



Morpheme Order in a Lexeme/Morpheme-Base Morphology

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This paper argues that contemporary morphological theories are undermined by the concept of the linguistic sign, the morpheme or the word, whichever forms the basis of these theories. Instead of the sign, grammars should operate on two distinct and definitionally incompatible basic units, the lexeme, which is a linguistic sign, and the (grammatical) morpheme, which is not. Grammars must contain autonomous lexical and morphological components in order to have sufficient power to explain the independence of the sets of conditions on lexical, syntactic and morphological rules. Such a model can be properly constrained to prevent these components from operating in disregard of each other by (a) discrete definitions of 'lexeme' and 'morpheme', (b) one specific principle constraining features added to underlying lexical bases by abstract (phonology-free) lexical derivations, and (c) an independently motivated markedness theory. This model also maps morphology onto abstract lexical and syntactic derivatives in the proper order, accounting for what Baker has recently called the 'Mirror Principle', plus the exceptions to it.

1. The Lexical Affix Hypothesis

1.1. The Basis of Lexical Morphology

Much recent work in generative grammar develops what might be called the Lexical Morphology Hypothesis, the independent assumptions that (i) affixes are isomorphic (biunique) linguistic signs (Sign-based Morphology or SBM), (ii) stored in the lexicon along with obvious lexemes (Lexical Affix Hypothesis or LAH), (iii) where all morphological and cyclic phonological operations are also carried out (Lexical Phonology).¹

Lexical Morphology is far from an unquestioned assumption of contemporary morphology in the US, but SBM and LAH underlie the work of Bresnan (1982), Farmer (1984), Guerssel (1983), Halle (1973), Halle and Mohanan (1985), Keyser and Roeper (1984), Lieber (1981,1983), Sadock (1985) and Selkirk (1982). Marantz (1982) and Pesetsky (1985) seem to be generally in agreement with (i) and (ii) while differing in substantial respects on (iii). Kiparsky (1982) agrees on (i) and (iii) while disclaiming, with hazy reasoning, (ii). Finally, Jackendoff (1975) assumes only (iii).

LAH derives from the position articulated by Bloomfield (1933: 177-183), that lexemes and affixes are 'free' and 'bound' variants of a single type of linguistic sign, the 'morpheme'. Bloomfield (1933: 162-163) and those above conclude from this assumption that all morphological signs and the rules which operate on them are proper to the lexicon alone. According to Lieber (1981: 35), 'affixes differ from non-affix morphemes only in that affixes have as part of their lexical entries frames indicating the category of items to which they attach as well as the category of the items produced'. Again (1981: 37), 'especially important for the theory to be developed below is the fact that lexical entries for affixes are identical to lexical entries for non-affix morphemes, except for the presence of subcategorization information in the entries of the former'.

Most versions of Lexical Morphology use this definition of affixes to account for categorial changes during L-derivation under the assumption that, for example, the nominal status of deverbal *bak-er* derives from the suffix *-er*. In Beard (1986a) I challenged the validity of LAH by showing that affixes are not reliable sources of category or other features during L-derivation, i.e. that LAH does not predict the range of form-function disjunctions found in morphology. Here, after examining a new type of form-function disjunction as a way of reviewing that problem (section 2), I will demonstrate that even with the assistance of Lexical Phonology, LAH cannot predict the basic principles of affix ordering (section 4).

The point of the arguments here is to prove that affixes are not lexemes at all but are in a class with other types of morphology whose members are so different from lexemes in form, function, organization and operation as to preclude the possibility of the two sharing the same component, let alone the same definition. Grammar possesses two discrete means of conveying meaning: the lexical sign (symbol) with its directly related form and meaning and the (grammatical) morpheme in paradigm, indirectly associated with meaning. All this implies a radically new basis for morphology, a lexeme-morpheme based morphology, and independent theories of lexicology and morphology (section 3).

A theory which separates lexemes and L-derivation from morphology is far more powerful than any version of SBM. The claim here will be, however, that this power is necessary in explaining morphological facts often overlooked. Although conditions on lexical and morphological derivation are independent, section 5 will demonstrate that the principles of (a) derivation, (b) morphology and (c) the mapping of (a) to (b)

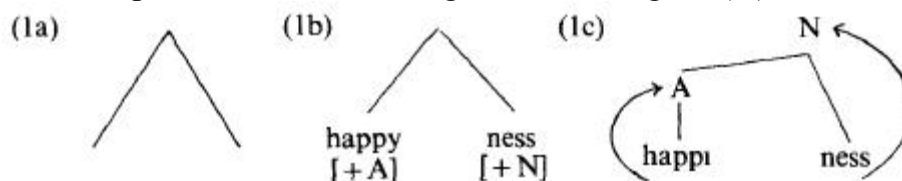
are essentially logical entailments of the definitions of 'lexeme', 'morpheme', 'lexical rule' and 'morphological rule'. Moreover, the predictions of this new approach to morphology account better for morpheme ordering than 'Level-ordered' approaches with more accuracy than even 'the Mirror Principle' (Baker (1985)) demands (section 6).

Although the arguments here will be addressed specifically to Lieber's version of LAH, they are generally applicable to all contemporary theories, including Autosegmental Morphology, which assume that both affixes and obvious lexemes are signs of the same linguistic category, 'morpheme'. They are not restricted to any particular school of morphology. Thus the very strong lexicalist position of Chomsky (1981) and the lexicon of Marantz (1984) as well as the Lexical Function Grammar of Bresnan (1982) are equally susceptible to the arguments raised here.

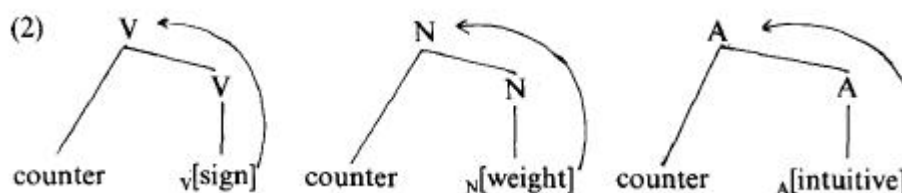
1.2. The Lexical Affix Hypothesis

The most detailed exposition of LAH to date, the one consistently cited by the proponents of Lexical Morphology mentioned above, is Lieber (1981). Productive L-derivation in Lieber's theory is reduced to 'lexical structure rules', context-free rewrite rules which generate unlabeled lexeme or word structures, e.g. (1a) below. What Saussure originally referred to as the *signifiee* of the sign has been analyzed into categorial and structural information, syntactic and morphological features, aside from any specific denotata which the morpheme might have.

Lexical category features in affixes, not L-derivation operations or word formation rules such as Aronoff (1976) proposed, determine the category of L-derivates. Category is assigned to derivates (1b) via four percolation conventions, the first of which specifies that all the features of the stem lexeme 'percolate up' to the first nonbranching node of a word structure. The second specifies that all the features of the affix percolate up to the first branching node as in figure (1c).



Affixes which do not change the category of L-derivates, e.g. the prefix *counter-*, are assumed to be unmarked for category. A third percolation convention specifies that in these cases the category feature of the stem will percolate to the maximal projection of the word structure.



The fourth percolation convention assigns categories in compounds, which is of no concern here. Lieber also proposes other types of rules to account for lexical irregularity, reduplication, and nonconcatenative morphology. The focus here will be on productive L-derivational processes.

1.3. Five basic principles

The arguments of this paper depend on the following definitions of certain fundamental aspects of the lexicon and grammar. Here and throughout the paper, stems of the three major categories, N, V, Adj, will be referred to as 'obvious lexemes' since it is commonly accepted that the definitions hold for these; other categories are assumed controversial.

I. Lexemic sound and sense mutually implied (isomorphic, biunique).

With many refinements added by Frege, Ogden and Richards, Pierce, Saussure and others, and despite its failure to hold for controversial L-classes such as prepositions, Plato's assumption still applies to obvious lexemes.

II. The relation of lexemic sound to meaning is strictly arbitrary.

Plato (Cratylus) established the principle of arbitrariness for proper names but it holds for all (non-onomatopoeic) obvious lexemes. If 'arbitrary' means 'noniconic', not determined by extralinguistic factors, 'strictly arbitrary' means 'nongrammatical' (= 'idiomatic') as well. A noniconic sound-meaning relation which is regular and can be predicted on the basis of grammatical rule will be called 'derivational'. Lexicologists and morphologists have traditionally sought ways of explaining lexical regularities in the same way as syntactic regularities are explained, by grammatical rule.

III. The lexicon is an open class.

The lexical stock may be expanded synchronically by L-derivation and a wide variety of performative, nongrammatical means: borrowing, loan translation, onomatopoeia, back-formation, blending, clipping, acronymization, etc. These latter means themselves may be semiregular; however, they are not grammatical and therefore they cannot be listed in a grammatical description (Beard (1981: 29-32, 1987)).

IV. Paradigms are closed, grammatically determined classes.

Carstairs (1981: 18) distinguishes classes which are 'strictly closed' from those which are merely 'closed'. Strictly closed classes are those like inflectional systems

whose desinences obligatorily co-occur with the lexical items of their category, e.g. the case endings which must appear on every noun in Latin. The claim here is not that all paradigms comprise strictly closed classes in Carstairs' sense but only that they are all logically closed. Thus the class of English number markers satisfies this criterion even though singular nouns bear no number marking. Paradigms are the central feature of morphology in inflectional languages. Whatever else they may be, paradigms are closed and their member categories (cases, persons, tenses) are determined by grammar, not by external rules or forces, including semantics.

V. 'Zero' morphemes represent the omission of real morphological marking in a paradigm.

This close paraphrasing of de Saussure (1959: 118-119) and Jakobson (1939) is the only workable definition of 'zero' or 'null' morphology offered to date. Meaning must be conveyed by something; silence cannot be meaningful. Thus, if meaning is conveyed during silence it must be carried by an implied category, e.g. case, which speakers know, independent of their knowledge of affix formants, must be present in that position. The absence of phonological material in a paradigm must be as contrastive as the presence of distinctive phonological material. This definition provides the tests for null morphology: (a) it is restricted to positions otherwise marked by real affixes and (b) it must belong to a closed, paradigmatic class.

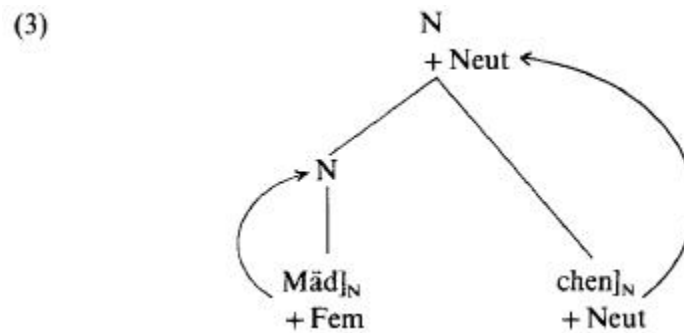
2. Form and function: categorial-acategorial affixes

The purpose of this section is to review two points raised in Beard (1986a) having to do with the definitional properties of affixes and other grammatical morphemes, and to show that LAH cannot successfully characterize them. Those points are (a) that affixation does not (always) account for category changes during L-derivation as (la-c) implies and (b) that derived category is more generally determined by abstract factors independent of affixation. If affixes are not associated with a lexical category as inevitably as are obvious lexemes (N, V, Adj), a major motivation for storing them in the lexicon and treating them as signs is lost. This section concludes that this is in fact the case, and that a new theory of morphology which separates L-derivation from affixation is required, one which can account for the one-many relations of derivation to affixation as readily as the less common one-one relation which LMH treatments generally focus on.

2.1. The percolation of gender features and German -chen

According to Lieber (1981: 48), all features of the affix, including number and gender, percolate up to the maximal projection of a word structure. Lieber exemplifies

the percolation of affixal gender with the German diminutive suffix *-chen*, along the lines of (1a-c).



