Part II Morphology and Grammar

8 Morphology and Syntax

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Introduction

The interaction between syntax and word formation has always been a battleground, on which many important linguistic wars have been fought. In the late 1960s and early 1970s, disagreements involving the nature of the Word Formation (WF) component and the Lexicon provided the background for the emergence of two radically different trends within generative grammar: that of Generative Semantics, on the one hand, and Lexicalism, on the other hand. At stake at the time was the appropriate constraining of the grammar, and whether an independent, list-like lexicon is more or less costly than an extremely powerful syntax, in which transformations could derive varying syntactic and morphological structures from unique semantic representations.

To a large extent this issue, which has been inert within the Extended Standard Theory during the late 1970s and early 1980s, has reemerged in the mid-1980s, albeit in a slightly different guise. Work done on the lexicon during that decade has resulted in important structural insights into the nature of word formation, thus strengthening the claim that morphology is an autonomous module, on a par with the phonological and the syntactic modules, and that it should be understood in these terms. On the other hand, work done in syntax during that same decade resulted in the emergence of syntactic systems capable of handling word-formation operations in a more restricted way, thereby avoiding many of the pitfalls encountered by earlier, less constrained such work.

It is within this enhanced understanding of both syntax and word formation that the same question is now raised again: is word formation an independent module, subject to restrictions all its own, or should it be subsumed under syntax, obeying syntactic restrictions which are independently motivated? For those who believe in the existence of an independent word-formation component, another question must be resolved: how is the interaction between such an independent word-formation component and the syntax to be characterized?

The resolution of these questions is an empirical issue. Proponents of an independent word-formation component must show that such a component includes operations and constraints which cannot be reduced to independently motivated syntactic conditions. They must further show that an independent word-formation component with its accompanying restrictions allows for a range of phenomena that cannot otherwise be accounted for. Proponents of an exclusively syntactic word formation, on the other hand, must do the opposite: they must provide a way of accounting for the richness of WF phenomena, without appealing to any syntactic processes which are not otherwise motivated. An illustrative example: if in order to allow word formation in the syntax one has to introduce constituent structures which are only attested in word formation, never induced for non-word-formation syntactic operations, this would not represent any simplification of the grammar. It would simply allow a modified specialized syntax for generating words, differing in crucial, principled ways from that needed for generating syntactic phrases.

Below, I will review very briefly some of the answers that have been given to these two questions in recent studies, pointing out the strengths as well as the weaknesses of those positions. Section 1 reviews a lexicalist, pre-syntactic approach to WF. In section 2, I review approaches attempting to reduce WF to syntax. In section 3 I turn to a formal comparison of morphological and syntactic structures, while section 4 reviews briefly issues concerning morphology and argument structure. Section 5 focuses on the existence, or non-existence, of isomorphism between morphosyntactic and morphophonological representations. Finally, section 6 is devoted to a review of some "mixed systems," those which cannot be easily described as syntactic or lexicalist in nature.
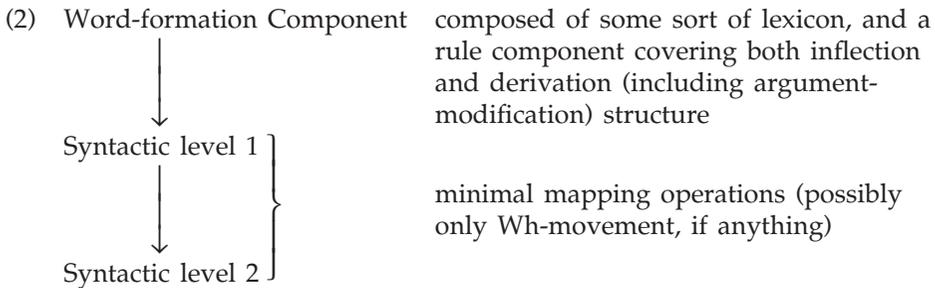
1 Linear models

Much of the work on word formation in the 1970s and the early 1980s has been informed by the assumption that not only is there an independent word-formation component, but its interaction with the syntax is severely limited by some version of Lapointe's (1980) Lexical Integrity Hypothesis (LIH). Di Sciullo and Williams (1987) formulate this principle as the Atomicity Thesis in (1):

(1)   The Atomicity Thesis: Words are 'atomic' at the level of phrasal syntax and phrasal semantics. The words have 'features,' or properties, but these features have no structure, and the relation of these features to the internal composition of the word cannot be relevant in syntax.
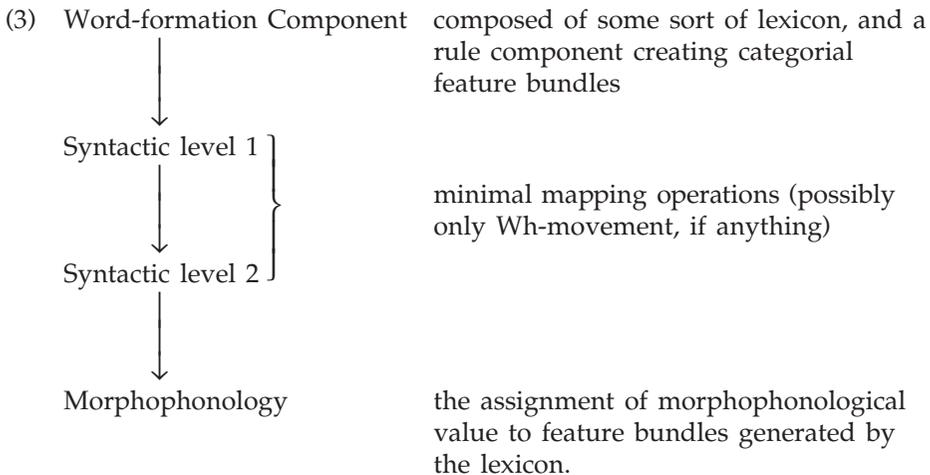
The way in which LIH is enforced in many of these models is by assuming that the WF component, as a block of rules, is ordered with respect to the syntax. The WF component and the syntax thus interact only in one fixed

point. Such ordering entails that the output of one system is the input to the other. This notion of the autonomy of the syntax and the WF component, and the restricted interaction between them, thus mimics the notion of autonomy developed for the interaction between the syntax and the phonology, where it is the output of the former which interacts with the latter. I will refer to this class of models as linear models.

One possible ordering for the WF component is prior to D-structure: that is, prior to the availability of any syntactic operations. Such ordering entails that the output of the WF component is the input to the syntax. Oversimplifying, this model may be schematized as in (2):

(2) Word-formation Component   composed of some sort of lexicon, and a
                                rule component covering both inflection
                                and derivation (including argument-
                                modification) structure

        Syntactic level 1

                                minimal mapping operations (possibly
                                only Wh-movement, if anything)

        Syntactic level 2

Another possible ordering would entail a separation between the lexical and word-formation components which precedes the syntax, and some morphophonological component which follows it. Within such approaches, lexical insertion and WF involve the combination of categories and features (e.g. V+NOM), and it is the morphophonological component which is responsible for assigning actual phonological value to these combinations. Such an approach is depicted in (3):

(3) Word-formation Component   composed of some sort of lexicon, and a
                                rule component creating categorial
                                feature bundles

        Syntactic level 1

                                minimal mapping operations (possibly
                                only Wh-movement, if anything)

        Syntactic level 2

        Morphophonology   the assignment of morphophonological
                                value to feature bundles generated by
                                the lexicon.

As an illustration of the distinction between (2) and (3), consider a case of suppletion, as in, for example, the *sing–sang* pair. In type (2) models, the phonological string /*sang*/ is generated by the lexicon and inserted at D-structure. It is lexically specified as [+past], a feature that percolates to the root of the word, thereby becoming syntactically visible. On the other hand, in type (3) models the past tense of *sing* is generated by the WF component exactly on a par with the past tense of *walk*: both consist of [V+past] feature bundles. It is only at a later stage, when the morphophonological component is reached, that [SING+past] is given the phonological representation /*sang*/, while [WALK+past] is given the phonological representation /*walked*/.

Note that while the Atomicity Thesis may hold for (3), only the model in (2) actually *requires* it to be correct. If, indeed, the phonological string /*sang*/ is inserted as such under V, the fact that it is past tense must be associated with the entire word, rather than with any internal segment of it, for the word as a whole is clearly morphologically opaque. In other words, for supporters of model (2), there could not be a discrete [past] morpheme associated with /*sang*/ which is syntactically visible. On the other hand, this is not the case for (3). Here, a discrete morpheme [past] is associated in an identical fashion with both [SING+past] and [WALK+past], regardless of their phonological spellout, making it possible, at least in principle, for the syntax to refer to such a morpheme. I will return in section 5 below to some further ramifications of this distinction.

Proponents of an independent word formation, LIH, and the D-structure insertion of word-formation output typically support a strongly lexicalist approach to syntax, where much of the syntactic tree is base-generated as is, and the power of syntactic movement operations to modify the tree is greatly reduced. This correlation, while not logically necessary, is nevertheless not accidental. Within such models, it is assumed that there is a pre-syntactic independent word-formation component, with a set of well-defined properties and formal operations associated with it. Among the properties we find typically lexical ones such as subregularities, accidental gaps, suppletion, semantic drift, and blocking. Among the formal operations we find, depending on particular models, rewrite schemata, subcategorization frames for affixes, heads-of-words and percolation, level ordering, etc.[1] Crucially, now, these properties and operations characterize both derivational morphology and inflectional morphology. Halle (1973) has already pointed out that inflectional morphology shares its formal properties with derivational morphology: both exhibit accidental gaps, semantic drift, and blocking, and both can be characterized by the same formal mechanisms. In the work of Kiparsky (1982c) it is further shown that, morphologically speaking, regular inflectional morphology and irregular inflectional morphology do not form a natural morphological class, thus casting serious doubt on the validity of any formal morphological distinction between derivation and inflection.[2]

Proponents of linear models thus assume the existence of an independent WF component which encompasses both inflection and derivation, and whose

internal structure, in accordance with (1) or a similar principle, is syntactically opaque. It thus follows that inflectional morphological structures, although they typically interact with syntactic structures, may not be derived by a post-lexical syntax but, rather, must be derived lexically and pre-syntactically, forcing the introduction into the lexicon of richly annotated lexical entries where syntactic information is abundant. Now, having given so much formal power to the WF component, and having incorporated so much syntactic information into it already in order to allow the derivation of inflectional forms, it is only natural to attempt to bank on the resulting formal richness, and to try to restrict the syntax so as to leave in it only those mapping operations which cannot be encoded lexically at all.

Consider a concrete example. In much work done in the early 1990s, and much inspired by Pollock's (1989) adaptation of Emonds (1978), it is assumed that V moves from its original position to the functional heads Tns and Agr, thereby becoming inflected for tense and agreement. A scheme of such a movement is illustrated in (4) for the French form *mangera* 'eat-fut.-3-sg.' (irrelevant details omitted):

(4)
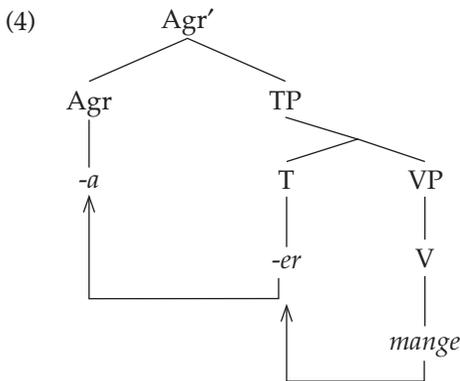
If, however, /*mangera*/ is base-generated already as is, specified as future and third person, the *morphological* motivation for the movement in (4) disappears. It can no longer be derived from the need for a host for the affixes heading TP and AgrP respectively, as has been argued by Baker (1988a) and Ouhalla (1991), among others.[3]

This rationale, note, carries over to supporters of type (3) models as well. Here, the verb would be inserted at D-structure as [STEM+Future+Agreement], and although phonological representation is delayed, head-to-head movement is not necessary for the stem to accumulate the necessary inflectional affixes.

