Distributed Morphology:

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What is Distributed Morphology?

Distributed Morphology (DM) is a theory of the architecture of grammar first proposed in the early 1990s at MIT by Morris Halle, Alec Marantz and their students and colleagues including Eulalia Bonet, Rolf Noyer, Jim Harris, Heidi Harley, Andrea Calabrese, David Embick and others. The locus classicus for DM is Halle & Marantz 1993, 1994. For further literature see How can I find out more about DM?

How is DM different from other theories of the architecture of grammar?

Although there are numerous hypotheses and directions in current DM research, three core properties define the theory: **Late Insertion**, **Underspecification**, and **Syntactic Hierarchical Structure All the Way Down**.

Late Insertion
refers to the hypothesis that the phonological expression of syntactic terminals is in all cases provided in the mapping to Phonological Form (PF). In other words, syntactic categories are purely abstract, having no phonological content. Only after syntax are phonological expressions, called Vocabulary Items, inserted in a process called Spell-Out.

Underspecification of Vocabulary items
means that phonological expressions need not be fully specified for the syntactic positions where they can be inserted. Hence there is no need for the phonological pieces of a word to supply the morphosyntactic features of that word; rather Vocabulary items are in many instances default signals inserted where no more specific form is available.

Syntactic Hierarchical Structure All the Way Down entails that elements within syntax 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 instead of as (the results of) morphophonological processes.

What happened to the Lexicon?

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 understand or to accept, but it is nevertheless a central tenet of the theory.

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', nor 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 (Aronoff 1994).

Lexical(ized) = Idiomatized. Because the Lexicon was supposed to be a storehouse for sound-meaning correspondences, if an expression is 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.

Lexical(ized) = Not constructed by Syntax. The internal structure of expressions is not always a product of syntactic operations. In DM structure can be produced both in syntax and after syntax in a component called **Morphology** (see How are the pieces of words put together?). Nevertheless, because of 'Syntactic Hierarchical Structure all the Way Down', operations within Morphology still manipulate what are essentially syntactic structural relations.

Lexical(ized) = Not subject to exceptionless phonological processes, i.e. part of 'lexical' phonology in the theory of Lexical Phonology and Morphology (Kiparsky 1982 et seq.).

In DM the distinction between two types of phonology -- 'lexical' and 'postlexical' -- is abandoned. All phonology occurs in a single 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. Rather, post-syntactic Phonology itself may have a complex internal structure (Halle & Vergnaud 1987).

What are morphemes?

In DM, the term **morpheme**
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 atoms of morphosyntactic representation. The content of a morpheme active in syntax consists of syntactico-semantic features drawn from a set made available by Universal Grammar.

What are Vocabulary items?

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 all Vocabulary Items is called the **Vocabulary**.

Vocabulary item schema

```
       signal          <-->  context of insertion
(phonological exponent)
```

Example vocabulary items

```
/i/  <-->  [___, +plural]
```

A Russian affix (Halle 1997)

```
/n/  <-->  [___, +participant +speaker, plural]
```

A clitic in Barceloni Catalan (Harris 1997a)

```
/y-/  <--> elsewhere
```

An affix in the Ugaritic prefix conjugation (Noyer 1997)

```
zero  <--> 2 plu
```

A subpart of a clitic in Iberian Spanish (Harris 1994)

Note that the phonological content of a Vocabulary item may any phonological string, *including* zero or 'null'. The featural content or context of insertion may be similarly devoid of information: in such cases we speak of the default or **elsewhere** Vocabulary item.

What kinds of morphemes are there?

In early work in DM, Halle 1992 proposed a distinction between *concrete* morphemes, whose phonological expression was fixed, and *abstract* morphemes, whose phonological expression was delayed until after syntax. Canonical DM however endorses Late Insertion of all phonological expression, so Halle's earlier concrete vs. abstract distinction has been modified in recent work.

Harley & Noyer 1998 propose that morphemes are of two basic kinds: f-morphemes and l-morphemes, corresponding approximately to the conventional division between functional and lexical categories.

