Models of Inflection

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Sonderdruck
aus LA 388

Max Niemeyer Verlag
Tübingen 1998
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The Demarcation of Inflection: a Synoptical Survey

1. Introduction: the demarcation of inflection

A volume on inflection and inflectional models like the present one raises the question whether inflection constitutes a set of phenomena or a module of the grammar that can be demarcated somehow from other morphological phenomena or other modules of the grammar. Such a demarcation of inflection from other kinds of morphology is presupposed in certain formal models of inflection such as Anderson's A-morphous Morphology (Anderson 1992), and Wunderlich's minimalist model of inflection (Wunderlich 1996). It is the aim of this contribution to present a survey of demarcation criteria, to evaluate them, and to discuss how the results of this evaluation bear on the position of inflection in the grammar.

The primary distinction between inflection and derivation is a functional one: derivation (i.e. word formation except compounding) is that kind of morphology that serves to create new lexemes, whereas inflection serves to create different forms of the same lexeme. Therefore, it is also said that derivation, unlike inflection, creates words for new concepts. However, one should realize that derivation has a secondary function in that it is also used to make stylistic variation possible. For instance, of the following two alternative phrasings of a referring expression, the second makes use of derivation (of reader from read):

(1) He who reads this book /The reader of this book

The formal means by which inflection and derivation are expressed are often the same. In both, the processes of affixation, vowel change, reduplication etc. may be used. For instance, in many Indo-European languages inflection is expressed primarily by suffixation, which is also a kind of morphological operation used in derivation.

Whether a sharp demarcation of inflection with respect to derivation is possible, is a classical problem in morphological theory. Whereas some linguists claim that there is no sharp demarcation between the two, and that there is a cline from prototypical derivation to prototypical inflection (Bybee 1985, Dressler 1989, Plank 1994), a number of generative morphologists make a sharp distinction which is reflected by their organizational model of the grammar, the split morphology hypothesis (Perlmutter 1988, Anderson 1982; 1992). In such models, derivation is considered as pre-syntactic morphology taking place in the lexical component, whereas inflection is equated with post-syntactic morphology. However, split morphology is not a necessary component of generative morphology: it is also possible to assume one morphological module that deals with both inflection and derivation.
In order to come to grips with this demarcation problem, I will review the different arguments and criteria proposed in the literature for distinguishing between the two (see also Scalise 1986 and Dressler 1989). This will lead to the conclusion that inflection and derivation behave differently in a number of ways, and that they have to be distinguished in order to make the right generalizations about the formal make up of morphologically complex words. Yet, as will be shown in Section 3 in a discussion of the split morphology hypothesis, distinguishing inflection and derivation should not lead to separation of the two because there is some interaction between inflection and derivation that cannot be accounted for in split morphology theories. My findings are then summarized in Section 4.

2. Criteria of demarcation

In this section I will review nine different criteria for distinguishing inflection from derivation.

2.1 Change of word class

The first criterion is that derivation, unlike inflection, may change the word class of the input word. That is, derivation may cause transposition of word class. This is of course a consequence of the lexical enrichment and stylistic variation functions of derivation, which do not apply to inflection. However, since derivation does not necessarily change word class, the fact that a morphological process does not change word class, is no proof of its inflectional nature. First, a category-determining affix may happen to attach to a word of the same category. An example is the Dutch nominalizing suffix -er that may be affixed to nominal bases, e.g. wetenschap 'science' - wetenschapper 'scientist'. Second, languages may have so-called evaluative morphology that is transparent for the syntactic category and the gender of the base, but that is nevertheless felt as derivation as far as the semantic change involved is concerned. For instance, the Italian diminutive suffix -in can be attached to nouns to form nouns, and to adjectives to form adjectives: ragazzo 'boy' - ragazzino 'little boy', ragazza 'girl' - ragazzina 'little girl', giallo 'yellow' - giallino 'yellowish'. This shows that the Italian diminutive suffix is transparent for the syntactic category and gender of its stem. On the other hand, Dutch diminutive suffixes are category-determining, and always create nouns, e.g. blond 'id.' - blondje 'girl with blond hair'. Moreover, the Dutch diminutives are always neuter, unlike their base words: de stoel 'the chair, non-neuter' versus het stoeltje 'the little chair, neut'. Thus, Dutch diminutives are a clearer case of derivation than the Italian ones.

