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## MORPHOLOGY, DIVIDED AND CONQUERED?

### ABSTRACT

*Concentrating on the taxonomy of grammatical morphemes, this study shows that traditional definitions of inflectional vs. derivational morphemes do not pass more rigorous testing, although they probably reflect instinctive distinctions present in a natural language system. The authors propose to define the distinctions by referring to derivational stages, namely by distinguishing levels of insertion for morphemes. Most of what is usually classified as derivational morphology and subject to the Right Hand Head Rule are morphemes which enter derivations in narrow syntax. As such, they conform to what is here termed a Logical Form Interpretation Condition, which allows only one syntactic feature per morpheme. On the other hand, morphemes such as agreements are not subject to the Right Hand Head Rule and result from post-syntactic insertion and exhibit cross-classification. The authors propose that the source of these bound inflections is the process of Alternative Realisation. They argue that their new distinction between derivational and inflectional morphology correlates with testable semantic, phonetic and syntactic properties and that in terms of these properties, both are necessary parts of an adequate formal linguistic framework.*

### KEYWORDS

*Inflection; Derivation; Agreement; Right Hand Head Rule; Alternative Realization.*

## 1. The basis for dividing inflection and derivation

Analysts of natural language grammars never seem to tire of the quest to categorize two kinds of affixes, which are widely termed (1) inflectional and (2) derivational.<sup>1</sup> The persistence of these attempts indicates that linguists share intuitions

<sup>1</sup> The division is in fact tripartite, but we are not going to address here free or lexical morphemes at all. Not because their status are much clearer but because of time and space reasons which force us to concentrate on a more limited topic.

about the reality of some core distinction between two kinds of elements, that this distinction is inherent to the language system, and therefore it must be part of any linguistic framework. The inconclusive discussions and variety of definitions, on the other hand, suggest that the study of the phenomena has not yet found a formalisation that can stand up to more rigorous scientific testing. We are going to address the issue from the perspective of generative grammar, accepting what is usually called Borer's Conjecture. In her study of parametric syntax, BORER (1984) proposes that the distinctions among the variety of human languages can be best expressed as distinctions among the repertory and characteristics of their grammatical morphemes. If so, a taxonomy of those morphemes must be a part of every linguistic analysis.

### **1.1 Inflection and derivation in traditional frameworks**

In most traditional frameworks, *inflectional affixes* are felt to include as core members the affixes on both (i) open and (ii) close class categories. Some of the most standard Indo-European inflectional affixes are listed below.<sup>2</sup>

- (i) Inflections
  - i Inflections on open class categories
    - a. Nouns (N): indications of number, gender, case and definiteness (including the proximal vs. distal distinction).
    - b. Verbs (V): indications of number, person and sometimes gender (usually based on agreement with a noun phrase in a local context), tense, aspect, mood and voice.
    - c. Adjectives (A): indications of comparative and superlative degree, and in many especially Indo-European languages, marks of feature agreements with nouns.
  - ii Inflections on closed class categories
    - a. Determiners (D): see Nouns and Adjectives above.
    - b. Adpositions (P): *thereby, into, inward, ...*
    - c. Complementizers (C): see Verbs above.
    - d. Numerals (Q): see Nouns and Adjectives above.

*Derivational affixes* on the other hand seem to be limited to appearing on open class categories only, with some uncertainties as to whether this kind of word formation

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<sup>2</sup> In this study we will concentrate on inflections on open class categories. For discussion of many prototypical correlations of bound inflectional morphology and syntactic categories in some typologically distinct languages {"XE categories: prototypical correlations"}, see CROFT (1991, 55, 65, 79).

extends to the category P or not (*downward, inward, seaward, ...*). Derivational affixes are widely said to ‘change the category of the open class host’ and/or to ‘give rise to a new word different in nature from the host’.

(2) Derivational affixes

- a. Derived Nouns (from verb and adjective hosts): e.g. *arriv-al, develop-ment, think-ing; act-or, collaborat-or, writ-er; humid-ity, special-ty, strange-ness*.
- b. Derived Verbs (from noun and adjective hosts): e.g. *bastard-ize, liquid-ate, length-en; intense-ify, modern-ize, short-en*.
- c. Derived Adjectives (from noun and verb hosts): e.g. *friend-ly, grass-y, courage-ous; digest-able, runn-y, fear-some*.

There is a general sense among those who try to make precise or formalize the distinction between inflectional and derivational morphology that the former is ‘more regular’ and ‘more grammatical’, while the latter is less regular and more related to the arbitrariness of the lexicon. Along these lines, the following differences are widely put forward as distinguishing the two types.

