DISTRIBUTED MORPHOLOGY

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Whenever a major revision to the architecture of UG is proposed, it takes some time for sufficient work to accumulate to allow evaluation of the viability of the proposal, as well as for its broad outlines to become familiar to those not immediately involved in the investigation. The introduction of Distributed Morphology (henceforth DM) in the early 1990s, by Morris Halle and Alec Marantz, is a case in point. In the four-year period since the first paper outlining the framework appeared, a reasonably substantial body of work has appeared, addressing some of the key issues raised by the revision. The goal of this article is to introduce the motivation and core assumptions for the framework, and at the same time provide some pointers to the recent work which revises and refines the basic DM proposal and increases its empirical coverage. Since the particular issues we discuss cover such a broad range of territory, we do not attempt to provide complete summaries of individual papers, nor, for the most part, do we attempt to relate the discussion of particular issues to the much broader range of work that has been done in the general arena. What we hope to do is allow some insight into (and foster some discussion of) the attitude that DM takes on specific issues, with some illustrative empirical examples.

This article is organized as follows. Section 1 sketches the layout of the grammar and discusses the division of labor between its components. The "distributed" of Distributed Morphology refers to the separation of properties which in other theories are collected in the lexicon, and in section 1 we elaborate on the motivation for this separation and its particulars. Section 2 explicates the mechanisms of Spell-Out, giving examples of competition among phonological forms from Dutch, introducing the notion of a morpheme and morphological categories, and distinguishing allomorphy from suppletion with examples from English. Section 3 discusses the operations which are available in the Morphology component, addressing in turn Morphological Merger, Impoverishment and Fission, and within morphology enter into the same types of constituent structures (such as can be diagrammed through binary branching trees). DM is piece-based in the sense that the elements of both syntax and of morphology are understood as discrete constituents instead of as (the results of) morphophonological processes.

1.1. The Lexicalist Hypothesis and DM

There is no lexicon in DM in the sense familiar from generative grammar of the 1970s and 1980s. In other words, DM unequivocally rejects the Lexicalist Hypothesis. The jobs assigned to the Lexicon component in earlier theories are distributed through various other components. For linguists committed to the Lexicalist Hypothesis, this aspect of DM may be the most difficult to accept, but it is nevertheless a central tenet of the theory. (For discussion of this issue from a Lexicalist viewpoint, see Zwicky & Pullum 1992.)

The fullest exposition of the anti-Lexicalist stance in DM is found in Marantz (1997a). There, Marantz argues against the notion of a generative lexicon, adopted in such representative examples of the Lexicalist Hypothesis as Selkirk (1982) or DiSculfo and Williams (1987), using arguments from the very paper which is usually taken to be the source of the Lexicalist Hypothesis, Chomsky's (1970) 'Remarks on Nominalization'. Marantz points out that it is crucial for Chomsky's argument that, for instance, a process like causativization of an inchoative root is syntactic, not lexical. Chomsky argues that roots like grow or amuse must be inserted in a causative syntax, in order to derive their causative forms. If their causative forms were lexically derived, nothing should prevent the realization of the causativized stem in a nominal syntax, which the poorness of *John's growth of tomatoes indicates is impossible. Other lexicalist assumptions about the nature of lexical representations, Marantz notes, are simply unproven: no demonstration has been made of correspondence between a phonological "word" and a privileged type of unanalyzable meaning in the semantics or status as a terminal node in the syntax, and counterexamples to any simplistic assertion of such a correspondence are easy to find.

Because there is no lexicon in DM, the term "lexical item" has no significance in the theory, nor can anything be said to "happen in the lexicon", and neither can anything be said to be "lexical" or "lexicalized". Because of the great many tasks which the lexicon was supposed to perform, the terms "lexical" and "lexicalized" are in fact ambiguous. (For a discussion of terminology, see Aronoff 1994.) Here we note a few of the more usual assumptions about lexicalization, and indicate their status in the DM model:

1 Lexicalized = Idiomatized. Because the lexicon was supposed to be a storehouse for sound-meaning correspondences, if an expression is conventionally said to be "lexicalized" the intended meaning may be that the expression is listed with a specialized meaning.
In DM such an expression is an **idiom** and requires an *encyclopedia entry* (see 1.4). There is no “word-sized” unit which has a special status with respect to the idiomatization process. However, the zero size may have particular interpretations in particular environments, while expressions consisting of many words which obviously have a complex internal syntax may equally be constructed. DM also distinguishes between two sets of morphemes: *l-morphemes* and *f-morphemes*. The former are defined as the root structure of expressions, which in its turn is defined (by syntactic and semantic features made available by Universal Grammar) as suffixed by a single l-morpheme, or Root. A l-morpheme is, properly speaking, a morpheme which divides phonology into a pre-syntactic and post-syntactic module. While Lexical Phonology and Morphology produced many important insights, DM denies that these results require an architecture of grammar which divides phonology into a pre-syntactic and post-syntactic module (see also Sprout 1985). Rather, post-syntactic phonology itself may have a complex internal structure (Halle & Vergnaud 1987).