A problem for the demarcation criterion discussed here is that it is not true that inflection never changes the syntactic category of its inputs (Haspelmath 1996). For instance, infinitives do not only exhibit verbal properties, but also nominal ones. This is illustrated by the Dutch infinitival phrase het boeken kopen 'the buying of books'. The external syntax of the infinitive shows nominal behaviour,
since it occurs with the determiner *het* 'the'. On the other hand, its internal syntax is that of a verb, since it allows for a preverbal preposition-less noun phrase-complement, *boeken*. Other examples of Dutch infinitives, preceded by a determiner and a preposition are:

(2)  
Ik ben aan het *fietsen*  
I am at the *cycle-INF*  
'I am cycling'

Ik zette *het* op een *lopen*  
I put *it* on a *walk-INF*  
'I started running'

In Romance languages, infinitives also function as nouns, as in French *le diner* 'the dinner' and *le manger* 'the food'.

Infinitives also feed nominal word formation. In Dutch, as in many Germanic languages, verbal compounding is unproductive, whereas nominal compounding is productive. Infinitives behave like nouns in this respect: Dutch has many compounds of the type *school-zwemmen* 'school-swim-INF, school-swimming' which do not have finite forms, and thus cannot be interpreted as the infinitival forms of verbal compounds (Booij 1989).

In many languages, participles behave like adjectives in that they can be used attributively and as predicates, and agree in gender, number and case with the noun that they modify. On the other hand, participles still have verbal potential in that they case-mark noun phrase arguments, as in the following example from German (Haspelmath 1996):

(3) ein den Richter überraschendes (NOM.SG.NEUT.) *Faktum* 'a fact that surprises the judge'

Here, the participle *überraschendes* 'surprising' agrees in number, case and gender with its head *Faktum* 'fact'; yet is has an accusative-marked verbal complement *den Richter* 'the judge-ACC'.

Participles also feed deadjectival word formation, as in English *spoiledness* and its Dutch equivalent *bedorvenheid*. They lexicalize quite often as adjectives with an idiosyncratic meaning, e.g. Dutch *gesloten* (past participle) 'closed, close-mouthed', and *woedend* (present participle) 'raging, angry'.

In Biblical Hebrew, participles may have the distribution of nouns. For instance, they can be preceded by a determiner, and they can be inflected for number, gender, and state (construct state when followed by a specifier or complement, absolute state if there is no specifier or complement). Yet, they are still verbal in that they allow for verbal complements marked with the accusative particle *et* (Dyk 1994).

Gerunds are another case of transpositional inflection: they are verbal forms with nominal properties. For instance, in *John's reading the papers* the gerund *reading* behaves externally as a noun since it assigns genitive case to *John*, whereas it behaves as a verb with respect to its nominal, prepositionless complement *the papers*. 
Thus, we see that forms that are traditionally considered as inflection may affect the external syntactic valency of a word, and are therefore category-changing. The reason why nevertheless they are usually considered inflection is that these forms are felt to belong to the paradigm of forms of a word, and can be made for each word of the relevant word class (cf. section 2.3). As far as these data are concerned, inflection and derivation still seems to differ in this respect because in the case of class-changing inflection the relevant word forms exhibit properties of both classes simultaneously, whereas in derivation it is only the new word class that determines the combinatorial possibilities of the derived word.

An even more complicated case is that of the possessive adjectives in Sorbian (Corbett 1987: 303). These words have the external distribution of adjectives, and are derived by means of the adjectivizing suffix -owa, nevertheless, the nominal stem is still accessible for agreement phenomena, which we would only expect if the adjectival suffix were inflectional:

(4) mojeho (GEN. SG. MASC.) mu_ owa-a (NOM. SG. FEM.) sotra (NOM. SG. FEM.)

my husband's sister

In this example, the possessive pronoun mojeho agrees with the masculine nominal stem mu 'husband' of the adjective mu owa with respect to gender and person, whereas the adjective mu owa itself agrees in gender, person and case with the head noun sotra. Corbett (1987: 305-06) therefore made the following comments on the nature of possessive adjectives such as mu owa:

"Clearly, given the control possibilities of [possessive] A[jectives] [...], their formation is relevant to syntax. Thus they meet the sufficient condition for being derivational, and they fully meet the condition of what is inflectional. They are therefore difficult to accommodate to the claim that morphology is divisible into two parts [i.e. inflection and derivation, GEB]."

What may be at stake here is that the nominal stem is still accessible because the derivational suffix -owa creates relational adjectives, and has no specific meaning contribution of its own except for a general 'relational' meaning. That is, it should not be seen as unambiguous evidence in favour of giving up the difference between derivation and inflection.

2.2 Obligatoriness

The second criterion found in the literature is that derivation is optional, whereas inflection is obligatory. For instance, given that Latin nouns are inflected for number and case, each Latin noun must be inflected for these two categories, and has an ending indicating number and case. Whether this applies to all words and/or all languages, depends on one's analysis. For instance, the English noun book may be claimed to lack a specification for number, which is an inflectional category for English nouns. This would imply that not all inflection is obligatory. Alternatively, one may claim that each word of the relevant category must be inflected for all inflectional properties of that category. This implies that a word like book is specified as singular by means of a zero-morpheme,
or will receive the feature [singular] on the basis of a paradigmatic opposition, i.e. its position in a paradigm of related word forms, as in Wunderlich's (1996) minimalist morphology.