Even more important, support for a strong lexicalist model, of type (2) or (3), comes from a massive redundancy present in models which assume the existence of syntactic movement alongside operations which modify argument structures lexically. Consider, for instance, the classical GB account of verbal and adjectival passives (cf. Freidin 1978, Chomsky 1981, Marantz 1984a). In

these accounts, the burden of explaining verbal passives is divided between the lexicon and the syntax. First, in the lexicon, some sort of de-thematization of the external argument takes place. The resulting participle is then inserted into D-structure having, essentially, the structure of an unaccusative verb. Subsequent NP movement then moves the internal argument to its surface subject position to receive Case. This highly modularized account of passive is schematized in (5) (where the underlined theta role is the external argument):
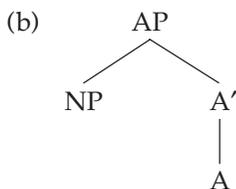
(5)   Passive:

    (a)   WF operation: [*wash*] $\Rightarrow$ [*washed*]
                      $<,\underline{\theta}_1\theta_2>$ $<\theta_2,(,\theta_1),>$

    (b)   D-structure insertion and NP movement:
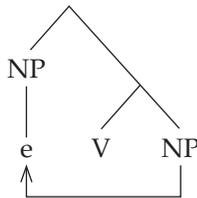
Yet within the same approach, adjectival passives are derived without NP movement, by a WF operation which takes the participle derived in (5a) as its input, and further lexically externalizes the internal argument, and (possibly) eliminates the original external argument altogether, as is schematized by (6a) (cf. Levin and Rappaport 1986). The resulting D-structure is (in essence) as in (6b), where the structure of adjectival passives (in predicative contexts) is in essence like that of unergative verbs:[4]

(6)   (a)   WF operation: [$_v$ *washed*] $\Rightarrow$ [$_A$[$_v$ *washed*]]
                           $<,\underline{\theta}_1,\theta_2>$ $<\underline{\theta}_2>$

    (b)

While empirical data lend some support to the representation of verbal passives as unaccusatives and adjectival passives as unergatives, from a conceptual point of view the following question arises: if lexical operations are allowed to modify argument structure, to eliminate external arguments, and to externalize internal arguments, as in adjectival passives, what, in principle, prevents a lexical operation that will externalize an internal argument in passive

participles, thereby giving rise to a "lexical" verbal passive? Without an appropriate constraining of the WF component, such an operation cannot be ruled out in principle. In eliminating NP movement and restricting argument-structure modification to the WF component, proponents of strong lexicalist models, such as Lexical Functional Grammar (see Bresnan 1982a, Bresnan and Kanerva 1989), thus carry to its logical conclusion the research program launched by Chomsky (1970).

2 Syntactic models

In contrast with so-called linear models, much research from the mid-1980s onwards (notably inspired by Baker 1985, 1988a) can be characterized as an attempt to deny (much of) WF its status as an independent module. The thrust of the argumentation in these works is to show that WF phenomena adhere to syntactic constraints and interact with syntactic rules, and hence are best characterized as syntactic phenomena, not WF-specific phenomena. Most recently, this research program has been explicitly articulated in Lieber 1992:

> The conceptually simplest possible theory would . . . be one in which all morphology is done as a part of a theory of syntax . . . A truly simple theory of morphology would be one in which nothing at all needed to be added to the theory of syntax in order to account for the construction of words. (p. 21)
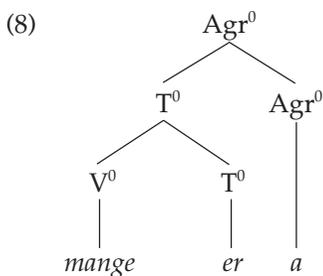
As Lieber (1992) herself points out, "no one has yet succeeded in deriving the properties of words and the properties of sentences from the same basic principles of grammar" (and I return to Lieber's own attempt shortly), but the desirability of this result continues to inform much current morphosyntactic research. Most of this research, however, continues to concentrate on a rather narrow range of phenomena, and the expansion of its results to a general explanatory model of syntactic WF is not clearly tenable.[5] In fact, with the recent exception of Lieber (1992), most researchers who have attempted to construct a model explicitly reducing (at least some of) WF to syntax have concluded that the task is impossible and quite possibly an undesirable one.[6]

Syntactically speaking, much of the work done by Baker (1988a) and subsequent work utilizes the notion of head-to-head movement, first proposed by Travis (1984). Head-to-head movement is the possibility of moving a Y^0 projection by Move-α and adjoining it to a governing X^0, thereby creating the adjunction structure in (7):[7]

(7) X^0

       Y^0 X^0
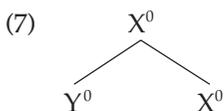
The availability of a syntactic operation which creates X^0 projections under well-defined conditions sets the stage for forming words syntactically. The case for syntactic WF is a formal one: if syntactic operations may form words, then the formal necessity for an autonomous WF component is weakened considerably. The reader should note, however, that the availability of syntactically derived X^0 projections does not entail that words as such are derived in the syntax, unless it is actually assumed that, *by definition*, all adjunction-created X^0 projections are *words* in the morphological sense: that is, if it is already assumed that morphological structures and syntactic structures are identical. It is in fact entirely compatible with existing syntactic assumptions to claim that the structures generated by head-to-head movement are *not* words in the morphological sense, but rather, nonmaximal phrases with some well-defined range of syntactic (rather than morphological) properties.

In general, work attempting to reduce morphological representations and operations to the syntactic configuration in (7) is divided into two groups, roughly corresponding to the traditional distinction between inflectional and derivational morphology. The first centers on the derivation of complex inflected forms from movement of lexical items through a succession of functional heads occupied by inflectional affixes. A typical example is shown in (4) above. It is an explicit assumption of most of these studies (see Belletti 1990 and subsequent work) that the representation in (4) is not just a syntactic one, in which nodes such as Tns and Agr are bundles of functional and possibly syntactic features, but that, specifically, these nodes dominate actual morphophonological strings, and that the head-to-head movement depicted in (4) has the effect of affixing to a verb specific morphemes, resulting in a structure which is a morphophonological word, as depicted in (8):

(8)

$$
\begin{array}{c}
\text{Agr}^0 \\
\diagup \quad \diagdown \\
\text{T}^0 \qquad \text{Agr}^0 \\
\diagup \ \diagdown \qquad | \\
\text{V}^0 \quad \text{T}^0 \qquad | \\
| \qquad | \qquad | \\
\textit{mange} \quad \textit{er} \quad \textit{a}
\end{array}
$$

Furthermore, the formation of a complex inflected word adheres to Baker's (1985) Mirror Principle:

(9)   The Mirror Principle: Morphological derivations must directly reflect syntactic derivations (and vice versa). (Baker 1985: 375)

Given the Head Movement Constraint, the order of morphemes in a derived form must reflect the syntactic structure. Thus, if the morpheme /*er*/ corresponding

to FUTURE appears closer to the stem than the morpheme /a/ representing third person, it follows that the syntactic node which dominates tense markers is lower in the tree than the syntactic node which dominates agreement markers.

A historical note is of some interest here. Pollock (1989), in arguing for the existence of two functional projections above the VP (but below CP), uses exclusively syntactic argumentation. Given the placement of negation, adverbials, tensed verbs, and infinitives in French, he argues for the existence of two possible X^0 landing sites for the verb outside the VP, and hence for the existence of two maximal projections above the VP. The labeling of these nodes as 'Tense' and 'Agreement', with the former dominating the latter, is not directly argued for by Pollock; nor is this labeling a crucial part of his argumentation. The claim that these projections are morphological in nature was first put forth by Belletti (1990), who linked the syntactic structure proposed by Pollock with the Mirror Principle, suggesting that since agreement morphemes in Italian occur outside tense morphemes, the Mirror Principle requires postulating AgrP over TP. It is worthwhile noting here that Baker's (1985) Mirror Principle was a claim specifically about the syntactic representation of argument-structure-changing morphology, not about the order of inflectional morphemes, and extending the Mirror Principle to structures such as those in (4) is by no means a logical necessity.

On the other hand, the possibility of deriving morphophonological strings by syntactic movement, coupled with a research program seeking to reduce WF to syntactic operations, resulted immediately in the emergence of what Laka (1990) refers to as the "Inflectional Big Bang." If, indeed, syntactic head-to-head movement is the only device for forming (8), the projection, as a full syntactic phrase, of every inflectional piece of morphophonology is inevitable. Further, as languages do not always display the same order of affixes with respect to the stem (i.e. some have tense markings outside agreement markings), the model requires the parameterization of the order of functional projections in a syntactic tree, allowing it to differ from one language to the next.[8] The system further necessitates postulating language-specific, and sometimes affix-specific, direction of adjunction. For a review of the problematicity of these results and attempts to constrain the system, see, in particular, Laka 1990 and Speas 1991a.

Before considering further implications of syntactic versus nonsyntactic WF, let us turn briefly to a comparison of the formal structures proposed for WF with syntactic structures.

3 Morphological vs syntactic structures

From the late 1970s onwards, work on WF typically utilizes notions such as head, projection, and subcategorization, all terms used in current syntactic

theories. But are morphological structures one and the same as syntactic ones? Let us briefly consider some of these alleged parallelisms.

3.1 Headedness and hierarchical structures in morphology

A review of the rewrite schemata and hierarchical structures proposed for morphology reveals immediately that they are systematically incompatible with notions of phrase structure and tree structure proposed for syntax.[9] Considering, specifically, proposals made by Selkirk (1982), note that her re-write schemata cannot be reduced to a categorial projection from the lexicon, as is customarily assumed for syntax (nor was it intended to achieve this goal). Second, there is no way to reduce it to X'-theory. Selkirk proposes rules such as WORD ⇒ STEM; STEM ⇒ ROOT, etc., where notions such as WORD, STEM, and ROOT are morphological primitives with a host of morphological and phonological properties, in order to represent cyclical domains for the application of morphological and phonological rules. An attempt to translate this terminology into syntactic phrase structure would require postulating that X^{max} be formally distinct from X', each representing a syntactically distinct primitive undergoing fundamentally distinct syntactic operations, a perspective implicitly and explicitly rejected in syntax (for an explicit argument against this perspective see esp. Speas 1990, as well as Kayne 1994, Chomsky 1995a).[10] Clearly, there is no sense in which Selkirk's rewrite schemata give rise to maximal or nonmaximal projections in the X'-theoretic sense.
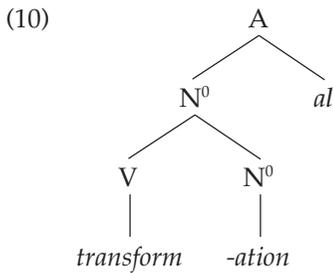
Heads and maximal projections of sorts are explicitly proposed for morphological structures by E. Williams (1981). Specifically, it is proposed that the rightmost element in a morphological string determines the categorial type of the projection dominating it (the Right-hand Head Rule). As such, the notion of head proposed for morphological structures is similar to that proposed for syntax: it is proposed that in branching hierarchical structures, branches may differ in their relations to the root node, and that some constituents may be more prominent or more closely related to the root than others. Note, however, that this generalization is true not only of syntax and morphology, but also of phonology, specifically in representations of syllable structure, where the vowel is more prominent than either the onset or the coda. This, then, may represent an inherent property of grammatical hierarchical structures across the board, and does not argue for reducing the morphology to the syntax any more than it argues for the reduction of the phonology to the syntax, or vice versa. Rather, what needs to be explored is whether the sense in which some subconstituent in a hierarchical structure is more prominent than others is identical in morphological representations and syntactic ones.