(3) Putative distinctions between Derivational and Inflectional Morphemes

- a. Derivational morphemes create *new* or different words (lexemes), while inflectional morphemes create regular variants of the same word (lexeme).
- b. Derivational morphemes change the *category* of the root or ‘host’, but inflectional morphemes leave the category of the root unchanged.
- c. Derivational morphemes are not *productive*, but inflectional morphemes are.<sup>3</sup>

If the above properties are to be contentful, they should converge on the same bifurcation of lexical forms, or alternatively coincide with some other interesting property of grammatical theory. But it can be easily appreciated that such convergence for (3a-c) depends on widely disputed equivocal definitions of terms like ‘variants of the same word’, ‘productive’ and ‘same category.’ In the next section, we show that once these equivocations are removed, no two of the distinctions in (3) coincide. There will remain a sense in which only (3b) should be retained, as differentiating derivation and inflection in some sense; and indeed, this will correlate with other interesting lexical properties of morphemes. However, the resulting dividing line between the two classes then ends up not being where it is

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<sup>3</sup> The notion of productivity is also crucial in possible definitions of the level of grammaticalization of a morpheme. We are not going to discuss this concept here, given that its formalization depends on how one selects and relates the criteria in (3).

drawn in previous studies of morphology. The line we will draw will also succeed in predicting *another difference* between derivation and inflection, a difference often stated but not explained in any theoretical framework.

(4) **Affix ordering**

Derivational affixes are supposed to be closer to the root morpheme than inflectional affixes.

## 2. Consideration of the traditional criteria

The traditional criteria for differentiating inflection from derivation can be divided into two groups, one related to the *newness* of the complex created with the addition of the relevant morphology (word, lexeme, category), the second related to the *productivity* of the process of adding to the preceding form (stem). We will address both criteria in the following sections.

### 2.1 Derivation creates a new word (lexeme) or category

The most common but still the emptiest of the traditional criteria separating inflection from derivation is (3a), i.e. whether a given bound morpheme ‘creates a different word’ or not. Abstracting from the absolute vagueness of the definition of ‘word’ itself, which resists any testable formalisation, let us compare for example noun-verb pairs like *cheat/cheat*, *ride/ride* and verb-adjective pairs like *open/open*, *empty/empty*. They all supposedly involve zero derivation. One of each pair can be considered different from the other only if their *different syntactic categories* are taken into account, since both members of each pair otherwise both mean the same thing and are pronounced the same.

Faced with this kind of argument, a traditional perspective usually claims that new or different word means a word ‘not in the same inflectional paradigm as the root’. But no independent definition of what constitutes a paradigm is presented, meaning that the perspective is entirely circular: a ‘paradigm’ is a set of forms related by ‘inflection’, and an ‘inflection’ is a form of the word in the same ‘paradigm’ as the root.

However, while we are uncertain about the definition of the term ‘word’, we do work in terms of categories, i.e. groups of morphemes which can be characterized as sharing a definable range of morpho-syntactic properties. The importance of such categories is crucial for the existence and functioning of a syntax producing an infinite number of structures from a finite number of elements. For precision then, we must reject (3a) in favour of some version of (3b) or, better, the following one.

- (5) A bound morpheme is derivational if adding it to a root results in a different word, i.e., in a different category that is shown by a different distribution.

This then indeed implies that the noun and the verb *cheat*, formed by zero derivation are different words, as are e.g. the verb and the adjective *empty*.

But now consider the English verb roots *do* and *have* in the light of (5) above and the examples below.

- (6) a. *Mary will do her homework soon. She will have plenty of time after dinner.*  
b. *Mary does not do her homework at home.*  
*She has done some of them even at school.*

If we add to *do* and *have* the supposedly inflectional third singular and third plural suffixes *-es* and *-Ø*, we can obtain from these verb roots auxiliaries that can invert in yes-no questions and can appear both before *n't* and in tag questions, i.e. which have what are widely known as the NICE properties (DENISON 1993).

As shown in several generative analyses, the English forms with NICE properties are *not* verbs, if Verb is supposed to be a definable category at all.<sup>4</sup> They must be of some other category, e.g. the category of Tense (which now widely replaces the symbol I used in CHOMSKY 1986). If so, following (5) above, we have to analyse the number agreements on verbs as derivational morphemes, or alternatively, that the criterion in (3a)/(5) is of no use in distinguishing the traditional bound morphemes of derivation from those of inflection. We know of no analysis that follows the above logic to its conclusion.

We propose that all that can be retained from the discussion so far is the following: In English and more generally, a bound suffix has its own category, which is also the category of the combination [root + suffix], whether or not the category of the root and the suffix are the same. This generalisation has been stated in WILLIAMS (1981) as the Right Hand Head Rule (RHHR) in (7).

- (7) Right Hand Head Rule (WILLIAMS 1981)

The category of a combination [root + suffix] is the category of the suffix in the lexicon.

In itself, the RHHR does nothing to distinguish inflection from derivation. Thus for the English auxiliary, words of the category Verb [<sub>v</sub> *do/have*], when they are inflected with the category of Tense [<sub>TENSE</sub> *-s/-Ø*], the resulting complex is also Tense

4 Keep in mind that no open class English lexical Verb acquires the NICE properties when it takes the suffixes *-es/-ed*. This behaviour is attested only with *do* and *have*.

according to the RHHR. In French, this holds more generally for all inflected finite verbs, which like English words in T, invert in yes-no questions and immediately precede the clausal negation *pas*.<sup>5</sup> Thus, the surface category of all finite French verbs is Tense, which is not V but rather a sister to VP.

To give other examples of the RHHR, consider the underlined morphemes on the right in (8).

