

The Autonomy of the (Syntactic) Lexicon and Syntax: Insertion Conditions for Derivational and Inflectional Morphemes

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1. The Problem of “Neutralized” Phrases

A central concern of western grammar has always been the proper characterization of what can be called non-finite verbal constructions: the infinitive, the gerund, and the participle. Under the aegis of generative grammar, progress toward this goal has been swift, in comparison to what went before; the principal clarifications will be outlined just below.

Nonetheless, we still lack a complete and formalized understanding of what a “verbal noun” (gerund) or a “verbal adjective” (participle) is. We cannot be content with describing them loosely as “neutralized” categories, precisely because an English gerund phrase, for example, appears only in noun phrase positions (Emonds 1976, ch. 4) but has the internal structure of a verb phrase (Chomsky 1970).¹ The pre-theoretical term “neutralization” sheds no light on why the opposite properties don’t hold: why not internal noun phrase structure and external verb phrase distribution?

We can ask further questions: why are the modals and tense endings not available in “verbal nouns” and “verbal adjectives”? What determines the choices among infinitives, participles, and gerunds, especially in cases where all three have understood, rather than lexically overt, NP subjects? How is it that Modern English uses the

(*) It is a pleasure to dedicate this study to my esteemed colleague, S.-Y. Kuroda. This work fits into our shared research program of rendering unto syntax what is syntactic (namely, most of what is linguistically interesting), and of rendering unto the lexicon very little.

I am grateful to Professor José Deulofeu of the Université de Provence and to the French University system for providing teaching conditions under which research could be simultaneously undertaken, conditions which were free of the endless grantsmanship and bureaucracy which precedes “research time” in the U.S. The stimulating paper presented by Professor Abdelkader Fassi Fehri at the First International Conference of the Moroccan Linguistic Society on the related Arabic *masdar* construction was crucial in refocusing my interest on this topic.

Ms. Jan M. Griffith of Wordwright, Seattle, efficiently and accurately prepared the manuscript, for which I am most appreciative.

(1) Other languages have gerund phrases of this sort; cf. George and Kornfilt (1981) for Turkish, and Fassi Fehri (1986) for Arabic.

same ending *ing* for participles and gerunds, which is furthermore a suffix of derivational morphology for turning verbs into both adjectives and nouns (*very intriguing, a thought-provoking reading*)? Many more questions can be posed in terms of the recent analyses of gerunds and participles, questions whose import can't be understood, however, without entering into more detail about what we already know about these constructions.

In this paper, I hope to sketch an answer to these questions, utilizing some theoretical tools developed in Emonds (1985). To my mind, these tools provide, almost automatically, some satisfying formal representations that succinctly express empirical generalizations about this subject matter. The fact that a number of these answers are latently present in a framework I developed without being aware of them suggests that the proposals in that work for lexical representation, categorial asymmetries, and grammatical formatives are on the right track. In what follows then, I will first show, in section 2, how the four principal uses of *ing* in English form a balanced and quite abstract syntactic paradigm, which is centrally based on the property that *ing* is an N or A (and not a V). These findings are then formally expressed, in section 3, by a unified lexical representation which crucially uses the two levels of lexical insertion for grammatical formatives provided for in Emonds (1985).² To fully exploit the predictive power of this framework, the notion functional head must be refined, so that a bar notation head X^0 empty at deep structure yields its selectional predominance to a filled Y^0 sister (section 4). Once the appropriate modifications are in place, section 5 is devoted to, if I may cite the reviewer, "the order that the framework reveals and accounts for in what the GPSG authors have called 'the unruly and idiosyncratic syntactic facts of subcategorization'... Most of the regularities discussed are not even observed in other approaches, let alone given a theoretical account".

If the analyses of English gerunds, infinitives, and present participles given here are satisfactory, a logical next step would be to extend the approach to passive and perfect participles, which are basically identical in several western languages, even though they differ both in their syntax and in their morphological (agreement) pro-

(2) Milsark (1988) also argues for a unified lexical entry for *ing*. His main proposal is that *ing* is "unique among derivational affixes, at least in English" (as well as among inflectional affixes) in lacking a category specification. (Uncontroversially, as here, *ing* suffixes to V). As this paper had been accepted with a space limit before Milsark's appeared, my remarks on his analysis must be brief. Nonetheless, his position clashes with mine at most points where an explicit comparison can be made. The many problems with his proposal, some of which are indicated in notes here, to my mind undercut severely his idea that (only) *ing* lacks a category.

As one result, for example, Milsark is empirically "forced to predict that *ing* should be available to form lexical items of the class P in addition to the N, V, and A items exemplified above" (615). However, no examples of lexically derived V are provided, since none exist: **The article convincings me; *she helpinged us*, etc. (Affixes which derive V from V, such as *re-* and *over-*, are nonetheless common.) For another example, Milsark ends up stipulating how "different instances of *-ing*-affixed lexical items acquire their various categorial identities in the absence of any specification thereof by either their stems or the *-ing* affix itself" according to whether an item is N or V (by "the provisions of Case theory, predication, θ -theory, and so on"), P ("listed lexically under their appropriate categorial feature specifications"), or A ("a semantically motivated bifurcation of the class of verbs with respect to their ability to accept *-ing* affixation"). (616) Indeed, Milsark's sections 2 and 3 read as a catalog of problems that arise when *ing* is accorded unique categoryless status. While it is refreshing that the author openly formulates what the problems are, his tentative suggestions for resolving them are often inexplicit or ad hoc, and do not seem to me promising.

perties. In another study, I argue that the passive/perfect participial ending (e.g., English *en*) is an A (but unlike *ing*, is never an N). The agreeing adjectival passive *en*, like the derived adjectival *ing*, is present in deep structure, while the verbal passive *en* and the perfective *en*, like participial *ing*, are inserted only at s-structure. The differences between the passive and the perfective, I show there, all result from whether or not the A position into which a surface *en* is inserted agrees with its subject, adjectival agreement of an empty A being optional. All passive (e.g., subject agreeing) *en* have in common a co-indexing with an empty object NP, quite analogous to that found with direct object clitics in Romance languages, in contrast to *ing*, which is completely unrelated to any phrase inside the X¹ which it heads.

2. The Uses of *ing*

Derived nominals. Papers by Fraser (1970), Chomsky (1970), Ross (1973), and Walinska de Hackbeil (1984) have shown that the italicized forms in (1) are nouns, even though the selection restrictions that these nouns enter into with surrounding argument phrases are determined by the verb to which *ing* is attached.

- (1) your thought-provoking *reading* of that text to a large audience
the *shooting* of the lions by the hunters

Walinska de Hackbeil (1984) shows that such "action nominalizations" are far from having all the properties of nouns. She proposes that the suffix *ing* is the "categorical head" of the NP, while the verb is the "lexical head" of the phrase. Roughly speaking, we may say that semantic selection proceeds as with verbs and that syntactic selection (i.e., the choice of phrasal categories in which arguments are represented) proceeds as with nouns. We return to this distinction later.

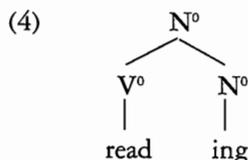
These derived nominals are incompatible with stative verb roots.

- (2) *Your knowing of algebra surprised me.
*The possessing of a few art objects makes a good impression.
*Susan criticized such constant owing of money.
*Mary's preferring of (for) Cuban cigars got her in trouble.
*They warned me about television's boring of Sam.
*A lot of daily amusing of children is fatiguing.

The right-hand head rule for English morphology of Lieber (1980), Williams (1981), and Selkirk (1982), to the effect that the affixes of derived morphology are lexical category heads, squares well with general constraints on word order in the bar notation (e.g., only phrases follow the head; Emonds 1985: ch.1). Under this approach, the *ing* of (1) is lexically represented as in (3).

- (3) *ing*, N, +V _____; V = +ACTIVITY

The subcategorization feature indicates that *ing* combines with an X⁰ of the bar notation, namely V. Combinations of an X⁰ (here, the N *ing*) with non-maximal phrases give rise to another X⁰, whose head, according to Williams and Lieber, is, in English and other suffixing languages, its right-hand member, as in (4).



Derived adjectives. Chomsky (1957) points out the fact that a class of verbs denoting psychological states and requiring animate direct objects can be systematically made into adjectives by the addition of *ing*. The possible realizations of SPEC for adjectives, given in (5), can be freely combined with the forms in (6a) but not with those in (6b).

(5) very, rather, so, too, more, less, how, etc.

- (6) a. amazing, amusing, boring, exciting, fatiguing, frightening, irritating, pleasing, revolting, soothing, surprising, tempting, etc.
 b. reading, shooting, barking, describing, destroying, completing, etc.

Like the derived nominals in *ing*, the forms in (6a) retain selectional properties of the stem verbs, while choosing the syntactic form of their complements like adjectives. For example, verbs but not adjectives can take direct object NP's:

- (7) The political manipulations frightened my friends.
 The manipulations were very frightening *(to, for) my friends.

Further, adjectives with non-animate subjects cannot appear in the progressive:

- (8) The manipulations were frightening my friends.
 *The manipulations were being very frightening for them.

As pointed out in a careful study by Brekke (1988), certain other classes of verbs (in his terms, of "disposition", "manner", and "impact") form adjectives in *ing*. He further notes that, in order to form a true adjective in *ing*, the "psychological" feature "is only a necessary but not a sufficient condition, since the (overt or covert) position of the Experiencer argument appears to be crucial: psychological predicates with a β -Experiencer [i.e., in object position, J.E.] produce *ing* adjectives, whereas those with an α -Experiencer do not" (172).