As a case at hand, consider the Right-hand Head Rule. Putting aside the question of its empirical adequacy, note that this is a very different type of
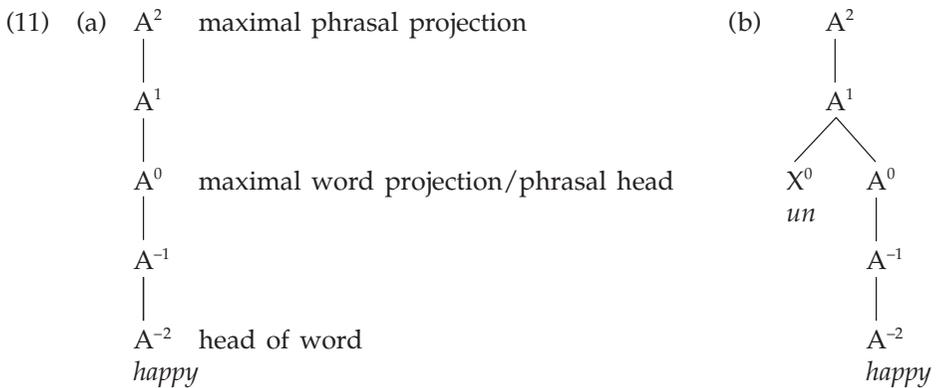
relation from the one proposed for syntactic projections: it is relativized to a linear order. The head, rather than being a terminal projection of the same type as its dominating category, as it is in syntax, is identified by its position. Considering, for instance, a strict SOV language, it is unlikely that the presence of a Y constituent to the right of the verb in such a language would result in interpreting that Y constituent as a head. Rather, a movement would be assumed to derive that configuration, and the head would continue to be the X^0 terminal which projects the X^{max}. As a particularly striking illustration, consider a recent proposal of Kayne's (1994), according to which UG only provides for [Specifier[Head Complement]] word orders at D-structure. At first sight, the mandated left-headedness of such a proposal appears similar to the Right-hand Head Rule, postulating a strict correlation between linearity and hierarchical order. Upon closer scrutiny, however, the similarity disappears. Thus, when confronted with a typical SOV language in the Kayne model, the null syntactic hypothesis would still be that the noncanonical position of the verb (or more accurately, the position of the object to the left of it) is the result of some movement operation, and that a closer investigation would, in fact, reveal the effects of such movement. It is rather unlikely that because of its location to the left of the final constituent, the structure would designate the object as the head and the verb following it as the complement. Yet, this is precisely the proposal made by E. Williams (1981) for all morphological structures, and by Lieber (1980) for the structure of English compounds, assuming that the determination of headedness of morphological structures is computed strictly from linearity.[11] Note, interestingly, that while the head of a word is assumed to be the rightmost constituent, heads of phrases according to Kayne (1994) are always generated in the leftmost periphery of X′, rendering the unification of these two notions of head *prima facie* implausible.[12]

Lieber (1980), rather than defining heads and projections as such, defines a set of percolation relations in morphological binary-branching structures. At times these are relations between affixes and the binary structure which dominates them. The term 'affix' in her system is a derivative, rather than a primitive notion: it is the element that has a subcategorization frame. For compounds, on the other hand, percolation is directionally determined.

While Lieber's (1980) notions of affix, binary structure construction, and percolation come closest to the notions of projection from the lexicon used in syntax, they still show a range of properties which are clearly distinct from those attested for syntactic heads. First, head affixes may be on the right periphery (*-ation*, *-ment*, etc.) or the left periphery (*en-*, *be-*). Second, headedness for compounds remains strictly directional. Third, while syntactic structures give rise to trees in which heads are dominated by projections with an increased number of bars, morphological representations are typically recursive, and a morphological head X is typically dominated by a formally identical X. Thus, in a representation such as (10) an identical bar-level projection, N^0, is associated with the verb *transform* and with the adjectival affix *-al*:

(10)

$$A$$

```
          A
         / \
       N⁰   al
      /  \
     V    N⁰
     |    |
 transform -ation
```

(10)

$$
\begin{array}{c}
A \\
\diagup \diagdown \\
N^0 \quad al \\
\diagup \diagdown \\
V \quad N^0 \\
| \quad | \\
transform \quad -ation
\end{array}
$$

As Lieber (1992) points out, a simple solution in terms of introducing a sub-zero projection is problematic, in that it would require *happy* to be dominated by A^0 when occurring independently, but by A^{-1}, when occurring affixed, as in *unhappy*. In turn, however, Ackema (1995) suggests that the problem is only apparent, if it is assumed that *happy* is ambiguous between being a phrasal head and a morphological head. As a phrasal head, it is A^0. However, as a morphological head, it is A^{-2}. The structure of *happy* is thus as in (11a), while the structure of *unhappy* is as in (11b):

(11) (a) A^2 maximal phrasal projection   (b) A^2
          | |
          A^1 A^1
          | /   \
          A^0 maximal word projection/phrasal head X^0 A^0
          | *un* |
          A^{-1} A^{-1}
          | |
          A^{-2} head of word A^{-2}
          happy   *happy*

While the solution proposed by Ackema is certainly attractive formally, note that it crucially requires the assumption of projection levels dedicated to subword structures and the postulation, within a single maximal projection, of two distinct heads and two distinct maximal projections, phrasal and word respectively. Further, syntactic heads and phrasal maximal projections are subject to distinct formal conditions from heads of words and maximal projections of words. On the other hand, Ackema (1995), quite explicitly, does not try to reduce WF to syntax. Rather, he claims that there is a distinct morphological component which is governed by principles which are identical to those of the syntax, but which is nevertheless distinct from the syntax.[13]
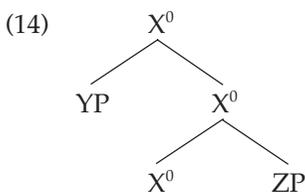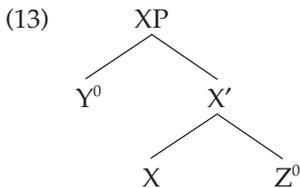
Interestingly, Lieber's (1980) notion of projections is not too different from that put forth in Chomsky's (1995a) Bare Phrase Structure. Here, as well, notions such as X^0 and X' are no longer basic; nor is a typical node composed of the

sequence X″–X′–X⁰. Rather, a phrase is conceived as a succession of identical nodes dominating each other, as in [$_{cat}$ [$_{cat}$ [$_{cat}$ *cat*]]], where the lowest, the terminal, is interpreted as X^{min} and the highest as X^{max}. To draw a parallelism with a morphological structure, in a string such as [$_A$ *un* [$_A$ *happy*]], *happy* would be A^{min}, while *unhappy* would be A^{max}.

In her own attempt to unite the hierarchical representation of words and phrases, and being fully aware of the syntactic incompatibility of previous accounts, Lieber (1992) proposes a modification of the (syntactic) X′ schema, adapting it to both morphological and syntactic needs. Such an attempt can only be successful, however, if in doing so, Lieber does not merely create a set of hierarchical structures and conditions on them which apply exclusively to word formation. Examining her proposed modification, it appears that she does precisely that. Specifically, she argues for the following modifications to the X′-schema:

(12)　(a)　Specifiers must be allowed to appear within the X′ level.
　　　 (b)　Recursion is allowed within the X^0 level.
　　　 (c)　Nonheads need not be maximal projections.

It is not clear that the modifications proposed in (12) have any independent syntactic justification. Concerning (12a), Lieber relies on a comment by Stowell (1981), proposing that in Japanese and German specifiers are generated under X′. Research since then has seriously challenged this claim. Nor does Lieber provide any evidence for the independent necessity of (12b) in syntactic (i.e. nonmorphological) representations. Finally, proposals quoted by Lieber as evidence for (12c) are extremely limited in scope, and center on a very narrow range of properties. Specifically, even if structures such as (13) are, according to some phrase-structural approaches, attested syntactically,[14] the question is why structures such as (14), which Lieber predicts to exist freely, are rare for morphological units, and not attested at all for syntactic ones:[15]

(13)

```
              XP
            /    \
          Y⁰      X′
                /    \
               X      Z⁰
```

(14)

```
              X⁰
            /    \
          YP      X⁰
                /    \
               X⁰     ZP
```

However, the most serious problem for Lieber's (1992) attempt to reduce morphological formalism to a syntactic one concerns her use of specifiers and complement, a point to which I return shortly.

3.2 Subcategorization

Lieber (1980) and others have proposed that morphological selection can be captured by means of a morphological subcategorization frame, or selection. Again, it is tempting to try and subsume this notion of subcategorization, or selection, under the notion of selection familiar from the syntax. Yet, an investigation of the properties of morphological selection reveals that it must be kept entirely distinct from syntactic selection. In order to illustrate this, consider a proposal by Rizzi and Roberts (1989) to encode morphological sub-categorization syntactically. They propose that morphological subcategoriza-tions are projected syntactically as adjunction structures with an empty slot into which substitution movement can move heads. Head-to-head movement is further possible without such base-generated structures, creating adjunc-tions, rather than substituting into base-generated ones. This latter operation does not result in a word. The two structures have distinct properties. Thus excorporation (in the sense of Roberts 1991) is possible from the latter, but not from the former.

Consider some of the consequences of this proposal. First, note that it allows head-to-head movement, and hence the formation of an X^0 projection, which is not a word, when no morphological subcategorization is projected. Thereby, the definition of word is lifted out of the syntax, becoming a purely mor-phological matter, which is entirely independent of the existence of an X^0 pro-jection. This is especially striking, as, syntactically, the outputs of substitution into a base-generated adjunction structure and adjunction-creating movement are identical. The syntax is thus in principle incapable of distinguishing between these two outputs, and an (independent) morphology must be appealed to, to determine which syntactic configurations correspond to words and which do not.

Second, since the outputs of substitution and adjunction are identical, a configuration is introduced here which is otherwise unattested in syntax, and seems needed only for the purposes of incorporating word formation into the syntax. (Note that this issue is independent of whether or not adjunction struc-tures can be base-generated, as it addresses specifically the possibility of sub-stitution into such structures, if, indeed, they may be base-generated.)

Attempting to address some of these problems, Roberts (1991) proposes that in substitution cases (but not in adjunction cases) a sub-X^0 structure is base-generated, with a null sister, having the structure in (15):
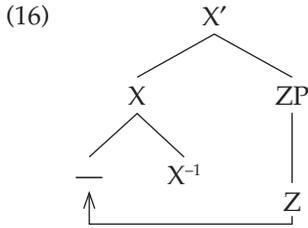
(15)

$$X$$
$$Y \qquad X^{-1}$$
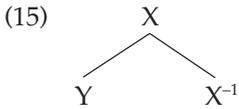
In this structure, substitution is to the empty Y slot. In this way, the structural identity between the outputs of adjunction and substitution is avoided. However, other problems arise. Some issues concerning sub-X^0 projections were reviewed in section 3.1. Note, in addition, that identity of output between adjunction and substitution is avoided here at the cost of introducing a sub-X^0 structure for the manifest purpose of allowing words to have syntactic structures. None but morphological structures would ever have sub-X^0 structure; nor would morphological selection ever be realized anywhere else. Thus the syntactic difficulty here is solved by reinforcing the gap between syntactic selection and morphological selection, not eliminating it.

   Second, note that under the standard assumptions that substitution movement is only possible to a specifier position, never to a complement position, we must assume that Y in (15) is a specifier. Under equally accepted assumptions, however, selection may only be realized by complements. We are thus faced with a contradictory situation where Y is selected by X^{-1}, and hence is its complement, but movement to it is possible, thus suggesting that it is a specifier. The problem is compounded by approaches (cf. Speas 1990, Kayne 1994) which obliterate the distinction between specifiers and adjuncts altogether, making the distinction which Rizzi and Roberts (1989) try to draw impossible to state.

   This criticism is equally applicable to proposals made by Lieber (1992). In her attempt to reduce morphological representations to syntactic ones, Lieber is clearly faced with the need to explain the persistent right-headedness of English words such as $[[happy_A]\ ness_N]]$ $[[monster_N]\ ous_A]]$ $[[glory_N]\ ify_V]]$. As *-ness*, *-ous*, *-ify* are clearly heads here, and as the stems to which they are attached appear to their left, Lieber concludes that *happy*, *monster*, and *glory* are specifiers (or possibly modifiers), and not complements of their respective heads. In addition, however, Lieber would still like to maintain that in a meaningful way, *-ness*, *-ous*, *-ify* categorially, and possibly semantically, select *happy*, *monster*, and *glory*. Again, selection according to standard syntactic assumptions may only be realized by complements, leading to a contradiction, or to a system of complements, specifiers, and selection which behaves differently for morphology and for syntax. (The nonstandard aspect of specifiers as sisters of an X^0 projection in Lieber's system was pointed out above.)

   Returning to (15) (or, for that matter, to the original structure proposed by Rizzi and Roberts (1989)), and given the D-structure syntactic projection of morphological subcategorization frames, one may ask what actually prevents the base-generation of morphological structures such as (15) with all morphemes in place, preempting movement altogether. The answer is that such base-generation is often not possible as the incorporated element is itself a

complement of X which must satisfy a distinct syntactic subcategorization frame at D-structure in order to meet the Projection Principle. The schema of such a structure is given in (16):

(16)

$$
\begin{array}{c}
X' \\
\diagdown \\
X \quad\quad ZP \\
\diagdown \quad\quad | \\
\underline{\quad}\ \ X^{-1} \quad\quad Z \\
\uparrow\text{_____}|
\end{array}
$$

It thus seems that morphological subcategorization frames need not, and indeed, at times may not, be satisfied at D-structure. In fact, it is precisely the conflict between the syntactic subcategorization, which must be satisfied at D-structure, and the morphological subcategorization, which need not be thus satisfied, which gives rise to the movement. It is thus obvious that syntactic subcategorization and morphological subcategorization are distinct, and should be kept as such, to ensure that one must be satisfied at D-structure, while the other need not be.[16]

In conclusion, extending the syntax to cover morphological structures requires a radical modification of our notion of hierarchical structures and selection as they emerge from the X' schema. Notions such as head and selection, when used morphologically, are sufficiently distinct to seriously shake any attempt to reduce them to well-known syntactic mechanisms.