F-morphemes
are defined as morphemes for which there is no choice as to Vocabulary insertion. In othe words, f-morphemes are those whose content suffices to determine a unique phonological expression. The spell-out of an f-morpheme is said to be *deterministic*.

In contrast, an **l-morpheme**
is defined as one for which there is a choice in spell-out. For example, in an l-morpheme corresponding to what would be pretheoretically called a 'noun' there might be inserted the pieces *dog, cat, fish, mouse, table* etc. Because the labels *noun, verb, adjective* etc. are by hypothesis not present in syntax, the widely adopted hypothesis that Prosodic Domain construction should be oblivious to such distinctions (Selkirk 1986, Chen 1987) follows automatically.

Does DM use conventional syntactic categories like Noun and Verb?

A related hypothesis (Marantz 1997a, Embick 1997, 1998a, 1998b, Harley & Noyer 1998, to appear) contends that the traditional terms for sentence elements, such as *noun, verb, adjective* have no universal significance and are essentially derivative from more basic morpheme types (see also Sapir 1921, ch. 5). Marantz 1997a contends that the configurational definition of category labels is already implicit in Chomsky 1970, and that Chomsky's classic arguments in 'Remarks on Nominalization' do not in fact entail the Lexicalist Hypothesis as later interpreted.

Specifically, the different 'parts of speech' can be defined as a single l-morpheme type, called **Root** (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 licenser) 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'.

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 example, the Vocabulary item *destroy* appears as a 'noun' *destruct-(ion)* when its nearest licenser is a Determiner, but the same Vocabulary item appears as a 'participle' *destroy-(ing)* when its nearest licensers are Aspect and v; if Tense appears immediately above Aspect, then the 'participle' becomes a 'verb' such as *destroy-(s)*.

However, it is probably the case that many traditional parts of speech labels correspond to language-specific features present after syntax conditioning various morphological operations such as Impoverishment and Vocabulary Insertion.

How are the pieces of words put together?

This is really two questions, depending on what is meant by a 'piece of a word.' In DM any given expression acquires at least two structural descriptions during its derivation. In a **morphophonological description**, an expression's phonological pieces (its Vocabulary items) and their constituent structure are displayed. In a **morphosyntactic description**, an expression's morphemes and their constituent structure are displayed.

> The expression *cows:*
>
> ```
> Morphosyntactic description:    [Root [+plural]]
>
> Morphophonological description: [kaw+ z]
> ```

How are the morphemes of an expression put together?

The morphosyntactic structure of an expression is generated by several mechanisms. Syntax, including the operation of head-movement, plays a major role in constructing morphosyntactic structures, including 'word'-internal structure. But in addition, DM employs several additional mechanisms.

Dissociated Morphemes. First, morphemes such as 'passive' or 'case' (in some instances, see Marantz 1991) which, by hypothesis, do not figure in syntax proper, can be inserted after syntax but before Spell-Out. These morphemes, which only indirectly reflect syntactic structures, are called *Dissociated* morphemes (Embick 1997).

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

How are the phonological pieces of an expression put together?

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 several factors may disrupt this relation (Noyer 1997), including Fission of morphemes and local displacements of Vocabulary items by Morphological Merger.

Is there a syntactic terminal for every piece of a word? Don't we have too many functional projections already?

In the early 1990s some linguists looked on with apprehension at the 'explosion' of INFL and the proposal of more and more new syntactic projections. In DM, because dissociated morphemes can be inserted after Syntax, not every morpheme corresponds to a syntactic terminal. Rather it remains as always an open question what the set of syntactic terminals is and how these relate to the morphophonological form of an utterance. In addition, Fission of morphemes during Spell-out in some cases allows multiple phonological pieces to

correspond to single morphemes, further obscuring the morphosyntactic structure. Nevertheless, these departures are considered marked options within a grammar, and therefore are assumed to require (substantial) positive evidence during acquisition.

What are idioms in DM?

The term **idiom**
is used to refer to any expression (even a single word or subpart of a word) whose meaning is not wholly the predictable from its morphosyntactic structural description (Marantz 1995, 1997a). F-morphemes are typically not idioms, but l-morphemes are always idioms.

