Chapter 22:
The role of morphology in Transformational Grammar

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for The Cambridge Handbook of Morphology

1 Introduction

A common view of the history of morphological research within the tradition of Generative Grammar, and one that the present author has himself retailed on various occasions, goes as follows. As successors to the American Structuralists, early generative grammarians (especially Noam Chomsky, a student of Zellig Harris) inherited the structuralist theory of the morpheme as a basic component of linguistic expressions. On this picture, morphemes were seen as more or less Saussurean minimal signs: irreducible associations of (phonemic) form with grammatical or semantic content. Chomsky’s own earlier work on the morphology of Hebrew (Chomsky 1979 [1951]) had made it clear to him that in the general case, the relation between morphemes and phonological form was much more complex and abstract than generally assumed in structuralist work, but discrete morphemes were still taken to serve as the link between form and content. Words, and by extension phrases, were to be analyzed as exhaustively composed of these morphemes, organized hierarchically into progressively larger structures.

Within Generative Grammar, the two substantive branches of morphological theory were both trivialized. On the one hand, the study of allomorphy, the variation in shape displayed by individual morphemes, was to be largely subsumed under the much broader conception of phonology held by generativists in comparison with their predecessors, leaving little residue beyond the listing of arbitrary, unsystematic and suppletive alternants. On the other hand morphotactics, the study of the combination of morphemes into larger units, was to be seen simply as syntax, with morphemes serving as the terminal nodes of phrase markers. There is a mild irony here, since a similar reduction in the opposite direction (with syntax taken as simply the morphotactics of increasingly large domains) characterized much structuralist thought.

These two consequences of the emerging approach to language in the 1950s and 1960s left little content for a theory of morphology per se, and the field more or less disappeared as a focus of interest. It was only beginning in the 1970s and 1980s, as evidence accumulated that the internal structure of words is interestingly distinct from that of phrases (see e.g. Zwicky 1992), and that variation based on morphemic identity follows different principles from that based on purely phonological factors alone (see e.g. Anderson 1992: 42ff.), that morphology re-appeared as a distinct focus of attention.

*I am grateful to Noam Chomsky, Larry Horn, and two anonymous reviewers for useful comments that have improved this chapter.
This picture of the intellectual history of our field is by no means altogether wrong, but a closer examination reveals that it somewhat oversimplifies things. In fact, morphological matters play more of a role in the literature of Transformational Grammar and its immediate descendants than has sometimes been appreciated, and the interplay of morphological and syntactic factors' has been somewhat more bidirectional than is sometimes assumed. The purpose of this chapter is to review these developments, identifying places in the syntactic literature where the view of morphology assumed (or explicitly presented) is not simply a matter of undigested adoption of structuralist assumptions. I focus here on the views of Noam Chomsky, as these constituted the center of theorizing on the issues at stake here from the beginnings of Transformational Grammar through its metamorphosis into later theories (Government/Binding Theory, Principles and Parameters, Minimalism).

I begin in section 2 with the assumptions about morphology — derived largely from those of Harris 1951 — that appear in Chomsky's earliest work in the 1950s. In section 3 I sketch the rather different view of morphology and its relation to syntax that appears in Chomsky 1965, most important for its view of inflection, and some of the motivation for the shift. Section 4 then follows the emergence of the “Lexicalist” view of the relation between morphology and syntax, principally important for its notion of the place of derivational morphology.

2 Origins: Morphology in the Transformational Grammar of the 1950’s

At its outset, Transformational Grammar as represented in Chomsky’s work made major breaks with the prevailing views of American Structuralists. It is hard today to reconstruct the atmosphere of the time, in which discovery procedures — the formal manipulations of surface data through which an analysis was reached — were the core of theory and theoretical discussion; but it was only in rejecting this approach that the field was able to focus on a view of language that treated the nature of speakers' knowledge as the object of inquiry, and not the series of steps organizing the data that the linguist was to perform. By rejecting the notion that the analysis had to start with the phonetics, proceed to a phonemic account of contrast relations, and then move on to the discovery of morphemes and (perhaps someday) to larger constituents, all without “mixing levels,” this new perspective on language made it possible to give serious attention to syntax as the central capacity underlying the creative aspect of language use. Very little of what linguists can be said to have accomplished since the 1950s would have been possible without the fundamental epistemological re-orientation that lay at the heart of the emerging theory.

In its underlying ontology, however, Transformational Grammar was much more conservative. It is striking that while Chomsky and other writers of the time (and their successors) reject the procedural foundation of linguistic analyses central to structuralist approaches, they seldom really question the status of the basic terms of an analysis: in particular, are there “morphemes” in linguistic structure? Carrying over Harris’ assumptions, Chomsky assumed that the terminal nodes of phrase

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1The historical connections between morphology and generative phonology raise similar issues, but that discussion falls outside the scope of the present chapter.

2The author recalls vividly having a proposed analysis rejected by one of his own early teachers, a prominent American Structuralist, on the grounds that “I don’t care how much it looks like the ‘right’ answer: what I want to know is how you got it!”

3As a notable exception to this prohibition, Pike (1947, 1952) argued that higher level information had to be taken into account in arriving at phonemic analyses — a stance that put him at odds with the rest of the American Structuralist establishment, which perhaps accounts for the exclusion of any of his work from the unofficial canon of the movement, Joos 1957.
markers are (or rather, correspond to) morphemes. These are abstract units, not to be identified either with the 'meaning' (semantic or grammatical) that they bear or with their (morpho-)phonemic realization. They are “the more or less smallest meaning bearing elements.”