German *-chen* alternates in a predictable way with *-lein*: only *-chen* occurs after nouns on /l/ and only *-lein* occurs after nouns ending in /x, ŋ, g/; both are free alternates elsewhere (Ettinger (1974: 75-76)). The third German diminutive suffix, dialectal *-el*, is masculine as well as neuter (*der Heb-el, Schläg-el, Deck-el*), but as a diminutive marker it is always neuter. All reassign neuter gender to the derived stem. Thus it is not obvious a priori whether the specific suffix *-chen* is neuter or whether gender here is associated with the Lfunction [Diminution], a feature which is derivationally added to the stem and might be separately marked by a semantically and functionally empty affix associated only in the context of the stem with neuter.

2.2. The percolation of gender features and Russian *-ĭk*

In order to preclude even the suspicion of the homophony, I will discuss here an affix so phonologically unique as to rule out any possibility of homophony at all. (The importance for excluding homophony as a possible explanation will emerge later in this section.) This suffix, *-ĭk* undergoes a unique set of morphophonemic rules, the 'vowel-zero' alternation (i) and labialization. It triggers palatalization and idiosyncratically constrains stress to the stem—all of which involve at least five sets of conditions. It is difficult to imagine an affix formant with more opportunity for allomorphic variation than *-ĭk*.

The abstract reduced vowel-zero alternation, /ĩ/, traditionally called the 'jer' (i) triggers palatalization in preceding velars, i.e. /k, g, x/ → /č, ž, š/. It is then (ii) lowered to /e/ before final consonants not followed by a vowel, and (iii) is deleted otherwise throughout the paradigm. The lowered vowel (iv) is moved back and rounded everywhere except after palatal consonants, but it labializes in this position, too, when accented: *volčok* 'toy top' vs. *daček* 'of little dachas'.

(4) Russian diminutives in -ik (tilde indicates moveable accent)

<i>Base (Gender)</i>	<i>Zero Alternate</i>	<i>Vowel Alternate</i>	<i>Gloss</i>
(a) jáščik (Mas)	jásčič-k-a (GenSg)	jásčič-ek (NomSg)	'drawer'
(b) jazyk'- (Mas)	jazyč-k-á (GenSg)	jazyč-ók (NomSg)	'tongue'
(c) lěs (Mas)	les-k-á (GenSg)	les-ók (NomSg)	'forest'
(d) jáblov-o (Neu)	jáblov-k-o (NomSg)	jáblovč-ek (GenPl)	'apple'
(e) molok-ó (Neu)	moloč-k-ó (NomSg)	[No GenPl]	'milk'
(f) sěrdc-e (Neu)	serdėč-k-o (NomSg)	serdėč-ek (GenPl)	'heart'
(g) sum-á (Fem)	súm-k-a (NomSg)	súm-ok (GenPl)	'bag'
(h) dác-a (Fem)	dáč-k-a (NomSg)	dáč-ek (GenPl)	'dacha'
(i) nog-ã (Fem)	nóż-k-a (NomSg)	nóż-ek (GenPl)	'leg'

This suffix also possesses a prosodic quirk which might expectably distinguish homophones. Russian exhibits marked and unmarked patterns of accent. Unmarked accent falls on the stem or the ending without movement throughout the paradigm. Marked accent patterns exhibit movement of various sorts (the exact nature of which is unimportant here). Here they are noted with a tilde over the syllable accented in NomSg (e.g. *lěs* in (4c)). Ending accent on the phonologically null NomSgMas (4a) is marked with an accent over the boundary mark. In the absence of an ending it quite logically recedes to the final syllable of the stem, e.g. *jazyk*, *jazyká*.

If the suffix *-ik* is accompanied by Declension I inflection (4a,b), the accent follows the pattern of the base even when it leads to the ending itself. Moveable accent surfaces in the masculine diminutive as fixed end stress just as end accent does. However, (v) if the suffix is preceded by a Declension II (Feminine) stem, end stress is prohibited and stress moves back exactly one syllable (4c). This fifth characteristic pattern identifies this suffix as a unique entity well beyond the shadow of doubt.

(5) ruk-a	ruč-k-a 'hand'
golov-a	golov-k-a 'head'
stat'j-a	statej-k-a 'article'
becev-a 'line, rope'	bečev-k-a 'string'

(4) also demonstrates that when *-ik* functions as a diminutive marker, it passes the gender of the underlying stem on to the L-derivate as does *counter-*. Under Lieber's hypothesis this suffix would be lexically empty, listed without gender features.² Elsewhere, however, this same suffix formant, with the identical complex of allomorphic characteristics, serves in the capacity of an agentive feminizer, especially productive in derivations feminizing animate lexemes ending in /nt/ or the agentivizing suffixes *-ist*, *-iak* and *-ian*.³ (Labials are extended by /l/ in undergoing palatalization.)

(6) Russian feminines on *-ĭk*

	<i>Masculine</i>	<i>Feminine</i>	<i>GenPl</i>	<i>Gloss</i>
(a)	kurs-ánt	kurs-ánt-ka	kurs-ánt-ok	'student'
	emigr-ánt	emigr-ánt-k-a	emigr-ánt-ok	'emigrant'
	sekt-ánt	sekt-ánt-k-a	sekt-ánt-ok	'sect member'
(b)	rad-íst	rad-íst-k-a	rad-íst-ok	'radio operator'
	pian-íst	pian-íst-k-a	pian-íst-ok	'pianist'
	zurnal-íst	zurnal-íst-k-a	zurnal-íst-ok	'journalist'
(c)	kievlj-án-in	kievlj-án-k-a	kievlj-án-ok	'Kievan'
	gorož-án-in	gorož-án-k-a	gorož-án-ok	'urbanite'
	anglič-án-in	anglič-án-k-a	anglič-án-ok	'English(wo)man'
(d)	zemlj-ak'-	zemlj-áč-k-a	zemlj-áč-ek	'compatriot'
	dobryj-ak'-	dobryj-áč-k-a	dobryj-áč-ek	'good person'
	sibirj-ak'-	sibirj-áč-k-a	sibirj-áč-ek	'Siberian'

There can be no question that we are dealing with the same affix formant. Not only does it exhibit all the segmental phonological peculiarities of the diminutive marker, but notice that the agentive morpheme *-ĭak* (6d) defers stress consistently to the endings throughout the Declension I paradigm. Just as in (5), *-ĭk* here shuns stress after the derived Declension II stems, forcing it to the next syllable left. The suffix *-ĭk* then is a feminine marker in these cases; indeed, its sole function is to mark feminine animacy. Under LAH the strikingly singular affix *-ĭk*, therefore, must simultaneously carry and not carry the feature [+Feminine]. Beard (1986a) demonstrates that LAH can only represent this phenomenon as homophony (cf. Halle and Mohanan (1985) on the English polyfunctional suffix *-ing*), a solution which allows both the phonological uniqueness of *-ĭk* and the lexical identity of Diminution and that of Femininity to escape.

Here we have seen two essential aspects of the affix: it does not (always) have the category features it seems to have and it shares functions with other affixes. The crucial point is to see that the relation of the phonology to the meaning (function) in an affix is much more variable, less stable than that of a lexeme. We may not resort to homophony as Halle and Mohanan (1985: 63) attempt in dealing with *-ing* without suspending the strict definition of homophony. In the next section we will see that even if we resort to homophony, the other side of the morphological asymmetry coin, massive synonymy of function further prevents a solution within SMB. What seems to be true is that gender and diminution are regular, unitary, universal categories represented by wide range of contextually determined nonuniversal affixes.

2.3. Subcategorization conditions

The subcategory frames in Lieber's work and elsewhere are disarmingly simple. Like the rules one finds in much work in morphology, e.g. $N \rightarrow V$ (Aronoff (1980)), subcategory frames are assumed to be defined by the syntactic categories, e.g. N, V, Adj, and their structural relations. Even were it possible for homophony to distinguish *-ik* subcategorized for [Agentive] from *-ik* without subcategorization, a more complete catalog of femininizing suffixes (7a-h) indicates that the factors determining affix assignment are much more complex and subtle than this; they involve phonological, morphological, as well as lexical features, yet all are curiously related via identical gender markings. To characterize this one-many relation of form to function requires subcategory frames containing highly complex insertion conditions.

- (7a) *-ic*: [+ N, [-Mas, + Fem], Dec II, [N[Mas; -(s)c-. -in, ...] _]] (let-č-ic-a 'flyer')
- (7b) *-in-ic*: [+ N, [-Mas, + Fem], Dec II, [N[Mas; -tel'- ...] _]] (učī-tel'-nic-a 'teacher')
- (7c) *-ik*: [+ N, [-Mas, + Fem], Dec II, [N[Mas; -ant, -ac. .] _]] (kurs-ant-k-a 'student')
- (7d) *-ix*: [+ N, [-Mas, + Fem], Dec II, [N[Mas; ...] _]] (storož-ix-a 'guard')
- (7e) *-š*: [+ N, [-Mas, + Fem], Dec II, [N[Mas; [+liquid], ..] _]] (millioner-š-a 'millionairess')
- (7f) *-īj*: [+ N, [-Mas, + Fem], Dec II, [N[Mas; -un, ...] _]] (boltun'-j-a 'chatterbox')
- (7g) *-inj*: [+ N, [-Mas, + Fem], Dec II, [N[Mas; ...] _]] (gero-inj-a 'heroin')
- (7h) *-Ø*: [+ N, [-Mas, + Fem], Dec II, [N[Mas; ...] _]] (suprug: suprug-a 'spouse')

With mostly predictable exception, animate masculine nouns may be femininized in Russian. The conditions on femininization will exclude borrowed lexemes ending on [ik], e.g. *klassik*, *akademik*, neo-classical compounds like *geolog* 'geologist', *biograf* 'biographer', *arxeolog* 'archeologist', and a few native and borrowed forms associated with traditionally male professions, e.g. *stalevar* 'steel-worker', *tokar* 'turner'. Femininizations of lexical agentives on *-or*, e.g. *direktor-š-a* 'director's wife', *professor-š-a* 'professor's wife', are frequently encountered in spoken Russian even though they are often ignored in discussions of femininization in traditional grammars. The L-derivation itself, femininization, aside from the specific suffixes which mark it, is a broad generalization constrained in Russian only by (i) lexemes ending with *ik*, and (ii) neoclassical compounds, the other exceptions explained as lexically potential but performatively unacceptable forms.

Thus the gender rule itself seems to be quite regular and remarkably predictable, so it should be represented unitarily in the grammar. This universal generalization itself is lost in lexical listings like (7a-h), where [Feminine] is one of a set of features related to masculine (agentives) by subcategorization frame rather than productive universal rule. The approach reflected in (7a-h) must explain this highly productive regularity in an independent theory of lexical categories rather than as part of the theory of lexical rules.

The constraints on affixation are legion and far more complex than those conditioning femininization; they would compel the subcategorization frame to become a feature inventory within a feature inventory. It would have to specify

phonological ([+liquid]) and morphological ($-(\check{s})\check{c}- + ___$, etc.) conditions on affixation as well as lexical (feminization is restricted to animate [+Masculine] stems), and even semantic conditions ('traditional male occupations'): exactly the same sort of information required of lexical feature inventories themselves. The definition of 'subcategorization frame' would have to be deeply enriched to make it virtually indistinguishable from a 'lexical feature inventory'.

While the conditions on the Russian feminine affixation are byzantine in their complexity, without undue exception, they are predictable.

(8)	<i>Masculine</i>	<i>Feminine</i>	<i>Gloss</i>
(a)	revniv-ec	revniv-ic-a	'jealous person'
(b)	vypust-n-ik	vypust-n-ic-a	'a graduate'
(c)	let-č-ik	let-č-ic-a	'flyer, pilot'
(d)	uč-i-tel'	uč-i-tel'-n-ic-a	'teacher'
(e)	číta-tel'	číta-tel'-n-ic-a	'reader'
(f)	partij-ec	partij-k-a	'Party member'
(g)	gražd-an-in	gražd-an-k-a	'citizen'

Vinogradov (1947: 133ff.) shows that if the masculine variant regularly receives *-ec* and is derived from an adjective or verb, then the corresponding feminine receives the suffix *-ic(a)* (8a). If the masculine is suffixed with $-(\check{s})\check{c}-ik$ or $-in-ik$, the feminine replaces *-ik* with *-ic(a)* (7a, 8a). If the agentive is marked with *-tel*, the complex $-in-ic(a)$ is added (7b, 8b). If the underlying base is a noun on $-ian$ or if the masculine receives *-ec*, the suffix *-ik* applies (7c, 8c). Even affixes in narrowly restricted, unproductive, classes like *-š* which, according to recent grammars, has resurged as a feminine marker of polysyllabic stems ending in liquids, *sekretar-š-a* 'female secretary', *general-š-a* 'general's wife', *lift-ěr-š-a* 'elevator operator' (7e) and *-ij*, regularly attached to masculine stems on *-un*, e.g. *beg-un : beg-un'-j-a* 'runner' (7f), are predictable under complex conditions.⁴ Thus while the affixation of feminization is predictable in Russian, it is predictable only given conditions on affixation which are independent of those on derivation.