Some idioms

cat	(a fuzzy animal)
(the) veil	(vows of a nun)
(rain) cats and dogs	(a lot)
(talk) turkey	(honest discourse)

For an alternative, non-DM analysis of idioms, see Jackendoff 1997.

What is the Encyclopedia?

The **Encyclopedia** contains Encyclopedia entries; these relate 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.

If Vocabulary insertion does not occur until after syntax, and Vocabulary is not present at LF, how is the meaning of expressions determined?

The meaning of an expression is interpreted from the entire derivation of that expression. LF does not express or represent meaning; LF is merely a level of representation which exhibits certain meaning-related structural relations, such as quantifier scope. See Marantz 1995.

Do theta-roles figure in DM?

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 structural configurations. For example, Harley 1995
proposes that Agent is the interpretation given to any argument projected into the specifier of Event Phrase (see alsoTravis 1994 on "Event Phrase", and Kratzer 1996 for related ideas). Theme is the interpretation given to any argument projected as a sister of Root. Unlike Hale & Keyser 1993, however, DM does not differentiate between an 'l-syntax' occuring in the Lexicon and a regular 's-syntax.' Both are simply one module, Syntax. See also Marantz 1997a.

How does Spell-Out work?

Spell-Out, also called **Vocabulary Insertion**, 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
construes Spell-Out as the rewriting of a place-holder 'Q' in a morpheme as phonological material. This operation is normally understood as **cyclic**, such that more deeply embedded morphemes are spell-out first.

How does Spell-Out of f-morphemes work?

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 the Subset Principle (Halle 1997).

> **Subset 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. Where several Vocabulary items meet the conditions for insertion, the item matching the greatest number of features specified in the terminal morpheme must be chosen.'
>
> Example (Sauerland 1995).
>
> *Dutch strong adjectival desinences*

```
       [-neuter] [+neuter]
[-pl]     -e        zero
[+pl]     -e        -e
```

> *Vocabulary Items*

```
zero  <-->  [___, +neuter -plural] /  Adj + ____
-e    <-->   Adj + ____
```

In Dutch, after syntax, a dissociated morpheme
is inserted as a right-adjunct of morphemes which are conventionally labeled 'adjectives.' The Vocabulary items above compete for insertion into this morpheme. In the specific environment of the neuter singular, zero is inserted. In the remaining or elsewhere environment *-e* is inserted. The insertion of zero in the specific environment bleeds the insertion of *-e* because, under normal circumstances, only a single Vocabulary Item may be inserted into a morpheme. Note that the Vocabulary items above are not specially stipulated to be disjunctive except insofar as they compete for insertion at the same morpheme.

How does Spell-Out of l-morphemes work?

For l-morphemes there is a choice regarding which Vocabulary item is inserted. For example, a Root morpheme in an appropriately local relation to a Determiner might be filled by *cat*, *dog*, *house*, *table* or any other Vocabulary item we would normally call a 'noun.' Harley & Noyer 1998 propose that such

Vocabulary items are not in competition, as are the Vocabulary items inserted into f-morphemes. Rather, these Vocabulary items can be freely inserted at Spell-Out subject to conditions of **licensing**. Licensers are typically f-morphemes in certain structural relations to the Root where the Vocabulary item is inserted. 'Nouns' are licensed by Determiner; different verb classes, such as unergatives, unaccusatives, and transitives, each are licensed by different structural configurations and relations to various higher eventuality projections. See also Does DM use conventional syntactic categories like Noun and Verb?

Which Vocabulary item wins if the features of two Vocabulary items competing for insertion into the same morpheme are not in a subset/superset relation?

In some cases it would be possible to insert two (or more) Vocabulary items into the same morpheme, and the Subset Principle does not determine the winner. Two approaches have been proposed in DM for such cases. Halle & Marantz 1993
suggest that such conflicts are resolved by extrinsic ordering: one Vocabulary item is simply stipulated as the winner. Alternatively, Noyer 1997 proposes that such conflicts can always be resolved by appeal to a **Universal Hierarchy of Features** (cf. also Lumsden 1987, 1992, Zwicky 1977 and Silverstein 1976). Specifically, the Vocabulary Item that uniquely has the highest feature in the hierarchy is inserted.

