ASPECTS OF
THE ORGANIZATION OF REDUNDANCY RULES
IN THE LEXICON

by

Raghavachari Amritavalli
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APPROVAL

Name: Raghavachari Amritavalli

Degree: Doctor of Philosophy


Examinining Committee:

Chairman: Ross Saunders

______________________________________________________________
Richard C. DeArmond  
Senior Supervisor

______________________________________________________________
Brian E. Newton

______________________________________________________________
Thomas Wasow  
External Examiner  
Associate Professor  
Stanford University  
Stanford, California, U.S.A.

Date approved: August 29, 1980
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Aspects of the Organization of Redundancy Rules in the Lexicon

Author: ____________________________

(signature)

RAGHAVACHARI AMRITAVALLI

(name)

1st Sept. 1980

(date)
ABSTRACT

This thesis examines the lexical redundancy rules for derivationally related words, and draws two theoretically relevant conclusions: that subcategorizational correspondences must be captured by lexical rules stated in terms of thematic functions, and that the rules for semantic and morphological redundancies are independent.

Subcategorizational correspondences in sentences and noun phrases are currently captured (by the X-bar theory of phrase structure) by generalizing the grammatical relations of the S to the NP. This strategy is shown to fail for deadjectival nominals, and to be inappropriate for deverbal nominals. In Chapter Two, an apparently irregular subcategorizational pattern is shown to arise for a semantically coherent class of verbs: causative verbs whose objects are "Experiencers." Crucial evidence comes from verbs which take both Experiencer and non-Experiencer objects, which are shown to have two patterns of nominalization.

In light of these data, the role of thematic functions in lexical rules is examined in Chapter Three. A distinction between "major" and "minor" lexical rules is retained, and two possible accounts of minor rules are compared: one where both grammatical and thematic information are accessed, another where only thematic information is accessed. The latter hypothesis is
argued to be superior.

In Chapter Four, data are presented showing the cross-classification of morphological and semantic relationships between words, and this is shown to be problematic for the theory of word based morphology advocated by Aronoff. A model of the lexicon is developed which expresses the cross-classification.
for
Andu and Anna
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CHAPTER ONE
INTRODUCTION

1. Overview

In 1970, Chomsky argued in Remarks on Nominalization for a substantial reduction in the power of transformations. The revision of syntactic theory that he proposed was to isolate and remove from the transformational component all matters pertaining to derivational morphology, and to concomitantly enrich the phrase structure and the lexicon, in order to provide the grammar with alternative mechanisms for capturing generalizations which were now excluded from the purview of transformations. The theoretical position outlined in Remarks on Nominalization has come to be known as the Lexicalist Hypothesis, and in the last decade it has had important consequences for research in two major, hitherto neglected, areas: the base, and the lexicon. In this thesis we shall be concerned mainly with the lexicon, in particular, with the notion "lexical redundancy rule." I shall propose a hypothesis regarding the mode of operation of one type of lexical redundancy rule, and follow up the consequences of my hypothesis for the theory of word formation.
Remarks on Nominalization (henceforth Remarks) constitutes the first acknowledgement within the theory of transformational grammar that the internal organization of the lexicon might be theoretically interesting. We may trace the evolution of the lexicon as a legitimate field of inquiry from Syntactic Structures (Chomsky 1957), where the lexicon is entirely absent (lexical items being introduced by categorial rules of the base), through Aspects of the Theory of Syntax, where it is taken to be "simply an unordered list of all lexical formatives" (Chomsky 1965:84) together with their "essentially idiosyncratic" phonological, syntactic and semantic features, to the lexicon of Remarks, with its provision for the "neutral" lexical entry, unspecified as to syntactic category, within which are organized words of the same morphological "family" and the features shared by them. Illustrating how such a lexical entry can be given for verb-noun pairs like refuse-refusal, destroy-destruction, Chomsky suggests that this is the general situation within the lexicon:

We can enter refuse in the lexicon as an item with certain fixed selectional and strict subcategorization features, which is free with respect to the categorial features [noun] and [verb]. Fairly idiosyncratic morphological rules will determine the phonological form of refuse, destroy, etc., when these items appear in the noun position. The fact that refuse takes a noun phrase complement or a reduced sentential complement and destroy only a noun phrase complement, either as a noun or as a verb, is expressed by the feature structure of the "neutral" lexical entry, as are selectional properties. . . .
Let us propose, then, as a tentative hypothesis, that a great many items appear in the lexicon with fixed selectional and strict subcategorization features, but with a choice as to the features associated with the lexical categories noun, verb, adjective. (Chomsky 1970:190)

With the evolution of the lexicon from a mere list (presumably of morphologically primitive words only) into a more extended component with internal structure, questions arise as to how much and what kind of information there is in the lexicon, what information is idiosyncratic and what predictable, and how the predictability is to be encoded. The "neutral" lexical entry was proposed by Chomsky as one such device for encoding predictability. In addition, Chomsky (1970) suggested that regularities in the lexicon be expressed by lexical redundancy rules.

The notion "lexical redundancy rule" is not unique to Remarks; it had been introduced earlier, in Aspects of the Theory of Syntax (henceforth Aspects). However, with each modification in the conception of the lexicon and its contents, different types of redundancies are uncovered that are apparently lexical, and the roles envisaged for lexical redundancy rules change and multiply. We shall see that at present the notion of a lexical redundancy is invoked for a variety of phenomena, and the types of lexical rules we can now identify are rather different in form and function from the lexical redundancy rules originally proposed in Aspects. The
situation of the lexical rule today is analogous to that of the transformational rule in the early, pre-lexicalist, phases of generative grammar. Since the theory at that time provided little alternative to the transformational rule for characterizing the many kinds of distributional regularities observed in a language, this one rule-type was employed to capture diverse kinds of generalizations. What Chomsky attempted in Remarks was to separate out from a number of allegedly transformational phenomena those that could legitimately be so characterized. This precise articulation of the domain of transformations was only the first step towards arriving at a narrower and more restrictive definition of transformational rules; subsequent research has postulated many other conditions on the form and function of these rules -- compare, for example, the typology of transformations presented in Emonds (1970, 1976), and the proposals of Chomsky in Conditions on Transformations (1973) and subsequent work.

Much of the ground that the transformational rule has lost has been gained by the lexical redundancy rule. The principal outcome of Remarks was to transfer to the domain of the lexical rule from that of the transformational rule the regularities exhibited by derivationally related words. The framework provided by Remarks and the typology of transformations proposed by Emonds also paved the way for a further erosion of the domain of transformations, widely proposed in the current literature:
the elimination of all structure-preserving transformations in favor of lexical redundancy rules. While this negative characterization of the domain of the lexical rule is not perhaps entirely justified, it does serve to indicate the rapid and successive extensions in the functions accorded to these rules, and to point out the need for any discussion of lexical redundancies to clarify its assumptions.

We may distinguish three stages in the evolution of the lexical rule: the Aspects stage, the Remarks stage, and the post-Remarks stage. My object will be to show that these three evolutionary stages correspond to three distinct rule-types (or sub-types). My main concern will be with the Remarks-type lexical rule, and the hypothesis I present applies to rules of this type. I shall argue that the Remarks-type rule differs from the Aspects-type rule in crucial respects. I hope to demonstrate that the distinction between the Remarks-type and the post-Remarks type (i.e. the kind of lexical rule postulated by Bresnan 1978) can be motivated on grounds other than theoretical conservatism. For this, I shall draw support from the insights of Wasow (1977, 1980).
2. Lexical Redundancies in Aspects and Remarks

In Aspects, Chomsky (1965:167) gives the lexical redundancy rule (1), and its interpretation:

\[ (1) (=\text{his (26)}) [+\text{NP Manner}] \rightarrow [+\text{NP}] \]

to be interpreted in the following manner: if \((D,C)\) is a lexical entry with distinctive feature matrix \(D\) and complex symbol \(C\) containing \([+\text{NP Manner}]\), then \(C\) is replaced by \(C'\), which contains each specified feature \([F]\) of \(C\), where \(F\neq [+\text{NP}]\), and also the specified feature \([+\text{NP}]\).

For example, the verb \textit{hit} might be entered in the lexicon as (2):

\[ (2) (=\text{Chomsky's (2811)}) \text{(hit, [+NP Manner, . . .])} \]

By rule (1), supplemented by a general convention (op. cit.:165) which negatively specifies the entry for all features it is not positively specified for, we derive a lexical entry (3) for \textit{hit}:

\[ (3) (=\text{Chomsky's (2911)}) \text{(hit, [+NP Manner, +NP, -Manner, - , . . .])} \]

That is, \textit{hit} must always appear with a direct object, but it can appear with or without a manner adverbial.

The lexical redundancy rule (1) is essentially the syntactic analogue of redundancy rules in phonology. The lexical entry for a lexical item is minimally specified for its relevant features; on the basis of this minimal feature specification,
the rule fills in predictable features in this lexical entry, for the same lexical item.1

The redundancy rule above is concerned with contextual features, and it is hypothesized to be language-particular (Chomsky 1965:168). There is one other type of word-internal redundancy considered in Aspects: this involves intrinsic features that are filled in by universal redundancy conventions. (Note that these are not redundancy rules.) Where a lexical item contains inherent features that are hierarchic rather than cross-classifying, features higher up on the hierarchy can be predicted, given features lower down. Chomsky therefore suggests (1965:165):

Let us say that the sequence of specified features \([\alpha^1 F_1, \ldots, \alpha^n F_n]\) (\(\alpha^i = +\) or \(-\)) is a hierarchic sequence with respect to the grammar \(G\) if \([\alpha^1 F_1]\) is the only specified feature directly dominating \([\alpha^{i+1} F_{i+1}]\), for each \(1 < n\), in \(G\). . . . Where such relationships obtain, we can utilize them to simplify lexical entries . . .

He suggests the following convention (ibid):

Suppose that \([\alpha^1 F_1, \ldots, \alpha^n F_n]\) is a maximal hierarchic sequence with respect to the grammar \(G\), and that \((D,C)\) is a lexical entry of \(G\), where \(C\) contains \([\alpha^n F_n]\). Then \(C\) is extended automatically to \(C'\) containing \(C\) along with all of the specified features \([\alpha^i F_i]\), for each \(1 \leq i < n\).

Thus given the subcategorization rules (4) (Chomsky 1965:82),

\[
(4) \quad \text{a. } (=\text{his (201)}) \quad N \longrightarrow [+N, +\text{Common}]
\]
we can simplify the lexical entry for boy from (5) to (6), the features [+N] and [+Animate] being predictable (Chomsky 1965:166).

\[(5) \text{boy, [+N, +Common, +Animate, +Human, +Count . . . ]}\]

\[(6) (=\text{Chomsky's (25)}) \text{boy, [+Common, +Human, +Count, . . . ]}\]

In general, then, the lexical redundancies discussed in Aspects are concerned with the feature matrix of a single lexical item.

There are, however, indications (already) in Aspects that lexical structures and lexical redundancies may turn out to be more complex. Thus Chomsky writes:

If we regard a lexical entry as a set of features, then items that are similar in sound, meaning or syntactic function will not be related to one another in the lexicon. For example, the Intransitive "grow" of "the boy grew" or "corn grows," and the Transitive "grow" of "he grows corn" would have to constitute two separate lexical entries, despite the meaning relation that holds between them . . . The same would be true of "drop" in "the price dropped," "he dropped the ball," "he dropped that silly pretense"; or of "command" in the example discussed on p.119, and in innumerable other cases of many different kinds. Alternatively, such relationships can be expressed by taking a lexical entry to be a Boolean function of features. Although it is likely that such a modification of the theory of lexical structure is necessary, it raises many problems of fact and principle to which I have no answer, and I therefore continue the exposition without developing it. (Chomsky 1965:214, fn.15)

The case of command that Chomsky refers to above poses the
problem of capturing an apparent dependency between the selectional features of the subject and object of this word. This dependency is illustrated below:

(7) a. He commanded the platoon.
    b. *His decision to resign his commission commanded the platoon.

(8) a. He commanded our respect.
    b. His decision to resign his commission commanded our respect.

Chomsky notes that command when it takes an abstract object (as in (8)) has a "different though not totally unrelated sense" from command in (7) (1965:119). He tentatively suggests that the selectional features for command specify the dependency between non-abstract object and non-abstract subject. Thus command might be given the two features [[+Animate] Aux ___ Det [+Animate]] and [[+Abstract] Aux ___ Det [+Abstract]], but not the feature [[+Abstract] Aux ___ Det [+Animate]]. However, Chomsky acknowledges that

the grounds for this decision are very weak, since a crucial question -- namely, how to enter lexical items with a range of distinct but related syntactic and semantic features -- is far from settled. (1965:119-120).
Within the framework of Remarks, wherein transformations were prohibited from performing derivational morphology, this question could no longer be left unsettled. It became necessary to capture regularities in the feature matrices of morphologically related words, each of which was present in the lexicon in its own right. Thus we pointed out in the previous section that the "neutral" lexical entry for derivationally related words is at the core of the Remarks lexicon. A lexical entry is no longer simply a conjunction of the features for a single lexical item; it incorporates disjunctive choices of features, with each set of choices leading to a "separate but related" lexical item. Hust (1978) illustrates schematically the structure of such a lexical entry. (L refers to 'lexical entry'.)

Phonological, syntactic and semantic features
common to all branches of L

Some feature $f$ ($f \neq g$)  
Some feature $g$ ($g \neq f$)

Other features specified for L, if L is specified with the feature $f$  
Other features specified for L, if L is specified with the feature $g$

He states: "the feature complexes which result at the terminal nodes in such a branching diagram are the words (lexical items) of the language, subject to lexical insertion."
Such a modification of lexical structure allows us not merely to express regularities between morphologically related words, such as read and readable; it also offers a method of dealing with words that are apparently the "same" word, but which have a range of related meanings and syntactic properties, such as drop and command in the examples given by Chomsky. We can now say that command in (7) is a separate lexical item from command in (8), but related to it. Such an analysis of command is motivated independently of semantic considerations in Hust (1978). Recall that if command is to be treated as a single lexical item, it is necessary for selectional features to encode subject and object dependencies. Hust shows that the inclusion of such dependencies leads to an exponential increase in the number of selectional features in the grammar. He proposes instead the following (partially specified) lexical entry for command, where each terminal node represents a lexical item, and the features specified for a node "precipitate" onto the nodes dominated by it.
This entry shows that when command takes an object like platoon, it must have a human subject; but when it takes an abstract object, it is free with respect to subject selection. Hust points out that "the fact that differences in the meaning of command correlate with differences in the syntactic feature constellation lends support to the analysis proposed here, since, in general, each terminal node in a branching lexical entry will have certain idiosyncratic features peculiar to just that lexical item." In this and other cases, Hust stresses that the structure of his lexical entries is not motivated by semantic considerations, but that semantic facts follow nevertheless from his analysis.

We shall in the course of our investigation encounter many such cases, where non-semantic considerations motivate a differentiation of homonymous lexical items, and semantic facts follow from this differentiation. The differentiation of
homonymous lexical items in fact turns out to be crucial for the analysis of lexical redundancies, i.e. for the extraction of regularities in the subcategorizational frames of morphologically related words. I will show, for example, that the verb *depress* in its physical sense cannot be treated as the same word as *depress* in the emotional sense. Similarly, I will show that a noun like *amusement*, in the sense of an emotional state, must be a different word from the noun (an) *amusement*, in the sense of something which can trigger that emotional state. Such distinctions must be maintained regardless of whether we adopt the "neutral" lexical entry, or the fully specified lexical entry with "costless" information (suggested by Jackendoff 1975).

The complexity of lexical structure revealed by such cases has a bearing on the theory of word formation, as we shall see in Chapter Four. The existence of more than one word *drop* or *depress* reveals, moreover, a different facet of the notion "separate but related lexical item." The relation between *drop* on a physical scale and *drop* on an abstract scale of values (such as price) is, for example, an intuitively regular one which is instantiated in many other cases. However, our investigation of the lexical relationship must here base itself not on regularities in the subcategorizational contexts of the related words, but on the conceptual structure that permits the observed semantic relationships. Jackendoff (1972,1976,1978)
provides very interesting analyses of such cross-field generalizations in terms of thematic functions. The development of such a theory of lexical relationships might vindicate our decision to postulate many homonymous lexical items in such cases, rather than a single lexical item with a range of interdependent syntactic and semantic properties.

The expansion of the scope of the lexical entry in Remarks was accompanied by a corresponding enlargement in the scope of the lexical redundancy rule in this model. Thus Hust (1978:76) writes:

Within the framework of the Lexicalist Hypothesis . . ., lexical redundancy rules seem to take on quite a different function . . . In addition to filling in feature specifications for a given lexical item on the basis of the minimal feature specification of the lexical entry, lexical redundancy rules are proposed as a means to account for regularities regarding selectional restrictions, strict subcategorization features, etc., which hold between pairs of derivationally related lexical items.

The lexical redundancy rule thus becomes a tool for analyzing the relationship between a base word and its morphological derivative, and the theory of lexical redundancies may now be viewed as the inverse of a theory of word formation.

I shall show that this type of lexical rule is very different from the lexical rule of Aspects. However, the formalism originally proposed by Chomsky (1970) for such rules makes them appear essentially similar to rule (1). Consider for
example Chomsky's proposal for the lexical rule which captures the parallelism in the objects of verbs like read and the subjects of the corresponding adjectival predicates like readable:

... it can be formulated as a lexical rule that assigns the feature [X____] to a lexical item [V-able] where V has the intrinsic selectional feature [____X]. (Chomsky 1970:213)

Stated in this fashion, the rule appears to be "only a very minor extension of the form and function of lexical redundancy rules proposed in Aspects" (Hust 1978:78); for it takes as input one subcategorization feature, and outputs another subcategorization feature. Moreover, if related lexical items are part of a single, "neutral" lexical entry, the Remarks type rules could still be considered as rules which fill in predictable features within a single lexical entry.

One of my main arguments in this thesis (however) will be that the Remarks type lexical rule should not be formulated as a mapping between subcategorizational features as such, but as a mapping between argument structures.
3. The "Localness" of Lexical Rules.