3.3 Incorporation and government

In view of the fundamental problems associated with the formal reduction of morphological structures to syntactic ones, what further support is there for the claim that, for example, noun incorporation as a morphological process is syntactically derived? Baker (1988a) brings forth many empirical arguments for his assumption that noun incorporation must be syntactically derived. However, subsequent work by Di Sciullo and Williams (1987) has shown clearly that none of his empirical arguments actually excludes a lexical derivation. Rather, Baker's argumentation by and large shows noun incorporation to be consistent with a syntactic analysis, rather than incompatible with a lexical one.

A major conceptual argument brought forth by Baker in support of a syntactic derivation for noun incorporation is based on simplicity: some central properties of words can be shown to follow directly from independently motivated syntactic principles if we assume that they are formed by head-to-head movement. The major independently motivated constraint is the Head Movement Constraint (of Travis 1984) and its (possible) reduction to the Empty

Category Principle (see Chomsky 1986). Specifically, the HMC/ECP accounts elegantly for subject–object asymmetries observed in noun incorporation, and groups them together with a wide range of syntactic subject–object asymmetries independently reducible to ECP effects.

This line of argumentation, however, is actually less than conclusive. More than anything else, it is indicative of the prevalence of the notion of government in syntactic models put forth in the 1980s. As is well established, word-formation operations which interact with argument structure are sensitive to selection properties. In particular, internal arguments, the classical "subcategorized" elements, enter word formation with the stem in a way which is not (typically) attested with external arguments. This was observed at least as early as Lees (1960), and has been incorporated in some fashion into WF accounts, be they syntactic (as in Roeper and Siegel 1978) or lexical (as in Lieber 1983).

Under standard assumptions, complements are projected in some minimal domain of the head, while noncomplements, either adjuncts or specifiers, are projected outside that same domain. If we refer to this minimal domain as "government," as is commonly done, it is clear that a statement concerning the incorporability of selected complements and a statement concerning the incorporability of elements governed by V are almost identical.[17]

Configurations of government and configurations of selection do, however, vary. Within phrase structures proposed in the mid-1980s, one area of difference involves Exceptionally Case Marked embedded subjects. Another involves specifiers of complements. As is well known, clitics do incorporate in the former contexts, as the following example from French illustrates. However, there are no documented cases of noun incorporation from such contexts:

(17) Je le$_2$ considère [$_{AP}$ t$_2$ malade]
      'I him consider   sick'

Baker (1988a) discusses, however, a case in Chichewa where it is clearly not a selected complement which incorporates into the verb, but rather its possessor, which is governed by the verb but is not selected by it:

(18) (a) Fisi   a- na- dy-a   nsomba za kalulu
           hyena SP-PAST-*eat*-ASP *fish*   *of   hare*
           'The hyena ate the hare's fish'

      (b) Fisi   a- na- dy-er- a   kalulu$_1$ nsomba (t$_1$)
           hyena SP-PAST-*eat*-APPL-ASP *hare*   *fish*

Note that in (18a), the possessor appears as a post-nominal PP, while in (18b) an applicative affix is attached to the verb, and the possessor appears adjacent to it.

Interestingly, on recent assumptions concerning phrase structure, the government asymmetry between complements and subjects disappears. Specifically, if subjects are base-generated as the specifiers of the head selecting them, and that head moves to a higher head, resulting in the configuration in (19), noun incorporation of subjects into the V can no longer be excluded by the HMC:

(19) $[_{FP} \ldots [_{F'} \text{ V} + \text{F} [_{VP} \text{ Subj } t_v \text{ (Obj)}]]]$

Borer (1995) argues that, indeed, the incorporation of specifiers in structures such as (19) is licit, also in construct state nominal configurations such as (20a), exemplified in (20b), where '*axilat-Dan* 'eating Dan' is argued to be an incorporated form (irrelevant details omitted):

(20)   (a) $[_{DP1} \text{ N}_1 \ldots [_{NP} \text{ N}_2 \text{ t}_1 [_{XP} \ldots]]]$

      (b)   'axilat Dan 'et   ha-tapuax
             eating Dan acc. the-apple
           'Dan's eating of the apple'

In view of this, one wonders why it is that cliticization and Hebrew construct state allow a type of head-to-head movement which is excluded for noun incorporation.

4 WF and argument structure

Word formation by syntactic means receives its strongest, overwhelming support from the existence of a very powerful pretheoretical approach to the interaction between lexical semantics and syntax. According to this view, closely resembling the Generative Semantics tradition, there should be a direct mapping between thematic roles and syntactic structures, and if such a direct mapping could be established, it would per force favor those formal representations which are compatible with it and exclude others. For proponents of such an approach it thus suffices that syntactic word formation be shown to be empirically adequate. It is not necessary to show that the rival approach, the lexical one, is empirically flawed, since everything else being equal, it is to be dismissed on general, pretheoretical grounds.

In the work of Baker (1988a), this perspective on the interaction of syntax and lexical semantics is formulated as the Uniformity of Theta Assignment Hypothesis given in (21):

(21)   The Uniformity of Theta Assignment Hypothesis: Identical thematic relationships between items are represented by identical structural relationships between these items at the level of D-structure.

UTAH, as utilized by Baker, argues that, for example, active and passive verbs must have the same D-structure; that causative verbs must appear in structure in which the arguments of the source, a noncausative verb, are fully represented, etc. Intuitively, UTAH suggests that for every lexical item there is a unique D-structure, and any further manipulation of argument structure or affixation must be syntactic, the output of movement. In its strongest possible interpretation, a principle such as UTAH not only enables words which interact with argument structure to be formed syntactically, but actually forces them to be formed syntactically.[18]

An illustration of the way in which a principle such as UTAH motivates a derivation is the comparison of the derivation of verbal passive in Chomsky 1981 with the analysis of verbal passive put forth in Baker et al. (1989). Recall (see section 1 for a brief discussion) that in the system of Chomsky (1981), deriving verbal passive is a modular process, having a 'lexical' WF component and a syntactic one. Specifically, for a verb such as *derive*, the WF operation forms the participle *derived* from the source V and suppresses/internalizes the external argument. The internal argument, however, remains intact, and projects as the complement of the participle at D-structure. Syntactic considerations (i.e. the need for Case) now result in that internal argument moving to receive nominative Case.

This derivation, note, is only partially compatible with UTAH. Although the projection of the internal argument remains identical for the lexical entry of *derive* both in its verbal and in its participial form, the projection of the external argument is altered. While for *derive* the external argument is projected as a sister of V' (or, alternatively, as a sister of VP), for the participle *derived* the external argument is not projected at all, or, alternatively, it is internalized, in violation of UTAH. Similarly, proposals put forth by Jaeggli (1986a) are not fully compatible with UTAH. This suggests that the affix *-en* is assigned the external argument. However, that affix is placed internal to the V' constituent, thereby allowing the external argument to be realized in different positions, although its thematic relationship with *derive(d)* is constant.

Baker et al. (1989) address this issue directly. Adopting Jaeggli's (1986a) assumption that the external argument is assigned to the morpheme *-en*, they project that morpheme *external* to the VP, and as its sister. Assuming that the notion "identical structural relations" means for external arguments sisterhood with a maximal projection, the assignment of an external thematic role to a head external to the VP satisfies UTAH. Relevant aspects of the structure proposed by Baker et al. (1989) are given in (22):

(22) $[_{IP}$ *-en*$_I[_{VP}$ *derive* NP$]]$
          $\theta_{ex.}$ $\theta_{int.}$

The ramifications of UTAH for the WF component and its interaction with argument structure are far-reaching and interesting. As has been pointed out often, however, for some argument-structure-changing morphology, a full

syntactic representation might turn out to be problematic. A particular problem is presented by the existence of complex morphological forms which are derived from verbs, but which do not preserve the argument of the source verb. This is the case for (some) agentive nominals derived from transitive verbs, which appear to lose their internal arguments (e.g. *killer*); for adjectives derived from verbs, either as adjectival passives (e.g. *the derived structure*) or as *-able* adjectives (e.g. *a derivable structure*), which appear to lose their external arguments; or for derived de-verbal nominals, which, on their result reading, lose both external and internal arguments of the source verb (e.g. *the excavation was successful*). I return, specifically, to the issue of derived nominals in section 6 below.

The necessity of introducing into the syntax all argument-structure-changing morphology follows from a particular set of assumptions concerning the relationship between argument structure and syntax, one which entails, in essence, that D-structure is the canonical level of argument-structure realization, and that the lexical entry is the locus of argument-structure specification. Recent approaches to argument structure, however, have cast doubt on the existence of D-structure as GF-θ, or, more generally, as a level of representation encoding argument structure altogether. Further, currently, the pivotal role played by lexical entries is in question, and models giving more weight in the determination of argument structure to predicates and to functional (rather than lexical) structures are widely entertained (for some current research along these lines, see e.g. van Hout 1992, 1996; Kratzer 1994; Borer 1994, in press; Ghomeshi and Massam 1994; Davis and Demirdash 1995). In view of this, the epistemological advantage of placing in the syntax all argument-structure-changing morphology, as follows from the UTAH research program, is no longer self-evident, leaving the merits and de-merits of syntactic WF to be determined independently of issues concerning argument structure and its projection.

5   Morphophonological/morphosyntactic isomorphism?
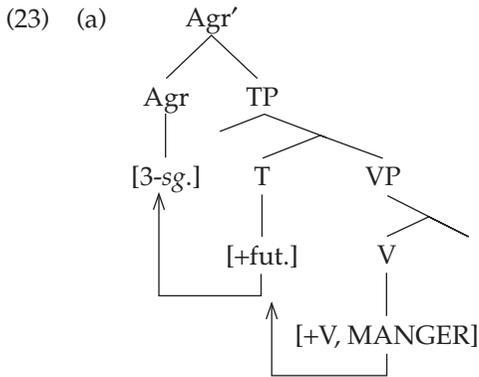
5.1   Projecting phonological strings?

Interestingly, the so-called Inflectional Big Bang approach shares an important property with type (2) linear models, but not necessarily with type (3) linear models. In both, the syntactic properties of words and the phonological properties of words are assumed to go hand in hand. Proponents of (2), assume that what is inserted at D-structure is the actual phonological string, rather than categorial feature bundles. Likewise, proponents of the derivation in (4) assume that the relevant inflectional heads dominate actual phonological material, and that the structure in (8) is responsible for the formation of an accurate

phonological string. Clearly, this is the rationale which drives the positioning of AgrP higher than TP, as discussed in section 2: it is based exclusively on the order of the morphophonological material in forms like /*mangera*/. Likewise, the assumption that grammars may project functional heads in different hierarchical orders is an attempt to derive a morphophonological string by syntactic movement.
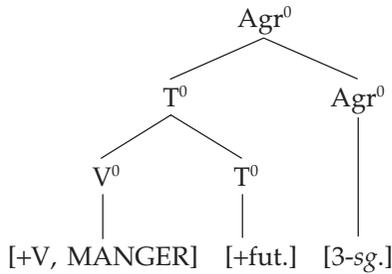
Consider, however, the model in (3). Here, what are inserted at D-structure are categorial feature bundles, which are in turn given phonological representation later on. If this is the case, there is no longer any reason to assume that a feature bundle such as [STEM+AFF$_{infl1}$+AFF$_{infl2}$] actually corresponds to any particular morphophonological sequence. And indeed, this point has been made by Marantz (1988), who suggests that there is no necessary isomorphism between feature bundles, lexically or syntactically derived, and the morphophonological representations assigned to them. In other words, it may be that while in Grammar 1 morphophonological considerations would lead to AFF-1 being realized closer to the stem, in Grammar 2 different morphophonological considerations would realize the same syntactic feature bundle differently.

What is at stake here is the following question: are syntactic representations or word structure isomorphic with phonological representations of word structure? Specifically, is there a unified notion of a morpheme, such that it is the true mediator between sound and (syntactic) function? Or, put differently, are morphological operations to be captured through the existence of lexical-like elements, which compose to give rise to the correct combinations, very much as is assumed for syntactic representations? For proponents of type (2) models, as well as for proponents of the Inflectional Big Bang approach, the answer is "Yes." For "lexicalists," this isomorphism is reflected by a lexically derived WF structure, encoding, as a derived unit, all the syntactic information associated with its components. For "movers," on the other hand, it is the syntactic movement which creates, through adjunction, the string which is directly mapped onto phonological representations.