With only 'pseudohomophony' as a solution to the problem of polyfunctional suffixes like *-ik*, LAH has no alternative but to redefine subcategory frames to allow them the power of L-rules, while creating feature inventories within feature inventories. Moreover, each unique category—masculine, feminine, diminutive, agentive—must be split up and be lodged in the feature inventories of as many affixes as express them. What prevents LAH and all SBM frameworks from capturing all the obvious generalizations here? The critical issue is that the conditions on L-derivation, feminization and diminution, seem to be quite different from the conditions on affixation, the selection of the phonological modification of the input base lexeme which marks the derivation. The interpretation of any given L-derivate seems to

depend as much on context as on the affix itself: (i) *-n-ic(a)* after *-tel'* \supset 'female N', (ii) *-ik* marked [+ Dec II] after /nt#/ \supset 'female N', (iii) *-ik* transparent as to declensional class \supset 'diminutive N'. Morphological theory needs to be expanded, given the power to generate L-derivations and affixation independently, then map the one onto the other. Section 3 presents such a model.

3. Lexeme/Morpheme Base Morphology (LMBM)

The phonological singularity of *-ik* and the functional identity of diminution and that of femininity are absolute. All represent grammatical entities determining grammatical rules. The functions are of more general interest since they are universal; moreover, they seem to be the more consistent. The theory which captures all the generalizations of lexical and syntactic derivation therefore must be one which distinguishes the rule operations of the lexicon and syntax from those of morphology.

3.1 *The separation of derivation and morphology: lexical derivation*

The simplest explanation of the derivational operations involved in diminutivization, independent of all considerations of morphological marking, must characterize the empirical fact that diminutivization is available to certain derived and all underived German nouns irrespective of the complexities of affix selection. In fact diminutivization seems to be universally available in inflectional languages. In German, masculine, but not femininized agentives, may be diminutivized: *Lehr-er-chen* but **Lehr-er-in-chen*. The conditions on affixation, however, are quite different: *-chen* may not appear after /x, ŋ, g/ and *-lein* may not appear after final /l/ (Ettinger (1974)).

If we assume that lexical and inflectional derivation are separate from the morphological means of marking them (*The Separation Hypothesis* or SH), the simplest lexical rule we might devise is (9a).⁵

$$(9a) [n \text{ Grade}] \rightarrow [n \pm 1 \text{ Grade}]$$

Where: $3 (\pm 2) > n > \emptyset$

This rule is predicated on the assumption that diminution/augmentation allows several grades, like the stacked diminutives in Russian, e.g. *korov-a* : *korov-k-a* (*korov-ik-a*) : *korov-oč-k-a* (*korov-ik-ik-a*) and the five grades of augmentation in Swahili, e.g. *khapu* 'basket', *kapu* 'large basket', *ji-kapu* 'larger basket', *m-kapu* 'very large basket', *m-ji-kapu* 'huge basket' (Shepardson (1983)). The constraints that condition this rule, of course, are subject to wide local variation.

(9a) may be accompanied by other local feature adjustments, e.g. in German all diminutives are assigned 'neuter' grammatical gender (N-agreement class). This means that the German version of (9a) may be provided with a local redundancy condition on (9a) like (9b).

$$(9b) [\alpha \text{ Agreement}] \rightarrow [+N \text{ Agreement}] / \frac{\quad}{[-1 \text{ Grade}]}$$

Since all its affixes must be listed as lexemes in the lexicon, LAH has but one alternative to (9a): synonymy with homophony.

- (10) -chen [+ N, + Neuter, + Diminutive, [N _]] (N does not end in x, η, g/)
 -lein [+ N, + Neuter, + Diminutive, [N _]] (N does not end in /l/)
 -el₁ [+ N, + Neuter, + Diminutive, [N _]] (dialectally)
 -el₂ [+ N, + Masculine, ..., + Perfective Nominalization, [N _]]

This approach requires independent L-entries which lose both the generalizations that German has a diminutive sharing the parameters of nominal gradation with other languages and that all German diminutives must be marked by the neuter agreement class regardless of the affixation. It implies that the inevitable neuter agreement among German diminutives is a lexical accident. If gender were a lexical accident, the probability of each suffix's being neuter would be 1:3 except for *-el*, whose chances would be much slimmer. To capture the neuter generalization, LAH might provide an ancillary redundancy convention to assign neuter to all diminutive suffixes. But such an approach produces an ad hoc device irrelevant to the first generalization: the universal category Diminution remains local, arbitrary, perhaps subject to linguistic drift which does not in fact seem to affect it.

$$(11) \begin{bmatrix} \pm \text{Masculine} \\ \pm \text{Feminine} \end{bmatrix} \rightarrow \begin{bmatrix} - \text{Masculine} \\ + \text{Feminine} \end{bmatrix}$$

LAH must list for Russian eight or more different affixes and affix combinations whose functions include feminization (7ah). Given the fact that masculine is the universally unmarked gender, the critical change is from positively to negatively marked masculine. Semantically 'unmarked' gender implies both male and female references and a corresponding [+Masculine, +Feminine] feature marking, e.g. Russian *student*, which may refer indiscriminately to men or women. Semantically unmarked nouns freely become purely masculine without affixation, i.e. *student* may refer to strictly male students without phonological change. This may be captured by a well-motivated redundancy condition, e.g. [+Masculine, +Feminine] = [+Masculine, -Feminine], which is reducible to a general principle of markedness theory. Thus the M-component must assign the same suffix (or none) to any nominal stem marked [+Masculine] regardless of the status of [αFeminine] to account for the unmarkedness of masculine gender.

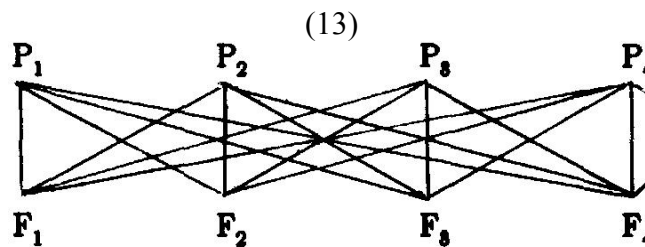
3.2 The distinction of lexemes and (grammatical) morphemes

Since SH requires a separate M-component in addition to the simple Lderivation rules (9a,b) and (11), it is not clear that it represents any major gain in theoretical eloquence. Aronoff (1983; 360) suggests that SH 'has few practical consequences'. But this is not true; SH leads to a totally new and more powerful morphology, 'Lexeme Morpheme Base Morphology' (LMBM), the basic principles of which are:

- (12a) Morphemes are independent of lexemes,
- (12b) M-rules are independent of L-rules, and
- (12c) Conditions on M-rules are independent of conditions on L-rules.

(12a-c) predicts the asymmetrical relations which characterize morphemes. It explains the universality of such lexical functions as [Diminution] and [Femininity] in terms of grammatically relevant cognitive categories rather than idiomatic lexical features, despite the language specific phonological descriptions of affixes. It claims the language has two ways of meaning.

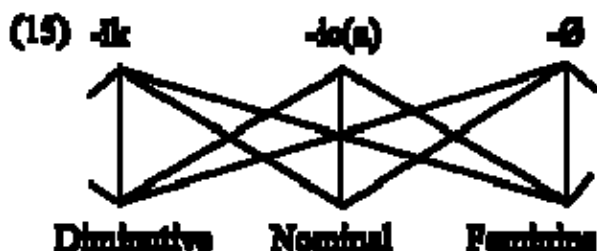
The issue is not the trivial issue which Anderson (1985: 159) sees, i.e. the separation of the 'study' of L-rules and morphology. It implies that lexemes and (grammatical) morphemes are definitionally autonomous. It is normal for any given function to be marked by more than one affix, e.g. [Feminine] in (7a-h), while any one affix marks more than one function, e.g. *-ik* in (4) and (6). The affix (morpheme) sound-meaning bundles are not distinguishable in (13) because the semantics amounts to grammatically determined functions (F) which are paradigmatically, not strictly arbitrarily, related to phonological descriptions (P).



The description of Russian *-ik*, therefore, would have to be placed in a paradigmatic context like (14), where its third productive function, the suffixation of (perfective) deverbal nominals, has been added.

(14)	<i>Diminutive</i>	<i>Nominal</i>	<i>Feminine</i>
-ik	korov-ka 'cow' (Dim)	u-pakov-ka 'packing up'	student-ka student (Fem)
-ic(a)	vešč-ica 'thing' (Dim)	...	l'v-ica lioness
-∅	...	izmen-a betrayal	(suprug-a) spouse

(14) tabularizes the one-many, many-one relationships of affixes to functions which Karcevskij (1929) called 'morphological asymmetry'. It may be paradigmatically reinterpreted in the spirit of (13).



The definitional properties of (15) to which we will return shortly, include the fact that both the morphemes and the functions belong to closed classes, in violation of Principle III. The relations between morphemes and their functions are determined by the grammatical paradigm and are not isomorphic and strictly arbitrary in the sense of Principles I and II.

It might seem the case that lexemes occasionally form such paradigmatic bundles.



But the meaning LEVEL, as in water table, is metaphoric for *table* and therefore only idiomatically related to the lexeme level. A desk is a special subtype of table, a table for transacting some kind of business, and no more semantically identical with table than *robin* is with *bird*. Moreover, neither the formants nor meanings here belong to a synchronically closed, let alone to paradigmatic, class. A definitional difference between lexemes and (grammatical) morphemes is that the former are always distinct form-meaning associates while the latter are such only accidentally.

It should be emphasized that the Russian suffix *-ĭk* is not an isolated or even unusual case. The English suffixes *-ed* and *-ing* if not *-s* are equally polyfunctional. In German, 23 of 28 productive inflectional and derivational affixes are polyfunctional, including *-en*, which marks every case in the language, 1st and 3rd plural verbs, material adjectives, gerundives (infinitival nominals), strong verb participles and more. The Slavic *-ov* marks a productive verb stem class (*pak-ov-at*), a subclass of relational adjectives (*kurs-ov-oj* 'course-'), the masculine possessive adjective (*ded-ov* 'grandfather's'), the genitive plural (*ded-ov* 'of the grandfathers') and a few other minor functions.

Beard (1985) in fact demonstrates that 35 of the 65 most widely used affixes in Turkish, an agglutinative language, have two or more functions. Watkins (1984: 126-127) devotes an entire section to the issue of homophony in Kiowa because 'the degree of homophony in the prefix system, as in much of the morphology of Kiowa, is rather high'. Watkins presents a table of 108 pronominal prefixes, projected from that number of available functions, of which she admits 43 are 'nonunique'. More impressively, Watkins analyzes these 108 prefixes as complexes comprising no more than 15 phonologically distinct morphemes. Polyfunctionality is beyond question the case among paradigmatic formants, not the exception.

Including affixes in the lexicon and attempting to describe them as linguistic signs is misleading. It implies that L-derivational and (sub)categorial features like [+Gradation], [+Feminine], [+Diminutive] are bound to particular formants and depend upon them for diachronic and synchronic variation. However, these features seem to determine a single universal rule, independent of any relation to sound or history, not subject to lexical idiomatization ('semantic drift') of any sort. What marks the locative nominalization in English, *-er-y*, bears no phonological relation to Serbo-Croatian *-iste*, Finnish *-la*, Hausa *ma-...ā*, Indonesian *per...an*, Pashto *-tun*, (Asiatic) Eskimo *-vik*, yet all these affixes mark the unidiomatizable universal grammatical category [Locative], 'grammatical' because it defines both an L-derivation and an inflectional function.

