... the English verb and its auxiliaries are always a source of fascination. Indeed, I think we can say, following Neumeyer (1980), that much of the intellectual success of Chomsky (1957) is due precisely to its strikingly attractive analysis of this inflectional system.

(Emonds, 1985, A Unified Theory of Syntactic Categories)

The now well-known differences between verb raising in English and French that were first explored by Emonds (1978), and later analyzed in more depth by Pollock (1989), played an important role in the early development of Chomsky’s (1995) Minimalist Program (MP). See Chomsky (1991), in particular, for an analysis in terms of economy of derivation. As the MP developed, the effort to analyze verb raising largely receded. Lasnik (1996), however, took the question up again and showed that fairly broad empirical coverage could be achieved within the MP framework. One important empirical gap (which will be discussed later) remained, and various stipulations about the feature makeup of inserted lexical items were required. In this paper we hope both to remove the empirical gap and to reduce the stipulative aspects of Lasnik’s proposal. The larger ambition of this paper is to support the effort, begun in Frampton and Gutmann (1999), to reorient the MP away from economy principles, particularly away from the idea that comparison of derivations is relevant to grammaticality. Here, we will assume certain key ideas from that paper and show how they provide a productive framework for an analysis of verb raising.

Suppose we have a head X and some head Y in the complement of X whose features can check (i.e., eliminate) a feature of X. If there are no intervening heads which block feature checking between Y and X, we assume movement of Y to X is forced unless there is some configurational or morphological obstacle to the movement. Configurational obstacles arise in the case of the movement of maximal projections. If the X already has a specifier, language-specific constraints on the availability of multiple specifiers create configurational obstacles to movement of a maximal projection to Spec(X). Morphological obstacles arise in the case of head movement. Head incorporation of Y into X is the formation of a compound syntactic word. We view constraints on well-formed words as part of morphology. If
we suppose that head movement is blocked if the resulting syntactic word is not well formed, language-specific or universal morphological constraints will therefore induce constraints on head incorporation. See Frampton and Gutmann (1999) for a comprehensive development of the theory of XP movement in this framework.

These assumptions differ sharply from Chomsky (1995) in two ways. First, he assumed that overt movement is avoided, unless the presence of so-called “strong” features overrides the principle Avoid Movement, the principle which the early principle Procrastinate evolved into in the MP.3

We dispense with any notion of feature strength and assume that rather than any tendency to avoid movement, feature checking forces movement unless it is blocked by configurational or morphological restrictions. Second, Chomsky assumed that the interaction between the syntactic derivation and the external systems was narrowly limited to two points in the derivation, the interface with the computation which leads to phonological form and the interface with the computation which computes meaning. Here, we assume that the interface with morphology is distributed throughout the derivation and morphology is consulted whenever head incorporation is at issue.

These differences with Chomsky (1995) provide a very different framework for looking at verb raising. Within Chomsky’s framework, an account of verb raising must be an account of the factors which cause auxiliaries to move in spite of the principle Avoid Movement. In our framework, an account of verb raising must be an account of the factors which block verb raising in the case of main verbs. The distributed interface with morphology provides the key.

Three different computations will be discussed: syntax, post-syntactic linearization, and morphological realization. The task with respect to syntax is to explain why auxiliary verbs raise to Tns, but main verbs do not. (We will use Tns for the name of the morpheme and T for the name of the category feature. So Tns is \{T, \ldots \}.) The linearization computation translates the syntactic structure into a sequence of words (at a level still removed from phonological form). Two important operations take place in linearization: the combination of Tns and main verbs, in some cases, and “do-support” in others. Finally, the computation which yields phonological form must be discussed in order to establish that the representations built in linearization yield the correct inflected forms. The paper is organized by devoting a section to each of these computations.

In spite of the considerable space we devote to post-syntactic computation, we want to emphasize that the core of this paper is Section 1, a proposal about the syntax of head movement. But that proposal only gives an account of auxiliary verb raising and main verb non-raising. This leaves main verb inflection and do-support unexplained. There are several accounts of main verb inflection and do-support in the literature which could potentially be appealed to, but none seems satisfactory to us. Accounts which rely on “downward movement” in syntax for main verb inflection essentially rely on a late suspension of the principles of syntactic movement to achieve the desired end. More promising is the idea that main verb inflection is
carried out under some kind of linear adjacency in a post-syntactic computation. As far as we know, however, there has been no attempt in the literature to develop a post-syntactic theory which yields the desired non-intervention effects for adverbs. We therefore propose such a theory in Section 2. It is set in the Distributed Morphology framework.