In a forthcoming study, I argue that the direct object position of the Experiencer (the psychological Location, in thematic role terms) results from an intrinsic feature on the verbal head, +LOCATION. Thus, parallel to the earlier entry for derived nominals (3), we can represent the *ing* for the derived adjectives of (6) as follows:

- (9) *ing*, A, +V _____, V = +PSYCHOLOGICAL, +LOCATION;
 V="disposition", etc.

Throughout, I abbreviate the condition on V in (9) as "V = +PSYCHOLOGICAL".

To express the similarity between (3) and (9), we can use the "archicategory" [+N] introduced in Chomsky (1970).³ This archicategory is typically used to account for the many common properties of adjectives and nouns.

- (10) *ing*, [+N], +V _____, $\left. \begin{array}{l} \text{N: V} = +\text{ACTIVITY} \\ \text{A: V} = +\text{PSYCHOLOGICAL} \end{array} \right\}$

The lexical entry (10) maximally factors out the common properties of the English *ing* in derivational morphology.⁴

Gerunds. One of the principal clarifications achieved by early generative grammar in the study of non-finite clauses was the characterization of English "NP-gerunds", two examples of which are italicized in (11).

- (11) We preferred *John's having been awarded the prize* to *your obtaining it fraudulently*.

Chomsky (1970) showed that this construction is entirely separate from derived nominals ending in *ing* in that inside its maximal projection, it has all the structural properties of verb phrases, including the requirement that its subject NP be structurally present (even if "understood"; Wasow and Roeper 1972). Emonds (1976: ch. 4) showed that, in contrast to infinitives and finite clauses, the NP-gerund has the external distribution of NP's with respect to both its deep structure positions and its behavior under transformational movements in passives, clefts, etc. We can informally summarize these results in a quasi lexical entry for gerundive *ing* as in (12):

- (12) *ing*, [+N], +V _____, N:V+[ing] selects like V inside its maximal projection, but its maximal projection is syntactically an NP.

Present participles. In Emonds (1985, ch. 2), a study is undertaken of the properties of another set of maximal projections whose head is V+*ing*, the "present participles" of traditional English grammar. As with NP gerunds, these heads select inside their maximal projection like a V, but unlike NP gerunds, they do not appear in positions characterized by deep and transformational syntax as NP positions. Some examples of participles are italicized in (13).

- (13) We {found the students/went on} *studying French*.
The students *conversing quietly* were waiting in the lobby.
He made the children sandwiches (while) *describing Albania*.
With John *having obtained his degree*, we can leave for Guadeloupe.

Participles never have an overt NP subject within these maximal projections. In addition, they do not exhibit overt COMP's, elements of INFL, or gaps characteristic

(3) The N and A in (10) may be viewed as easy-to-read representations of [-V] and [+V], respectively, where, using Chomsky (1970), N=[+N, -V] and A=[+N, +V].

(4) Each of the lines in the entry (10) may well include a lexical list of co-occurring stems. Some verbs would occur in one list but not the other: *very astonishing* / **very forgetting* vs. **the astonishing* / *the forgetting*. Under Milsark's 1988 proposal, *ing*'s unique property of not having a lexical category precludes the listing of such distinctions. Nor can Milsark have recourse to a future semantics to express these distinctions, "as it is difficult or impossible to isolate a 'meaning' for any of the types of *-ing* mentioned above, . . ." (614)

of non-overt movements into COMP: **the books sending on to John are expensive*.⁵ I concluded that these "non-NP" forms are VP's immediately dominated neither by S nor by NP – i.e., that these are "bare VP's". This analysis led to a couple of puzzling questions, however, within the framework I developed there.

- (14) What is the nature of the participial *ing*, since there is no morpheme category with which it can be associated?

This analysis, together with my proposal for the characterization of S in the bar notation as an "extra projection" of V (=V³), implied that both V² and V³ can appear as complements to X⁰. Might it be preferable to restrict complements to strictly maximal projections, allowing VP to appear only as a sister to INFL?

In fact, I came to be aware of a distributional generalization about the syntactic distribution of present participles, but did not really see how to express it naturally in the system I developed. Terming such participles "bare VP's":

Bare VP's have turned out to have the deep structure distributional characteristics of AP's, which is to be expected if bare VP's are V², and if V and A are considered to share a cross-classifying feature [+V], as in Chomsky (1970). Like AP's, bare VP's can be sisters to V (aspectual and object-controlled gerunds), sisters to N¹ and NP (reduced relatives), and sisters to V¹ and VP (adverbial gerunds; here an AP would have adverbial form). Also like AP's, [bare] VP's can be sisters to P, under restrictive choices of a head P. Lastly, [bare] VP's can occur directly under the initial symbol E in absolutive constructions, as can AP's (*With John sick, ...*). Thus, no special base composition rule is needed to specify where [bare] VP's occur, as opposed to other phrasal categories. (Emonds 1985: 97)

On other grounds, I am not convinced that the feature $\pm V$ plays a role in syntax, and yet the above passage crucially relies on the archcategory +V. Moreover, the passage leaves the questions in (14) unanswered. Finally, if the (bare) VP's in NP-gerunds were sisters to empty deep structure N, this would square badly with my argument (Emonds 1985: ch. 1) that all deep structure sisters to N must appear in PP.

The basis of an answer to these problems lies, I believe, in the empirical generalization outlined in the citation; with respect to syntactic principles of phrasal distribution, participial VP's have the deep structure properties of AP's. If participial clauses are AP's, their lack of overt internal NP subjects for the participles is immediately explained. Moreover, this explains why participles do not combine directly with modals and tense endings (English AP's never do), and the category of participial *ing* is identified with that of derived adjectives.

Besides sharing the deep structure distribution of AP, present participles also share the following surface properties with AP.

- (i) English pre-nominal AP's and participles must end in their head:⁶

(5) Some of them can contain parasitic gaps: *the papers he read without sending on to John*. An analysis of these gaps, which involves an operator in subject position but not a separate COMP, is given in Emonds (1985 section 2.5).

(6) Borer (1990) claims not only that the pre-head participles contrasted in (15) are AP's, but that their heads are A's; she reasons that if these heads are not A's, "the categorial component has to be complicated in the way Emonds suggests" (as in this paper, available to her prior to publication).

If Borer is right about pre-nominal AP's (i.e., *conversing* in (15) is a lexical adjective), the framework of the present study is unaffected; such forms are simply derived adjectives rather than present participles, and then

- (15) A few very unhappy (*about the exams) students were in the lobby.
A few quietly conversing (*about the exams) students were in the lobby.
- (ii) AP's and participles are incompatible with cleft focus position:
- (16) *It was guilty about the exams that the students felt.
*It was talking about the exams that the students finished.

As indicated to me by a reviewer, this argument is strengthened by the observation that in dialects of English in which AP *may* appear in the focus position of a cleft, present participle phrases may also appear there. In some varieties of Irish English, examples like (17 a-b) are grammatical. In these dialects, (17 c-d) are also grammatical:

- (17) a. It's cold and wet we are.
b. It's too full of spite they are.
c. Is it going home you are already?
d. It is trying to milk the poor you are?

If the phrases projected from present participles are simply VP, there is no explanation for this correlation.

(iii) Present participles, which indicate actions and not states, can be complements to the Spanish verb *estar* 'be', which is compatible only with those AP's which indicate non-inherent states.

Thus, the best approximate generalization about present participles is *not*, as in Emonds (1985: ch. 2), that they are VP's which are not immediately dominated by NP or by S. It is rather that their maximal projections have the external distribution of AP's, while inside the maximal projection, the participle selects complements like a verb.⁷ Thus, we arrive at a preliminary statement for participles (18), analogous to the one for gerunds (12).

- (18) *ing*, [+N], +V _____, A:V +[ing] selects like V inside its maximal projection, but its maximal projection is syntactically an AP.

can not be used to further confirm that participles have the syntactic distribution of AP. However, since I contest some of her empirical paradigms and argumentation, I continue to maintain that pre-modification by SPEC(A)=*very, rather, how, as, more, less, too*, etc. is necessary and sufficient for A status of V+*ing*, though, as Borer points out, it is only a sufficient condition for V+*en* (**very unoccupied*).

In any case, the present categorial component is not more complicated than Borer's; it differs rather in that my definition of head of a phrase (35) requires that the head not be entirely empty (neither co-indexed with another head nor associated with a morpheme.)

(7) We have now seen that clauses headed by V+*ing* appear structurally in NP and AP positions, but not in VP, S, or PP positions. In contrast, Milsark (1988) "would thus expect to find nominal, verbal, adjectival, and even prepositional 'gerundives', . . . It is the major contention of this article that essentially this state of affairs obtains in English..." (618) Yet later, he observes: "Of prepositional gerundives there is not a trace". (631) His subsequent denial that the problem exists (section 5.3) is unconvincing; I see nothing in his system that excludes, for example, **They put us crossing the street*, analogous to *They put us across the street*. Moreover, there is no natural way for him to exclude gerundives in typical VP or S positions; although his position is that present participles are "verbal gerundives", we have just surveyed the evidence that they have rather the distribution of AP. (See also my criticisms of Baker (1985) in note 20).

