained similarly. Finally, zero morphology is simply derivation without affixation, while empty morphemes result from affixation without derivation.

Morphosemantic mismatches like those in *unhappier*, those in compounds like *truck-driving* on Boij's interpretation, and those in head operation constructions may be resolved by a similar separation of derivation and semantic composition. The asymmetry explored by Karcevskij and Matthews, on the other hand, is more a *morphophonological mismatch* between derivation and phonological realization. The ultimate implication of asymmetry, therefore, is that semantics, derivation, and affixation represent three distinct levels of morphological operations, which require two distinct mapping systems.

## 7 Types of derivation

We have surveyed the general attributes of derivation and the major accounts of them. We may now turn to the particular properties of derivation: the types of derivation and the types of affixation marking them. In its broadest sense, *derivation* refers to any process which results in the creation of a new word. However, the output of some morphological operations is far more principled than the output of others. The derivations in (6), for example, form a sort of lexical paradigm which holds for many other bases:

(6)

$$\text{LASER} \left\{ \begin{array}{l} \text{re-laser, out-laser, over-laser, . . .} \\ \text{laser-er} \rightarrow \text{laser-er-s, laser-er-'s} \\ \text{laser-ing} \rightarrow \text{laser-ing-s, laser-ing-'s} \\ \text{(un)laser-able} \rightarrow \text{(un)laser-abil-ity} \end{array} \right.$$

Some types of derivation do not fit into derivational paradigms like (6). It is well known that words may be misanalyzed when a phonological sequence identical with that of an affix is misperceived as that affix. The result is that a previously nonexistent underlying base is extracted and added to the permanent lexical store via a process known as *back formation*. *Sculptor*, for example, was borrowed as an integral base into English. However, because the final phoneme cluster */ər/* is identical with an agentive marker in English, and since *sculptor* is an agentive noun, a verbal base, *to sculpt*, has been extracted and added to the stock of English verbs. Consequently, *sculptor* changes from a lexical base to a derivate.

Several facts obstruct the conclusion that back formation is a derivational process. First, in order to use back-formed words, we must be familiar with them. While some potentially back-formed words are used, far more may not be. It is not possible, for instance, to say that a butcher *\*butches* or that a barber *\*barbs*, even though these verbs are potential back derivatives as legitimate as *sculpt*. There is no grammatically definable constraint preventing this; it simply is not acceptable to do so. Second, we do not find positions for back derivatives in lexical paradigms like (6). Take the back derivate of *laser* itself: *to lase*, for example. It generates exactly the same paradigm as (6). Thus, in those dialects which use *lase*, one may say *relase, outlase, overlase, laser, lasing, (un)lasable, (un)lasability* – all with the same sense as the corresponding zero-derived verb in (6). In other words, rather than forming a derivational relationship with a lexical base, back-formed words create a new base, expanding the underived lexical stock in a way that regular derivations do not. This characterization partially fits several other types of word formation which need to be distinguished from regular, grammatically determined derivation.

### 7.1 Lexical stock expansion

*Clipping* (*telephone: phone*), *blends* (*smoke + fog = smog*), *acronymization* (*aids*), and *analogical formation* (*workaholic*) all conform to the description of back formation in significant ways. Back formation generates a base which the lexicon lacks. Clipping, on the other hand, produces a redundant base, but a new one all the same. With rare exceptions (e.g. *caravan: van*), the input and output of clipping rules are semantically identical, and both remain active in the lexicon. Both *telephone* and *phone* have the same range of grammatical derivations, all with the same meaning:

(*tele*) *phoner*, (*tele*) *phoning*, etc. Notice, too, the irregularity of clipping. It usually reduces a polysyllabic word to a monosyllabic one; however, this may be accomplished by removing the initial syllables (*phone*), the final syllables (*rep*), or the initial and final syllables (*flu*).

Blending, acronymization, and analogical formation also tend to be conscious operations, unlike grammatical derivation. Words like *smog*, *motel*, and *tangelo* are created intentionally by a logical rather than grammatical process: if the reference is part A and part B, then the word referring to it should comprise parts of the words for A and B. Acronyms like *laser*, *scuba*, *aids*, have been converted from phrases to the initial letters of the words in those phrases, which are not part of grammar, then the initials have been phonologically interpreted. *Acquired immune deficiency syndrome*, for example, provides *aids*, which is rendered pronounceable by applying English spelling rules in reverse. The process hence requires considerable conscious activity outside the bounds of grammar. As in the case of clipping, the phrase and the acronym are synonymous, and both remain in the language.