One residual problem is dealt with in Section 3. The analysis of Section 2 leads to the conclusion that auxiliary verbs and Tns do not form distinct syntactic nodes at the point where morphological realization rules apply. This conclusion conflicts with the view that the segmented surface structure of inflected auxiliary verbs, evidenced in forms like *ha-s* and *ha-d*, must be a reflection of distinct syntactic nodes. In Section 3, we demonstrate that this view is false and that the parsing of words into morphological pieces can be the natural result of the form which morphological realization rules take and the computation which uses these rules to transform syntactic forms into phonological forms, rather than a straightforward reflection of the internal syntactic structure of words.

1. Syntax

It is useful to begin by making some assumptions explicit and defining some terms which will be useful in the subsequent discussion. We suppose that UG makes available a certain set of features. Each language picks from this universally available feature set some subset $F$. Each language has a dictionary of roots $D$, whose internal structure we have little to say about. A morpheme is an unstructured set, consisting of features from $F$ and (possibly) a dictionary entry, which we take to be a pointer to a root in the dictionary. So, for example, $\{N, \langle 132 \rangle\}$ is a morpheme, with $\langle 132 \rangle$ a pointer to an entry in the root dictionary — ‘goose’ for example. The entry contains everything special that the speaker of English must know about the root ‘goose’. This includes both semantic information and whatever is needed to realize the root phonologically in the various contexts in which it appears. In this case, in addition to the phoneme string for the root, there will be a special plural rule, yielding the irregular plural *geese*. The lexicon is a generative procedure which produces various lexemes, the morphemes made available to the syntax. Morphemes can undergo changes in the course of syntactic derivations.

The Inclusiveness Condition (Chomsky, 1995:228) as a goal for minimalist theories limits the kinds of changes which a morpheme can undergo in the course of a syntactic derivation. The ideal would be to limit these changes to the removal of so-called uninterpretable features. Some departures have been necessary: marking an element as a trace, and replacing unvalued features by their values. We will shortly propose one further kind of change, the fusion (i.e. set union) of two morphemes in syntax. But this kind of change satisfies the Inclusiveness Condition, because no new features are introduced. Because lexemes which are introduced into the syntax by the lexicon can be altered in the course of the syntactic derivation, and become well-formed morphemes which are not directly available from the lexicon,
it is useful to distinguish between the notion lexeme and the notion morpheme. The syntactically initial morphemes are lexemes. But morphemes can be altered derivationally so that they are no longer lexemes.

The operation of 0-level adjunction builds complex 0-level structures in the course of syntactic derivations. With respect to syntactic operations, these structures are terminal elements. Syntax can see only the features of the morpheme which is the 0-level head of the structure, and can displace only the structure as a whole. Syntactic terminals can therefore be either complex or simple (monomorphemic). We will use the term head to denote a syntactic terminal, and distinguish between complex heads and simple heads.

The construction of complex heads in syntax is at the interface of morphology and syntax. In Bloomfield’s (1933) view, “morphology includes the construction of words and parts of words, while syntax includes the construction of phrases.” We propose to take this view seriously and suppose that head adjunction, although it is carried out in syntax, is subject to morphological conditions. In what follows, we assume that one of the tasks of morphology is to distinguish well-formed lexemes, morphemes, and heads from their ill-formed counterparts. Crucially, we suppose that morphological well-formedness acts as an active constraint on operations throughout the syntactic derivation, not simply as an output filter. An earlier incarnation of the present paper was titled “Distributed Morphological Interface,” intended to capture the idea that the interface with morphology is distributed throughout the derivation.

1.1. Two Varieties of Head Incorporation: Adjunction and Fusion

Suppose X and Y are simple heads. If Y is attracted to X and undergoes syntactic movement, incorporating into X, we can ask why the resulting head is not simply formed by fusing the heads X and Y rather than forming the compound head \([X Y]_0\). It is reasonable to suppose that the fusion of a feature with a morpheme is an operation which is available in generating the lexemes which enter the syntax. The process of “adding” a \(\phi\)-feature to a noun, for example, is not an adjunction operation, but the simpler process of fusing the \(\phi\)-feature with a morpheme. Post-syntactic fusion of morphemes is commonly assumed in Distributed Morphology. So it is not unreasonable to expect that fusion of simple heads might take place syntactically. Why is it commonly assumed that when X incorporates into Y, it is via an adjunction operation in which X and Y maintain their integrity within the structured complex head \([X Y]_0\) rather than fusing and forming a new morpheme? On the face of it, fusion is the simpler operation, so considerations of simplicity should favor fusion over adjunction. (After considering certain complications which arise, we will conclude below that, in fact, adjunction-incorporation is the simpler operation and is always preferred over fusion-incorporation if it is available.)