The redundant relation between lexical items that the lexical rules in Remarks try to capture concerns the regularities in their subcategorizational frames. Thus the fact that the object of transitive grow is selectionally parallel to the subject of intransitive grow, or that the object of read is selectionally parallel to the subject of be readable, is of interest to this type of rule. The obvious way to capture these relations would seem to be to postulate a rule which operates on the subject, object etc. of an input word, to assign its features to the subject, object etc. of a derived word. This is the natural interpretation of the rule [X] ---\( \rightarrow \) [X ] for verbs and their -able adjectival derivatives in Chomsky (1970:213); for Chomsky here assumes the framework of Aspects, wherein selectional restrictions are defined on heads of phrases linked by grammatical relations. His rule assigns the selectional features of the verb's object to the subject of the corresponding adjectival predicate. It has thus been widely assumed in current research that the lexical rule of Remarks operates on grammatical relations; the clearest articulation of this position is in Wasow (1977).

I shall argue that such a formulation of these lexical rules is fundamentally in error. I show that a rule which refers to grammatical relations at all is incapable of explaining, or predicting, the full range of subcategorizational
correspondences in the frames of derivationally related words. I propose instead that lexical rules relate the argument structures of words, specified in terms of thematic functions. The observed correspondences in subcategorizational frames are viewed as the outcome of general principles governing the assignment of thematic structures to syntactic frames, as suggested by Anderson (1977).

A major argument for formulating lexical rules of the Remarks-type in terms of grammatical relations is the necessity of characterizing the "local" property of these rules. This argument is given by Wasow (1977), in the context of an insightful examination of the differences between lexical rules and transformations (structure-preserving or otherwise). I quote below the third of Wasow's five criteria for distinguishing lexical redundancy rules, and his justification of this criterion.

<table>
<thead>
<tr>
<th>Lexical Rules</th>
<th>Transformations</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;local&quot;; involve only NPs bearing grammatical relations to items in question</td>
<td>need not be &quot;local&quot;; formulated in terms of structural properties of phrase markers</td>
</tr>
</tbody>
</table>

... lexical rules must be more "local" than transformations. Whereas transformations are mappings between entire phrase markers, lexical redundancy rules are mappings only between lexical items. Hence, lexical rules ought not to be able to refer to aspects of the environments in which the lexical items appear, other than those aspects that must for independent reasons be included in the lexical entries anyway. . . .
... one rather strong hypothesis to put forward is that the only elements of a verb's (footnote omitted) environment that may enter into the statement of lexical redundancy rules are the NPs bearing deep structure grammatical relations to it (viz., its subject, direct object and indirect object). In an intuitive sense that is hard to pin down, these NP's are the elements of a verb's environment most closely associated with it. There can be little doubt that they must enter into the statement of contextual features; indeed, informal statements of both selectional restrictions and strict subcategorization are typically formulated in terms of these relations ... Thus, I claim that a natural way of stating the "localness" property of lexical rules is to insist that they be "relational" in this sense. I assume that transformations, in contrast, are defined in the usual way, in terms of structural relations of phrase markers (footnote omitted). (Wasow 1977:330)

Although Wasow adopts this as a working hypothesis, he in fact leaves the question open. In the concluding section of his paper, he acknowledges the possibility of "some other way of characterizing the 'localness' property of lexical rules" (1977:354) (possibly in terms of thematic functions), stressing only that "Criterion 3 or some other 'localness' condition is needed."

Let us briefly consider the evidence Wasow provides that some "localness" condition is necessary. Consider the rule which relates transitive and intransitive verbs:

(10) a. (=his (5a)) John showed hostility.
    b. (=his (5b)) Hostility showed.

This rule must relate the object of the transitive verb to the subject of the intransitive verb. The number of idiosyncratic
exceptions to the rule argue that it is lexical, not transformational. Thus drop but not lower, shatter but not demolish, move but not transport, exhibit this alternation.

The fact to be explained is that even a verb which normally exhibits this alternation fails to do so in certain constructions. Thus show, when it occurs in the accusative-infinitive ("raised to object") construction, has no intransitive counterpart.

\[(11)\]
\[\begin{align*}
a. \text{(his (5c)) } & \text{John showed hostility to be a result of cold weather.} \\
b. \text{(his (7b)) } & \text{Hostility showed to be a result of cold weather.}
\end{align*}\]

Similarly, drop does not exhibit the causative alternation in the "double object" construction \[(13)\], although it does so otherwise \[(12)\].

\[(12)\]
\[\begin{align*}
a. \text{(his (8a)) } & \text{They dropped the rope 100 feet.} \\
b. \text{(his (8b)) } & \text{The rope dropped 100 feet.}
\end{align*}\]

\[(13)\]
\[\begin{align*}
a. \text{(his (8c)) } & \text{They dropped John the rope.} \\
b. \text{(his (10b)) } & \text{John dropped the rope. \(\neq a\)}
\end{align*}\]

Thus the transitive-intransitive rule does not simply relate any immediately post-verbal NP to the subject. It is in addition sensitive to some information in the verb's lexical entry: it is
local."

Wasow gives examples of two other lexical rules which relate objects to subjects: the -able rule, and the adjectival passive rule. Once again, these rules fail to apply in constructions like the accusative-infinitive and the double object. Thus there is a consistent contrast in the acceptability of the verbal passive, which (Wasow hypothesizes) is a transformational rule, and the adjectival passive, which is a lexical rule, when the passive applies to these two constructions. This contrast is illustrated below. The tests for an adjectival passive are prefixability with un-, and cooccurrence with verbs like seems, sounds, etc.

(14) a. (=his (62b)) John is known to be a communist.
    b. (=his (62c)) *John is unknown to be a communist.

(15) a. (=his (56b)) Bill was told (the story).
    b. (=his (56d)) *Bill was untold (the story).

Consider also (16), which shows that the adjectival passive cannot prepose a chunk of an idiom in immediately post-verbal position, although the verbal passive can.

(16) a. (=his (64a)) Advantage is easily taken of John.
    b. (=his (64a)) *Advantage sounds easily taken of John.

"local."

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    b. (=his (64a)) *Advantage sounds easily taken of John.

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What is it about these constructions that prohibits the lexical rules from applying to them? Wasow points out that in all these constructions, the immediately post-verbal NP is not the verb's direct object. In the accusative-infinitive construction, the post-verbal NP is arguably the subject of the complement clause. In the double object construction, the indirect object of the verb precedes its direct object. For idiomatic verbs like take advantage of, a structure like

\[
\text{[[take] [advantage] of]}
\]

is plausible, in which case the direct object would be not the idiom chunk advantage, but the NP following the entire idiom take advantage of.

We can now account for the above facts by hypothesizing the lexical rules to be "relational"; they relate only direct objects to subjects. Even if some other NP occupies the normal direct object (immediately post-verbal) position, they cannot relate this NP to the subject.3

But an alternative explanation of these facts in terms of thematic functions is suggested by Anderson (1977). We know that the lexical entry of a verb contains a semantic representation in terms of thematic functions (Jackendoff 1972); it also contains information correlating thematic functions with syntactic positions. Suppose now that the lexical rules we considered were sensitive to the notion Theme. Then they would apply to direct objects, since direct objects are generally Themes. But they would not apply to the post-verbal NPs in the

21
other constructions, for

Indirect Objects are Goals (usually); idiom chunks have no thematic status, and NPs from a lower clause bear no thematic relation in a higher one. (Anderson 1977:371)

(Anderson's hypothesis that the rule relates Themes is also consistent with Wasow's observation that (13a) and (13b), although they are both grammatical, must not be related because "John in [ (13b)] is the agent, not the goal of drop" (op. cit.:332). In (12), on the other hand, the rope would be identified as the Theme in both sentences, for it is the entity that moves.)

The "localness" of lexical rules is therefore not a compelling argument for requiring these rules to be formulated in terms of grammatical relations. However, given that grammatical relations and thematic functions can equally well account for the same range of facts, there is no compelling evidence (at this point) for deciding between them either. I shall in the following chapters present some new evidence that bears on this question.

The obvious problem for any theory of lexical redundancy rules which appeals to thematic functions is the problem of adequately defining these functions. However, I believe that this problem is not insurmountable. Moreover, the definition problem is not unique to thematic functions; for defining the appropriate range of grammatical relations for lexical rules
turns out to be similarly problematic. Chomsky (1965) presented a strict definition of "subject" and "object" in terms of structural configurations, but (as Wasow notes) it is not obvious that the notion "indirect object" can be similarly defined. (Wasow's 1977 model implicitly rejects Chomsky's definitions: compare his hypothesis that help and thank take only indirect objects.) Further, if lexical rules are to be formulated in terms of grammatical relations, it becomes necessary to define these relations for categories other than verbs. Thus Wasow writes:

My Criterion 3 requires that NPs mentioned by lexical rules bear grammatical relations to the items undergoing the rules. This requires either that all lexical rules involve verbs, or that grammatical relations be defined for items of other categories. The former alternative is probably untenable (since, e.g., there are de-adjectival nouns), and the latter alternative further complicates the already difficult problem of defining grammatical relations. (Wasow 1977:354)

The only explicit proposals that have so far been made for extending grammatical relations to categories other than verbs are those of Jackendoff (1974a, 1977), working within the X-bar theory of phrase structure; and it is with a consideration of the problems faced by this attempt that we will begin our investigation. The lexical rules we will examine are the rules for the nominalizations of verbs and adjectives. The operations performed by these rules have so far been assumed to be very simple: they take as input the verb's or the adjective's subject
or object, and assign these same NPs to the noun, as its "subject" or "object". The discussion has thus centered not so much on the rules themselves, as on how to capture the subcategorizational "parallelism" which apparently results between the S and the NP. I show that there is no such general parallelism in the S and the NP, and that the nominalization data are much more complex.
FOOTNOTES TO CHAPTER ONE

1 It may be questioned whether a rule like (1) is necessary, since the information it provides could equivalently be given by a contextual feature with an optional element, e.g. [+____NP(Manner)]. However, there are problems with using optional elements in contextual features, in the Aspects model. This is because

a set of frames in which the symbol A occurs imposes a corresponding subclassification on A, with one subclassification corresponding to each listed context. (Chomsky 1965:94, emphasis added)

In Aspects, transitivity is treated as a contextual feature. Thus given Chomsky's lexical entry (loc. cit.) for grow,

(1) (=his (41)) grow, [+V, +_NP, +#, +Adj]

nothing would prevent the abbreviation of the contextual features for transitive and intransitive grow as [+__(NP)#], if parenthesized elements were allowed. But with this abbreviation, the transitive–intransitive subclassification would be lost.

I have argued elsewhere (Amritavalli 1979) that transitivity is not a contextual feature, but an intrinsic feature of the verb. If so, transitive and intransitive grow would be treated as two lexical items, the contextual features for which could not be collapsed. Further evidence is available
to support treating transitive and intransitive verbs as separate lexical items. Thus Hust (1978) notes that intransitive grow, but not transitive grow, can occur with a quantifier phrase:

(ii) The corn grew a foot.

(iii) *John grew the corn a foot.

Similarly, DeArmond (1980) observes that we can choose a locative prepositional phrase for open when it occurs in the frame __#, but not when it occurs in the frame ___NP:

(iv) The door opens onto the patio.

(v) *John opens the door onto the patio.

If we can thus distinguish the true optionality of contextual elements for a word from the case where optionality is a symptom of a differentiation in lexical items, it becomes possible to abbreviate contextual features for a given lexical item, and rules like (1) become unnecessary. We may note that informal statements of contextual features in the literature have utilized abbreviatory conventions freely, and few other redundancy rules like (1) have been posited.

2 It would also result in the definition of a false grammatical relation "Subject-Object". In the Aspects theory, any two grammatical functions can potentially define a grammatical relation. According to Chomsky, what distinguishes the "irrelevant psuedorelation Subject-Object" from the "legitimate
and traditionally recognized grammatical relation Subject-Verb" is the irrelevance of Subject-selection to Object-selection: "the choice of Main-Verb is determined by the choice of Subject and Object, though Subject and Object are in general chosen independently of one another and, correspondingly, have no grammatical relation of the sort in question holding between them" (Chomsky 1965:73-74).

3 Wasow here makes the assumption that Dative Movement and Raising to Object are not transformations. If they were, the inapplicability of lexical rules to indirect objects and "raised" objects could be explained without reference to "localness." Since lexical rules precede transformations, the relevant NPs would not be in immediately post-verbal (direct object) position when the lexical rules applied.

Notice however that the "localness" condition is still needed to account for (16b). A reference to relational information also appears necessary to rule out (ii) and (iv) below, where John is generated in immediately post-verbal position:

(1) Someone helped John.

(ii)*John seems helpable/(un)helped.

(iii) Someone thanked John.

(iv)*John appears thankable/(un)thanked.

Wasow hypothesizes that help and thank take only indirect
objects. He observes that the cognate German verbs helfen and danken take dative objects, and that the preposition which appears in the corresponding nominalization is to, usually a marker of indirect objects:

(v) Our help *to the hostess went unacknowledged. thanks *of

Anticipating a little, note that Anderson's alternative explanation in terms of thematic functions is possible here as well. Thus if the objects of help and thank are analyzed as Goal, a lexical rule sensitive to the notion Theme would not apply to them.

4 A weaker argument (in Wasow's 1977 framework) for utilizing grammatical relations in lexical rules is that this serves to differentiate lexical from transformational rules. However, Anderson points out that it is a priori doubtful if the locus of differentiation for transformational and lexical rules lies in the sensitivity of the latter rule-type to grammatical relations. For although grammatical relations do not directly figure in the statement of transformations, they do figure in conditions on the applicability of transformations (so that a transformation might, for example, apply differentially to subjects and non-subjects). Anderson concludes that "(t)he criterion of sensitivity to grammatical relations (at least to "Subject") is therefore not a sufficient condition for the
assignment of a rule to the category of lexical redundancy rules" (1977:366). (See also DeArmond (1980)).
CHAPTER TWO

THE DESCRIPTIVE INADEQUACY OF GRAMMATICAL RELATIONS

1. An Alleged Parallelism

The system of phrase structure known as X' Syntax,1 developed by Jackendoff (1974a, 1977), receives its impetus from the Lexicalist Hypothesis, which calls for a lexical account of cross-categorial parallelisms. Since the Lexicalist Hypothesis was first articulated (in Chomsky 1970) with respect to the relation between sentences and derived nominals, X' Syntax takes the expression of subcategorizational parallelisms in Ss and NPs to be one of its major areas of concern. In particular, there are in related Ss and NPs regular correspondences in the syntactic positions on which an identical set of selectional restrictions must be imposed. X' Syntax attempts to account for such correspondences by generalizing the grammatical relations of the S to the NP, with a view to generalizing the projection rules which enforce selectional restrictions on corresponding positions in the S and the NP. Since grammatical relations are defined (as in the standard theory) by phrase structure configurations, subcategorizational parallelism is ultimately sought to be expressed in terms of structural parallelism.
In this chapter and the next, I present evidence that the subcategorizational correspondences in Ss and NPs cannot be adequately expressed in terms of generalized grammatical relations, or even as a mapping between (two sets of) grammatical functions. I argue for an alternative theory of subcategorizational correspondences, based on (a refined notion of) thematic functions, and general principles assigning thematic functions to syntactic positions. In section 2, I consider one of the two major cases of parallelism that the generalization of grammatical relations purports to account for (namely, the case of Ss with adjectival predicates, and deadjectival derived nominals); and show that subcategorizational parallelism is not matched by structural parallelism in this case. Thus an explicit formulation of projection rules, in the manner envisaged by X' Syntax, reveals that the rules for adjectives and deadjectival nouns cannot be generalized by referring to a common set of grammatical relations.

In later sections, I demonstrate that there is no general parallelism in grammatical relations in the case of Ss with verbal predicates and deverbal derived nominals (the second major case). A group of apparently idiosyncratic exceptions to the postulated parallelism is examined, and the thematic function Experiencer is seen to be crucially involved in all these cases. I argue that the pattern of correspondence in the
subcategorizations of the verbs and deverbal nouns under consideration is not an irregularity in the language, but an instance of a regular subcategorizational pattern which obtains wherever this particular combination of thematic functions occurs. I show that a constant pattern of correspondences in the subcategorizational frames of verbs, nouns and adjectives can be predicted for a constant set of thematic functions, irrespective of whether it is the verb, the adjective or the noun which is morphologically 'basic.'

It is seen that the generalizations that can be made about subcategorizational correspondences in Ss and NPs are not amenable to an approach which compares only pairs of subcategorizational frames (at a time). But the lexical rules in a theory based on grammatical relations (advocated in X' Syntax) can relate only the subcategorizational frames of a pair of words such that one is morphologically derived from the other, and are therefore incapable of capturing the required type of generalizations.