Since the obligatory nature of inflection is theory-dependent, the criterion of obligatoriness is not always helpful as a demarcation criterion.

2.3 Paradigms

A characteristic difference between inflection and derivation is that inflection is organised in terms of paradigms. Each cell in the paradigm specifies the form of a word for a particular value (property) of the relevant inflectional categories, such as number, person, tense, and case. One possible consequence of this view is the assumption of zero-markers in case there is no explicit marking for a particular inflectional property; thus a singular noun as book is given the morphological analysis book-o because book fills the cell for sg. The same applies to the expression of present tense in works which can be analyzed as work-o-s (work-PRES-3RD PERS. SG.).

This difference between inflection and derivation appears to be relativized by morphologists who assume zero-morphemes in derivation. Given data such as the following from Dutch:

\[
\begin{align*}
\text{val}_v & \text{ 'fall'} & \text{val}_n & \text{ 'fall'} \\
\text{vang}_v & \text{ 'catch'} & \text{vang}_v & \text{ -st}_n \text{ 'catch'} \\
\text{beloof}_v & \text{ 'promise'} & \text{beloof}_v & \text{ -te}_n \text{ 'promise'}
\end{align*}
\]

We may reason that each verb has a corresponding deverbal event noun with a nominalizing marker that is expressed as -st in the case of vang, -te in the case of beloof, and as zero in the case of val. This reasoning seems to presuppose that each verb has a paradigmatic cell for a deverbal event noun. However, there is a difference with the use of zero-morphemes in inflection, because zero-morphemes are only assumed for derivational morphology if there are also non-zero morphemes for the relevant morphological category. Whereas we may assume a zero-morpheme for the English singular nouns without there being an overt counterpart, in derivational morphology at least one overt marker for the morphological category involved is usually required. This is known as the overt analogue criterion, which distinguishes derivation from inflection (cf. Sanders 1988).

Related to the paradigmatic structure of inflection, we often find that there is no one-to-one correspondence between inflectional properties and their formal expression: two or more properties may be expressed by the same form, or vice versa (Matthews 1991). An inflectional property will be expressed in more than one way if the language involved has inflection classes (declensions for nouns, and conjugations for verbs); each class may have its own formal expression for a particular array of inflectional properties. Whereas in Latin mens-is 'table, DAT. PL.' the properties 'dative' and 'plural' are expressed by the suffix -is, the same properties are expressed by -ibus in the noun partibus 'part'. Inversely, in inflectional systems there might be one formal expression for two different
arrays of properties, i.e. syncretism. For instance, the ending -ibus is both the dative pl. and ablative pl. form. In this respect, inflection clearly differs from derivation.

A further characteristic of inflectional paradigms in many languages is that more than one stem form has to be used for the formation of the set of inflectional forms. Latin uses three stem forms for each verb, one for the present tense, one for the perfect, and one for the past participle. Thus, the verb armare 'to arm' has the stem forms arma, armav, and armat, as in arma 'I arm', armav-i 'I have armed', armat-us 'armed, past participle'). The stem arma-i is also used in word formation, as in armatura 'armament'. This type of stem allomorphy is, however, not an exclusive characteristic of inflection: we also find cases where different stem forms of a base word have to be used in derivation. Latin itself is an example, as shown in the preceding paragraph. In Germanic languages many non-native words have two stem forms, one for native derivational morphology, and another one for non-native derivation. A English word like drama has two stem forms, drama as in the plural form dramas, and dramat, as in dramat-ic (Booij 1997).

Since the words of an inflectional paradigm are more closely connected to each other than derivationally related words, analogy applies more frequently within inflection. For instance, whereas Latin honos 'honor' changed to honor because of the genitive form honor-is (from honos-is), the derived adjective honestus 'honest' kept its /s/. This is why it is called 'paradigmatic leveling'. Clearly, this term presupposes that inflectional forms of a word have stronger paradigmatic relations than words derived from the same base. Therefore, although we cannot exclude that derivationally related words may also form a sort of paradigmatic network, the forms of an inflectional paradigm clearly show a stronger relation between each other.

2.4 Generality and productivity

A number of properties of inflection reflect the basic generalizations concerning the differences between inflection and derivation discussed above.

First, if inflection is obligatory in the sense that each word has a paradigm the cells of which have to be filled, we expect that all words of the relevant category undergo the pertinent inflectional rules. That is, inflectional rules tend to be general (apply to all relevant words) and are productive (that is, new word-forms can be made in accordance with the rule). This is the main reason for considering certain types of class-changing morphology discussed in Section 2.1 as inflection.