There are good reasons why incorporation via head adjunction is the norm. The obvious reason is that fusion is likely to create an incoherent morpheme. If an N incorporates into a V via fusion, for example, the resulting morpheme would bear
both N and V category features. This is problematical. A subtler reason is that fusion-incorporation creates complications for chain formation. Straightforward adjunction-incorporation is represented below.

\[ \begin{align*}
(1) \quad & \left[ X \left[ Y \alpha \right] \right] \rightarrow \left[ [X \ Y]_0 \left[ t_Y \alpha \right] \right] \\
\end{align*} \]

Here, \([X \ Y]_0\) is the head formed by adjoining \(Y\) to \(X\) and \(t_Y\) is the trace of \(Y\), which is taken to be a pointer to \(Y\).

It is tempting to suppose that fusion-incorporation could be represented by:

\[ \begin{align*}
(2) \quad & \left[ X \left[ Y \alpha \right] \right] \rightarrow \left[ X \cup Y \left[ t_Y \alpha \right] \right] \\
\end{align*} \]

But this is meaningless. The essence of fusing \(X\) and \(Y\) is that \(X\) and \(Y\) disappear as individual entities. \(X \cup Y\) is not a structured object with \(X\) and \(Y\) as sub-objects. It therefore makes no sense to talk about \(t_Y\), at least not as a pointer to \(Y\). If, instead of a pointer to \(Y\), \(Y\) itself is left in place, a different problem arises. The features of \(Y\) appear in two distinct objects, not one chain.

The only viable option is to suppose that fusion-incorporation involves a somewhat more complex operation, which affects the trace pointer in a non-trivial way. It must be “lifted” to be a pointer to \(X \cup Y\).

\[ \begin{align*}
(3) \quad & \left[ X \left[ Y \alpha \right] \right] \rightarrow \left[ X \cup Y \left[ t_{X \cup Y} \alpha \right] \right] \\
\end{align*} \]

Is there any evidence that fusion-incorporation as in (3) actually occurs? We first ask where we might expect it to occur. First, note that fusion-incorporation is not an option if either \(X\) or \(Y\) is already a compound head. Second, since adjunction-incorporation turns out to be the simpler operation, we might expect that adjunction would always be chosen over fusion as the way to satisfy an attracting feature. In fact we do assume that fusion-incorporation is never chosen if adjunction-incorporation is available. Recall, however, that we suppose that head incorporation is always constrained by morphology. Could it be the case that the morphology of a language excluded a complex head in an environment in which the simple head resulting from fusion was permitted? In this case, we would expect that fusion-incorporation would be the only option. We propose that the English verbal system instantiates this possibility, that English morphology excludes adjunction-incorporation of V to Tns. In French, on the other hand, since morphology allows V to adjoin to Tns, V will never incorporate into Tns via fusion.

1.2. Particularities of the English Inflectional System

The possibility of fusion-incorporation and its inherent limitation to the incorporation of simple heads, coupled with some assumptions about the morphology of Tns in English, explains two important features of the English verbal inflectional system. Suppose that \([Tns \ X]_0\) is excluded in English, as a language-particular fact about the morphology of Tns in English. Consequently, incorporation into
Tns, if it occurs, must be fusion-incorporation. From this, we can account for the following facts:

(4) a. Main verbs do not incorporate into Tns.
   b. With respect to VP-ellipsis, the trace of an auxiliary which raises to Tns behaves as if it is inflected in the position of the trace.

We take these up in turn.

Much recent work has suggested that main verbs always occur in a \([v \ V \ldots]\) structure, with \(v\) a light verb which provides the event semantics associated with main verbs. See, for example, Chomsky (1999) and references cited there. If \(V\) incorporates into \(v\) and forms \([v \ V]_o\), as has also been suggested, the possibility of fusion-incorporation into Tns is foreclosed, since it is an option only for morphemes, not structured heads. We conclude that main verbs cannot incorporate into Tns. In the next section, we provide an explanation of how main verbs combine with inflection in English, since fusion-incorporation of main verbs has been excluded on general grounds and adjunction-incorporation has been excluded by a language particular feature of English morphology. We also explain the mechanism of do-support, which allows the inflectional features of Tns to be realized in those cases in which Tns cannot combine with a verb.

We now proceed to an account of (4.2). Lasnik (1996) pointed out the relevance of (5) for theories of English verbal inflection.

(5) *You are happy. I should be happy too.

Under the common view that verbs are inserted uninflected and must combine with Tns in order to receive inflection, (5) should be grammatical, with the structure (6).

(6) You Tns + be (be) { happy }. I should { be happy } too.