2. The Subjectlessness of Predicate Adjectives

Jackendoff (1974a, 1977), discussing the arguments against a transformational derivation of a deverbal nominal like John's criticism of the play from a sentence like John criticized the play, observes that
(o)ne of the stronger arguments for deriving this nominal from a sentence is that the selectional restrictions parallel those of the sentence John criticized the play; the range of noun phrases that can occupy possessive position in the derived nominal is identical with the range of possible subjects in the sentence, and the range of noun phrases following of is identical with the range of direct objects in the sentence. In order to capture this generalization for a wide range of nominals, we do not want to state twice in the grammar the selectional restrictions shared by criticize and criticism; nor do we want to state twice the set of rules which enforce these selectional restrictions, once for NP and once for S. (Jackendoff 1974a:9, 1977:16)

A non-redundant specification of the selectional features of criticize, criticism (as of other lexically related words) can be given in a "neutral" lexical entry (cf. Chomsky 1970, Hust 1978; and Jackendoff 1975 for an alternative formalization). Regarding the non-redundant enforcement of identical selectional restrictions in the S and the NP, Jackendoff suggests that along with a generalization of the base rules..., there is a corresponding generalization in the projection rules. For example, the notion "subject of" can, where semantically appropriate, be generalized to possessive NPs, and "object of" can be generalized to postnominal NPs. This generalization ensures that the rules enforcing selectional restrictions on criticize and criticism are in fact the same rules in Ss and NPs, and they need not be stated twice. (Jackendoff 1977:16)

A similar selectional parallelism is seen in the S John is perverse, and the (deadjectival) nominal John's perversity. Once again, we must account for the generality of selectional...
restrictions, e.g. for the fact that perversity restricts the subject in (2.37) (i.e. John's being perverse, R.A.) in precisely the same way that perversity restricts the genitive phrase in (2.38) (i.e. John's perversity, R.A.). (Jackendoff 1977:21)

Once again, the subject-possessive NP parallelism is to be expressed in terms of the generalized notion "subject of," and a generalized projection rule referring to this notion:

Since the genitive NP in (2.38) is to be considered the subject of (2.38), the rules which impose selectional restrictions on grammatical subjects will apply equally in (2.37) and (2.38). Thus, as in section (2.1) (i.e. the case of verbs and deverbal nouns, R.A.), the Lexicalist Hypothesis requires a cross-category generalization to be expressed, but this time in terms of adjectives and nouns. (op.cit.:21)

Let us examine how the proposed generalization of grammatical relations and projection rules works for verbs and deverbal nouns. Jackendoff first modifies the structural configurations of S and NP, to ensure a parallelism in the position of the "subject" in both. An important innovation in the interests of structural parallelism is the identification of S with V'''. Compare the configurations (1a, 1b) with (2a, 2b) below. An obvious difference between (1a) and (1b) is that the subject NP in (1a) is not dominated by the V'' whose head V imposes a selectional restriction on it; whereas in (1b), the possessive NP is dominated by the N''' whose head N selectionally restricts it:
In (2a), S is V'''. The subject NP in (2a) and the possessive NP in (2b) are both dominated by the X''' category whose lexical head X (V in (2a), N in (2b)) selectionally restricts them.
A generalized definition which picks out the subject of the sentence and the possessive NP in the nominal can now be given as \([N^{'''}, X^{'''}]\) (the \(N^{'''}\) immediately dominated by an \(X^{'''}\)). In Jackendoff's system of phrase structure, nouns and verbs share the feature \([+\text{Subj}]\), and he therefore gives the generalized definition for "subject of" as \([N^{'''}, [+\text{Subj}']']\) (op.cit.:41). The generalized definition of "object of" is similarly given as \([N^{'''}, [+\text{Subj}']\) (the \(N^{'''}\) immediately dominated by \(N'\) or \(V'\)) (op.cit.:42).
Jackendoff does not formalize the projection rules for criticize and criticism, to demonstrate in what respect these rules "are in fact the same rules in Ss and NPs," once the notions "subject of" and "object of" are generalized. But we may formalize the rule for their "subjects" as in (3):

(3) Given a lexical entry with the feature [+Subj] (N or V):

substitute the reading of [N''', [+Subj]'''] ("its subject"), where [+Subj]''' is the phrasal category with the lexical entry as head, for argument x in the entry's functional structure.3

The projection rule for the "objects" of criticize and criticism can be formulated along the same lines. Thus the subcategorizational parallelisms of verbs and deverbal nouns are captured by generalized projection rules referring to their "subjects" and "objects."

Let us now try to give a similar generalized projection rule for adjectives and deadjectival nouns, as suggested by Jackendoff (1977:21). Consider first the structures (4a) and (4b).
It is immediately apparent that the structural relation between John and perverse in (4a) is not the same as the structural relation between John's and perversity in (4b). The non-parallelism between (4a) and (4b) is similar to the non-parallelism between (1a) (wherein S was not treated as V'''), and (1b). In (4a), as in (1a), the subject N''' is
outside the X''' whose head X imposes a selectional restriction on it. In (4b), as in (1b), the possessive N''' is dominated by the X''' whose head X imposes a selectional restriction on it.

Rule (5) represents my attempt to state the projection rules for perverse and perversity. Let us take nouns to be [+Subj, -Obj], adjectives to be [-Subj, -Obj], and verbs to be [+Subj, +Obj] (following Jackendoff 1977:32-33). The rule has two subparts. Subpart (i) applies in the NP, i.e. (4b). It is similar to rule (3). Subpart (ii) applies in the S, i.e. (4a).

Note that here the rule must refer to the "subject of" the V''', rather than of the A''' dominating the A (the lexical entry.)

(5) Given a lexical entry with the feature [-Obj] (N or A):
   i. if the entry is also [+Subj] (i.e. N),
      substitute the reading of [N''', [+Subj]'''] ("its subject"), where [+Subj]''' is the phrasal category with the lexical entry as head, for argument x in the entry's functional structure.
   ii. if the entry is also [-Subj] (i.e. A),
      substitute the reading of [N''', [+Subj]'''], where [+Subj]''' is the phrasal category whose head strictly subcategorizes the X''' category of which the lexical entry is the head ("the subject of the verb which strictly subcategorizes the AP dominating the adjective"), for argument x in the entry's functional...
There is no sense in which (5) can be regarded as a single projection rule. The point is that since there is no phrase structure configuration (6a) corresponding to (6b) and (6c),

\[
\begin{align*}
(6) & \quad a. \\
& \quad \begin{array}{c}
A'''
\end{array} \\
& \quad \begin{array}{c}
N'''
\end{array} \\
& \quad \begin{array}{c}
\vdots
\end{array} \\
& \quad \begin{array}{c}
\vdots
\end{array} \\
& \quad \begin{array}{c}
\vdots
\end{array} \\
& \quad \begin{array}{c}
A
\end{array} \\
& \quad \begin{array}{c}
([-\text{Subj}, -\text{Obj}])
\end{array}
\end{align*}
\]

\[
\begin{align*}
& \quad b. \\
& \quad \begin{array}{c}
N'''
\end{array} \\
& \quad \begin{array}{c}
\vdots
\end{array} \\
& \quad \begin{array}{c}
\vdots
\end{array} \\
& \quad \begin{array}{c}
\vdots
\end{array} \\
& \quad \begin{array}{c}
N
\end{array} \\
& \quad \begin{array}{c}
([-\text{Subj}, -\text{Obj}])
\end{array}
\end{align*}
\]

\[
\begin{align*}
& \quad c. \\
& \quad \begin{array}{c}
N'''
\end{array} \\
& \quad \begin{array}{c}
\vdots
\end{array} \\
& \quad \begin{array}{c}
\vdots
\end{array} \\
& \quad \begin{array}{c}
\vdots
\end{array} \\
& \quad \begin{array}{c}
V
\end{array} \\
& \quad \begin{array}{c}
([-\text{Subj}, +\text{Obj}])
\end{array}
\end{align*}
\]

and therefore the definition \([N''', [-\text{Obj}]]\) does not pick out anything in the case of adjectives, the rules for adjectives and deadjectival nouns cannot be generalized by referring to a grammatical relation between an \(X\) and the \([N''', X''']\), as the rules for verbs and deverbal nouns can be.

It is interesting that elsewhere in X' Syntax, Jackendoff (1977:32, fn.2) cites precisely the absence of a phrase structure configuration (6a) in support of an analysis
(Independently suggested in Jackendoff (1974b)) where the selectional restriction of a predicate adjective on the subject of the sentence is enforced by a rule referring to the thematic relation Theme, and not to the grammatical relation "subject of":

... it is often assumed that John in John is tall is the subject of tall. This assumption is incorrect. Although tall imposes a selectional restriction on the NP in NP is tall, the NP bears the grammatical relation "subject of" to the verb be, not to the adjective. ... An NP bearing the "subject of" relation to an adjective would have to be contained in the AP, as the subject of a noun is contained in the NP. Since there is no AP *John('s) fearful corresponding to the NP John's fear, for example, we conclude that adjectives do not have syntactic subjects. For a discussion of how the selectional restriction is imposed without a grammatical relation, see Jackendoff (1974b) ... .

In the article to which he refers us, Jackendoff proposes a Complex Predicate Rule (CPR). Given a sentence like (4a), John is perverse, the CPR combines the interpretation of the adjective perverse with that of the verb be, the latter acting "simply as a semantically unmarked place holder, so that the CPR can apply and create a verbal one-place function out of the AP" (Jackendoff 1974b:502). Once the CPR applies,

(t)he subject, strictly subcategorized by be, can now be taken as NP1 in the new function and is inserted by Argument Substitution, subject to the selectional restrictions of the adjective. (loc. cit.)

Since in this instance it is the "subject" that the projection
rule of Argument Substitution inserts into the functional structure of the complex predicate \textit{be perverse}, it might appear that the notion "subject of" is again useful for generalizing a projection rule cross-categorially. The case of adjectives and deadjectival nouns appears to differ from that of verbs and deverbal nouns only in that in the first case, a complex predicate \textit{V-Adj} must be created before the projection rule picks out the "subject of" the \textit{V} or the \textit{N} for argument substitution. If so, the claim that "the rules which impose selectional restrictions on grammatical subjects will apply equally" in \textit{John is perverse} and \textit{John's perversity} could be substantiated. Unfortunately for this claim, Jackendoff (1974b:488ff.) provides independent evidence that argument substitution into complex predicates must refer to thematic functions.

The CPR was originally motivated for the interpretation of complex predicates like \textit{put/pin/place/fix the blame on} and \textit{take/get/receive/accept the blame for}, which proceeds in the following manner. The functional structure of the noun \textit{blame} is specified for (at least) two arguments: a 'blamer,' and a 'blamee.' But in \textit{John put the blame on Bill} and in \textit{Bill took the blame}, the NPs which must be substituted into the noun's functional structure do not appear as the syntactic "subject" or "object" of the noun; they stand in grammatical relations to the verbs \textit{put} and \textit{take}. The situation is thus similar to that of the predicate adjective \textit{perverse}. The CPR now applies to create the
complex predicates put the blame (on) and take the blame (for), following which the arguments of the verbs can be "borrowed" for insertion into the noun's functional structure.

But observe that if the verb is put, its prepositional object must be substituted for the 'blamee' argument, while if the verb is take, its subject must be substituted for the same argument. Jackendoff therefore argues that the projection rule does not simply refer to grammatical relations in such cases. Rather, it refers to the thematic relations of the verb. The Goal is always chosen as the 'blamee.' For put, the Goal appears as a prepositional object, whereas for take, the Goal appears as the subject. Thus the appropriate NPs are chosen as 'blamee' in both cases.

It is in fact the thematic basis of argument substitution into complex predicates that serves to recommend the extension of the CPR to deal with the selectional restrictions of predicate adjectives, in Jackendoff (1974b). Jackendoff gives two arguments against basing argument substitution on grammatical relations, in the case of predicate adjectives. Firstly, the NPs that predicate adjectives restrict appear in diverse syntactic positions, depending on the semantic structure of the verb. Thus the adjective perverse restricts the subject in (7a) and (7b), but in (7c), it restricts the object:

(7) a. John is perverse.
b. John impresses (strikes) me as perverse.
c. I consider John perverse.

Jackendoff therefore suggests that

the modified NP is always the Theme of the adjective, and so, for the sake of the CPR, it must appear as the Theme of the main verb. (op. cit.:502)

The second argument concerns the range of syntactic positions that can be selectionally restricted by rules referring to grammatical relations. Thus Jackendoff (1974b:500) writes:

In the standard formulation of strict subcategorization and selectional restrictions (Chomsky 1965), a lexical item can place restrictions only on the occurrences of NPs and PPs within its major phrase. A verb can determine the nature of its subject and of constituents in the VP; that is, it restricts the arguments in the immediately dominating S. . . . Predicate adjectives present an apparent anomaly in this respect. . . . there is never an NP to the left of the adjective in an AP which functions as "subject." . . . Thinking only of sentences like John is guilty, one is tempted to call the modified NP the subject of the adjective and to try to state a strict subcategorization (sic) restriction on this basis. But since John is outside the AP and is in fact the subject of be, this proposal goes against the generalization about strict subcategorization that we noted above.

The problem that Jackendoff discusses in the preceding extract in fact arises only within the framework of X' Syntax. The "generalization about strict subcategorization" that he wishes to capture is the requirement in Chomsky (1965:99-100) that strict subcategorization be "strictly local." This
requirement does not apply to selectional restrictions in the standard theory, and with good reason. Recall that in the standard theory, $S$ is rewritten as NP VP. Now if selectional restriction were "strictly local," it would not be possible to impose the selectional restrictions of a verb on the subject of the sentence, since the subject is not dominated by the major category (VP) which introduces the V.4 But selectional restriction is not "strictly local," and therefore it is no more of a problem (for the standard theory) that the subject NP in NP be AP structures is outside the AP, than it is that the subject NP in NP VP structures is outside the VP.

Consider, however, a theory where $S$ is V". In such a theory, the subject of the sentence is dominated by the major phrase (V") that introduces the V. We can now legitimately claim that the subject-verb selectional restriction is 'local' with respect to the X" category whose head X specifies the restriction. The selectional restriction between the possessive NP and the head N is also 'local' in this sense. In this framework it would indeed be an anomaly that a predicate adjective restricts an NP (namely, the subject) which is not dominated by the A" whose head A specifies the restriction. Thus a nice constraint on selectional restriction which is made possible by the identification of $S$ with V" also serves as an argument against a projection rule referring to "subject of," for predicate adjectives.

45
The discussion of the problem of predicate adjectives is complicated by the obliteration, in X' Syntax, of the distinction between the notions "grammatical function" and "grammatical relation," made by Chomsky (1965:71,73). Thus Jackendoff presents [N''', [+Subj]''] as a definition of "the generalized grammatical relation 'subject-of'" (op. cit.:41, emphasis added); but in the standard theory, this would be the definition of a grammatical function. Chomsky defines grammatical relations derivatively in terms of functional notions. The grammatical function "subject-of" is defined for the S, and the grammatical relation "Subject-Verb" is the relation between the Subject-of the Sentence and the Main-Verb-of the Predicate-of the Sentence (Chomsky 1965:73). This being the case, there is nothing (in the standard theory) to prevent the postulation of a grammatical relation "Subject--Predicate Adjective," given appropriate functional definitions. The subject of the S is thus accessible to the selectional rules of both V and A. But X' Syntax apparently attempts to state selectional restrictions in terms of the grammatical functions of a single phrasal category. Ss with an adjectival predicate present a problem for this attempt.

Observe that the point at issue is not merely a matter of evolving an alternative method of capturing the subcategorizational parallelisms of adjectives and deadjectival nouns; though this is not a trivial problem, given the...
assumptions of X' Syntax. The motivation for identifying S with V''', and for generalizing the grammatical relations of the S to the NP, is itself called into question. There is no a priori reason to assume that the S and the NP are structurally parallel; as Hornstein (1977) points out, there is in fact evidence that they are not parallel. (Thus Ss have auxiliaries and complementizers, while NPs have determiners.) Jackendoff (1977:38-39, fn.5) dismisses these differences as "irrelevant," for "the X' Convention says nothing about what to do with nonparallel structures. . . . the X' Convention says simply that when parallelisms exist, they must be expressed." Now the observed parallelism in the S and the NP that the theory must account for is in the subcategorization, and it obtains for Ss with two types of predicates (verbal, and adjectival) and the corresponding NPs. By Jackendoff's argument, the postulation of a structural parallelism would be justified (regardless of other structural differences) if it succeeded in expressing both these cases of distributional parallelism. But we have seen that one case of distributional parallelism remains unexpressed in structural terms.

Moreover, the structural parallelism of S and NP is achieved at the cost of obscuring a general structural difference between S and NP, and of creating a nonparallelism between verbal and adjectival predicates. If S is not V''', the subject of the S is a specifier of neither the V nor the A,
while the "subject" of the NP is always a specifier of the N. The restriction against sentences in the possessive NP position (but not in the subject position) may be attributed to this difference (cf. Emonds 1976, Jackendoff 1977:44). The projection rules for verbs as well as adjectives would have to refer to a position (namely, the subject of the sentence) outside the major phrase introducing the V or the A, and there would be no need to assume a radical difference in the types of projection rules involved.

In the light of these problems we might consider reverting to a theory of phrase structure wherein S is not V', and relinquish the claim that the grammatical relations of the NP are identical to those of the S. The NP could be allowed its own set of grammatical functions, "Poss-NP" and "of-NP." However, we might still try to state subcategorizational correspondences in terms of a correspondence in the grammatical functions of the S and the NP. Thus we may claim that the Subject corresponds to Poss-NP, so that a selectional rule which relates Subject-Verb or Subject-Adjective in the S will relate Poss NP-head N in the noun phrase; and that the Object corresponds to the of-NP, so that a selectional rule which relates Verb-Object in the S will relate head N-of NP in the noun phrase. This is essentially the suggestion in Chomsky (1970:201):6

\[
\ldots \text{grammatical relations are defined by configurations in the deep structure, and selectional}
\]

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features relate the heads of phrases that are associated in specific grammatical relations. Then the words John and proof are the heads of the related phrases several of John's and proofs of the theorem in several of John's proofs of the theorem, and the same selectional feature that associates subject and verb in John proved the theorem will relate these two items, despite the very different syntactic origin of the relationship. (Chomsky 1970:201)

The next section is an attempt to show that even the weaker claim outlined in the preceding paragraph must be rejected. I shall argue that a mapping rule which refers to grammatical functions (at all) is the wrong theoretical mechanism for stating correspondences of selectional restrictions between derivationally related words; and that (in its place) we need to use a rule which operates on thematic functions.

3. An "Irregular" Class of Deverbal Nominals

Examples of verbs and deverbal nouns like criticize-criticism, destroy-destruction, which are commonly discussed in the literature, have led to the setting up of a paradigm of correspondence between (i) the subject of the sentence and the possessive NP in the nominal, and (ii) the object of the verb and the of-complement to the noun. Hence the attempt to formulate projection rules for the S and the NP in terms of generalized grammatical relations. If this paradigm of correspondence can be shown to be unjustified, the principal reason for generalizing the grammatical relations of the S to
the NP disappears. In what follows I show that there is a semantically coherent class of verbs and morphologically deverbal nouns for which the postulated paradigm is not valid. Further, I show that these verbs and nouns are not "irregular" in any way; and that they would in fact be "irregular" if they conformed to the commonly assumed pattern of correspondence.