- (8) a. Czech            *káv-a* ‘coffee’    > *káv-ičk-a*    ‘little coffee’  
 b. Spanish        *café* ‘coffee’    > *cafe-cit-o*    ‘little coffee’  
 c. English        *white*            > *whit-ish*  
                       *old*                > *old-ish*

From the perspective of (7), long-debated questions about whether diminutive suffixes on a noun in (8a/b) or the English adjective-forming (8c) *-ish* are inflections or derivations simply disappear, since the roots and the suffixes are in the same lexical categories. The assumption that categories like Tense and Verb (or Adjective and Grading) are in some sense ‘the same’, i.e. they are parts of one extended lexical projection in the sense of GRIMSHAW (1990), allows the analyses based on the RHHR to result in a more revealing taxonomy, which need not, however, contradict the implicit rationales hidden in traditional analyses.

## 2.2 Productivity of inflection

Let us now turn to whether ‘productivity’ is a property that distinguishes between inflection and derivation (3c). Even though some affixation processes seem to occur without exception (English gerundive nominals V + *ing*, Czech clausal negation *ne* + V), this cannot be what traditional studies of morphology mean by the phrasing ‘inflections are productive’. If indeed no exception were allowed, we would not be able to claim that even the most regular plurals on English nouns or the standard 3rd singular number agreements of English verbs are inflections (\**haves*, \**dos*). Traditional grammar seems rather to mean that an affixation process can be deemed ‘productive’ if it satisfies the following criterion.

- (9) Productive affixation

An affixation process is productive under specified conditions if and only if it can always apply, with the exception of a fixed and finite list of irregular forms.

This definition allows us to specify precisely whether an affixation process is productive. Productive processes always and crucially involve a *default form*. This means

5 For a generative comparison of English and French verbal morpho-syntax see EMONDS (1978).

that once the finite list of items which do not accept the default affix is put aside, the default form of the process can always be spelled out in Phonological Form.<sup>6</sup>

For example, even though current English has some two hundred irregular verbs, outside this list any English verb can appear in the past tense with one of the phonetic allomorphs *-ed*, *-d*, *-t* (respectively exemplified by *treated*, *loved*, *laughed*). We might thus say that the English past tense is a regular inflection, as are most likely all the English and Czech endings treated under the rubric of inflection in traditional handbooks of these languages. However, there are still pitfalls in assuming a relation between productivity and inflection.

First, by definition, there is no prediction made for any *closed class category*, as all its members can be considered as a potential fixed and finite list of exceptions. Thus, it is *contentless* to say that some Czech (or English) pronouns (determiners) can be productively inflected for number, gender and case. Even if these categories bear no inflections or take irregular ones, they are finite in number and are thus allowed as lists of exceptions within the lexical category, the formal properties of which they to some extent share.

Second, the correlation (3c) between productivity and inflection is *neither a necessary nor sufficient criterion*. It breaks down in both directions, even in the well-studied processes of English. For example English derived nominals, in particular the variants that GRIMSHAW (1990) calls complex event nominals, are generally considered to exemplify derivation, since they involve a change from verb roots into nouns (e. g. *develop/development*; *edit/editing*), and morphologists typically consider the output of the process to be different words formed from the verbal roots.

Yet in fact, English complex event nominals are formed *productively* even though most traditional and generative accounts do not face up to this fact. To our knowledge, the first clear claim to this effect is in ANDERSON (1982), where a condition on productive formation of these nominals is also proposed: they are formed not from all verbs, but from activity verbs. Stative verbs, underlined in (10), lack corresponding event nominals:

- (10) a. \**The owning of a house seems like a full time job.*  
b. \**We didn't realize the advantage of the knowing of calculus.*  
c. \**Bill's hating of overtime doesn't surprise me.*

To illustrate the fact that English complex event nominal actually *are* productive, we can construct examples with the first three verbs of this essay:

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<sup>6</sup> General principles of economy cause languages to avoid synonymy. ARONOFF (1976, 43) accepts this general principle and adds a constraint on morphologically constructed lexical items, the Blocking Principle, defined as "the non-occurrence of one form due to the simple existence of another". Cf. also ARONOFF - ANSHEN (1998, 241).

- (11) a. *Mine eyes have seen the glory of the coming of the Lord.*  
 b. *The division of the property took years.*  
 c. *The categorizing of the suffixes took longer than that of the roots.*

We see in example (11b) an instance from a long but finite list of complex event nominals, those that end in *-ion*, superseding the use of the default *-ing*. No matter how long such lists are, they are straightforward applications of the Blocking Principle of ARONOFF (1976). We thus see an instance of derivational morphology being productive in the sense of (9).<sup>7</sup>

Perhaps even more disturbing for a partisan of productive inflections (3c) is the fact that a generally recognized ‘inflection’ in English, that of adjectival grading, is *not* productive. Of course, it is well known that comparative adjectives A + *-er* and superlative adjectives A + *-est* are limited to stems which are monosyllabic or disyllabic trochees:

- (12) *clever-er, friendli-er, grassi-er, often-er, handsom-est, shallow-est, stupid-est*

But the latter group are in no way productive; even though the following forms have comparatives and superlatives, they must be formed analytically with *more* and *most*.