Lasnik (1996,1999) gives substantial evidence that (6) cannot be ruled out on the grounds that the head of the ellipsis antecedent is a trace.

Lasnik’s conclusion was that \(be\) must be inserted in inflected form. The underlying structure of (5) is therefore (7).

(7) You Tns + are { (are) happy }. I should { be happy } too.

Assuming that strict identity is required for VP-ellipsis, as proposed by Sag (1976) and assumed by Lasnik, the failure of ellipsis in (7) is predicted and (5) is explained. We will return later to analyze Lasnik’s proposal in more detail.

Under the view that \(be\) (inserted uninflected) can undergo fusion-incorporation into Tns, but cannot undergo adjunction-incorporation into Tns, (5) is also immediately explained. The structure (8) is as in (3).
(8) *You Tns ∪ be { (Tns ∪ be) happy }. I should {be happy } too.

The potential elision antecedent does not satisfy the identity requirement. The effect of fusion-incorporation is to associate the features of Tns with the trace, so that it behaves as if it had been inserted already inflected.

One loose end must be tied up in order to ground this part of our analysis. Implicit in the considerations above was the assumption that verbs only combine with inflectional features derivationally. With respect to ϕ-features, this is straightforward. ϕ-features are interpretable as nominal features. As features on morphemes in the verbal system, they appear only as the result of agreement, values provided to unvalued ϕ-features as the result of feature checking. Unvalued ϕ-features do appear on some V-lexemes, but this leads to inflection for object agreement, not T-mediated agreement.

It is not so clear if the features ±Past can appear on V-lexemes. It is plausible to assume that ±Past features are interpretable only as a feature syntactically associated with a T-morpheme. This limits the possibilities of a V-lexeme bearing ±Past to those lexemes which combine syntactically with Tns, e.g. the auxiliaries. Since auxiliaries will fuse syntactically with Tns, it is not obvious that there is anything at stake. But there may be. The case of interest is modals. It could be that inherent tense features on modal lexemes is the right way to analyze the anomalous behavior of modals with respect to tense. While interesting and worth pursuing, such considerations do not impact the main argument of this paper and will not be further pursued here. We will assume that verbs cannot be inserted with inflectional features.

It should be clear at this point that the notion of well-formed morpheme and well-formed lexeme diverge. Every lexeme is a well-formed morpheme. But morphemes can be produced in the course of the syntactic derivation which are not available directly from the lexicon (i.e. are not lexemes). Consideration of uninterpretable features also points to the same conclusion. Tensed Tns, for example, is always introduced into syntax bearing a $V^\sim$ (V attracting) feature. That is, as a lexeme it bears $V^\sim$. But this $V^\sim$ feature is later eliminated, yielding a well-formed morpheme which is not a lexeme.

2. Linearization

The previous section explained how auxiliaries are inflected by fusion-incorporation into Tns. We now must address main verb inflection and do-support. We follow Halle and Marantz (1993) and Bobaljik (1995) in supposing that this occurs post-syntactically.

It was recognized by Chomsky and Halle (1965) that the transition from syntax to phonology was not seamless.

... the surface structure must meet two independent conditions: first, it must be appropriate for the rules of phonological interpretation; second, it
must be “syntactically motivated,” that is, it must result from the application of independently motivated syntactic rules. Thus we have two concepts of surface structure: input to the phonological component and output of the syntactic component. It is an empirical question whether these two concepts coincide. In fact, they do coincide to a very significant degree, but there are also certain discrepancies. These discrepancies indicate that the grammar must contain rules converting the surface structures generated by the syntactic form into a form appropriate for use by the phonological component.

It has turned out that the transition from syntax to phonology has unexpected complexities. Distributed Morphology (DM) addresses some of these complexities. But there is still a gap between the output of syntax, which has hierarchical structure but no linear ordering (under the assumptions of the MP), and the kinds of forms which morphological linearization rules can map to phonology. This section outlines the computation which bridges this gap. We call this computation linearization. For the sake of concreteness, we assume the formalization of DM given in Trommer (1999). The input to a DM computation of the phonological form of a word is an ordered list of morphemes. The DM computation processes this morpheme list from left to right, progressively converting it into phonetic form.

Two kinds of linearization must be carried out. First, the heads must be given a linear order, producing a representation like (9).

\[
\begin{array}{cccc}
  \ldots & x & x & x & \ldots \\
  \mid & \mid & \mid \\
  \alpha_1 & \alpha_2 & \alpha_3
\end{array}
\]

We have little to say in this paper of a general nature about how this linear order is determined. We do propose a theory of adverb placement in what follows.