Chomsky (1970:188-189) noticed that the deverbal nominals amusement and interest do not show the "expected" pattern of correspondence with their verbs:

(8) a. John amused (interested) the children with his stories
    b. *John's amusement (interest) of the children with his stories

In these cases, the set of possible objects of the verb corresponds to the set of possible "subjects" in the NP:

(9) the children's amusement at (interest in) John's stories

It has been suggested by Lakoff (1970), Jackendoff (1975:660-661), and (more recently) by Wasow (1977:359, fn.15), that the subcategorizational properties of such nominals be accounted for by relating them to an adjectival past participle rather than to the verb. Thus (9) would be related to (10):
The children were amused at (interested in) John's stories.

Wasow first motivates a distinction between "transformational" passives and "lexical" passives, and shows that the latter are derived by a category-changing lexical rule. One criterion for distinguishing a transformational from a lexical rule is that the latter has idiosyncratic exceptions (Wasow's Criterion 5). Since the participles in (10) select idiosyncratic prepositions like at, in, instead of the expected by, they are candidates for the lexical rule by this criterion. The nominals in (9) seem to follow the adjectives' idiosyncracy in preposition selection. Neither the adjectives nor the nominals (unlike the verbs) permit inanimate subjects.

I give below a partial list of verb-participle-nominal triplets for which the paradigm we noted in (8)–(10) seems to hold.

(11) a. amaze, amuse, annoy, astonish, bore, confuse, delight, disappoint, disgust, dismay, distress, elate, embarrass, fascinate, frustrate, humiliate, hurt, inspire, interest, irritate, (dis)please, puzzle, relieve, surprise, vex
b. amazed (at), amused (at), annoyed (at), astonished (at), bored (with), confused (by), delighted (at), disappointed (with), disgusted (at), dismayed (at),
distressed (at), elated (at), embarrassed (at), fascinated (with), frustrated (at), humiliated (by), hurt (by), inspired (by), interested (in), irritated (at), (dis)pleased (at), puzzled (at), relieved (at), surprised (at), vexed (by)

c. amazement (at), amusement (at), annoyance (at), astonishment (at), boredom (with), confusion (*by), delight (at), disappointment (with), disgust (at), dismay (at), distress (at), elation (at), embarrassment (at), fascination (with), frustration (at), humiliation (*by), hurt (*by), inspiration (*by), interest (in), irritation (at), (dis)pleasure (at), puzzlement (?at), relief (at), surprise (at), vexation (*by)

Relating the nominals in (1lc) to the participles in (1lb) neatly accounts for distributional facts. Further, it reinstates the parallelism between the subject of the sentence and the possessive NP in the nominal. Note, however, that it constitutes no kind of explanation of why only a "passive" nominalization exists in just these cases. It is not generally the case that the existence of an adjectival passive implies that the corresponding nominal is related to this adjectival passive and not to the verb. We can argue for adjectival passives in the case of collected and explored (since we have uncollected and
unexplored, and un- attaches only to adjectives; cf. Siegel 1973, 1974, and Hust 1977), but collection and exploration must be related to the verb: the Church's collection of tithes, the Norwegians' exploration of the Antartic. The analysis suggested by Lakoff, Jackendoff and Wasow invites us to accept the fact that a verb in (11a) does not have a related nominalization, or the fact that a participle in (11b) has a related nominalization, as (in each case) an arbitrary fact about the individual lexical item. A lexical "gap" needs no further explanation. (Thus Jackendoff (1975:661), who considers only one nominal, amusement, of the group of nominals (11c), expressly states that "the existence of only one of the possible forms of amusement is an ad hoc fact, expressed in the lexicon."

But it is striking that the verbs for which the same ad hoc fact must be expressed form a coherent semantic class. The verbs in (11a) signify the causation of internal states in animate (typically human) objects that are capable of experiencing these states. It would appear that any attempt to explain the paradigm (11a)-(11c) must mention some such semantic fact. Chomsky (1970) suggested that this semantic fact is a feature [+cause] of the verb.10 The explanation however cannot be (just) the causative nature of the verb, for as Jackendoff (1975:660) notes, "other causatives do have nominalizations" (example (12b) from Jackendoff):
(12) a. Gamma rays excited the protons.
   b. the excitation of the protons by gamma rays

Let us tentatively hypothesize that the crucial semantic fact is not the causativity of the verb as such, but the semantic role of the verb's object. Let us call the animate objects of the verbs in (11a), which are experiencing internal states, Experiencers. As a first approximation, we may describe the facts in (11a)-(11c) as follows: if the object of a causative verb is an Experiencer, the verb does not have a "regular" nominalization with a causative interpretation. Instead, the subject of the verb appears, if at all, as a prepositional object in the NP; and the verb's object appears as "subject." Further, there is an adjectival passive which takes the verb's object as subject. The nominal therefore appears to be subcategorizationally parallel to the adjectival passive.

When considered more closely, the causative verb excite (of (12)) and its nominalizations can be seen to provide a particularly neat confirmation of our hypothesis. The verb excite can take either inanimate objects, as in (12a), or animate objects, as in (13a):

(13) a. The news excited Mary.

In (13a), Mary is an Experiencer. The interesting fact is that (13a) does not have the nominalization (13b) (compare (12b)):
Rather, we have the derived nominal (14a), which is subcategorizationally parallel to (14b):

(14) a. Mary's excitement (*excitation) at the news
    b. Mary was excited at the news.

Observe that the participle excited at does not allow inanimate subjects.

(15) *The protons were excited at gamma rays.

For excite, there are two different morphological forms of the nominal (excitement, excitation), each with its specific distributional properties. There are other verbs whose nominals have only one morphological form, but the nominal once again shows different subcategorizations depending on whether the object of the verb is inanimate, or an animate Experiencer. If the object is inanimate, the subcategorization of the nominal follows that of the verb. If the object is animate, there is a lexically related past participle, and the subcategorization of the nominal follows that of the participle.

(16) a. The air pressure depresses the lever.
    b. the air pressure's depression of the lever

(17) a. The weather depressed Mary.
b. *the weather's depression of Mary

(18) a. Mary was depressed at the thought of going home.
   b. Mary's depression at the thought of going home

(19) a. *The lever was depressed at the air pressure.
   b. *the lever's depression at the air pressure

(20) a. The machine's rotary action agitates the soap solution.
   b. the agitation of the soap solution by the machine's rotary action

(21) a. The (aide's) resignation agitated the official.
   b. *the (aide's) resignation's agitation of the official

(22) a. The official was agitated at (over) the aide's resignation.
   b. the official's agitation at (over) the aide's resignation

(23) a. *The soap solution was agitated at (over) the machine's rotary action.
   b. *the soap solution's agitation at (over) the machine's rotary action
(24) a. The lexical entry satisfies the non-distinctness requirement.
   b. the satisfaction of the non-distinctness requirement by the lexical entry

(25) a. The dress satisfies Mary.
   b. *the satisfaction of Mary by the dress

(26) a. Mary is satisfied with the results.
   b. Mary's satisfaction with the results

(27) a. *The non-distinctness requirement is satisfied with the lexical entry.
   b. *the non-distinctness requirement's satisfaction with the lexical entry

(28) a. Indiscriminate mining exhausted the country's resources.
   b. the exhaustion of the country's resources by indiscriminate mining

(29) a. The walk exhausted Mary.
   b. *the walk's exhaustion of Mary

(30) a. Mary was quite exhausted (by the walk); the walk left Mary exhausted; Mary seems very exhausted.
   b. Mary's exhaustion (*by the walk)
(31) *Indiscriminate mining left the country's resources very exhausted; *the country's resources seem very exhausted.

We have an interesting problem here. From the point of view of lexical insertion, verbs like excite, exhaust, depress, agitate and satisfy are free to take either animate or inanimate objects. That is, these verbs need not be specified for the features [+____[+Animate]] or [+____[-Animate]]. But their nominalizations differentiate between the animate and inanimate NPs following these verbs. If this NP is inanimate, it is assigned the of-NP position in the noun phrase (and the subject is assigned the Poss-NP position.) This is the "expected" correspondence. But if this NP is animate, it is assigned the Poss-NP position, and the subject of the S fails to appear in the NP, or appears as a prepositional object. This is the "skewed" correspondence that we noticed between the verbs in (11a) and the nouns in (11c). The basis for this differentiation is obviously not a difference in the grammatical functions of these NPs, which in both cases remain the verb's direct object. Thus our model of a "simple" mapping from the grammatical functions "Subject of the Sentence" and "Object of the Verb" to the grammatical functions "Poss-NP" and "of-NP" apparently breaks down.
Observe that the problem is not avoided by postulating two nominals, (e.g.) depression and depression, and relating one of them to the participial adjective and the other to the verb. This "solution" only shifts the problem to another rule of the grammar. For we notice that the rule for the participial adjective must also be sensitive to the feature of animacy of the verb's object. The subjects of the predicates be excited at, be depressed at, be satisfied with, be agitated at and seem exhausted must be animate; they correspond to only the animate objects of the related verbs. This means that the rule relating the verb and the participial adjective must differentiate between the animate and inanimate objects of the verb.

The problem becomes nicely focussed when we look at the formalism of lexical redundancy rules. The general schema for such rules has been suggested by Chomsky (1970), for verbs and their -able derivatives (read-readable), and it has been further developed by Hust (1978):

\[ \begin{align*}
\ldots & \text{a subregularity} \ldots \text{regarding selectional rules in the case of -able} \ldots \text{can be formulated as a lexical rule that assigns the feature [X]} \\
& \text{[V-able] where V has the intrinsic selectional feature [___X].} \\
& \text{(Chomsky 1970:213, emphasis added)}
\end{align*} \]

The point to note is that within this formalism, the rules can mention only the intrinsic selectional features of the verb. Therefore, if the verb's selectional features say nothing about the animacy of the direct object, this information will not be
available to the lexical redundancy rules. In the framework of Jackendoff (1975), we must similarly differentiate between the [+____[+Animate]] and the [+____[-Animate]] subcategories of these verbs. Jackendoff gives fully specified lexical entries which are related by lexical redundancy rules. We must relate excitation to excite [+____[-Animate]], and excitement to excite [+____[+Animate]]; so also for the two senses of depression, agitation, satisfaction, and exhaustion. We thus have a situation where a selectional feature irrelevant to lexical insertion must nevertheless be specified in order to capture lexical redundancies. That is, verb subcategorization must proceed beyond the requirements of lexical insertion, for these verbs.

Given that it is necessary to set up [+____[+Animate]] and [+____[-Animate]] subcategories of these verbs, it is now possible to treat each subcategory as a separate lexical item. But now (it could be pointed out) it is again possible to state the required lexical redundancy rules simply in terms of grammatical functions. The rules would not have the problem of differentiating between the animate and inanimate objects of the verbs, since this differentiation would be made available to them as part of the subcategorization of different lexical items. However, statements of correspondences in grammatical functions once again conceal regularities in the data. It is not accidental that of ten verbs (five homonymous verb pairs), it is
the five [+Animate] verbs which have a nominalization with the object appearing in the Poss-NP position. Observe that these animate objects are Experiencers; our hypothesis predicts that they should appear in the Poss-NP position. Again, it is only the five [+Animate] verbs that have adjectival passives. If lexical redundancy rules referred only to grammatical functions, we would not expect such a systematic separation of five homonymous verb pairs into the classes [+Animate] and [+Animate] for purposes of rule application, coincidental with a difference in the semantic role of their objects. Thus regardless of whether excite, exhaust, depress, agitate, and satisfy are each treated as one lexical item or two, an explanation of the subcategorizational correspondences in these cases cannot be given unless the semantic role of their object NPs is taken into account.

Observe that it is the semantic role of the object, and not its animacy or inanimacy per se, that is relevant for lexical redundancies. We may contrast the examples above with criticize—criticism, where the inanimacy or animacy of the object does not correlate with changes in its semantic role, and is (thus) irrelevant for lexical redundancies. Compare John's criticism of the play, John's criticism of Mary. Note also that the semantic roles (thematic functions) to which lexical redundancy rules are here claimed to be sensitive are much finer than notions like Theme. Thus, for Jackendoff (1972), both the lever and Mary as
objects of depress in (16a) and (17a) would be Themes; since Themes include NPs whose location or change of location is asserted by the predicate, and the notions "location" and "change of location" are generalized to cover both physical space and "abstract" space (such as points on an emotional scale). Thus adjectives can function as abstract locations, and the subjects of such adjectival predicates are considered Themes (op. cit.:29-31). But, as we see, this gross classification will not do for us.

The finer subcategorization of excite, exhaust, depress, agitate and satisfy allows us to include the [+___[+Animate]] subcategory of these verbs with the verbs in (11a) (all of which take only animate objects), and to extend our generalization about Experiencers to this new class of verbs, (11a'). That finer subcategorizations may reveal underlying "logical" relationships and allow the identification of "overlapping" categories has been anticipated by Chomsky (1964). Chomsky discusses the classification of lexical formatives into hierarchies of categories, in the following terms:

Suppose we have a three level hierarchy. Then $C_1^1$ is the class of all words. Let $C_1^2$ = Nouns, $C_2^2$ = Verbs, $C_3^2$ = Adjectives, $C_4^2$ = everything else. Let $C_1^3$, ..., $C_3^3$ be subcategories of Verbs (pure transitives, those with inanimate objects, etc.); ...
He then asks:

What is the natural point where continued refinement of the category hierarchy should come to an end? This is not obvious. As the grammatical rules become more detailed, we may find that grammar is converging with what has been called logical grammar. That is, we seem to be studying small overlapping categories of formatives, where each category can be characterized by what we can now (given the grammar) recognize as a semantic feature of some sort . . . (op. cit.:387, fn.8)

In the light of the program for grammar sketched in the preceding extract, we can see that our analysis has been in the right direction. A "continued refinement of the category hierarchy" (in the case of excite, etc.) along semantic lines revealed a class of verbs (llal): a class of "causative" verbs with Experiencer objects. Interestingly, this result converged with the result of a study of subcategorizational correspondences, which revealed the same class of verbs. The discovery of such categories is what Chomsky views as a step towards "logical" grammar.
1 Following the practice of Jackendoff (1977), I shall represent bars as primes: e.g., $\bar{X}=X'$.

A previous version of the material presented in this chapter and the next is to appear in Linguistic Analysis, under the title Expressing Cross-Categorial Selectional Correspondences: An Alternative to the $\bar{X}$ Syntax Approach. I wish to thank Joel Hust, Richard DeArmond, Karattuparambil Jayaseelan and Alfredo Hurtado for useful discussions.

2 Such a structural parallelism is necessary in a theory (like the standard theory) wherein grammatical relations are defined by structural configurations. Thus Jackendoff writes: "The general principle entailed by the $X'$ Convention is that if parallel grammatical relations exist in two different categories, the categories must be syntactically parallel with respect to that grammatical relation" (1977:37-38).

3 We assume that arguments in the functional structure carry thematic information (Agent, Theme, Goal, etc.) and other semantic information (concrete, animate, human, etc.); cf. Jackendoff (1972:36-43). Thus given the functional structure
the projection rule substitutes the reading of \( [N''']^{+\text{Subj}}]''\) for the Agent argument.

4 Observe that verbs are never strictly subcategorized for subjects in the standard theory, but selectional features for subjects are included in their lexical entries.

5 Thus suppose we claim that a projection rule referring to the notion Theme can be generalized for adjectives and deadjectival nouns. We must then countenance two types of projection rules -- "grammatical" and "thematic" -- in Ss and NPs. But now it becomes imperative to specify the conditions under which either type of rule applies. Suppose we stipulate that the "grammatical" rule applies for restrictions within an \( X''' \), and the "thematic" rule applies elsewhere. This condition holds for the S; but it fails for the NP, since the restrictions in deadjectival as well as deverbal nominals involve the specifier and the head of the same \( X''' \). We might argue that the type of projection rule in the NP is determined by the type of projection rule in the S. But this tells us nothing about NPs for which there are no corresponding Ss. Selectional restrictions must be enforced in yesterday's weather, John's attitude, Mary's uncle; the theory we envisage provides no hint as to whether the rules in these NPs refer to thematic...
relations, or to grammatical relations.

Observe also how such a theory would account for the subcategorizational correspondences between Ss; cf. (i) and (ii) below:

(i) The door opens.
(ii) The door is open.

The restrictions on NPs occupying subject position in (i) and (ii) are identical. But the rule in (ii) enforces the restrictions of a predicate adjective, and must therefore refer to the notion Theme, whereas the rule in (i) refers to the "subject-of" the intransitive verb open.

6 In later work (Chomsky 1973, 1977), Chomsky adopts the position that the possessive NP is the "subject" of the noun phrase. The motivation he provides is not subcategorizational parallelism, but the behaviour of this NP with respect to the Specified Subject Condition. If there are alternatives to this condition (as suggested by Brame (1977)), then even this argument for regarding the possessive NP as a "subject" is not very strong.

7 Nominals like (9) do have variants like (1), where the nominal has an of-complement:

(1) the amusement of the children (at John's stories)

However, this should not be taken as indicative of a parallelism in the grammatical relations of amuse and amusement, for this
of-complement cannot cooccur with a filled Poss-NP "subject" (cf. (8b)), or with a (postposed) by-phrase.

The of-NP position in the noun phrase is (under the traditional "movement" analysis) filled in one of two ways. For 'transitive' NPs like destruction of the city, this position is filled in the base. For 'intransitive' NPs like the growth of the corn or the height of the building, a rule of NP-postposing (cf. Jackendoff (1977:90ff)) moves an NP from the Poss-NP position to the of-NP position. Thus the occurrence of an NP in the latter position does not (in itself) indicate a correspondence with the object of a related verb.

8 Contrasts like (ib), (iib) below appear to be a nice confirmation of this analysis, which utilizes the distinction between "transformational" and "lexical" passives.