Before continuing, it may be appropriate to return again to the possibility of whether the behavior of a participle as in (18) can be explained by appeal to the notion of a category which is "neutralized" between A and V. The problem with such a notion is that we can perfectly well imagine a syntactic category which selects like an A inside its own maximal projection, but whose maximal projection distributes syntactically like a VP. The adjective in Japanese and Korean, which case-marks its closest complement differently than does a verb and also takes adjectival specifiers, is exactly a category of this type (Jo 1986). In external distribution, the maximal projection of A can combine with INFL (tense and mood), like an English VP. Recourse to a "neutralized category" can't explain any of these asymmetries. We could as well say, with no better success in making specific predictions, that an ordinary English verb phrase is "neutralized" between the Japanese AP and the English participial phrase. Under this curious view, which would be perfectly consistent with "neutralization", a "pure VP" would be incompatible with INFL.

3. A Generalized and Autonomous Lexical Entry for *ing*

The similarity between the quasi-formalizations for gerundive and participial *ing*, (12) and (18), allows us already to begin to understand a development from Middle to Modern English. The Old English participial suffix *-end-* develops in Chaucer to *-ing(e)*, for derived adjectives and participles. The Old English derived nominal suffix *-ung-* is also represented as *-ing(e)* in Chaucer's Middle English (late fourteenth century). In Emonds (1971), I show that Chaucer apparently does not have a native gerund, a view recently reinforced by the more detailed study of Donner (1986). Thus, Chaucer's English represents *ing(e)* as follows:

- (19) *ing(e)*, [+N], +V _____, $\left. \begin{array}{l} \text{N: V} = +\text{ACTIVITY} \\ \text{A: V} = +\text{PSYCHOLOGICAL} \\ \text{A: V} + [\text{ing}] \text{ selects like V inside its maximal} \\ \text{projection, but its maximal} \\ \text{projection is syntactically a } [+N]\text{-} \\ \text{phrase.} \end{array} \right\}$

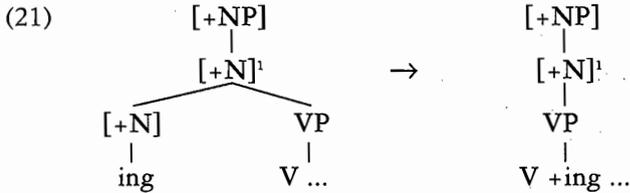
Even before formalizing the property in the third part of (19), it is easy to see why the falling together of OE *ung* and *end* in Chaucer's time led to a further development, namely, a generalization. The symbol A (that is [+V]; see note three) in the third line of (19) was eliminated, giving rise to the NP gerund in Modern English; e.g., Spenser (late sixteenth century) has a fully developed gerund. No explanation of the introduction of the NP gerund in Modern English could be simpler.

Unlike the English *-ing*, the Spanish participial suffix *-ndo* on verbs, whose lexical entry is (20), does not double as a derived nominal affix.

- (20) *ndo*, A, +V _____, V +[ndo] selects like V inside its maximal projection, but is syntactically an AP.

Exactly as expected, given the above reasoning, there is no pressure on the Spanish participle to develop a gerundive usage. This verbal noun phrase in Spanish is expressed rather by a form of the infinitive (*el* +V) (cf. Plann 1981).

Let us now formalize the lexical specification "selects like V inside its maximal projection, but its maximal projection is syntactically a [+N]-phrase". One possibility is to derive participles and gerunds transformationally, as in (21).



This approach fails to answer the second question in (14); it necessitates an *ad hoc* extension of affix movement beyond the well-established linking of I and V, and, worse, it allows neither for the unification of the syntactic and derivational morphology uses of *ing*, nor for the explanation of the historical development of the English gerund based on this unification.⁸

Another problem with (21) concerns a general property of gerunds and participles that I have not previously brought out. Not only does the head *V+ing* of these constructions select complements and specifiers inside its maximal projection like a V, it also *is lexically selected by exterior heads like a V*, and not like an NP with a lexical N, an AP with a lexical A, or an S. That is, when the maximal projection of *V+ing* is in complement position and subject to lexical selection by a governing Y^0 , it does not appear automatically as a possible complement to all (and only) the Y^0 's which are subcategorized for NP's or AP's.

For example, intransitive verbs of temporal aspect and transitive perception verbs take present participle complements, but not necessarily AP's.

- (22) John {kept, resumed, ceased} {criticizing me, *mad at Bill}.
 John heard Mary {scolding Sam, *mad at Sam}.

Similarly, verbs which take AP's do not necessarily take participles:

- (23) John {felt, looked, became} {sick, *taking medicine}.

A parallel distinction can be noted for NP-gerunds in object position.

- (24) Mary {believed, repeated} {my account, the instructions, *visiting Canada}.⁹

Thus, the distributional characteristics of gerunds and participles, roughly expressed in (12) and (18), can be rendered more adequately as follows:

- (25) With respect to deep structure lexical selection, participles and gerunds select and are selected like V's.

(8) The approach of Reuland (1983), who derives *ing* from INFL, fails on the last two counts, but more seriously, provides no explanation for the NP and AP distributions of gerunds and participles, respectively, except through appeals to "neutralization".

(9) It may be that all verbs which take NP-gerund objects can also take regular NP objects with lexical head N's.

- (26) With respect to deep structure and transformational syntactic principles, participles act like AP's and gerunds act like NP's.

The syntactic principles referred to include the base composition rules of the bar notation, the requirement that V's and A's must have subject NP's (Chomsky's Extended Projection Principle), the definition of subject, structure-preservation or some counterpart, case theory, binding theory, c-command, and word order parameters.

Given that a participle is now seen to be truly an AP as far as syntax is concerned, we can rewrite the Middle English (19) as (27).

$$(27) \text{ } \textit{ing}(e), [+N], +V______, \left. \begin{array}{l} \text{N: } V = +\text{ACTIVITY} \\ \text{A: } V = +\text{PSYCHOLOGICAL} \\ \text{A: } V [+ing] \text{ selects like a head of a VP} \end{array} \right\}$$

It is hardly surprising that lexical selection should be sensitive to morpheme categories such as V (25), and that syntax should be sensitive to phrasal labels (26). The lexicon is, after all, the repository of properties of morphemes (not of phrases), and syntax has largely been elaborated on the basis of the properties and distribution of phrases. (25) and (26) are thus merely reflections of a more general type of autonomy between syntax and the lexicon; the lexicon expresses relations between categories of morphemes, and the syntax expresses relations between phrases and other categories (phrasal or non-phrasal).

To better reflect the centrality of morpheme categories (in contrast to phrasal categories) in lexical selection, I now replace subcategorization frames such as +____NP and +____PP with +____N and +____P. The contextual feature +____X requires the selection of the largest phrase of which X is the head. For extensive justification of this move, see Baltin (1989).¹⁰

The feature +____V now specifies deep structure selection of a phrase whose head, or at least whose selectionally dominant element, is a V. Since the principles of syntax I use here do not treat the VP as maximal, the feature +____V in fact requires some other maximal projection, at first glance S(=V³), which accommodates all the head properties of V. What I wish to show, however, is that the principles of syntax and θ -role assignment can conspire with inflectional morphology to produce situations in which a "non-head" V of Y^{max} can act as the selectionally-dominant (head-like) member of Y^{max}. In particular, an AP or NP can in fact contain such non-head selectionally dominant V⁰.¹¹

In order to represent this seemingly incongruous dichotomy, I turn to a proposal made in Emonds (1985: ch. 5) for introducing inflectional morphology. In contrast to open class items inserted at deep structure, the morphemes of inflectional morphology, among which participial and gerundive *ing* certainly belong, are introduced

(10) Writing the selected category to the right of the blank (Y,+____X) requires selecting a phrase as a complement to Y, whereas Y,+X____ indicates selection of an X⁰ underneath Y⁰. Alternatively, we could define Y,+____X and Y,+X____ as directly representing left-to-right order, with a general word order parameter of English determining that all and only the complements to the right of a head Y are maximal in deep structure.

(11) There is no question here of two different derivational "levels", since semantic (lexical) selectional properties and various syntactic principles hold at the same level, deep structure.

into syntactic contexts defined at s-structure (or subsequent to s-structure). In the cases considered there, the inflectional morphemes (e.g., the finite tense endings and the adjectival comparison endings) are inserted under categories positioned by virtue of transformational movements such as "affix movement". However, there is no reason to exclude such surface structure insertion of inflectional morphemes into base positions of categories. In fact, as will now be explained, surface insertion of a head X^0 into a base configuration $[_X V^0 - X^0]$ will have just the "incongruous effect" of making V^0 selectionally dominant, the puzzling factor in (12), (18), and (19).

I thus propose to formally express the Middle English (19) by (28). By the historical generalization which introduces the NP-gerund, (28) becomes the Modern English (29).

$$(28) \text{ } ing(e), [+N], +V \text{ } ______, \left\{ \begin{array}{l} N: V = +ACTIVITY; \text{ d-structure insertion} \\ A: V = +PSYCHOLOGICAL; \text{ d-structure insertion} \\ A: \text{ s-structure insertion} \end{array} \right\}$$

$$(29) \text{ } ing, [+N], +V \text{ } ______, \left\{ \begin{array}{l} N: V = +ACTIVITY; \text{ d-structure insertion} \\ A: V = +PSYCHOLOGICAL; \text{ d-structure insertion} \\ \text{ s-structure insertion} \end{array} \right\}$$

A final simplification is possible. In this model utilizing both deep and s-structure insertion, deep structure insertion is restricted to inserting elements associated with (either conditioned by or inducing) the presence of a purely semantic (non-syntactic) feature. Thus, since the two uses of *ing* as functional heads for derived nominals and derived adjectives are conditioned by the presence of semantic features (ACTIVITY, PSYCHOLOGICAL), their insertion in deep structure is fully predictable.¹² In this model, then, most of what is termed "derivational morphology" is the insertion of morphemes as deep structure N, A, and V heads, using the "right-hand head" rule within words.