Across languages it seems that grammatical functions are universal while specific morphemes are local and particular. The relation of form to function among grammatical morphemes in inflectional languages, contrary to structuralist claims, is as often if not more often many-one and one-many as one-one. A framework which associates the form and function of affixes as directly and arbitrarily as those of lexical entries will not support the pursuit of L-derivational and inflectional universals.

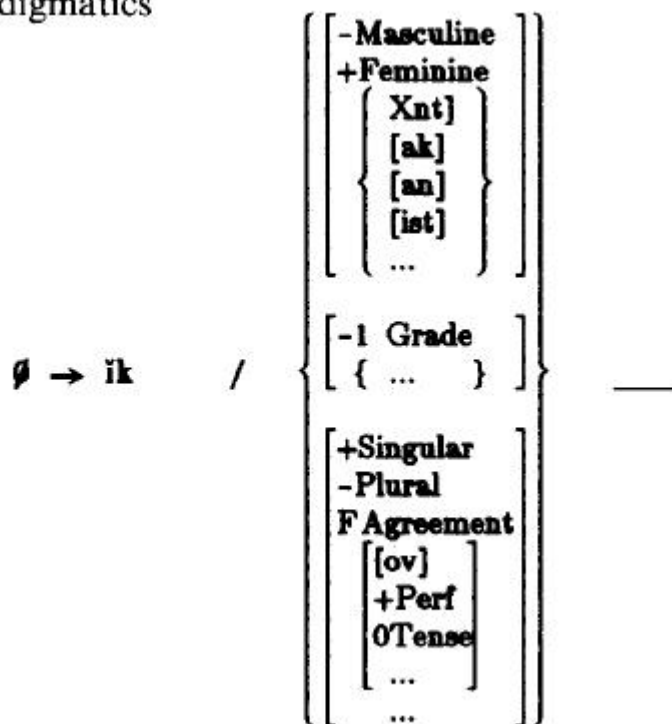
3.3 Conditions on morphology: partial lexical conditioning

To see how we may account for a multifunctional affix with a single independent M-rule, let us look again at the Russian suffix *-ĭk*. In one of the derivations we examined it seemingly assigns gender and agreement class; in the other, it does not. In

LMBM this suffix like all morphemes is empty, assigns nothing. All functional and categorial changes are made in the stem by abstract Lrules. The features adjusted or inserted by L-rules then become a part—but only a part—of the conditions of M-rules. A (grammatical) morpheme is therefore decodable only in context, i.e. morpheme + context \supset function. Functions are associated no more with a morpheme than with its context. Speakers must retain a complex calculus to encode and decode derived neologisms and inflectional forms, paradigms which in LMBM represent the organization of conditions on affix insertion.

The complexity of this calculus no doubt influences the nonideal speaker's preference for listing L-derivates in his specific lexicon rather than rederiving them each time they occur in speech. However, this performance preference does not relieve lexical and morphological competence theories of the responsibility of accounting for productive L-derivates in generative terms. The rule for inserting *-ik* to mark L-derivates femininized by (6), diminutivized by (4) as well as others is at least of the form in (17).

(17) Paradigmatics



Szymanek (1980) is correct in claiming that the most interesting aspect of M-rules is the conditions on them, for it is these conditions, containing the features added and adjusted during derivation which determine the mapping of morphology onto derivates. The morphemes themselves are straightforward processes, but the conditions on them involve too many levels to be simple subcategorization frames (recall (7a-h)).

The segmental representation above may be taken as symbolic shorthand for the elaborate 'three-dimensional', tiered diagrams of Autosegmental Morphology. Rules for constructing revoweling melodies, reduplication and suprasegmental morphology may be treated in exactly the same manner as affixation without being constrained in any way by function and without representing any such operation as a fixed lexical item, e.g. a CV-schema directly associated with a function. Zero morphology is eliminated altogether by the Separation Hypothesis. It is explained in terms completely compatible with Saussure's and Jakobson's definitions: certain feature arrays simply condition no M-rules as determined by the paradigm (Principles IV and V, section 1.3).

If the output of L-rules (and inflection rules) did not become part of the conditions on M-rules, the two would be able to operate in complete disregard for each other. M-rules cannot ignore features like [-Feminine, +Masculine], [n Grade] which satisfy conditions on their operation and operate in complete isolation from derivational rules for they are defined specifically in terms of such conditions. However, unlike LAH, the Separation Hypothesis posits L-rule output as only a necessary part of the conditions on M-rules. Inherent lexical features and paradigm characteristics explain the variation in affixation characterizing many functions, e.g. the Russian femininization and diminutivization.

For example, the insertion of Russian feminine suffixes (7a-h), (8a-c) is determined not only by the features [-Masculine, +Feminine], but also by the phonology of the stem ([+liquid] + š), the morphology of the stem (-*ĭan*, -*tel'*, -*ĭn-ic(a)*), and the category of the stem. There are even more abstract referral conditions, e.g. 'if the stem S is a denominal [+Feminine, -Masculine] noun and S would be marked by -*ĭn* or -*ec* were it [+Masculine], insert -*ĭk'*'. By stating these factors as conditions on morphological marking rather than as greatly enriched subcategorization features, we capture them as generalizations about morpheme behavior rather than claim that all are idiomatic lexical subcategories. The mapping of morphology onto derivations then is controlled by the combined features of the lexical base: inherent and derivational.

It would be more accurate to say that the features inserted by derivation at least partially determine affixation, for it is possible for an affix to mark only one function. In fusional languages this is exceptional and in agglutinative languages, polyfunctionality is common (Beard (1985)). However, if a one-to-one association of form and function were not possible, SBM would have no appeal at all. For this reason, LMBM must explain the tendency toward morphological isomorphism and the extent of its effect on morpheme ordering (see section 5).

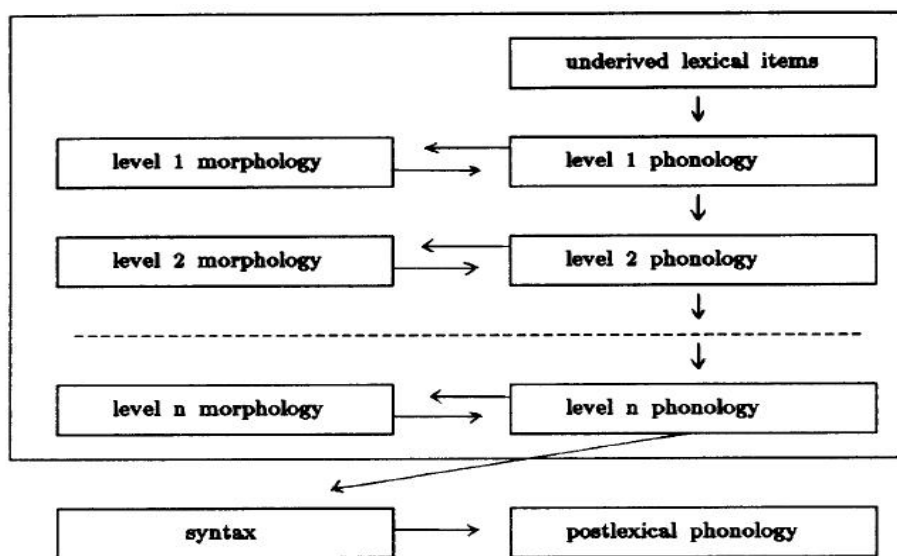
3.4. The integrated morphology hypothesis

Recent theoretical morphologists might be divided into advocates of an integrated lexical-inflectional morphology located in the lexicon (Lieber, Bresnan, Guerssel,

Kiparsky, Halle, Marantz) and those who advocate a 'split' morphology with lexical morphology residing in the lexicon and inflectional morphology in or paralleling syntax (Anderson, Matthews, Perlmutter). The LMBM position that a combined inflectional and derivational morphology is located in a postlexical component operating after all syntactic movement, is an innovation requiring justification.

Two lines of argument motivate this position. First, if affixes like English *-ing*, *-ed* and German *-er*, *-en* and *ge-* are unitary entities which mark both inflectional and L-derivational functions, they must belong at least to a segment of overlapping classes, given the common assumption that lexical and inflectional operations are discrete. Halle (1973), Bybee (1985) and Marantz (1986) argue that both derivational and inflectional affixes share all the definitional characteristics of paradigmaticity demonstrated by boundary classes, asymmetry, null marking, defective paradigms and so on.

Second, to the extent movement rules are responsible for differences in deep and surface grammatical relations, deep and surface subjects, objects, and the like, the M-component will have to be located among or after movement rules to account for surface markings. Morphemes may be included among syntactic derivation rules only if they are signs such that an operation on a function implies a simultaneous operation on the form of some morpheme. As we have already seen, and will see again below, this is no more often the case than not. Thus the position indicated for the M-component is postlexical, after all lexical and syntactic rules.



Whether the grammatical morpheme is an affix, clitic, nonclitic free morpheme, or phonological operation on the base, becomes irrelevant, accounted for by the appropriate statement of morphological process. Languages which have inflectional affixes are structurally identical with those which use auxiliaries, adpositions and clitics to mark the same functions (a goal of Marantz (1984, 1986)). Morphemes like

English *over*, *under*, *out*, which function as clitic prepositions and prefixes, are simply unrestricted as to whether they attach to lexemes or phrases. Situating the M-component after movement accommodates this and 'multicomponential' affixes like *-ing* and *-ed* quite naturally while avoiding the postulation of an autonomous level of morphological structure.

4. Mapping morpheme order onto multiple derivations

LMBM with the Separation Hypothesis is a far more powerful hypothesis than SBM since it allows derivation and morphology to operate independently. This state of affairs requires constraints on (a) derivation, (b) morphology and (c) the mapping between (a) and (b). The principle of partial conditioning prevents the total isolation of derivation and morphology; however, as semioticians such as those of the Natural Morphology school (Mayerthaler (1981), Dressler (1985)) point out, the correlation between derivation and morphology is generally very close if not always one-one. This means that the order of formal morphemes added to lexical bases to mark multiple derivations generally reflects the order of those derivations and that order is from the base outward ('the Mirror Principle', Baker (1985)).

Baker notes that the order of affixes parallels the order of the grammatical function (morphosyntactic) rules with which they are associated even though other patterns are reasonable, given the autonomy of morphology and syntax. He postulates that the best way to account for this is the assumption that affixation occurs in the same component as does the syntactic rules which they mark; given movement rules, this component would be syntax. Baker does not deal with the distinction between lexical and syntactic derivation and the corresponding differences between derivational and inflectional affixation discussed here in section 4.2; thus, his conclusion is based on incomplete data. Indeed, Grimshaw (1986) was quick to point out that the same ordering falls out of LAH, the assumption that affixes are lexemes with features to trigger the syntactic relationships themselves, plus the hypothesis that affixes are the heads of their derivations (Selkirk (1982)). Selkirk's theory would have the head of a new derivation 'neutralizing' the head of any previous derivation(s) so that each new affix could change the category of the derivative. This way the order of the categories would parallel that of the affixes marking them.