Analogical forms like *workaholic*, *chocoholic* and *cheeseburger*, *fishburger*, *chicken-burger* differ from regular derivations in that they require prosodie identity. Genuine suffixes like *-ing* may be added to stems of any length or prosodie structure. Pseudo-derivates like *chocoholic*, however, must additionally fit the prosodie template of their analog, in this case, *alcoholic*: the output must contain four syllables with penultimate accent. Thus *chocolaholic*, *shoppingaholic*, and *handiworkaholic* do not work as well as *chocaholic*, *shopaholic*, and *workaholic*. When we begin to find acceptable violations of this extragrammatical principle like *chickenburger*, we usually find that the remainder, in this case *burger*, has become an independent back-formed word capable of undergoing regular compounding.

This does not exhaust the catalogue of lexical stock expansion processes. That catalogue also contains *borrowing* (*troika*, *detente*, *thug*), *commonization* (*quisling*, *aspirin*), *semantic narrowing* (*percolator*, *escalator*), *loan translation* (German *Einfluß* 'influence', *Mitleid* 'compassion'), *folk etymology* (*craw[ll]fish* from Old French *crevice*), and perhaps others. The point is that these processes tend to be conscious, extragrammatical, and hence grammatically irregular. Rather than filling a position in some lexical paradigm, they create new lexical bases which then generate their own paradigms. To better understand the difference, let us now examine the regular derivation types.

## 7.2 Lexical derivation

Four distinct types of regular grammatical derivation have been described in the literature; *featural derivation*, *functional derivation*, *transposition*, and *expressive derivation*. While all the details of the properties of these types of derivation and their interrelations have not been refined, their basic nature and functions may be broadly described.

### 7.2.1 Featural derivation

Featural derivation does not change the category of the underlying base, but operates on the values of inherent features. An obvious candidate for such a rule is natural gender, as described by Jakobson (1932, 1939) in connection with his concept *markedness*.<sup>5</sup> In most languages which support natural gender, the default or unmarked form is masculine. A convenient technical notation of the fact that unmarked masculine nouns may refer to males or females is [+Feminine, +Masculine]. This requires a Jakobsonian principle of markedness whereby in cases of conflict, the surface realization will default to that of the unmarked category, masculine. Thus the Russian noun *student* 'student' may refer to females or males, but all grammatical agreement will be the same as purely masculine nouns like *brat* 'brother', *otec* 'father', which cannot refer to females.

Default masculines like *student* differ from pure masculines in that they are susceptible to feminization. This requires some rule on the order of *student(∅) → student-k(a)* which converts the default masculine noun into a purely feminine one and marks this fact by transferring the base from declension I, marked in the nominative by *-∅*, to declension II, marked in the nominative by *-a*. All that is required grammatically and semantically of this rule is the toggling of the masculine feature from positive to negative: that is:

- (7) [+Feminine, +Masculine] → [+Feminine, -Masculine]

(7) converts the lexical description of the base from unmarked masculine to marked feminine like the purely feminine nouns *sestra* 'sister' and *mat'* 'mother', which may refer only to females and not to males. The addition of any feature [+Feminine] would be inappropriate since (7) applies only to nouns with natural gender: that is, those which inherently (lexically) possess lexical gender features.

### 7.2.2 Functional derivation

Kuryłowicz (1936) first distinguished rules which add features to the underlying base from those which merely change its category. Consider (8), for example:

- (8) (a) recruit: recruit-er
- (b) recruit: recruit-ee
- (c) bake: bak-ery

Kuryłowicz referred to this type of derivation as "dérivation lexicale," because the derivate differed semantically from its base. In the middle of this century, several European linguists, among them Belić (1958: 140-1, 148-50), noted a similarity between the functions of these derivations and those of the case system. The traditional names of nominals like *recruiter* and *recruitee*, "agentive" and "patientive," suggest that the functions of this type of derivation are semantic. However, many "agentive" forms are not animate as the name implies (*breaker, floater, sparkler*), and many are not even active (*riser, marker, divider*). The same is true of patientives: alongside *employee, recruitee, draftee*, we find inanimate "patientives" of resultative verbs like *painting, carving, writing*. The suffixal distinction does not change the fact that a painting is an object painted in just the same sense that an employee is an object employed. It therefore seems more likely that this type of derivation is based on case functions: for example (nominative of) subject, (accusative of) object, (locative of) place (*bakery, fishery*), (genitive of) possession (*dirty, forested*) and material (*oaken, woolen*), (ablative of) origin (*American, Brazilian*), (dative of) purpose (*roofing, siding*), (instrumental of) means (*cutter, defoliant*).