Words are composed of morphemes, although the correlation will not in general be direct since the mapping of morphemes onto words, the units that will be realized phonologically, is not necessarily order-preserving. Chomsky does not ask, though, whether in fact the existence of morphemes as units independent of the content and form to which they are linked is actually justified. A word corresponds to a possibly complex combination of content elements (some components of lexical meaning, some grammatical categories, derivational material...) and it has a realization as a sequence of elements of external form, but from that it does not follow that a word always should (or even can) be decomposed into a sequence of discrete, non-overlapping units, each uniting a determinate subpart of the content with a determinate subpart of the form while remaining logically distinguishable from either. Of course, such a decomposition can obviously be made in the vast majority of words in the vast majority of languages. But there are cases where this is rather transparently artificial, as morphologists proposing word-based accounts have argued since the 1970s, and that suggests that morphemic structure does not constitute the general case. Nonetheless, Chomsky and those most closely associated with him do not seem to have taken seriously the possibility that there is a real question here, simply assuming that their analyses should be based on a rather traditional understanding of the nature of morphemes as intermediaries between form and content.

In his first significant publication on syntax, Chomsky (1953: 244) describes the fundamental units of a syntactic analysis as morphemes, where “[t]he linguist's morphemes are classes of conforming minimal meaning-bearing units, e.g. ‘boy,’ ‘think,’ ‘of,’ ‘ing,’ the plural ‘s’, etc. Forms such as ‘wife’ and ‘wive,’ with selection predictable given the context (thus ‘wive’ occurs only before ‘s’ plural, ‘wife’ only elsewhere), are called morpheme alternants and are considered to belong to the same morpheme. They are here considered to conform. See [Harris 1951: chap.12,13].” At this point in his intellectual development, Chomsky was attempting to work out the problems in Harris’s approach on the basis of that program’s methodological assumptions. The failure of that effort would lead him in later work to return to a more abstract and non-procedural view closer to that underlying his earlier work on Hebrew morphophonemics.

The formulation just cited suggests initially that a morpheme is to be construed as a sort of minimal sign (in the Saussurean sense) linking a determinate chunk of sound with the component(s) of meaning that it bears, but the notion is actually more abstract than that, as the description of ‘wife/wive’ shows. In fact, for Harris and for Chomsky in this paper, a morpheme was identified not with a particular phoneme sequence, but rather with an abstract object, realized in any given context by one member of a set of such sequences. In many cases, this set contains only a single member (e.g. ‘boy’), while in others the set has multiple members which may or may not be close in phonological form. In the case of ‘wife/wive’ the two differ only in the voicing of a single consonant, but in others, as we shall see, the variation may be more extreme. Thus, ‘think/thought(t)’

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4 Where “meaning” presumably includes “grammatical” as well as “semantic” content. This formulation is taken from a 2010 interview with Michael Schiffmann, suggesting that Chomsky’s views on this matter have not changed greatly over the years. Taken literally, it would seem at odds with the observation (Chomsky 1957: 100) that “[s]uch morphemes as ‘to’ in ‘I want to go’ or the dummy carrier ‘do’ in ‘did he come’ can hardly be said to have a meaning in any independent sense, and it seems reasonable to assume that an independent notion of meaning, if clearly given, may assign meaning of some sort to such non-morphemes as gl- in ‘gleam,’ ‘glimmer,’ ‘glow.’ Thus we have counterexamples to the suggestion that morphemes be defined as minimal meaning-bearing elements.” Much of Chomsky’s writing about other linguists’ views during the early period of Generative Grammar is devoted to attacks on appeals to meaning, and it can only be assumed that he sometimes uses the word as shorthand for “grammatically significant content” or the like.

correspond to a single morpheme, with variation dependent on the presence of a following ‘past’, while ‘is/are/am/was/were/be’ are all alternants of a single morpheme ‘be’. Indeed, the only constraint on the alternants of a single morpheme was that they be in complementary distribution, with specifiable environments, and that they correspond to the same functional or semantic content.

As was appropriate for the journal in which this article appeared, the focus here was on the formal logic of descriptions, and virtually no real examples are offered from which we could derive further consequences. The abstract, set-theoretic nature of the morpheme emerges more prominently in later work, however, and has important consequences for the relation between morphological and syntactic analysis.

The central text for Chomsky’s ideas about syntax and morphology in the 1950s and early 1960s is Chomsky 1985 [1955-6], a work that served as the source of his 1955 Doctoral dissertation and also (less directly) for Syntactic Structures (Chomsky 1957), though it remained unpublished as a whole until 1975. This work characterizes the description of a language in terms of a number of levels, each with its own properties and each related in formalizable ways to others at higher and lower levels of abstraction. One of these is the level M on which linguistic objects are represented as sequences of morphemes. The fact that these units are not to be equated with strings of phonemes, but rather are abstract objects that are realized (first as words, and subsequently on the phonemic level) is made clear:

The correlation [between the representation of a linguistic object as a sequence of morphemes and as a sequence of phonemes — sra] will not in general be direct. Morphemes may be discontinuous, a string of morphemes may correspond to a single word or phoneme sequence even if parts of this morpheme sequence do not correspond to parts of the word or phoneme sequence, [footnote: As in the case of what Hockett has called “portmanteau” forms. See “Problems of morphemic analysis” for this and other discussions of morphology. See also the relevant sections in Harris, Methods, and Nida, Morphology.] morphemes may have null phonemic content, etc. (Chomsky 1985 [1955-6]: 168)

The abstract nature of morphemes allows them to play roles in syntactic description that are flexible in important ways. Thus, we read in Chomsky (1957: 69, footnote 2) that a rule T_w_involved in the formation of questions can be defined as “the transformation that converts any string Z into \textit{wh} + Z, where \textit{wh} is a morpheme. In the morphophonemics of English we shall have rules: \textit{wh} + be \rightarrow /huw/, \textit{wh} + him \rightarrow /huwm/, \textit{wh} + it \rightarrow /wat/.”

