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MORPHOLOGICAL AND SYNTACTIC CATEGORIES IN THE THEORY OF GENERATIVE GRAMMAR

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1. On the early morpheme-based model of transformational generative grammar

In his first major publication on the theory of transformational generative grammar Chomsky (1957) saw the need for setting up higher-level elements like morphemes but no separate component which would deal with morphemes or morphemic structure. This need followed from Chomsky's (1957: 13 ff.) view of the grammar of L as:

(1) ... device that generates all of the grammatical sequences of L and none of the ungrammatical ones.

The grammatical/ungrammatical sequences of L were ultimately taken to be sentences viewed as sequences of phonemes. However, Chomsky (1957: 59) warned that:

(2) ... it would be absurd, or even hopeless, to state principles of sentence construction in terms of phonemes or morphemes ...

Earlier, Chomsky (1957: 18) argued for the view of grammar in which:

(3) ... the linguist ... states separately the morphemic structure of sentences and the phonemic structure of morphemes.

The grammar that could cope with the above-mentioned tasks was, in Chomsky's view, one with a tripartite arrangement like the following (Chomsky's 1957: 46 in (35)):

(4) Σ: *Sentence*

$$\left.\begin{array}{l} F: X_1 \rightarrow Y_1 \\ \vdots \\ X_n \rightarrow Y_n \end{array}\right\} \text{Phrase structure}$$

$$\left.\begin{array}{l} T_1 \\ \vdots \\ T_j \end{array}\right\} \text{Transformational structure}$$

$$\left.\begin{array}{l} Z_1 \rightarrow W_1 \\ \vdots \\ Z_m \rightarrow W_m \end{array}\right\} \text{Morphophonemics}$$

The symbol Σ stands for a finite set of initial strings. Originally, this set consisted of a single member, i.e. *Sentence*, but it could be extended to include other members like *Declarative Sentence* and *Interrogative Sentence* (Chomsky 1957: 29). The symbol *F* stands for a finite set of instruction formulas which assume the form $X \rightarrow Y$ interpreted "rewrite *X* as *Y*".

The phrase structure part of the grammar [Σ, F] can be reconstructed as containing the following rules (Chomsky's 1957: 26, 29, n. 3, 39 rules (13) and (28i-iv)):

(5) a. Sentence → NP + VP

b. $\text{NP} \rightarrow \begin{cases} \text{NP}_{\text{sing}} \\ \text{NP}_{\text{pl}} \end{cases}$

c. $\text{NP}_{\text{sing}} \rightarrow \text{T} + \text{N} + \varnothing$ (+ *Prepositional Phrase*)

d. $\text{NP}_{\text{pl}} \rightarrow \text{T} + \text{N} + \text{S}$ (+ *Prepositional Phrase*)

e. VP → Verb + NP

f. Verb → Aux + V

g. T → *the*

h. N → *man, ball,* etc.

i. V → *hit, take, walk, read,* etc.

j. Aux → C (M) (*have* + *en*) (*be* + *ing*)

k. M → *will, can, may, shall, must*

where *S* is "the morpheme which is singular for verbs and plural for nouns," and ∅ is "the morpheme which is singular for nouns and plural for verbs) (1957: 29, n. 3).

The rules in (5a-k) will generate a terminal string like the following (one of Chomsky's 1957: 39 strings in (30)):

(6) *the* + *man* + *C* + *have* + *en* + *be* + *ing* + *read* + *the* + *book*

which consists of morphemes. Some of these morphemes occur out of their natural order and must be rearranged by rules of *Transformational structure* to form words. The rules of Transformational structure also provide strings with word boundary symbols (#). The following are examples (Chomsky's 1957; 39 in (29i-iii)):

(7) a. $\text{C} \rightarrow \begin{cases} S \text{ in the context } \text{NP}_{\text{sing}} \text{ —} \\ \varnothing \text{ in the context } \text{NP}_{\text{pl}} \text{ —} \\ past \end{cases}$

b. Let *Af* stand for any of the affixes *past, S, ∅, en, ing.*
Let *v* stand for any *M* or *V,* or *have* or *be* (i.e., for any nonaffix in the phrase *Verb*). Then:

$$Af + v \rightarrow v + Af\ \#,$$

where # is interpreted as word boundary.

c. Replace + by # except in the context *v* — *Af.* Insert # initially and finally.

The rules in (7a-c) apply to the string in (6) converting it into (8) (the last line in Chomsky's 1957: 40 derivation in (30)):

(8) # *the* # *man* # *have* + *S* # *be* + *en* # *read* + *ing* # *the* # *book* #

All of the elements in (8) now occur in the correct order, with substrings contained between two consecutive occurrences of # constituting words. It remains now to apply the rules of Morphophonemics to obtain a sequence of phonemes. Like the other rules in F, the rules of Morphophonemics are of the form "rewrite *X* as *Y*", for instance:

(9) a. *have* + *S* → /hæz/
b. *be* + *en* → /biyn/
etc.

It is important to note at this point that the past tense forms of irregular (strong) verbs will also be represented on the morphological level as sequences of morphemes, e.g.,

(10) *take + past*

which will be taken to sequences of phonemes by the morphophonemic rules.

In Chomsky's (1957: 58 ff.) approach, morphology and phonology were regarded as "two distinct but interdependent levels of representation, related in the grammar by morphophonemic rules ..."

By the morphological level Chomsky (1957) understood the final line in a derivation effected by the topmost two thirds of F in the grammar [Σ, F]. By the phonological level was meant the output from the morphophonemic rules.

Originally, the rules in (7a-c) were termed *Number Transformation, Auxiliary Transformation,* and *Word Boundary Transformation*, respectively (see Chomsky 1957: 112-113). The Auxiliary Transformation was later renamed *Affix Hopping* and appeared to be the longest-lived: it survived until the late 1970s.

When a closer look is taken at the morphological level, for instance, the string in (8) above, it turns out that some of the units contained between two consecutive occurrences of # had word status before they were introduced into the string. Compare the rules (5g, h, i, k) each of which rewrites an abstract category symbol *T, N, V* or *M* as a set of tokens belonging to the respective category. However, the symbol *Aux* is different in that it rewrites as a sequence consisting of the morphophonemically uninterpretable symbols *C* (*M*) followed by the morpheme sequences (*have* + *en*) (*be* + *ing*) which are subject to morphophonemic interpretation only after they have been rearranged by the rule of Auxiliary Transformation in (7b). It is in the new environments that they form words with the preceding morphemes. Some of them, for instance # *read* + *ing* # in (8), may be claimed to belong to a particular category, others, for instance # *have* + *S* # and # *be* + *en* # in (8), can only be shown to be dominated by *Aux* as a sequence.

In Ruszkiewicz (1997) this model of linguistic description is referred to as *morpheme-based grammar.* In the morpheme-based model, sentences are assembled from morphemes by the application of the rules of Phrase structure and Transformational structure. In the course of derivation some of the input morphemes remain intact, preserving their word status, others get rearranged and incorporated under syntactic category symbols with other morphemes to form words, while still others are rearranged to form words with the morphemes to their immediate left, without acquiring a distinct category label. In the last-mentioned case, the word status of units (# *have* + *S* #, # *be* + *en* #) is only signalled by the presence of # at the beginning and end.

In the early morpheme-based model of generative grammar, transformations could effect other changes in the input strings than so far specified. In particular, they could convert declarative sentences into interrogative or negative sentences, or reduce sentences to noun phrases. Transformational relations on the phrasal level often involved parallel relations on the lexical level. For instance, given Chomsky's (1957: 73) assumption that the following phrasal categories:

(11) a. *the child is sleeping*
b. *the sleeping child*

are transformationally related in that (11b) is transformationally derived from (11a), the verb *sleeping* in (11a) is transformationally converted into the adjective *sleeping* in (11b).

Earlier we saw how words could be formed by transformationally rearranging morphemes. Another transformational mode of word formation was the insertion of the bearer *do* to the left of a stranded affix, where a stranded affix is one occurring in the following context:

(12) # —

The rule, originally called *do-Transformation* (Chomsky 1957: 113), later renamed *do-Support*, assumed the following form (Chomsky's 1957: 62 rule in (40)):

(13) # *Af* → # *do* + *Af*

Depending on the content of *Af*, the morphophonemic rules of English converted the sequence *do* + *Af* into /duw/, /dʌz/, or /did/.

The three components of grammar presented in (4) gave rise each to a different representation: (a) strings underlying kernel sentences, (b) sequences of morphemes, and (c) sequences of phonemes. Chomsky (1957: 47) viewed the three types of strings as represented in terms of the rules by which they were derived. Morphemes had no independent existence: they only existed as objects handled by rules.

In this context, it is interesting to note what Chomsky (1957: 40-41) had to say about the morphemes *to* and *ing*:

(14) ... the morphemes *to* and *ing* play a very similar role within the noun phrase in that they convert verb phrases into noun phrases ...