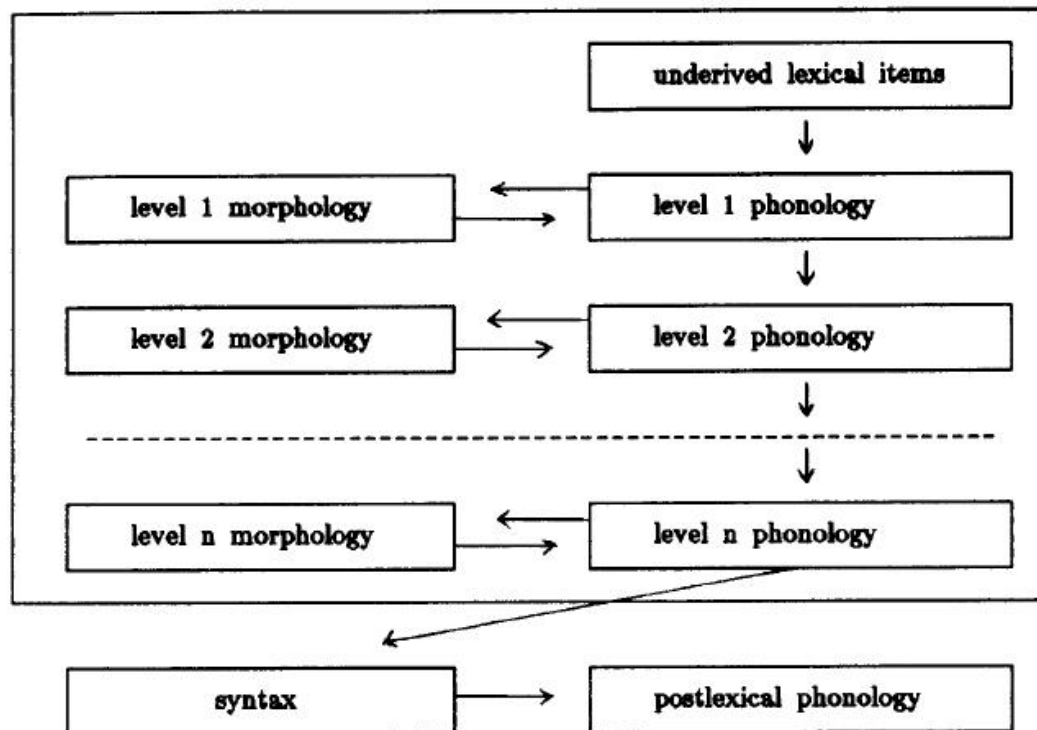
LMBM abandons the conviction that the one-one correlation of sound and function has special status in morphology, thus the issue of parallel order is of particular consequence to it since the order of its morphemes is not entailed by that of its derivations (lexical or syntactic). Since this paper has demonstrated the failure of LAH, LMBH cannot explain the Mirror Principle in terms of headedness as does Grimshaw. The LMBM framework must predict these two morphological relations with well-motivated universal principles in order to justify the more powerful framework just proved superior in other respects.

In this section I will not attempt to specify the constraints on the nature and number of L-derivational and morphological rules themselves; Beard (1986a) suggests that morphology may require no special constraints within a LMBM framework and the discussion of constraints on derivation has been opened elsewhere (Beard (1981, 1986c)).⁶ Rather, this section will demonstrate that the order of morphemes mapped onto multiple derivations falls out of the hypothesis, the definitions of 'lexeme' and 'morpheme' and a single principle. This section will also raise four new problems of affix ordering—all matters of derivation-affixation disjunction—which further weaken LAH, even fortified with the principles of Level-ordered Morphology.

4.1 Level-ordered Morphology

Kiparsky (1982) and Halle and Mohanan (1985) advocate a recent variation of Lexical Phonology, 'Level-ordered Morphology', first suggested by Siegel (1974) (see (19)).

(19) The lexicon (Kiparsky (1982))



In addition to its natural representation of the relation of cyclic to postcyclic phonology, Level-ordered Morphology explains marked and unmarked affixation in English without reference to the '+' and '#' boundary types of SPE (Chomsky and Halle (1968)). This is achieved by postulating two or more levels or 'strata' at which affixes are inserted by M-rules, then assigning each P-rule to one of these strata as its

domain. Halle and Mohanan posits 5 levels for English: Level I for Class I ('+' boundary) affixes and irregular inflection, Level II for Class II ('#' boundary) affixes, Level III for compounding and Level IV for participles and regular inflection. Level V, the phrasal level, is the domain of postlexical, postcyclic rules.

The fundamental distinction handled by Level-ordered Morphology is the ordering of Latinate and Germanic morphology. Level-ordered Morphology does not address (a) the ordering of morphemes within these levels or (b) the relation of morphemes to their functions. The order of morphemes within levels is assumed to be determined by the subcategorization of the affix and the morphological structure which it selects. However, the success of affixal subcategorization depends crucially on affixes being (lexical) signs; thus, what is two issues for LMBM is for the Level-ordered model but one. Now, since the evidence adduced in section 2 undermines the LAH assumptions of Levelordered Morphology, we are encouraged to explore for another approach to the problem of morpheme order, too.

LMBM is able not only to account for the Latinate-Germanic phenomena and the dominant order of derivational and inflectional morphemes which Level-ordered Morphology predicts, but the intralevel ordering reflected by Baker's Mirror Principle as well. The great advantage of LMBM, however, is that it predicts these orderings without committing the model to principles which fail in the face of inflectional affixes inside derivational, morphological over- and underdetermination, morphological asymmetry and the like.

4.2 Affix order: derivational and inflectional

A well-known major obstacle to a full-blown theory of Level-ordered Morphology is those compounds like *parks commission*, *sales manager*, *parts department*, *(wo)menswear*, *boyswear*. What is less known is the full extent of the problem. In German, all inflectional markers occur inside compounds and most occur inside several highly productive L-derivational affixes.

(20)	Seif-en-blase	'soap bubble'
	Kalb-s-braten	'roast veal'
	Tag-e-buch	'diary'
	Bild-er-buch	'picture book'
(21)	frühling-s-haft	'spring-like'
	läch-er-lich	'laughable'
	bär-en-haft	'bear-like'

Within compounds after the suffixes *-heit*, *-keit*, *-schaft*, *-tum*, *-ung*, *-ut*, *-ion*, *-ität*, the inflectional marker *-s* is productively, indeed, obligatorily inserted: *Schönheit-s-pflege* 'beauty care', *Ordnung-s-zahl* 'ordinal number'.

The Slavic languages separate their compounds with the unmarked neuter morpheme *-o-*, e.g. *vod-o-pad* 'waterfall', *ruk-o-pis'* 'manuscript', unless the first component is a numerical. In this case the genitive case ending is productively inserted: *dv-ux-let-nij* 'two-year(-old)', *p'at-i-let-ka* 'five-year plan'. One cannot argue that these inflections mark actual grammatical functions, e.g. that a *parks commission* is a commission of many parks while a *park commission* is a commission for only one park. There is no **womanwear* or **boywear* corresponding to *womenswear* and *boyswear*. It could be equally argued that Plural and Possessivity are implications of all compounds: a *manhole* is not for only one man. But these are semantic implications of the fact that lexemes denote generically, only incidentally associated with the /s/ in a few compounds in English. Inflectional features occur outside derivational functions because syntactic agreement rules apply after L-derivation. We must agree with something like Fleischer's claim (1975: 126):

"Das Fugenelement hat also nicht mehr die Funktion eines Flexionszeichens. Es ist— wie bereits aus der morphematischen Behandlung der ersten Konstituente deutlich wird (Morphem-varianten ...)—überhaupt kein Zeichen mehr, sondern seine Setzung oder Unterlassung eine Frage des Sprachgebrauchs, der Konvention, der Üblichkeit ohne funktionelle Motivation."

The same characterization applies to the occurrences of inflectional markers inside Slavic compounds and Germanic L-derivation markers. But inflectional affixes in German and Slavic may be added externally as well, e.g.:

- (22) *dva dv-ux-let-n-ix mal'čika* (Russian: GenPl) 'two two-year-old boys'
ein läch-er-lich-er Mann (German: MasNomSg) 'a ridiculous man'

Here, only the outside 'inflectional' morphemes may be interpreted as marking syntactic inflectional categories and functions. Noun agreement rules and the like are possible in the example in (21) only after all L-derivation is complete and the L-derivate enters the phrase as a noun. Given whatever forces that account for the Mirror Principle (section 5 contains my account), it follows that inflection will automatically be marked following derivation.

No theory based on the assumption that inflectional markers determine inflectional functions (or vice versa) can predict the multiplicity of roles played by 'inflectional' markers nor their use without any grammatical function at all.⁷ However, we must not think that inflectional markers cannot occur inside L-derivational markers in association with grammatical functions. Since evidence indicates that L-rules as well as agreement rules operate on grammatical functions (Beard (1981, 1986c)) and an integrated morphology then marks these outputs, we expect affixes

sometimes marking inflection to also occur inside L-derivational markers, marking these same grammatical functions.

Languages like Buryat, a Mongol language noted also for its double case markings, exhibit 'inflectional' affixes inside 'derivational', but in Buryat the inflectional affixes do convey the semantics of grammatical functions. In Buryat the denominal adjective suffix *-xi* is regularly added to nouns marked with the Locative (*-DA*) and instrumental endings *-(g)AAr*, preserving the semantics of the grammatical function (Sanzheev (1962: 115-116)).

(23)	ara-da-xi 'hind, rear'	zaxa-da-xi 'extreme'
	ara-da 'in/on the back'	zaxa-da 'at the extremity'
	urd-uur 'in the front'	urd-uur-xi 'frontal'
	ügloo-güür 'in the morning'	ügloo-güür-xi 'morning's'

Mongol languages apparently have a grammatical function rule which adjectivizes nouns in the locative function essentially as in the IE languages, e.g. English *front* : *front-al*. However, the incorporated grammatical function features, [+Locative, ±Attributive] are not marked by a single, independent 'derivational' affix, but rather the 'inflectional' affix marks the locative grammatical function and *-xi* marks the output as a lexically derived attributive.

Notice that we have examined three different arrangements of form and function among inflectional affixes: (a) affixes with neither the semantics nor syntactics of the function (20)-(21); (b) affixes with both the semantics and syntactics, (22), and (c) affixes with the semantics but not the syntactics of the function (23). It follows that grammar must discriminate three properties of inflection: (i) affixation; (ii) semantic functions (or, better, 'grammatical functions', since the functions are grammatically determined), and (iii) syntactic government and agreement categories. Only the latter is the exclusive domain of syntax; the 'inflectional' affixes which emerge inside L-derivates may have the phonological description and/or the grammatical functions of inflectional categories but not the agreement class. Only inflectional markers appearing outside all L-derivational markers may reflect government and agreement. If we allow affixes to be lexemes whose formant and function are mutually implied like those of lexemes, LAH will have to posit three independent sets of 'inflectional' affixes corresponding to the relations (a)-(c). The alternative is a morphological component independent of the lexicon and syntax with these three components independently accounting for properties (i)-(iii).

The independent behavior of these properties also undermines the 'Split Morphology' hypothesis of Matthews' and Anderson's Word-and-Paradigm model. Anderson (1982 and elsewhere) and Perlmutter (1986) argue that lexical morphology is handled in the lexicon and is unrelated to inflectional morphology, that lexical operations are complete before inflectional processes apply. On this hypothesis,

inflectional affixes are not available in the lexicon when lexical derivation occurs and therefore cannot occur in word-internal positions. Anderson must eventually postulate in addition to his inflectional affixes, two sets of affixes phonologically identical with these, one set semantically filled and the other empty, with a redundant theory to explain the identity of formants of these affixes in their different uses. Word-and-Paradigm models therefore do not escape the necessity of positing three different sets of affixes, which in many languages will be phonologically identical, in order to capture all the uses of these affixes. The next section will show how LMBM with SH provides the power to explain all these variations in affix order without redundancy yet maintains the appropriate constraints to prevent overgeneration.

5. LMBM and affix ordering

If we assume that L-derivation and affixation are independent processes and that the lexemes upon which the former operate are independent of the operations of the latter (= morphemes), we are not inevitably led to chaos. Indeed, the correct ordering of both L-derivation and affixation falls out of one principle and any workable definition of 'lexeme' and 'morpheme'. However, the Separation Hypothesis allows us the flexibility to predict with great accuracy the kinds of exceptions to the LAH predictions discussed above (section 4) and below (section 6).