(1) a. The children were annoyed (amused) by John's stories.
   b. *the children's annoyance (amusement) by John's stories

(ii) a. The children were annoyed (amused) at John's stories.
   b. the children's annoyance (amusement) at John's stories

If annoyed by, amused by, are analyzed as "transformational" passives, but annoyed at, amused at, as "lexical passives" (by
Wasow's Criterion 5), the unacceptability of by in the nominal follows from the inability of transformationally derived structures to participate in lexical rules (compare Wasow 1977:359, fn.15, examples (a) and (c)).

However, we must also note some recalcitrant facts. The "subjects" of the nominals confusion, humiliation, hurt, and inspiration correspond to the subjects of the participles be confused, be humiliated, be hurt, and be inspired (and to the objects of the corresponding verbs). We would therefore like to analyze these participles as "lexical" passives, and relate the nominals to the participles. (Additional evidence that these participles are adjectives is provided by the "unpassives" unhurt, uninspired; cf. Hust (1978), Siegel (1973, 1974).) Now these participles select by:

(iii) He seemed confused by the questions.
(iv) John seemed humiliated by the disclosures.
(v) I was very hurt by that remark.
(vi) The poet seemed more inspired by the dinner than by the sunset.

(Notice that un- attachment, modification by very or more, and the context NP seem ___, are diagnostics for adjectives.) The by here is apparently lexically selected. (As Wasow notes, "there is nothing to prohibit a lexically derived passive from taking by as its associated preposition, or as one of several alternatives" (1977:349)). But even this by is unacceptable in
the nominal:

(vii) his confusion (*by the questions)
(viii) John's humiliation (*by the disclosures)
(ix) My hurt (*by that remark)
(x) the poet's inspiration (*by the sunset)

On the other hand, if we argue that this *by is the "regular" by and the participles are "transformational" passives, the nominals cannot be related to the participles.

This imperfect correspondence in the syntactic frames of the participles and nominals under consideration suggests that their relation may be less direct than the Lakoff-Jackendoff-Wasow analysis argues for.

9 Anderson (1977:371-372) seems to make the same point. However, he (incorrectly) assumes that Wasow advocates the derivation of all nominals from past participles. He also advances an alternative solution, namely, to subcategorize verbs like *amuse*, *annoy*, etc., to take idiosyncratic prepositions ("we note that these verbs have to contain, in their lexical entries, information concerning idiosyncratic preposition selection"), and to derive the nominals from "intransitive" instead of "transitive" verbs. This solution is unworkable, since the verbs *amuse*, *annoy*, etc. never take idiosyncratic prepositions; it is only the participles in the context be which must be so subcategorized:
(1)*The news had annoyed at Mary.
(11)*Mary had annoyed at the news.

10 Chomsky initially suggests (1970:192) that structures like John amused the children are transformationally derived from John cause [the children be amused], just as John grows tomatoes might be transformationally derived from John cause [tomatoes grow]. Later, he treats [+cause] as a lexical feature, which we must "restrict . . . with respect to the feature that distinguishes derived nominals" (op. cit.:215).

11 The participle exhausted is one of the problematic "lexical" passives which select by (see fn.(8), above). Its adjectival status in (30a) is shown by its ability to occur in contexts diagnostic for adjectives, i.e. leave NP___, seem___, and its ability to take modifiers like very. The examples in (31) show that when the NP which is modified is inanimate (and a non-Experiencer), this participle does not occur in contexts diagnostic for adjectives.

12 For clarity of presentation, I diverge from the convention of the standard theory (argued for in Chomsky (1965), and adopted by Hust (1978)) of giving negatively marked selectional
features. The feature [+____[+Animate]] is equivalent to the feature [-____[-Animate]] of the standard theory, and [+____[-Animate]] is equivalent to [-____[+Animate]].
1. Two Hypotheses

The question now arises whether we have merely identified a class of principled "exceptions" to an otherwise valid paradigm of correspondences, "Subject of the S" and "Poss-NP," and "Object of the Verb" and "of-NP" (much as we might identify a class of principled exceptions to the rule of Passive); or whether these verbs and nouns are not exceptional at all, and it is the paradigm which is unjustified. The theoretical interest of this question is whether lexical redundancy rules should still be mappings between grammatical functions, but have access to thematic information (at a cost); or whether thematic functions are a more appropriate basis for stating these rules (and subcategorizational correspondences). The latter approach has been suggested by Anderson (1977), who proposes that recurring correspondences of thematic and grammatical functions in given syntactic frames be abstracted and stated as general principles of (the) language, so that individual lexical rules need no longer explicitly relate grammatical functions.

If lexical rules are mappings between grammatical
functions, we will apparently need two rules for the nominalizations of transitive verbs, illustrated schematically in (1):

(1)  

i. Subject \[ V \rightarrow \text{Object} \rightarrow \text{Poss-NP} \]  

\[ \text{[+Experiencer]} \quad \text{N} \quad \text{(of) NP} \]  

ii. Subject \[ V \rightarrow \text{Object} \rightarrow \text{Poss-NP} \]  

\[ \text{[+Experiencer]} \quad \text{(Prepositional Object)} \quad \text{N} \]  

An alternative in line with the analysis suggested by Lakoff (1970), Jackendoff (1975), and Wasow (1977), would dispense with rule (1), subpart (ii) above; it would derive NPs with \[ [+Experiencer]\] "subjects" by the "regular" rule for deadjectival nominals, which can be illustrated as (2):

(2)  

Subject \[ (be) A \rightarrow \text{(PP)} \rightarrow \text{Poss-NP} \]  

\[ \text{(PP)} \quad \text{N} \]  

Notice however that even this solution must countenance rule (ii), which is thematically restricted.

Further, the rules which relate verbs and adjectival passives must also contain thematic information. We have seen
that whether or not a verb has an adjectival passive is not entirely unpredictable; while verbs with Experiencer objects characteristically have adjectival passives, the [+____[-Animate]] verbs *excite*, *exhaust*, *depress*, *agitate* and *satisfy* (which take non-Experiencer objects) do not have adjectival passives. The relevant lexical rule must be so stated as to exclude the latter class. We may therefore say that in this theory, lexical redundancy rules (in general) must take into account two kinds of information: grammatical and thematic.¹ I shall refer to a theory which states a lexical rule as an operation on grammatical functions which is sensitive to thematic information as the "mixed" version of the "grammatical functions" hypothesis of lexical rules. (The "pure" version of this theory, wherein lexical rules are denied access to thematic information, has been shown to be descriptively inadequate.)

The theory I wish to oppose to the "mixed" version of the "grammatical functions" hypothesis is the "thematic functions" hypothesis. In this theory, lexical rules relate argument structures, and the syntactic frames that particular argument structures are "mapped" into are independently specified. Thus to account for the data considered so far, we shall postulate a rule which relates a verb with the argument structure (Causer, Experiencer) to a noun or an adjective with the argument structure (Experiencer, X), where X≠Causer, and is possibly null.
I shall show that the "grammatical functions" hypothesis, in either its "pure" or its "mixed" version, imposes a limitation on lexical rules that renders them incapable of expressing the types of generalizations about subcategorizational correspondences that need to be expressed. But first, I wish to consider a model for lexical rules that has recently been proposed by Wasow (1980). Wasow's motivation for including thematic functions in lexical rules is somewhat different from ours, and he advocates the "mixed" theory that I shall argue against. However, there are some interesting points of convergence between his theory and the analysis we have so far developed, which I shall point out.


With the possibility of capturing distributional regularities in the lexicon in the framework of Remarks, the issue arose of the necessity for a class of structure-preserving transformational rules in the grammar, distinct from lexical rules. Wasow (1977) has described why a number of linguists argued for the elimination of structure-preserving transformations.

The primary motivation for structure-preserving transformations has been to account for regularities in co-occurrence restrictions. More specifically, when there are two syntactic constructions with the following three properties, then their relationship can be formulated as a structure-preserving transformation: (i)
they both can be generated by the rules of the base; (ii) the morphological forms that appear in one construction are predictable from those that appear in the other; and (iii) the co-occurrence restrictions in one construction are predictable from those in the other. Recently, several linguists have pointed out that it is, in general, also possible to relate constructions satisfying (i)-(iii) by means of lexical redundancy rules. This is accomplished by isolating a key word in each construction (generally a verb) and expressing the regularities between the constructions in terms of the lexical entry for that word, especially the contextual features in the entry for that word. Freiden (1974, 1975) and Bresnan (1976) have suggested that all structure-preserving transformations can be reformulated as lexical redundancy rules. (Wasow 1977:328)

It has been suggested that such a reanalysis offers a natural explanation for the fact that these rules preserve structure; other advantages, such as reduced generative capacity and a closer approximation to psychological reality, have also been claimed in its favor.

Initially, Wasow, in his well-known article "Transformations and the lexicon" (1977), argued against the elimination of structure-preserving transformations. The major part of his article was devoted to an examination of the passive in English, a paradigm case of a structure-preserving rule. Wasow showed that there were in fact two rules of passive in English, one the traditional rule which does not alter syntactic category (the verbal passive), the other a rule which took verbs as input to output past participial adjectives (the adjectival passive). He illustrated that the two rules, though both structure-preserving, differed in productivity and in conditions...
on application. (Thus we saw in Chapter One that the adjectival passive was "local", in the sense that not every immediately post-verbal NP could be preposed by this rule.) Wasow argued that the differences between the verbal passive and the adjectival passive were in fact the differences we would expect between a transformational rule and a lexical rule. Thus, he concluded that not all structure-preserving rules were lexical rules.

The distinctions that Wasow pointed out between the verbal passive and the adjectival passive were indisputable. What was perhaps not equally evident was that these differences indicated a transformational versus lexical dichotomy in structure-preserving rules. The maintenance of a class of transformational rules which were structure-preserving led to the loss of an elegant demarcation between transformational and lexical rules, and it left the structure-preserving property unexplained. Acknowledging these problems, Wasow (1980) accepts the structure-preserving property as the boundary between lexical and transformational rules. The problem he addresses is that of retaining the distinctions between a rule-type like the verbal passive and a rule-type like the adjectival passive in a framework wherein both these rules are lexical, and both are stated as operations on grammatical relations. His solution is to adapt the suggestions of Anderson (1977), and incorporate thematic functions into lexical rules. He therefore makes the
following proposal:

Let us suppose that the functional structure in lexical entries is a specification of which thematic relations should be assigned to the elements mentioned in the syntactic context. Then we may distinguish two types of lexical rules: those that make reference to thematic functions and those that do not. The former would correspond to rules that my earlier paper called lexical, and the latter to those that I called transformations.

Unlike the 1977 model, the 1980 model provides definitions of grammatical relations in terms of "rather superficial structural configurations." Thus Wasow continues:

the distinctions my earlier paper tried to capture in terms of the difference between structural rules and relational rules is now to be handled in terms of the difference between (superficial) grammatical relations and thematic relations.

Wasow thus postulates two types of lexical rules, which he calls "major" and "minor" lexical rules. A typical lexical rule is given the form $\psi_{pq}(n<---m)$. $\psi$ indicates the morphological effect, $P$ and $Q$ are the grammatical categories of input and output (respectively), and $n<---m$ symbolizes the change from the grammatical relation $m$ to the grammatical relation $n$. Major and minor rules are distinguished in the following ways:

a. Minor rules stipulate the thematic relation of $m$, major rules do not.
b. In major rules, $P$ and $Q$ must be identical.
c. Only minor rules may have idiosyncratically marked exceptions. (op. cit.)
The verbal passive is now a major lexical rule, which is stated as follows: $-\text{en}_{\text{VV}}(1<---2)$. The adjectival passive is now a minor lexical rule, which is stated as follows: if $2=t(\text{heme})$, $-\text{en}_{\text{VA}}(1<---2)$.

Note the reference to Theme in the adjectival passive rule. The operations of the adjectival and the verbal passive are otherwise here identical; both turn direct objects into subjects. It is the thematic condition that precludes "indirect" objects (which are Goals) and "raised" objects (which have no thematic status) from undergoing the adjectival passive rule, even when they occupy direct object (i.e. immediately post-verbal) position. This is the "localness" property that (as we saw) distinguishes the adjectival from the verbal passive, and the explanation here is essentially that suggested by Anderson (1977).

Wasow's main motivation for incorporating thematic functions into (minor) lexical rules is thus a theoretical one; it rests on the assumption that all structure-preserving rules are lexical rules. If this assumption is denied, his case for thematic functions is correspondingly weakened. What is needed is empirical evidence to support the incorporation of thematic functions into lexical rules. Our data provide this evidence. We saw that the animate Experiencer objects of excite, exhaust, agitate, depress and satisfy undergo the adjectival passive, but
that the inanimate objects do not. If we tried to account for this differentiation in terms of grammatical relations (as in the 1977 model), we would be forced into the counterintuitive position that the Experiencer objects of these verbs are direct objects, but that the non-Experiencer objects are not.

To put the same point somewhat differently, there was some initial plausibility to the view that the immediately post-verbal NP in double object constructions, accusative-infinitive constructions, and idiomatic constructions was not the verb's direct object in the lexicon. The double object construction V NP1 NP2 alternates with another construction V NP2 to/for NP1, where the "first object" is a prepositional object; the accusative-infinitive construction allows NPs like *there* to follow the verb, showing that this "object" has its origin in the subject position of the complement clause; and the idiom \[\text{[[take]}_\text{advantage} \text{of}]\], is possibly present as a unit in the lexicon. The failure of such post-verbal NPs to undergo the adjectival passive rule could therefore be conceivably due to their non-direct object status. In the case of verbs like *excite*, however, there is no such evidence for assigning non-direct object status to inanimate objects at any stage. The explanation here must appeal to thematic functions, irrespective of whether the verbal passive is a transformational rule that refers solely to structural properties, or a lexical rule that refers to grammatical relations.
Notice that the verbal and adjectival passive again differ in productivity. Verbal passives of the inanimate objects of \textit{excite}, etc., are possible:

(3) a. The protons were excited by gamma rays.
   b. The lever is depressed by the air pressure, and water flows.
   c. The soap solution is agitated by the machine's rotary action, so that it lathers.
   d. The non-distinctness requirement is satisfied by the lexical entry, and lexical insertion goes through.
   e. The country's resources were exhausted by indiscriminate mining, resulting in dependence on foreign oil.

Compare also (4)-(7), where only Experiencer objects appear as subjects of an adjectival passive construction.

(4) a. John moved (touched) the stone.
     b. *The stone seemed moved (touched).

(5) a. The story moved (touched) John.
     b. John seemed (un)moved (touched) by the story.

(6) a. The authorities relaxed the regulations.
     b. *The regulations seem relaxed.

(7) a. A shower and a shampoo relaxed John.
b. John seems relaxed.

Moreover, our data show that reference to thematic functions is a general property of minor lexical rules. The characteristics of a minor lexical rule according to Wasow (1980) are that it can alter syntactic category, and that it may have idiosyncratic exceptions. On both these counts, the nominalization rule is a minor lexical rule (it was its idiosyncratic character that motivated the Lexicalist Hypothesis in the first place). Thus it is significant that the nominalization rule and the adjectival passive rule show a common sensitivity to the Experiencer-non Experiencer distinction, which the verbal passive rule is immune to. The distinction between major and minor lexical rules is thus shown to be consistent, and one that must be incorporated into a framework where there are no structure-preserving transformational rules. Wasow's model is unique in this respect (as he notes, "Bresnan's theory, as she has presented it so far, says nothing about the major-minor rule distinction").

Wasow's optimism concerning a satisfactory resolution of the problem of identifying the thematic functions relevant to lexical rules also turns out to be justified. He suggests "a line of research (which) holds some promise," which is very close to the method we pursued in Chapter Two. Noting that a lack of rigorous justification for proposed thematic assignments
undermines the force of any explanation of "exceptional" behaviour, he observes that

(t)he ideal answer to this sort of charge would be a characterization of the semantic content of the thematic relations which is precise enough to make their assignments as transparent to the intuitions of the native speaker as are control relations. However, given the failure of substantial previous efforts (e.g., Gruber (1965), Jackendoff (1976)) to achieve the requisite level of precision (see Hust and Brame (1976)), there is little cause for optimism on this score. An alternative means of lending substance to the thematic assignments could be provided by considering a wider range of minor rules. If I am correct in claiming that all such rules are sensitive to thematic relations, then each assignment will make predictions with respect to the operation of a number of different rules. These assignments would then predict a clustering of properties, and hence could not be said to be arbitrary.

It is precisely such a "clustering of properties" that was seen above, that motivated the thematic function Experiencer. Causative verbs with Experiencer objects were shown to consistently have both an adjectival passive, and a "skewed" nominalization subcategorizationally parallel to this adjectival passive. This evidence was corroborated by evidence from "finer" subcategorization, along the lines suggested by Chomsky (1964).

3. A Cross-Morphological Regularity

The question posed by the data in Chapter Two (repeated here as (8), with the [+____[+Animate]] subcategories of verbs like excite included) was whether causative verbs with
Experiencer objects are "regularly exceptional" in exhibiting a "skewed" nominalization, subcategorizationally parallel to a past participial adjective.

(8) a. agitate, amaze, amuse, annoy, astonish, bore, confute, delight, depress, disappoint, disgust, dismay, distress, elate, embarrass, excite, exhaust, fascinate, frustrate, humiliate, hurt, inspire, interest, irritate, (dis)please, puzzle, relieve, satisfy, surprise, vex

b. agitated (at, over), amazed (at), amused (at), annoyed (at), astonished (at), bored (with), confused (by), delighted (at), depressed (at), disappointed (with), disgusted (at), dismayed (at), distressed (at), elated (at), embarrassed (at), excited (at), exhausted (by), fascinated (with), frustrated (at), humiliated (by), hurt (by), inspired (by), interested (in), irritated (at), (dis)pleased (at), puzzled (at), relieved (at), satisfied (with), surprised (at), vexed (by)

c. agitation (at, over), amazement (at), amusement (at), annoyance (at), astonishment (at), boredom (with), confusion (*by), delight (at), depression (at), disappointment (with), disgust (at), dismay (at), distress (at), elation (at), embarrassment
The theoretical interest of this question, we said, was whether to adopt the "mixed" version of the "grammatical functions" hypothesis of lexical rules, or the "thematic functions" hypothesis of lexical rules. A related question was whether the nominalizations of these verbs should be related to the past participial adjectives instead of to the verbs themselves, as suggested by Lakoff (1970), Jackendoff (1975), and Wasow (1977). I undertook to show that the verbs, adjectives and nouns under consideration are not "irregular" in any way, and that it is the requirement that lexical rules refer to grammatical functions which prevents us from seeing the underlying regularity in the observed pattern of subcategorizational correspondences.