1.2. The status of Vocabulary Items and the *lexical* / functional distinction

In DM, the term *Vocabulary Item* properly refers to a syntactic (or morphological) terminal node and its content, not to the phonological expression of that terminal, which is provided as part of a Vocabulary Item. Morphemes are thus the atomic units of morphosyntactic representation. The content of a morpheme active in syntax consists of syntactic-semantic features drawn from the set made available by Universal Grammar. A Vocabulary Item is, properly speaking, a relation between a phonological string or “piece” and information about where that piece may be inserted. Vocabulary Items provide the set of phonological signals available in a language for the expression of abstract morphemes. The set of phonological signals available by Universal Grammar. Co-semantic features drawn from the set made available by Universal Grammar. Vocabulary Items provide the set of phonological signals available in a language for the expression of abstract morphemes. The set of phonological signals available in a language for the expression of abstract morphemes.

The notion of “idiom” in DM, obviously, embraces much more than the conventional use of the term it implies. Idioms in the conventional sense — that is, groups of words in a particular syntactic arrangement which receive a special interpretation, for example, *kick the bucket* — are not the English default expression of abstract morphemes, whose morphological expression was fixed, and abstract morphemes, whose phonological expression was delayed until after syntax. More current work in DM, however, endorses Late Insertion of all phonological content, so Halle’s earlier concrete vs. abstract distinction is no longer tenable. Harley & Noyer (1998a) propose an alternative to the concrete vs. abstract distinction; they suggest that morphemes are of two basic kinds: *f-morphemes* and *l-morphemes*, corresponding to abstract morphological components, such as between functional and lexical categories, or closed-class and open-class categories. *F-morphemes* are defined as morphemes for which there is a unique phonological expression as to Vocabulary insertion; the spell-out of an f-morpheme is determinsitic. In other words, *f-morphemes* are those whose content (as defined by syntactic and semantic features made available by Universal Grammar) suffices to determine a unique phonological expression. One prediction is that Vocabulary Items conventionally classified as “closed-class” should either express purely grammatical properties or else have meanings determined solely by universal cognitive categories (see 2.4 for further discussion).

In contrast, an *l-morpheme* is defined as one for which there is a choice in spell-out: an l-morpheme is fixed on a l-morpheme, and f-morpheme may be filled by a Vocabulary Item which may denote a language-specific concept. For example, in an l-morpheme whose syntactic position would traditionally define it as a noun, any of the Vocabulary Items *dog*, *cat*, *fish*, *mouse*, *table* etc. might be inserted. Note that because the conventional category labels noun, verb, adjective etc. are by hypothesis not present in syntax (l-morphemes being acategorial), the widely adopted hypothesis that Prosome and k-morphemes should be idiomatized is often dubious to such distinctions (Selkirk 1986; Chen 1987) follows automatically.

1.3. The syntactic determination of lexical categories

The conjecture we have just alluded to, which we will term the L-Morpheme Hypothesis, (Marcant 1997a; Embick 1997, 1998a, 1998b; Harley 1996, 1997; Harley & Noyer 1998a) contends that the traditional terms for sentence elements, such as noun, verb, and adjectve, have no universal significance and are essentially derivative from more basic morpheme types (see also Spanos 1995a, 1995b). Harley & Noyer (1998a) contends that the configurational definition of category labels is already implicit in Chomsky (1970).

Specifically, the different “parts of speech” can be defined as a single l-morpheme, or Root (to adopt the terminology of Pesetsky 1995), in certain local relations with category-defining f-morphemes. For example, a noun or a nominalization is a Root whose nearest c-commanding f-morpheme (or licensor) is a Determiner, a verb is a Root whose nearest c-commanding f-morphemes are v, Aspect and Tense; without Tense such a Root is simply a participle (Embick 1997; Harley & Noyer 1998b). Thus, the same Vocabulary Item may appear in different morphological categories depending on the syntactic context that the item’s l-morpheme (or Root) appears in. For a Root, the Vocabulary Item *destroy* is realized as a noun *destructor* (ion) when its nearest licensor is a Determiner, but the same Vocabulary Item is realized as a participle *destroy-ing* (ing) when its nearest licensors are Aspect and Tense, or its nearest f-morpheme is v. As noted above Aspect, when the participle becomes a verb such as *destroy* (s). However, it is probably the case that many different parts-of-speech labels correspond to language-specific features present after syntax which condition various morphological operations such as Impoverishment (see 1.1, 1.2) and Vocabulary Insertion.