- (13) *\*feistier/\*feisti-est; \*ghostlier/\*ghostli-est; \*honester/\*honest-est; \*horrider/\*horrid-est; \*rapider/\*rapid-est; \*seldomer/\*seldom-est; \*gruesomer/\*gruesom-est; \*woodener/\*wooden-est*

If there is any finite list involved here, it is rather that only a finite list of disyllabic A allow synthetic grading; the productive forms are the analytic ones (without bound morphemes).

Moreover, it is rarely noted that even some gradable monosyllabic adjectives do not accept comparative and superlative suffixes. Some of them are listed in (14) – they demonstrate that English grading suffixes are not productive, even on monosyllables.<sup>8</sup>

7 The complex event nominals of Czech are an even more obvious example of the same possibility. These derived nominals of the form V + *-á-n(-i)/-e-n(-i)* have been extensively studied in KARLÍK – NÚBLER (1998) and KARLÍK (2000).

8 This non-productivity makes the English grading suffix its productive Tense inflection. Even ‘less frequent’ verbs all accept regular Tense suffixes (*gawked, sashayed, loathed, taunted*, etc.). To claim that adjectives like *dour, gauche* and *loathe* are “irregular” (that they consist of a finite list of lexically marked exceptions to synthetic grading, like irregular verbs) would grossly violate the usual pattern whereby morphological irregularity is limited to more frequent, not less frequent, words.



(14) *beige, chic, dank, deft, dour, gauche, just, lithe, loathe, prim, suave, swell, taut, vast, wan*

So now we have completed the demonstration that productive morphological processes are not, even in English, linked in any necessary way to inflection as traditionally conceived. In the latter terms, there are productive derivations (e.g. complex event nominals) and non-productive ‘inflections’ (comparative and superlative synthetic grading).

### 3. Interface conditions on bound morphemes

Observing the classification of grammatical morphemes from the perspective of a generative framework, both derivational and inflectional affixes belong to a specific part of the lexicon, which we call the *Syntacticon* (EMONDS 2000, chapter 4),<sup>9</sup> which lists the language-specific grammatical elements with unique syntactic behaviour. This limited subset of morphemes has properties distinct from those in the substantially larger *Dictionary* (or *Encyclopaedia*), which is a repository of open class lexical entries.

According to EMONDS (2000), a specific characteristic of *Syntacticon* entries concerns their ability to participate in the process of syntactic and phonological derivation at several distinguished levels: crucially these morphemes can be inserted into a syntactic structure at three different stages: at the *start* or at the *end of a phase* in narrow syntax, or *post syntactically* at the Phonological Form (PF) interface (some may call this the Morphological module). We are going to show that analysis based on such a radically distributed morphology, i.e. analysis which distinguishes several clearly definable levels of insertion of morphemes, is able to capture and explain the distinct properties of grammatical morpheme types in a way superior to the traditional taxonomy discussed in Sections 1 and 2.<sup>10</sup>

#### 3.1 *Narrow Syntax: the scope of the Right Hand Head Rule*

In the preceding section we have argued that the only positive claim one can make about different types of bound morphology having distinct behaviour concerns Williams’s Right Hand Head Rule (7). All so called derivation plus a subset of

<sup>9</sup> With one difference, this is the same as the ‘grammatical lexicon’ of OUHALLA (1991). The *Syntacticon* explicitly contains closed subsets of the lexical categories N, V, A and P.

<sup>10</sup> In this study we distinguish only between syntactic and post-syntactic insertion. EMONDS (2000) also distinguishes two levels of insertion within narrow syntax, which is able to explain distinctions between compounding and derivational processes, and between lexical and productive derivational morphemes. This study does not treat these matters.

inflections, in both English and Czech, behave like heads in the sense of the RHHR. Morphemes subject to the RHHR are in given in (15).<sup>11</sup>

- (15) a. All the affixes traditionally considered to be ‘derivational’.  
b. ‘Inflectional’ affixes in positions that prima facie have inherent interpretations (Tense, Clausal Negation, Verbal Aspect Grading, Gender/Animacy).

Inflections that do not seem to fall under the RHHR (7) are grouped below in (16). Most of them are what are traditionally called configurational, secondary, or agreement morphemes, i.e. a cross-classifying morphology appearing on a specific category because of its structural relation to some other category.

- (16) a. [Case+Number] inflections (on Nouns, Participles and Adjectives)<sup>12</sup>  
b. [Person+Number] inflections (on Verbs)

Our treatment of Case+Number on Nouns as ‘agreement’ is not obvious, but it is nonetheless well-motivated. First, we take the case-assigning categories (V, T, P etc.) and traditional ‘case features’ (respectively Accusative, Nominative, Oblique, etc.) to be the same features, as argued for in EMONDS (1985, chapters 1 and 5); while the case-assigning categories are in (‘canonical’) positions where they are interpreted in Logical Form (LF), the case features themselves are these same features realized on nominal categories. Second, noun plurals are forms that agree with overt or covert non-singular Numerals/Quantifiers: *one/three young chicken(s); many/a good cheese(s)*.<sup>13</sup>

Both (a) and (b) in (16) are fused clusters including the feature of Number. This fused characteristic may logically be related by a general summarising statement about Number inflection.