Just as the assumption of morphophonological/morphosyntactic isomorphism has its lexical and syntactic variants, so the assumption of no isomorphism has a lexical and a syntactic variant. Its lexical variant is the model in (3). Consider now its syntactic variant. Returning to the original Pollock (1989) argumentation, one may argue syntactically for the existence of a complex functional structure above the VP, or support the existence of such functional structure on semantic grounds (e.g. the existence of a T head as necessary for the formation of a proposition, and the existence of a D head as necessary for the assignment of reference). Such functional structure may itself dominate a feature bundle to which a stem will be adjoined by syntactic movement. However, the specific ordering of such projections, or their existence, would now be motivated exclusively on syntactic or semantic grounds. As an illustration, consider the following structure, assuming there to be compelling UG reasons to place Agr above T:

(23) (a)

```
              Agr'
             /    \
          Agr      TP
                  /   \
        [3-sg.]  T      VP
                 |       \
              [+fut.]    V
                         |
                     [+V, MANGER]
```

(b) syntactic output:

```
              Agr⁰
             /     \
           T⁰       Agr⁰
          /  \        |
        V⁰    T⁰       |

  [+V, MANGER]  [+fut.]  [3-sg.]
```

(c) morphological output:
[+V, MANGER][+fut.][3-*sg.*] ⇒ /*mangera*/

For *mangera*, the order of syntactic projections following head-to-head move-ment and the order of phonological material are the same, thereby leading to an appearance of syntax/phonology isomorphism. Consider, however, the case of agreement and tense morphology in Hebrew, as illustrated in (24). While in the past tense, agreement and tense marking are stem-final, as in (24a), in the future tense, the agreement morpheme is split between a post-stem and a pre-stem position:[19]

(24) (a) qibbəl   -*u*   (a') *ye-*   qabbəl   -*u*
          receive+past -3pl.   3+fut.-   receive -pl.

     (b) qibbal   -*ti*   (b') *'a-*   qabbel
          receive+past -1sg.   1+sg.+fut.- receive

     (c) qibbal   -*nu*   (c') *ne-*   qabbel
          receive+past -1pl.   1+pl.+fut.- receive

Even if one were to grant, as Ouhalla (1991) suggests, that in some languages TP is above AgrP, such an order would not give rise to the correct order of

morphemes in Hebrew. First, the division of the agreement morphology in some cases, but not in others, into pre- and post-stem positions is hard to reconcile with a morphophonological/morphosyntactic isomorphism. The fact that in (24a') a future plural form receives its number specification post-stem, but its person specification pre-stem, while in (24c') a future plural form receives both its number and its person specification pre-stem could only be reconciled within an isomorphic model by fragmenting the functional representation so as to give a separate, and hierarchically distinct, representation to first person, third person, plural, singular, etc. A theory which does not assume isomorphism faces no such difficulties.

Isomorphic models, be it noted, need not elaborate on the structure of the morphophonological component. That structure is one and the same as the morphosyntactic component. However, proponents of nonisomorphic models must address another issue. Assuming the syntactic aspect of WF to be essentially as in (23b), where (23b) is derived either lexically or through movement, and its hierarchical structure is either syntactic or morphological in nature, what is the nature of the morphophonological component? In other words, what is the model that would give the structure in (23b) the correct phonological representation?
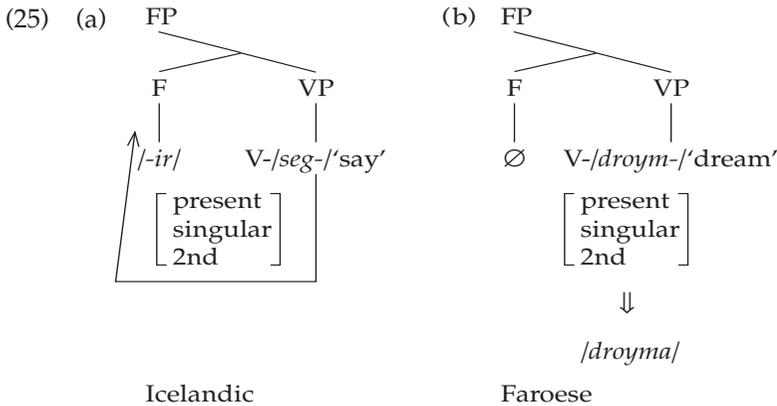
On this issue, we find considerable variation. On the one hand, we find models which assume that the morphophonological component is hierarchical in nature, and that morphemes are coherent phonological units. Typically, in these models the hierarchical structure of (23b), derived lexically or syntactically, is matched with a distinct hierarchical structure which is morphophonological in nature, but which still embodies within it a coherent notion of a morpheme. Such a model is explicitly put forward by Zubizarreta (1985), who proposes that Italian causatives, exhibiting both bi-clausal and mono-clausal properties, do so because their morphosyntactic structure is bi-clausal, but their morphophonological structure is mono-clausal. A similar idea is put forward in Sadock's (1985, 1991) autolexical model, where the output of syntactic trees projects independently as a morphological structure, with co-occurrence conditions restricting the relationship between the two structures and preventing reordering of elements. Most recently, a morpheme-based non-isomorphic model has been proposed by Halle and Marantz (1993) (see also Marantz 1988 on cliticization). This model, Distributed Morphology, derives syntactic structures akin to (23b) through syntactic movement, subsequently assigning to them morphophonological representations. Crucially, in this model it is possible to assign an identical syntactic structure to amalgams in which the order of agreement and tense differs and cannot be derived from the syntactic structure, as is the case in (24), leaving the derivation of the correct (distinct) morphophonological structure to a postsyntactic component. Further, it is capable of assigning the correct phonological string to syntactically regular, but morphophonologically irregular forms, such as /*sang*/. Crucially, within the model there is still a coherent phonological notion of a morpheme,

and hence some hierarchical structure associated with complex phonological words.
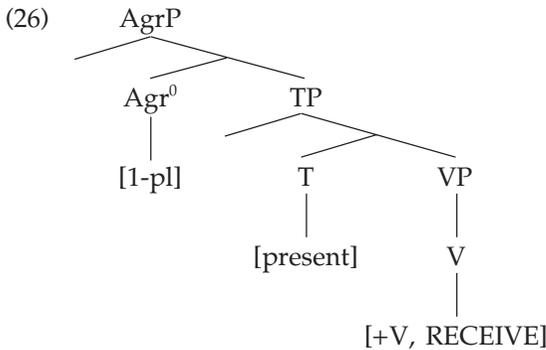
At the other end of the spectrum, we see the coupling of hierarchical syntactically relevant representations with a phonological component that is explicitly based *not* on discrete morphemes, but rather, on phonological representations of particular operations. The strongest thesis along these lines, labeled appropriately as the "Separation Hypothesis", was proposed by Beard (1976, 1988, 1995). In such a model, the derivation of, for example, /*walked*/ from /*walk*/ is not phonologically or morphologically distinct from the derivation of /*sang*/ from /*sing*/: both involve the mapping of syntactic amalgams to phonology on the basis of paradigmatic representations. A similar model is proposed for inflectional morphology (but not for derivational morphology) by Anderson's (1992) A-morphous Morphology (or, alternatively, the Extended Word-and-Paradigm model), where it is argued that inflectional processes are exclusively phonological in nature, consisting in giving a phonological representation to an abstract entry, comprising, among other factors, syntactic information. Again, there is no necessity in this approach to assume that the hierarchical nature of morphosyntactic representations translates into a morphophonological hierarchical structure or, for that matter, that morphemes are discrete phonological terminals of any sort.

Summarizing, nonisomorphic approaches assume that the hierarchical grammatical properties of words are segregated completely from their phonological realization, and that the term "morpheme," as such, implying, indeed, some phonological-functional isomorphism, is an ill-defined one.[20]

Morphophonological considerations, especially those concerning the representations of suppletive forms, mixed-order forms, and autosegmental forms strongly favor a nonisomorphic approach, be it lexical or syntactic. However, some recent syntactic analyses which depend crucially on the actual projection of morphophonological material in the syntactic tree cannot be captured naturally in a DM-type system. As an illustration, consider recent proposals to account for the restrictions on verb movement by appealing to the "richness" of morphophonological representations. Thus it has been proposed that the existence of V movement in Icelandic, versus its absence in the mainland Scandinavian languages or English, is due to the presence of a "rich," in some sense, inflectional paradigm in the former, and its absence in the latter (see Platzack and Holmberg 1989, Roberts 1985, Rohrbacher 1994). Thus Rohrbacher (1994) proposes that the "rich" inflectional paradigm comprises a full person/number paradigm in at least one tense. In this system, "rich" paradigms are lexical entries which project as independent heads, thereby requiring the verb to move and attach to them. By contrast, "nonrich" paradigms are not lexical entries; nor are they discrete morphemes at all. Rather, they are the result of phonological stem change of the type advocated in Anderson's (1992) A-morphous Morphology. Syntactically speaking, they do not project, and therefore no (overt) V movement is required. A movement configuration is given in (25a), a nonmovement one in (25b):[21]

(25) (a)

```
        FP
       /  \
      F    VP
      |    |
    /-ir/  V-/seg-/'say'
    ┌─────────┐
    │ present │
    │ singular│
    │ 2nd     │
    └─────────┘
```

      (b)

```
        FP
       /  \
      F    VP
      |    |
      ∅    V-/droym-/'dream'
           ┌─────────┐
           │ present │
           │ singular│
           │ 2nd     │
           └─────────┘
                ⇓
            /droyma/
```

Icelandic   Faroese

Crucially, the notion of richness is based on the properties of actual morpho-phonological strings. From the perspective of a Distributed Morphology model, such a distinction cannot be made. Considering, within a DM model or any other model based on feature bundles, the syntactic structure of English versus that of Icelandic form such as, for example, *receive* in the context of *we receive*, both would have the structure shown in (26), making the statement of any dependence between verb movement and the nature of the inflectional para-digm unstatable (see Rohrbacher 1994, where this point is made explicitly):

(26)

```
         AgrP
        /    \
      Agr⁰    TP
       |      /  \
     [1-pl]  T    VP
             |    |
         [present] V
                   |
              [+V, RECEIVE]
```
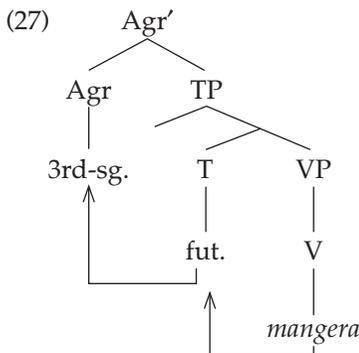
In turn, the result obtained in (25) could be achieved within a DM model by stipulating that in English, but not in Icelandic, Agr is weak, in the sense of Chomsky (1993), thereby making (overt) movement unnecessary. However, within the DM model the weak–strong feature must be formally dissociated from the properties of the morphophonological paradigm, as these are strictly nonpresent in the syntactic structure. The correlation, if such indeed exists, between the "weak–strong" property and morphophonological "richness" thus becomes entirely stipulative in nature.
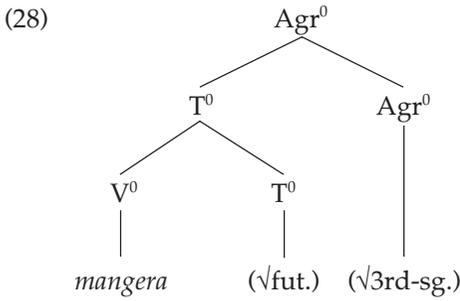
Similar issues arise concerning accounts of null pronominal subjects which are based on the richness of inflection. Thus, Speas (1994) suggests that English bars null pronominal subjects because Agr must be phonologically licensed,