Members of closed classes, therefore, can be inserted in deep or surface structures. It is to be expected that the level of insertion can be predicted from other properties; for example, a proposal that determines which closed class verbs are inserted at deep structure is contained in Emonds (1985: ch. 4), while unresolved questions remain about insertion level for various SPEC. But for bound inflectional morphemes, it can be proposed that, when no semantic features are associated with insertion, s-structure is *always* the level of insertion. Thus, (28) and (29) can be revised by means of the parenthesis notation:

$$(28) \text{ Middle English (Revised):} \\ \text{ } ing(e), [+N], +V \text{ } ______, \left\{ \begin{array}{l} N: V = +ACTIVITY \\ A: (V = +PSYCHOLOGICAL) \end{array} \right\}$$

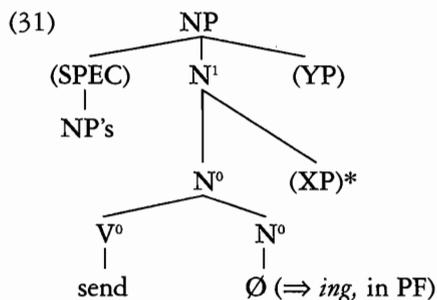
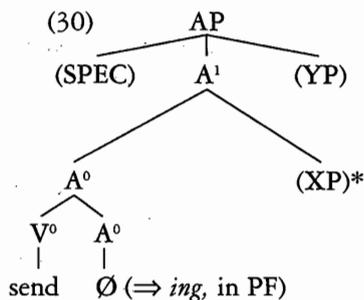
(12) Similarly, insertion of open class N, A, and V can only take place at deep structure, since the members of N, A, and V (except for small closed subsets of grammatical N, A, and V) are differentiated only by purely semantic features.

(29) Modern English (Revised):

$$ing, [+N], +V \text{ ______}, \left(\left(\begin{array}{l} N: V = +ACTIVITY \\ A: V = +PSYCHOLOGICAL \end{array} \right) \right)$$

The Revised (29) is the final simplified form of the lexical entry for *ing* in Modern English; it is completely general, and expresses, as no other competing theory, the related nature of derivational and inflectional *ing*. That is, *ing* is a morpheme added to V to yield forms of category [+N], at either possible level of lexical insertion. When the insertion is conditioned by a semantic feature, the level is deep structure.¹³ When the insertion is unconditioned, the level is s-structure.

We must now see how surface insertion of *ing* automatically predicts (25) and (26). We will be working with the representations of English present participles and NP-gerunds (30) and (31), respectively. These trees are both deep and s-structure trees (i.e., inputs to logical form). They provide the context for s-structure insertions; after the insertion of *ing*, the trees are of course "on the way" to phonological form (PF), and no longer are strictly speaking s-structures.



It is clear that such phrases will have the syntactic distribution and behavior of AP's and NP's respectively, and hence conform to (26). However, it is not obvious how, in line with (25), the "non-head" V will select complements (XP), adjuncts (YP), and specifiers in (30) and (31). And it is even less clear why a higher governing predicate lexically specified as +_____V would choose (30) or (31) instead of, say, an S whose functional head is V. Nonetheless, these properties follow immediately from plausible generalizations of some independently motivated principles of lexical selection, as will now be seen.

4. Defining the Functional Head

We first discuss how and why the V in (30) and (31) acts as an "internal head". The basis of the explanation is a revision of the "right-hand head" rule of Lieber (1980), Williams (1981), and Selkirk (1982). Following the lead of Walinska de Hackbeil (1986, ch.3), I recast Lieber's definition of head (of an immediately dominating node) so that certain Z⁰ are defined as heads of entire maximal projections.

(13) I argue in Emonds (1985: ch. 2 and 3) that "deep structure insertion" is actually insertion into the head of a given domain D at the beginning of the cycle on D. As long as insertion of all elements in D occurs during the transformational cycle on D (even at the end of this cycle), the head of D will be filled during subsequent cycles, which is all that is required for what in this study is called "deep structure insertion".

- (32) The “functional head” of W^2 is the rightmost Z^0 dominated by W^2 (and by no other maximal projection under W^2).

By (32), it is still unhelpfully the case that A rather than V is the functional head of (30). To remedy this, let us extend a prohibition on empty deep structure complements, which is motivated in part by the need to prevent “accidental violations” of subadjacency. The unrevised prohibition is as follows:

- (33) A contextual subcategorization feature + _____ X^k of a morpheme α is satisfied only by an X^k which dominates a terminal element at the level at which α is inserted, unless X^k is further stipulated as (possibly) empty by the feature in question. (Emonds 1985: 178)

The needed extension is (34):¹⁴

- (34) A subcategorization relation Z^0 , + _____ X^k of a morpheme α is satisfied only by a functional head Z^0 and a complement X^k which both dominate terminal elements after the operation inserting α , unless X^k is further stipulated as (possibly) empty by the feature in question.

Thus, in order for subcategorization to be satisfied, the selecting head category must dominate a terminal element. To be consistent with this requirement, (32) must be modified.

- (35) The “functional head” of W^2 is the rightmost *lexically filled* Z^0 dominated by W^2 (and by no other maximal projection under W^2).

We now have the desired result which is the basis for explaining (25); namely, V^0 in (30) and (31) is the functional head of AP and NP, due to the existence in English of late (s-structure) insertion of *ing* into the bar notation head position.¹⁵ This late insertion, in both Middle and Modern English, is effected by ignoring the parenthesized material in Revised (28) and (29).

Let us now discuss how deep structure lexical selection proceeds inside participles (30) and gerunds (31).

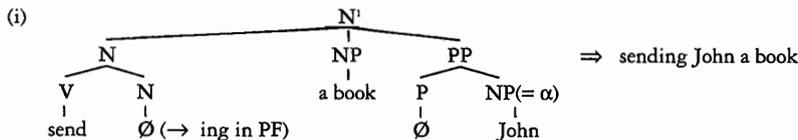
Stowell (1981) argues for a category-neutral syntactic bar notation. Following this idea, I elaborate a theory of complementation in Emonds (1985: ch. 1) in which complement category types, the XP in (30) and (31), are determined lexically by how they receive their semantic roles (“ θ -role assignment”). If the head lexical item is a V or P, what I term “direct θ -role assignment” to XP sisters of all categories is allowed; if instead the head lexical item is N or A, then a secondary mode of “indirect θ -role assignment” is induced, with the effect (details play no role in the argument here) that complement XP will always have the surface form of PP’s. Thus, the functional heads, as defined in (35), which determine the categorial types of XP in

(14) For languages which allow empty “small pro” complements (English does not), (33) and (34) have to be modified appropriately. This extension is not of concern here.

(15) In recent grammatical discussion, one hears of insertion “at a level”, as if an element (e.g., abstract case) could be simultaneously absent and present. This type of illogic is avoided here. S-structure defines the context for *ing*-insertion, but *ing*-insertion itself derives a post s-structure representation.

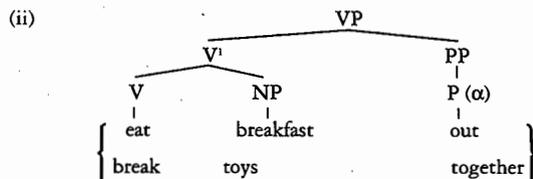
(30) and (31) are verbs, so that (30) and (31) will internally, at least as far as deep structure selection is concerned, *look like VP's*.¹⁶

(16) English participles and gerunds seem to also exhibit some "surface" VP properties; for example, they permit an indirect object NP to move toward their functional head, as in (i).



Such movement is not allowed in derived nominals with filled bar notation heads: **the sending John of a book*.

This contrast can be explained without mention of the dominating category N' or V' , however. In Emonds 1986, this "indirect object movement" is subsumed under a quite general language-particular local transformation, $NP-\alpha \Rightarrow \alpha-NP$. Local transformations cannot apply to sequences of terms where neither minimally c -commands the other (Emonds 1976, ch. 6):



I eat breakfast out.

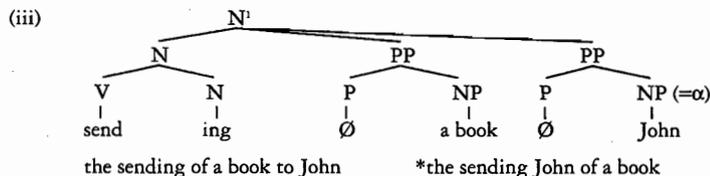
⇒ *I eat out breakfast.

Children tend to break toys together.

⇒ *Children tend to break together toys.

In (ii), neither NP nor α c -commands the other, so movement of α is not allowed. But in (i), NP c -commands α , and so indirect object movement is permitted.