### (17) Number Agreement Inflections

Affixes that express number agreement do not act like Right Hand Heads of words.

11 Notice that Grammatical Number and Grammatical Case suffixes do not belong to the list in (15), even though both spell out categories that seem to contribute interpreted in Logical Form. In contrast, Numerals (English: *two, ten, -teen, -ty*, Czech: *dva, deset, -náct, -cet*) and case-assigning categories (V, P, T) do belong in the list and are subject to the RHHR. In fact, this discrepancy is the main motivation why we have undertaken this study. Resolving it will be the main focus of the final sections of this paper.

12 If we were including Scandinavian languages in our focus, we could include the definiteness suffix on nouns.

13 In several languages and also in some dialects of English, the plural agreement on nouns does not appear when a Numeral/Quantifier is overt. This is analogous to languages where finite verbs agree in number only when the subject NP is covert.

Empirically, what this means is that *agreement* affixes do not seem to select or be selected like heads, keeping in mind that selection is the principal property of heads according to the original definition of this concept in HARRIS (1957). In fact, among widely studied morphological processes, number agreements are the main exception to a generalization of (3b), rephrased here for convenience, to all of bound morphology.<sup>14</sup>

(18) Bound Morphology Condition (tentative)

Except for agreement inflections, bound suffixes determine the category of a word.

This statement is a special case of the Right Hand Head Rule (7). Notice that Condition (18) covers not only derivation but also (i) grading morphology on the category A, (ii) Tense and Aspect morphology on V, (iii) Czech clausal Negation (vacuously, since it is a verbal prefix, VESELOVSKÁ – EMONDS 2015), and (iv) Gender suffixes on Adjectives (which are nouns; EMONDS 2012).<sup>15</sup>

### 3.2 A Logical Form Interface Condition on morphemes

At the end of Section 1, we observed that if the three traditional divisions (3a-c) between derivation and inflection do not coincide, and we have seen that they do not, then whichever survives (a modification of (3b)) should correlate with other interesting lexical properties of morphemes. And in fact, the bound affixes of morphology, with the exception of Agreement inflections, seem to have two other properties that set them apart from Agreement (and possibly from open class morphemes as well): they express only one grammatical category/feature, and this feature is invariably interpretable in LF. These properties can be stated as follows:

(19) The Agglutinative Ideal

The bound morphemes in (15) spell out single marked and interpretable syntactic features, i.e., there is one feature per bound morpheme.<sup>16</sup>

<sup>14</sup> Some other apparent exceptions are ‘applicative suffixes’ on verbs and ‘definiteness’ suffixes on nouns. Our reconceptualization of (18) just below removes these exceptions.

<sup>15</sup> English contractions, as in *we’ve lost* and *they haven’t*, are apparent exceptions to Condition (18). These optional so-called ‘contractions’, which are systematically reflected in English spelling, are not subject to the RHHR(7) either. They are plausibly a purely phonological (PF) phenomenon, which we do not treat here further.

<sup>16</sup> One might speculate that this is the reason for why in several languages, including notably English (EMONDS 2013), bound grammatical morphemes have a highly reduced phonological character. That is, since bound morphemes do not ‘mean much’, it is possible that a language can economize on the phonological level and not pronounce them very sharply. This is however only an option, since there are many languages (Czech, French) where bound morphemes are not phonologically reduced at all.

In other words, such affixes seem to spell out a single marked feature. There is no cross-classification like we find with e.g. agreeing demonstrative morphemes, which can spell out both +PLURAL and/or Person features, and PROXIMAL or DISTAL (whichever is marked) at the same time. In a single long French word of 11 morphemes in (20a) (rather artificial, but not implausible in a context of scientific experimenters conversing), only the bolded verbal agreement morpheme contravenes the restriction in (19).<sup>17</sup> The Czech example in (20b) shows the same agglutinative characteristics for 10 morphemes, with the notable exception of the final fused Case/Number agreement morpheme mentioned in (16). Most bound morphology, as in these French and Czech examples, thus observes a ban on cross-classification.<sup>18</sup> (Open class roots are underlined in the examples.)

- (20) a. French: ‘they won’t demagnetize themselves again’  
 [*elle* - *s* - *ne* - *se* - *re* - *dé* - *magnét* - *is* - *er* - *ai* - **ent**] - *pas*  
 fem- plur -neg -self - again - un - magnet -cause -fut -past - **AGR(3,PI)** - not
- b. Czech: ‘(with) the least cultivatable (ones)’  
 [<sub>A</sub> *nej* - *ne* - *ob* - *hospod* - *ař* - *ova* - *tel* - *n* - *ějš* - **ími**]  
 superl. - neg - perf - cultivate - N - theme - agent - A - compar. - **AGR(Instr,PI)**

Relating the Agglutinating Ideal to the RHHR, it appears that both the properties that (19) expresses reflect the need for a unique syntactic constituent labelling.