As opposed to the view that morphemes are related to phonological content simply by an operation of instantiation from within a set of specified allomorphs, Chomsky’s earlier work on Hebrew had resulted in the notion of a system of morphophonemic rules capable of relating complexes of morphemes to phonological strings in very complex ways. The content of Chomsky 1979 [1951] was included in some versions of The Logical Structure of Linguistic Theory as an appendix; it does not appear in the most readily accessible current edition (Chomsky 1985 [1955-6]), but the notion of morphophonemics developed there must be taken into account in understanding the morphological assumptions of that work.

Strings of morphemes are thus mapped via the complex operations of morphophonemics onto strings of phonemes. The centrality of morphemes for syntactic analysis, in turn, derives from their role as elements corresponding to the terminal nodes of representations on the level of phrase structure. This relation is not entirely straightforward, as is made clear in its characterization in Chomsky (1985 [1955-6]):

Since the systematic role of morphological analysis is to simplify the derivation of word sequences from phrase sequences, we can regard M as a level intermediate be-
between the level \( W \) of words and the level \( P \) of phrase structure. This suggests that it might be useful to consider separately two classes of morphological elements, those that figure in the statement of phrase structure and those whose function is limited to the description of word structure. In the first class (call it \( \bar{M} \)) we have what we can call “morphological heads” as well as those affixes that function syntactically (e.g., morphemic long components [footnote: See Harris, Methods, Chapter 17. The distinction we are drawing is essentially that between the morphological processes of inflection and composition. See Bloomfield, Language.] expressing agreement in gender and number, etc.). In the second class we have such elements as English \( ess \) (actress, etc.) which do not themselves enter into the description of phrase structure, but which enter into the description of the minimal units that play some role in syntax. \( \bar{M} \) can be pictured (for the time being) as embedded into the level \( P \). Derivations in \( P \) thus lead from the representation \( Sentence \) to strings in \( \bar{M} \). These derivations are then extended through the levels \( \bar{M} \) and \( W \) by first analyzing the morphological heads into strings of morphemes, and then placing word boundaries (i.e. applying \( \Phi^M \)).

\( \bar{M} \) can thus be set up as a subalgebra of \( M \). The primes of \( M \) are then a set \( H \) of morphological heads and a set \( Af \) of syntactically functioning affixes. \( \bar{M} \) is the only part of \( M \) that need be considered on higher levels of syntax. (Chomsky 1985 [1955-6]: 168)

The rules of the syntax, then, distribute and manipulate morpheme-level elements rather than words, abstracting away from a subset of derivational morphemes that are only relevant to word-internal structure. This move is quite crucial, since it is this that allows transformational rules to introduce, delete, and most importantly, permute morphemes independent of the larger domains (words) of which they will form a part. And such a move, in turn, is at the heart of the analysis that was probably more influential than any other factor in persuading the field of the merits of Transformational Grammar: the rule that has come to be known as “Affix-Hopping.”

In English, main verbs can appear alone, marked for tense, or preceded by various auxiliaries: sequences of a modal and/or aspectual auxiliary. Formulating the set of possible auxiliary sequences is a problem, because each auxiliary element imposes a requirement on the form of the element that follows it, rather than on its own shape. Chomsky’s solution to this was to introduce auxiliary elements together with the affixes they require, and then re-order the resulting sequences so that the affixes follow the element with which they should be associated.

The analysis based on Affix-Hopping is present in full detail in Chomsky 1985 [1955-6]; I cite it here in the formulation found in Syntactic Structures, the most familiar source:

\[
\begin{align*}
(28) \quad & (i) \quad \text{Verb} \rightarrow \text{Aux} + V \\
                    & (ii) \quad V \rightarrow \text{hit, take, walk, read, etc.} \\
                    & (iii) \quad \text{Aux} \rightarrow \text{C(M)} (\text{have+en}) (\text{be+ing}) (\text{be+en}) \\
                    & (iv) \quad M \rightarrow \text{will, can, may, shall, must}
\end{align*}
\]

\[
\begin{align*}
(29) \quad & (i) \quad \text{C} \rightarrow \left\{ \begin{array}{l} 
S \text{ in the context } NP_{\text{sing}} \\
\emptyset \text{ in the context } NP_e \\
\text{past}
\end{array} \right\} \\
                    & (ii) \quad \text{Let } Af \text{ stand for any of the affixes past, } S, \emptyset, \text{ en, ing. Let } v \text{ stand for any } M \text{ or } V, \text{ or } \text{have or be (i.e., for any non-affix in the phrase Verb). Then:}
\end{align*}
\]

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This name for the rule re-ordering an affix and a following verbal element was coined by Haj Ross, and has become standard.
$Af + v \rightarrow v + Af$

where $\#$ is interpreted as word boundary.

(iii) Replace $+$ by $\#$ except in the context $v - Af$. Insert $\#$ initially and finally.

(Chomsky 1957: 39)

The rules in (28) here are part of the phrase structure component of the grammar. These introduce both lexical elements and affixal morphemes as terminal nodes of phrase markers: the fact that the affixes, in particular, have this status is crucial to the success of the analysis. Rule (29ii) realizes the non-terminal element ‘C’ as either the third person singular present verbal ending (‘S’, realized as [s], [z] or [əz] in the phonology), as null in other present tense contexts or as the morpheme past. The heart of the analysis is rule (29ii), “Affix-Hopping.” This is part of the transformational component of the grammar, and its effect is to re-order affixes (tense and aspect inflection, and also the en of the passive). Word boundaries inserted into the resulting structure will organize the affixal elements as suffixes to the verbal elements whose form is governed by a preceding auxiliary.