This is probably the earliest acknowledgement in the history of transformational generative grammar that morphemes could directly relate structures belonging to different categories. Chomsky (1957: 41) formalised this property of the morphemes *to* and *ing* by adding the following rule to the grammar (his rule in (33)):

(15) NP → $\left\{\begin{matrix} ing \\ to \end{matrix}\right\}$ VP

The familiar Auxiliary Transformation will interchange *ing* and the first constituent of VP, leaving *to* intact, as in (16) (Chomsky's 1957: 41 example in (32)):

(16) $\left\{\begin{matrix} to\ prove\ that\ theorem \\ proving\ that\ theorem \end{matrix}\right\}$ *was difficult.*

The morpheme *to* stays put because it is not in the set designated by *Af* (cf. (7b) above).

The idea expressed in (14), that is, that morphemes could relate various categories, came to light later on in both transformational generative and categorial grammar, after subcategorization frames were adopted for morphemes, both free and bound. In categorial grammar, which does not make use of a device which would be parallel to the phrase structure rules of transformational generative grammar, morphemes, including affixes, are viewed as functions from categories to categories (for details, see Ruszkiewicz 1998).

After this necessarily sketchy presentation of the early version of transformational generative grammar, it is legitimate to ask: Where is morphology located in the model of morpheme-based grammar?

By morphology is understood the device which specifies the internal structure of non-phrasal syntactic constituents in terms of other syntactic constituents.

Originally, linguists were convinced that the immediate constituents of non-phrasal syntactic constituents were free and bound morphemes. However, the study of compounds has shown that, in addition to free morphemes, they may incorporate as immediate constituents other compounds and even phrasal categories.

Going back to the question posed above, in the 1957 model of transformational generative grammar morphology was scattered between the phrase structure component and the transformational component as defined in (4) above. The phrase structure rules introduced morphemes in strings under appropriate category labels. The transformational rules rearranged them where necessary and subdivided the strings into words. The morphophonemic rules specified the phonemic shape of the words delineated by the transformational rules.

As the schema in (4) indicates, the early model of transformational generative grammar consisted of a set of initial symbols (Σ) and a system of rules (F). It is true that rules are motivated by the generalizations they are meant to capture. When viewed from this perspective, the three types of rules subsumed under F appear to be very different. Best suited for the purpose of capturing generalizations were the phrase structure rules. The other extreme was occupied by

the rules of morphophonemics, with the transformational rules occupying an intermediate position. In fact, most of the morphophonemic rules were tailored to individual cases each, which is tantamount to saying that they did not capture generalizations at all.

Observe that the grammar [Σ, F] in (4) did not differentiate between truly syntactic and distinctly morphological categories: both free and bound morphemes were handled by the rules of phrase structure and those of transformational structure. Chomsky's later works corroborated this state of affairs. For instance, following Bolinger (1948), Chomsky (1964: 52) introduced the term *formatives*, defined as:

(17) minimal syntactically functioning elements

The term continued to be used in this sense in subsequent years, cf. for instance Chomsky (1965: 3) and Chomsky and Halle (1968: 7).

2. Towards lexical morphology

The essence of the morpheme-based model of transformational generative grammar was that sentences were assembled from free and bound morphemes through the application of the rules of phrase structure and transformational structure without the mediation of a separate system of word formation rules. The 1957 model outlined above had no separate lexicon and no semantic component. The rules that introduced lexical material into preterminal strings were part of phrase structure. Given this picture of the early model of morpheme-based grammar, morphology could only be syntactic.

2.1. Prerequisites to lexical morphology

In contradistinction to syntactic morphology, lexical morphology is a theory which assumes that the word formation processes of a language take place in the lexicon. Given the purely syntactic model of sentence structure which engulfed morphology, linguists had to demonstrate that, first and foremost, it was plausible to separate the lexicon from the rules of phrase structure, that there were certain primes which belonged to the level of morphological structure as distinct from that of syntactic structure, and that the primes were governed by different rules from those of the syntax.

If we agree that a lexicon is primarily a store-house of units of some sort, it follows that the first hint that the grammar of a language should contain some kind of storage mechanism can be found in Lees' familiar *The grammar of English nominalizations* (1960).

On Lees' (1960) account, nominalizations resulted from the application of generalized transformations. Generalized transformations applied to two source-sentences, one of which was referred to as the *matrix* sentence and the

other as the *constituent* sentence, converting the constituent sentence into a nominal expression. It sometimes happened that the resulting nominals had a different syntactic distribution from the constituents they were composed of and fitted nowhere in the structure of the matrix sentence. Examples included *redcap, egghead,* etc. For instance, given Lees' (1960: 116) assumption that *redcap* is transformationally derived from the following sentences:

(18) *The cap is lying on its side*
WH + the cap is red

the matrix sentence with *cap* replaced by *redcap*:

(19) *The* ***redcap*** *is lying on* ***its*** *side.*

is ill-formed.[1]

To circumvent this difficulty, Lees (1960: 55) proposed a device called *storage* whose function was to retain transforms like *redcap*, *egghead,* etc. pending the generation of appropriate matrix sentences into which the "stored" constituents could be substituted.

Lees (1960: 20 ff.) also referred to the notion of lexicon, which had nothing to do with the storage mechanism mentioned above. By the lexicon Lees understood "very long disjunctive expansions of the lowest-level grammatical categories developed in the constituent-structure strings, yielding all the individual morphemes ..." (Lees 1960: 20). From both the description and sample presentation of such expansions (Lees 1960: 22-23), it follows that what Lees had in mind were rules like (5g, h, i, k) above. Lees' mention of the lexicon should be taken as a suggestion, implemented by Chomsky (1965), that certain rules of phrase structure might be singled out from the rest of the grammar.

Lees addressed, albeit in passing, the question of morphology in transformational generative grammar. He used the various sections of grammar as reference points with respect to which several types of morphology were defined. In particular, Lees (1960: 108, n. 41) set up the following types:

(20) a. *inflectional* morphology, as developed in the kernel-sentence-generating constituent-structure grammar,
b. *derivative* morphology, a subset of the latter, developed in or near the lexicon, and
c. *transformational* morphology, as developed by generalized transformations yielding complexes from simplexes.

[1] The transform is ill-formed on the interpretation indicated, i.e., when *its* is assumed to refer to *redcap*.

Moreover, he regarded his definition of the three types of morphology as superior to one using the traditional criteria, but did not deny "a rather wide-spread tendency to confine 'inflectional' affix morphemes to certain paradigmatic categories and to peripheral positions in the word" (Lees 1960: 108, n. 41).

Lees (1960: 108, n. 41) mentioned *-ity, -y,* and *-ize* among the derivative morphemes and called them "category-change affixes", a label which gained recognition two decades later.

Observe that so far morphemes, whether free of bound, had no existence outside the rules that introduced them. In other words, they were not stored as such in the lexicon or in any other section of the grammar.

In his *Aspects* model of transformational generative grammar Chomsky (1965) broke with the view of the lexicon as a set of rewriting rules which constituted a section of the phrase structure grammar. The lexicon came to be viewed as an unordered list of all *lexical* formatives, where *formatives* were defined as in (17) above. The *grammatical* formatives remained outside the lexicon. They were handled by the rules of the base (i.e., approximately the rules of phrase structure as in (5) above minus the rules in (5h, i, k)).

Lexical formatives were described in terms of features which specified: (a) unpredictable aspects of their phonetic structure, (b) properties relevant to the functioning of transformational rules, (c) properties relevant to their semantic interpretation, and (d) lexical features stating the positions in which the lexical rule can insert formatives in preterminal strings (Chomsky 1965: 87). For the latter, Chomsky adopted the label *subcategorization frames*.

Lexical formatives occurred in the preterminal strings generated by the rules of the base in virtue of the *lexical rule*, reproduced below (Chomsky's 1965: 84 rule):

(21) If Q is a complex symbol of a preterminal string and (D, C) is a lexical entry, where C is not distinct from Q, then Q can be replaced by D.

On a closer analysis of the derivational processes as distinct from the inflectional ones, it turned out that some of the derivational processes were only quasi-productive and could not be effected by transformations. Chomsky (1965: 186) quoted the following set of words to illustrate his point:

(22) a. *horror, horrid, horrify*
b. *terror, *terrid, terrify*
c. *candour, candid, *candify*
d. *gramophone; phonograph; telegram*
e. *frighten*

with the asterisked forms constituting non-occurring items. To cope with the actual cases in (22), Chomsky (1965: 187 ff.) proposed the procedure of "internal computation" which relied on two things: (a) lexical entries for bound morphemes and (b) a reapplication of the lexical rule (21). The actual words of (22) were broken down into bound stems and affixes in the following way (Chomsky's 1965: 187 in (44-45)):

(23) a. (*tele*‿ Stem_1, $[F_1, \ldots]$)
b. (Stem_2‿ *ify*, $[G_1, \ldots]$)
c. (Stem_3‿ *en*, $[H_1, \ldots]$)

(24) a. (*graph*, $[+\text{Stem}_1, \ldots]$)
b. (*horr*, $[+\text{Stem}_2, \ldots]$)
c. (*fright*, $[+\text{N}, +\text{Stem}_3, \ldots]$)

The lexical rule would first insert the entries in (23) into a basic string. Then, on reapplication, the lexical rule would insert the items in (24) into the strings formed on its prior application.