If the head of X' is a deep structure lexical N or A, as in a derived nominal, indirect θ -role assignment insures the presence of an intervening PP over *a book* in the counterpart to (i). Thus, the minimal c -command condition is violated in (iii), and indirect object movement is prevented:



It has sometimes been claimed that "particle movement" affects derived nominals. However, by a general ordering restriction, intransitive P precedes transitive P, whatever the category of the head:

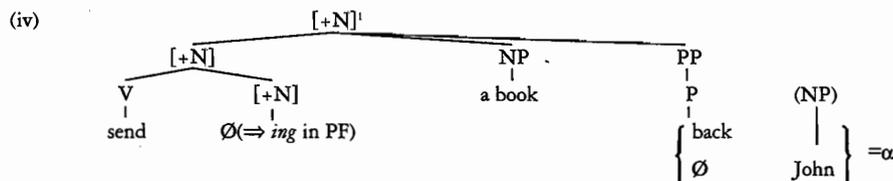
Mary talked {back to John/*to John back} yesterday.

We moved {out to St. Louis/*to St. Louis out} last year.

The sending {back of a book/*of a book back} is impolite.

Thus, derived nominals (where the c -command condition on local movements is not met) are irrelevant to any discussion of particle movement.

If particles appear in a gerund or participle, NP minimally c -commands α , so NP- α inversion is allowed (*sending back a book; sending John a book*).



With the proviso that a *functional* head (whether or not immediately dominated by W^1) governs the daughters of W^1 , it also follows that the V in (30) and (31) can assign abstract accusative case when $XP=NP$. The Arabic *masdar* (Fassi Fehri 1986), essentially a verb-initial gerund, has the expected property of being able to assign morphological accusative case to its direct object.¹⁷

We now turn our attention to what is outside the first projection in (30) and (31). The interplay of syntactic principles and lexical selection with respect to the presence of the subject NP node under SPEC makes interesting and correct predictions. We know that the English SPEC(N) may be expanded as an overt NP subject, while the SPEC(A) may not be.

(36) SPEC(N) \rightarrow NP

The definition of subject and the requirement that verbs must have subjects are stated in (37)-(38).

(37) The subject of a functional head of W^2 is the closest maximal N^i which minimally *c*-commands W^1 and is in all the same NP and S as W^1 (Emonds 1985: 76; modified to include "functional head").

(38) Extended Projection Principle. Functional heads which are V or case-marked A must have unique subjects at deep structure, s-structure, and logical form. (Emonds 1985: 134; modified to include "functional head").¹⁸

It automatically follows from (37) and (38) that the optional expansion of SPEC(N) in (36) becomes obligatory in NP-gerunds (31). This NP may of course be "understood", i.e., an empty category, but the subject of gerunds is invariably structurally present (cf. Wasow and Roeper 1972). In contrast, (37) and (38) have no noticeable effect in participles, because SPEC(A) does not permit overt NP subjects; consequently, English participles are indistinguishable from verb phrases as far as their relations to subjects go. Thus, principles of syntax correctly predict the existence of separate subjects for gerunds (31) and no separate subjects for participles (30).

It remains to discuss the selection of specifiers and adjuncts in (30) and (31). Since lexical selection is in general a relation between pairs of morpheme categories, it is natural to assume that the lexical classes SPEC(N) and SPEC(A), as well as numerals, are licensed by the category of the selectionally dominant functional head of a phrase. Similarly, since there are well-known selectional restrictions between nouns and modifying adjectives, it is plausible that in the absence of a functional head N, no adject-

(17) The behavior of gerunds and participles in Celtic also confirms the proposal of Emonds (1985) that the genitive is assigned by SPEC(N) rather than by N, and, like any other case, under government. Since the details would be tedious (I would have to repeat the treatment of the genitive, the exact definition of government, the possibility of multiple governors, etc.), I limit myself to observing that the definitions of government and case-assignment in Emonds (1985, section 1.8) predict that a genitive case (assignable by SPEC) should be optionally available for XP in (30) and (31). This seems to be exactly what occurs in Welsh (Harlow 1981, and Sproat 1985) and Irish (McCloskey and Chung 1987).

(18) I make no effort to reconcile my proposals with "small clause" analyses of English AP's. Cf. Williams (1983) and Emonds (1985: ch. 2) for critiques of such analyses.

tive can be chosen. In participles and gerunds, the functional head (at deep structure—the level of lexical insertion) is a V, and so only modifiers which are SPEC(V) can be chosen for the SPEC position (perhaps certain adverbs such as *already*, *yet*, *never*, *always*, etc.).¹⁹

The only syntactic restriction on the form of adjuncts is that, across categories of the head, the YP is (30) or (31) must be AP, PP or S. There are cases where adjuncts appear to be NP's: the "bare adverbial NP's" of Larson 1985 and the "measure phrases" of Jackendoff 1977. I argue that the former have PP structure, with empty P, in Emonds 1987. The latter (*John read the book three times*) seem more like extraposed specifiers than like adjuncts; as pointed out by Jackendoff, English measure phrases are in SPEC(X) for X=V. The general restriction against truly bare NP adjuncts I imagine is due to the lack of a potential case assigner; here I agree with Larson. In fact, by the case theory developed in Emonds (1985, ch. 1), predicate attribute (nominative) NP adjuncts *are* licensed, but they are not interpreted adverbially: *the man walked out of the room a better person*.

The particular kinds of adjunct allowed are determined by particular choices of SPEC; this is most evident in the AP system, where each specifier imposes a limitation on adjunct types (*so* with a *that*-clause; *more/less* with a *than*-clause; *as* with an *as*-clause; *too/enough* with an infinitive; *very* with no clause, etc.). Significantly, possessive NP's in SPEC(N) are incompatible with restrictive relative clauses (*John's friend that I saw*); since possessive NP's are always structurally present in NP-gerunds, this suffices to correctly exclude relative clause modifiers in this construction. In any case, the choice of adjuncts is dependent on the choice of SPEC, and the latter in turn depends on the category of the functional head. It follows that gerunds and participles will contain only adjunct phrases that are compatible with the functional head V, and none that are selected by various lexical choices for SPEC(N) or SPEC(A).

In summary, the definition of "functional head" in (35) has allowed us to construct a thorough account of how and why NP gerunds and present participles act internally like VP's. The simple fact that the bar notation heads N or A remain unfilled through s-structure provides the key for explaining the "dual nature" of these constituents.²⁰

(19) In derived nominals and adjectives, the functional head throughout the syntactic derivation is the N or A *ing*, so this filled head, like any other N or A, permits selection of SPEC(N) or SPEC(A), and appropriate corresponding adjunct phrases.

(20) My analysis of English gerunds might seem akin to Baker's (1984), who argues "that the puzzling behavior of English gerunds can be understood and explained in terms of an affixation that changes verbs to nouns between underlying syntactic structure and surface syntactic structure". In fact, many of his and my empirical predictions are the same, and both might be termed "syntactic" (as opposed to lexical) affixation. However, his approach contains many ad hoc moves, which we will examine.

Our two s-structures for gerunds are alike, except that his affixal head N contains a lexical item *ing* (whereas the affixal here in (31) is \emptyset , so that V is the functional s-structure head). Baker admits that this entails abandoning s-structure case-marking by governing heads, since direct objects in gerunds must then receive case from (his non-head) V. He acknowledges the difficulty in note 3: "Another possibility is that accusative Case assignment happens strictly at S-structure, and that the verb root is still visible and able to assign Case in gerunds". As he explicitly recognizes, this variant entails that the internal s-structurals of derived nominals and gerunds such as *singing*, *balancing*, *trafficking* are distinct. But all such words have an identical phonology (e.g., familiarly, no *ing* affects word stress nor softens final velars of romance origin). This uniformity is ac-

5. Lexical Selection of Non-Finite Clause Types

In the previous section, we have seen that a V whose deep structure sister is $N[\emptyset]$ or $A[\emptyset]$ satisfies the definition of "functional head of a phrase", and thus induces "VP-internal structure" inside gerunds (NP's) and participles (AP's). I have claimed that this same functional head (V) is also selected by higher predicates subcategorized as +_____V, with variations as discussed below. More precisely, general principles of grammar, and not ad hoc lexical selection for "participles", "gerunds", and "infinitives", determine when +_____V leads to choosing one or another of these complement structures.

For example, I claim that verbs such as *keep*, *avoid*, *hope* and *decide* share the subcategorization feature +_____V, even though they take, respectively, participle, gerund, infinitive, and indirect question complement structures.

- (39) a. John kept mowing the lawn.
 *John kept (when) to mow the lawn
 Participial (AP) complements do not move like NP's:
 *Mowing the lawn was kept by John.
 *It was mowing the lawn that John kept.
- b. John avoided mowing the lawn.
 *John avoided (when) to mow the lawn.
 Gerund (NP) complements move like NP's:
 Mowing the lawn was avoided by John.
 It was mowing the lawn that John avoided.

cidental in Baker's model, but here, when derived nominals and gerunds enter the phonological component after s-structure insertion, the two types of N^o nominals correctly are absolutely identical in structure.

In both Baker's scheme and mine, the functional head (governing selection) of a gerund at deep structure is a V. The difference is whether the gerund phrase is an S (Baker, following a proposal of Stowell 1981) or an NP. Here, all indications point to difficulties for Baker. For example, an S but not an NP may stand alone as the root of a tree and express an independent (Fregean) judgment; a gerund certainly patterns as NP and not as S in this regard. Another problem for Baker is whether the gerundive S is embedded in an S or not; if so, why is its COMP always obligatorily empty: if not, how does a "bare S" come to require only this INFL, and moreover not appear in other non-NP positions (e.g., as a complement to an N or an A)? In my analysis, no such questions arise, since gerunds are not S's at any level and are not expected to alternate with S's.