EMONDS (2000, chapter 4) defines Syntacticon entries in terms of their interpretation, claiming that they never contain purely semantic features. All their features are gramaticalized, i.e. they can be shown to play a role in some syntactic (narrow syntax) process. We can add that in most cases, these syntactic features seem to contribute directly to interpretation, but again with the exception of agreement features, which, as noted at length in CHOMSKY (1965, chapter 4), do not. Thus, as exemplified in (20), there is a near one-to-one correspondence between bound morphemes and the interpretation of the grammatical features that they express.

As a result, we can now rephrase condition (19) as a single Interface Condition between the structures of syntactic derivations and what can be ‘read’ or interpreted at Logical Form.

- (21) Logical Form Interface Condition (LFIC)  
 LF can interpret bound morphemes only if they spell out a single syntactic feature.

17 The second part of French sentence negation *pas* is a separate word that must follow a finite verb. Our thanks to Cécile de Cat for helping construct this instructive word.

18 The Agglutinative Ideal is in fact now widely almost taken for granted in work that is broadly labelled the Cartographic Approach. The Ideal itself is called the Functional Sequence.

### 3.3 A Phonological Form Interface Condition on morphemes

According to the Agglutinative Ideal (19) and its rephrased version (21), the morphemes of agreement, which express more than one feature, cannot themselves be part of the LF interpretation in the position where they occur. Intuitively, this seems correct (again, CHOMSKY 1965, chapter 4). We take this to mean that agreement morphemes are in fact not present at all in narrow syntax, i.e., they are not even candidates for entering LF. Rather, agreement morphemes spell out features (of person, gender, case-assignment and number) *not* in the canonical positions where these categories contribute to LF. They appear instead in structurally near-by PF positions, which we call their Alternative Realizations (see Section 4). That is, agreement features are interpreted not where they are pronounced, but in some other part of the structure where they are represented by only null element.<sup>19</sup>

Noting that these features are not autonomously interpreted in situ, the agreement morphemes themselves are in fact ‘true inflections’ exactly in HUMBOLDT’S (1822) original sense, namely cross-classifying feature bundles in heads of (extended) nominal and verbal projections. We thus propose that the term ‘inflection’ should be limited to those bound morphemes that satisfy (22a-c).

- (22) PF Interface Condition (PFIC)
- a. Inflections express *cross-classifying features* (Humboldt’s defining criterion of inflection).
  - b. Inflections are among the affixes that are *invisible in Logical Form*, i.e. they are not autonomously interpreted in the PF position where they appear.
  - c. Inflections seem to be exceptional with respect to the RHHR (7), they do not behave as selected or selecting heads of the complex forms that contain them.

Referring to the head properties of agreement morphemes, let us recall that the second property of heads, crucially correlated by HARRIS (1957) with selection, is being *obligatory*. In fact, this is an often noted, almost taken for granted property of different types of number agreement in Indo-European languages; they are never optional. This characteristic suggests that perhaps (22c) is unneeded.

Since it is desirable to avoid stipulations exempting one kind of morpheme from the RHHR, we want to use the latter to explain the obligatoriness of agreements. We propose to solve the problem of (22c) by restricting the selectional aspects of the RHHR to a specific part of derivations, namely to narrow syntax. That is, the role of headedness in selection has an effect only at the point when morphemes are

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<sup>19</sup> We will see that the ban on cross-classification in LF is only a one-way implication, since there are single feature affixes (applicatives) that are not interpreted autonomously either. Rather, bound morphemes not directly used at LF are motivated rather because they *contribute to economy*.

inserted (or lexicalized, depending on the technical execution of late insertion). For agreement morphemes, this occurs not in narrow syntax, but in Phonological Form (PF).<sup>20</sup> This is why they do not ‘seem like heads’, even though they are.

#### 4. Post-syntactic insertion (Alternative Realization)

Arguments for the existence (and function) of post-syntactic (post Spell Out, PF) insertion of grammatical morphemes are introduced and justified in EMONDS (1987, 2000), using the term Alternative Realization. Similar principles allowing a kind of post-syntactic insertion of some morphemes have been widely used in research on syntactic treatments of morphology, though different authors focus on special cases and use different names.

##### (23) Alternative Realization

A syntactic features  $F$  whose canonical position is in  $\alpha^o$  (= where  $F$  is interpreted in LF) can be realized under some  $\beta^o$  outside  $\alpha^o$  only if *some projections of  $\alpha$  and  $\beta$  are sisters*.

The Merger operation of HALLE – MARANTZ (1993) is in fact Alternative Realization limited to configurations where  $\beta$  is a complement of  $\alpha$  and  $F$  is realized by a bound morpheme (though nothing motivates this theoretical limitation). EMBICK – NOYER (2001) introduce the term Dissociation for AR, without specifying structural conditions on it. Therefore we are going to use the original concept as it is used in EMONDS (1987).<sup>21</sup>

Assuming that Universal Grammar (UG) associates a very few syntactic features with their respective host categories, we define these categories as the *canonical positions* of these features. We claim that syntactic features and categories contribute to Logical Form (LF) only in these canonical positions. As this paper has explained, there exist nonetheless a number of bound morphemes (agreement affixes) which can realise such syntactic features ‘alternatively’, i.e. in positions distinct from their canonical positions. The main role of these alternative morphemes is to *license empty categories* that are interpreted in their canonical positions.