Internal computation was a non-transformational procedure of accounting for complex words. It required that, along with the entries for lexical formatives, the lexicon should also contain entries for sublexical entities like stems and affixes. In addition to that, the lexical rule had to be allowed to reapply to its own output.

Other complex words, notably those that involved lexical formatives, were derived transformationally. For instance, if verbs like *destroy* and *refuse* were inserted in nominalizing environments, i.e. in the position after the abstract nominalizing (grammatical) formative *nom*, they would ultimately end up as the nominals *destruction* and *refusal* (cf. Chomsky 1965: 184-185).[2]

For the sake of describing the inflectional processes of a language, Chomsky (1965: 170) adopted the method of paradigms. The method places the inflecting categories of a language in a system of paradigms by specifying values for certain inflectional features like gender, number, case, and declensional type. Each of the features constitutes an independent dimension of the paradigm.

The four inflectional features were meant to characterize the inflecting category Noun in German. Chomsky (1965: 171) assumed two of the features, i.e. gender and declensional type (class), to be inherent to German nouns, with number and case being introduced by grammatical rules. In particular, number would

[2] It would be up to the rules of the phonological component, which now superseded the morphophonemics of the 1957 model, to convert strings like *nom*‿ *destroy* and *nom*‿ *refuse* into *destruction* and *refusal*, respectively, represented in phonetic terms.

be handled by one of the context-free rules of the base, and case would be introduced by one of the transformations.

Summing up, Chomsky (1965) covered three areas traditionally subsumed under morphology: (a) stem-based compound formation, exemplified by (22d) above,[3] (b) affixational structures, both stem-based (as in (22a-c, e)) and word-based (resulting from nominalization, like *destruction, refusal,* etc.), and (c) inflectional structures. The stem-based processes, whether compounding or affixational, required no special apparatus but access to the lexicon and to the lexical rule. The remaining processes depended on both the phrase structure rules and syntactic transformations.

Since the stem-based processes discussed by Chomsky involved no post-lexical insertion apparatus, they might be considered prototypical for the processes later subsumed under the term *lexical morphology*. It should be emphasized that as early as 1965 Chomsky entertained a hypothesis according to which the stem-based formations were entirely confined to the lexicon. They would be effected by context-sensitive rewriting rules contained in the lexicon.[4] Chomsky (1965: 188) rejected the latter hypothesis on the grounds that it affected the structure of the lexicon.

Subsequent research carried out in the spirit of the *Aspects* model repeated some of the difficulties encountered by Lees (1960), and uncovered new problems.

Consider one of Lakoff's (1965: 32) minor rules, namely ABLE Substitution (ABLE–SUB). The rule was added to the grammar of English to convert phrases like the following:

(25) *able to be read*

into derived adjectives:

(26) *readable*

The following are some of Lakoff's (1965: 32) examples:

(27) a. *His handwriting can be read ⇒ His handwriting is readable*
b. *He can be depended upon ⇒ He is dependable*
c. *This function can be computed ⇒ This function is computable*

[3] Such compounds were later called *Root-Root* or *Greek* compounds by Selkirk (1982: 99, 129, n. 18).

[4] The idea of having a system of rewriting rules to generate all of the complex words of a language was picked up and developed by Selkirk (1982: 2 ff.). Her system of rules was an extension of the familiar context-free grammar developed for syntactic structures. One difference between Selkirk's extension of the context-free grammar and Chomsky's (1965) hypothesis consisted in that, contrary to Chomsky, she did not use context-sensitive rules.

d. *John can be relied upon ⇒ John is reliable*

Lakoff (1965: 32) was aware of the fact that most of the English verbs could not undergo the rule of ABLE-SUB. The following are examples:

(28) a. *John can be killed ⇏ *John is killable*

b. *John can be shot ⇏ *John is shootable*

c. *This fast ball can be hit ⇏ *This fast ball is hittable*

etc.

This aspect of the syntactic behaviour of verbs could easily be accounted for in the *Aspects* model by investing the verbs' lexical entries with features relevant to the functioning of transformations.

What Lakoff overlooked was the question of particle deletion after derived adjectives in cases like (27b, d). The deletion transformation would do away with stray particles after selected derived adjectives, as in (27b, d), repeated below in modified form:

(29) a. *He is dependable upon ⇒ He is dependable*
b. *John is reliable upon ⇒ John is reliable*

but not after others, as in (30) (quotation from the *Oxford English Dictionary*, henceforth *OED*):

(30) *Every thing, which is not strictly accountable for, by the Ordinary Cause of Natural Causes.*

The relevant particle deletion transformation would be lexically governed. Obviously, the applicability versus nonapplicability of the rule in hand depended not on the idiosyncratic properties of the particle but on those of the preceding adjective. It follows that the adjectives should bear appropriate features governing the applicability of the deletion transformation to stray particles following them. As was indicated earlier, Chomsky (1965: 87) argued that this kind of information should be attached to lexical formatives in the lexicon. The problem, however, is that the adjectives *dependable, reliable, accountable,* being transformationally derived from verbs, have no lexical entries. This means that the problem of idiosyncratic behaviour of derived adjectives with respect to the particles inherited from the underlying verbs could not be solved in the syntactic approach to derived adjectives (and other derived categories which happened to display some sort of idiosyncratic behaviour).

Earlier we reported Lees (1960) as noting that derived nominals could have a distribution which differed from that of any of its components. This fact prompted Lees to postulate the storage mechanism whose function was to hold

the recalcitrant transforms in store pending the generation of appropriate syntactic structures which could accommodate them.

More than a decade after the publication of Lakoff (1965), Wasow (1977) observed a similar difficulty with Lakoff's ABLE-SUB referred to above. Analysing verbs occurring in single-object and double-object constructions, as in (31-33) (Wasow's 1977: 335 examples in (26-28)):

(31) a. *This book can be read.*
b *This book is readable.*
c. *Johnny can be read this book.*
d. **Johnny is readable this book.*

(32) a. *Such behaviour cannot be allowed.*
b. *Such behaviour is not allowable.*
c. *Such behaviour cannot be allowed him.*
d. **Such behaviour is not allowable him.*

(33) a. *Shirley can be elected.*
b. *Shirley is electable.*
c. *Shirley can be elected President.*
d. **Shirley is electable President.*

Wasow found out that those of the adjectival constructions were ill-formed which contained *-able* adjectives based on verbs that occurred in double-object constructions.

The problem with the adjectives in (31d) through (33d) is syntactic: the adjectives do not inherit nominal complements from the verbs from which they have been derived. This means that no grammatical devices are capable of increasing the class of adjectives which occur in the position before NP, i.e.:

(34) — NP

with the NP analysed as a complement to the preceding adjective. Only three adjectives, namely (from Bresnan 1978: 8, n. 2):

(35) a. *like*
b. *near*
c. *worth*

all inherited from Old English, can take nominal complements without the mediation of a preposition.

The last class of difficulties to be discussed here in connection with the *Aspects* model of transformational generative grammar concerns the interface between syntax and phonology.

The phonological component, which came to replace the morphophonemics of *Syntactic structures*, became full-fledged in 1968. It was composed of a system of rules which applied to surface structures generated by the syntactic component converting them into phonetic representations. Chomsky and Halle (1968: 9) observed that there were two aspects to the surface structure:

(36) a. *surface structure* as output of the syntactic component, i.e., "it must result from the application of independently motivated syntactic rules," and
b. *surface structure* as input to the phonological component, in which capacity "it must be appropriate for the rules of phonological interpretation."

Chomsky and Halle (1968: 9) posed the question whether the two concepts really coincide, and gave a partially affirmative answer saying that, "In fact, they do coincide to a very significant degree, but there are also certain discrepancies." It was the discrepancies that called for additional rules which would make the syntactic structures generated by the syntactic component appropriate for the rules of the phonological component. The relevant rules were variously called: "readjustment rules" (p. 10), "the system of readjustment rules" (p. 171), or "the readjustment component" (p. 236).

The readjustment rules performed several different tasks. In the first place, they divided linguistic expressions of considerable complexity into phonological phrases which constituted maximal domains for phonological processes. Secondly, they could create distinctive feature matrices for certain lexical and grammatical formatives. For instance, the syntactically generated structures underlying the forms *sang* and *mended* (Chomsky – Halle's 1968: 11):

(37) a. $[_V[_V sing]_V\ past]_V$
b. $[_V[_V mend]_V\ past]_V$

would be converted into:

(38) a. $[_V s*ng]_V$
b. $[_V[_V mend]_V\ d]_V$

That is, the formative *past* is replaced by *d* as a general rule. However, in the position after *sing* (and other similar verbs), the readjustment rules would delete *past* together with the associated labelled bracketing and add a feature specification to the vowel of *sing* (symbolized by the asterisk (*) in (38a) above), indicating that the vowel is subject to conversion into [æ].

Thirdly, structures like *Fifth Avenue* and *Fifth Street*, which emerge from the syntactic component as structurally identical, would be modified in such a way as to enable the stress assignment rules to differentiate between compounds and phrasal categories (cf. Chomsky – Halle 1968: 369).