1.4. Idioms: the content of the *Encyclopedia*

In DM, the Vocabulary is one list which contains some of the information which in *lexical* -theoretical systems is associated with the Lexicon. Another such list is the *Vocabulary Items* dictionary, which relates Vocabulary Items (sometimes in the context of other Vocabulary Items) to meanings. In other words, the Encyclopedia is the list of idioms in a language.

The term *idiom* is used to refer to any expression (even a single word or subpart of a word) whose meaning is not wholly predictable from its morphosyntactic structural description (Marcant, 1985, 1997a). F-morphemes are typically not idioms, but l-morphemes are always idioms.

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**2. Spell-Out**

Spell-Out inserts Vocabulary Items (phonological pieces) into morphemes. In the unmarked case, the relation between Vocabulary Items and morphemes is one-to-one, but as we have seen, several factors may disrupt this relation (Noyer 1997), including fission of morphemes, removal of morphosyntactic features by Impoverishment, local displacements of Vocabulary Items by Morphological Merger and post-syntactic insertion of associated morphemes.

Spell-Out works differently depending on what type of morpheme is being spelled out, *f*-morphemes or l-morphemes. Regardless of the type of morpheme, however, Spell-Out is normally taken to involve the association of phonological pieces (Vocabulary Items) with abstract morphemes. Halle (1992) constructs Spell-Out as the rewriting of a place-holder “Q” in a morpheme as phonological material. The operation is normally understood as cyclic, such that more deeply embedded morphemes are spelled-out first.

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2.1. Spell-Out of f-morphemes: the *Subset Principle*

Early work in DM was focused primarily on the spell-out of f-morphemes. In such cases sets of Vocabulary Items compete for insertion, subject to what Halle (1997) called the Subset Principle.

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1. Some idioms

| cat (a furry animal) |
| the veil (veils of a nun) |
| (rain) rats and dogs |
| (talk) turkey (honest discourse) |

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Lumsden 1987, 107 proposes a similar principle and calls it “Blocking”. Halle’s principle is not to be confused with the Substitution Principle of Manzini & Wexler 1987, which deals with learnability issues).

Substitution Principle

The phonological exponent of a Vocabulary Item is inserted into a morpheme... if the item matches all or a subset of the grammatical features specified in the terminal morpheme. Insertion does not take place if the Vocabulary Item contains features not present in the morpheme. When several Vocabulary Items meet the conditions for insertion, the item matching the greatest number of features specified in the terminal morpheme must be chosen.

Below, we give an example from Sauerland (1995):

In Dutch, after syntax, a dissociated morpheme (see section 3) is inserted as a right-adjunct of the morpheme in question and is labeled “adjectives”. The Vocabulary Items above compete for insertion into this morpheme. In the specific environment of the neuter singular, $\emptyset$ is inserted. In the remaining or elsewhere environment, $\text{e}$ is inserted. The insertion of $\emptyset$ in the specific environment bleeds the insertion of $\text{e}$ because, under normal circumstances, only a single Vocabulary Item may be inserted into a morpheme... if the item contains a phonological feature not present in the morpheme.

Note that all Vocabulary Items above are not specially stipulated to be disjunctive except insofar as they compete for insertion at the same morpheme.

Note that all Vocabulary Items may compete for insertion at any node; there is no pre-insertion separation of Vocabulary Items into “related” forms which may compete. However, since the insertion process is restricted by feature content, a certain collection of Vocabulary Items competing to the traditional notion of a “paradigm” may be the set under discussion when accounting for the phonological realization of a given terminal node. In some theories certain such collections have a privileged status or can be referred to by statements of the grammar (Carstairs 1987; Wunderlich 1996). But in DM, paradigms, like collections of related phrases or sentences, do not have any status as theoretical objects, although those morphemes which are conventionally labeled “adjectives”. The Vocabulary Items above and as outlined above, these structural relations typically determine the traditional notion of category. Nouns are licensed by an immediately c-commanding disjunctive verb phrase, such as unergatives, unaccusatives, and transitive verbs each are licensed by different structural configurations and relations to various higher eventuality projections.