Without going into great detail, this system also accounts elegantly for additional structures. When the negative element not is introduced into a sentence, or an element $A$ of contrastive affirmation, these interrupt $Af + v$ sequences so that rule (29ii) does not apply, and the result is to ‘strand’ the affix. Such a stranded affix is directly preceded by $\#$ as a result of rule (29iii), and the dummy verb do is then inserted by a subsequent transformation in the environment $\# - Af$ (as in John does not like sardines or John does like sardines). Similarly, in the formation of yes-no questions, an initial affix can itself be preposed, resulting in the same stranded configuration and the insertion of do (Does John like sardines?).

The Affix-Hopping analysis unites a wide range of facts about English verbal structures on the basis of a few simple rules. It is, as Chomsky emphasized, quite impossible to formulate in terms of phrase structure regularities alone, and thus furnished a direct and very persuasive argument for transformational rules in grammatical descriptions. For our present purposes, it is important to note that the formulation here relies on the notion of morphemes as terminal elements in syntactic structure: the affixes that are introduced by rules like Chomsky’s (28iii) and (29i), and which are manipulated by rules in (29iii), do not constitute separate words, but they must be accessible as autonomous elements in the syntax if the analysis is to work as intended.

The details of the Affix-Hopping account, including the syntactic status of affixes it assumes, were questioned from various perspectives in later work (see for example Pullum & Wilson 1977, Gazdar et al. 1982, Lasnik 1995, Chomsky 1993, and from a very different point of view, Beard 1995), but for linguists in the early days of Transformational Grammar, the analysis — and the assumptions it made about the relation between morphology and syntax — was a fundamental and virtually unquestionable achievement of the emerging view of linguistic structure.

The quotation from Chomsky (1985 [1955-6]) above also raises another issue. As we have seen, the distribution of many individual morphemes is governed by the operation of the syntax, but in some cases there is no reason to believe the syntax is involved. In a language like English, where no principle such as gender agreement would require (or motivate) syntactic access to the element ess in actress, lioness, duchess, mistress, etc., what accounts for the presence of this element in complex words? Chomsky describes the difference between syntactically relevant morphological formations and others as approximating that between inflection and “composition,” but what is the scope of the latter, and what principles govern it?

On the second point, the principles of word-internal syntactically irrelevant morphology, there was little or no discussion in the linguistic literature of the 1950s and early 1960s. The existence of such formations was widely acknowledged and discussed within the wider field: see, for example the discussion in Hill (1962: 59) of precisely the set of pairs such as count:countess, duke:duchess,
lion:lioness and whether these would motivate an analysis of queen, wife etc. as *king-ess, *husband-ess and the like. Given the role of zero morphemes and the abstractness of morphemes in general, it is hard to see anything in the principles of Chomsky (1985 [1955-6]) that would prevent such an analysis, but the issue was never raised.

With regard to the scope of the notion of non-syntactic “composition,” it is tempting to equate this with “derivational morphology,” given Chomsky’s appeal to a traditional distinction. That would probably be mistaken, however, at least in any standard sense of “derivation.” Much of what is usually treated as derivational morphology was in fact described in the transformational literature of the period as produced by the syntax.

For example, we might think of the word proving in proving that theorem was difficult as a nominalization of the verb prove, since the phrase proving that theorem of which it is the head clearly fills the role of a Noun Phrase as the subject of the sentence. Chomsky (1957: 41), however, treats this in terms of a Phrase Structure rule NP → ing VP. The element ing is thus introduced in the syntax; it permutes around the initial verb of the VP by the Affix-Hopping rule, and thus the structure of proving falls entirely within the scope of the syntax.

Such formations, always seen as somewhere on the border between syntax and morphology, are only the beginning of the encroachment of syntactic formation on the traditional domain of derivational morphology. A whole range of other de-verbal nouns were also seen as created by the introduction in the syntax of nominalizing elements: thus, Chomsky (1985 [1955-6]: 499) proposes an element ν such that “see+ν = sight, fly+ν = flight, refuse+ν = refusal, etc.” The syntactic relevance of the element ν comes from its presumed role in transformational rules that derive such nominalizations from sentential paraphrases. Chomsky describes phrases such as the sight of men working in the fields, the flight of birds, his refusal to come as arising by transformation from he saw men working in the fields, the birds flew, he refused to come. Any such phrase with a sentential paraphrase was thus to be derived by transformation from a more basic structure underlying a simple sentence, and elements such as nominalizing ν were to be introduced by the transformation(s) involved. This line of analysis was developed and extended much further by Lees 1960 in the first Doctoral dissertation produced within the new theory of Transformational Grammar.

A great deal of traditional derivational morphology falls on this view within the domain of the syntax. Chomsky recognized the potential existence of a certain residue, as indicated by his comments on actress, etc., but the treatment of this residue (“composition”) was never substantively addressed.

Contrary to a common view of the history, it is apparent that early Transformational Grammar in the form of Chomsky’s work in the 1950s actually presented a rather intricate theory of morphology. This included views on the nature of the relation between morphemes and phonological form that incorporated most (if not all) of the puzzles that had previously been raised in work such as that of Hockett (1947) and which would later be adduced as arguments against the coherence of analyses in terms of morphemes. It involved a rather specific role for morphemes in syntactic analysis, and a distinction between inflectional and derivational morphology, even if the line between them did not fall in the standard place.