Languages with rich morphologies have dozens of such derivations, including those just mentioned. Even in Serbian and Polish all these derivations are still quite productive, and all their functions serve as pure case functions expressed without adpositions in some language. Basque has a locative of locus, *mendi-an* = mountain-Loc 'on the mountain'; Serbian exhibits the possessional (qualitative) genitive: *čovjek plav-ih očiju* 'a man of (with) blue eyes'; Turkish marks origin and material with the ablative, *Ankara-dan* = Ankara-ABL 'from Ankara', *taş-tan bir ev* = stone-ABL one house 'a house of stone'; and Latin has a dative of purpose: *castr-is locum* = camp-DATSG place-ACCSG 'a place for a camp'. All languages express these functions with case endings, adpositions, or a combination of both. Few verbs and no nouns are subcategorized for these argument relations, yet they are widely available to functional lexical derivation in languages with rich morphological systems like Serbian, Inuit, and Chukchee.<sup>6</sup>

If the ultimate constraint on functional derivations is the set of case functions, the question becomes why some functions seem to be missing and why subject and object relations are more productive and diachronically stable than others. Some omissions are obvious: the (ablative) absolute relation is missing because it is purely a syntactic relation, that of sentential adverbs; the same applies to the (ablative of) distinction, used to mark comparatives in many languages: for example, Turkish *Halil'-den tembel* = Haul-ABL lazy 'lazier than Haul'. The reason why we find more subjective and objective nominalizations than others is, no doubt, high pragmatic demand. This is an area which has received little attention historically, and thus no definitive answers to these questions are available.<sup>7</sup> However, it is clear that functional derivations involve far more functions than the argument functions found in the base, yet few if any productive derivational functions fall outside those found in the inflectional system.

### 7.2.3 Transposition

Another type of derivation which reflects a simple change of category without any functional change is *transposition*, illustrated in (9):

- (9) (a) walk: walk-ing (V → N)
- (b) new: new-ness (A → N)

(c) budget: budget-ary (N → A)

Kuryłowicz called derivations like those of (9) “*dérivation syntaxique*,” but Marchand (1967) used the more distinctive term, “transposition.”

Transposition introduces no argument structure, but simply shifts a stem from one category to another, sometimes marking the fact affixally, sometimes not. The definition of *dryness* must coincide with that of *dry* in all essential respects, since, unlike *bake* and *baker*, its reference is identical to that of its base. The same is true of all the relations represented in (9). Whether transpositions are marked by real or zero affixation is a separate issue, bound up with the general issue of the nature of zero morphology.

### 7.2.4 Expressive derivation

Expressive derivation does not change the referential scope of its input; however, expressive derivation also does not change the lexical category of the base. As mentioned in section 2, the reference of the three grades of the Russian word for ‘rain’, *dožd*, *doždik*, and *dožd-iž-ek*, all refer to the same conceptual category. The formal variation reflects subjective perceptions of the speaker: whether he perceives the rain to be relatively light, beneficial, or pleasant. For this reason, expressive derivation may be recursive, applying to its own output as in the Russian example. In addition to diminutive and augmentative expressive derivation, pejorative and affectionate forms also occur: for example, Russian *kniga*: *knížonka* ‘damned book’ (cf. *knížka* ‘little book’) and *papa* ‘daddy’: *papoška*.

There is no obvious means of relegating expressive derivation to any of the other three types. The categories involved are not found elsewhere in grammar as are functional categories, nor are they inherent lexical categories like gender. Since expressive derivation does not involve a category change, it cannot be a form of transposition. It therefore remains mysterious in many respects.

## 8 Realization and productivity

The types of phonological realization (stem modification) which express derivation are by and large the same as those which express inflection. The glaring exception seems to be that derivation is not expressed by *free morphemes*: those which are not modifications of stems, but which stand alone. This would follow from the assumption that only inflection is syntactic. Since free morphemes require a structural position, this type of realization would be ruled out for lexical derivation by the Lexicalist Hypothesis.