Marantz (1997a) discusses the interesting case of l-morphemes which undergo apparent allomorphy in different environments, such as the rise/raise alternation. These pose a problem in that they appear to be in competition for insertion in different environments (that is, raise is inserted in the context of a commanding CAUSE head, while rise, the intransitive and nominal variant, is the elsewhere case). They cannot be separate Vocabulary Items... if the item should be a separate verb with the properties of the destroy class. The absence of nominalizations like $\text{John’s}$ pigs for bacon, however, indicate that raise is simply a morphophonological variant of the raise form. Rise, which is a member of the group class. That is, in DM, l-morpheme alternations like rise/raise must be determined by competition, as may be the case for allomorphy of f-morphemes... if the product of post-insertion readjustment rules.

DM, then, must recognize two different types of allomorphy: suppletive and morphophonological. Suppletive allomorphy occurs where different Vocabulary Items compete for insertion into an f-morpheme, as outlined in section 2.1 above. To give another example, Dutch nouns have (at least) two plural number suffixes, -en and -s. The conditions for the choice are partly phonological and partly idiosyncratic. Since $\text{en}$ and $\text{s}$ are not plausibly related phonologically, they must constitute two Vocabulary Items in competition.

Morphophonological allomorphy occurs where a single Vocabulary Item phonologically similar underlying forms, but where the similarity is not such that phonology can be directly responsible for the variation. For example, destroy and destruct represent stem allomorphs of a single Vocabulary Item; the latter allomorph occurs in the nominalization context. DM hypothesizes that in such cases there is a single basic allomorph, and the others are derived from it by a rule of Readjustment. The Readjustment in this case replaces the rime of the final syllable of destroy with -uct. (Alternatively such allomorphs might both be listed in the Vocabulary and be related by “morpholexical relations” in the sense of Lieber 1981.)

Traditionally it is often thought that there is a gradient between suppletion and other types of more phonologically regular allomorphy, and that no real evidence of a need to divide the two or if they should be divided at all. Marantz (1997b) has recently proposed that true suppletion occurs only for Vocabulary Items in competition for f-morphemes, since competition occurs only for f-morphemes. An immediate consequence of this proposal is that undeniably suppletive pairs like go/went or bad/worse must actually represent the spelling of f-morphemes. The class of f-morphemes is as a result considerably enriched, but since the class of f-morphemes is circumscribed by Universal Grammar, it is also predicted that true suppletion should be limited to universal syntactic-semantic categories. Moreover, given that some independent grounds might in this way divide suppletive from Readjustment-driven allomorphy, a theory of the range of possible Readjustment processes becomes more feasible.

In some theories certain such collections have a privileged status or can be referred to by statements of the grammar (Carstairs 1987; Wunderlich 1996). But in addition, DM employs several additional mechanisms in a post-syntax component, Morphological Structure.

Morphophonological description: $\text{[root [+pl]]}$

The morphonastic structure of an expression is generated by several mechanisms. Syntax, using conventional operations such as head movement, plays a major role in constructing morphonastic structures, and syntactic lowering may be considered a dissociated morpheme. For a full exposition of the mechanism of dissociated morpheme insertion, see Embick (1997).

Second, the constituent structure of morphemes may be modified by Morphological Merger, which can effect relatively local morpheme dispositions.

2.3. Spell-Out of l-morphemes: competition, suppletion and allomorphy

For l-morphemes there is a choice regarding morphophonological allomorphy. In DM any given expression acquires at least two structural descriptions during its derivation. In a morphonastic description, an expression’s phonological pieces (its Vocabulary Items) and their constituent structure are displayed. In a morphonastic description, an expression’s morphemes and their constituent structure are displayed.

3. Manipulating structured expressions: morphophonological operations

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3.1. Merger

Morphological Merger, proposed first in Ma-

rantz (1984), was originally a principle of well-

formedness between levels of representation in

syntax. In Marantz (1988, 261) Merger was gen-

eralized as follows:

Morphological Merger

At any level of syntactic analysis (e.g., structure, phonological structure, structural description) any wordform may be replaced by (expressed by) the affixation of the lexical head of X to the lexical head of Y.

What Merger does is essentially “trade” or “ex-

change” a structural relation between two ele-

ments at one level of representation for a different structural relation at another level. The brack-

eting under adjacency is also proposed and dis-

cussed at length in Sprat 1985.)

Merger has different consequences depending upon the level of representation, all occurs at.