Second, the morphemes which make up each head must be given a linear order, the order in which the morphemes which make up the word are processed by the morphological realization rules, working from left to right. Typically, such lists begin with a root morpheme, followed by affixal morphemes. This linear order is not necessarily the ultimate order in which the phonological expressions of the morphemes appear. A particular affixal morpheme can be specified as a prefix, producing a disjuncture between the order of morphemes in the morpheme list and the order of the phonological expression.

Preliminary linearization therefore transforms the syntactic structure into a list of lists. This leads to a form such as (10).

\[
\begin{array}{cccc}
  \ldots & x & x & x & \ldots \\
  \mid & \mid & \mid \\
  L_1 & L_2 & L_3
\end{array}
\]

Each \(L_i\) is a list of morphemes, which the morphological realization rules process from left to right.
Before the morphological realization rules apply, certain readjustments of the linear structure (10) are possible. Two such linear readjustment rules are crucial to English verbal inflection. They are both varieties of fusion of adjacent elements. Word internally, i.e. internal to a morpheme list, fusion of adjacent morphemes can take place, as in (11a). Between words, fusion of morpheme lists can take place, as in (11b), where L₁ + L₂ is the concatenation of the morpheme lists L₁ and L₂.

\[(\ldots \mu_1 \mu_2 \ldots) \rightarrow (\ldots \mu_1 \cup \mu_2 \ldots)\]

\[
\begin{array}{c}
\ldots \quad x \quad x \quad \ldots \\
L_1 \quad L_2 \\
\end{array} \quad \rightarrow \quad \begin{array}{c}
\ldots \quad x \quad x \\
L_1 + L_2 \\
\end{array}
\]

We suppose that fusion of both varieties is available for unattached Tns.

Derivations like the one in (12) result. The eventive v and Tns are feature bundles, but the particular features are not relevant to the considerations at hand and are not shown.

\[(12) \quad \text{Mary left.}\]

\[
\begin{array}{c}
\begin{array}{c}
\{N, \langle \text{Mary} \rangle\} \\
\end{array} \\
\begin{array}{c}
\text{Tns} \\
\end{array} \\
\begin{array}{c}
\{V, \langle \text{leave} \rangle\} \\
\end{array} \\
\begin{array}{c}
v \\
\end{array} \\
\end{array}
\]

\[
\begin{array}{c}
\begin{array}{c}
\{N, \langle \text{Mary} \rangle\} \\
\end{array} \\
\begin{array}{c}
\text{Tns} \\
\end{array} \\
\begin{array}{c}
\{V, \langle \text{leave} \rangle\} \\
\end{array} \\
\begin{array}{c}
v \\
\end{array} \\
\end{array} \quad \text{as in (11b)}
\]

\[
\begin{array}{c}
\begin{array}{c}
\{N, \langle \text{Mary} \rangle\} \\
\end{array} \\
\begin{array}{c}
\text{Tns} \cup \{V, \langle \text{leave} \rangle\} \\
\end{array} \\
\begin{array}{c}
v \\
\end{array} \\
\end{array} \quad \text{as in (11a)}
\]

We will return later to specify how morpheme lists and complex morphemes like the one in (12.3) are transformed into phonological representations by the morpheme realization rules. Note that the fusion step in (12.3) yields a morpheme which cannot enter the syntax directly from the lexicon (i.e. is not a lexeme), nor could it be formed by fusion-incorporation in syntax.

2.1. Adverb Intervention

As noted by Bobaljik, the analysis cannot be quite so simple. The syntactic representation in (13a), for example, should lead to the linearized form in (13b). The adverb then intervenes between Tns and the verb complex, preventing them from fusing.
(13) a. Mary never left.
   b. \[ [ Mary \{ \text{Tns} \{ never \{ leave \} \} ] ] \]
   c. 
      \[
      \begin{array}{cccc}
      x & x & x & x \\
      \| & \| & \| & \|
      \end{array}
      \]
      Mary \quad \text{Tns} \quad \text{never} \quad \text{leave}

(Curly brackets were used in (13b) to distinguish adjoined \textit{never} from a specifier.)