Apart from serving as the basis for syntactic accounts such as that of Affix-Hopping, however, these assumptions about morphology attracted little or no discussion among generative grammarians of the period. The interest of the field lay in developing theories of syntax, not morphology, and that was where their efforts were expended. As a result, the specific assumptions made in the literature and the residual problems of a morphological nature that those assumptions raised (such as the nature and place of non-syntactic derivational morphology) remained unexamined, with the result that morphological structure in essentially the form developed by Harris (1951) (now founded

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7Following Chomsky, I use the Greek letter ν here, despite its somewhat confusing resemblance to a lower case “v.”
on a different, non-procedural basis) remained the standard.

3 The Morphological Theory of Aspects

Morphological issues play at best a peripheral role in the literature of Transformational Grammar through the mid-1960s, but in a significant re-formulation of the theory, Chomsky (1965) proposed fundamental revisions of his earlier views on these as well as other matters. The original motivation for this lay in problems that had arisen with respect to the categorization of lexical items.

In the earlier theory, Chomsky (1957, 1985 [1955-6]) treated the members of major lexical categories (verbs, nouns, adjectives) as introduced directly by the phrase structure rules: cf. rules such as “V → hit, take, walk, read, etc.” above for example. The fact that these lexical categories have sub-categories, however, where those sub-categories are relevant for the statement of restrictions on the set of well-formed sentences, presents a serious problem.

Referring to earlier work by G.H. Matthews, Chomsky (1965: 79f.) observes that the obvious suggestion is to deal with subcategorization by rewriting rules [of the sort just mentioned — sra . . . ], and this was the assumption made in the first attempts to formalize generative grammars […] The difficulty is that this subcategorization is typically not strictly hierarchic, but involves rather cross-classification. Thus, for example, Nouns in English are either Proper (John, Egypt) or Common (boy, book) and either Human (John, boy) or non-Human (Egypt, book). Certain rules (for example, some involving Determiners) apply to the Common/Proper distinction; others (for example, rules involving the choice of Relative Pronoun) to the Human/non-Human distinction. But if the subcategorization is given by rewriting rules, then one or the other of these distinctions will have to dominate, and the other will be unstatable in the natural way.

That is, in the example given, if the Proper/Common distinction is introduced first as a subcategorization of nouns, a category such as Human can only be referred as the disjunction “Proper-Human or Common-Human” and not as a unitary category in itself. And “[a]s the depth of the analysis increases, problems of this sort mount to the point where they indicate a serious inadequacy in a grammar that consists only of rewriting rules. Nor is this particular difficulty overcome, as many others are, when we add transformational rules to the grammar.” (Ibid.)

Chomsky’s solution to this difficulty is to revise the relation between syntactic structures and the lexical items that appear in them in a radical way. Instead of developing lexical subcategories by a hierarchical set of rewriting rules, and then introducing lexical items by re-writing a maximally specific subcategory symbol, he proposes to view the terminal elements of syntactic form as Complex Symbols: (unordered) collections of syntactically relevant features. The rules of the Phrase Structure component of a grammar then allow a lexical category symbol (e.g., Noun) to be expanded as a complex symbol by rules such as these (Chomsky 1965: 85):

i. \( N \rightarrow [+N, \pm \text{Common}] \)

ii. \( [+\text{Common}] \rightarrow [\pm \text{Count}] \)

iii. \( [+\text{Count}] \rightarrow [\pm \text{Animate}] \)

iv. \( [-\text{Common}] \rightarrow [\pm \text{Animate}] \)

*See Matthews (1993), especially pages 90ff., for a review of these developments within the larger context of morphological theory in America.
Concrete lexical items, in turn, are listed in a Lexicon, each associated with a collection of features that characterize it: Thus, boy is listed with its phonological form (and semantics) linked to a set of features including [+Common, +Animate, +Human, +Count] (and perhaps others). A separate operation of Lexical Insertion then allows the association of an item from the lexicon with a terminal position in a phrase marker consisting of a Complex Symbol whose featural content is consistent with the features of the lexical item in question.

From the morphological point of view, this may appear to be a relatively minor technical move concerned only with the details of the relation between lexical items and syntactic positions, but in fact it has much more dramatic consequences. These are evoked somewhat schematically in the final chapter of the book, though the proposals made there had minimal impact on the practice of syntacticians.

Chomsky (1965: 170–184) compares two approaches to the description of inflectional morphology, on the basis of alternative accounts of an inflected form such as the German NP der Brüder ‘the brothers (Masculine, Genitive, Plural)’. On one analysis, which he identifies with that of traditional grammar,

\[ \text{Brüder} \]

He then notes that this description can be translated directly into an account of the sort developed earlier in the book for lexical items, treating the traditional “paradigm dimensions” in terms of syntactic features. On that basis, we would represent Brüder in the phrase der Brüder as associated with a complex symbol including the features [+Masculine, +Plural, +Genitive, +1 DC, ...]. He then assumes that rules of interpretation in the phonological component will operate on the lexical item Bruder in the context of this feature combination to yield the surface form Brüder.

The features involved in the complex symbol that conditions the expression of Bruder as Brüder have various origins. The properties of gender ([+Masculine]) and declension class ([1 DC]) are inherent in the noun’s lexical entry, and so this noun could only be associated with a terminal position whose content included those values. The property [+Plural] is not inherent in the lexical entry, but represents a value on a paradigmatic dimension relevant for German nouns, and so can be introduced by the rules of the phrase structure component in expanding this position. The feature [+Genitive] “is introduced by a rule that does not belong to the base subcomponent of the syntax at all but rather to its transformational part” — that is, there is a transformational rule that assigns appropriate case on the basis of the larger configuration in which the word appears.