Where Merger applies in syntax proper it is essen-

tially Head Movement, adjoining a zero-level pro-

jection to a governing zero-level projection (Baker 1986). Cases of syntactic lowering may be a type of Merger as well, presumably occurring after syntax proper but before Vocabulary Insert-

tion, e.g., the Tense to verb affixation in English (see Bobaljik 1994) or perhaps C-to-I lowering in

Irish (McCloskey 1996).

The canonical use of Merger in Morphology is to express second-position effects. Embick & Noyer (in progress) hypothesize that where Merger involves particular Vocabulary Items (as opposed
Adjectival suffixes in Norwegian

In Norwegian, there is a three-way distinction (*e* → *ø* → *ø*) in adjectival suffixes in a "strong" syntactic position, but in the “weak” position one finds only *ø*. By hypothesis, it is not accidental that the affix *-e* is the Elsewhere affix in the strong context, and also appears everywhere in the weak context. Sauerland’s (1995) Impoverishment analysis of the weak paradigms captures this insight. He proposes the following set of Vocabulary Items:

\[(11) \]

Norwegian Vocabulary Items

\[
\begin{array}{c}
\text{Impoverishment} \\
\text{[neuter]} \rightarrow \Omega \\
\end{array}
\]

Impoverishment thus guarantees that neither the Vocabulary Items *t* nor *ø* can be inserted, since both reveal explicit reference to a value for [neuter]. Insertion of the general case, namely *-e*, follows automatically.

As we have noted above, in Bonet’s original proposal (1991) and in several subsequent works (Harley 1994; Harris 1997; Ritter & Harley 1998), morphosynthetic features are arranged in a feature geometry much like phonological features, and Impoverishment is represented as delinking. Consequently, the delinking of certain features entails the delinking of features dependent on them. For example, if person features dominate number features which in turn dominate gender features, then the Impoverishment (delinking) of number entails the delinking of gender as well:

\[(12) \]

Impoverishment as delinking

\[
\text{[neuter]} \rightarrow \Omega
\]

Noyer’s (1997) rejects the use of geometries of this sort as too restrictive, and proposes instead that Impoverishment be better understood as feature co-occurrence restrictions or filters of the type employed by Calabrese (1995) for phonological segment inventories. For example, the absence of a first person dual in Arabic is represented as the filter [*1 dual], and a Universal Hierarchical of Features dictates that where these features combine, because [dual] is a number feature and [1] is a (hierarchically higher) person feature, [dual] is deleted automatically, since ‘cure’ morphosynthetic features are arranged in a feature geometry much like phonological features, and Impoverishment is represented as delinking. Consequently, the delinking of certain features entails the delinking of features dependent on them. For example, if person features dominate number features which in turn dominate gender features, then the Impoverishment (delinking) of number entails the delinking of gender as well:

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Feature-changing Impoverishment, which as a device has approximately the same power as Rules of Referal ([Zwicky 1985b; Stump 1995]), has in general been eschewed in DM. However, Noyer (1998a) discusses cases where feature-changing readjustments seem necessary. It is proposed that such cases always involve a change from the more marked value of a feature to the less marked value and never vice versa.

### 3.3. Fission and Feature Discharge

Fission was originally proposed in Noyer (1997) to account for situations in which a single morpheme may correspond to more than one Vocabulary Item. In the normal situation, only one Vocabulary Item may be inserted into any given morpheme. But where fission occurs, Vocabulary Insertion does not stop after a single Vocabulary Item is inserted. Rather, Vocabulary Items accumulate on the shelf of the fissioned morpheme until all Vocabulary Items which can be inserted have been, or all features of the morpheme have been discharged. A feature is said to be discharged when the insertion of a Vocabulary Item is conditioned by the presence of that feature.

However, Noyer (1997) argues that features conditioning the insertion of a Vocabulary Item come in two types. A Vocabulary Item primarily expresses certain features in its entry, but it may be said to secondarily express certain other features. This distinction corresponds (approximately) to the distinction between primary and secondary exponent (Carstairs 1987). Only features which are primarily expressed by a Vocabulary Item are discharged by the insertion of that Item.

For example, in the prefix-conjugation of Tamazight Berber, the AGR morpheme can appear as one of two forms, and these may appear as prefixes or as suffixes:

\[(14) \]

Some features in the above Vocabulary Item list are in parentheses. This notation denotes that the Vocabulary Item in question can be inserted only if the parenthesized feature has already been discharged, whereas the features which are not in parentheses cannot already have been discharged if insertion is to occur. For example, *-m* can be inserted only on a verb to which *-t* has already been attached. Parentheses are thus used to denote features which are secondarily expressed by a Vocabulary Item, while ordinary features — those which a Vocabulary Item primarily expresses — are not parenthesized.