Productivity of inflectional patterns is certainly a universal tendency, but not without exceptions: we do find paradigmatic gaps, i.e. words for which certain inflectional forms are not available. Dutch has a number of complex verbs that only exist in the infinitive, and do not have finite forms, for instance bloemlezen 'to make an anthology'. French has a number of defective verbs for which not all tense forms can be formed. The verb frire 'to fry', for example, has no plural forms for the present indicative (Morin 1995).
Moreover, the property of generality does not always hold. In English many nouns do not have a plural form at all (courage, food, grace, March, assuredness, etc.). However, this is of course because the relevant nouns are uncountable, and therefore one might say that such words do not belong to the domain of plural inflection. A similar case is that many English adjectives do not have comparative or superlative forms (instead, one has to use more/most A). Here, we might say that the relevant domain of adjectives is defined prosodically, and that comparative formation applies without exception within that domain. Languages may also have pluralia tantum, i.e. nouns that only occur in the plural, such as Dutch Alpen 'Alps', notulen 'minutes' and hurken 'haunches'. In the latter case, we do seem to have arbitrary gaps, since, for instance, nothing would be wrong, semantically or otherwise, with the word Alp 'mountain of the Alps'.

2.5 Semantic transparency

Another corollary of the more general and productive nature of inflection is that it is semantically more transparent than derivation. Whereas derived words often have a meaning that is not purely a compositional function of the meaning of its morphological constituents, this is very rarely the case with inflection. Exceptions are again formed by cases of inherent inflection such as plural nouns: the Dutch plural noun letteren 'letters' has the special meaning 'arts and humanities', and whereas English cloth means 'woven material', the plural clothes has the meaning 'garments'. Such inflectional forms exhibit the phenomenon of lexical split: the semantic relation between two formally related words is no longer transparent. It is a pervasive phenomenon in derivation, and relatively rare in inflection.

The criterion of semantic regularity is also involved in the issue whether the system of conjugational classes in Hebrew (the binyanim) and other Semitic languages is a matter of inflection or of derivation. Since the different binyanim of a verbal root often have unpredictable meaning aspects, one is inclined to consider this system as derivation. On the other hand, the fact that the binyanim of a verbal root such as qatal 'to kill' form a kind of paradigm reminds us of inflection. The best interpretation appears to be that binyanim are inflectional classes, and that Hebrew derives new verbs by changing the inflectional class (binyan) of a verb. That is, transposition of conjugational class is a form of derivation (Aronoff 1994).

2.6 Psycholinguistic differences

The differences between derivation and inflection outlined in the preceding sections may also have a psycholinguistic reflex in that products of derivation will more readily be stored in the mental lexicon, whereas inflectional forms, being mostly regular and formed according to productive rules, will often be made 'on the spot'. This will in particular be the case for languages with rich inflectional systems, for which it is simply impossible to store all the possible inflectional forms of a lexeme. The
distinction between storage and rule does not completely coincide, however, with that between inflection and derivation. Irregular inflectional forms, and regular forms with a high token frequency appear to be stored, whereas regular inflectional forms with a low frequency are produced by rule (Sternberger & MacWhinney 1988, Baayen et al. 1997). On the other hand, there are very productive and regular derivational categories that can easily be extended by rule, and for which it is therefore implausible that all its members are stored in the mental lexicon. This is in particular the case for languages with agglutinating morphology like Turkish where with one root we may have millions of different word forms which cannot possibly be stored (Hankamer 1989).

In another recent paper, Baayen et al. (ms.) provided another type of evidence for the difference between inflection and derivation: it is the token frequency of plural nouns that contributes to the cumulative frequency effect of the relevant stem, whereas it is only type frequency that affects cumulative frequency effects in the case of words that are derivationally related to that stem. This underscores the point made before that inflectional forms are more strongly related to each other than derivational forms.

The distinction between inflection and derivation has also been investigated in studies of aphasia, with unclear conclusions. Badecker & Caramazza (1989) investigated the speech of an Italian aphatic who made many inflectional errors, but almost no derivational ones. They therefore concluded that the grammar must distinguish inflection and derivation, although, as they point out, this does not imply that inflection and derivation belong to two different components of the grammar (as in the split morphology hypothesis, cf. Section 3). On the other hand, there are also speakers with agrammatism (Broca aphasics with poor syntax and almost no function words) whose inflectional morphology is not affected, and preserved to the same extent as their derivational morphology (De Bleser & Bayer 1988).