<sup>20</sup> Apart from their specific morpho-syntactic properties and grammaticalized interpretation, Syntacticon entries exhibit specific (language particular) phonology. E.g. in English, only their initial syllable can have any stress at all. If Syntacticon items are in addition bound morphemes, they have no stress of their own. It also seems that if they have more than one syllable (*any, every, even*) they are inserted in narrow syntax and thus enter LF.

<sup>21</sup> Alternative Realization as defined in (23) is discussed in detail in EMONDS (2000, chapter 4). More examples and application to various syntactic structures are provided in EMONDS (1987), JO (1996), CAINK (1998) and VESELOVSKÁ (2001).



Importantly, grammaticalized morphemes – among those listed in the Syntacticon – may appear in Alternatively Realized positions, higher or lower than their canonical positions. They can be either bound or free morphemes: for example some free morphemes that exemplify Alternative Realization, such as the English finite copulas (*is, are, am*), make no independent contribution to LF and thus should be inserted in the domain of a cycle or phase of a syntactic derivation *after* that domain has been sent to LF. This is what is meant here by *late insertion of morphemes* (or their *PF insertion*).

In current terminology, Alternative Realization can be taken as an Interface Condition that specifies Feature Spell Outs “near” (but not in) their canonical positions only at PF. It thus explains both (22a) and (22b).

Using terminology by now traditional in generative frameworks, Alternative Realization as in (23) may in fact be interpreted as a kind of PF head movement or displacement. EMONDS (2012) compares Alternative Realization with transformational head movement, listing distinctions given in table (24).

(24) Comparing Alternative Realization (AR) with Head Movement

	Alternative Realizations (AR)	Transformational Head Movements
a.	AR is defined only for <i>closed class items</i> .	Head Movement affects <i>open classes</i> , as in French V to I or Bantu N to D.
b.	AR is possible only for <i>least marked members</i> of a category.	Head Movement affects <i>all members</i> of a category such as I, V or N.
c.	AR realizes features <i>lower or higher</i> than their canonical (LF) positions, even in other phrases.	Head Movement always involves raising a node <i>within single properly defined extended projections</i> .
d.	AR is never sensitive to a root vs. embedded clause dichotomy.	Syntactic principles determine if a head movement is limited to root clauses.
e.	Lexical entries specify types of PF positions under X <sup>0</sup> , such as <i>adjoined prefixes and suffixes</i> , and can specify fission or fusion.	Head Movements (V to I; I to C; N to D) are always <i>substitutions</i> . Later adjunction to moved stems can be effected by PF-insertion under AR.

It appears that lexical Alternative Realization and transformational Head Movement co-exist in some form in syntactic theory. Among the differences between the two, the first one in table (24) is an unambiguous indicator of which of the two non-overlapping mechanisms is at play.<sup>22</sup>

In any case, it turns out that ‘inflectional morphology’ fairly exactly corresponds to alternative realization and late (PF) insertion from the Syntacticon. ‘Derivational morphology’, on the other hand, contributes to LF and hence such morphemes are inserted either during syntax processing (when they express ‘productive derivation’, somewhat rare in English), or even at the outset of a derivation in a phase, when they

22 Alternatively one may try to explain the distinctions listed in (24) by the fact that contrary to syntactic head movement, Alternative Realization need not obey certain constraints of narrow syntax, such as proper binding. However, we are not going to undertake conflating the two notions in this short paper.

contribute to semantically specific formations found in the Dictionary (or Encyclopaedia).

Moreover, if as in Section 3 agreements come to be present in trees (and hence as right hand heads) only in PF, it is irrelevant that their category or feature composition is not subject to HARRIS'S (1957) co-occurrence, i.e., distributional/combinatorial patterns with surrounding structure. These latter are not determined in PF, but solely in narrow syntax. Thus we can dispense with stating that the RHHR does not apply to inflections, an earlier concern in SELKIRK (1982) and EMONDS (2000).

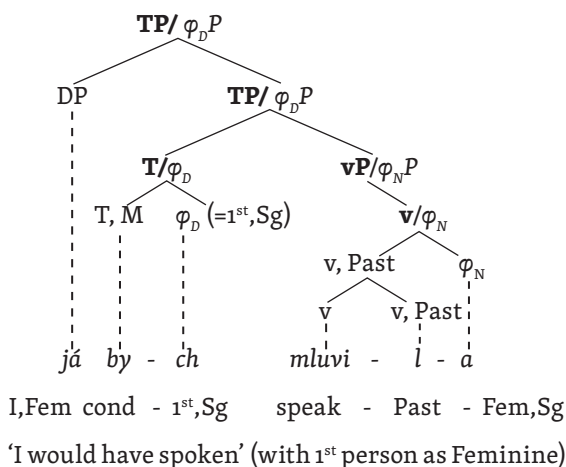
For example, it does not matter that in PF, the Czech agreement morphemes in (25) with Structure of Agreement (PF) in (26) are heads, and hence actually determine the categories of their words (and possibly phrases), because selection is fully carried out earlier in the derivation in narrow syntax, before these agreements are present. The structure below shows that accepting the hypothesis that agreement suffixes are heads of words (subject to the RHHR) results in predicates being TP in narrow syntax (in bold) but  $\varphi$ P (in italics) at PF.<sup>23</sup>