Notice that nowhere in this account is any role played by morphemes, in the sense of minimal structural elements linking form and content. The morphologically relevant features of gender, number and case are part of the large complex symbol which as a whole determines the phonological
realization of lexical *Bruder* as phonological */brüdrə/. There are no structural units invoked which parcel out the realization into local content-form associations.

This absence of appeal to morphemes is no accident, as Chomsky shows by contrasting this description with an alternative:

The characteristic method of analysis of modern linguistics is rather different from the traditional approach that we have just restated in our terms. In place of the traditional categories (our features), this approach would substitute morphemes. Thus *Brüder* [above] would perhaps be represented [as below] in a completely consistent “item and arrangement” grammar:

\[
\begin{align*}
\text{Bruder} & \rightarrow \text{DC} \text{Masculine} \text{Plural} \text{Genitive} \\
\text{DC} & \text{being a kind of “class marker.”}
\end{align*}
\]

where each of these elements is regarded as a single morpheme, *DC* being a kind of “class marker.” Rules would then be given that would convert [this representation] into a sequence of phonemes.

Chomsky then provides arguments against the morpheme-based account, and in favor of his re-interpretation of the traditional (paradigm based) analysis:

For one thing, many of these “morphemes” are not phonetically realized and must therefore be regarded, in particular contexts, as zero elements. In each such case a specific context-sensitive rule must be given stating that the morpheme in question is phonetically null. But this extensive set of rules is entirely superfluous and can be omitted under the alternative paradigmatic analysis.

[...]

More generally, the often suppletive character of inflectional systems, as well as the fact that (as in this example) the effect of the inflectional categories may be partially or even totally internal, causes cumbersome and inelegant formulation of rules when the representations to which they apply are in [the form of morpheme sequences]. However, suppletion and internal modification cause no special difficulty at all in the paradigmatic formulation. Similarly, with morphemic representations, it is necessary to refer to irrelevant morphemes in many of the grammatical rules. [...]. But in the paradigmatic representation, these elements, not being part of the terminal string, need not be referred to at all in the rules to which they are not relevant. Finally, notice that the order of morphemes is often quite arbitrary, whereas this arbitrariness is avoided in the paradigmatic treatment, the features being unordered.

I know of no compensating advantage for the modern descriptive reanalysis of traditional paradigmatic formulations in terms of morpheme sequences. This seems, therefore, to be an ill-advised theoretical innovation. (Chomsky 1965: 173f.)

Given that virtually all syntactic discussion (as well as much phonology) in this period and subsequently assumes representations in terms of sequences of morphemes, this passage cannot help but strike today’s reader as extraordinary. Indeed, Chomsky’s arguments here against morphemic analyses of inflection and in favor of the “paradigmatic” account are essentially the same as those offered in work developing more detailed morphological theories along lines similar to those suggested in *Aspects* (e.g. Matthews 1965, 1972, Anderson 1992, Stump 2001 and others), and have never been explicitly and effectively rebutted in the literature. “It is therefore a remarkable tribute to the inertia of ideas that, when [Chomsky & Halle (1968)] addressed the phonology of English, it was the other, morpheme-based solution that they adopted” (Matthews 1993: 93). This is true not only for phonology, but also for the literature on syntax, which has largely disregarded with little
or no discussion the proposals and arguments of *Aspects* concerning the treatment of inflection, and continues to assume morpheme-based representations. The disappearance with hardly a trace within mainstream generative thinking of Chomsky’s explicit and quite persuasive reasoning against that view is indeed remarkable.

There is also some discussion of derivational morphology in Chomsky (1965: 184–192), but this is quite inconclusive. In general, the analysis of derivation there is little different from that of earlier theories, with words like *destruction, refusal,* etc. “clearly” not entered in the lexicon as such, but rather represented as *nom ~ destroy,* etc., where *nom* is a nominalizing morpheme introduced by the transformation converting verbal expressions into nominals. In a footnote (fn. 42, p. 235) the possibility is raised that the nominalization element might be introduced not as a morpheme but rather as a feature, but this line is not pursued further in the text. One notable point, though, is the fact that in attempting to deal with the often limited productivity of derivational formations, “it may be necessary to extend the theory of the lexicon to permit some ‘internal computation,’ in place of simple application of the general lexical rule” (Chomsky 1965: 187). This remark can be seen as a harbinger of the next stage of development of the theory of morphology-syntact interaction, as described in section 4 below.

## 4 “Remarks on Nominalizations” and the Emergence of Lexicalism

While the morphological proposals of *Aspects* elicited little reaction, the suggestions there about the relation between syntactic structure and semantics got much more attention. One line of analysis emerging from this (and the prior work that underlay it) was to lead to the theory of Generative Semantics: a view on which a direct representation of meaning was to be taken literally as syntactic in nature, and mapped seamlessly onto surface form by the operation of a sequence of transformational rules. While sympathetic to the initial formation of these ideas in Katz & Postal 1964, on which the syntactic representation produced by the phrase structure rules was the basis of semantic interpretation, Chomsky soon became hostile to the more extreme developments that came to characterize Generative Semantics.