It has often been suggested that adverbials enter the structure late. Others have suggested that adverbials are “in a 3rd dimension”. We follow these suggestions by supposing that the immediate post-syntactic linearization of (13a) is:

\[
\begin{array}{c}
\text{never} \\
\| \\
\| \\
\| \\
\end{array}
\]
\[
\begin{array}{ccc}
\text{x} & \text{x} & \text{x} \\
\| & \| & \|
\end{array}
\]
\[
\text{Mary} \quad \text{Tns} \quad \text{leave}
\]

More generally, we suppose that clausal adverbials are associated with the heads they modify, but not yet in a fully linearized representation. Full linearization is “late”, capturing the idea that adverbials enter the structure late. Late full linearization interleaves the adverbials. At each x-slot, the adverbial is spelled out first, then the word below the line is spelled out. Crucially, word fusion can apply to (14) before full linearization, yielding (15a) and eventually, after the adverbials have been interleaved, (15b).

\[
\begin{array}{c}
\text{never} \\
\| \\
\| \\
\| \\
\end{array}
\]
\[
\begin{array}{cc}
\text{x} & \text{x} \\
\| & \|
\end{array}
\]
\[
\text{Mary} \quad \text{Tns} \cup \text{leave}
\]

We have proposed that adverbs are associated to the same word slot that the head of the maximal projection to which they are adjoined in syntax is associated. What happens if that head is a trace? If traces are not associated with a word slot, the algorithm for associating adverbs with a word slot breaks down. There are other possibilities, but it is simplest to assume that traces, at least initially, are associated with a word slot. This would give (16b) as the first step in linearization.

(16) a. Mary was never (was) happy.
   b. 
      \[
      \begin{array}{cccccc}
      x & x & x & x & x \\
      \| & \| & \| & \| & \|
      \end{array}
      \]
      Mary \quad \text{Tns} \cup \text{be} \quad \text{(Tns} \cup \text{be}) \quad \text{happy}
If the trace is then deleted in the linearization computation, the adverb reassociates to a neighboring word slot, indeterminately to the right or left. This yields either (17a) or (17b).

(17)  a.  never  b.  never
     x  x  x  x  x  x  x
     |   |   |   |   |
    Mary Tns ∪ be  happy  Mary Tns ∪ be  happy

This outcome is entirely consistent with the apparent equivalence of the surface forms in (18).

(18)  a.  Mary never was happy.
      b.  Mary was never happy.

2.2. The Special Status of Sentential Negation

As is well-known, sentential negation does not behave like a typical sentential adverb. Now is the time to try men’s souls.

(19)  a.  Mary did not leave.
      b.  *Mary did never leave.

From the point of view outlined above, what is crucial is that the full linearization of sentential not is not deferred, so that the representation at the point when word fusion could apply to the linear structure, that structure is as in (20).

(20)  x  x  x  x
     |   |   |   |
    Mary Tns  not  leave

It could be, as has often been argued, that not in (19) is a head. That would justify the representation (20), since it is only adverbials that are on a second tier. But treating sentential not as a head has the major drawback that it makes it mysterious that categorial selection in the verbal system treats not as if it were transparent. It is equally plausible that sentential negation is an adverb which, as a special lexical property, undergoes early full linearization.

The best argument for head status for sentential negation is Potsdam (1997). But his argument does not seem to us to be conclusive. His crucial evidence is the VP-deletion contrast illustrated in (21), where the tense in all cases is present subjunctive.
(21) a. Bill will leave early, but I insist that you not leave early.
   b. *Bill might leave early, but I insist that you never leave early.
   c. *Bill will leave early, and I insist that you leave early.

Potsdam shows that this follows from the assumption that that VP-ellipsis requires a phonologically non-null head to govern the elided material. But other assumptions lead to the contrast in (21). Suppose that VP-deletion occurs in the structures below, after morphological realization rules have applied, but before adverbials have been interleaved.

(22) a. \[ \ldots \ x \ x \ \{ \ x \ x \ \} \]
    \[
    \quad \Tns \ not \ leave \ early \]

b. \[ \ldots \ x \ \{ \ x \ x \ \} \]
    \[
    \quad \Tns \ never \ leave \ early \]

c. \[ \ldots \ x \ \{ \ x \ x \ \} \]
    \[
    \quad \Tns \ leave \ early \]

As Potsdam establishes, Tns in the present subjunctive is a null morpheme, with no phonological expression. At issue is the ellipsis in brackets. Suppose we assume that the edge of the ellipsis site must be properly demarcated, and that null morphemes do not suffice to properly demarcate the edge. Operationally, the effect is that ellipsis cannot begin after a null morpheme. This gives the desired contrast without any assumption that sentential negation is a head. Note that it is crucial for this analysis that sentential negation appear below the word slots and that adverbs appear above them. It should also be pointed out that the issue is a side issue and not crucial to the analysis developed in this paper, which could easily accommodate the idea that sentential negation is linearized in the way that it is because it is a head. It merited some discussion mainly because it illustrates the way in which looking at linear representations opens up some new possibilities of analysis.

2.3. Do-Support

Do-support applies to the post-syntactic linearized structure after fusion, before the morphological realization rules.