Fourthly, Chomsky and Halle (1968: 223) note that, "Among the readjustment rules, there are many that apply to specific derivable formatives," illustrated by the following (their rule in (110)):

(39) $t \rightarrow d\ /\ = \begin{Bmatrix} mi\text{—} + ive \\ ver\text{—} + ion \end{Bmatrix}$

The segment [d] resulting from the application of rule (39) will be converted into [z] by *Spirantization* (Chomsky – Halle's 1968: 229 rule in (120)). The [z] will be devoiced in the context before *-ive* by the rule in (40) (Chomsky – Halle's 1968: 232 rule in (124)):

(40) $z \rightarrow [-\text{voice}]\ /\ \text{—} + ive$

The consonant [z] will be palatalized before + *ion*. Hence the difference, in American English, in the phonetic reflexes of the underlying /t/ in *-mit* + *ive* and *-vert* + *ion*, i.e.:

(41) a. *mis* + *ive*
b. *verž* + *ion*

The last class of rules subsumed by Chomsky and Halle (1968: 382) under the rubric of readjustment rules were the "lexical redundancy rules", alternatively called "morpheme structure rules". Their function was to draw a distinction between admissible and inadmissible matrices.

Given the fact that the overwhelming majority of complex words were transformationally derived in the *Aspects* model of transformational generative grammar, it is obvious that the following sample word structures would appear inside the phrasal categories generated by the syntactic component:

(42) a. *#nomin+ate+ee#*
b. *#vari+ous+ity#*
c. *#rend+er+ition#*
d. *#un=forgiv#ing#ness#*
e. *#order# li# ly#*
f. *#lord# li# ly#*

Depending on the style or the variety of English used, the forms in (42) would be obligatorily or optionally subject to rules which, following Isačenko (1972), Aronoff (1976: 40, *passim*) called "truncation rules". The constituents *+at* (42a), *+ous* (42b), *+er* (42c) and *# ly* (the first occurrence of *# ly* in (42e)) *must* be left out, whereas the formatives *#ing* (42d) and the first occurrence of

 # ly in (42f) *may* be dropped. The truncation of *# ly* in (42f) is possible in American English but not in British English.

Observe that with the exception of the morpheme structure rules and those delineating phonological phrases, the processes subsumed under readjustment rules perform highly idiosyncratic, lexically governed operations. As such they do not deserve the status of rules as, by definition, rules are supposed to capture generalizations. But this means that the discrepancies between the two notions of surface structure (adduced in (36a, b) above), to which the readjustment rules were specifically tailored, were more serious than Chomsky and Halle (1968) envisaged. Needless to say, Chomsky and Halle failed to note the need for adding truncation rules to the inventory of the readjustment rules.

2.2. The Lexicalist Hypothesis

Reviewing the question of the simplicity of grammar, earlier raised in *Syntactic structures* (1957: 56), Chomsky (1970: 185) restated his position that "enrichment of one component of the grammar will permit simplification in other parts". Having initially analysed a class of sentences with *feel* as the main verb, Chomsky (1970: 186-187) came to the conclusion that "the evaluation procedure must be selected in such a way as to prefer an elaboration of the base to an elaboration of the transformational component ..." Chomsky derived further support for this sort of trade-off between the base and the transformational component from an analysis of nominalization in English. In particular, he concentrated on the relation between sentences and two types of nominals: gerundive and derived, taking into account the productivity of the process involved, the generality of the relation between the nominal and the associated sentence, and the internal structure of the nominal. The data examined by Chomsky (1970: 187) included:

(43) a. *John is eager to please.*
b. *John has refused the offer.*
c. *John criticized the book.*

(44) a. *John's being eager to please.*
b. *John's refusing the offer.*
c. *John's criticizing the book.*

(45) a. *John's eagerness to please.*
b. *John's refusal of the offer.*
c. *John's criticism of the book.*

The conclusions reached were that "gerundive nominalization involves a grammatical transformation from an underlying sentencelike structure" (1970: 187) and that derived nominals "correspond to base structures rather than transforms" (1970: 193).

The question of the nature of derived nominals was crucial in the discussion of the trading relation between the subcomponents of grammar. It gave rise to the formulation of the lexicalist position as different from the transformationalist position along the following lines (Chomsky 1970: 188):

(46) a. the lexicalist position involves extending the base rules to accommodate the derived nominal directly; and
b. the transformationalist position excludes derived nominals from the base structures and allows them to be derived by some extension of the transformational apparatus.

The thrust of Chomsky (1970) was to prove the correctness of the lexicalist hypothesis. He referred to the choice between (46a) and (46b) as "an empirical question" and envisaged the possibility of "a compromise solution that adopts the lexicalist position for certain items and the transformationalist position for others" (1970: 188).

Aronoff (1976: 6) hailed Chomsky (1970) by making the following statement:

(47) The birth of morphology, or at least the declaration of its domain, is simultaneous with, and contained in, Chomsky's "Remarks on nominalization" (1970). This paper presents a new theory of syntax, in which all of derivational morphology is isolated and removed from the syntax; it is instead dealt with in an expanded lexicon, by a separate component of the grammar. This distinction legitimizes the field of morphology as an independent entity.

Aronoff (1976) appears to have read too much into Chomsky (1970). In fact, the role of the lexicon was very much limited in "Remarks on nominalization". For instance, to express the generalizations concerning the contexts in which *refuse* appears as a verb and *refusal* as a noun, Chomsky (1970: 190) suggested that *refuse* should be entered in the lexicon as an item underspecified with respect to the categorial features [noun] and [verb]. The item could be inserted into phrase markers both in the noun position and in the verb position. The phonological form of *refuse* inserted in the noun position would be determined by what Chomsky (1970: 190) called "fairly idiosyncratic morphological rules".

It follows that no derivation was postulated in the lexicon. Morphological (and phonological) derivation took place after categorially underspecified items got inserted in the appropriate positions in phrase markers. The morphological derivation of an item, which consisted in specifying its lexically underspecified categorial features and possibly adding phonological segments, was a post-lexi-

cal-insertion process. This means that the trade-off proposed by Chomsky (1970) actually involved the transformational subcomponent and the categorial component of the base, not the lexicon. The latter was only marginally involved in the sense that it allowed lexical items to be stored with their categorial features underspecified.

Later on, Schachter (1976) argued against the transformational derivation of gerundive nominals on the basis of their internal structural as well as distributional properties. He showed that, with the exception of the constituent *-ing*, all the nonsemantic properties of gerundive nominals could be accounted for in the categorial component. With respect to the appearance of *-ing* in gerundive nominals, Schachter (1976: 226) had the following to say:

(48) The *-ing* of the gerundive nominal is, I assume, an automatic consequence of the occurrence of a [+Verb] constituent – that is, a verb or one of the auxiliaries that are constituents of VP – in the context $_{NOM}[\ _{VP}[(ADV) - X]]$.

The details of exactly how the constituent *-ing* got inserted were never explained. Since the missing constituent was not provided by the rules of the categorial component, one could only conjecture that the job would have to be done in the transformational subcomponent.

Working within a version of X-bar syntax, Siegel (1974) had earlier shown that *-ing* could be introduced by the rewriting rules of the categorial component. The relevant rule is reproduced below (Siegel's 1974: 62 rule in (54j)):

(49) $N' \rightarrow \begin{Bmatrix} N\ldots \\ -ing\ V'\ldots \end{Bmatrix}$

with *-ing* being subject to Affix Hopping.

2.3. Towards the break-off of morphology from syntax

Schachter's (1976) and Siegel's (1974) analyses support my claim that *non-transformational* does not automatically mean *lexical* since there was nothing lexical about the derivation of gerundive nominals carried out by the two linguists, if *lexical* is taken to mean 'done in the lexicon'.

What did play a fundamental role in the process of distinguishing between morphology and syntax were (a) Chomsky's (1970) theory of X-bar syntax, and (b) Jackendoff's (1972) formulation of the weak version of the Lexicalist Hypothesis.

Jackendoff (1972: 12-13) interpreted Chomsky's (1970) Lexicalist Hypothesis as an instruction that "transformations do not perform derivational morphology." Furthermore, he formulated several constraints on transformations subsumed under the label *the Extended Lexical Hypothesis*. The latter included the following provisions (Jackendoff's 1972: 13):

(50) a. transformations cannot change node labels, and they cannot delete under identity or positive absolute exceptions ...
b. ... the only changes that transformations can make to lexical items is to add inflectional affixes such as number, gender, case, person, and tense.
c. Transformations will thus be restricted to movement rules and insertion and deletion of constants and closed sets of items.

Jackendoff's Extended Lexical Hypothesis may be referred to as the *weak version* of the Lexicalist Hypothesis, or the *Weak Lexicalist Hypothesis* (WLH). This version should be kept distinct from a more restrictive principle formulated in the second half of the 1970s and known under the label of *the Strong Lexicalist Hypothesis* (SLH). The following is one of several versions of the SLH proposed by Lapointe:

(51) *Strong Lexicalist Hypothesis* (Lapointe 1978: 3, after Lieber 1980: 3)
Syntactic transformations never have to be allowed to perform morphological operations.