Evidence indicates, however, that the bound phonological realization of derivational and inflectional morphology is provided by a single component (see also the discussion of the Split Morphology Hypothesis in Stump, INFLECTION). The English suffix *-ing*, for example, may be attached to verb stems to generate inflectional forms like the progressive (*is painting*), the present participle (*painting machine*), as well as derivational forms like the objective nominalization (*a painting*). The same is true of *-ed*, which productively marks the past tense and participles (*John (has) annoyed Mary*), as well as derivations like the possessional adjective: for example, *two-headed*, *forested*. The important point is that derivation seems to be an abstract process independent of the various means of phonological realization and of the means of semantic interpretation.

Two specific types of marking, *subtraction* and *metathesis*, weakly represented in inflection, apparently do not mark derivation. Papago, for example, seems to derive perfective verbs from imperfective ones by deleting the final consonant if there is one, *him* ‘walking’: *hi* ‘walked (sg.)’, *hihim* ‘walking (pl.)’: *hihi* ‘walked (pl.)’ (Anderson 1992). However, aspect is probably inflectional, though the matter remains unclear. Metathesis for the most part is an allomorphic change effected by affixation, as in the case of the Hebrew reflexive prefix, *hit-*, whose final segment metathesizes with initial voiceless stridents: for example, *xipes* ‘seek’: *hitxapes*, but *silek* ‘remove’ *histalek*.

### 8.1 Discontinuous morphemes

Evidence suggests that one type of verbal derivation is marked by *discontinuous morphemes*, morphemes which may be loosened or removed from their base. The English correlate of *preverbs*, a type of verbal prefix expressing a closed set of adverbial functions, is a particle which is written

separately and may appear either immediately following the verb or the VP. Consider the Russian examples and their English counterparts in (10) for example:

- (10) (a) Ivan vy-vel sobaku \*‘John brought [out] his dog [out]’  
 (b) Ivan v-vel sobaku ‘John brought [in] his dog [in]’  
 (c) Ivan so-stavil plan ‘John put [together] a plan [together]’

Because verbs with preverbs form notoriously irregular patterns and are equally notorious for idiomatizing (e.g. *pri* ‘to’ + *pisat* ‘write’ = *pripisat* ‘attribute’), they are considered lexical derivatives. How, then, may their markers appear a phrase away from the stem which they mark?

Preverbs are in fact often loosely attached to their stem as the examples above from Sanskrit (*pari=a-nayat* = AROUND=IMP=lead ‘he married’) and Georgian (*mo=g-klav-s* PRVB=2OBJ-KILL-3SUB ‘He will kill you’) illustrate. These preverbs attach to the outside of the fully inflected verb, the head of the VP. One possible account of these morphemes is that they are clitics, defined in terms of attachment to either the phrasal head or periphery, depending on the morphological conditions of specific languages. The important point is that their position is morphologically predictable by Anderson's general theory of affixation (see *affixation* in section 8.2.1 below), and requires no syntactic projection as do lexemes and free morphemes. Hence it is possible to explain these derivations without violating the Lexicalist Hypothesis, given the Separation Hypothesis.

## 8.2 Other types of stem modification

### 8.2.1 Affixation

Affixation (prefixation, suffixation, and infixation) is the most productive means of marking derivation. Anderson (1992: ch. 8) points out that affixation may be defined in the same terms as cliticization, assuming that the peripheral element of a word is its initial or final segment or syllable and its head is the accented syllable. That is, affixes may attach only to the inside or outside of the initial or final phoneme or syllable, or to either side of the head, the accented syllable.<sup>8</sup> This purely morphological definition of affixation is far more accurate than structural descriptions, and does not require word structure or any sort of affix movement. *Circumfixation*, such as Indonesian *ke... -an as besar* ‘big’: *ke-besar-an* ‘bigness, greatness’, is merely extended exponence involving a prefix and a suffix simultaneously.

### 8.2.2 Apophony (stem mutation, revoweling)

This type of stem modification is well attested in Semitic languages. Lexical items in those languages comprise consonants only, and vowels are used to mark morphological functions. The (Algerian) Arabic stem for ‘write’ is \**ktb-*, and the derivative for ‘book’ is *ktaab*, while that for ‘writer’ is *kaatab*. This type of morphological modification, like subtraction and metathesis, raises the question of the limits on modification of the phonological representation of the base: to what extent may the base be corrupted before it becomes unrecognizable? This is another open question in morphology.