In my view, general principles beyond the item-specific selections imposed by lexical choices govern the distribution of phrases at deep structure. These principles are outlined in Emonds (1985: chs. 1 and 2). One of them is that only NP's can appear in subject positions at deep structure. From this principle, we correctly expect that gerunds will freely appear as subjects; Baker's analysis also leaves this fact unexplained. (Note that s-structure subjects are *not* limited to NP's.)

Finally, besides these inadequacies in Baker's proposed deep and s-structures, his utilization of "affix movement" to place *ing* has special and unmotivated formal effects. When his *ing* moves from INFL to V, it changes S into NP, because *ing* is "nominal". Yet, movement of other INFL (the Tense endings) does not change phrasal categories, even though they are, if anything *more* nominal than *ing*, since they but not *ing* exhibit person and number variation. As Baker acknowledges, such category changing prior to s-structure also violates Chomsky's (1981) Projection Principle, but he contents himself here with citing other analyses of a similar sort, without revision to overcome the difficulty.

Milsark (1988) utilizes Baker's analysis of gerunds, but replaces *ing* lowering with raising of V to INFL. But this leaves the "change" of deep structure S to surface NP just as mysterious, since *ing* has no categorial feature. Why should V to INFL (=ing) create an NP, while *be* or of anything else to INFL *not* induce such a change?

- c. *John {hoped/decided} mowing the lawn.
 John {hoped/decided} to mow the lawn.
 *John hoped when to mow the lawn.
 John decided when to mow the lawn.

For a full discussion of tests which differentiate participles (39a) from gerunds (39b), see Milsark (1972), Emonds (1973), and Pullum (1974).

To describe such distributions, I utilize the theory of subcategorization and θ -role assignment developed in Emonds (1985: ch. 1). The central principles are the uncontroversial condition for θ -role assignment (40) and an extension (41). Z is a functional head subcategorized for a complement phrase α which Z may also assign a θ -role to.

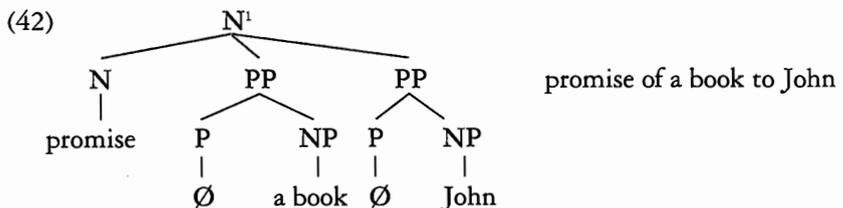
(40) Direct θ -role Assignment. If $Z = V$ or P , then Z and α may be sisters. A given lexical Z may assign only one θ -role directly.

(41) Indirect θ -role Assignment. If principles of syntax block (40), then α must dominate the only lexical material under a sister of Z.

Unless otherwise licensed by (40), all phrasal sisters to an X^0 or X^1 in the bar notation are of the form PP or \bar{S} (cf. Emonds 1985: ch. 7, for arguments that S is a subcase of PP).

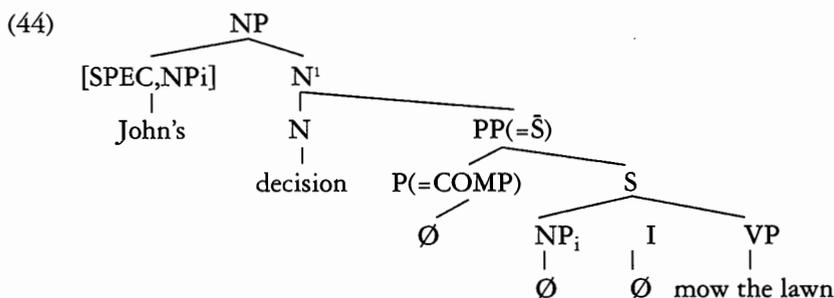
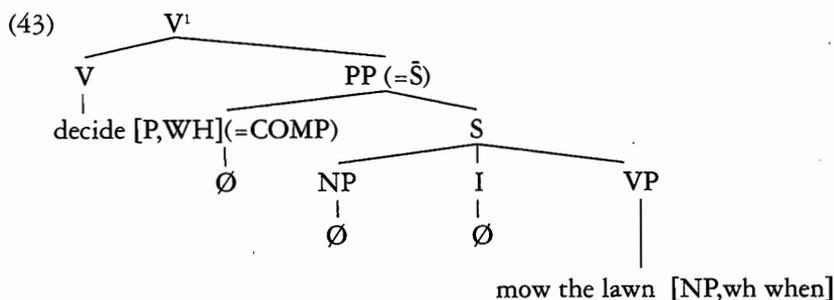
In a phrasal subcategorization frame + _____ α , α can just be an X^0 (in our new notation), or, as in Chomsky (1965), α may consist of a grammatical formative category linked to a phrase; e.g., $\alpha = of^{\wedge}N$ with the verb *think*. (For typological convenience, I introduce a caret \wedge in subcategorization features for linking grammatical formatives and phrases to replace the arch " \circ " of Chomsky (1965) and Emonds (1985).

Some deep structures which exemplify indirect θ -role assignment are exemplified in (42)-(44). In the first case, a verb and its associated derived nominal (*promise*) share the subcategorization + _____ $NP^{\wedge}NP$ (+ _____ $N^{\wedge}N$ in our newer notation), but the prohibition on direct θ -role assignment by N and A makes indirect θ -role assignment in the deep structure derived nominal (42) the only option. That is, the only lexical material under sisters of N must be under NP's, so the P's in (42) are necessarily empty when *promise* is inserted.



In (43), the deep structure for *decide when to mow the lawn* results from the frame for *decide* + _____ $(WH)^{\wedge}V$; the V determines that *decide* takes a complement phrase with a V head (a VP) which, prior to WH-movement, dominates the only lexical material under a sister (S) of *decide*. The same frame for the related derived nominal

decision gives rise to (44). Like many other grammatical morphemes, *to* under I is inserted only after s-structure.²¹



The Choice between Participles and Gerunds. According to (41), direct θ -role assignment has priority over indirect θ -role assignment. We can factor this stipulation out of (41) and generalize it as follows:

- (45) Minimal Structure: Co-occurrence restrictions are to be satisfied by deep structure trees which contain the fewest number of phrasal nodes consistent with the principles of syntax.

Hence, verbs can not take the “unnecessary” indirect θ -role assignment which would parallel (42):

- (46) *Bill promised of a book to John.

Minimal Structure can be taken as a special case of a Principle of Economy of Representation proposed in Chomsky (this volume:): “The analogous principle for representations would stipulate that, just as there can be no superfluous steps in derivations, so there can be no superfluous symbols in representations”.

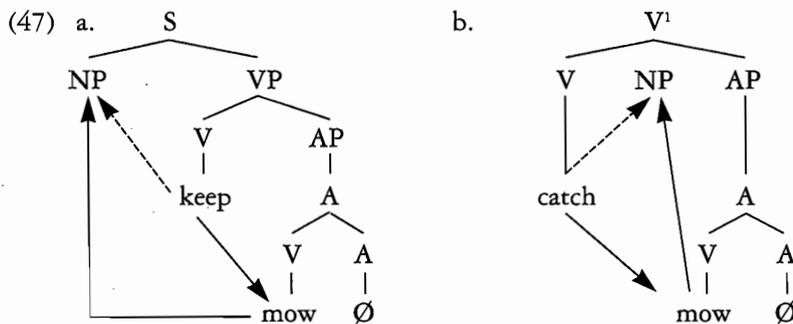
Let us now turn to the selection of non-finite complements. The definition of functional head (35), the two principles of θ -role assignment, and Minimal Structure together now interact to make a series of correct predictions about the distribution of non-finite clausal structures in English. Since English surface insertion of *ing* de facto licenses [V-Ø] at s-structure, the node which is both maximal with respect to

(21) The detailed explication of licensing conditions for zeroed infinitives after *to* provided in Lobeck (1986) utilizes this analysis of *to*, and thus provides independent support for it.

V being its head and minimal in the sense of (45) is in fact AP. An NP with a functional head V (a gerund) would contain an extra subject NP phrase, and a VP, not being maximal, would entail the presence of both an S and a subject NP phrase. Thus, the "preferred" non-finite structure, other principles of syntax permitting, will be a participle (AP).

In non-subcategorized positions (e.g., those of restrictive relative and of adverbial clauses), the non-finite English structures without overt subject NP's are in fact participles, as predicted. In subcategorized positions, the frame + ___V of temporal aspect verbs (e.g., *keep*) and + ___N^V of perception verbs (e.g., *catch*) are also satisfied by participles (cf. 39a).²²

Nonetheless, it is only by virtue of an exceptional lexical property that the two classes of verbs just mentioned do not run afoul of a principle of syntax. Temporal aspect verbs assign no independent θ -role to their subject, nor do perception verbs to their object. In other words, *keep* and *catch* assign θ -roles following the downward solid arrows in (47a-b) respectively, but not following the broken arrows. The θ -roles assigned by the embedded verbs to their NP subjects, as characterized in (37), are indicated by upward solid arrows.