through the presence of phonological material either in its head (a condition met by the classical null-subject languages such as Italian and Spanish) or in its specifier. As Agr does not dominate (sufficiently rich) phonological material in English, the specifier must be filled.[22] Again, it is hard to see how such a notion of phonological licensing can be translated into a DM-type system which utilizes syntactic feature matrices rather than actual phonological material.
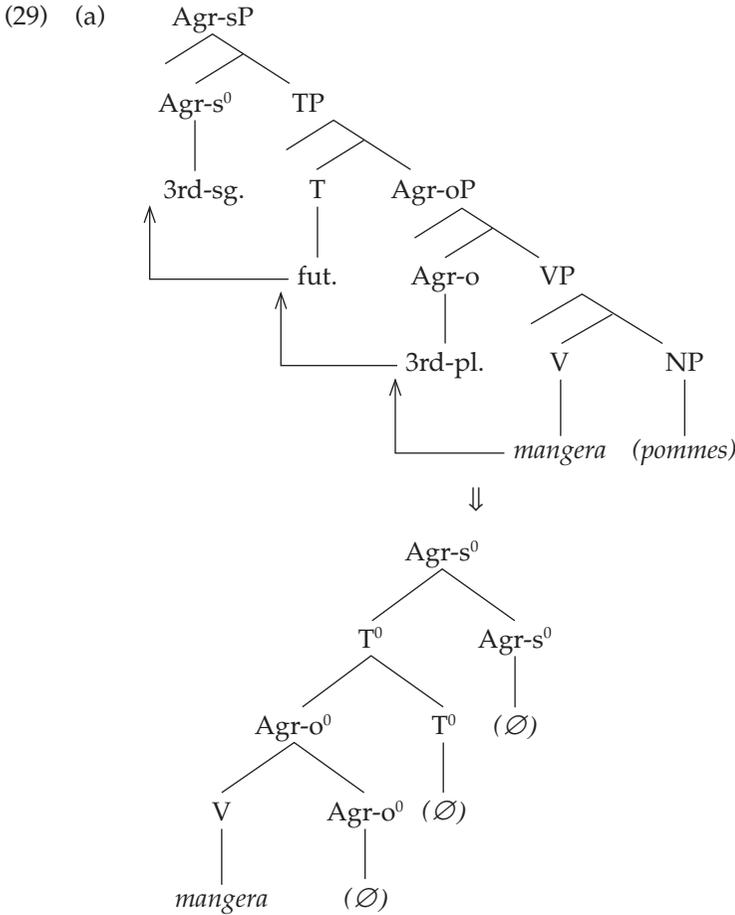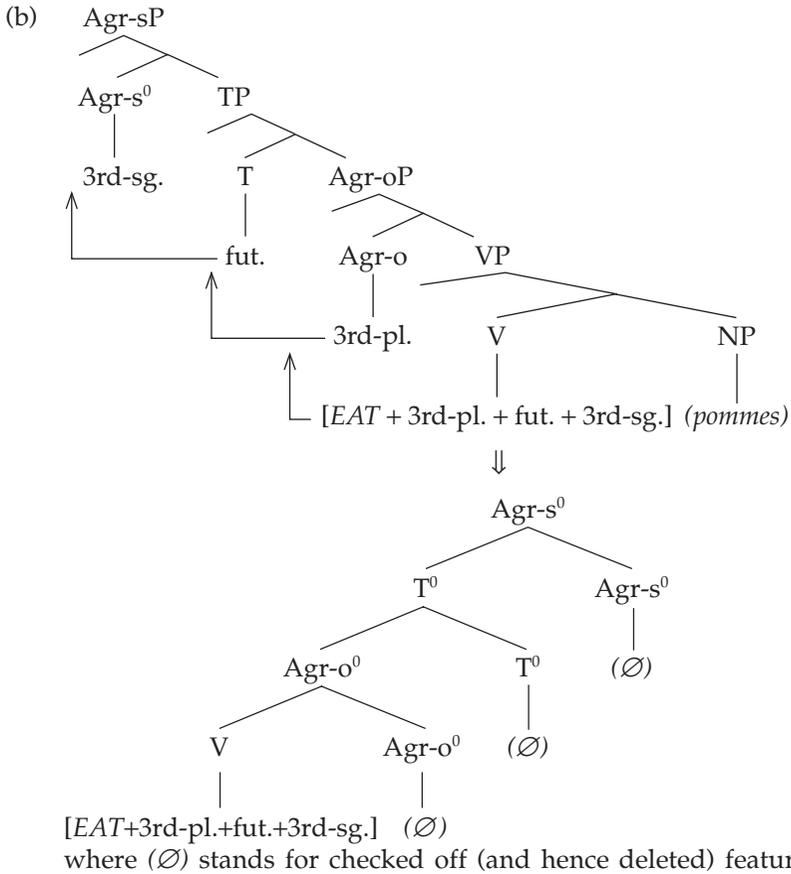
5.2 Checking Theory

In what is possibly the strongest departure from the assumption of isomorphism, Chomsky (1993, 1995b) assumes that while (inflectionally-derived) words are well formed only if syntactic head-to-head movement has occurred, syntactic movement and the resulting adjunction are entirely divorced from any morphological properties of such words, be they phonological or syntactic. Thus, for the formation of words, Chomsky adopts, in essence, a linear model of WF, assuming that the output of some WF component consists of fully formed words with a set of properties which may be syntactically relevant, but with an opaque internal structure, thereby, in essence, adopting the atomicity thesis.[23] However, in departure from the spirit, if not the letter, of the atomicity thesis, these outputs of the WF component must move through the syntactic tree, checking their inflectional features through a succession of functional projections marked inflectionally. The input of such movement may be a syntactic structure similar to (4) (cf. (27)), in which head-to-head movement applies, but (27) is specifically *not* the input to WF, and the output of head-to-head movement, as in (28), is specifically *not* morphological in nature, nor do the heads in it dominate actual phonological material, or even bundles of features to be associated with the moved stem, in the sense of Distributed Morphology. Rather, the heads dominate abstract semantic features, such as tense, number, etc., to be matched with the properties of the word as a whole. The movement is thereby entirely divorced from morphological considerations, and the syntax, while equipped with a device for checking the *syntactic* appropriateness of words, is deprived of any role in the building of morphological units, be they phonological, as in isomorphic approaches, or syntactic, as in nonisomorphic ones.

(27)

(28)

```
                    Agr⁰
              ┌──────┴──────┐
             T⁰            Agr⁰
         ┌────┴────┐        │
        V⁰        T⁰        │
         │         │        │
      mangera   (√fut.)  (√3rd-sg.)
```

As within Checking Theory, the specific nature of the WF component is not fully explicit; it is not clear whether it entails the insertion of morpho-phonological forms as in (29a) (in essence a type (2) model) or bundles of features as in (29b) (in essence a type (3) model):

(29)   (a)

```
              Agr-sP
           ┌────┴────┐
        Agr-s⁰       TP
          │       ┌───┴────┐
       3rd-sg.    T      Agr-oP
          ↑       │     ┌───┴────┐
          │      fut.  Agr-o     VP
          │       ↑     │     ┌───┴───┐
          └───────┘  3rd-pl.  V      NP
                       ↑       │      │
                       └─────mangera (pommes)
```

⇓

```
                 Agr-s⁰
             ┌──────┴──────┐
            T⁰           Agr-s⁰
        ┌────┴────┐        │
     Agr-o⁰      T⁰ (Ø)    (Ø)
     ┌──┴──┐      │
     V   Agr-o⁰ (Ø)
     │      │
  mangera  (Ø)
```

(b)   Agr-sP

[Tree diagram with nodes]

Agr-s⁰ ... TP

3rd-sg.   T   Agr-oP

fut.   Agr-o   VP

3rd-pl.   V   NP

[*EAT* + 3rd-pl. + fut. + 3rd-sg.] *(pommes)*

⇓

Agr-s⁰

T⁰   Agr-s⁰

Agr-o⁰   T⁰   *(∅)*

V   Agr-o⁰   *(∅)*

[*EAT*+3rd-pl.+fut.+3rd-sg.]   *(∅)*
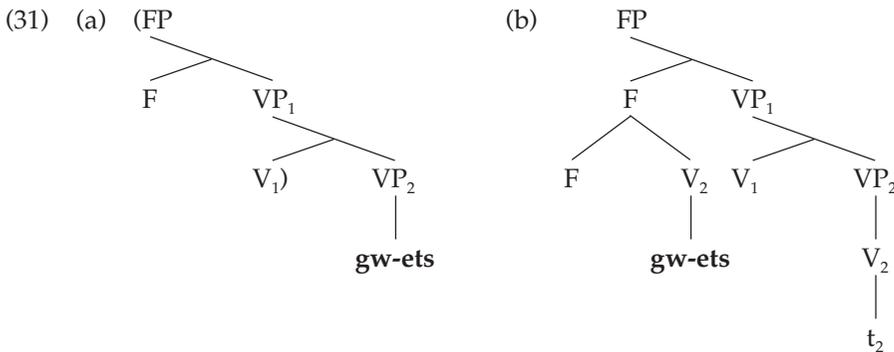where *(∅)* stands for checked off (and hence deleted) feature.

Nor is it entirely clear how properties of derivational morphemes are to be checked. As an illustration of the problems involved, consider the structure of (bi-clausal) synthetic causatives, using as an example Chichewa, as discussed by Baker (1988a). As is well established, (30b) is bi-clausal, on a par with (30a), leading Baker to give it the D-structure in (30c) and the S-structure in (30d) (irrelevant details omitted):

(30)   (a)   Mtsikana ana-chit-**its**-a   kuti mtsuko   u-**gw**-e
              girl   AGR-do-make-ASP that waterpot AGR-fall-ASP

       (b)   Mtsikana anau-**gw-ets**-a   mtsuko
              girl   AGR-**fall-made**-ASP waterpot

       (c)   . . . [$_{vP1}$ **its** . . . [$_{vP2}$ waterpot **gw**]

       (d)   . . . [$_{vP1}$ [$_{v1}$ [$_{v2}$ **gw**] [$_{v1}$ **its**]] . . . [$_{vP2}$ waterpot t$_{v2}$]

In (30), the D-structure configuration, the level at which argument structure is determined, V$_2$, **gw**, 'fall' assigns its thematic roles and projects a well-formed VP. At S-structure, it has incorporated into the matrix a causative verb, form-

ing a morphological unit with it. Consider, however, a potential Checking Theory account of (30b). If all morphological structures are inserted as such at D-structure, to preserve the bi-clausality of (30b), the incorporated causative form **gw-ets** 'make-fall' would have to head the embedded VP at D-structure, as in (31a). In turn, V_2 in (31) would rise to check its causative component. Addressing this issue briefly, and proposing that checking can only be accomplished in functional (non-lexical) heads, Chomsky (1995b) suggests that checking in such structures would be in a superordinate functional V projection. Suppose, then, that the structure is as in (31b), where V_1 adjoins to F dominating VP_1, thereby checking off its **its**-*CAUSE* properties (again, irrelevant details omitted):

(31)   (a)   (FP

```
              (FP
             /    \
            F     VP_1
                 /    \
               V_1)   VP_2
                       |
                     gw-ets
```

(b)

```
              FP
             /    \
            F     VP_1
           / \    /    \
          F  V_2 V_1   VP_2
                        |
         gw-ets        V_2
                        |
                       t_2
```

The structures in (31) give rise to a host of yet to be resolved issues. What is the argument structure associated with **gw-ets** when it heads VP_2 prior to head-to-head movement? At least morphologically, the causative verb **its** is the head of such structures. How, then, is the argument structure of the embedded verb **gw** 'fall' realized in the embedded VP? Further, in order to be checked, **gw-ets** must move and adjoin to F. Does this movement pass through V_1? If yes, how is this movement motivated, given that no features are checked at V_1. If not, how can the movement skip V_1 without violating HMC? Further, does V_1 dominate an abstract *CAUSE* marker? If yes, is this marker an abstract lexical entry, of the sort typically associated with the derivation of causative *break ([∅ [$_v$ break]])*? But if V_1 does dominate a lexical entry distinct from **its**, what is the nature of the fully morphologically derived **gw-ets** form? On the other hand, if the abstract *CAUSE* marker generated under V_1 is not an abstract lexical entry, but rather, a semantic feature, on a par with, say, *TENSE*, is VP_1 a regular VP, or rather, is it a functional projection of sorts (e.g. CᴀᴜsᴇP)? Similar questions clearly arise with respect to noun incorporation and synthetic compounding, both morphological structures that have been argued to correspond to syntactically articulated structures.[24]

Leaving the possible resolution of these issues to future research, let us turn now to a more detailed comparison of morphological structures and syntactic structures, asking whether they are the same. Specifically, let us ask whether the notion of head and, consequently, selection (or subcategorization) are unified

notions; or, put differently, whether morphological hierarchical structures are identical to syntactic hierarchical structures.