The two versions of the Lexicalist Hypothesis differ in that, whereas according to the WLH only the processes of derivational morphology take place before lexical insertion, the SLH has it that all processes of word formation, whether derivational or inflectional, are pre-lexical-insertion operations. Chomsky's (1970) original version of the Lexicalist Hypothesis differs from both the WLH and the SLH in that, for instance, nominals take on their final shape only after the underlying underspecified lexical items have been inserted into phrase markers under appropriate nodes.

The morphological analyses carried out in the 1970s oscillated between the two versions of the Lexicalist Hypothesis. In the first half of the 1970s the prevailing approaches to morphology were those based on the WLH. Halle (1973) was certainly an exception in that he advocated a model of transformational generative grammar in which all word formation preceded lexical insertion. His theory antedated the formulation of the SLH. Aronoff (1974/1976) and Siegel (1974) relied on the WLH. In the second half of the 1970s the SLH won out. For instance, Lapointe (1980: 21) built his theory of grammatical agreement on the assumption that lexical items are "inserted into syntactic trees in their fully specified surface morphological form ...".

Depending on which version of the Lexicalist Hypothesis was chosen, either the derivational processes alone or both the derivational and inflectional pro-

cesses were placed in the lexicon. Selkirk (1982) was an exception. She extended the rewriting rules of a context-free grammar first developed for phrasal categories to word structures. This extension was based on the assumption that "word structure rules and phrase structure rules have the same general formal properties" (1982: 10). It is noteworthy that Selkirk (1982: 10) regarded as irrelevant the question of where in the structure of the grammar the system of word structure rules should be located.[5]

Reliance on the Lexicalist Hypothesis resulted in two basic models of morphology. The weak version of the hypothesis gave rise to the model of morphology which was bifurcated between two components: the lexicon or the categorial component and the transformational subcomponent. The strong version of the hypothesis was used to construct unified models of morphology which incorporated both derivation and inflection. As was indicated earlier, Halle (1973) was an exception in that he opted for a unified model before the strong version of the Lexicalist Hypothesis was formulated. The overwhelming majority of the unified models of morphology were lexical but, again, there was an exception, namely Selkirk (1978), who at that early date actually put forward a unified model of morphology/syntax.

It is true that some linguists, for instance Halle (1973), argued for morphology as different from syntax without providing any criteria for differentiating between the two. The 1970s witnessed not only the rise of morphology but also attempts aimed at reducing the power of syntactic transformations. By 1976 enough evidence had been accumulated to throw light on the distinction between syntactic transformations and lexical rules. This distinction was captured by several criteria formulated by Wasow (1977: 331). They are reproduced in (52) below:

Linguists agreed almost unanimously that the lexical rules should be placed in the lexicon.[6]

Wasow's (1977) criteria ultimately sanctioned the separation of morphology from syntax. However, to justify the setting up of a component of grammar as different from other components, it must be shown that the new component has its own primes governed by a distinct set of principles. Wasow's criteria shed light on the principles, but not on the categories that are handled by lexical processes.

Paradoxically, the set of morphological primes was established by an extension of the principles of X-bar syntax originally formulated by Chomsky (1970).

[5] Selkirk (1982: 10) confessed that in an earlier (1978) unpublished version of her work she entertained the position that word structure rules formed part of the system of base rules of the syntactic component.

[6] But see note 5 on Selkirk's (1982) position.

Equally paradoxically, extending the principles of X-bar syntax to morphology ultimately led to the formulation of a unified theory of morphology and syntax.

(52)

	Lexical rules	Transformations
Criterion 1	do not affect structure	need not be structure preserving
Criterion 2	may relate items of different grammatical categories	do not change node labels
Criterion 3	"local"; involve only NPs bearing grammatical relations to items in question	need not be "local"; formulated in terms of structural properties of phrase markers
Criterion 4	apply before any transformations	may be fed by transformations
Criterion 5	have idiosyncratic exceptions	have few or no true exceptions

Originally, Chomsky (1970: 210) proposed simple schemas reproduced below (Chomsky's 1970: 211 in (50), (49) and (48), respectively):

(53) $S \rightarrow \overline{\overline{N}}\,\overline{\overline{V}}$

(54) $\overline{\overline{X}} \rightarrow [\text{Spec}, \overline{X}]\ \overline{X}$

(55) $\overline{X} \rightarrow X \ldots$

which captured dominance relations, heads as well as specifiers and complements to heads formerly expressed by the categorial rules of the base.

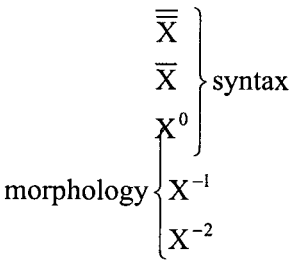
In the 1970s the theory of X-bar syntax evolved through several proposals which differed with respect to the depth of layering indicated by the number of bars (or primes) attached to the lexical category heading the phrasal category of a particular type. For instance, Siegel (1974) worked on the assumption that cased noun phrases are four layers deep but verb phrases and other phrasal categories are at most two deep. Williams (1975) argued for noun phrases being three deep but full clauses, analysed as projections of the verb, being four deep. Jackendoff (1977) proposed the Uniform Three-Level Hypothesis which set the number of layers for all phrasal categories at three. The hypothesis was expressed by the following schema (Jackendoff's 1977: 36 in (3.9)):

(56) $X^n \rightarrow (C_1) \ldots (C_j) - X^{n-1} - (C_{j+1} \ldots (C_k)$, where $1 \leq n \leq 3$, and for all C_i, either $C_i = Y'''$ for some lexical category Y, or C_i is a specified grammatical formative.

When the principles of X-bar syntax began to be extended to word structures in the late 1970s, several modifications were made to the basic X-bar template. First of all, the bar-level was used to encode Siegel's (1974) Level-Ordering Hypothesis in such a way that the variable *n* was allowed to take on two negative values, namely [−1] to denote *stems*, and [−2] to encode *roots* (Selkirk 1978). Secondly, in word structures the dominating node may, but does not have to be higher in the X-bar hierarchy than the dominated node(s) (Selkirk 1982: 8, 14). Thirdly, it was assumed, erroneously, that in word structures a particular node cannot dominate a node which is higher in the X-bar hierarchy than the dominating node (Selkirk 1982: 8). Fourthly, affixes were assigned to lexical categories on a par with free morphemes (Williams 1981). Fifthly, it became possible to define the notion of *head* for word structures parallel to syntactic structures (Williams 1981).

The extended X-bar hierarchy assumed the following shape:

(57)



with the domains of syntax and morphology clearly marked. Lapointe (1980: 67) made the following statement to describe the relation between syntax and morphology as it emerged from the theory of grammar based on the SLH:

(58) ... the syntax and the morphology are distinct parts of the grammar, each with its own system of categories and P[hrase]S[tructure] rules governed by restrictions unique to each component; the two parts interact only at the point in a syntactic derivation where lexical insertion takes place, and they interact via the mediation of lexical categories X^0 which are the only categories defined in both components.

The notation X^0 mentioned by Lapointe and used in (57) refers to words. The three levels of morphological categories *word* (X^0), *stem* (X^{-1} or X^{stem}) and *root* (X^{-2} or X^{root}) were reduced by Selkirk (1982: 51) to two: X^0 and X^{-1}, with the category level *stem* eliminated and X^{-1} used to stand for the category level *root*.

Selkirk showed that the *Word/Root* distinction was sufficient to encode the distributional properties of English affixes, i.e. to capture Siegel's (1974) Level-Ordering Hypothesis.

Selkirk (1982: 7) also set up the category X^{af}, which included affixes, but denied it a rank in the X-bar hierarchy. Thus affixes were outside the X-bar hierarchy.

3. Towards syntactic morphology

The strong version of the Lexicalist Hypothesis gave rise to the separationist view of morphology/syntax in that the two were assigned to different components of the grammar. This view came to a climax in the works of Lapointe (1980), Lieber (1980), and Williams (1981).

Selkirk (1982: 126, n. 10) was aware of Botha's (1980) findings that in Afrikaans phrases could enter into word formation, but did not take a position on the issue. In the 1980s enough evidence accumulated to undermine the position that the only point of contact between morphology and syntax was the category level Word.

The available evidence provides basically two types of word structures which fly in the face of any theory that keeps morphology and syntax separate.

The first type includes so-called *phrasal compounds*, i.e. compounds whose left-hand immediate constituents are phrases of various sorts, clauses included. The following is as representative selection of English phrasal compounds from Lieber (1992: 11), with the type of phrase incorporated being indicated in parenthesis:

(59)	a.	*a* [*pipe and slipper*] *husband*	(conjoined determinerless NP, i.e. a conjoined $\overline{N}$)
	b.	*a* [*floor of a birdcage*] *taste*	(determinerless NP, i.e. $\overline{N}$)
	c.	[*off the rack*] *dress*	(PP)
	d.	*an* [*ate too much*] *headache*	(tensed VP)
	e.	*a* [*pleasant to read*] *book*	(adjective with its complement, i.e. $\overline{A}$)
	f.	*a* [*connect the dots*] *puzzle*	(imperative VP)
	g.	[*God is dead*] *theology*	(clause)

Other linguists have reported the existence of compounds in other languages, for instance Afrikaans (Savini 1993), Dutch (Hoeksema 1988), and German (Toman 1983). These data show that on the separationist view of morphology and syntax, phrasal categories are not available for the word formation processes and, consequently, phrasal compounds cannot be accounted for.