> *Fragment of the Hierarchy of Features*
>
> ```
> 1 person > 2 person > dual > plural > other features
> ```

See also Harley 1994.

How is allomorphy obtained?

DM recognizes two different types of **allomorphy**: suppletive and morphophonological.

Suppletive allomorphy occurs where different Vocabulary items compete for insertion into an f-morpheme. For 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 *-en* and *-s* are not plausibly related phonologically, they must constitute two Vocabulary items in competition.

Morphophonological allomorphy
occurs where a single Vocabulary item has various 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.*

What criteria differentiate between Suppletion and Morphophonological Allomorphy?

Traditionally it is often thought that there is a gradient between suppletion

and other types of more phonologically regular allomorphy, and that no reasonable grounds can be given for how 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 (How does Spell-Out of l-morphemes work?). An immediate consequence 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 syntactico-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.

If DM is 'piece-based' how is 'process' morphology handled?

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 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 and not strings of these, 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'odham verb stems to produce a separate stem 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 an allomorph to have several contexts of use. For example, in Papago 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 in the perfective.

What kind of language would be possible in a process-based morphology but impossible in DM?

Since process-morphology can in principle apply to any string, regardless of its morphological derivation, it is predicted 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:

Singular and plural nouns in the pseudo-language 'Martian'

singular	plural	
takata	taka	earthling
takata-ri	takata	earthling-genitive
laami	laa	antenna

```
jankap      jan       flying saucer
jankap-ri   janka     flying saucer-genitive
zuuk        lorp      canal
zuuk-ri     zuu       canal-genitive
yuun-i      yuu       antenna waving
                        (cf. yuun 'wave antennas')
merg-i      mer       canal digging
                        (cf. merg  'dig a canal')
merg-i-ri   mergi     canal digging-genitive
```

In 'Martian', nominalizations can be formed from nouns stems by addition of the suffix (*-i*) and genitives with the suffix (*-ri*). Regardless of the derivation of a noun, the plural is always either a truncation of the last syllable of the singular, or suppletive (*zuuk ~ lorp*). 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 which affect individual Vocabulary items.

What is Morphological Merger?

Morphological Merger, proposed first in Marantz 1984, was originally a principle of well-formedness between levels of representation in syntax. In Marantz 1988:261 Merger was generalized as follows:

> *Morphological Merger*
> At any level of syntactic analysis (d-structure, s-structure, phonological structure), a relation between X and Y 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 'exchange' a structural relation between two elements at one level of representation for a different structural relation at a subsequent level.

Merger has different consequences depending upon the level of representation it occurs at. Where Merger applies in syntax proper it is the equivalent of **Head Movement**, adjoining a zero-level projection to a governing zero-level projection (Baker 1988). Syntactic **Lowering** may be a type of Merger as well, presumably occuring after syntax proper but before Vocabulary Insertion. See Bobaljik 1994.

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 to morphemes), the items in question must be string-adjacent; such cases of Merger are called **Local Dislocation**. Schematically Local Dislocation looks like this:

> *Local Dislocation:*
> `X [Y ... ] --> [Y + X ...`

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 (Sadock 1991).

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

```
[[A Q] [N-Q]]      [cl [[A-Q] [N-Q]]]              Mophological structure
[[bon i] [puer i]] [-que [[bon ae] [puell ae]]]    Vocabulary insertion
[[bon*i]*[puer*i]]*[-que* [[bon*ae]*[puell*ae]]]   Linearization
[[bon*i]*[puer*i]]* [[[bon*ae] *que] * [puell*ae]]] Local dislocation

good-nom.pl boy-nom.pl good-nom.pl-and girl-nom.pl
```

'Good boys and good girls'

By hypothesis, **Prosodic Inversion** (Halpern 1995) is a distinct species of Merger at the level of PF, and differs from Local Dislocation in that the affected elements are prosodic categories rather than morphological ones.