6 "Mixed" models

In sections 1 and 2 of this chapter two types of models were reviewed: LIH models, which assume an independent WF component which does not interact with the syntax, and syntactic models, which attempt to derive internal word structure syntactically. Indeed, it has often been assumed that an independent WF component entails the absence of syntactic interaction with word-internal structure, while syntactic interaction with word-internal structure entails the absence of an independent WF component. For convenience of presentation, this entailment is given as (32):

(32)   Independent WF component ⇔ no syntactic interaction with word internal structure

However, the discussion in section 5 has already indicated the possible existence of models in which the entailment in (32) does not hold. Consider again nonisomorphic models, such as those of Beard (1988, 1995), Sadock (1985, 1991), Anderson (1992), or Halle and Marantz (1993). From the perspective of these proposals, it is not clear that the entailment in (32) can even be stated coherently. In these models (abstracting away from differences between them), the formation of amalgams of functional heads is a nonmorphological task, and its output, in turn, feeds into an independent morphophonological component that is syntactically irrelevant. Recall again that lexicalist versus movement accounts are neutral with respect to this factor. Thus in lexicalist isomorphic models, an output of the WF component, a word, is associated with all the syntactic features, allowing it to interact with the syntax. These features, in turn, are associated with it as a result of the internal structure of the word, as determined by the WF component (see Di Sciullo and Williams 1987). On the other hand, in nonisomorphic models, regardless of the existence or nonexistence of movement, word structure as formed by syntactic or morphological rules is explicitly distinct from morphophonological considerations, and the output of the morphophonological component, in turn, does not have, meaningfully, any syntactic properties. Consider, as an example, the representations given by Zubizarreta (1985) or by Sadock (1985, 1991): the syntactic representation is fully syntactically interactive, while the morphophonological representation is fully syntactically opaque, rendering the entailment in (32) meaningless. Rather, in nonisomorphic systems the relationship between the (independent) morphophonological component and the syntax is either linear, as in (33a), or parallel, as in (33b):

(33)   (a)   Phrasal syntactic structure   →   morphophonological spellout

(b) $\begin{bmatrix} \text{Phrasal syntactic structure} \\ \text{Morphophonological structure} \end{bmatrix}$

Yet another type of system in which the entailment in (32) does not hold in a straightforward way is that proposed by Laka (1990) and by Rohrbacher (1994) (see section 5 for some discussion), as well as the system proposed by Emonds (1985). Here, WF is partitioned into syntactically active versus syntactically inert components, or in essence, into the two logical possibilities provided by (32). Thus, syntactically active WF is reduced to syntax, while syntactically inert WF is syntactically opaque:

(34) WF 1: no independent morphological component ⇔ syntactic derivation of word-internal structure

      WF 2: independent morphological component ⇔ no syntactic interaction with word-internal structure

Crucially for Rohrbacher (1994) as well as for Laka (1990), there is no principled functional distinction between those operations which fall under WF1 and those which fall under WF2. For Laka (1990), some typically inflectional markings are generated pre-syntactically, while others are projected as heads. For Rohrbacher (1994), it is crucial that while some agreement markers in some languages be projected as independent heads, having their own lexical entries – for example, agreement in Icelandic – the same function in other languages would not constitute an independent lexical entry and would be part of an abstract morphophonological spellout rule – for example, agreement in Danish.[25]

It is in this latter respect that Laka (1990) and Rohrbacher (1994) differ from Emonds (1985). On Emonds's account, WF is partitioned according to the function of the morphology involved. While some morphology remains, in essence, pre-syntactic in accordance with type (2) linear models, other morphological processes, defined specifically as those which are transformationally introduced, are the amalgamation of abstract features through syntactic means, to be spelled out in a post-lexical phonology, in essence along the lines suggested by Anderson's Extended Word-and-Paradigm system. The former, lexical morphology encompasses, in essence, those traditional WF processes classified as derivational (but excluding some argument-structure-changing operations). The latter encompasses, in essence, those WF processes traditionally classified as inflectional. Thus, for Emonds, unlike Rohrbacher (1994), the introduction of agreement morphology at times through direct projections and at other times through a post-syntactic spellout rule, as in the picture in (25), is an impossibility.

While Laka (1990), Rohrbacher (1994), and Emonds (1985) are interested primarily in WF processes which are sensitive to syntactic contexts, systems embodying the duality in (34) have been proposed extensively for derivational processes. Specifically, consider the model proposed by Shibatani and Kageyama (1988) and that proposed by Borer (1984b, 1988, 1991). Like that of Rohrbacher (1994), these models assume that the output of morphological processes may be inserted at D-structure or later on. In accordance with the entailments in (34), these systems further propose that, depending
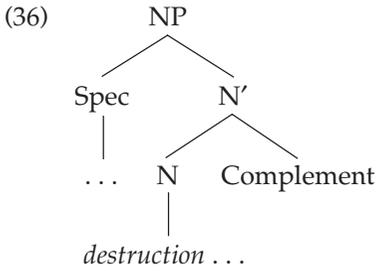
on the level at which the relevant morphological output becomes available, it does, or does not, interact with syntactic representations.[26] In Shibatani and Kageyama 1988 and in Borer 1988 this analysis is articulated with respect to compounds in Japanese and Hebrew respectively. While lexical compounds display idiosyncratic, drifted properties, compounds that are inserted later preserve argument structure (Japanese, Hebrew), allow their nonhead members to be modified (Hebrew), and exhibit word-internal effects of post-syntactic phonology (Japanese), all absent from lexical compounds.[27]

The existence of parallel processes of WF applying pre-syntactically as well as at a later stage, be it the syntax or post-lexical phonology, presents an interesting problem for co-representational models of the type put forth by Zubizarreta (1985) and Sadock (1985, 1991). In these theories, a form could, in principle, have two representations, one syntactic and one morphological, where morphological well-formedness conditions are met on the morphological representations, while syntactic well-formedness is met by the syntactic one. Thus, for Zubizarreta (1985), the morphological representation of causatives is, in essence, flat, while the syntactic one is bi-clausal. What, within such a system, is the fate of forms which are morphologically identical, but syntactically distinct?
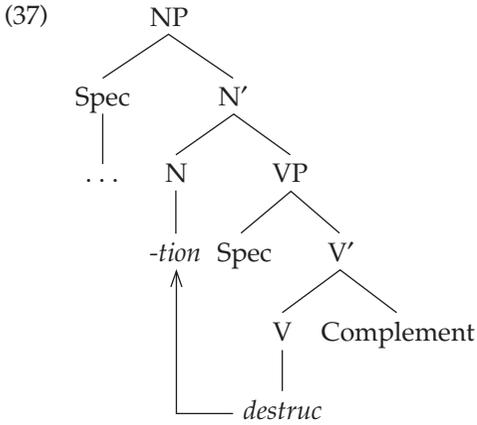
As a possible answer to this question, consider Parallel Morphology as proposed by Borer (1991). Here, there is an independent WF component, and its output is, in accordance with the LIH or similar principles, syntactically inert. However, in violation of the spirit, if not the letter, of LIH and the Atomicity Thesis, there is a clear interaction between morphological and syntactic structures. This interaction is dependent on whether morphological structures have a corresponding syntactic one or not. In turn, the presence versus absence of a coexisting syntactic structure depends exclusively on whether the output of WF is inserted at D-structure or at a later level, where it corresponds to the output of syntactic movement. In this model, as in (34), there is no morphological difference between forms derived prior to D-structure and those derived later on. Further, the morphological properties of the output are identical. There are, however, syntactic differences between the derivations, dependent exclusively on the accompanying syntactic structure. As an illustration (with irrelevant details omitted) consider de-verbal derived nominals. Morphologically, a form such as *destruction* has the structure in (35):

(35)

```
              N
            /   \
          V       N
          |       |
       destruc   -tion
```
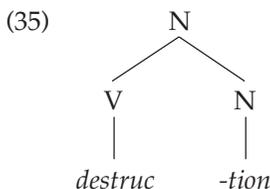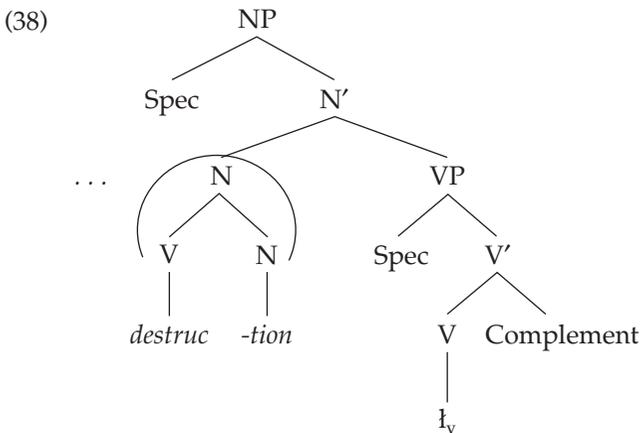
(35) may be inserted as such at D-structure, under N, resulting in the following syntactic structure, where the syntactic properties of *destruction* are not different from those of an underived word such as, for example, *event*:

(36)

```
              NP
            /    \
        Spec      N'
         |       /   \
        ...     N    Complement
                |
          destruction ...
```

Crucially, however, both *-tion* and *destruc (= destroy)* are independent lexical entries, and, as such, may either enter into WF or be projected as heading their own phrases. In the latter case, D-structure is as in (37) (functional structure omitted):

(37)

```
              NP
            /    \
        Spec      N'
         |       /    \
        ...     N      VP
                |     /   \
              -tion Spec   V'
                          /   \
                         V    Complement
                         |
                      destruc
```

In (37), head-to-head movement adjoins V to N, thereby giving rise to the syntactic structure in (38). In turn, the circled tree segment in (38) could enter WF, resulting in the formation of *destruction*:

(38)

```
                  NP
                /     \
            Spec       N'
                     /     \
        ...        N         VP
                  / \       /    \
                 V   N    Spec    V'
                 |   |          /    \
              destruc -tion    V    Complement
                                |
                                t_v
```

Note that, syntactically, head-to-head movement in (37) is optional, and without it, (37) is still well formed. However, we may assume that (37) is not morphologically well formed, due to the presence of a morphologically free affix, *-tion*. While, morphologically, *destruction* always has the structure in (35), note that the syntactic structures in (36) and (37) are very distinct: (37) contains a VP, while the existence of a V node word-internally in (36) is syntactically irrelevant. It is this syntactic difference, I argue, which results in the so-called process reading associated with (38), versus the result reading associated with (36) (see Grimshaw 1990 for extensive discussion of process versus result nominals).

Interestingly, Hebrew provides some reason to prefer the insertion of concrete phonological material under the heads in (37), rather than bundles of abstract features such as V and NOM. Specifically, it turns out that morphologically complex forms where an actual source V exists allow a process reading, in this account corresponding to a structure with a projected VP, as in (37), alongside a result reading, with the syntactic structure in (36). On the other hand, synonymous forms with no such source V – for example, borrowed words – may only have a result interpretation. A minimal pair is given in (39) and (40):

(39) (a)   ha-transformacia Sel ha-'ir
            the-transformation of the-city

      (b)   ha-Sinui Sel ha-'ir (source verb: *Sina*, 'change')
            the-transformation of the-city

(40) (a)   *ha-transformacia Sel ha-Sita 'al yedey ha-memSala
            the-transformation of the-system by the-government

      (b)   ha-Sinui   Sel ha-Sita 'al yedey ha-memSala
            the-transformation of the-system by the-government

However, as pointed out by Hazout (1990, 1995), the direct projection of morphophonological segments in structures such as (37) faces the typical problems associated with direct phonological projections, already discussed in section 5 above. Thus derived nominals in Hebrew are often morphophonologically deviant, presenting the same problem as is presented by English forms such as /*sang*/ or /*children*/.[28] It is to be hoped that future research will shed additional light on these matters, as well as on other matters concerning the morphophonological/morphosyntactic isomorphism already discussed in section 5.

7 Conclusion

I have surveyed here a number of important issues that have emerged in the attempt to model the relationship between WF and syntax. We have looked at

exclusively syntactic models, as well as exclusively lexicalist models, surveying a number of issues that emerge in each. We saw that the lexical/syntactic distinction interacts with another, equally important one: the issue of isomorphism, which cuts across the lexical/syntactic distinction. Finally, we have looked at mixed systems, where solutions to the interaction between morphology and syntax are given in terms of partitioning the morphological component, allowing it to accomplish its task in slightly different ways, depending on the way in which it interacts with the syntax. As is clear from the range of models and possibilities, issues concerning the interaction between WF and syntax are not resolved, and they remain sensitive to theoretical contributions to syntactic theory on the one hand and to WF theory and phonology on the other hand.

NOTES

1   I am referring here, in no particular order, to the work of Halle (1973), Aronoff (1976), Jackendoff (1975), Lieber (1980), Selkirk (1982), E. Williams (1981b), and Kiparsky (1982c), as well as others.