In order to see the limitations of the "grammatical functions" hypothesis, let us briefly advert to the simplest (and strongest) form of this hypothesis: the model that Jackendoff (1977) and Wasow (1977) have in mind (call it the "pure grammatical functions" model). The prediction that this model makes is that the subcategorization of a nominal N will

...
parallel the subcategorization of a predicate P from which it is morphologically derived. This may be schematized as in (9), where the arrow indicates morphological derivation and the dotted line indicates subcategorizational parallelism. The predicate P is a verb in (9a), an adjective in (9b).

(9) a. V          b. A
      ↓          ↓
     N          N

Examples (10a,b) and (11a,b) illustrate the schema above.

(10) a. John criticized the book.
      b. John's criticism of the book

(11) a. The book is readable.
      b. the book's readability

Now there may be other predicates to which the nominal N is morphologically related, but from which it is not morphologically derived. Consider for example the predicates (be) critical and read. The subjects of these predicates (which are not the morphological "bases" of criticism and readability) may, or may not, correspond to the "subject" of the nominal. Thus we have (12)-(13):

(12) a. John was critical of the book.
      b. John's criticism of the book.

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(13) a. John read the book.
   b. the book's readability

Observe that the subject (and of-complement) of be critical are parallel to the "subject" (and of-complement) of criticism, whereas it is the object of read that corresponds to the "subject" of readability. But these correspondences do not validate or invalidate (respectively) the model we are discussing, for it makes no direct predictions in these cases. Rather, we must first ascertain the morphological (and hence subcategorizational) relation of be critical to criticize and of read to readable, since the latter predicates are the morphological "bases" of the nouns. Thus, since the subject of be critical is also the subject of criticize, it corresponds (as expected) to the "subject" of criticism. But since it is the object of read that corresponds to the subject of readable, the "subjects" of the verb and the deadjectival noun are not expected to be parallel; as indeed they are not.

Given a range of Ss and an NP with morphologically related predicates, therefore, the "pure grammatical functions" model predicts a parallelism between only one of these Ss, and the NP. The S that the NP's subcategorizational frame is predicted to be parallel to is that S whose predicate is the morphological "base" of the head noun.³ Obviously, any claim that the NP's subcategorizational frame should parallel those of the whole
range of Ss with morphologically related predicates is immediately refutable, since the Ss do not show such a parallelism among themselves. The link with morphological derivation is therefore a crucial one for this model.

This crucial dependence on the links provided by morphological derivation is the reason why the problem of the examples (8a-c) is not solved, for this model, by relating the nouns in (8c) to the participles in (8b). Observe first that the verbs in (8a) each have not one, but two adjectival (participial) derivatives: present participial adjectives, and past participial adjectives. The present participles take as subject the subject of the verb, but the past participles take as subject the object of the verb:

(14) a. The stories amused the children.
    b. The stories were amusing.
    c. The children were amused.

Given a noun amusement which is morphologically derived from neither amusing nor amused, it is a priori impossible to predict whether its "subject" will correspond to the subject of be amusing or of be amused. This correspondence can only be inferred from the subcategorizational correspondence of amusement to (its morphological base) amuse. The prediction of the "pure grammatical functions" model is that the "subject" of amusement will correspond to the subject of amuse, and
(therefore) to the subject of be amusing. The case of 
amuse-amusement-(be) amusing should thus be parallel to that of 
criticize-criticism-(be) critical. It is precisely because 
amusement "violates" this prediction that a parallelism is 
observed in the "subjects" of the nominal and the past 
participial adjective; this parallelism arises by virtue of the 
fact that both these "subjects" correspond to the verb's object. 
The analysis which relates amusement to amused appears to 
accord with the "pure" version of the "grammatical functions" 
hypothesis, by restoring a parallelism in the "subjects" of one 
S and NP pair in a paradigm of morphologically related 
predicates. But the parallelism which is thus reinstated is 
merely an observation, not a prediction.

The property of being able to express only pairwise 
relations between lexical items "linked" by morphological 
derivation is in fact a general property of lexical rules as 
currently formulated. Thus the active-passive rule relates only 
a pair of Ss, such as (15) and (16):

(15) Someone read the book.

(16) The book was read.

It does not (directly) relate (16) to (17) or (18):

(17) The book is readable.

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The choice of which pair of Ss to relate is obviously determined by a (postulated) morphological derivation, which derives **be read** from transitive **read**, and not from readable or intransitive **read**.

Observe that the rules of the "mixed" version of the "grammatical functions" hypothesis are also subject to the same restrictions. Such rules (cf. (1-2) above) may apply to finer subcategories, by virtue of their containing thematic information; but they may still express only pairwise relations, the choice of the pair being determined by morphological derivation. As a further illustration of this property, consider again the formalism for minor lexical rules given by Wasow (1980): "if m=(some thematic function)x, then Ψₚₚₑ(n<---m)." Such a rule specifies a subcategorizational correspondence between m and n (e.g., "object" and "subject") in conjunction with a morphological operation Ψ; it relates the subcategorization of a pair of predicates such that one is morphologically derived from the other. On the other hand, rules which relate only thematic structures may predict a subcategorizational pattern in a range of Ss and an NP. Further, they may apply to lexical items exhibiting diverse patterns of morphological relationships. (These points are illustrated below.)

I shall now show that there are generalizations about
subcategorizational correspondences which cut across different morphological paradigms, and which cannot be expressed by pairwise comparisons. Consider the four different morphological paradigms schematically illustrated in (19a-d). The arrows indicate morphological derivation, and the dotted lines indicate observed subcategorizational parallelism. Recall that the "pure grammatical functions" model predicts that the dotted line will follow the arrow.

(19) a. \[ \begin{array}{c} V \\ \nearrow \\ N \quad \longrightarrow \quad A \\ \searrow \\ \end{array} \]

b. \[ \begin{array}{c} V \\ \nearrow \\ N \quad \longrightarrow \quad A \\ \searrow \\ \end{array} \]

c. \[ \begin{array}{c} V \\ \searrow \\ N \quad \longrightarrow \quad A \\ \nearrow \\ \end{array} \]

d. \[ \begin{array}{c} V \\ \searrow \\ N \quad \longrightarrow \quad A \\ \nearrow \\ \end{array} \]

For the "pure grammatical functions" model, the paradigms represented by (19a) and (19d) are "irregular." Further, even the "mixed" version of the "grammatical functions" hypothesis cannot say anything about the relation indicated by the dotted line in (19a) and (19d). In order to express this relation, it needs the presence of an "arrow," i.e. a morphological derivation. However, when the four sets of data exemplifying the four schemata of (19) are represented in terms of argument structures (thematic functions) alone -- ignoring morphological
derivation --, we obtain (as we shall see) the single general schema (20):

(20) \[ V \]
\[(Causer, \ Experiencer)\]
\[Subject \ Object\]

\[N\]
\[(Experiencer, \ X)\]
\[Poss-NP \ PP\]

\[A\]
\[(Experiencer, \ X)\]
\[Subject \ PP\]

The generalization represented by (20) should be apparent.

Schema (19a) represents the relation of amuse to amusement and amused (and the other examples in (8a–c)). It should be clear that these data conform to the representation in (20).

Schemata (19b–c) are exemplified in (21a–d).4

(21) a. The news saddened (gladdened, cheered, tired) Bill.
    b. *The news' sadness (gladness, cheerfulness, tiredness) of Bill
    c. Bill was sad (glad, cheerful, tired).
    d. Bill's sadness (gladness, cheerfulness, tiredness)

In (21a) and (21d), as in (8a–c), the object of the verb corresponds to the "subject" of the nominal. However, here we do not readily see an instance of the "skewed" paradigm, since the
nouns in (21d) are plainly deadjectival (as are the verbs sadden and gladden). The "pure grammatical functions" model therefore predicts the parallelism in (21c-d); the "subject"-object correspondence in (21d), (21a) is to be inferred from the relationship of the verbs in (21a) to the adjectives in (21c).

But observe that the same pattern of subcategorizational correspondences is predicted by our hypothesis about Experiencers. The verbs in (21a) are causative verbs with Experiencer objects. The objects of the verb correspond to the "subjects" of the nominal and the subjects of the adjectival predicates with Experiencer arguments, as expected. The "thematic functions" hypothesis thus allows us to treat (8a-c) and (21a-d) as instances of the same pattern of subcategorizational correspondences, namely (20).

The case of tire_v, tired_A and tiredness_N is a particularly illuminating example of the problems created by morphological derivation for the "pure grammatical functions" model. The adjective tired is morphologically a past participle, just like the adjective exhausted (and the other adjectives in (8b)). However, the noun tiredness is formed by -ness attachment to the adjective, while the noun exhaustion (like the other nouns in (8c)) is formed from the verb (suffixes like -ment, -(at)ion, characteristically attach to verbs, to form nouns). The "pure grammatical functions" model therefore predicts that *the walk's exhaustion of Mary will be grammatical, but that *the walk's.
tiredness of Mary will be ungrammatical. The "thematic functions" hypothesis, however, correctly predicts that the semantically similar verbs tire and exhaust (strictly, the subcategory of the latter with the feature [+____[+Animate]]), and their adjectival and nominal derivatives, will have the same pattern of subcategorizational correspondences.

Consider now the hypothetical situation wherein the nominals in (8c) are subcategorizationally parallel to the verb, i.e. where John's amusement of the children is grammatical. Such a hypothetical paradigm would violate the generalization about Experiencers. Our hypothesis thus not only accounts for (8a-c), and generalizes it with (21a-d); it predicts that the language would be more complex if the facts were otherwise.5 The "pure grammatical functions" model, on the other hand, predicts that (8a-c) and (21a-d) should be non-parallel. Further, when this prediction fails, this model is still unable to see (8a-c) and (21a-d) as instances of the same subcategorizational pattern. The morphology tells us that in (8a-c), there is a relation between an S with a verbal predicate, and an NP; while in (21a-d), there is a relation between an S with an adjectival predicate, and an NP. The only way to reconcile the two paradigms is to ignore the morphology, postulate a lexical "gap" where the nominalizations of the verbs (8a) should be, and consider both the nouns in (8c) and (21d) as deadjectival. Recall that this is the solution proposed by Lakoff, Jackendoff,
Consider next the schema (19d), illustrated in (22a–d).

(22) a. The news terrified (horrified) Mary.
   b. *the terror (horror) of Mary by the news
   c. Mary was terrified (horrified) at the sight of blood.
   d. Mary's terror (horror) at the sight of blood

In (22a) we have verbs which are morphologically derived from the nouns in (22d). The same arguments that motivated the "pure grammatical functions" model for verbs and deverbal nouns ought to apply in the case of nouns and denominal verbs. Observe the parallelisms in (23)–(24):

(23) a. John's apology to Bill
   b. John apologized to Bill.

(24) a. John's scrutiny (summary) of the article
   b. John scrutinized (summarized) the article.

In (22a–d), however, this parallelism does not obtain; the "subject" of the nominal corresponds to the object of the verb. This is a problem for the "pure grammatical functions" hypothesis. If (22d) is related to (22a) on the strength of the morphological evidence, the grammatical functions of the S and the NP do not coincide. If (22d) is related to (22c), the
subcategorizational relation conflicts with the morphological relation. Observe that once again, the thematic function Experiencer is crucially involved. The object in (22a), and the "subject" in (22c-d), are Experiencers. The paradigm (22a-d) thus generalizes with (8a-c) and (21a-d).

But now the "pure grammatical functions" model has not only made a consistently wrong prediction in two different morphological paradigms where Experiencers have appeared; in the case of (22a-d), we have a strong intuition that the paradigm in fact is regular. It seems to me that this intuition has its roots in two facts: first, the subcategorization of the noun is "given," since it is morphologically basic; second, verbs ending in -ify are causative verbs. In general, the subjects of intransitive (non-causative) constructions appear as the objects of transitive (which includes causative) constructions (compare the Theme-Rule of Anderson (1977)). The paradigm (22a-d) reveals an interesting fact: when the relevant semantic factors are sufficiently overt as to be available to unanalyzed intuition, our expectations about the subcategorizational correspondences in Ss and NPs depend on perceived semantic roles, and not on a simple correspondence in grammatical functions.

We have thus far examined four morphological paradigms where Experiencers are involved, and the same pattern of subcategorizational correspondences has been seen to hold in all four cases. The underlying unity in the subcategorizational
pattern emerged only when the syntactic frames of three predicates were compared at once: a verbal, an adjectival and a nominal predicate. The pairwise comparison of Ss and NPs cannot reveal such regularities.

But we have seen that such a pairwise comparison will be an essential feature of any version of the "grammatical functions" hypothesis. Thus consider how the "mixed" version of this hypothesis will deal with the three morphological paradigms we have discussed. To deal with deverbal nominals so as to distinguish the data of (8a–c) (illustrating the schema (19a)) from the "normal" cases, it will postulate the two "marked" rules (11, 11) (repeated here as (25)):

\[
\begin{align*}
1\text{. Subject } & V \quad \text{Object} \\
& \downarrow \quad \downarrow \\
& \text{Poss-NP} \quad N \quad \text{(of) NP}
\end{align*}
\]

\[
\begin{align*}
11\text{. Subject } & V \quad \text{Object} \\
& \downarrow \quad \downarrow \\
& \text{(Preposition N Poss-NP)}
\end{align*}
\]

In the case of (21a–d) (illustrating the schemata (19b–c)), it will have no cause to postulate a "marked" rule mentioning the thematic function Experiencer, since all subjects of adjectival predicates correspond to the "subjects" of deadjectival
nominals. The required rule is (2) (repeated here as (26)):

\[(26) \quad \text{Subject} \quad (\text{be}) \quad A \quad (\text{PP})\]

\[\downarrow \quad \downarrow \quad \downarrow \]

\[\text{Poss-NP} \quad \text{N} \quad (\text{PP})\]

In the case of denominal verbs, in order to distinguish the "skewed" correspondence exhibited by (22a-d) from the "normal" correspondence in (23) and (24), the theory will need two "marked" rules, which we may represent as (27):

\[(27) 1. \quad \text{Poss-NP} \quad \text{N} \quad [-\text{Experiencer}] \quad \downarrow \quad \downarrow \]

\[\text{Subject} \quad \text{V} \quad \downarrow \]

\[11. \quad \text{Poss-NP} \quad \text{N} \quad [+\text{Experiencer}] \quad \downarrow \quad \downarrow \]

\[\text{Object} \quad \text{V} \quad \downarrow \]

It should be apparent that these rules do not express the generalization we have noticed; nor do they constitute any kind of explanation of the phenomena under consideration.

Let us conclude the discussion with a rather nice bit of evidence for the Experiencer hypothesis (as against the pairwise comparison approach). Among the examples in (8a-c) is the verb-adjective-nominal triplet delight, delighted (at), delight...
(at):

(28) a. The news delighted Mary.
   b. *the news' delight of Mary
   c. Mary was delighted at the news.
   d. Mary's delight at the news

From (28a-d) we must conclude that delight is one of the nouns exhibiting the "skewed" pattern, being subcategorizationally parallel to the participial adjective. However, there is an intransitive verb delight, and this verb has a corresponding nominalization:

(29) a. Mary delights in tormenting small insects.
   b. Mary's delight in tormenting small insects

The "subject" of the noun delight is thus at the same time parallel and non-parallel to the subjects of the verbs delight. The facts, however, are straightforward. The "subject" of the noun is an Experiencer; it corresponds to the subjects of those Ss in which Experiencers appear as subjects.11

4. The Thematic-Syntactic Mapping

There is thus a variety of evidence to show that the parallelism in the grammatical functions of the S and the NP postulated by Jackendoff is unjustified, and the proposal for
generalizing the projection rules of verbs and deverbal nouns fails. One task which remains is to specify a general method of enforcing the shared selectional restrictions of lexically related words. The other task is to specify the formalism for lexical redundancy rules under the "thematic functions" hypothesis.