2.7 Recursivity

A consequence of the functional differences between derivation and inflection is that, whereas an inflectional process is applied only once to a word, to create a word form that fills a cell of the paradigm, derivational morphology may apply recursively, because each derivational step may add some additional meaning. For instance, in the Dutch adjective *werke-loos-heids-loos* ‘without unemployment’, the suffix *-loos* ‘without’ occurs twice. Recursive application of derivational morphology is also found for a number of languages in the domain of evaluative morphology. For instance, we find two consecutive diminutive suffixes in Polish *kote-ek/kot-ek-ek* ‘dear little cat’, and in Afrikaans *huis-ie-tjie* ‘dear little house’ (*-ie* and *-tjie* are allomorphs of the diminutive suffix). Note that the two occurrences of the diminutive suffix in these examples do not have the same meaning, the more peripheral one does not express smallness, but endearment.
2.8 Syntactic relevance

An important demarcation criterion often proposed in the literature is that inflection is that part of morphology that is relevant to syntax (e.g. Anderson 1982: 587). Particular inflectional forms of words may be required by the syntactic context, i.e. they are determined by agreement or government (rection). This is what I call 'contextual inflection' (Booij 1994). Typical examples are agreement in number and person between subject and finite verb, and the selection of particular case forms of nouns by verbs and prepositions. Note, however, that not all inflection is dependent on syntax. For instance, the number of a noun in subject position is not determined by syntactic context, but depends on whether the speaker wants to refer to a singular or to a plural entity. That is, there is also inherent inflection (e.g. number of nouns, tense, aspect, comparatives, and superlatives), which is closer to derivation than contextual inflection. This is also reflected by the fact that inherent inflection tends to be more idiosyncratic than contextual inflection (lexical split, lacking forms, forms without base words, etc., cf. Booij 1994).

This difference between inherent and contextual inflection has also been observed by Kurylowicz who distinguished between inflectional categories with a primarily syntactic function such as case, and inflectional categories with a primarily semantic or autonomous function. He pointed out that number is "a semantic trait of the noun" (Kurylowicz 1964:31), and that "degrees of comparison [...] represent the autonomous inflection of the adjective. This inflection is intrinsically semantic and never assumes a special syntactic function" (Kurylowicz 1964:34).

The criterion that syntactically relevant morphology is inflection is not so easy to apply in all cases. Note that derivation is also relevant to syntax in that if often determines the syntactic category and the syntactic valency of the words it creates. For instance, the Dutch prefix be- creates transitive verbs from verbs and nouns. The transitivity effect shows that be-prefixation is syntactically relevant. Yet, we may consider be-prefixation derivation, because of its potential for word class transposition, and the often unpredictable meaning of the be-verb.

We meet a similar problem when we want to determine whether the formation of adverbs in -ly in English is inflection or derivation. The use of the adverb(ial form) happily in They sang happily is required by the syntactic context. This does not necessarily imply that -ly suffixation is a matter of inflection: one might also say that the syntactic context requires an adverb, and that suffixation with -ly is the morphological answer to this need, i.e. morphology creates adverbs. Similarly, the use of a than NP phrase requires the use of an adjective, as in John is bigger than Peter, but we can also use the comparative form without a than-phrase.

Therefore, when one uses 'relevance to syntax' as a criterion for inflection, this does not help us that much: clear cases of derivation can also be relevant syntactically, and on the other hand not all cases of what is traditionally considered inflection have a specific syntactic impact, as is the case for the plural inflection of object nouns in Germanic languages that have no object agreement, and for the semantic use of cases.
2.9 Order of morphemes

In a complex word with both derivation and inflection, inflection is usually peripheral with respect to derivation. For instance, in the Dutch diminutive *moeder-tje-s 'little mothers', the diminutive suffix -tje precedes the plural suffix -s, and a form like *moeder-s-tje is ill-formed. This is one of the most important formal reasons for distinguishing between inflection and derivation: derivational suffixes are not attached to words in the concrete sense, but to stems, i.e. words minus their inflectional endings. In the Italian example given in section 2.1., the diminutive suffix -in is not attached to *ragazzo 'boy', but to the stem *ragazz-.

The peripherality of inflection has been stated as a universal by Greenberg:

(6) Universal 28. If both the derivation and the inflection follow the root, or they both precede the root, the derivation is always between the root and the inflection (Greenberg 1963: 93)

It has been claimed that German diminutives such as Kind-er-chen 'small children' are counterexamples to the claim that inflection is always peripheral with respect to derivation, because the plural morpheme -er precedes the diminutive suffix -chen. However, this example is very idiosyncratic, and a form like Mätcherchen 'little man' is ill-formed. The sequence -er in this word can probably be seen as an extension of the stem of the lexeme Kind 'child'; this implies that the plurality is expressed by zero, just as is the case for all other words in -chen such as Mädchen 'girl'.

As we saw in section 2.8, inherent inflection appears to share a lot of properties with derivation; this is in line with the generalization that contextual inflection tends to be peripheral with respect to inherent inflection. For instance, in Dutch finite verbs, the (contextually determined) number agreement suffix is peripheral with respect to the (inherent) tense-suffix, e.g. werk-te-n 'work-PAST-PL'.