### 8.2.3 Conversion

Transposing a lexeme from one category to another without affixation is sometimes called *conversion*. The evidence weighs against a separate operation of conversion, however, for we find precisely the same semantic relations between conversional pairs as between derivational pairs. Thus for every conversion *to dry, to wet, to empty* we find at least an equal number of affixed derivatives with the same relation: *to shorten, to normalize, to domesticate*. Moreover, precisely those stems which affix are precluded from conversion (*to \*short, \*normal, \*domestic*), and precisely those which convert are precluded from affixation: *to \*endry, \*wetten, \*emptify*.<sup>9</sup> The simpler account of such forms is that those without affixation are null marked variants of the same derivation which is otherwise marked by a variety of affixes.

### 8.2.4 Paradigmatic derivation

A common means of marking lexical derivation is shifting the base from one nominal declension class to another, with or without a derivational marker. Thus, in Swahili, diminutives are formed by shifting nouns to noun class 3: for example, *m-lango* ‘door’ (class 2): *ki-lango* ‘little door’ (class 3), *m-lima*

'mountain': *ki-lima* 'hill'. Feminine agentives in Russian are usually derived from masculines of declension I (= noun class 1) by adding a declension II (= noun class 2) suffix: for example, *učitel* 'teacher': *učitel'-nic-a*, where the final *-a* indicates declension II. However, the processes of adding the suffix and changing the declensional paradigm must be independent, since the latter may apply without the former: *rob* (masc, declension I): *rab-a* (fern., declension II) 'slave', *suprug* (masc., declension I): *suprug-a* (fern., declension II) 'spouse'.

### 8.2.5 Prosodie modification

A derivational function may be marked by simply shifting the accent of a word or modifying the intonation, perhaps a variant of apophony. Thus, in English, it is common to indicate the objective (resultative) nominalization by shifting accent from the stem to the prefix: for example, *survéy*: *súrvey*, *suspéct*: *súspect*. The process is productive with verbs prefixed by *re-*: *rewrite*: *réwrite*, *remáke*: *rémake*. The morpheme here seems to be the process of shifting the accent from one syllable to another.

### 8.2.6 Reduplication

In addition to attaching phonologically specified affixes to a stem, derivation is often marked by the full or partial reduplication of a part of the stem attached to it. Indonesian forms adverbs from all categories by completely reduplicating them: *kira* 'guess': *kira-kira* 'approximately', *pagi* 'morning': *pagi-pagi* 'in the morning'. Reduplication may be combined with various types of affixation as in Indonesian *anak* 'child': *ke-anak-anak-an* 'childish'.

## 8.3 Productivity and allomorphic variation

Proponents of *Natural Morphology* (NM) have long noted that not all the modes of stem modification surveyed in the previous section are equally productive (Dressier et al. 1987); some means of morphological marking are more productive than others. Aronoff (1976) first noted that affixes such as the English suffixes *-ing* and *-ness* (e.g. *deriding*, *kindness*), which are *transparent*, in that they involve no allomorphy, tend to be more productive and more predictable than those which do induce allomorphy: for example, *-ion* and *-ity* (e.g. *deride*: *derision*, but *ride*: *\*rision*; *curious*: *curiosity*, but *spurious*: *\*spuriousity*).

NM argues that the isomorphic linguistic sign is the linguistic ideal, and that the further a morpheme deviates from this ideal, the more difficult it is for languages to sustain it. If the subjective nominalization changes or adds semantic material to the underlying base, it should add phonological material to the stem iconically and transparently. English derivatives like *bak-er*, *resid-ent*, *escap-ee* then are more natural, and thus more likely to be productive, than unmarked derivatives like (a) *cook*, *guide*, *bore*. Opaque affixes which cause or require phonological adjustments such as the Latinate suffixes mentioned above should be less productive inter- and intralinguistically. Zero and empty morphology should be rare, and subtractive morphology nonexistent for the same reasons.

NM offers a means of uniting Word Syntax and processual morphology. Notice that while NM offers the isomorphic morpheme as the ideal, it implicitly admits the sorts of asymmetrical variations that processual morphology is designed to explain. Processual morphology, however, holds that this ideal is restricted to lexemes in the lexicon. Moreover, it has no inherent account of why transparent, symmetrical markers seem to be more productive than asymmetrical ones. If the predictions of NM hold, they could make a major contribution toward unifying the two major approaches to derivational morphology discussed in this chapter.