5.1 *The Push-down Principle*

Beard (1981) suggested a principle which accounts for the ordering of information added by L-derivations. It might be extended to syntactic derivations and called 'The Push-Down Principle':

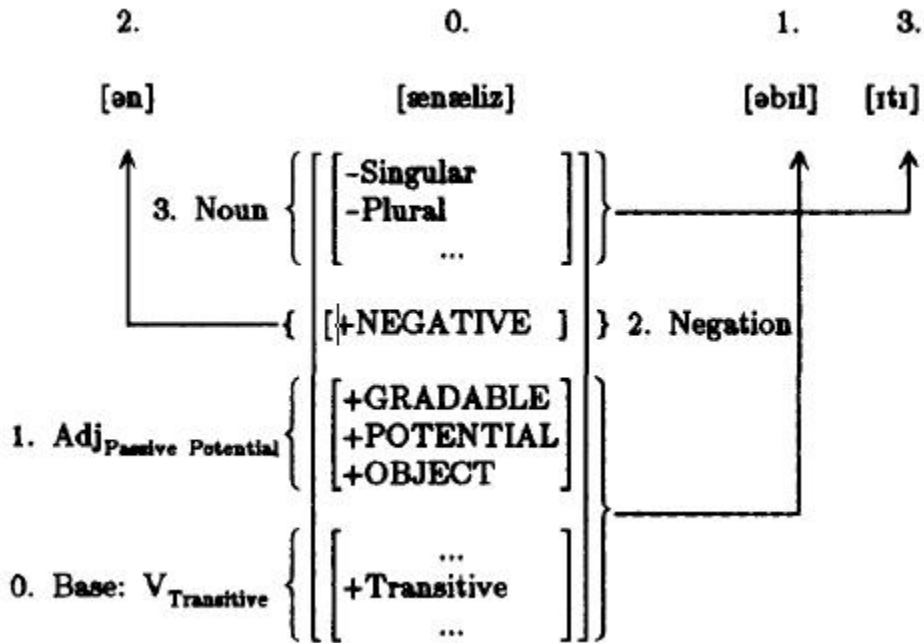
(24) *Information added to the stem during (lexical and syntactic) derivation is added to the top of the feature inventory of the base and 'pushes down' previously stored information.*

(24) makes a reverse or 'mirror image' record of all derivations, lexical and syntactic, applying to the stem from the top down. The phonological formant, of course, would not be pushed down since we are assuming derivation rules devoid of phonological content. Intuitively, this principle seems like an instance of a broader principle of cognitive processing.

(25) below represents a derived feature inventory of an underlying base verb with the grammatical function features [+Object] and [+Potential] inserted by (i) grammatical functional L-rules. This L-derivate received the optional negative element available to most gradable adjectives during derivation. Let us say that it is inserted on top of the adjective feature tier since it is an optional element of adjectives and adjectivizations. Finally, the negated adjectivization was subjected to simple

nominalization which involves nothing more than the insertion of nominal agreement features by (ii) a category provision L-rule. The value of those features has been subsequently adjusted to [-Singular, -Plural] by (iii) a feature adjustment L-rule. The L-derivations responsible for the features in the inventory of the base are numbered vertically in (25); the corresponding affixes are numbered horizontally.

(25)



[+Object] is used to capture the parallel between this adjectivization and objective nominalizations like *employee* and *painting* which seem to be generic objects of their underlying verbs, i.e. an employee is 'one who is employed', a painting is 'something which is painted'. In the same vein, an *analyzable* person is 'one who can be analyzed' as opposed to an *analytic* person, 'one who analyzes'. Beard (1981, 1986a) provides detail for the three types of L rules ((i)-(iii) above) which generate derived feature inventories like (25).

An interesting question which LMBM raises but seems to have little to say about is the order of those morphemes marking inflectional categories whose features are not ordered by the sequence of L-rule application. These affixes, when attached externally to the stem, seem to maintain the order Gender (Masculine-Feminine) - Number - Case. If Babby (1985, 1987) is correct, case features are at least to some extent controlled by syntax and therefore may originate externally (see also Beard (1986a)). Masculine, as the unmarked gender, would naturally take sequential precedence over Feminine; that is, masculine could mark Agentive alone without distinguishing gender, e.g. *Lehrer*, while Feminine could not. Since Feminine is a semantically marked category, it would have to be in principle phonologically marked. Therefore it is possible to add a feminine ending to a masculine stem, but not

to add a masculine suffix to a feminine stem marking an agent. Exceptions like English *widow-er* and Russian *vdov-a* 'widow' : *vdov-ec* 'widower' are rare. The point is simply that the ordering of these markers is constrained by factors derived from central, model theoretic concerns.

As a theoretical representation of knowledge, (25) is to some degree arbitrary; lexical features are arranged no more vertically than horizontally. The point is, as L-derivations apply and reapply to the stem to generate new derived stems, the added lexical features, which become contextual features for M-rule selection, accumulate by (24) from the stem outwards (= upwards). It is impossible for either type of rule to insert features randomly or insert a feature inside one inserted on a previous cycle, i.e. build a feature inventory from the end inwards:

(25) *analyze [Fn ... F2, F1],
 where F = a set of nonnull derivational features.

Of course, it does not follow from this principle, given the Separation Hypothesis, that the morphology will follow the same pattern. The question for Separation theories, then, is, Why do M-rules operate in the same order, from the stem outwards rather than, say, from the top of the feature inventory downward to the stem? The answer to this question is a logical entailment of underlying definitions requiring no special linguistic principles.

5.2 The definitions of 'lexeme' and '(grammatical) morpheme'

A corollary of Principle I is that *lexemes presuppose sequences of phonological segments*. In other words, lexemes must have formants which must be prespecified phonological matrices: no name may be marked with a null, reduplicative or any other type of nonprespecified signal. Null morphology, metathesis, suprasegmental morphemes, (Semitic) revoweling and other nonconcatenative types of morphology, on the other hand, demonstrate that while phonological addenda may be used as function markers, the predefined phonological segmental sequence (or matrix) cannot be a definitional criterion of a morpheme (Beard (1986a)).

Bound morphemes, clitics and affixes do, however, presuppose lexemes in the sense that there is no way to define these markers other than as modifications of lexemic formants. (Grammatical) morphemes have no independent existence: no naming function, no citation form; they have no purely labeling function such as use on physical signs, e.g. *Restaurant, Men, Exit*. Morphemes are commonly prefixes added to the front of a lexeme, suffixes added to the back of a lexeme, infixes inserted into a lexeme. Clitics are added similarly to one formant within a phrase, revoweling schemes operating within lexemes and metathesis which reorders certain parts of a lexeme. Morphemes, therefore, cannot be defined except in terms of operations upon fully defined lexeme formants. We might state this insight as a partial definition

(27b), the fundamental criterion of a full definition of the morpheme (further constraints may not be necessary; see fn. 6).

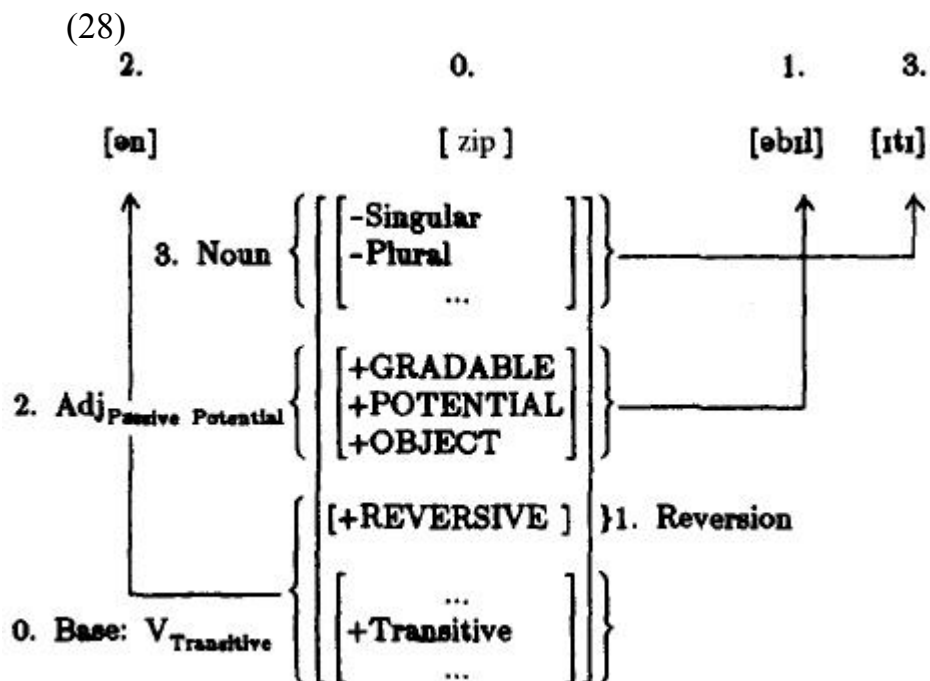
(27a) Assume lexeme L , a mutually implied triplet P, F, R , where $P =$ a prespecified nonnull phonological matrix, $F =$ a feature inventory specifying lexical and syntactic categories, and $R =$ all knowledge of the projected world reference associated with P .

(27b) A morpheme, M , is a(ny) modification of P .

Let us suppose that several L-derivation rules have operated on a lexical base, *analyze*, providing it with the functional requirements of *unanalyzability*, features appropriately ordered according to the Push-down Principle. The morpheme criterion (27b) prevents the insertion of any morpheme other than one marking the passive potential adjective features on first cycle, i.e. *-able*, for only the base *analyze* has a fully defined lexeme formant during the first cycle. Since the output of this operation is also a lexeme formant, a second M-rule may operate on that output during the second cycle, if a morpheme is available to mark the features of the adjective plus negation.

When morphological conditions are satisfied, the rule they determine must operate, assuming these rules normal computation rules; rules cannot ignore their own conditions. This is why the adjectivization rather than the nominalization operates on the second cycle, providing *unanalyzable* and not *analyzability*. Thus the negative prefix *un-* must be supplied on the second cycle when its conditions are met. The output of the M-rules on this cycle is a third fully defined lexical formant (*unanalyzable*), still with the featurization of a qualitative adjective. Only when this formant is available can the third affix, *-ity*, be inserted on the third cycle. Thus the definitional criterion (27b) forces M-rules to operate from the base outwards (= upwards), the same direction in which the insertive L-rules operate. Remember, however, it still does not follow that an M-rule will operate for every L-rule that operates; fewer or more M-rules than L-rules may operate over the same domain of derivationally inserted features.

Notice also that the Lexeme/morpheme-based framework handles ambiguities like *unzippable* without generating morphological tree structures. Assuming that the prefix *un-* is conditioned to mark both negated adjectives and derived reversive verbs, conditions on the latter will position the prefix *un-* in the same place as do the conditions on negated adjectives⁸ Thus the LMBM approach generates the same ambiguity as configurational morphology with only linear structure.



The intriguing implication of SH is that morphology, unlike syntax and phonology, seems to be purely linear, not requiring bracketing. If true, this not only obviates bracket paradoxes and the need for bracket erasure principles, it explains the lexical opacity principle (Anaphoric Island Constraint, Lexical Island Constraint, Lexical Integrity Principle), whereby syntax fails to refer to the internal structure of lexemes, including derived ones. However, this suggestion is too complex to explore here; here, suffice it to say that the definitional approach to matching derivation to morphology explains bracketed morphological phenomena as well as does bracketing. This is not a farfetched suggestion, however; so I will touch on it briefly again in the following section.

Given (a) Principle I and its corollaries; (b) the Lexeme-morpheme-based framework with the Separation Hypothesis, and (c) the Push-down Principle, the order of all morphemes are fundamentally constrained by simple entailment of the morpheme criterion (27b), itself a constituent of the definition of 'morpheme' in the terms of the Separation Hypothesis. Now, if inflectional (morphosyntactic) rules operate after Lrules as suggested by (18), their features will be added only to the topmost tiers, e.g. (25.4). This will guarantee that morphemes marking inflectional functions will be affixed only after those marking L-derivation.

This approach does not commit these markers to final position in all instances, however, for their conditions may allow them more than one marking role. Remember, these are not always specifically inflectional markers; they are functionally empty processes for modifying lexemes in context. Because of this, the same affixal markers may be used to mark lexical derivations as in (24) or as special

interfixes as in (22, 23); the range of a morpheme's particular roles is locally determined by the morphological conditions of the specific language.