Morphologists who do not accept a rigid distinction between inflection and derivation have tried to establish principles for the ordering of affixes within a complex word. The best known proposal is that of Bybee (1985). According to her, the order of affixes is determined by the degree of relevance of an affix for the meaning of the word. Since derivational affixes such as the causative suffix have a considerable and specific effect on the meaning of the word, and thus have a higher semantic relevance, they occur close to the stem, whereas affixes for aspect, tense and the like are more peripheral: they have more general, hence vaguer meanings. Moreover, inflectional markers often do not pertain to the meaning of the complex word itself, but express the relation of a word to situation and context. Tense, for example, expresses the time relation between the event or situation expressed by the verb and the moment of speaking, and case expresses the relation of a noun to other parts of the sentence.

Bybee (1985: 35) established the following tendencies in the ordering of verbal inflectional markers with respect to the stem:

(7) stem-aspect-tense-mood-number/person
As already mentioned, contextual inflection tends to be peripheral with respect to inherent inflection. To put it differently, syntactically relevant morphemes tend to occur at the periphery, in order to be visible for the syntax (Williams 1981). For instance, as Greenberg pointed out, there is a strong universal tendency for case affixes to be peripheral with respect to number affixes. This is in line with the observation that inherent inflection is more like derivation than contextual inflection:

(8) Universal 39. Where morphemes of both number and case are present and both follow or precede the noun base, the expression of number almost always comes between the noun base and the expression of case (Greenberg 1963: 95)

In sum, the following universal tendency appears to occur: contextual inflection is peripheral with respect to inherent inflection, and inherent inflection is peripheral with respect to derivation. This generalization presupposes, and thus supports, the inflection-derivation distinction.

2.10 Conclusions

In a number of respects, the differences between inflection and derivation appeared to be of a gradual nature. In particular, inherent inflection appeared to occupy an intermediate position, in between derivation and contextual inflection. Nevertheless, there is a number of phenomena that support a distinction between inflection and derivation:

(i) the role of the paradigm: the network of paradigmatic relations between related words is much tighter in the case of inflection;
(ii) generalizations about affix order require the inflection-derivation distinction;
(iii) inflection typically exhibits a complex relation between form and meaning (inflectional classes and paradigms).

Therefore, it is justified to assume that inflection forms a special subcomponent of the morphological part of the grammar, with specific formal properties.

3. Split morphology?

The differences between inflection and derivation discussed above have led some linguists to assume an organizational model of the grammar in which there is a strict separation of derivation and inflection. Derivation is located in a pre-syntactic morphological component, and functions to enrich the lexicon. Inflection, on the other hand, is located in a post-syntactic component of morphological spell out rules, since the correct inflectional form of a word depends on its position in syntactic structure. This model is called the model of 'split morphology' (Perlmutter 1988), and is also advocated in Anderson (1982; 1992). An additional reason for this separation is that, whereas in
derivational morphology there is usually a one-to-one relation between form and meaning, this is
different for inflection, as exemplified above in Section 2.3. Therefore, inflectional rules are seen as
realizational rules or spell out rules that specify the formal expression of each array of inflectional
properties.

A variant of this organizational model is proposed in Beard (1994): derivation is pre-syntactic as
far as its semantic and syntactic aspect is concerned, inflection is post-syntactical. Both derivational
properties (e.g. Agent, Action) and inflectional ones are spelled out by the same realizational
component. The reason for this conflation of the formal expression of derivational and inflectional
categories is that derivation and inflection often make use of the same affixes. For instance, the
Dutch suffix -v expresses both '3d pers. sg. present tense' for verbs, 'plural' for nouns, and
deadjectival nominalization as in goed-s 'the good', and English -er is both the comparative and the
deverbal agentive suffix.

It should be realized, however, that the fact that the choice of a particular inflectional form is
determined by syntax does not necessarily imply that inflection is post-syntactic. One can also
assume that inflection applies pre-syntactically, and that rules such as subject-verb agreement only
have a checking function: they check whether the relevant morphosyntactic properties of two words
in a specific syntactic construction are compatible. For instance, since the English nouns people and
books are marked as plural, the second due to an inflectional process, they both require a plural
finite verb if they are the head of a subject noun phrase. That is, the presence of a singular finite verb
will qualify such a sentence as ungrammatical.

An additional argument adduced in favour of the split morphology hypothesis is that it predicts
that inflection does not feed derivation, i.e. that we should never find inflectional morphemes inside
derivational morphemes. Thus, this model directly accounts for the peripherality of inflection with
respect to derivation. However, as we will see below, inflection is not always peripheral to
derivation, and therefore this argument is not valid.