Let us consider in some detail the proposals of Anderson (1977), to which I have made brief references earlier. Anderson observes that there are recurrent regularities within a language, and perhaps across languages, in the syntactic positions in which certain thematic functions are characteristically realized. He suggests that the grammar provide for a statement of these regularities in the thematic-syntactic mapping. Two such regularities he notes are the preference of Agents for subject position, and the occurrence of Themes as subjects of intransitive verbs or objects of transitive verbs; and he informally designates these regularities as the "Theme-Rule" and the "Agent-Rule". Note that such "mapping" rules would extract a core of regularities from thematic-syntactic correspondences which, in existing frameworks, are specified for individual lexical entries. Thus Jackendoff (1972, section 2.4) assumes an indexing procedure for correlating syntactic positions and thematic functions, in his illustrative examples of lexical entries. Similarly, Wasow (1980) gives equations for thematic-syntactic correspondences,
e.g., "l(i.e. subject) = a(gent)." The rules suggested by Anderson
do not therefore result in any ad hoc extension of the grammar.
On the contrary, they simplify lexical entries, by allowing
thematically-syntactic equations or indices to be omitted from the
entry if the information contained in them is entirely regular
and predictable. 13

Assuming, then, that the grammar specifies a Theme-Rule and
an Agent-Rule, Anderson illustrates how this affects the minor
lexical rule relating transitive and intransitive verb pairs.
Jackendoff (1975) proposes the rule (30):

\[
\begin{array}{c}
\begin{array}{c}
\text{NP1} \\
\text{NP1 W}
\end{array}
\end{array}
\qquad \longleftrightarrow \qquad
\begin{array}{c}
\begin{array}{c}
\text{NP2} \\
\text{CAUSE (NP1 W)}
\end{array}
\end{array}
\]

Anderson points out that

... this rule ... explicitly establishes the fact
that the NP in Direct Object position in a clause with
break(tr.) corresponds semantically to the NP in Subject
position in a clause with break(intr.). In light of the
Theme-Rule, however, we can see that this association is
exactly the natural one; and that it need not be stated
as part of the lexical relation at all. In fact, neither
verb need contain any explicit association of particular
NP in its syntactic environment with particular
positions in the semantic representation, for these will
follow directly from the Theme-Rule and the Agent-Rule.
(Anderson 1977:368)

In this model, we may represent the relation between
transitive and intransitive verbs as follows:
We may now state the selectional restrictions of intransitive and transitive verbs on the thematic functions Agent and Theme, and the syntactic positions corresponding to these functions will be automatically restricted by the Agent-Rule and the Theme-Rule, which (thus) function as projection rules. Let us illustrate this with the verbs break:

\[
\begin{align*}
(31) \quad & \left[ \begin{array}{c}
+V \\
+NP_{\text{Theme}} \\
\text{(Theme)} \\
\text{+breakable}
\end{array} \right] \\
& \leftrightarrow \\
& \left[ \begin{array}{c}
+V \\
+NP_{\text{Agent, Theme}} \\
\text{(Agent, Theme)} \\
\text{+concrete +breakable}
\end{array} \right]
\end{align*}
\]

If such a thematic-syntactic mapping can also be specified for NPs, the same mechanism which enforces shared selectional restrictions in the domain of the S, for Ss with lexically related predicates, can be extended to account for the subcategorizational correspondences in Ss and NPs. As our recognition of thematic functions is sharpened, we may postulate more such functions; and there may be corresponding modifications in rules like the Theme-Rule. We have already noted that the notion "Theme" is too gross for the statement of lexical redundancies and subcategorizational correspondences.
The thematic-syntactic mapping (we expect) will typically be a many-to-one mapping, since the number of syntactic positions available will (likely) be much smaller than the number of thematic functions.

We may conceptualize the mapping from argument structures to syntactic frames in the following way. Let there be a hierarchy of grammatical functions in the S and the NP, and a hierarchy of thematic functions, approximately as in (33):

<table>
<thead>
<tr>
<th>(33) Thematic functions</th>
<th>Grammatical functions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Causer</td>
<td>1 Subject/Poss-NP</td>
</tr>
<tr>
<td>Theme, Experiencer</td>
<td>2 Object/of-NP</td>
</tr>
<tr>
<td>X</td>
<td>3 Prepositional phrase</td>
</tr>
</tbody>
</table>

(X≠Causer or Theme/Experiencer)

Let us hypothesize that the highest available thematic function is mapped on to the highest available grammatical function. This means that if there is a Causer in the argument structure, Experiencer/Theme has the rank 2; if there is no Causer, it has the rank 1. Thus given an argument structure (Causer, Experiencer/Theme), and a syntactic frame Subject/Poss NP-Object, Causer will occupy Subject or Poss-NP position, and Experiencer/Theme will occupy Object or of-NP position. Given an argument structure (Experiencer, X) or (Theme, X), (where there is no Causer), and a frame Subject/Poss NP-PP, the Experiencer
or Theme will occupy the Subject or Poss-NP position. Note that in the NP, the Poss-NP position is optional. In this case, if we have the syntactic positions of-NP and PP, and an argument structure (Experiencer, X) or (Theme, X), the Experiencer or Theme will occupy the (higher) of-NP position, and X will go to the PP position.

We can now give a lexical entry the following schematic representation. (We assume that each lexical item is fully specified, as in the framework of Jackendoff (1975)).

(34) 1. /phonological representation/
     2. lexical category
     3. subcategorization frame
     4. semantic representation, i.e.
        argument structure in terms of
        thematic functions
     5. mapping specification

The mapping specification correlates thematic functions with syntactic positions. We assume that where this mapping is predictable from the hierarchy in (33), it need not be stated as part of the lexical entry.

Given such a hierarchy, the lexical rules relating verbs, nouns and adjectives can be viewed simply as rules relating argument structures, for the subcategorizational correspondences they produce will be predictable. In my attempts to formulate
the rules in these terms, I shall be assuming that there are separate morphological and semantic redundancy rules, and that the same semantic rule can be paired with more than one affix. I shall justify this separation in the next chapter, and show how the semantic rules may be accessed by rules of affixation.

Let us suppose that in the simplest case, there are rules like the following:

(35) For any verb with a certain argument structure, form a noun with the same argument structure.
(e.g. criticize-criticism, excite-excitation)

(36) For any adjective with a certain argument structure, form a noun with the same argument structure.
(e.g. sad-sadness, pure-purity, callous-callousness)

(37) For any noun with a certain argument structure, form an adjective with the same argument structure.
(e.g. fury-furious, glory-glorious)

Let us call rules like (35)–(37), rules of Inheritance. Let us further hypothesize that the output of the rules relating argument structures is subject to filters, which express the notion "possible argument structure" for the output category; and that there is a (possibly language specific) filter that rules out nouns with the argument structure (Causer, Experiencer):
This will filter out the output of rule (35) for verbs with this argument structure. Now there is a rule of Decausativization, which we need for relating causative verbs to their past participial adjectives. Suppose we say this rule is more general, and that it relates verbs to nouns as well as to adjectives. We can formalize this generalized rule in terms of the feature system of Chomsky (1970), where verbs have a feature \([-N]\), and adjectives and nouns share a feature \([+N]\). The required rule is (39):

\[
(39) \begin{cases} 
-N \text{ (i.e. } V) & +N \text{ (i.e. } N \text{ or } A) \\
+NP \_ _ NP & +NP \_ _ (PP) \\
(Causer, Experiencer) & (Experiencer, (X)) 
\end{cases}
\]

This rule will produce adjectives and nouns like amused and amusement from amuse.

In addition, we know that there is a rule of Causativization that produces verbs from nouns and adjectives (horror-horrify, sad-sadden).
Notice now that rules (40) and (39) are inverses of each other, and that rules (36) and (37) would be inverses of each other. Moreover, corresponding to rule (35), there is an inverse rule which retains the argument structure of the noun for the verb (summary-summarize, scrutiny-scrutinize). In a theory wherein the same rule specifies morphological and semantic information, such inverse rules must be kept separate, in order to preserve information about the "direction" of morphological derivation. I have indicated, however, that I shall argue for a distinct body of affixation rules. These affixation rules will be unidirectional, and will supply the necessary information "is derived from." This allows us to give the semantic rules simply as bidirectional rules, expressing the notion "is related to". That is, the language appears to have rules which relate the argument structures of nouns, verbs, and adjectives, which are neutral with respect to the direction of morphological derivation.

We may therefore give the following semantic rules. I indicate below each rule the lexical items related by it.
(41) Causativization-Decausativization

\[
\begin{align*}
\begin{array}{c}
\text{[-N (i.e. V)}] \\
\text{[N (i.e. N or A)]} \\
\text{[NP_\text{---}(PP)]} \\
\text{[(Experiencer, (X))]}
\end{array}
\end{align*}
\]

\[
\begin{array}{c}
\text{[+-NP_\text{---}NP]} \\
\text{(Experiencer, (X))}
\end{array}
\]

\[
\begin{align*}
\text{amusement, amused} & \quad \text{amuse} \\
\text{horror, horrified} & \quad \text{horrify} \\
\text{tired} & \quad \text{tire} \\
\text{sad} & \quad \text{sadden}
\end{align*}
\]

(42) Inheritance 1

\[
\begin{align*}
\begin{array}{c}
\text{[-N (i.e. V)}] \\
\text{[N (i.e. N or A)]} \\
\text{[NP_\text{---}NP]} \\
\text{(Argument, Argument)}
\end{array}
\end{align*}
\]

\[
\begin{align*}
\text{[V]} \\
\text{[NP_\text{---}NP]} \\
\text{(Argument, Argument)}
\end{align*}
\]

\[
\begin{align*}
\text{criticize} & \quad \text{criticism} \\
\text{excite} & \quad \text{excitation} \\
\text{summarize} & \quad \text{summary}
\end{align*}
\]
(43) Inheritance 2

\[
\begin{align*}
\text{[A} & \quad \text{+NP}_{\_}(PP) \\
\text{\quad (Argument, (Argument))} & \quad \text{\textless-----\textgreater} \\
\text{[N} & \quad \text{+NP}_{\_}(PP) \\
\text{\quad (Argument, (Argument))} &
\end{align*}
\]

sad
tired
furious

sadness
tiredness
fury
Postscript: Thematic Functions

The strategy I have pursued for identifying a thematic function Experiencer of relevance to lexical rules has been to begin with an examination of subcategorizational correspondences, rather than with a theory of thematic functions. Considering the present lack of a constrained theory in this area, this is perhaps the right strategy. However, I shall in this section make an attempt to integrate this thematic function into the familiar system of Gruber (1965) and Jackendoff (1972,1976), and point out some problems to be resolved in this area.

Jackendoff (1976), following Gruber (1965), hypothesizes three basic classes of predicates: Motional, Punctual and Durational. Their schematic representations are given below.

(44) a. GO (x, y, z) (Motional)
    b. BE (x, y) (Punctual)
    c. STAY (x, y) (Durational)

In addition, the notion of causation is expressed by the functions in (45):

(45) a. CAUSE (x, e(vent))
    b. LET (x, e(vent))
We thus arrive at the following familiar definitions.

(46) a. Causer: First argument of CAUSE or LET
    b. Theme: First argument of GO, BE or STAY
    c. Source: Second argument of GO
    d. Goal: Third argument of GO
    e. Location: Second argument of BE or STAY

Our first task is to refine these functions, for we have stressed that the system in (46) does not provide enough information for lexical rules. For instance, the sentences the air pressure depressed the lever and the news depressed Mary would in this system have identical semantic representations:

(47) CAUSE(the air pressure, GO(the lever, BE(the lever, not depressed), BE(the lever, depressed)))
    i.e. depress (Causer, Theme)

(48) CAUSE(the news, GO(Mary, BE(Mary, not depressed), BE(Mary, depressed)))
    i.e. depress (Causer, Theme)

We might effect the required refinement by taking into account the "locational mode" to which the functions GO and BE must be restricted in (47) and (48). Jackendoff (1976:102) postulates "locational modes" such as Positional, Possessional and Identificational, which can be specified as restrictive.
markers on GO, BE and STAY:

The marker Positional affixed to a semantic function . . . indicates that the Location or Source or Goal of that function specify claims about where the Theme is; the marker Possessional indicates that they specify claims about whose the Theme is. . . . A parameter Identificational . . . indicates that the Location or Source or Goal of the function to which it is affixed specify claims about what the Theme is.

The attractiveness of this proposal lies in the claim that it is not accidental that a verb which can locate entities in the physical domain can also locate entities in the abstract domains of possession or identification: "in the simplest case, the verb stays fundamentally the same, changing only the restrictive modifier from one locational mode to another" (op. cit.:103 -104). Thus Jackendoff suggests that the verbs turn in the coach turned into a driveway and the coach turned into a pumpkin are both specified for a semantic function GO, but that the locational modes differ (Positional in the former case, Identificational in the latter). Similarly, keep in keep the book on the shelf and keep in keep the book are treated as differing in the modes Positional and Possessional, while sharing a function STAY.

Since we have noticed a similar generalization in the semantic fields of verbs like depress, a consideration of the relevant locational modes would appear to be an appropriate starting point for integrating the notion Experiencer into this
We may first revise the representation (47) to (49) (we write GO(x, BE(x,not y), BE(x,y)) as BECOME y(x), to distinguish these two-place predicates from predicates like give):

(49) CAUSE (the air pressure, BECOME-posit DEPRESSED (the lever))

To similarly revise (48), we must determine the appropriate locational mode. But the relevant locational mode again appears to be Positional. In saying the news depressed Mary, we are not saying who Mary belongs to or what she is; rather, we are again specifying her position, but this time in terms of a scale of emotions: in terms of the world within.

Let us then postulate two new locational modes, External and Internal, and add these as restrictive markers to GO-posit: GO-posit.ext(ernal), and GO-posit.int(ernal). We now revise (49) to (50), and (48) to (51).

(50) CAUSE (the air pressure, BECOME-posit.ext DEPRESSED (the lever))

(51) CAUSE (the news, BECOME-posit.int DEPRESSED (Mary))

We may now define what we have been calling Experiencer as the first argument of GO-posit.int., BE-posit.int, or STAY-posit.int.

The analysis so far suggests that thematic functions may be
defined at two levels of specificity. On a first, broader, level, they may be defined as in (46), with reference to only one of the five semantic functions. At this level, the function Experiencer was identified merely as a Theme. On a second, finer, level, they may be defined with reference to the semantic functions, as well as to the locational mode to which these functions are restricted. This is the level which defines notions like Possessor or Experiencer.

We have seen that this finer level is essential for the statement of lexical rules and selectional restrictions. The question then arises if the broader level is necessary at all. One motivation for retaining this level would be if it suffices for the thematic-syntactic mapping, and there is some evidence that this might be the case. Thus we see that with respect to this mapping, Experiencers appear to behave like Themes. They occupy the object position of causative verbs, sharing this position with (non-Experiencer) Themes. Again, there are a few cases exhibiting a correspondence between an Experiencer-object and an Experiencer-subject, which appear to be subcases of Anderson's Theme-Rule:

(52) a. Tormenting small insects delights Mary.
   b. Mary delights in tormenting small insects.

(53) a. He worries his mother.
   b. His mother worries (about him).
We may anticipate that as our recognition of thematic functions is sharpened, there will be a number of cases of "coincidence" in the thematic-syntactic mapping. Now if we find that some set of refined thematic functions $t_1, \ldots, t_n$ which behave similarly with respect to this mapping can also be subsumed (from the semantic point of view) under one broad thematic function, the coincidences can be explained, and the statement of the mapping rules simplified, if the broad level is retained.

This must, however, remain a very tentative proposal. For I must also note some counterevidence against the inclusion of Experiencer under Theme. Consider (54b):

\begin{enumerate}
\item a. John touched the table.
\item b. The story touched John.
\end{enumerate}

According to Gruber (1965:37) and Jackendoff (1972:43-44), the verb \textit{touch} takes Theme as subject, and \textit{Location} as object. But we have seen that the object of \textit{touch} in (54b) is an Experiencer. The behaviour of \textit{touch} with respect to the adjectival passive rule is entirely parallel to that of \textit{move}:

\begin{enumerate}
\item a. *The table seemed touched by John.
\item b. John seemed touched by the story.
\end{enumerate}

\begin{enumerate}
\item a. John moved the stone.
\item b. The story moved John.
\end{enumerate}
c. #The stone seemed moved by John.
d. John seemed moved by the story.

But move, unlike touch, is considered to have a Theme as its object. Thus we are forced to say that move has an Experiencer/Theme object, while touch has an Experiencer/Location object.19

There is a deeper question here, namely whether the thematic structures of predicates of emotion, cognition, possession, and so on, can be reduced to, and restated in terms of, the thematic structures of positional predicates. If the theory maintains that this can be accomplished, it must offer us strict guidelines for the metaphorical interpretation of non-positional predicates in terms of a "localistic" system. In the absence of such guidelines, the system is open to abuse.

As an illustration of the problem, consider the treatment of predicates of possession in this theory. Jackendoff (1976:101) starts out with a system wherein the possessed item is always Theme, and the possessor is Location (for static predicates), or Source or Goal (for dynamic predicates). Thus we have the thematic assignments in (57):
(57) a.
The book belonged to the library.
possessed possessor
THEME LOCATION

b.
Max owned an iguana.
possessor possessed
LOCATION THEME

c.
Bill had no money.
possessor possessed
LOCATION THEME

However, Jackendoff (following up an observation of Gruber's)
notes that "there is a sort of converse of Possessive location
in the following expressions" (op. cit.:134):

(58) a. Nelson ran out of money.
    b. Ari is in the money.
    c. Fred came into a lot of money.

Recall that Theme is informally characterized as the entity that
moves, or whose location is asserted. By this criterion, the
Themes in (58) seem to be Nelson, Ari and Fred. Jackendoff
therefore postulates a new locational mode Poss'. In this
locational mode, the possessor is Theme, and the possessed item
is Location (or Source or Goal).

Now in cases like (58a) and (58c), the "movement" of the subject away from or towards the money is perhaps fairly obvious, and the inverse locational mode Poss' is perhaps identifiable. But the undesirable consequences of postulating inverse locational modes are seen in the following analyses of Ostler (1979).

Ostler attempts to develop a system of "linking rules" (essentially our mapping rules) for argument structures and syntactic frames. He notes that for a verb with the argument structure (Possessed, Possessor), two syntactic realizations are possible. In some frames, the possessed "outranks" the possessor (the book belongs to the library). In other frames, the possessor "outranks" the possessed (Mary has/owns/possesses the book).

A similar alternation of ranking is seen in the Dative alternation: John gave a book (possessed) to Mary (possessor), John gave Mary (possessor) a book (possessed). The solution Ostler proposes is the following. We know from Jackendoff's analysis that there are two locational modes, Poss and Poss'. We may now say that belong to is a Poss verb, while have/own/possess are Poss' verbs; and always require Theme to outrank Location/Source/Goal. We thus arrive at the following assignment of thematic functions, which may be compared with those in (57) above.

118
(59) a.

The book belonged to the library.
possessor
THEME
LOCATION/GOAL

b.

Max owned an iguana.
possessor possessed
THEME LOCATION/GOAL

c.

Bill had no money.
possessor possessed
THEME LOCATION/GOAL

In this system, Dative alternation verbs are simply specified for both Poss and Poss' modes. For example:

(60)

a.

John gave Mary a book.
possessor possessed
THEME LOCATION/GOAL
b.

John gave a book to Mary.

possessed possessor

THEME LOCATION/GOAL

But this solution robs thematic functions of any semantic content, without gaining anything by way of explaining the facts.