In the fall of 1966, Chomsky was away from MIT at the University of California, Berkeley. During that term, classes taught at MIT by John R. (‘Haj’) Ross and at Harvard by George Lakoff, building also on work by James McCawley and Paul Postal, elicited great interest in the emerging theory of Generative Semantics among syntacticians and students in Cambridge. When Chomsky returned in the spring of 1967, he found this view to have come to dominate discussion in the linguistic community. In the fall of 1967, he gave a series of lectures in a course at MIT that initiated a counter-attack, although he did not explicitly refer to Generative Semantics *per se* there. These lectures were written and circulated by the end of the year, and later appeared in published form as Chomsky 1970. While there are a variety of consequences of the proposals made in that paper, it is important to see it as directed toward an agenda that would restrict the power of transformational operations, thus limiting the semantic adequacy of syntactic underlying forms and countering the proposals of the Generative Semanticists.

Our interest here is not directly in those syntactic and semantic issues, but rather in the consequences of the paper (henceforth “Remarks”) for morphology and the theory of the Lexicon. The core proposal was superficially modest enough, and concerned a particular construction which

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10 Discussion of the nature and development of Generative Semantics falls well outside the scope of the present article. For three somewhat different perspectives on these matters, see Newmeyer 1986, Harris 1993 and Huck & Goldsmith 1995.
had figured in much previous work: nominalizations in English. As noted above, in work up to Chomsky 1965, he had treated nominalizations uniformly as resulting from the transformation of a sentential source, a process that introduced (or depended on) an abstract nominalizing element that combines with a verb to give surface word forms like *destruction, refusal, etc.*

In “Remarks,” however, he observed that it is useful to distinguish two sorts of nominalizations of Verbs in English:

**Derived** nominals, like *John’s refusal of the offer;* and  

**Gerundive** nominals, like *John’s refusing the offer*

At the time, both of these were assumed to be produced in the syntax, by rules that started with the same structure as the one underlying *John refuse(s) the offer.*

Chomsky pointed out, however, that the two types differ in several systematic ways:

**Formal uniformity:** derived ones have a great many distinct shapes (e.g. laughter, marriage, construction, belief, doubt, difficulty, . . .) while gerundives are always formed by stem plus *-ing* (laughing, marrying, constructing, believing, doubting, being difficult)

**Semantic uniformity:** derived nominals like recital, transmission, inflation, generation etc. are commonly the locus of semantic idiosyncrasy, while the gerundives are semantically uniform.

**Internal structure of projected phrases:** Cf. *Those first four completely unmotivated criticisms of my book which you had the temerity to raise.* Derived nominals take articles, adjectives, quantifiers, plural form, and their complements appear in PP’s; but they don’t take adverbs (*John’s pointedly denying/*denial that he took a bribe). In general, the derived ones appear in phrases with all of the internal syntax of NP’s, while the gerundives appear in phrases with the internal syntax of S.

**Syntactic unproductivity:** In general, the derived ones do not appear in structures where they would have to have been formed from syntactically derived constructions. Thus, we get *John’s *easiness/*being easy to please, John’s *appearance/*appearing to like Albanian nouvelle cuisine, etc.

One commonly cited observation in this paper was the fact that derived nominals are frequently not meaning-preserving in relation to their presumed sentential source. But it is important to note that this was only one relatively minor point: the main thrust of the article (and of the lectures on which it was based) was the set of structural differences. Overall, that is, the ‘derived’ nominals show all of the properties of Nouns, and not those of Verbs, as far as their syntax is concerned. And this suggests that deriving them from verbs in the syntax is problematic.

On the other hand, we still need to express in some way the fact that there is a relation between *refuse* and *refusal.* The syntactic solution to this is to derive both from the same word in the syntax. Chomsky’s suggestion, in contrast, was that “we might allow the base rules to accommodate derived nominals directly.” That is, we could allow the relation between Verbs and derived nominals to be described not in the syntax but in the part of the grammar responsible for providing words to the syntax: the Lexicon. On this view, *refusal* is consistently a noun, as far as the syntax is concerned, and so it follows directly that it appears as the head of a Noun Phrase. This, in turn, implies that it will display the syntax of NP, not that of S.

*Refusing,* on the other hand, is a particular form of the verb *refuse,* so it is introduced as a verb in sentential structures. In terms of the syntax of the time, this was straightforward. In the kind of theory that came to prevail later, we can assume — as proposed by Kaiser (1998) — that there is
some element that can be ‘merged’ with a VP in the syntax and which has the effect of converting that VP into a NP while adding -ing to the verb:

\[ F_{\text{GERUNDIV}}: [\text{VP} [\text{v} X] Y] \Rightarrow [\text{NP} [\text{n} \text{X+ing}] Y] \]

Such a pseudo-formal representation should not be taken too seriously: the point is that somehow, verbal VPs can be converted into gerundive expressions in the syntax. There is of course more work to be done to get the resulting structure to look like an NP: the subject has to be marked genitive, for example, but these are matters of detail that do not appear especially problematic.

The real interest of the proposals in “Remarks” however, is not in the gerundives, but rather in the phrases headed by derived nominals. On the account being considered, these are always nouns from the point of view of the syntax, and so phrases headed by them have all and only the structure associated with NPs. The important difference is between lexical and syntactic formation of phrases that fill NP positions. To implement this, however, it is necessary to have not only basic verbs but also the derived nominals available in the Lexicon to fill positions in syntactic structure. To that end, we need to assume that the Lexicon contains rules of the sort briefly envisioned in Aspects, rules that perform a (perhaps limited) amount of internal computation to capture relations such as those between verbs and their associated derived nominals.

Localizing the formation of derived nominals in the Lexicon, rather than in the syntax, provides a clear path to the registration of the idiosyncrasies of individual forms. Allowing for similar computations in the Lexicon also helps us avoid a set of problems with the formation of compounds as this was envisioned in Lees (1960). In that account, the formation of compounds like snowman, garbageman, mailman, etc. is based on sentential sources (the man is made of snow, the man takes away the garbage, the man brings the mail, etc. This formation, however, necessarily involves the deletion of semantically significant material, in the context of an extremely rich theory of transformational operations. Not producing such compounds in the syntax helps us avoid the unrecoverable deletions involved on the earlier analysis, thus contributing to the overall program of simplifying and constraining the theory, a central theme in Chomsky 1964, 1965, 1973 and subsequent work.