Another organizational variant in which derivation and inflection are not completely separated,
but distinguished within the lexical component, is the hypothesis of level-ordered morphology
(Kiparsky 1985). In this model, a variant of strong lexicalism, morphological processes are assigned
to different, ordered strata or levels in the lexicon. The idea then is that derivation is located at an
earlier level (or earlier levels, if more than one derivation level is assumed) than (regular) inflection.
This ordering predicts that inflection cannot feed derivation. On the other hand, such an
organizational model maintains the possibility that derivational and inflectional processes induce the
same phonological processes, which is often, but not always, the case. This variant faces the same
problems as the split morphology hypothesis, unless we allow for loops between the different levels.

The basic problem for the split morphology hypothesis is that inflection sometimes does feed
word formation. This is particularly clear in the case of compounding: plural nouns may function as
the first or second constituent of compounds:
Italian:
* lava-piatti * 'lit. wash-dishes, dish washer'
* portalettere * 'lit. carry letters, postman'

Dutch:
* steden-raad * 'cities council'
* huizen-rij * 'row of houses'

Plural nouns also occur in Dutch derived word with the collective suffix *-dom* such as *scholier-en-dom* 'set of pupils'.

Nouns with case endings also occur inside compounds; the generalization appears to be that only inherent case, i.e. case selected on the basis of semantics, and not on the basis of syntactic structure is involved. For instance, we find the following compounds with word-internal case suffixes in Finnish (Booij 1994):

(10) * maa-lta-pako 'country-ABLATIVE-flight, rural depopulation'

As already shown, inflection does not only feed compounding, but also derivation. In most European languages past participles feed de-adjectival word formation, as in Dutch *gevreesd-heid* 'feared-ness'. In Breton, the diminutive suffix is not only attached to singular nouns, but also to plural nouns such as *bag* 'boat' and *paotr* 'boy' (Stump 1990):

(11) sg dim plu plu dim
    bag bag-ig bag-où bag-où-ig-où
    paotr paotr-ed paotr-ed-ig-où

Breton plural nouns also feed two other derivational processes, the formation of denominal verbs and of denominal adjectives:

(12) * aval* 'apple' * aval-où* 'PL' * aval-où-a* 'to look for apples'
    * delienn* 'leaf' * deliou* 'PL' * deliaou-ek* 'full of leaves'

As already pointed out above, infinitives often behave as nouns with respect to compounding. In Dutch verbal compounding is unproductive, unlike nominal compounding. Yet, compounding with infinitives as head or modifier is productive:

    * lijd-en-s-verhaal* 'suffer-INF-story, Passion'; * et-en-s-tijd* 'eat-INF-time, eating time'

In sum, both the split morphology hypothesis and the level ordering hypothesis have problems with the types of interaction of inflection and word formation presented above. Therefore, one should assume one morphological module in which both derivation and inflection are accounted for. In this
module, fully inflected forms are generated by the inflectional subsystem of that module. These inflectional forms are then selected by the syntax. Some types of inflected forms, instances of inherent inflection may feed the word formational part of the morphological module.

This conception of the position of morphology in the grammar is corroborated by some observations about allomorphy, which will now be dealt with.

3.1 Stem allomorphy

Derivational processes may make use of stem allomorphs that are formally identical to specific inflectional forms. This implies that such inflectional forms have to be available for derivation, another problem for the separation of inflection and derivation.

An example of stem allomorphy in which inflected forms play a role is the role of the feminine form of French adjectives in derivation: the adverbial suffix -ment is always added to the feminine form of the adjective without a feminine meaning being implied (with four exceptions: brillament 'brilliantly', savamment 'learnedly', éloquement 'eloquently' and apparement 'apparently'):

\[(14)\]

\[
\begin{array}{lll}
\text{masc.} & \text{fem.} & \text{adverb} \\
\text{fau} & \text{fausse} & \text{faussement} \\
\text{lent} & \text{lente} & \text{lentement} \\
\text{heureux} & \text{heureuse} & \text{heureusement} \\
\text{certain} & \text{certaine} & \text{certainement} \\
\end{array}
\]

In these cases one could still defend an analysis that does not refer to the notion 'fem. inflected adjective' by assuming a latent stem-final consonant which then surfaces before the suffix -ement, just as it surfaces before the suffixes -e and -esse. This analysis, however, fails to explain why, if an adjective has a suppletive or irregular feminine form, it is this suppletive form that shows up in the adverb in -ment:

\[(15)\]

\[
\begin{array}{lll}
\text{masc.} & \text{fem.} & \text{adverb} \\
\text{beau} & \text{belle} & \text{bellement} \\
\text{blanc} & \text{blanche} & \text{blanchement} \\
\text{fou} & \text{folle} & \text{follement} \\
\text{sec} & \text{sèche} & \text{sèchement} \\
\text{vieux} & \text{vieille} & \text{veillement} \\
\end{array}
\]

These 'feminine' allomorphs also show up in other types of deadjectival words. Therefore, the only generalizing analysis is that in which a stem allomorph that is formally identical to the feminine form of the adjective is the formal basis for derivation. In other words, we use a 'rule of referral' that specifies the form of the stem of adverbs by referring to a specific inflected form of the adjective.