5.3 Morphological markedness and linearity

Although the order guaranteed by the Push-down Principle and the morpheme criterion (27b) guides the general order of morphemes, it does not guarantee the proper order of native (word-boundary) and nonnative (morpheme-boundary) affixes, generated with great accuracy by Level-ordered Morphology. This is because both types of affixes mark identical L-derivations, e.g. the resultatives: *a painting, a statement, a publication*. The problem here is that the sequence type (a) *native + nonnative is prohibited, whether the native formant is lexemic or affixal, but (b) nonnative + nonnative, (c) nonnative + native and (d) native + native sequences are permissible. This ordering falls out of the definitional criterion of the morpheme (27b) in concert with a fundamental principle of Markedness Theory, presumably required independently.

According to this basic principle, marked affixes accrue only to marked stems but unmarked affixes attach to all stems on each cycle. Thus marked Germanic strong 'inflections' like *-en* attach only to strong verb stems (*ride : ridden* but *glide : *glidden*). Unmarked 3rdPerSg *-s*, however, attaches to marked and unmarked stems (*ride : rides, glide : glides*). The same principle applies to L-derivation: to the extent that nonnative affixes are marked, they should attach to nonnative stems while native affixes attach to all stems. Now, given that morphemes operate only on fully specified lexeme formants (27b), plus the independent general theory of marking, it follows that only nonnative affixes will be added to nonnative stems on the first cycle but that native (unmarked) affixes may be added to either type of stem-even if both marked and unmarked M-rules operate on each cycle.

The output of the first cycle will be either a nonnative or native derived lexeme formant depending on the affix added. Since no nonnative suffix will be added to any native stem or suffix, none of the prohibited combinations above will occur; at least, LMBM faces no more exceptions than does Level-ordered Morphology on this score. Thus the basic predictions of Level-ordered Morphology fall out of the assumption that morphemes are semantically and functionally empty processes which presuppose phonologically prespecified lexeme formants and the logical implications of markedness principles applied to borrowed and native formants.

Although LMBM does not speak to the issue of the type of bracketing paradox represented by derivatives like *unanalyzability*, where Level I (Linate, '+' boundary) affixes occur outside Level II (native, '#' boundary) affixes, this is not a theoretical problem for LMBM. The suffixes *-able* and *-ity*, for example, seem to be Linate suffixes in that they evoke allomorphic changes in the stems to which they attach.⁹ The prefix *un-* does not evoke such changes and according to the level-ordered theory, should not occur inside *-ity*. Yet in *[[un[analyz-abil]]ity]*, *un-* would seem to occur

structurally within the domain of *-ity*, a common bracketing paradox discussed widely in the literature (e.g. Pesetsky (1985)).

The approach to morpheme ordering outlined here and in Beard (1986a) suggests that morphology may be distinguished from syntax by its linearity; that is, morphology may not have structure in the sense syntax and perhaps phonology do, contrary to current conviction. If this is true, not only is lexemic opacity explained (lexemes have no internal structure for syntax to refer to), so are bracketing paradoxes like that represented by *unanalyzability*.

Let us assume that English affixes describe marked and unmarked categories and that a marked one cannot follow an unmarked one in derivational concatenations. In the case of (28) the only concern will be whether *-ity* can attach linearly to *-able* and *un-* to *analyzable*. This they do without any violation of markedness principles. If linear morphology proves to be a dependable implication of the Separation Hypothesis and LMBM, this type of bracketing paradox will be explained by LMBM with markedness theory in a natural way which eludes stratal approaches. The promise of the elimination of bracketing erasure principles (which destroy structure M-rules have just constructed) and bracketing paradoxes while explaining markedness governed ordering and lexemic opacity, suffices to justify exploration of LMBM at least in this direction.

6. Under- and overdetermined mapping of morphology to derivation

6.1 Morphological underdetermination

Although an M-rule cannot ignore features in the feature inventory of an L-derivation which satisfy its conditions, since its conditions are independent of conditions on the L-rules which inserted those features, the opportunity of disjunctures precluded by SBM arises under Separationist theories. The curly brackets in (25), for example, mark bundles of features inserted or adjusted by L-rules. If the conditions on M-rules are independent of those on the L-rules which inserted those features, it becomes possible for morphological conditions to reinterpret, to 'rebundle' those features. An M-rule condition may comprise features from more than one rule or part of the features inserted by one rule. For example, the conditions on some M-rule in some language might be based on [+Negative, -Singular, -Plural, ...] or [<Gradable, +Potential, +Negative, ...], even though the negation, number, gradation and potentiality L-rules which insert them are all independent.

The common terms for this phenomenon, inexplicable within consistent sign-based frameworks, are 'morphological underdetermination' and 'overdetermination'. A good example of the former is found in Serbo-Croatian (SC). SC has a possessional adjective which may be agentivized.

(29)	dronj-av	'ragged-y'	dronj-av-ac	'ragged person'
	čad-av	'soot-y'	čad-av-ac	'sooty person'
	vas-ljiv	'lous-y'	vas-ljiv-ac	'lousy person'
	moč-an	'power-ful'	moč-n-ik	'strong man'

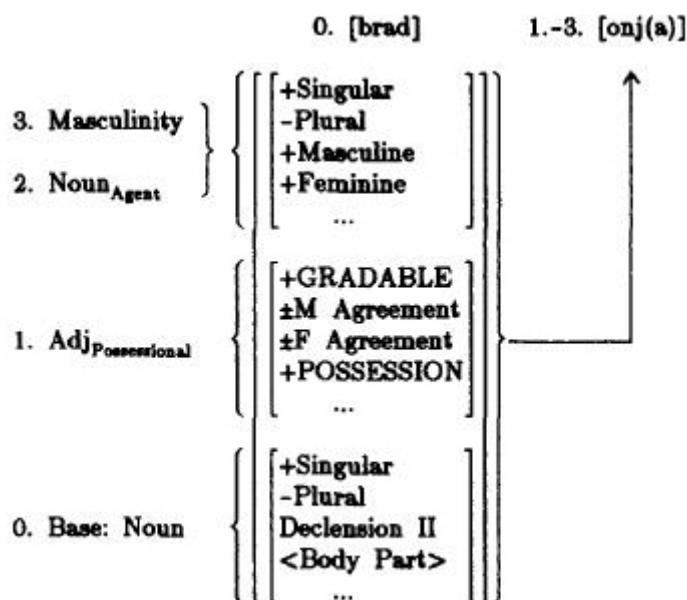
If, however, the reference of underlying stem belongs to the semantic class <salient body parts>, a lexical class comprising about 50 commonly used nouns, affixes are not concatenated as in (29). Now, since 'truncation' is unfalsifiable and, especially suspicious in that it would involve a rule to truncate an affix inserted by a previous rule, we are safer in concluding that a single M-rule here marks features inserted by two different L-rules.

(30)	brad-a	brad-at	brad-onj-a
	'beard'	'bearded'	'bearded male'
	glav-a	glav-at	glav-onj-a
	'head'	'(big) headed'	'big-headed male'
	rog	rog-at	rog-onj-a
	'horn'	'horned'	'horned male'

These L-derivates are morphologically unrelated, but their functional behavior prove them derivationally related.¹⁰ Even idiomatic meanings hold from adjective to noun, e.g. from the noun *rep* 'tail', *rep-at* 'tailed' and *rep-onj-a* 'tailed one' are derived. Most often they refer to animals as expected. But *repat* has two unusual, more or less human referents: people with tail-like vertebral extensions and the devil, e.g. *rep-at-i* (NomSgMas definite form) 'the tailed one'. Both these idiomatic interpretations turn up in the noun, *reponja*. In fact, all idiomatic references and senses which turn up in the adjectives also appear in the nouns, a situation we would not expect were the two L-derivations as unrelated as the M-derivations.

The feature [Possession] is added by the adjectivization, and the [Gender] and [Number] features are added by the nominalization as in (25). Thus the M-rule inserting the single suffix *-onja* is conditioned by features located at all three derivational levels in (31): only the inherent <salient body part> underlying bases receive the suffix *-onja* at all, then only in masculine possessional agentivizations. (The feminine correlate is *-ač(a)*, also added directly to the base.) The adjectival M-rule is apparently blocked by the semantic class of the base (31.0) so that for three L-derivations, (i) possessional adjective, (ii) agentive noun with (iii) masculine adjustment only one affix is attached.

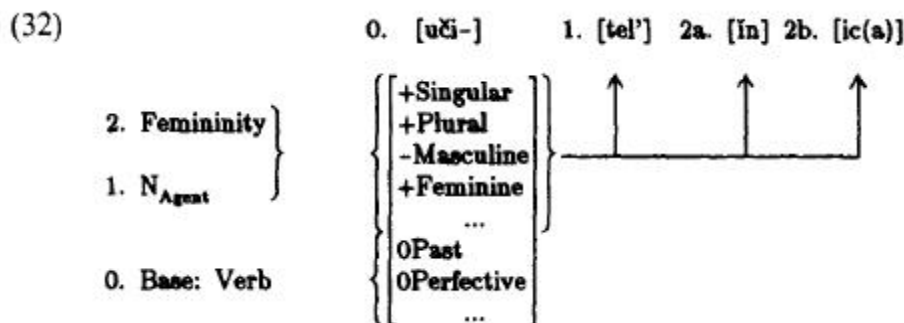
(31)



Since LAH is based on a sign morphemes, it will have to explain the nominal *-onj(a)* and adjectival *-at* as two unrelated affixes, one nominal, the other adjectival. Thus it will miss the overall generalization that these derivations parallel all others in this highly productive scheme in which the adjectivization always underlies the nominalization and is so marked. Level-ordered Morphology is vacuous here; the Mirror Principle fails to predict the data.

6.2. Morphological overdetermination

Underdetermination is the result of M-operations which reflect the operation of L-rules in one-many fashion; overdetermination results from M-rules operating against L-rules in many-one fashion. The Russian feminizations of agentives on *-tel'*, *uči-tel' : uči-tel'-n-ic(a)* 'teacher', exemplifies overdetermination, i.e. more than one affix conditioned by the features of a single tier of lexical features. (32) has undergone two L-derivations, (a) agentivization which inserted the nominal features at the top of the feature inventory, including the natural gender features which determine agentivity, and (b) feminization which merely fixed the values of those natural gender features already inserted at [-Masculine, +Feminine]. Here we have another instance like (31) where we might expect underdetermination; however, we find just the opposite.



(32) represents at least three M-rules summarized in (33a-c). The suffix *-tel'* marks the first derivation, agentive nominalization, and the two suffixes *-n+ic(a)* together mark femininity.

- (33)
- (a) $\emptyset \rightarrow$ *-tel'* / [\pm Masculine, \pm Feminine, ...] ____
 - (b) $\emptyset \rightarrow$ *-ɪn* / [-Masculine, + Feminine, ...] *-tel'* ____
 - (c) $\emptyset \rightarrow$ *-ic(a)* / *-ɪn* + ____
[-Masculine, + Feminine, ...]

The lack of a perfect correlation between the conditions on lexical material inserted by L-derivation and conditions on the phonological material inserted by M-rules forces separate L- and M-operations. However, it is not the case that the phonological material is directly conditioned by lexical or inflectional material; lexical material inserted by several rules may be interpreted by a single M-rule or several M-rules may interpret the material inserted by a single L-rule. Moreover, inherent lexical material often forms a part of conditions on M-rules.

LAH and the Mirror Principle predict that three L-derivations should underlie the affixes of (32), yet only two are there. They predict 3 suffixes in (31) yet only one occurs. LMBM allows more M-rules to operate than L-rules, this opening the door for infinite morphologization. Any theory which accounts for overdetermination will require additional machinery to control the number of possible affixes. LMBM at least correctly predicts the fundamental possibility of a many-one relationship between affixation and derivation.

LAH will require further adjustment to somehow account for this possibility and only then can it face the task of fashioning this constraint. Level-ordered Morphology is again silent on this issue. Overdetermined constructions fall within the prediction of the Mirror Principle in its weak form, where form and function are necessarily but not sufficiently parallel, but this principle explains nothing of the nature of overdetermined form-function relations.

Notice that the three problems of ordering facing LAH interface with the original problem of categorial-acategorial affixes. While the suffix *-ɪn* cannot be directly associated with any particular function in (32), elsewhere it can be.