2   Some important work on word formation (notably Jackendoff 1975; Aronoff 1976; M. Allen 1978; Anderson 1982, 1992; and Emonds 1985) does subscribe to the view that inflectional morphology is formally distinct from derivational morphology. In much of this work, however, a model of the interaction of inflectional morphology with the syntax is not proposed in any detail. Excepted from this generalization are the models proposed by Anderson and by Emonds. Emonds (1985) puts forth an explicit theory which distinguishes inflectional morphology and derivational morphology formally. In the theory, inflectional morphology is that morphology which is introduced through syntactic transformations. On the other hand, derivational morphology remains pre-syntactic

in the sense discussed in section 1. I return briefly to Emonds 1985 in section 6. For discussion of Anderson 1992, see primarily section 5.

3   The so-called stray affix filter, often attributed to H. Lasnik. Note that regardless of the need for an affix to find a host, there may still remain a *syntactic* motivation for such movement, as e.g. in Chomsky's Checking Theory. See discussion in section 5.2.

4   I am abstracting away here from a number of irrelevant details such as the D-structure position of verbal subjects and the correct representation for modifying (as opposed to predicative) adjectives.

5   As an example, consider Ouhalla 1991, in which a theory of functional heads and inflectional affixation is spelled out in great detail, and where there is an implicit assumption that the reduction of WF representation to syntactic structures is a desirable one. While the workings of inflectional affixation are spelled out in detail, a full, comprehensive

model of the reduction of morphology to syntax is not attempted; nor is it clear what is the fate of affixes which do not have a syntactic representation in the Ouhalla system. Much other research which tries to derive morphological representations and syntactic representations from similar principles, such as Toman 1985 and Walinska de Hackbeil 1986 is, in general, either too vague or utilizes syntactic principles specific to WF. See Lieber 1992 for a recent review.

6   Thus, in a departure from his earlier position stating that "all Grammatical Function changing rules such as passive, causative, and applicative can be eliminated from the grammar [and] their effects can be derived entirely from . . . the result of standard movement rules applying to words rather than to entire phrases" (1985: 10), Baker (1988) has himself moved away from the attempt to reduce *all* grammatical function-changing rules to syntax, allowing at least some of them (notably, adjectival passive) to be derived lexically. See section 6 for some additional discussion.

Other illustrative examples are the system proposed in Rohrbacher 1994 (see section 5.1 below for a brief discussion) and that proposed in Laka 1990, where the inflectional system is divided between the syntax and the morphology, some inflectional markings are added through head-to-head movement, while others are base-generated on the stem. Yet a third type of affix is generated as a syntactic specifier. I return in section 6 to "mixed" systems, which divide the morphological task between different components.

7   In (7), movement is restricted to a governing head so that the resulting structure obeys the Head Movement Constraint (see Travis 1984), possibly reducible to the Empty Category Principle (see Chomsky 1986).

8   Thus Ouhalla (1991) argues that in Arabic TP dominates Agr-SP, unlike French and English, which display the opposite order.

9   For an excellent recent review of the differences between morphological hierarchical structures and syntactic hierarchical structures, which goes beyond the review given here, see Lieber 1992. The discussion in the text incorporates many of her points, as well as independent ones.

10   See directly below for more comments on the implications of Chomsky 1995a for the attempt to integrate morphology into the X'-system.

11   The same observations are applicable to revisions of the Right-hand Head Rule proposed by Selkirk (1982) and Di Sciullo and Williams (1987). See Lieber 1992 for review.

One may argue that the Kayne model is, in fact, identical to the RHR model for morphology, with the added proviso that movement is not available for morphological structures, and hence surface order reflects the base-generated order. However, if, indeed, the morphology is to be reduced to the syntax, which is the purpose of postulating this identity of structure to begin with, the prohibition of movement, rather than accounting for the distinction, just adds to the mystery. Why should it be impossible for the head of a compound, say, to move and adjoin to the left of its complement, creating a left-headed S-structure, although the D-structure was right-headed?

12 For an interesting attempt to apply Kayne's system to morphology, with the assumption that all morphologically right-headed structures are derived by adjunction, see Keyser and Roeper 1994. Roeper argues that if Kayne is correct, and e.g. synthetic compounds are generated syntactically as in (i), in a left-headed structure, the surface right-headed structure is derived by head-to-head movement of the complement:

(i)

```
              V
            /   \
          V       N
          |       |
     groom(-ing)  cat
```
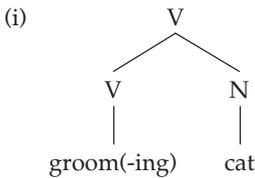
   As is clear already from the representation in (i), this proposal, although intriguing, and possibly promising, would need to further elaborate on the derivation of *-ing* forms and the way in which *-ing* comes to be positioned between the V and its complement. Syntactically, *cat* is the complement of *groom*, not *grooming*. On the other hand, *-ing*, if a syntactic functional head, would need to be a sister to the entire *[groom cat]* constituent, thereby predicting the erroneous *[[cat groom$_v$]–ing$_N$]*.

13 That WF and syntax do remain in essence segregated systems in Ackema's (1995) model is further clear when one considers the representation in (i), which, for Ackema, consists of a single projection containing a maximal phrase, a maximal word, a head of phrase, and a head of word, all projected in accordance with the same X'-theoretic principles:

(i) $[_{N_2}[_{N_1}[_{N_0}[_{N_{-1}}[_{N_{-2}} \textit{John}]]]]]$

Formally, however, it is not at all clear in what sense, other than a definitional one, there is a single phrasal maximal projection N^2, which in turn dominates the maximal head projection N^0, in a string such as (i), rather than a maximal phrasal projection with a syntactic head which is distinct from a maximal word projection with a morpheme head as in (ii), given that the well-formedness conditions on N_2 as a maximal projection and N^0 as a maximal projection are distinct anyway:

(ii) Phrasal maximal projection:
   $[_{N_2}[_{N_1}[_{N_0} \textit{John}]]]$
   Word maximal projection:
   $[_{N_0}[_{N_{-1}}[_{N_{-2}} \textit{John}]]]$

14 Note in this context that here Lieber's (1992) proposal is quite different from that put forth by Chomsky (1995a), where a Y^0 specifier would be both maximal and minimal. Kayne (1994) and Chomsky (1995a) allow (13) as a possible syntactic structure (albeit for Chomsky without the X' specification for the intermediate projection), but would specifically exclude the structure in (10). The possibility of generating structures such as (13) syntactically derives directly from the relative definition of maximal and minimal projections, which would render a bare head an X^0 and an X^{max} at the same time. Precisely for that very reason, the $[_x[_x[X]]$ structure in (14) is a syntactic impossibility, rendering the most deeply embedded X^0 by definition X^{min}, and the topmost one, by definition, X^{max}.

15 Lieber (1992) specifically argues that they do exist as morphological units, as in *an ate too much headache* and *the Charles and Di syndrome*.

16 Ouhalla (1991) makes this distinction between morphology and syntax explicit, arguing that the (Generalized) Projection Principle applies differently to affixes and to syntactic elements, forcing selection by the latter, but not the former, to be satisfied at D-structure. Clearly, such a proposal flies in the face of reducing morphological selection to a syntactic one.

17 Chomsky (1995b) defines the domain of complementation without using government. For the purposes of this work, however, his approach is equivalent, as the relevant domain would cover both selection and subject–object asymmetries.

18 A somewhat similar principle of lexical projection sometimes utilized is the Universal Alignment Hypothesis, due to Perlmutter and Postal (1984):

(i) The Universal Alignment Hypothesis: Principles of UG predict the initial relation borne by each argument in a given clause from the meaning of the clause.

While the claims made by UTAH and UAH appear similar in nature, they are actually distinct. Unlike UTAH, UAH predicts the role played by arguments from the meaning of the entire clause rather than from the properties of particular lexical entries. Thus UAH is entirely consistent with an approach whereby argument structure is computed on the basis of a predicate, rather than the lexical semantics of individual entries. As the dominant approaches to morpho-syntax within the GB model clearly center on lexical entries, only UTAH will be discussed here. See Pesetsky

1995 for a lexical-entry-based formulation of UAH.

19 An additional complication for the morphophonology/morphosyntax isomorphism approach is the fact that in Semitic languages some of the tense morphology is affixal and some is autosegmental. Note in this context that autosegmental morphological systems, such as Semitic morphology, present a particular problem here, as the order of morphemes is sometimes an incoherent notion when a particular vocalic melody serves to give information about a binyan (typically derivational information), person, and tense, all in one. In fact, the existence of such portmanteau marking supports the approach of Anderson (1992), who argues that viewing WF as the hierarchical projection of discrete morphemes attached to a stem (rather than viewing morphology as an operation which transforms a stem) is empirically problematic. See text below for a brief discussion.

20 The determination of the formal nature of the morphophonological component is dependent, to a large extent, on the determination of the formal property of the phonological operations involved. This issue, not touched upon here, is reviewed in detail in Halle and Marantz 1993, as well as in Anderson 1992.

21 Alternatively, Rohrbacher (1994) suggests that nonrich markers may fail to project, but are nevertheless available for pre-syntactic affixation processes, resulting in the base-generation of a fully inflected form, thereby preempting movement.

22 Neither the particular notion of richness used by Speas (1994) nor the overall workings of her system are crucial to the discussion here.

What is of significance is that any system accounting for null subjects by appealing to properties of inflection cannot be naturally captured in DM terms.

23 In a tentative weakening of this claim, Chomsky (1995b) suggests, following Lasnik (1994), that it may turn out that some inflectional affixation is syntactically derived. See n. 25 below for a brief discussion of Lasnik 1994.

24 It could be argued that causatives are light verbs of sorts, and hence functional in nature, thereby avoiding at least some of the problems presented by (31) (although note that licensing the argument structure for both VP_2 and VP_1 remains an issue). However, a similar problem exists for noun incorporation, where a V+N form must be inserted under N. Even if the appropriateness of the form is checked in some functional projection dominating V, it is difficult to see, in this case, how a lexical VP intervening between the inserted form under N and the functional head where it is checked can be avoided.

25 For a similar system, see Lasnik 1994, where it is assumed that the base-generation of inflected forms as well as the projection of inflectional morphemes under functional heads coexists in UG as well as being internal to the grammar of specific languages. Thus in English, auxiliaries are base-generated as inflected forms, as are, perhaps, irregular verbs; but regular past tense /-ed/ may still be projected as an independent functional head under TENSE. Note that in Checking Theory, as assumed by Lasnik (1994), this difference in the formation of, say, /were/ and /walked/ cannot be

syntactically relevant, due to the extreme nonisomorphic nature of Checking Theory, as discussed in section 5.2 above.

26 The possibility of identical affixing existing lexically as well as a result of syntactic movement is also put forth in Baker (1988a), but is not executed in detail.

27 An additional issue concerns the existence of morphological processes at a post-lexical, but pre-phonological stage, i.e. in a direct interaction with syntactic structures. In Borer 1988 it is suggested that these, indeed, exist. Thus *syntactically* formed compounds allow modification of the nonhead member, as well as its binding, as in (ia, b); but a nonhead quantifier embedded in a compound may not take wide scope, plausibly because of the impossibility of LF movement from within a word (compare (iia, b):

(i) (a) **beyt mora** xadaSa
          house teacher new
          'the house of the new teacher'

     (b) Ran$_2$ hibit be-**tmunat**
          Ran looked at-picture-
          'acmo$_2$
          himself
          'Ran looked at a picture of himself'

(ii) (a) tmuna Sel SloSa anaSim
          picture of three people
          'one picture showing three people'
          'three pictures, each of a single person'

     (b) **tmunat SloSa 'anaSim**
          picture three people
          'one picture showing three people'
          *'three pictures of a single person each'

If this is indeed the correct interpretation of the data in (i) and (ii), it suggests that the word *tmunat SloSa 'anaSim* has been formed at a level which affects the possibility of further syntactic movement, most plausibly, at S-structure (or spellout).

28   Another problem pointed out by Hazout (1990) in advocating an abstract NOM representation is relevant to attempts to derive deverbal derived nominals exclusively syntactically. Thus Hazout (1990) points out that in Hebrew the particular (nonexceptional) deverbal nominalizing affix is determined on the morpho-phonological properties of the stem V. In a system which gives V+N a syntactic representation exclusively, it is not clear how the correct affix would be selected. However, in the parallel system sketched above, V+N has a morphological structure as well. Assuming free (overgenerating) lexical insertion, it may be assumed that morpho-logically inappropriate (although syntactically well-formed) V+N forms simply fail to result in the formation of a word, thereby violating the morphological well-formedness conditions on the affix.