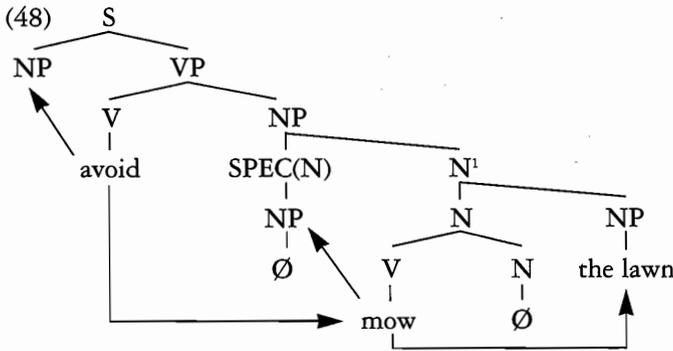
If θ -roles were assigned along the broken arrows in (47), this would violate a principle of syntax, the " θ -criterion", which under certain circumstances prevents a single NP from being assigned two θ -roles.²³

Most verbs with the feature + ___V do in fact assign θ -roles along the broken lines in (47); e.g., *avoid*, *attempt*, *complete*, *describe*, *explain*, etc. In these cases, the principle of Minimal Structure (45) allows a phrasal structure to be generated which contains an additional NP that permits the θ -criterion to be respected, with θ -roles assigned as in (48).

(22) Milsark (1972) establishes that the domain of the "double *ing* filter" does not apply across an NP boundary, which seems like a plausible restriction on all such filters. However, Milsark 1988 recasts this filter to apply to "any sentence containing contiguous *-ing*-affixed words", which PRO can interrupt. I don't believe this succeeds, given examples such as *his amazing findings*, etc.

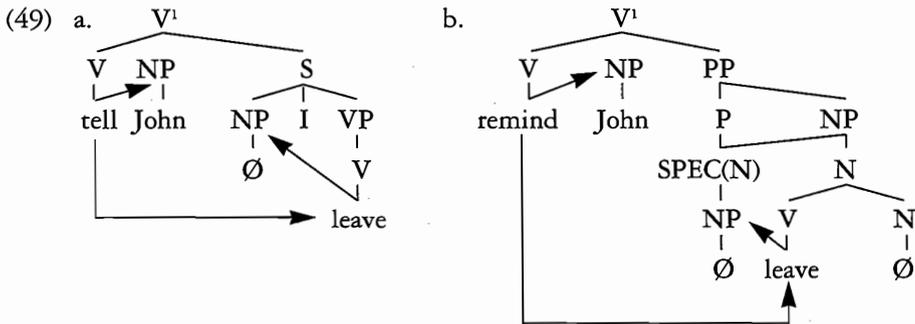
(23) In Emonds (1985, ch. 2), arguments are presented that the θ -Criterion of Chomsky (1981) must be modified as follows, where X^0 and Y^0 are " θ -related" if and only if one assigns a θ -role to the maximal projection of the other.

Revised θ -Criterion. θ -relatedness is anti-transitive.



After *ing* is inserted according to (29) after s-structure, NP-gerunds as in (39b) correctly result.

If a transitive verb, e.g., *tell*, *remind*, subcategorized as +___N^V assigns θ -roles to both complements, the θ -criterion could be respected via either (49a) or (49b).



By inspection, we see that Minimal Structure allows either choice, if single bar projections are ignored. This seems correct, given possibilities as in (50).²⁴

(50) They {reminded/told} John {to leave/of leaving}.

We have seen that the minimal structure induced by +___V in English (thanks to post s-structure *ing*) is preferably a participial AP and then, *pace* the Revised θ -Criterion, an NP-gerund. However, since gerunds are NP's, they cannot immediately follow direct objects, nor can they be sisters to N or A. When a second complement to a V (or a first complement to N or A) is specified by +___V, and when the governing head assigns all its complements θ -roles, then +___V leads either to an NP-gerund embedded in a PP structure, as in (51), or to infinitives of obligatory control, as in (52).

- (51) Bill accused John of working slowly.
- Bill limited John to working nights.
- His preference for eating fish is understandable.

(24) By Indirect θ -role Assignment, where α =VP in (49a) and NP in (49b), the lower NP in (49a) and the P in (49b) must be empty in deep structure. As discussed in detail in Emonds (1985: ch. 2), "obligatory control" in infinitives is thus predicted by independently justified principles of θ -role assignment. Of course, as in competing accounts, the antecedent of the controlled NP must be determined by the binding theory or a special control rule.

- (52) Bill forced John to work fast.
 Bill urged John to work nights.
 His tendency to eat fish is understandable.

Why Infinitives and not Gerunds? Certain verbs do not accept a gerund or a participle as a first complement, but at the same time are not subcategorized for a sentence (they are not listed as +____I). Such verbs take infinitives with obligatorily understood subjects (obligatory control), sometimes with the added possibility for fronted WH-constituents.

- (53) John hoped (*when) {to mow/*mowing} the lawn.
 (54) John will decide (when) {to mow/*mowing} the lawn.

Unless an indirect question is involved, some additional factor beyond +____V must force a verb like *hope* or *decide* to take an S, rather than appear as in (50). As discussed in more detail in (Emonds 1985, ch. 2), I claim that the complements of such verbs express an "unrealized" or future/potential modality, which is syntactically translated as the obligatory presence of the category modal M on the head I of S. Thus, verbs like *hope* and *decide* have the subcategorization feature +____M^V, and verbs which take an indirect question appear with the similar lexical frame +____WH^V.

Consider now a verb like *hope*, which does not accept an indirect question. In the system used here, either the feature +____M^V or the feature +____GOAL^V (where GOAL characterizes the complementizer/preposition *for*) will induce an S complement with obligatory control. In order for M or GOAL to be present at deep structure, the sister *a* of *hope* which is mentioned in Indirect θ -role Assignment (41) must include S or \bar{S} . Either way, VP is the largest complement phrase for which *hope* is subcategorized (i.e., of which V is the head), so that at deep structure, all of COMP, its subject NP, and its I must be empty, by (41). The surface realization of unmarked COMP with an empty subject is \emptyset , and that of empty I is *to* (cf. Emonds 1985: ch. 7, and Lobeck 1986, respectively). In this manner, infinitives of obligatory control can arise from the frame +____F^V, without our invoking any feature specific to infinitives; MODAL and GOAL are features which play a central role in any analysis of finite clauses and indirect object PP's.

It is a simple matter to specify other occurring subcategorizations of English verbs. For example, a range of verbs like *arrange*, *beg*, *pray*, *watch*, *wait*, etc. take either *for* +NP, *for* +S, or an infinitive of obligatory control.

- (55) John was waiting for the train.
 John was waiting for the train to leave.
 John was waiting to leave.

A verb like *wait* can be assigned the unified frame +____([P, GOAL]). The subject of an S complement to P(=COMP) will be lexical or empty, giving rise to a *for-to* clause or a bare infinitive.

A verb like *decide* does not accept an *ing* complement clause (39c). It might be listed as +____(WH)^M^V. However, this frame would employ two pre-head fea-

tures. The same complement types can be generated via the frame $+ ___\{WH, GOAL\}^V$. In fact, since the only complementizers (P) which are even compatible with an empty I (an infinitive) are WH (*whether*) and GOAL, the desired frame for *decide* might reduce to $+ ___\{P\}^V$. Indirect θ -role Assignment (41) will still insure that the subject NP is empty (obligatorily controlled).

If $+ ___\{F\}^V$ (F=GOAL, WH, MODAL) are possible subcategorizations, then the features $+ ___\{F\}^V$ should also exist. The value of F=M or GOAL is realized by several temporal aspect verbs whose complements are optionally realized as participles or as infinitives of "modal force": *begin, start, continue* (but not *finish* or *resume*). Such distributions can be elegantly captured by the feature $+ ___\{M\}^V$. Without M, Minimal Structure (45) will favor a participial (AP) complement structure for these verbs, made possible by the English post s-structure *ing* insertion. With M, an S-complement containing [I, M] must be generated, yielding infinitives.

When the same frames $+ ___\{M\}^V$ or $+ ___\{GOAL\}^V$ occur with a non-aspectual verb, the choice of V without M leads, as expected, to an NP gerund complement. Consequently, there can be verbs whose complements are either NP-gerunds, without modal force, or infinitives, with modal force.

- (56) John has tried to climb the mountain.
 John has tried climbing the mountain.

The fact that *try* can also occur with NP or *for* +NP suggests that its most general frame is $+ ___\{GOAL\}^{\{N, V\}}$, which correctly provides four different options.

Another example of the insertion frame $+ ___\{V\}$ optionally accompanied by an introductory feature is provided by $+ ___\{WH\}^V$. This feature gives rise to a type of complement paradigm which is not uncommon in English, but which has not previously been naturally expressible in terms of even ad hoc features for gerunds and infinitives.

- (57) The lawyer discussed $\left\{ \begin{array}{l} \text{buying some clothes in Rome.} \\ \text{*what clothes buying in Rome.} \\ \text{*to buy some clothes in Rome.} \\ \text{what clothes to buy in Rome.} \end{array} \right\}$

- (58) I don't recall $\left\{ \begin{array}{l} \text{using these dishes for lunch.} \\ \text{*which dishes using for lunch.} \\ \text{*to use these dishes for lunch.} \\ \text{which dishes to use for lunch.} \end{array} \right\}$

That is, our system expresses very naturally the "changeover" from gerundive to infinitival structure with those factive verbs which can take indirect questions. No competing system which differentiates infinitives and *ing* forms on the basis of features internal to V, rather than on the basis of explanatory principles, can make this non-stipulative prediction.