The second type of word structure results from attaching bound morphemes, whether inflectional or derivational, to phrasal categories. Foremost among

these are the genitive constructions which indicate that the genitive marker attaches to noun phrases, as in Bloomfield's (1933) celebrated example:[7]

(60) $_{NP}$[*the man I saw yesterday*]*'s hat*

The English plural marker can attach to phrasal categories after they have been nominalized by what Williams (1981: 250) called *headless rules*. The following are examples:

(61) a. $[\textit{also ran}]_{VP} \rightarrow [[\textit{also ran}]_{VP}]_N$ — *also-rans*
b. $[\textit{has been}]_{VP} \rightarrow [[\textit{has been}]_{VP}]_N$ — *has-beens*
c. $[\textit{have not}]_{VP} \rightarrow [[\textit{have not}]_{VP}]_N$ — *have-nots*
d. $[\textit{reach me down}]_{VP} \rightarrow [[\textit{reach me down}]_{VP}]_N$ — *reach-me-downs*

These examples are not crucial for our discussion.

Next consider the option of attaching derivational affixes to phrasal categories. The data include:

(62) Proper names or titles with phrasal stress
a. *Millennial Dawn* – *Millennial Dawnist*
b. *New York* – *New Yorker*
c. *New Zealand* – *New Zealander*
d. *United States* – *United Statesian*

(63) Zero-conjoined proper names
a. $[[\textit{Eritrea-Ethiopia}]_{NP}\ n]_A$ (*war*) (from $[[\textit{Eritrea-Ethiopia}]_{NP}\ \textit{an}]_A$ via morphological adjustment)

(64) Truly phrasal but nonmaximal (i.e. $\overline{X}$) categories (with the specifier position left out)
a. *fifth column* – *fifth columnist*
b. *ill at ease* – *ill-at-easeness*
c. *nothing to do* – *nothing-to-do-ish*
d. *Prime Minister* – *Prime Ministerial* (*residence*)
e. Marchand's (1969: 317) examples
hang to it – *hang-to-itive, hang-to-itiveness*
stick to it – *stick-to-itive, stick-to-itiveness*

(65) Semi-phrasal categories involving a verb and a stray preposition (not a particle)
a. *come-'at-able*
b. *get-'at-able*

[7] See Wójcicki (1995: 25, *passim*) for other involved examples.

The status of the examples in (64e) requires a comment. Elsewhere (Ruszkiewicz 1999) I argue, contrary to, for instance, Selkirk (1982: 94), Rubach (1984: 45, n. 21), and Fabb (1988: 529), that the English suffix *-ive* attaches to nouns. This means that prior to *-ive* attachment, the verb phrasal categories *hang to it* and *stick to it* must be converted into nouns. Confirmation of this hypothesis derives from the class of nouns exemplified below:

(66) a. $[\textit{do-little}]_N$ 'one who does little' (from $[\textit{do little}]_{VP}$); also used in the adjectival sense of 'lazy, doing little' (after the *OED*)
b. $[\textit{do-good}]_N$ (obsolete)
'one who or that which does good, or is of use' (after the *OED*)

In American English, *'do-good* is used as an adjective which alternates with *do-'gooding*, the noun corresponding to (66b) being *do-'gooder* (cf. *Webster's Third*). It may be the case that, judging by the stress pattern, the base underlying *do-'gooding* and *do-'gooder* is phrasal, i.e. a VP. Although the data are not particularly numerous, the pattern is definitely there.

Next consider phrases which enter into affixational structures in Polish, a Slavic language which does not tolerate phrasal compounds. Here are a few examples derived in both the past and the present stages in the development of the language:

(67) a. Adjectives derived from quantified noun phrases
co dzień – *codzienny*
every day 'everyday, daily'
co godzinę – *cogodzinny*
every hour 'hourly'
co noc – *conocny*
every night 'nightly'
co rok – *coroczny*
every year 'yearly'
etc.

b. Adjectives derived from noun phrases
Boże Narodzenie – *bożenarodzeniowy*
God's Birth 'of Christmas'
Wielka Noc – *wielkanocny*
Great Night 'of Easter'
'Easter'

c. Nouns derived from adjective phrases
byle jaki – *bylejakość*
any which (paltry) 'the state or quality of being paltry'

Śmiechu warte – *śmiechuwarciarz*
laughter worth 'one who takes part in the
(a light TV programme) programme "Śmiechu warte"

d. Nouns derived from verb phrases
w tył ciach[8] – *wtyłciach*
towards the back slash 'backslash'
z martwych wstać – *zmartwychwstanie*
from the dead rise 'resurrection, rising from the dead'
'rise from the dead'

e. Adjectives derived from appositive structures involving titles
pana Mariana (AWS) – *panamarianowy (AWS)*
Mr Marion's ("Solidarity" 'of Mr Marion'
Election Alliance)
pana Prezydenta (dzieci) – *panaprezydenckie (dzieci)*
Mr President's (children) 'of Mr President'
Radio "Maryja" – *radiomaryjni*
Radio "Mary" 'of those citizens who are supportive of Radio "Mary"'

f. Nouns derived from clauses
tu mi wisi – *tumiwisizm*
here me hangs 'the state or quality of being indifferent'
'let things go hang'
widzi mi się – *widzimisię*
thinks me reflex. part. 'whim'
'methinks'

g. Adjectives derived from prepositional phrases
na wodzie – *nawodny*
on water 'aquatic'
od ręki – *odręczny*
from/by hand 'hand-made; impromptu'
po obiedzie – *poobiedni*
after lunch 'after-lunch'
pod wodą – *podwodny*
under water 'under-water'
poza szkołą – *pozaszkolny*
out of school 'out-of-school'

[8] This phrase resembles an interjection which has a VP status inasmuch as Polish military commands do. For instance, it is structurally parallel to the military command *w tył zwrot* 'about turn', with *w tył* functioning as a prepositional phrase and *zwrot* as a noun.

przy ziemi – *przyziemny*
near the ground 'ground'
etc.

The derivational type presented in (67g) appears to be the most productive. The preposition incorporated into the adjective no longer has the power to assign Case. Thus the form of the inflectional ending that terminates an adjective derived from a prepositional phrase is independent of the Case-assigning properties of the internal preposition.[9]

The above observation also applies to the quantifying particle *co* in (67a) which governs the nominal complement in the nominative, genitive or accusative in phrasal structures but not when incorporated into adjectives.

The adjectives *bożenorodzeniowy*, *wielkanocny* (67b), the noun *śmiechuwarciarz* (67c), the incorporated nouns *tył* and *martwych* (67d), and the incorporated

[9] Stating relations between prepositional phrases and corresponding adjectives is beset by difficulties. In the first place, not every prepositional phrase has a lexical counterpart in Polish. Those prepositions which do occur as part of derived adjectives form a subset of all the prepositions functioning in the language (for details, see Kallas 1984: 433). Secondly, to account for the fact that prepositions incorporated into adjectives do not assign Case, I suggested in Ruszkiewicz (1992: 160 ff.) a redundancy rule, reproduced below (rule (12)):

(i) Prep W $\leftrightarrow$ Pref W'

which requires that those of the prepositions which can be incorporated into adjectives should be listed in the lexicon as prefixes with subcategorization frames (W') which differ from the subcategorization frames of the corresponding prepositions (W).

Within the government-binding model a slightly different solution might be offered. In particular, the relevant prepositions need not have a dual representation in the lexicon involving the category *prefix*, but somewhat unconventional subcategorization frames. For instance, one might argue that they are subcategorized for maximal nominal phrases ($\overline{N}$) or their nominal heads (N^0), along the following lines:

(ii) $[X]_{Prep}$: — $\overset{(=)}{N}$

It is important that the prepositions in question should be followed by either full NPs or lexical categories of the same syntactic type, but nothing in between.

Given the familiar assumptions on Case assignment, maximal NPs will be assigned Case and the resulting prepositional phrases will be well-formed. Non-maximal projections are invisible to Case assignment and remain caseless. Lieber (1992: 60) has provided an escape hatch to the effect that "Case marking is not required inside words." Thus caseless nominal expressions occurring in prepositional phrases will be made invisible to the Case Filter if they are incorporated into lexical categories. The Case Filter states that (after Chomsky 1982: 6, which he attributes to Jean-Roger Vergnaud):

(iii) Case Filter
Every NP with phonological content must receive Case. 99999999999999

title *pana* in (67e) all preserve the inflections they have in phrasal categories. That is, the first [e] of *bożenarodzeniowy* and the [a] of *wielkanocny* are not linking vowels. It is true that the adjectives *boży* ('of God') and *wielki* ('great'), among others, may occur in compounds but then the linking vowel used is [o]:

(68) a. *bożonarodzeniowy* — a variant of *bożenorodzeniowy*
b. *wielkofabryczny* — 'of huge factories'

This contrast shows that derivational affixes may be attached to Polish (non-maximal) phrasal categories to derive words.