In a fissioned morpheme, Vocabulary Items are no longer in competition for a single position-of-exponent, i.e. for the position of the morpheme itself. Rather, an additional position-of-exponent is automatically made available whenever a Vocabulary Item is inserted (see Halle 1997 for a slightly different view).

A form like *t-dawa-n* ‘*to you* (FEM.PL)’ cure’ has three affixes, *-t*, *-n*, and *-Ø*. The affixes are added in an order determined by the Feature Hierarchy. Hence *t-‘2* is added first, then *-n* ‘plural’, and finally *-Ø* ‘female’. (In the feature-geometric approach of Harley (1988), fission detachs subtrees of the feature geometry and realizes them as separate affixes, giving much the same effect.)

A form like *n-dawa-‘we cure’ there is but one affix. By discharging the feature ‘1’, the insertion of *-n* ‘pl’ prevents the subsequent insertion of *-Ø*. This illustrates that two Vocabulary Items can be disjunctive not by competing for the same position-of-exponent, but rather by competing for the discharge of the same feature. Such cases are termed Discontinuous Bleeding.

### 3.4. Morphological processes and the predictions of a piece-based theory

DM is piece-based inasmuch as Vocabulary Items are considered discrete collections of phonological material and not (the result of) phonological processes (as in Anderson 1992). Nevertheless Readjustment can alter the shape of individual morphemes, the items in question must be string-adjacent. Such cases of Merger are called Local Dislocation. Schematically Local Dislocation looks like this:

\[(9) \]

Local Dislocation

\[
X (Y \rightarrow Y + X \rightarrow)\]

In Local Dislocation, a zero-level element trades its relation of adjacency to a following constituent with a relation of affixation to the linear head (peripheral zero-element) of that constituent. (Local Dislocation has also received considerable attention outside of DM from researchers working in Autolexical Syntax, see Sadock 1991.)

For example, Latin -que is a second-position clitic which adjoins to the left of the zero-level element to its right (8) (* represents the relation of string adjacency; Q represents disassociated morphemes).

By hypothesis, Prosodic Inversion (Halpern 1995) is a distinct species of Merger at the level of Phonological Form, and differs from Local Dislocation in that the affected elements are prosodic categories rather than morphological ones. For example, Schütze (1994), expanding on Zee & Inkelaar (1990), argues that the auxiliary clitic je in Serbo-Croatian is syntactically in C, but inverts with the following phonological word by Prosodic Inversion at Phonological Form (parentheses below denote phonological word boundaries):

\[(10) \]

Serbo-Croatian second-position clitics

\[
\text{Morphological structure after Spell-Out}\]

\[
\text{Parse into}\]

\[
\text{phonological words je (U ovoj) (nodi) (klavir) Prosodic inversion (U ovoj) je (nodi) (klavir) In this aux room piano In this room is the piano}
\]

The positioning of the clitic cannot be stated in terms of a (morpho)syntactic constituent, since *U ovoj* ‘in this’ does not form such a constituent. Embick & Izvorski (1995) specifically argue that syntactic explanations, including those involving remnant extraposition, cannot reasonably be held accountable for this pattern.

For example, it should be emphasized that the extent to which Local Dislocation and Prosodic Inversion are distinct devices in the mapping to Phonological Form remains controversial, with many researchers seeking to reduce the two to a purely prosodic or a purely syntactic mechanism.

#### 3.2. Impoverishment

Impoverishment, first proposed in Bonet (1991), is an operation on the constituent morphemes prior to Spell-Out. In early work in DM, Impoverishment simply involved the deletion of morphosynthetic features from morphemes in certain contexts. When certain features are deleted, the insertion of Vocabulary Items requiring those features for insertion cannot occur, and a less specified item will be inserted instead. Halle & Marantz (1994) termed this ‘the Retreat to the General Case’.

\[(11) \]

Adjectival suffixes in Norwegian (Sauerland 1995)

\[
\text{STRONG} \rightarrow \bullet[\text{neuter}] \rightarrow \text{[+neuter]}
\]

\[
\text{WEAK} \rightarrow \bullet[\text{neuter}] \rightarrow \text{[+neuter]}
\]

In Norwegian, there is a three-way distinction (*e* → *ø* → *ø*) in adjectival suffixes in a ‘strong”
Vocabulary Items in appropriate contexts. Two factors thus distinguish DM from process-only theories of morphology.