## 9 Conclusion

Derivational morphology differs from inflectional morphology in that it provides new lexical names for objects, relations, and properties in the world. Lexical names may be combined in syntactic constructions to generate descriptions of the real world in speech, or may be used to label objects in the real world: for example, *bakery*, *careful*, *occupied*, *slippery*, *gentlemen*. The grammatical relations upon which derivation operates seem to be the same as those found in inflection; the difference is that these relations hold between the derivate and its base in derivation, rather than between two different phrases in syntax. Consider *the cookie-baker bakes cookies*, for instance. The noun *cookie-*

*baker* exhibits internal subject and object relations between the derivate and its constituent parts. The same relations hold in the sentence between the subject, *cookie-baker*, the object, *cookies*, and the verb. The semantic difference between the two uses is that *cookie-baker* is the name of a semantic category while the sentence is a description of a specific event. We would expect inflectional means of marking the subject and object relations in the sentence but derivational means of marking it in the derived compound.

Evidence supports the conclusion that morpholexical derivation and phonological realization are two discrete processes executed by autonomous components. Lexical rules apparently provide for derivation, and either the phonological component or a separate morphological component is responsible for phonological realization. The Split Morphology Hypothesis notwithstanding, it is possible that a single autonomous spellout component accounts for inflectional and derivational morphological realization. If the lexicon and syntax appropriately distinguish morpholexical features and morphosyntactic features, derivation and inflection may be distinguished despite the fact that both operate over the same morphological categories, realized phonologically by the same spellout component.

1 Bybee (1985) is one of several morphologists to take issue with the Lexicalist position itself. She argues that derivational and inflectional processes form a scale along which rules are more or less derivational and inflectional. A rule's position along this scale is determined by its *generality* and *relevance*. Tense, for example, is more general than the functions of prefixes like *trans-* and *re-* since it applies to all verbs. Tense, on the other hand, is more relevant to verbs than is person, since it directly modifies the meaning of the verb, while person simply denotes an argument of the verb. The less general and more relevant the meaning of a morphological operation, the more "derivational" it is; the more general and less relevant, the more "inflectional" it is. Tense by this measure is less derivational than verbal prefix functions, but more so than person. No strict division between the two may be made, however, according to Bybee.

2 Beard (1995: 286-9) offers a contemporary account of phrasal adjectives as an extragrammatical phenomenon.

3 Chomsky's Minimalist Program (Chomsky 1995b) as of the moment provides no theory of derivation, hence any comment would be premature. However, since words are copied from the lexicon "fully inflected," it would seem that Minimalism currently makes no distinction between either derivation and inflection or lexemes and grammatical morphemes. To the extent that this observation is accurate, Minimalism is susceptible to the problems with these assumptions discussed here.

4 Although Bybee exemplifies her hypothesis with inflectional categories, she makes it clear that she intends it to extend to derivation, which, in her view, is merely the other end of the same continuum (see n. 1).

5 Note that the following discussion does not apply to *grammatical gender*, which amounts to no more than *lexical class* (Halle 1989).

6 Only two accounts of the parallel between inflectional and derivational categories have been suggested. According to Botha's *Base Rule Theory* (Botha 1981, Beard 1981), both lexical and syntactic rules operate on deep structures, which must contain these functions. Borer (1988) argues for a single word formation component which operates at two levels, deep and surface structure. At present it is not clear whether these two approaches differ in any essentials.

7 Beard (1993) argues that higher productivity is also facilitated by "dual origin." Subjective and objective nominalization e.g. may be derived either by functional derivation or by transposition. The semantic interpretation is identical in either case; however, if the desired output is blocked for any reason via one derivational type, another means of derivation, which may not be blocked, is available in these cases.

8 Clitics may be attached at correlate points of a phrase, i.e. either side of the phrasal head or either side of a peripheral word or constituent (see Halpern, CLITICS).

9 A few sporadic examples of derivation-"conversion" pairs may be found, e.g. to *clear*: *clarify*, *winter*: *winterize*. However, such pairs are rare and semantically unpredictable, and may be explained as easily in terms of zero morphology.

## Cite this article

BEARD, ROBERT. "Derivation." *The Handbook of Morphology*. Spencer, Andrew and Arnold M. Zwicky (eds). Blackwell Publishing, 2001. Blackwell Reference Online. 28 December 2007  
<[http://www.blackwellreference.com/subscriber/tocnode?id=g9780631226949\\_chunk\\_g97806312269495](http://www.blackwellreference.com/subscriber/tocnode?id=g9780631226949_chunk_g97806312269495)>

## Bibliographic Details

### The Handbook of Morphology

**Edited by:** Andrew Spencer And Arnold M. Zwicky

**eISBN:** 9780631226949

**Print publication date:** 2001