The data in (67e) show that when appositive structures in the genitive are used as derivational bases, one of the appositive constituents retains its original case. In the phrase *panaprezydenckie dzieci* ('Mr President's children') *pana* does not modify *dzieci* but is still felt to be associated with *prezydenc-*, the allomorph of *prezydent* used before the adjective-forming suffix *-isk*.

It is interesting to note that, long before Lieber (1992) came forward with the idea of syntactic morphology, at least some linguists were aware of the fact that phrasal categories could be included in and dominated by lexical categories, but they relegated such phenomena to the periphery of language. For instance, Selkirk (1982: 8) admitted the existence of nouns like the following:

(69) a. *ne'er-do-well*
b. *speak-easy*
c. *will-o'-the-wisp*

with syntactic structure, but claimed that they were "not representative of general processes of word formation".

To account for syntactic structures along with word structures incorporating phrasal structures, Lieber (1992: 37 (17)) modified the basic X-bar template along the following lines:

(70) $X^n \rightarrow \ldots X^{\{n-1,\ n\}}\ldots$; recursion allowed at least for $n = 0$

The choice between $\overline{\overline{N}}$ and N^0, to the exclusion of $\overline{N}$, in (ii) is crucial. For instance, *bez błędu* 'without an error' has the adjectival counterpart *bezbłędny* on the assumption that *błąd* 'error' is generated under N^0, not under $\overline{N}$, but *bez najmniejszego błędu* 'without the slightest error' has no lexical counterpart. That is,

(iv) **beznajmniejszobłędny*

or the like, is ungrammatical.

Cf. Jakubczak (1985) for arguments that $\overline{N}$ is a legitimate category in Polish syntax.

From the examples analysed in the text, it follows that the variable *n* ranges over the following values:

(71) $2 \geq n \geq -1$

The dotted constituents in (70), i.e. pre- and post-head modifiers, may be Y^{max} (i.e. Y^2) or Y^0 (Lieber (1992: 38 (19c)), and Y need not differ from X.

The template in (70) along with the condition on the category level of pre- and post-head modifiers defines the constituency and dominance relations within both phrasal structures and word structures. Of course, to account for the structures in question, a richer machinery is required than the principles of X-bar syntax. Lieber (1992) makes use of other tenets of the theory of government and binding, for instance, licensing conditions, Theta theory, Case theory, etc.

In Lieber's (1992) theory of morphology/syntax (or, alternatively, syntactic morphology) the zero-level category (X^0) receives a special status. It may dominate other zero-level categories (Y^0), root-level categories (X^{-1}) and phrasal categories. Furthermore, the domain headed by X^0 may serve as a haven for syntactically incomplete constituents, for instance, caseless nominal expressions. To give a concrete example, the bracketed nominal expressions in (59a, b) do not have Case. Lieber (1992: 60) uses caseless nominal expressions to sanction movement in what she calls *synthetic compounds* (p. 59). In particular, based on Baker's (1988: 46) *Uniformity of Theta Assignment Hypothesis*, reproduced for the reader's convenience below:

(72) Identical thematic relationships between items are represented by identical structural relationships between those items at the level of D-structure.

Lieber (1992: 61 ff.) explains the difference between (73a) and (73b):

(73) a. *thirst quencher* (synthetic compound)
b. *quencher of thirst* (phrasal constituent)

as resulting from *thirst* being generated in post-head position under the node N^0 in (73a) versus N^{max} in (73b). Since Case can only be assigned to maximal projections (see note 9 above), the D-structure representation of (73a) will be ruled out unless the constituent *thirst* moves leftwards and ends up dominated by the lexical node N^0 which now dominates the head *quencher* as well as the moved constituent. As indicated, the constituent *thirst* is generated under a X^{max} node in (73b). It receives Case in the usual way and there is no need for it to move. Lieber (1992: 60) concludes that "movement does not occur unless it is forced",

which simultaneously explains why synthetic compounds do not incorporate phrases.[10]

3.1. On some problems with the syntactic theory of morphology

There are several wrinkles to the approach to morphology and syntax proposed by Lieber (1992). We will address some of them as we proceed.

In the first place, the theory of morphology/syntax appears to be a new version of the morpheme-based grammar in that sentences are progressively assembled out of morphemes in accordance with general principles which are not supposed to differentiate between word structures and phrasal structures. It goes without saying that the new theory of morpheme-based grammar employs a much more complex array of devices than the 1957 version did. But does the new theory do away with the difficulties encountered by the early version of morpheme-based grammar?

Lieber (1992) departs from the use of the classical subcategorization frames in stating the syntactic environments of lexical items. Instead she borrows from Rappaport and Levin (1988) the notion of *Lexical Conceptual Structure* (LCS) which is viewed as the decomposition of the meaning of a lexical item, whether bound or free, into semantic primitives. The following is an example of the LCS for a free morpheme (Lieber's 1992: 118 in (57) from Carrier and Randall 1989: 9):

(74) PUT: $[_{\text{Event}}$ CAUSE $([_{\text{Thing}}\ ],\ [_{\text{Event}}$ GO $([_{\text{Thing}}\ ],\ [_{\text{Place}}$ At $[_{\text{Place}}\ ]])])]$

The three open slots in (74) are the verb's arguments. The fact that they are hierarchically related to the verb is represented in terms of a *Predicate-Argument Structure* (PAS) (another notion borrowed from Rappaport and Levin 1988), exemplified below:

(75) PUT: x $\langle$y, P_{loc} z$\rangle$

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[10] Lieber (1992: 60) refers to the Visibility Condition, which is based on the Case Filter adduced in note 9 above.

To my mind, caseless nominal expressions of type X^0 are invisible to the Case Filter and the Visibility Condition as they have been defined. Consequently, caseless N^0 constituents will not be ruled out. One might invoke an earlier version of the Case Filter proposed by Chomsky (1980: 25) which states that (Chomsky's 1980: 25 in (70)):

(i) *N, where N has no Case.

Chomsky (1980: 25) assumed that Case was assigned to NPs by three general principles (his in (68)) and, furthermore, Case percolated to the head noun (and its determiner and modifiers). It is obvious that if the head N of a NP did not possess Case, it was because the whole NP failed to receive Case. Thus the earlier version of the Case Filter would do the job here, but not the one that the Visibility Condition is based on.

where *x* is the external argument, *y* the direct internal argument and *z* an indirect internal argument.

Bound morphemes are handled in a similar fashion. For instance, the LCS for the suffix *-ize* is the following (Lieber's 1992: 119 in (59a)):

(76) -ize: $[_{\text{Event}}$ CAUSE $([_{\text{Thing}}\ ],\ [_{\text{Event}}$ BE (LCS of base)])]

The important observation about the LCSs for affixes is that they incorporate the LCS of their bases.

Lieber is silent on the question of the category level of the expressions that may function as arguments in the LCSs: Must they be X^{max} categories or can they also be of type X^0? In fact, both options are available. However, this information is not written directly into the LCSs or the accompanying PASs but can be read off the basic X-bar template (see the comment to (71) above).

To get things to come out right, the grammar must incorporate several *ad hoc* solutions. For instance, consider the *ad hoc* differential sensitivity of Case assignment and Theta assignment to X^{max} versus X^0. Whereas Theta roles are assigned to both X^{max} and X^0 constituents, Case is only assigned to X^{max} constituents. But then the Case Filter must be formulated in such a way as to see all instances of caseless nominal expressions, whether X^{max} or X^0 (see the original version of the Case Filter in (i) of note 10 above). In effect, those structures are ruled ungrammatical which contain caseless N^0s for which no sub-X^0 escape hatches can be found via movement. But this means that the difference between X^0 and supra-X^0 structures is real.

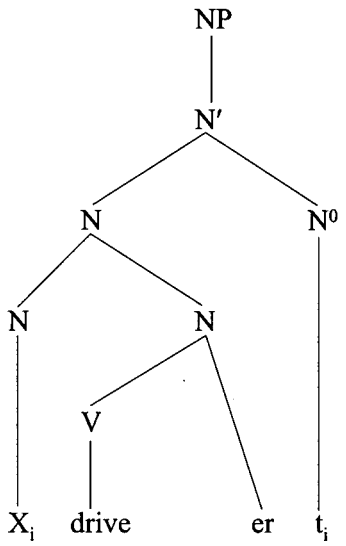
Another piece of evidence for the reality of the difference in question comes from Lieber's (1992: 143) modification of the Empty Category Principle (ECP). Originally, the ECP was formulated to account for the distribution of traces in syntactic structures. The following is Chomsky's (1986a: 16-17) version, initially adopted by Lieber (1992: 141):

(77) *Empty Category Principle* (original version)
Every trace must be properly governed. α properly governs β iff α θ-governs or antecedent-governs β.