First, since Readjustment can affect only individual Vocabulary Items in a given context, it is more than one Vocabulary Item at once, it is predicted that "process" morphology is always a kind of allomorphy (see also Lieber 1981). For example, Marantz (1992) shows that truncation applies to (Papago) O'dhám verb stems to produce a separate subpart allomorph; it does not affect more than one Vocabulary Item at once.

Second, since processes produce allomorphs but do not directly "discharge" features, it is common for the same morphological vowel in different contexts of use. For example, in O'dhám the truncated verb stem allomorph has several functions, including but not limited to its use in the perfective form, and the property of perfectivity is primarily expressed in another morpheme, namely an affix on the syntactic auxiliary. It is therefore incorrect to directly equate truncation and the perfective; rather, truncation applies to verb stems which appear as free forms, whereas formation of subparts allomorphs conforms to the viewpoint of Lieber (1981).

Since process-morphology can in principle apply to any subpart of the total morphological derivation, it is predicted in that theory that a language could mark the category Plural by deletion of a final syllable, regardless of whether that syllable consisted of one or several discrete phonological pieces. Consider "Martian:" below.

(15)

 Singular and plural nouns in the pseudo-language "Martian:" singular plural takata taka "earthling" takata-ri takata-"earthling-GEN' laami laa 'antenna' jankap-ri janka 'flying saucer-GEN' zuuk-ri zuu 'canal-GEN' vu-n-yi vuu-"canal waving" meng-i merg "canal digging" meng-i-ri merg-"canal digging-GEN'

In "Martian," nominalizations can be formed from noun stems by addition of the suffix -(i) and genitives with the suffix -(ri). The final syllable of the derivation of a noun, the plural is always either a truncation of the last syllable of the singular, or suppletive (zuuk-zuuk-ri). The truncated form never occurs anywhere else except in plurals. Number marking has no other expression than truncation.

The "Martian" rule of plural formation is easy to express in a process-morphology; instead of adding an affix one simply deletes the final syllable. In DM however, this language could never be generated, because processes like "delete the final syllable" could only be expressed as Readjustments (or morphological relations) which affect individual Vocabulary Items.

4. Syntax and morphology

As noted in section 1, DM adopts a strictly syntactic account of word-formation; structuring of the morphosyntactic feature primitives is performed by the syntactic structure-forming operations. Features which will eventually be realized as a subpart of a phonological word are treated no differently from features which will eventually be realized as an autonomous word. The phonological realization of features is accomplished by a distinct set of operations at Insertion and afterwards. That is, DM adopts a variety of Separationism.

4.1. Separationism

Separationism characterizes theories of morphology in which the mechanisms for producing the form of syntactic-semantic features and their phonological realizations are separated from, and not necessarily in a simple correspondence with, the mechanisms which produce the form ("spelling") of the corresponding phonological expressions. Lexeme-Morpheme Base Morphology developed by Robert Beard (e.g. Beard 1995) is another example of a Separationist model, but differs principally from DM in its endorsement of the "lexeme" as a privileged unit in the grammar.

Theories endorsing Separationism are attractive because (a) they allow similar syntactico-semantic forms to be derived in different ways phonologically and (b) they permit polyfunctionality of phonological expressions: a single phonological piece (e.g. the English affix -(s)) might correspond to a set of distinct and unrelated syntactico-semantic functions (e.g. 'past tense', 'plural', etc.).

Theories endorsing Separationism, on the other hand, are unattractive for exactly the same reasons as above: when unconstrained, they fail to make any interesting predictions about the degree to which syntactico-semantic and phonological features can diverge. See Embick (1997, 1998a, 1998b) for a discussion of how Separationism could be constrained in DM.

4.2. Morphosyntactic features and terminal nodes

In the early 1990s some linguists looked on with apprehension at the "explosion" of Infl and the increasing elaboration of clause structure. It is therefore worth noting that the DM does not necessarily entail a complex clausal architecture simply because morphosyntactic features are manipulated by the syntax. In general, these departures are considered marked options within a grammar, and therefore are assumed to require (substantial) positive evidence during acquisition.

4.3. Theta-assignment

Most work in DM does not recognize a set of discrete thematic roles. Instead, following the insights of Hale & Keyser (1993, 1998), thematic roles are reduced to formal configurations. For example, Harley (1995) proposes that 'Agent' is a thematic role which can refer to any argument projected into the syntactic auxiliary. It is therefore incorrect to apply any string, regardless of its morphological or syntactico-semantic functions, to which syntactico-semantic and phonological words. Nevertheless, these departures are worth noting that the DM does not necessarily entail a complex clausal architecture simply because morphosyntactic features are manipulated by the syntax. In general, these departures are considered marked options within a grammar, and therefore are assumed to require (substantial) positive evidence during acquisition.