For example, Schuetze 1994, expanding on Zec & Inkelas 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 PF (parentheses below denote Phonological Word boundaries):

```
je [ [U ovoj sobi PP] klavir VP]     syntactic structure
je (U ovoj)(sobi)(klavir)            parse into Phonological Words
((U ovoj)+je)(sobi)(klavir)          Prosodic Inversion
In this AUX room piano

'In this room is the piano'
```

By hypothesis, 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. Izvorski & Embick 1995
specifically argue that syntactic explanations, including those involving remnant extraposition, cannot reasonably be held accountable for this pattern.

However, it should be emphasized that the extent to which Local Dislocation and Prosodic Inversion are distinct devices in the mapping to PF remains controversial.

What is Impoverishment?

Impoverishment, first proposed in Bonet 1991, is an operation on the contents of morphemes prior to Spell-Out. In early work in DM, Impoverishment simply involvedthe deletion of morphosyntactic 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 termed this the **Retreat to the General Case**.

> *Example* (Sauerland 1995).
> The adjectival sufixes in Norwegian.

```
STRONG [-neuter] [+neuter]
[-pl]     zero       t
[+pl]      e         e

WEAK   [-neuter] [+neuter]
[-pl]      e         e
[+pl]      e         e
```

In Norwegian, there is a three-way distinction (*t* ~ *e* ~ zero) in adjectival suffixes in a 'strong' syntactic position, but in the weak position one finds only *-e*. By hypothesis, it is not accidental that the same affix *-e* appears in the weak context as is the elsewhere or less marked affix in the strong context. Sauerland 1995 proposes the following set of Vocabulary items:

```
/t/    <-->  [___, -pl +neut] / Adj + ____
zero   <-->  [___, -pl -neut] / Adj + ____
/e/    <-->  elsewhere  / Adj + ____
```

In the weak syntactic position, a rule of Impoverishment applies, deleting any values for gender features:

```
[±neuter] --> null
```

Impoverishment thus guarantees that both the Vocabulary items *t*
and zero cannot be inserted, since both require explicit reference to a value for [±neuter]. Insertion of the general case, namely *-e*, follows automatically.

What kinds of Impoverishment rules are there?

In Bonet's original proposal (1991) and in several subsequent works (Harley 1994, Harris 1997a, Ritter & Harley 1998), morphosyntactic 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:

```
2   -->    2
|
=
|
pl
|
```

```
f
```

Noyer 1997
rejects the use of geometries of this sort as too restrictive, and proposes instead that Impoverishments are better understood as feature-cooccurrence 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 Hierarchy 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. Calabrese 1994 and 1996 further expand this idea.

The use of feature geometries in DM remains an unresolved issue at this time, but Feature Hierarchies, whether geometric or not, ensure that normally more marked feature values persist in contexts of neutralization.

Does Impoverishment ever involve rules that change morphosyntactic feature values?

Feature-changing Impoverishment, which as a device has approximately the same power as **Rules of Referral** (Zwicky 1985b, Stump 1993), has in general been eschewed in DM. However, Noyer 1998
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.

What is Fission?

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 accrete on the sister 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 **discharged** when the insertion of a Vocabulary item is primarily conditioned by that feature.

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

Tamazight Berber Prefix Conjugation. dawa 'cure'

	singular	plural
3m	*i-dawa*	*dawa-n*
3f	*t-dawa*	*dawa-n-t*
2m	*t-dawa-d*	*t-dawa-m*
2f	*t-dawa-d*	*t-dawa-n-t*
1	*dawa-g*	*n-dawa*

Vocabulary items

```
/n-/  <-->  1 pl
/-g/  <-->  1
/t-/  <-->  2
/t-/  <-->  3 sg f
/-m/  <-->  pl m (2)
/i-/  <-->  sg m
/-d/  <-->  sg (2)
/-n/  <-->  pl
/-t/  <-->  f
```

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

In a form like *t-dawa-n-t* 'you (fem pl) cure' has three affixes, *t-*, *-n,* and-*t.* The affixes are added in an order determined by the Feature Hierarchy. Hence *t-* '2' is added first, then *-n* 'plural', and finally *-t* 'feminine.'

In a form like *n-dawa* 'we cure' there is but one affix. By discharging the feature '1', the insertion of *n-* '1 pl' prevents the subsequent insertion of *-g* '1'. This illustrates that two Vocabulary items can be disjunctive not by competing for the same position-of-exponence, but rather by competing for the discharge of the same feature. Such cases are termed **Discontinuous Bleeding**.