(34)	mir	'peace'	mir-n(yj)	'peaceful'
	gnev	'anger'	gnev-n(yj)	'angry'
	vred	'harm'	vred-n(yj)	'harmful'

On the other hand, the highly productive agentive suffix *-tel'* of (32) occurs in deverbal adjectivizations with no ostensible function.

(35)	vraščaj	'rotate'	vrašča-tel'-n(yj)	'rotary'
	letaj	'fly'	leta-tel'-n(yj)	'flying'
	želaj-	'wish'	žela-tel'-n(yj)	'desirable'

Russian contains a large catalog of such derivations from verbs whose agentive is derived by means of affixes other than *-tel'*, for example, *let-č-ik* 'pilot, flyer', *želaj-ušč-ij* '(one) desiring'. The lesson that affixation teaches us is that each language contains a finite number of morphemes which are over and over put to whatever uses morphemes have and that marking grammatical functions is but one such use. Morphemes are characteristically, not exceptionally multifunctional; they respond to syllabic and prosodic demands, mark grammatical functions and serve uses yet to be discovered.

Given theories of percolation, LAH models have no option but to postulate several phonologically identical derivational affixes with and without grammatical functions if they explain the patterns of recurrence examined here. LAH might revert to the traditional tack of ignoring the identity of the suffix *-in* in (31.2a) and (34) and claim a single compound suffix *-in-ic(a)*. This tack fails to raise the very interesting questions such as, Why do affixal extensions like this always come from the common stock of morphemes and why are such compound morphemes necessary in the first place? Although LMBM does not answer these questions, at least within this framework they arise.

Sections 4-6 have demonstrated the ability of LMBM to correctly predict both the 'normal' order of lexemes dictated by the Mirror Principle and Levelordered morphology. However, LMBM is powerful enough to distinguish those L-rules whose order is relevant to morphology from those which are not. Level-ordered Morphology might seem to account for markedness theory by explaining the native-nonnative and strong-weak verb distinctions in terms of M-operations at different levels. However, Kiparsky (1982) and Halle and Mohanan (1985) place these operations at four different levels, losing the very broad cross-categorical generalization afforded by markedness theory. Not only does LMBM with markedness theory predict the marked-unmarked distinction of Latinate and Germanic derivations, it does so in the same manner as it treats strong and weak verbs, keeping the generalization of markedness intact.

7. Two ways of meaning

LAH, even supported by Level-ordered Morphology, works well only on biunique signs. But if Beard (1985) is correct in pointing out that even in agglutinative languages, half the affixes are polyfunctional, and in inflectional languages around 80% are, LAH may not work for any language type. LAH fails to predict (i) morphological asymmetry (Beard (1986a)) and (ii) morphemes simultaneously with and without functions (it can explain these phenomena only as pseudohomophones); (iii) conflicting features; (iv) 'inflectional' morphemes inside 'derivational'; (v) morphological underdetermination, and (vi) overdetermination.

A theory of morphology that explains these phenomena requires the Separation Hypothesis, the separation of derivation from morphology. This hypothesis is much more powerful than sign-based morphology, allowing the possibility of derivation and morphology operating in isolation of each other. The question thus arises, Can theories based on this hypothesis be constrained in natural, non-ad hoc ways and still predict the general parallel between derivational and morphological operations (the Mirror Principle)?

The LMBM model based on this hypothesis features definitions of 'morpheme' and 'lexeme' with the 'Push-down Principle' plus the general theory of markedness, which predicts the full range of possible form-function relations and that of ordering phenomena in inflectional languages. The greater explanatory power of this model is put to good use: it (i) provides a place for the paradigm; (ii) explains asymmetry, (iii) explains null morphology in accord with de Saussure's and Jakobson's definition as the simple noninsertion of morphological material in the absence of conditions for insertion. It further (iv) explains affixes both with and without functions, even when the same affix is involved, and (v) provides for violations of the Mirror Principle like over- and underdetermination. Even more satisfying, the definition of the (grammatical) morpheme itself explains and guarantees the general parallel between derivation and morphology and with an accuracy beyond that demanded by the Mirror Principle.

LMBM also seems to provide a way of handling morphology in a linear fashion, avoiding rules which insert then erase the same brackets. In collaboration with principles of markedness, it does this without losing the ability to represent the fixed ordering of Latinate and native morphemes; indeed, it promises the ability to account for a wider range of morphology without the bracketing paradoxes of configurational morphology. It explains lexical opacity in the most natural manner: morphological constructs have no internal structure.

Perhaps the most intriguing implication of LMBM, however, is this: if lexemes and morphemes are two unrelated basic linguistic units, language possesses two ways of meaning, a direct way via signs or symbols (lexemes) and an indirect, paradigmatic way (morphemes). We have seen time and again that morphemes 'mean' only in context, only when attached to a lexeme or phrase, while lexemes are names, labels

which name things independent of their role in sentences. Beard (1986a) argues that these two basic units share no property at all, not even necessary phonological formants, and provides evidence that lexical and syntactic characteristics of derivations are not directly associated with formants where they exist. If this is true, we would expect these two types of basic elements to constitute two different modules of grammar and operate in two different areas of the brain. Beard (1986b) reviews the strong neurological evidence that this is true and demonstrates that of all morphological theories, LMBM alone can stand the most stringent psychological test of a grammatical theory: the Type Transparency Test of Berwick and Weinberg (1984).

Also, it would not follow that beings who can communicate by one of these basic units can communicate by the other. Specifically, since the morpheme needs a context to even have a meaning, the use of morphemes should be restricted to beings capable of simultaneous multilevel processing including deductive logic at one level. For if morphemes have different significances in different contexts, they require logic running simultaneous to speech, operating alongside grammar, to decide between the available meanings. All the experimental studies of pongid communication over the past two decades have involved pure sign 'languages'; none have involved the more interesting paradigmatic meaning examined here and thus demonstrate nothing about language.

LMBM also, ironically, allows us to apply the strongest definition of the linguistic sign without exception; that is, the linguistic sign may be maintained if restricted to a lexicon without grammatical morphemes. All but only lexemes are mutually implied binary associations of phonological sound and meaning. There is no lexemic sound without meaning and no lexemic meaning without sound and there is no exception (Principles I and II, section 1.3). Any and all items which conform to this definition of the lexeme are stored in the lexicon and all others, without exception, are morphemes conforming to Principles IV and V, and are contained in the M-component. This framework also, of course, implies the necessity of two domains of linguistic study where one previously stood: lexicology and morphology. Borderline cases no doubt arise, e.g. the well-known problem of adverbs and adpositions, down, up, before, behind, out, which seem to move diachronically between the categories lexemic adverb and morphemic preposition. Ancillary theories of movement between these two basic natural classes will be required of any framework.

Notes

*Parts of this paper were originally read at the Twelfth Penn Linguistic Conference at the University of Pennsylvania, February 1-2, 1985. The discussion which followed has enriched this version. Additionally, I am indebted to Ellen Kaisse, Franz Rainer, Bogdan Szymanek and an anonymous *Lingua* reviewer for comments on various earlier drafts which have materially contributed toward reshaping the final one.

¹The Saussurean terms 'isomorphic' and 'biunique' will be used synonymously here. The definition of these terms have two fundamental implications, only one of which is relevant to this article. First, Saussure felt that the form and function of signs are 'mutually implied', i.e. changes in sound should entail changes in meaning and vice versa. Saussure knew well, however, that null and empty morphology violate this criterion. I have argued elsewhere (Beard (1981, 1986a)) that SBM theories cannot merely accept these violations; they must predict them. It is not enough to extend the definition of signs to 'mutually implied (possibly null) sound and (possibly null) meaning'. This entails the absurd proposition that silence can convey meaning and the vacuous, linguistically irrelevant prediction that it can convey nothing. These are not entailments of Jakobson's definition of null morphology (Jakobson (1939)) as we will see further on. The other implication of the term 'isomorphic', the one relevant to this article, is that the relation of form and function is direct, without intervening structures. Although he did not pursue this implication, Jakobson's null morphology hypothesis does imply that this relation must be indirect. It is this implication which will be explored in depth in this article.

²'Gender' is used here in the sense of traditional 'semantic' rather than 'grammatical' gender. Beard (1984b) argues that semantic gender is the only grammatically relevant gender and that 'grammatical' gender is not gender at all but a combination of declension and agreement class. Several phenomena in Russian grammar are dependent upon the discrimination of the gender of animate nouns which cannot be predicted on the basis of grammatical gender.

³In the transliteration of (6) I have split the Russian letter corresponding to 'ja' into 'j' and 'a' in order to indicate the palatalization of the stem caused by the suffix *-jak*

⁴For occupations where women are still underrepresented, the token referent of feminized agentives tends to be the wife of the referent of the underlying agentive rather than its female counterpart. Both referents are often possible, e.g. *storož-ix-a* 'female guard' or 'guard's wife'. See Potikha (1970) for discussion.

⁵'Affective' L-derivations like these are not considered by all morphologists to be of the same nature as other L-derivations, i.e. feminization, agentive, patientive, resultative nominalizations, and the like. Rather, they are generally taken to be means of reflecting the personal attitude of speakers. They structurally differ in that in many languages they may be stacked one on another to indicate degree as noted here.

⁶Assuming that every lexeme must contain a prespecified ordered sequence of phonemes required to maintain its identity, it follows that morphemes cannot perform any operation which would radically (irrecoverably) reorder that sequence, e.g. exchange initial and final consonants or a consonant and a vowel (*top* → *pot*, *soul* → *slow*). Notice that this definitional constraint would not preclude consonant mutations or even infixation, so long as they are controlled by an M-rule which allows the recovery of the original formant. Nor would this prevent purely phonological operations, such as vowel harmony, built into the system in such a way as not to interfere with the immediate recoverability of the underlying formant. Such a definitional constraint would explain not only why affixation is preferred over nonconcatenative morphology but why transparent affixation is preferred over nontransparent, without excluding either.

⁷Sadock's system of Autolexical Syntax can be simplified with empty morphemes, too (Sadock (1985)). As his theory stands, the mapping between his M- and S-structures requires morphemes and lexemes in both structures even though his S-structures per se require only lexemes and his M structures need to assign only morphemes. However, since clitics require a lexeme for proper morphological attachment, his M-level must redundantly assign lexemes as well as morphemes. If I read Sadock's theory correctly, the two levels may be collapsed into the single level of the theory discussed here if we assume that syntactic functions (morphosyntactic features) are properties of lexemes which are marked by empty M-rules in context.

⁸The reversive verbs may be explained by the same feature, [+Negative], although this solution is not attempted here. Negation involves two concepts: contrariness and opposition (Zimmer (1964)). Unhealthy does not mean 'sick' for the addition of negation to adjectives results in a derivate with contrary not opposite referent. Let us say that in IE languages negating an adjective results in a derivate with a referent contrary to

that of the base while negating a verb results in a derivate whose referent is the opposite of that of the base. Could logic explain the use of the 'reversives' given this condition? What would be the opposite of *to button, zip, wrap* if not to *unbutton, unzip, unwrap*? In English the same prefix is used to mark the identical feature [+Negation] in adjectives and verbs while in other IE languages alternate affixes, e.g. German *un* and *ent-*, Russian *ne-* and *raz-*, mark the different semantic functions of negation.

⁹More accurately, *-able* belongs to both the classes of Latinate and native morphemes since it may either effect or not effect allomorphy (Aronoff (1976)):

'comparable	com-'par-able
'educ-able	edu-'cat-able
'in-imit-able	un-imit-'at-able

¹⁰Some of these examples translate as 'very much N-ed' due to 'lexical intensification'. Thus while *bradat muž* 'bearded man' would translate as 'heavily bearded man', while *bradata žena* 'bearded woman (lady)' refers to a woman with only a few hairs on her chin. The reason is that all men by definition have beards thus the former phrase would be circular except for lexical intensification. Women, on the other hand, are not definitionally bearded, so a simple 'having N' translates the latter. Lexical intensification is a semantic condition holding across all L-derivations so it would be inappropriate to accommodate it in any individual L-derivation. My assumption, therefore, is that the sole function of these derivations is Possession.

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