(23) \[ \emptyset \rightarrow \{V, \langle \text{do}\rangle\}/ \quad \Tns, \pm \text{Past}, 0V, \ldots \} \]

The notation 0V is used to denote the absence of a V feature. Note that only Tns bearing a tense feature, ±Past, is supported. Although the general form of (23) is
similar to a morpheme realization rule, perhaps an “enrichment rule”, it is not part of the distributed morphology which we will discuss in the next section. The rule (23) applies in the linearization component, before morpheme realization.

This leads to derivations like the following.

\[(24) \quad \text{We did not drive.}\]

\[
\begin{array}{c}
\text{we} \\
\{\text{Tns}, +1, +Pl, +Past\} \\
\not\{V, \langle \text{drive} \rangle\}
\end{array}
\]

The conversion of the morpheme list (\( \{V, \langle \text{do} \rangle\} \{\text{Tns}, +1, +Pl, +Past\} \)) to phonological form will be explained in Section 3.

2.4. Some Comments on Lasnik (1996)

Now that our proposal has been elaborated, including a discussion of the post-syntactic operations which are crucial for the surface form of inflected main verbs and do-support, we can compare it with Lasnik (1996). His analysis deserves particular comment because it served as the point of departure for our analysis.

Chomsky (1995) assumed that verbs do not acquire inflectional morphology by syntactic movement to an inflectional head which bears the inflectional morphology. If they appear overtly inflected, they have entered the syntax already inflected and, if they do move to an inflectional head, move only to check features, not to pick up inflectional morphology. Lasnik proposes to derive the different behavior of auxiliary verbs and main verbs from a simple modification of this assumption. He maintains the idea that verbs never acquire inflectional morphology by syntactic movement in English, but proposes that they can acquire inflectional morphology via a post-syntactic process, uniting with inflectional morphology in the spellout computation under a condition of linear adjacency along the lines of the proposal we developed above. Further, he assumes that, in English, main verbs must acquire inflectional morphology in this way because only bare forms are available from the lexicon. Auxiliary verbs, on the other hand, cannot acquire inflectional morphology either syntactically or post-syntactically; an overtly inflected auxiliary must have come as an inflected form from the lexicon.

We have maintained the view that the combination of main verbs and inflection is post-syntactic, and sketched a theory of the relevant post-syntactic computation. Since fusion-incorporation entails the transfer of features from the target of movement to the trace, the proposal that auxiliaries raise to Tns via fusion-incorporation has consequences much like Lasnik’s proposal that auxiliaries are inserted already inflected.
Conceptually, the most serious weakness of Lasnik’s proposal is that it does not give any justification for the split between main verbs and auxiliary verbs. There is no reason why the situation could not be the opposite, with main verbs raising inserted inflected and auxiliary verbs not. This would lead to main verbs raising and auxiliaries not.

There is a serious empirical problem as well. Lasnik assume that bare auxiliaries cannot be inserted into the syntax. This assumption is crucial, so that (25b) is not admitted along with (25a).

(25) a. I was not (was) happy.
    b. *I did not be happy.

This assumption could conceivably be justified, but it would require some account of apparent instances of bare auxiliaries, such as the examples in (26).

(26) a. To be or not to be, that is the question.
    b. I want not to be bothered.
    c. I should not be here.

Lasnik offers no justification for supposing that the auxiliary in the examples in (26) are not bare. We are forced to conclude that it cannot be a requirement on lexical insertion that auxiliaries be bare. The only way to account for (25b) in Lasnik’s system is to stipulate that Tns which is $\pm$Past cannot select a bare auxiliary.

In view of the conceptual and empirical problems, we conclude that the account in terms of fusion-incorporation is to be preferred. There are two crucial differences between our proposal and Lasnik’s. First, we assume that it is the verb which is attracted to Tns, not inflectional features on the verb. This is what forces raising in (25b). It allows the contrast between French and English to be narrowed to a simple morphological difference. Second, we assume that head raising is always forced, assuming attraction, unless blocked by the morphology.

3. Morphological Realization

We now address the question of precisely how the complex morphemes which fusion creates are realized phonologically. In particular, we need to address a paradox. The verb and inflection begin in the syntax as separate morphemes. They appear at the surface as separate pieces of phonological material, as in $lik$-$d$, the past tense of $like$ combined with the phonological expression $-d$ of past. Nevertheless, we propose that there is an intermediate level at which the two morphemes fuse into a single morpheme.