Now while the literal content of Chomsky’s paper was quite modest (its central point was merely a proposal for a particular analytic decision in English), it gave credibility to the idea that there are really two entirely separate classes of rules: Lexical rules, which relate lexical items to one another and govern their internal structure, and Syntactic rules, which compose and relate phrasal structures. Having argued for this result, Chomsky (1970) has little to say about the specific form lexical rules should take. Others such as Jackendoff (1975) and Aronoff (1976) would subsequently pursue these matters in more detail, in ways that eventually gave rise to a rebirth of interest in strictly morphological issues in grammatical theory.

The consequences of distinguishing lexical rules from syntax sensu stricto were explored in a number of publications in the years following the appearance of “Remarks.” These included Wasow (1977) and Anderson (1977), who derived a number of conclusions from the basic character of the distinction: to wit, Lexical rules relate lexical items, and so in principle these operate on the basis of (all and only) the information present in a lexical entry. Syntactic rules, in contrast, operate over full syntactic representations, and so have access to information beyond the content of a single word, but on the other hand there is no reason to believe that they can access information concerning a lexical item apart from the content of the terminal node (complex symbol) with which it has been associated through lexical insertion. This suggests a number of differences in the ways the two sorts of rule operate:

- Lexical rules must be structure preserving, because both the basic and derived lexical items must fall within the same range of structures, those permitted by the lexicon of the language. Syntactic rules, in contrast, can perform adjunctions and thus create new structures not gen-
erated by the rules of the base (subject to other constraints).

- Lexical rules (and perhaps certain instances of ‘Merge’ like $F_{\text{GERUNDE}}$) can change category, while there is no reason to believe that any such operation takes place within the syntax otherwise. Note that we would lose this result if we allowed the syntax to analyze and move affixes, treating them as lexical category heads (perhaps leading possibilities such as John detests inflation $\rightarrow *$John’s detestation inflate).

- Lexical rules are necessarily local to the subcategorization frame of a lexical item. Syntactic rules are subject to a different notion of locality. Similarly, syntactic rules but not lexical ones can refer to A-bar positions, since the latter are by definition not sub-categorized and thus not mentioned in lexical entries.

- Lexical rules can see (and thus be sensitive to) the concrete semantic (or ‘$T$’) roles assigned to particular arguments. There is no reason to believe this is true in the syntax: at most it is possible to argue that every argument expression must receive some 0-role, but that does not imply access or sensitivity to which such role a given argument bears.

- Lexical rules all have to apply first, ‘before’ any of the syntax. Since lexical items are inserted into phrase markers, such rules cannot be fed by syntactic operations.

- Syntax is structurally general and productive, while the lexicon is preeminently the locus of idiosyncrasy and exceptionality.

The thrust of this, then, is that there seems to be a principled difference between the structural principles at work within words vs. those that organize words into larger structures. This observation led to the emergence of the approach to syntax (and morphology) known as “Lexicalism,” grounded in the distinction between lexical processes relating words to one another and syntactic processes relating phrase markers. A number of variants of the basic underlying principle have been explored, discussion of which would go well beyond the present article’s historical concerns. One fairly restrictive formulation is the **Lexical Integrity Hypothesis**, according to which the syntax neither manipulates not has access to the internal form of words. On this view the only way the syntax can affect the form of a word is through manipulation of the complex symbol with which lexical insertion has associated it, while the only aspects of a word’s structure that are accessible to the syntax are those reflected in the featural content of that complex symbol.

The Lexical Integrity Hypothesis as described in the preceding paragraph is one way of working out the program implicit in “Remarks”; others are described and discussed in a review article by Lieber & Scalise (2006), which also summarizes various sorts of evidence which they feel might compromise this in its strong form.

## 5 Conclusion

The Lexicalist theory of “Remarks” provided the basis for the development of X-bar theory (Jackendoff 1977), a notion that occupied linguists for some time in the 1970s and 1980s. The principal immediate impact of the paper was in its implications for phrasal structures rather than morphology, although work such as that of Selkirk (1982) developed extensions of X-theory to the internal structure of words.

In terms of the scope of this chapter, however, the class of theories properly called "Transformational Grammar" began to be supplanted by the mid-1970s by theories that progressively abandoned the construction-specific rules called transformations. This development is visible already in
Chomsky (1973), where properties common to a number of such rules are abstracted from them. While the syntactic assumptions of “Remarks” have been largely superseded in subsequent years, the morphological issues that paper raises remain the subject of much lively discussion.

There is very little of morphological interest to be found in the syntactic literature of the 1970s, but by the early 1980s, syntactic analyses focussing on functional categories had begun to restore inflectional properties to their earlier status as syntactically autonomous elements — indeed, structural heads, each projecting layers of structure similar to those associated with basic lexical categories. Combined with the rise of Distributed Morphology (Halle & Marantz 1993), a view of word structure more popular with syntacticians than with morphologists, the result at the time of writing is a view of the syntax-morphology relation based on the syntactic primacy of morphemes of a rather traditional sort, overall rather like the picture presented in LSLT. This reversion to an earlier view, without significant attention to the earlier arguments that suggested its inadequacy, has taken place in the syntactic literature despite the fact that many morphologists have pursued quite a different picture. But I leave the description of these post-transformational developments to others to recount.
References