To summarize, all classes of clausal complements not selected by $+ ___\{I\}$ can be selected by $+ ___\{+F\}^V$, where F is WH, GOAL, or M. When F is present, some type of infinitive of obligatory control results. For gerunds and participles, F is not

present, the choice between the two being determined by Minimal Structure and the Revised θ -Criterion. The features N or NP are not involved in choosing gerunds; lexical selection of participles and gerunds results entirely from their functional head being V, and not from their empty structural head A/N. Thus, all "verbal" properties of participles and gerunds in fact result from deep structure lexical selection, in which verbs are both the governing and governed verbal head. In other respects, these two constructions are unambiguously AP and NP (respectively) throughout their syntactic derivations.

6. Conclusions

The crucial step in this unified analysis of derived nominals, derived adjectives, participles and gerunds is that the single "substantiving" English verbal affix *ing*, associated with one general lexical entry (29), is inserted at both the deep and surface levels. When the insertion is "semantically conditioned", it occurs at deep structure, and selection proceeds as with nouns and adjectives. On the other hand, the "unconditioned" insertion of *ing* occurs, as predicted, at s-structure, giving rise to the well-known "verbal properties" of gerunds and participles, but in no way neutralizing their syntactic status as NP's and AP's.

The "verbal properties" of gerunds and participles are in fact nothing other than what results from their having functional V heads at deep structure. Entirely general principles of θ -role assignment and a newly isolated principle of "Minimal Structure" (45) determine when the feature +____V gives rise to participles, gerunds, and infinitives.

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Appendix

My analysis of English gerunds might be taken as related to that of Baker (1984), who argues "that the puzzling behavior of English gerunds can be understood and explained in terms of an affixation that changes verbs to nouns between underlying syntactic structure and surface syntactic structure". In fact, many of the empirical predictions of his and my analyses are the same, and the term "syntactic affixation" (as opposed to lexical affixation) is a not inappropriate moniker for either approach. However, I believe that descriptive adequacy under his approach leads to several theoretical ad hoc queries, which we will now examine.

At s-structure, our two structures for gerunds are alike, except that his affixal head N corresponding to (31) contains a lexical item *ing*. (The affixal head in my (31) is \emptyset , so that the V is the functional head at s-structure.) Baker admits that this entails

abandoning s-structure case-marking by governing heads, since if XP in (31) is an NP, it must receive case from (his non-head) V, not from the N *ing*.

Baker acknowledges the difficulty in his note 3: "Another possibility is that accusative Case assignment happens strictly at S-structure, and that the verb root is still visible and able to assign Case in gerunds". As explicitly recognized by Baker, this variant entails that the internal s-structure of derived nominals such as *singing*, *balancing*, *trafficking* is distinct from the s-structure representation of the same words taken as gerunds. But all such words, whatever intuitions we may have about their internal identity, have an identical phonology, whether they are derived nominals or gerunds (e.g., familiarly, no *ing* affects word stress or softens final velars of Romance origin). Where can this generalization be expressed in Baker's model? His phonological component, including phonology at "level 2", must apply to two different kinds of structures, his lexical items and his surface affixations. Even the vague solution that "it's all in the lexicon" is unavailable to him.

In the model followed here, it is exactly when derived nominals and gerunds enter the phonological component ("PF"), after s-structure lexical insertion, that the two types of nominals are, within N° , absolutely identical.

In both Baker's scheme and mine, the functional head of a gerund at deep structure, that is, the element that governs selection of gerund-internal material, is a V. The difference is whether the deep structure phrase is an S (Baker) or an NP. Whether or not this choice gives rise to empirical differences depends on what fuller theory Baker's proposal is embedded in. If he claims that deep structure well-formedness is nothing more than lexical selection, then different (but still telling) predictions will be made only with respect to external distribution of the gerund, since in my theory the lexical selector within the gerund is also V.

Even here, all indications point to difficulties for Baker's alternative. For example, an S but not an NP may stand alone as the root of a tree and express an independent (Fregean) judgment; a gerund certainly patterns as NP and not as S in this regard. Another problem is that Baker makes no mention of whether the gerundive S is embedded in an \bar{S} or not; if so, why is its COMP always obligatorily empty? if not, how does a "bare S" come to require only this INFL, and moreover not appear in other non-NP positions (e.g., as a complement to an N or an A)? In the analysis presented here, no such questions arise, since gerunds are not S's at any level and are not expected to alternate with S's.

In my view, very general principles beyond the item-specific selections imposed by lexical choices govern the distribution of phrases at deep structure. These principles are outlined in Emonds (1985, chs. 1 and 2). One of them is that only NP's can appear in subject positions at deep structure. From this principle, we correctly expect that gerunds will freely appear as subjects; Baker's analysis leaves this fact unexplained. Of course, he can choose to embed this analysis in a theory where this fact follows from Case Theory, but it is exactly this use of Case Theory that I claim to show is entirely inadequate in ch. 1 of the work cited.

Finally, besides these inadequacies in Baker's proposed deep and s-structures, his utilization of "affix movement" to place *ing* has special and unmotivated formal effects. When his INFL *ing* moves from INFL to V, it changes S into NP, because *ing*

is "nominal". Yet, movement of other INFL (the Tense endings) does not change categories, even though they are, if anything *more* nominal than *ing*, since they but not *ing* exhibit person and number variation. As Baker acknowledges, such category changing prior to s-structure also violates Chomsky's 1981 Projection Principle, but he contents himself here with citing other analyses of a similar sort, without offering a theoretical refinement to overcome the difficulty.

Another recent analysis of NP-gerunds offered in Suzuki (1988) derives them from a deep structure [_@DET [_SNP-*ing*-VP]]. He investigates in detail the various extractions, especially those of long-distance movement, allowed from both gerunds with possessive subjects and those with objective case subjects, and derives various restrictions on such movements from an interplay of his proposals and a government and binding framework slightly modified from Chomsky (1981, 1986).

Suzuki's analysis might appear quite incompatible with my present proposals, but much of the incompatibility arises from terminology he chooses on the basis of considerations that are not treated here. Thus, for him, @ is a DET-phrase ("DP"), while I retain NP. We do not, however, disagree on the need for DET to govern its phrasal sister; with Lobeck (1986), I espouse "specifier government"-government by SPEC(X) of intermediate projections of X. Neither does Suzuki deny that DET and N are universally linked in some way as the "functional" and lexical categories that "go together" in the unmarked case. Nor is the structure within DET a point of conflict. Suzuki elaborates a system wherein DET contains a potentially phrasal specifier position as well as a head (D) position: his [_{DP}(XP)D-NP] = my [_@(XP)-SPEC(N)-N^{max-1}] parallel to [_SNP-SPEC(V)-V^{max-1}]; I am comfortable with such a parallel, which slightly simplifies the abstract case theory I have elsewhere elaborated, in which both SPEC(V) and SPEC(N) assign case. Thus, I am willing to accept much of the mechanics required for Suzuki's analysis of movement restrictions in possessive gerunds.

Some other differences between him and me are harder to reconcile. His claim that @ is not a projection of N is based on the fact that some DET can appear with gerunds, especially in earlier stages of English; even today we have *I don't like this removing the grass*. My interpretation of such "mixed gerunds", to the extent that they are grammatical, is that their DET morphemes are structurally available in the SPEC of an NP, as in example (31), and need not be lexically selected by a head noun. Granted, this is not explanatory (cf. **I don't like some removing the grass*), but Suzuki can do no better (his *this* but not *some* is subcategorized for S complements). Beyond these puzzling variations described but not explained under either view, the "DP hypothesis" for gerunds is subject to many of the criticisms I presented above against Baker: why does the S after D always contain the INFL *ing*? (For Suzuki, this *ing* is *not* always +N.) Why can't *ing* freely appear in other INFL? Why are these gerund S not embedded in \bar{S} when all others are? Why can't such an S appear as a root?

Another area where Suzuki and I differ in a way that impinges upon my analysis here concerns his deriving NP-gerunds with objective case subjects from clauses whose head *ing* is -N. For me, all *ing* are crucially +N. Suzuki justifies his proposal on the basis that the subjects of such "accusative gerunds" can be governed and case-marked from outside the gerund. However, for me, the governor of these subjects is

in any case never N or *ing*, but rather the SPEC(N); I am not against the idea of exploring a variant of Suzuki's main idea here, which is that a governor without a positive feature specification (his *ing* and my SPEC(N)) doesn't govern and yields rather to government "from outside" by a higher governor. To my mind, however, there is a complication he overlooks, which suggests to me that government from outside the gerund (his justification for *ing*=-N) is possibly misguided. In his *we preferred each other reading books*, *each other* may be the direct object of *prefer* and *reading books* a modifying participle. We can be more certain that an "accusative gerund" is involved with a singular verb (e.g., *we were shocked by agents making political decisions*; *agents making political decisions was shocking*); compare *we were shocked by agents as dope runners*; *agents as dope runners shocks some people*. We then find that government of their subject from the outside is highly dubious: **we were startled by each other making political decisions*; **we were startled by each other as agents*.

In answer to Suzuki's proposed *ing* as -N, then, I proffer my several objections to Baker's similar use of INFL, given earlier; I add the idea that Suzuki's government "from the outside" could just as well be elaborated on the basis of an unspecified SPEC(N) as well as an unspecified INFL not governing; and I conclude that factually we may still need to exclude this possibility, since it is not clear that all "accusative gerunds" are really of the same type.

Finally, I continue to emphasize that a central advantage of the present article's approach to *ing* is that it formally relates the adjectival and participial uses of *ing* to its nominal and gerundive uses, and this in a maximally compact way, via the unified lexical entry (29). Neither of the alternatives discussed in this appendix nor any other in the literature takes on this challenge, nor is it easy to see how they could.

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