Lieber (1992: 143) observed that the above definition of proper government did not sufficiently constrain movement of N^0 in a configuration like the following (Lieber's 1992: 143 in (43)):

Given the assumption that the noun *driver* inherits the Case-assigning and Theta-assigning properties of its base *drive*, the constituent X_i receives a Theta role before movement. The trace t_i left by the moved X_i is thus Theta-governed. On this theory, t_i would be properly governed regardless of where X_i moved, which is an implausible result.

(78)



In order to restrict in configurations like (78) the movement of X_i to left-adjunction to its (proper) governor, Lieber (1992: 143) revised the ECP along the following lines (hers in (44)):

(79) *Empty Category Principle* (revised version)
A properly governs *B* iff *A* Theta-governs and L-marks *B*, or antecedent-governs *B*.

L-marking was restrictively defined as applying to phrasal categories only (Lieber's 1992: 141 definition in (40)):

(80) *L-Marking*
X^0 L-marks a YP to which it assigns a Theta-role or Case.

Since the trace dominated by N^0 in (78) is not phrasal, it cannot meet the condition of being both Theta-governed and L-marked. It can only be antecedent-governed.

The joint condition of being Theta-governed and L-marked can never be met by X^0 constituents. It was added to the ECP to restrict movement of X^0 constituents, not X^{max} constituents. This move brings out the difference between X^0 categories and supra-X^0 categories.

Next consider the question of anaphoric relations at the sublexical level. By anaphoric relations at the sublexical level I mean that either the anaphor or its antecedent is dominated by a X^0 category, or both are. Examples include (from Lieber 1992: 121-122, 135):

(81) a. *Reagan$_i$ ites no longer believe in him$_{i,j}$.*
b. *His$_{i,j}$ mother respects Reagan$_i$ ites.*
c. *His$_{*i,j}$ self$_i$-admirer*
d. *His$_i$ self$_i$-denial*
etc.

In (81a, b) only one of a pair of anaphorically related expressions is sublexical, i.e. contained within a N^0. In (81c) both the anaphor and its antecedent are sublexical. The dialects of English fall into two classes with respect to whether or not they admit the anaphoric interpretation in examples like (81a). Permissive dialects allow the anaphoric judgements in question while non-permissive dialects do not (Lieber 1992: 122).

The permissive dialects provide an interesting contrast: if both the anaphor and its antecedent are sublexical, they must both occur in a X^0 domain. In supra-X^0 domains only one of the anaphorically related terms can be sublexical.

Forms like (81c), with both the anaphor and its antecedent being sublexical, and those like (82):

(82) **John's$_i$ admirer of himself$_i$ is late today.*

with only the antecedent (i.e. the *-er* of *admirer*) being sublexical, were analysed by Sproat (1985: 296 ff.). To account for the ungrammaticality of the examples on the interpretation indicated above, Sproat (1985: 296) made the suggestion that it was the constituent N', not N" (i.e. X^{max}) that acted as a domain for the binding theory. Based on Sproat's suggestion, Lieber (1992: 137) came forward with a revised version of the Minimal Governing Category, reproduced below (hers in (30)):

(83) *Minimal Governing Category* (revised version)[11]
The MGC of α is a projection β containing both a subject and a lexical category governing α.

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[11] The original version of the Minimal Governing Category was formulated by Chomsky (1986b: 169) as follows:

(i) *Minimal Governing Category* (original version)

> ...a governing category is a maximal projection containing both a subject and a lexical category governing *a* (hence containing *a*). A governing 'category is a complete functional complex' (CFC) in the sense that all grammatical functions compatible with its head are realized in it - the complements necessarily, by the projection principle, and the subject, which is optional unless required to license a predicate, by definition.

The import of the revision is that the MGC need not be a maximal projection.

Returning to (81c), repeated below as (84):

(84) *His*$_{*i,j}$ *self*$_i$*-admirer*

it is ungrammatical on the interpretation indicated because *self*, a sublexical anaphor, is bound by the sublexical subject *-er*. The indexing is thus the following:

(85) *His*$_{*i,j}$ *self*$_i$*-admir-er*$_i$

That is, *self* is bound within the category N^0, a verbal compound. The anaphor *self* cannot be additionally bound by the pronoun *his*.

The foregoing discussion provides additional evidence for the reality of the distinction between X^0 and supra-X^0 domains.

Another critical difference between X^0 level and supra-X^0 level units boils down to the fact that the former *must* be listed and that some of the latter *may* be so listed.[12] Support for the claim that X^0 level units, whether simple or complex, are listed in the lexicon derives from what Ruszkiewicz (1992, 1997, 1998, 1999) has called *oblivion phenomena*. The term captures the fact that affixes, free morphemes functioning as derivational bases, or even whole families of words may sink into oblivion. The case of affixes having sunk into oblivion and revived later on is discussed by Laskowski (1981). The example of a whole family of words in Polish having being forgotten and revived after half a century can be found in Ruszkiewicz (1998). However, of special interest to the researcher are cases of complex items whose bases have been forgotten, with the affixes remaining fully productive. This class can be exemplified by the following:

(86) a. *fulsome, gruesome, winsome*
b. *feckless, hapless*

According to the *OED*, at the time the adjectives were formed, *feck, full, grue, hap,* and *win* all functioned as nouns.

The existence of the forms in (86) argues against Lieber's theory of morphology/syntax in which phrasal categories (sentences included) are constructed from morphemes. If this were the case, the speakers' memories would be refreshed every time they decided to use any of the items from (86) in a sentence, preventing their nominal bases from falling into oblivion. If derived items are listed in the lexicon, one or more of their components may become forgotten without affecting the use of the whole derivatives.

[12] Examples of supra-X^0 level units that must be listed in the lexicon include fixed phrases like *How do you do?*, proverbs, poems, novels, etc.

Also note that in the course of morphological derivation, the syntactic properties of the base need not be inherited *in toto*. Consider the derivation of the adjective *independent*. As the data below show:

(87) a. *depend*$_V$: – [$_{PP}$ *on* NP]
b. [[*depend*]$_V$ *ent*]$_A$: – [$_{PP}$ *on* NP]
c. [*in*[[*depend*]$_V$ *ent*]$_A$]$_A$: – [$_{PP}$ *of* NP]

the adjective *dependent* inherits the complete array of syntactic features from the verbal base but the adjective *independent* has a subcategorization frame that only partially overlaps with that of *dependent*. Furthermore, the change of *on* to *of* is unpredictable and cannot be effected by any of the principles established jointly for the syntax and the morphology.

What the foregoing discussion strongly suggests is that Lieber's theory of morphology/syntax is correct in the sense that highly similar principles hold for both X^0 level and supra-X^0 level structures. The discussion does not corroborate the view that phrasal structures are formed in the course of derivation that starts with sublexical units and carries across X^0 units to supra-X^0 structures at one swoop. The processes that produce X^0 categories appear to be once-only rules in the sense of Aronoff (1976: 22). That is, they apply to derive words which are then listed in the lexicon, but they do not apply in the derivation of every sentence.

4. Conclusions

We have seen that morphology has been present in all the models of generative grammar since the inception of the theory in 1957. Originally, morphology was viewed as a level of representation that resulted from the application of the phrase structure rules and rules of the transformational component. Working within this framework, Lees (1960) was able to establish several types of morphology depending on where in the structure of transformational generative grammar the particular morphological phenomena were dealt with. No separate morphological categories were set up yet. All formatives were viewed as minimal syntactically functioning elements (Chomsky 1964). The first hint that morphology could be done in the lexicon via internal computation or by lexical rewriting rules can be found in Chomsky (1965).

Chomsky's (1970) formulation of the Lexicalist Hypothesis provided an impetus for revising the status of the rules of the syntax, a process which took several years to complete. A set of criteria for distinguishing between lexical rules and (syntactic) transformations was provided by Wasow (1977). This move was followed by the formulation of the strong version of the Lexicalist Hypothesis (Lapointe, several references). Based on the strong version of the Lexicalist Hypothesis and the X-bar template first proposed for phrasal categories by

Chomsky (1970), linguists were able to come up with an X-bar hierarchy of categories covering both morphology and syntax (see (57) above). It was for the first time in the history of transformational generative grammar that a *principled* account of morphology as different from syntax could be presented. The domain of morphology was originally defined by three category levels: *root, stem,* and *word*. This range was later reduced to two levels: *root* and *word*. At that time word level categories were thought to be the only categories shared by both morphology and syntax.

It soon turned out that the approach that relied on the separation of morphology from syntax was too restrictive and *ipso facto* observationally inadequate. Attempts were made within the theory of government and binding to demolish the boundary between morphology and syntax and construct a unified theory of morphology/syntax (Lieber 1992). However, the discussion has revealed that there are certain fundamental differences between X^0 domains and supra-X^0 domains. They show up in the way the Visibility Condition/Case Filter is to be interpreted with respect to X^0 level versus supra-X^0 level categories, or how the Empty Category Principle and the Minimal Governing Category must be defined to do the job in both types of domains. We have also stressed the fact that the X^0 level categories are generally listed in the lexicon and the processes that produce them are captured by once-only rules. This array of facts makes for the difference between morphological and syntactic categories.

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