We adopt the point of view of Distributed Morphology that the phonological realization of a word is determined by the phonological realization of its constituent morphemes. The phonological realization of morphemes is determined by realization rules of the form $\alpha \rightarrow \mu$, where $\alpha$ is a morpheme and $\mu$ is its phonological
expression. The realization rules are ordered, largely by inclusion, so that \( \alpha \to \mu \) takes priority over \( \alpha' \to \mu' \) if \( \alpha' \subset \alpha \).

Now consider a typical morpheme produced by the post-syntactic operations discussed above, (27a) below. The relevant realization rules are given in (27b), as an ordered list.

(27) a. \{T, V, \langle like \rangle, -1, -2, -Pl, -Past\}
   b. \{V, \langle like \rangle\} \longrightarrow /lik/
   \{T, +Past\} \longrightarrow /-d/
   \{T, -1, -2, -Pl\} \longrightarrow /-s/

Root realization rules are universally taken to be ordered before other realization rules, so the rule ordering (27) is partially determined by general principles. Ordering past tense realization before person/number realization is a particular fact about English inflectional morphology.

We further suppose that if a morpheme realization rule realizes only a subset of the elements of a morpheme, the remaining elements are split off and subject again to the realization rules. This idea, called *fission*, is due to Noyer (1992). This produces derivations like the one in (28). The phonological material produced by realization is on the left, separated by the symbol \( \| \) from the still to be processed morphemic material on the right. See Trommer (1999) for a particularly straightforward discussion of fission and the organization of the computation. We adopt this framework.

(28) 1. \( \emptyset \| \{T, V, \langle like \rangle, -1, -2, -Pl, -Past\} \)
   2. /lik/ \( \| \{T, -1, -2, -Pl, -Past\} \)
   3. /lik-d/ \( \| \{-1, -2, -Pl\} \)
   4. /lik-d/ \( \| \emptyset \)

Note that on line 3, no realization rule applies to the remaining feature bundle. In this case, it is deleted and the derivation proceeds if there are further morphemes in the list of still unprocessed morphemes. Here, there are none and the derivation ends.

In the example above, the inflected word was the realization of a single morpheme. Do-support led to a morpheme sequence, as in the righthand side of (29a). The morpheme sequence is realized in a straightforward fashion, shown below.

(29) 1. \( \emptyset \| (\{V, \langle do \rangle\} \{T, +1, +Pl, +Past\}) \)
   2. /do/ \( \| \{T, +1, +Pl, +Past\} \)
   3. /do-d/ \( \| \{+1, +Pl\} \)
   4. /do-d/ \( \| \emptyset \)

Clearly, more needs to be said. A “readjustment rule” (in this case, \( o \to i \) in the
4. Conclusion

Early versions of the Minimalist Program assumed that movement was a last resort. The goal of this paper has been to support the idea that the reality is quite the opposite and that overt head movement is induced by feature attraction to the extent that morphology allows. Rather than grudgingly revealing to the sound system only what it is forced to reveal, language is designed so that the syntax overtly displays the connections created by feature attraction as overt movement, limited only by whatever morphological and configurational constraints are imposed. See Frampton and Gutmann (1999) for the implications of this view for NP movement, case assignment, and expletive constructions. The successful treatment of the verbal inflectional system along these lines gives important evidence that this point of view is correct.

Notes

1. Portions of this work were presented by one of the authors (JF) in a course at the University of California at Santa Cruz. We thank the participants (particularly Jason Merchant) for their questions, examples, and comments, which were invaluable in bringing this work to its present form. We also acknowledge helpful comments by David Embick, Morris Halle, Alec Marantz, Armin Mester, David Pesetsky, and Geoffrey Pullum. Mostly, we thank Howard Lasnik, both for discussion and the work that initiated this paper.

3. By Chomsky (1998, 1999), XP movement to Spec Y occurs only if Y has an “EPP feature”; if it does, movement is as early as possible.

4. Chomsky (1999) proposes that trace marking can be replaced by stripping away the phonological content of the element which becomes the trace.

5. We have excluded comparison of derivations from syntactic theory. But this does not exclude simplicity considerations which can be immediately determined with respect to the current representation.

6. More specifically, it could be, for example, that ⟨should⟩ and ⟨shall⟩ are separate dictionary entries, but that ⟨should⟩ obligatorily bears +Past and ⟨shall⟩ obligatorily bears −Past. These tense features would be exceptional lexically specified features reflecting the historical residue of ⟨should⟩ in a past tense form and ⟨shall⟩ in a present tense form.

7. An early suggestion that inflectional morphology in English is post-syntactic was made by Lasnik (1981).

8. It could be, for example, that null material abutting an ellipsis is automatically drawn into the ellipsis site.
References


Chomsky, Noam. 1999. Derivation by Phase Ms., MIT.