- (25) *já bych mluvi-l-a*  
 $I_{\text{Fem}}$  would<sub>1Sg}</sub> speak-Past-Fem,Sg  
 'I would have spoken' (with 1<sup>st</sup> person as Feminine)

- (26) Structure of Agreement (PF)

$\Phi_D$  = Person, Number

$\Phi_N$  = Gender, Number



23 The distribution of the feature clusters [Person + Number] and [Gender + Number] on Auxiliaries and Participles is discussed in more detail in VESELOVSKÁ (2002). Following this work we label the  $\varphi$  features as N-related ( $\varphi_N$ ) or D-related ( $\varphi_D$ ). The combination with Number is common to both of them (16). For an alternative analysis in a Distributed Morphology framework see PARROTT (2015). He concentrates on the Gender feature and does not analyse a possible discrepancy between Number on Auxiliary and on Participle.



Moreover, insertion in PF immediately explains why inflections as in (17) are the only bound morphemes that can be fused, i.e. can simultaneously express more than one grammatical feature. It is because they, unlike almost all free morphemes and the bound morphemes in (15), are not subject to the LF Interface Condition (that is, the Agglutinative Ideal of ANDERSON 1982).

We can go further. According to the T-model of derivations based on CHOMSKY - LASNIK (1977), cross-classification by 'true inflections', in essence Humboldt's agreements, are located in what is broadly construed as Phonological Form. In fact, cross-classification of features has been the hallmark of formal phonology, i.e. processes of sound structure, from the beginning of generative grammar and was taken over from the pioneering work of Jakobson and Trubetskoy. It is thus no accident that the basic segments of Phonology, which are outside of narrow syntax, also crucially display and motivate cross-classification of distinctive features.

For us, the rationale of all cross-classification, both phonological and syntactic, is based on its being exterior to narrow syntax. That is, it is an economic option that can occur in any part of a derivation not subject to the Logical Form Interface Condition (21). Thus, finally, its late ordering in PF explains why true inflections are always on the outside of a word, forming the *right-most* part of a lexical word.

To conclude, we propose to redefine the traditional taxonomy of bound grammatical morphemes in terms of the derivational process. So called 'inflectional' morphology is the morphology inserted into structures at PF, and so called 'derivational' morphology is the morphology inserted in the same structures before PF. Because both these groups of morphemes are listed in the grammatical lexicon (the Syntacticon), they are subject to Borer's Conjecture, i.e. they are language specific. In all languages, however, their status is fully characterizable, i.e. linguistic theory predicts their specific formal characteristics, several of which have been discussed in this paper.

## 5. A note about methodology and conclusions

Staying strictly within the logic of this article, we could say that the Agglutinative Ideal and the LF Interface Condition play the role of an irrefutable core of our research program, in the sense of LAKATOS (1978). Alternative Realization is then what he terms an Auxiliary Hypothesis that accounts for what remain as 'anomalies' that at first seem inconsistent with the Agglutinative Ideal for bound morphemes, e.g. in the framework of Cartographic research.

The essence of Lakatos's methodology of progressive scientific research programs is that auxiliary hypotheses are required to predict new and startling results not accounted for directly by a research program's irrefutable core. In fact, the explanatory accounts provided by Alternative Realization in the last three

decades more than satisfy his requirement, i.e. that an Auxiliary Hypothesis in a progressive (rather than degenerate) research program explain novel and unexpected empirical patterns. Alternative Realization hence strongly confirms the core of the research program itself.

Another concluding point concerns determining whether cross-classification is a necessary as well as sufficient condition at PF on features expressed by morphemes and phonological segments that are not present in derivational domains of narrow syntax. In fact, nothing indicates that PF items must exhibit more than one feature, either in morpho-syntactic inflection or in phonology narrowly conceived. There is no obvious argument that cross-classifying features are needed on segments such as glottal stops, *h* in many languages (e.g. English), schwa vowels (e.g. French), null consonants (so-called mute *h* in French), or liquids in numerous languages (GOAD 1993). Similarly in morpho-syntax, there are well-justified alternatively realized features that seem to be unique properties of the morphemes that spell them out, e.g. applicative suffixes in Bantu and other languages, and the plural suffix on English nouns.<sup>24</sup> So it seems that nothing requires cross-classifying features outside narrow syntax; the only restriction is that narrow syntax forbids cross-classification.

Finally, we have also shown why agreement morphemes are on the ‘outside’ of a word (4), exterior to both classically termed derivation and the meaningful inflections that, by the RHR (7), are classed with derivation. The reason is that agreement inflections are inserted into words only at the last stage of a derivation, in PF. Since we have treated here only suffixes, not prefixes, we have accounted for why agreement suffixes always come last in a word that exhibits it.

More generally, the taxonomy of morphemes proposed in this study is based on the level of their insertion into the structure. The taxonomy suggests that inflection is best understood by returning to the original definition of inflection given by HUMBOLDT (1822), rather than in terms of later intuitive re-classifications. Our study shows that the traditional grouping of inflections in (1)-(2) that has come about through unformalized study of morphology has no status in a scientific linguistic theory.

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