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-* '2' has already been attached. Thus features conditioning the insertion of a Vocabulary item come in two types. A Vocabulary item **primarily** expresses the non-parenthesized features in its entry, but it **secondarily** expresses the parenthesized features (or any features belonging to other morphemes which are required for insertion of the item). In other words, the parenthesized features must be primarily expressed by some other Vocabulary item. This distinction corresponds (approximately) to the distinction between **primary and secondary exponence** (Carstairs 1987).

How do paradigms figure in the DM model?

A **paradigm** is a collection of related words; in some theories certain such collections have a privileged status and can be referred to by statements of the grammar. In DM paradigms, like collections of related phrases or sentences, do not have any status as theoretical objects, although certain regularities obtaining over paradigms may result from constraints operating during language acquisition.

What is Separationism?

Separationism
characterizes theories of morphology in which the mechanisms for producing the form of syntactico-semantically complex expressions are separated from, and not necessarily in a simple correspondence with, the mechanisms which produce the form ('spelling') of the correponding phonological expressions. DM endorses a variety of Separationism, as does Lexeme-Morpheme Base Morphology developed by Robert Beard (e.g. Beard 1995).

Theories endorsing Separationism are attractive because (a) they allow similar syntactico-semantic forms to be realized in quite 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.

Theories endorsing Separation 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 form can diverge. See Embick 1997, 1998a, 1998b.

Is there any difference between inflectional and derivational morphology in DM?

This controversial distinction has no explicit status in DM. However, DM does distinguish between f-morphemes and l-morphemes (not all f-morphemes would normally be considered 'inflectional' however) as well as between syntactic and non-syntactic (dissociated) morphemes.

How are clitics analyzed in DM?

'**Clitic**' is not a primitive type in DM but rather a behavior which an element may display. Conventionally, clitics are said to 'lean' on a 'host'; this sort of dependency relation of one element on another manifests itself differently depending on what the element is and where its dependency relation must be satisfied. Hence there is no coherent class of objects which can be termed clitics; instead morphemes andVocabulary items may show a range of dependencies.

Leaners (Zwicky 1985a) are Vocabulary items which cannot form Phonological Words by themselves but whose morphemes have no other special displacement properties. For example, the English reduced auxiliary -*s* (from *is*) 'promiscuously' attaches to any phonological host to its left (Zwicky & Pullum 1983):

```
The person I was talking to's going to be angry with me.

Any answer not entirely right's going to be marked as an error.
```

Selkirk 1996 analyzes prosodically dependent function words as either **free clitics** (adjuncts to Phonological Phrases), **affixal clitics** (adjuncts to Phonological Words) or **internal clitics** (incorporated into Phonological Words). These options are shown schematically below:

Types of phonologicalclitics
{ = phrase boundary, (= word boundary

```
{...free clitic {(host)...}}
{...(affixal clitic (host))...}
{...(internal clitic + host)...}
```

English leaners are typically free clitics, according to Selkirk, but other languages exploit other options. For example, Embick 1995 shows that, depending on their syntactic provenance, Polish clitics behave phonologically as either affixal clitics (allowing their host to undergo word-domain phonology), or as internal clitics (preventing their host from undergoing word-domain phonology on its own). A lexicalist account of the same facts is shown to be highly cumbersome and unexplanatory.

Second-position clitics are Vocabulary items which undergo either Local Dislocation or Prosodic Inversion with a host.

Syntactic clitics. Finally, the term 'clitic' is sometimes used to describe **syntactically mobile heads**, typically Determiners, such as certain Romance pronominals on some accounts. In such cases the dependency relation or special behavior is a syntactic property of a morpheme (syntactic category). In many cases the Vocabulary items which are inserted into these morphemes also show either phonological dependency as leaners or additional peculiarities of position via Local Dislocation or Prosodic Inversion. See Harris 1994, 1997a and Embick 1995 for case studies.

How can I find out more about DM?

Click here for a list of relevant literature.

Please direct questions or comments about this page to Rolf Noyer.