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5. An agenda for future research

The research program envisioned by Distributed Morphology encompasses a great many aspects of the theory of grammar. Thus, the agenda for future research with which we conclude here touches upon what we feel are some of the most pressing questions in contemporary syntactic and morphological work. We have divided the agenda into three headings.

5.1. Syntactic categories and the architecture of grammar

As noted, DM denies that syntactic categories necessarily stand in any simple relation to traditional parts-of-speech such as nouns and verbs; moreover, DM denies that the syntactic categories and morphological word-formation manipulate such semantic forms to be realized in quite different linguistic validity, if any, of traditional part-of-speech labels in universal syntax. Second, how do these categories relate to the increasing elaboration of clause structure. It is therefore incorrect to apply any string, regardless of its morphological or syntactico-semantic functions, to which syntactico-semantic and phonological words. Nevertheless, these departures are considered marked options within a grammar, and therefore are assumed to require (substantial) positive evidence during acquisition.

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5.2. Spell-Out

A number of researchers in DM have accepted the traditional view that morphosyntactic features have markedness properties or are aligned into hierarchies of various sorts. Open questions which DM in fact shares with all theories of morphology — currently include what the set of universal morphosyntactic features is and what, if any, are their universal markedness properties, as well as how these are represented (e.g. in a geometry, in a list, or in some other way).

Spell-Out of morphemes may be conditioned by properties in nearby morphemes, and so an important issue is the syntagmatic (locality) constraints on Spell-Out, that is, how close structural- ly a morpheme has to be to another to influence the other’s Spell-Out. Similarly, opinion remains divided as to whether the outcome of a competition for the Interface Items for positions may be settled by means of a hierarchy of features or can be stipulated.

Finally, not all morphemes are present in syntax proper, but some are purely morphological, reflecting syntactic configurations or properties. Which morphemes, then, are inserted after syntax and what kind of limitations are placed on morpheme-insertion?

5.3. Operations

Impoverishment, Fission and Morphological Merger are the chief novel operations proposed in DM for the Morphological component, and questions remain open about each. Is impoverishment constrained to reduce markedness only, and if not, does it differ fundamentally from Rules of Referral (Zwicky 1985b; Stump 1993)? What are the syntagmatic (locality) constraints on the operation of Impoverishment? Is the mechanism of morpheme fission, in which positions are automatically generated as needed for the insertion of features, really necessary, and if so, under what conditions is morpheme fission undergone? How many types of morphological Merger are there and how do they differ? Can Merger be reduced to a purely syntactic or purely phonological mechanism?

The task of morphophonology, Marantz’s conjecture that true spellout is limited to f-phonemes prompts a search for non-stipulative criteria dividing suppletion from Readjustment. Once these criteria are factored out, the possibility arises for an interesting theory of Readjustment allomorphy based on the degree of relatedness between allomorphs necessary for these to be ascribed as variants of the same Vocabulary Item.

6. Conclusion

We have presented DM’s primary theoretical assumptions, provided some concrete illustration of the implementation of certain of its mechanisms, and proposed an agenda for future research. Although we have touched on a large array of topics in current morphological theory, we cannot claim to have fully elucidated the advantages of DM relative to its competitors, nor have we exhausted the historical bases for many of its tenets. Instead, we hope that our exposition will provide the groundwork for an informed discussion of DM’s contribution to the theory of grammar. Interested readers should consult the following bibliography of representative works within DM as well as important alternative approaches to the issues that stimulated the DM research program.

A Distributed Morphology Bibliography


Distributed Morphology recognizes a number of morphology-specific operations that occur post-syntactically. There is no consensus about the order of application of these morphological operations with respect to vocabulary insertion, and it is generally believed that certain operations apply before vocabulary insertion, while others apply to the vocabulary items themselves.[3] For example, Embick and Noyer (2001)[8] argue that Lowering applies before Vocabulary insertion, while Local Dislocation applies afterwards. In Distributed Morphology, the abstract morphemes that comprise words are held to be completely empty of phonological information until after the syntactic component has finished manipulating them.Â Core properties. There are three main properties which distinguish Distributed Morphology from other theories[1]: Late Insertion. Phonological information is inserted into syntactic structure only after all syntactic operations have applied.