The same allomorphy pattern is found in related languages such as Spanish, as in clara-mente 'clearly', with the feminine suffix -a. As Rainer (1993: 267) pointed out, this feminine suffix reflects
the historical origin of the suffix -mente which is a case form of Latin mens, mentis 'mind' a feminine noun that requires the modifying adjective to agree in gender, as in clara mente 'with a clear mind'. These other Romance languages therefore also require such a rule of referral that predicts the right allomorph of an adjective on the basis of the feminine form of that adjective.

Another relevant case is that of the five verbs of Dutch which are special in that they have an infinitive form in -n instead of the regular -en:

(16) doen 'to do' staan 'to stand'
    gaan 'to go' zien 'to see'
    slaan 'to hit'

These verbs have a second stem which is formally identical to the (irregular) infinitival form, and functions as the verbal base for the formation of the present participles (e.g. doen-d 'doing') and for derivation.

(17) be-doen-ing 'to-do' boete-doen-ing 'penance'
    vol-doen-ing 'satisfaction' voor-zien-ing 'provision'
    aan-doen-ing 'affliction' her-zien-ing 'revision'

Crucially, we cannot say that the relevant derived words are derived from the infinitive, because the Dutch suffix -ing is a deverbal suffix, whereas the infinitive behaves as a noun in word formation (Booij 1989). That is, we have to say that these verbs have stem allomorphs to be used in derivation that is phonologically identical to the infinitival form of these verbs.

Thus, a proper model of the morphological module of a grammar has to allow for derivation to have access to specific inflectional forms because the correct stem allomorphs for certain derivational processes are to be computed on the basis of inflectional forms.

4. Conclusions

This article did not present a formal model of inflection. Instead, it focused on the demarcation of inflection and derivation, which is often presupposed in such formal inflectional models. We saw that inflection and derivation do differ in a number of ways, which justifies the assumption of a specific inflectional submodule with particular formal properties. However, we also saw that inflection interacts with derivation in a number of ways, and therefore, inflection and derivation cannot be separated in two different components of the grammar, as the split morphologists would have it.
References


A Generalized Theory of Ablaut: 
the Case of Modern German Strong Verbs

1. Introduction

In this article, we discuss non-arbitrary vowel colour alternations known as Ablaut or Apophony that lack any contextual conditioning and are exploited for the purpose of grammatical opposition. Some examples of such context-free alternations in various languages are given below:

(1) Berber fa6 (imperat.2S) i-fu6 (pret 3MS)
Somali yiqiin (past 3MS) yaqaan[n-aal] (pres 3MS)
Hebrew saamar (qal-pf 3MS) yi-ämør (qal-ipf 3MS)
Ge'ez xäsiir (adj SM) xasäar (adj SF)
Cl. Arab. katab- (pf I act) ya-ktab- (ipf I act)
German helf-o (pres 1S) helf (pret 1S)
English sit (pres 1S) ssn (pret 1S)

The question raised by these data concerns the status of the alternating vowel: are its different manifestations lexically determined, or are they predictable? In other words, are there as many lexical entries as there are words, or are the different grammatical forms of the cognate words related by a derivation? In the remainder of the paper, we shall argue for the latter option.

The existence of a derivational link between two apophonically connected forms was most succinctly formalized by Kuryłowicz (1956, 1968). In his approach, any pair of apophonically related forms A and B is of derivational nature to the extent that B (forme fondée) is the non-arbitrary output of a derivational operation (le fondement A→B) performed on A (forme de fondation). This process obeys two principles: 1) proportionality, that is, for any pair displaying the same apophonic operation, the grammatical relation is constant; 2) polarization, that is, the distance between A and B is maximal. Even though this perspective does establish a derivational relation between the alternating vowels, it does not state any more general feature of Apophony. Particularly, any two vowels under these provisions may contract an apophonic relation. Moreover, the vowel colour of the derived form is not a priori predictable from the colour of the base-form. From such a perspective, the pairs of alternating vowels found in different languages are lexically determined. They have nothing in common but the derivational relation they contract.

Proposing a much more constrained approach to the derivational character of apophonic morphology, we claim that apophonic systems obey a precise regularity defining the substantial...

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1 This paper is a revised and augmented version of Ségéral and Scheer (1994). We would like to thank Ray Fabri, Jean Lowenstamm, Utz Maas, Damaris Nübling and Albert Ortmann for helpful comments and criticism.