In view of the latitude that the theory offers with regard to the semantic content of notions like Theme, such notions are at present of little value for formalizing lexical rules. In conclusion, I must stress that the nature of thematic relations is a very ill-understood area, and it has not been my intention here to present a coherent system of thematic functions; I believe such an attempt would be premature. My intention rather has been to motivate one thematic function, and on the basis of this, to suggest that this is the most appropriate level for lexical rules. Hopefully, further investigation of lexical rules will allow the development of a satisfactory system of thematic functions. Whether the resulting system will be integrable into the system we now have remains to be seen. In the meanwhile, there is little option but to proceed along the lines suggested by Chomsky (1965:75):

A linguist with a serious interest in semantics will presumably attempt to deepen and extend syntactic analysis to the point where it can provide the
information concerning subcategorization, instead of relegating this to unanalyzed semantic intuition, there being, for the moment, no other available proposal as to a semantic basis for making the necessary distinctions.
FOOTNOTES TO CHAPTER THREE

1 There is some evidence that the rules for -ing and -ive adjectives must also refer to thematic information. Consider (i-vi):

(i) The walk exhausted Mary.
(ii)*The walk was exhaustive.
(iii) The walk was exhausting.
(iv) This list exhausts the possibilities.
(v) This list is exhaustive.
(vi)*This list is exhausting.

The walk in (i) is a "Causer," the list in (iv) is not. Compare also John/This example suggests the following analysis, this example is suggestive, *John is suggestive.

2 See also DeArmond (1980).

3 Or vice-versa; cf. (23)-(24) below.

4 Since we are here interested only in the fact that in both (19b) and (19c) the noun is deadjectival, I have combined the two paradigms.

5 This prediction has some consequences for the identification...
of "exceptions" in the lexicon. Thus although the majority of causative verbs with Experiencer objects do not have a nominalization with the Experiencer as "object," nominals like (i)-(iii) below are apparently acceptable for some speakers:

(i) John's disappointment of his audience

(ii) The teacher's inspiration of the students

(iii) John's embarrassment of Mary

Example (i) is cited by Anderson (1977:372); (ii)-(iii) are cited by Newmeyer (1979), who also cites Tom's disappointment of Sue. From the point of view of the Experiencer hypothesis, these noun phrases must be regarded as exceptions. For the "pure grammatical functions" hypothesis, however, these nominals represent the regular case. Apart from the statistical difference in the number of "exceptions" under the two hypotheses, note that the alleged correspondence in the frames of the verb and the noun is subject to restrictions. Thus, the news'/ results'/ performance's disappointment of the audience (equivalently, the disappointment of the audience by the news/ the results/ the performance), the sunset's inspiration of the poet (equivalently, the poet's inspiration by the sunset), and the disclosure's embarrassment of Mary (equivalently, the embarrassment of Mary by the disclosure) seem to me to be totally unacceptable, although the news/ the results/ the performance disappointed the audience, the sunset inspired the poet, and the disclosure embarrassed Mary are perfectly
A more difficult counterexample to the Experiencer hypothesis is provided by (iv)-(vi):

(iv) Mary charmed the hostess.
(v) The hostess was charmed.
(vi) Mary's charm

Assuming that the hostess is an Experiencer in (iv), we do not get the expected Experiencer subject in (vi). I have no explanation for this. Notice that (vii) is nevertheless ungrammatical:

(vii)*Mary's charm of the hostess

Advocates of the Jackendoff-Wasow analysis might point out that the theory of word based morphology proposed by Aronoff (1976) appears to allow the morphological derivation of amusement, annoyance, irritation, etc., from the corresponding past participles. In this theory we might postulate WFRs producing [[X]ed]_A^ment]_N etc., and "truncate" the participial inflection. This analysis faces a host of morphological problems, however. There are well-motivated suffixes -ment, -ance and -(at)ion which attach to verbs. We must postulate homonymous suffixes which attach to [Xed]_A; these cannot be the "same" as the deverbal suffixes, for a WFR operates on a unitary syntacticosemantic base (op. cit.:48). Apart from the lack of independent evidence for "deadjectival" -ment, -ance and
-(at)ion -- they do not attach to any other adjectival bases such as [Xable], [Xive], [Xing] -- there is evidence against a past participial base for these suffixes. Consider first morphological restrictions on base-suffix combinations. Given the hypothetical base [Xed] which is free to combine with -ment, -ance and -(at)ion, we must explain why from [irritated] we get [irritation] and not *irrit(ate)ment, *irrit(ate)ance. This fact is explained if we take into account the morpheme -ate of irritated, ignoring the -ed; Xate is a typical base for Xation (Marchand 1969:259). Again, Aronoff (op. cit.:56, fn.10) notes that Xcite may take either -ment (incitement) or -ation (citation). Precisely this variation is seen excite, excitement, exitation; if [excited] is the base of excitement, the -ed must once again be ignored if the variation is to be explained. But if the participial inflection is ignored by base-suffix combinatory principles, and truncated before it reaches the surface, there is no evidence for its presence at any stage of the derivation, i.e. no evidence for a base [Xed].

Secondly, there is a "level ordering" problem in this hypothetical derivation. Siegel (1974) postulated two classes of affixes: + boundary (Class I or Level I) affixes, and # boundary (Class II or Level II) affixes. Aronoff retains this distinction (see also Allen (1978), Pesetsky (1979), for justification of the two levels). In word based morphology, truncation operates only before + boundary suffixes. Thus if the -ed is to truncate,
the suffixes which attach to it must have + boundaries. Since + boundary suffixes do not normally appear outside # boundary suffixes, the -ed must itself therefore be a + boundary suffix. But Allen (op. cit.:38ff.) presents evidence that -ed is a # boundary suffix: (i) nominals and negations of Xed are always formed with Level II suffixes, and not with Level I suffixes, e.g. tired#ness, *tired+ity; un#hurried, *inhurried; un#announced,*in+announced; (ii)-ed is stress-neutral and stressless, a typical characteristic of # boundary suffixes; (iii) underlying non-syllabic r, which appears in syllabic form before # boundaries and non-syllabic form before + boundaries, is syllabic before -ed (sober, sobriety, sobered). Allen observes that this evidence is consistent with the fact that "only Level II derivational suffixes exhibit the phenomenon of 'copying' the shape of inflectional affixes."

Thirdly, the impossibility of *unXment, *unXance, and *unXation is further evidence against an adjectival base for these nouns, since "un- appears on nouns . . . only if these nouns have been derived from adjectives" (Siegel 1973:303); e.g., untruth, unkindness.

Interestingly, Aronoff motivates morphologically "abstract" derivations like those considered above, partly on the basis of semantic facts. We shall return to an examination of word based morphology in Chapter Four.
Marchand (1969:300) notes that -ify has formed desubstantival and deadjectival derivatives in English from the sixteenth century onwards. If the nouns in (22d) were formed from the verbs in (22a), we would expect *terrification, *horrification; cf. glory-glorify-glorification, identity-identify-identification.

The suffix -ize forms desubstantival (winterize, lionize, dramatize) and deadjectival (generalize, liberalize, popularize) derivatives. Nouns formed from Vize end in -ism (criticism, plagiarism) or -ation (generalization).

Notice the shared preposition at in the complements of the adjective and the noun in (22c-d). (Compare also the parallelism below in the of-NP complements to the noun and the adjective: Mary's terror of growing old, Mary is terrified of growing old.) Shared prepositions were one argument for relating the nouns in (8c) to the past participles in (8b), although the nouns were morphologically deverbal. By the same token, we must now relate the morphologically basic nouns in (22d) to the past participles of denominal verbs in (22c), instead of to the denominal verbs (22a) themselves. It appears that once again a generalization is being missed. The shared preposition should be accounted for not by positing various arbitrary relations in the lexicon, but in terms of shared thematic functions signalled by particular prepositions.
Wasow (1980) does not consider minor lexical rules involving adjectives. Since the primary function of thematic functions in his framework is to encode the "exceptionality" of lexical rules for verbs arising out of their "localness," it is unclear to me if he would require a reference to thematic functions in apparently exceptionless cases. It could be argued that the additional level of thematic functions should be accessed only when necessary, in the interests of theoretical parsimony. If, however, reference to thematic functions is obligatory for all minor rules, rule (26) could be modified as follows:

Subject (be) A (PP)
[+Experiencer]  
Poss-NP N (PP)

There are also transitive verbs (and verbs which take other types of complements) which have Experiencer subjects, and which have nominalizations exhibiting the "normal" correspondence; cf. hate, hope, fear, love, regret, pity, repent, admire.

This task (in fact) reveals the fundamental inadequacy of the approach to this problem suggested in X' Syntax. The cross-categorial generalization of grammatical relations obviously cannot help in capturing the subcategorizational correspondences of a derivationally related pair like...
read-readable. In fact, in the majority of cases of derivationally related words, we must postulate lexical redundancy rules that alter grammatical relations. However (for some unclear reason) X' Syntax supposes that the generalization strategy will be fruitful in the case of the nominal derivatives of verbs and adjectives. Accordingly, the proposal of X' Syntax is confined to this small subdomain of derivational morphology. But the task that the Lexicalist Hypothesis imposes on the grammar is more general: it is to capture regularities in the subcategorizational frames of all lexically related words. The "neutral" lexical entry, which economizes on the statement of shared selectional restrictions, is one such general device. What is needed is a device of similar generality which economizes on the enforcement of shared selectional restrictions, regardless of whether the syntactic positions which must be thus restricted represent the same grammatical functions or not.

13 The necessity for such rules was observed as early as Jackendoff (1972); he notes that one mechanism that must be built into the lexicon is "a set of rules describing generalities among the lexical correlations of thematic and grammatical relations," and suggests that the solution is to "state a redundancy rule in the lexicon that would make lexical items contain less independent information if they conform to
such generalizations. The redundancy could be expressed in terms of not needing to specify superscripts in the lexical entry" (op. cit.:42).

DeArmond (1980) attempts to develop such rules, in the context of a discussion of the lexical entry for the verb open. He introduces the "modal features" [+Transitive], [-Transitive], and [+Instrumental] for process verbs, and gives rules for predicting semantic functions from these features, as also the syntactic positions occupied by these functions. See DeArmond (op. cit.) for details. See also Ostler (1979).

14 Such an enforcement of selectional restrictions removes Jackendoff's main argument for generalizing the grammatical relations of the S to the NP. (Hornstein (1977) makes the same point: if selectional restrictions are not placed on grammatical functions, "the motivation for a generalized notion 'subject-of' evaporates" (op. cit:141)).

Prof. DeArmond has pointed out to me that an argument could still be made for a "subject" in the NP, based on facts like the following:

(i) the tendency for John to forget his keys

(ii) John's tendency to forget his keys

Example (ii) appears to be the analogue, in the NP, of Raising to Subject. However, it also appears to be a unique case. Verbs like seem, appear, happen have no nominalizations; adjectives
like certain and likely, which have nominalizations, do not permit raising in the NP (examples (iii)-(v) are from Chomsky (1970:188-189)):

(iii) John is certain (likely) to win the prize.
(iv) *John's certainty (likelihood) to win the prize
(v) John's certainty that Bill will win the prize

I therefore wish to leave open the question of whether a "subject" in the NP can be justified on grounds other than selectional parallelism.

15 Cf. Jackendoff (1972) for an early attempt to set up a hierarchy of thematic functions. Cf. also Hust and Brame (1976) for some critical comments.

16 I use the term Causer rather than Agent to indicate that the first argument of CAUSE or LET need not be animate or exercise volition.

17 Ostler (1979) suggests that Location is a static Goal. Jackendoff (1978) suggests that Source and Goal be collapsed into the function Path.

18 Jackendoff (op. cit.:110) envisages the postulation of additional locational modes as one way of enriching his system. The occurrence of more than one locational mode as a restrictive modifier has also been anticipated (op. cit.:138-139).
We might note that the predicates we have identified as taking Experiencer arguments, and which we now suggest are a realization of the locational mode Internal, coincide with a class of predicates decomposed in terms of a semantic primitive FEEL in the system of Wierzbicka (undated). She gives the following as examples: sad, upset, glad, joyful, regret, (un)happy, (un)pleasant, (dis)pleased, (dis)satisfied, disappointed, surprised, amazed, angry, indignant, irritated, afraid, worried, repentant, remorse, ashamed, embarrassed, humiliated, proud, contempt, admiration, envious, jealous, pity, compassion, grateful, and vengeful.

19 We can of course resolve this problem by saying that the two senses of touch have different broad thematic assignments. This is not implausible, considering that if one touches a table, the table does not undergo a change of state, whereas if one is touched by a story, one undergoes a change from an unsympathetic to a sympathetic state. However, this would mean that the generalization of the meaning of a verb involves more than a simple switch in the locational mode.

Prof. DeArmond has pointed out to me that if Experiencers are Themes, the sentences below must have Themes in subject position, although the verbs are transitive and allow passivization.

(1) John enjoyed the party.
(ii) John pities Mary.
  fears
  admires
  resents
  envies

This contradicts the hypothesis of Jackendoff (1972:44) that sentences with Themes as subjects do not passivize. (See also Wasow (1980), DeArmond (1980)).

However, these are not the only counterexamples to this hypothesis. Hust and Brame (1975:249) cite the following (their (17)):

(iii) Washington is bordered by Oregon, Montana and Canada.
(iv) The king's carriage was flanked by two phalanges of the royal guard.
(v) The column was capped by an ornate scroll.
(vi) The cowboy was only touched by the ambusher's bullet.
(vii) This sentence is preceded by the sentence numbered (17d) and it is followed by the rest of the paper.

I have already argued that the verbal passive (whether lexical or transformational) is not sensitive to thematic information.

20 Notice, however, that run out can be used intransitively, and the object of the transitive verb then appears as subject:

(i) Nelson ran out of money.

(ii) The money ran out.

If this is an instance of the Theme-Rule, then Nelson in (i) cannot be the Theme.
21 The problem of giving content to these notions is seen again in the thematic assignments of the verbs *strike* and *regard* in Jackendoff (1972:45) and Wasow (1980): for Jackendoff, they have inverse thematic assignments, while for Wasow, they have the same thematic assignments, differing only in control.

1. Preliminaries.

In the previous chapter I hypothesized that semantic lexical rules do not specify the morphological relationships between the lexical items they relate. The exclusion of morphological information allowed us to isolate a set of semantic relations for semantically similar verbs, nouns, and adjectives, which occurred in paradigms wherein the "direction" of the morphological derivation varied as shown below (the arrows indicate morphological derivation):

\[
\begin{align*}
\text{(1) a. } & \quad \text{V} \quad \text{amuse} \\
& \quad \text{N} \quad \text{A} \\
& \quad \text{amusement} \quad \text{amused}
\end{align*}
\]

\[
\begin{align*}
\text{b. } & \quad \text{V} \quad \text{tire} \\
& \quad \text{N} \quad \text{A} \\
& \quad \text{tiredness} \quad \text{tired}
\end{align*}
\]

\[
\begin{align*}
\text{c. } & \quad \text{V} \quad \text{sadden} \\
& \quad \text{N} \quad \text{A} \\
& \quad \text{sadness} \quad \text{sad}
\end{align*}
\]

\[
\begin{align*}
\text{d. } & \quad \text{V} \quad \text{horrify} \\
& \quad \text{N} \quad \text{A} \\
& \quad \text{horror} \quad \text{horrified}
\end{align*}
\]
I argued that the independence of the "thematic functions" hypothesis from morphological derivations was its crucial advantage over the "mixed" version of the "grammatical functions" hypothesis.

In this chapter I present evidence that the separation of morphological and semantic redundancy rules in the lexicon is necessary independently of the "thematic functions" hypothesis. I show in section 2 that even when the "direction" of morphological derivation is held constant from a lexical category $X$ to a lexical category $Y$ (as under the "grammatical functions" hypothesis), a single semantic rule may intersect various morphological rules, and a single morphological rule may intersect various semantic rules. The resulting cross-classification of morphological and semantic redundancy (which was first noticed by Jackendoff (1975)) cannot be captured by rules required to specify both kinds of information. In particular, the model of word formation rules (WFRs) developed by Aronoff (1976) is seen to be inappropriate for lexical redundancy rules, and to pose problems for the semantics as well as the morphology of word formation. I argue for a model of the lexicon wherein affixation rules do not specify semantic operations, but access a body of independently existing semantic operations. I show that such a conception of word formation can be reconciled with a current theory of morphological structure.
2. The Cross Classification of Morphology and Semantics

That the lexicon must contain separate morphological and semantic rules is suggested by Jackendoff (1975). Consider his rule for noun-verb pairs like decide-decision (given below), and his comments on it:

\[
\begin{align*}
\text{(2)} \quad (= \text{his (3)}) \\
\begin{array}{c}
\text{\[ /y+\text{ion/} +N +NP1's\text{\_}_\text{(P)}\text{NP2} \quad \text{ABSTRACT RESULT OF ACT OF NP1's} \quad Z-\text{ING NP2} \]}
\end{array}
\end{align*}
\]

... redundancy rule (3) (is) a rule relating lexical items both at the morphological and semantic levels. In fact, this formulation will not do. It claims that there is a particular meaning, ABSTRACT RESULT OF ACT OF V-INQ, associated with the ending -ion. However, there are several different semantic relations obtaining between -ion nominals and their related verbs, and there are several nominalizing endings which can express the same range of meanings ... The picture that emerges is of a family of nominalizing affixes and an associated family of noun-verb semantic relationships.

Jackendoff goes on to show that the three deverbal nominalizing suffixes -ment, -ion and -al (e.g., refuse-refusal) can each express any of the three semantic relations "abstract result of act of V-ing," "group that V's," or "act or process of V-ing."
He suggests that the three morphological and the three semantic rules be independently available, such that the choice of one rule from each set yields a pair of morphological and semantic rules to relate a pair of words. This is illustrated in the table below (examples from Jackendoff), where each noun is related to the corresponding verb by the morphological rule at the head of its column, and the semantic rule at the left of its row.

<table>
<thead>
<tr>
<th>Semantic rules</th>
<th>Morphological rules</th>
</tr>
</thead>
<tbody>
<tr>
<td>S1 ABSTRACT RESULT</td>
<td>M1 -ion</td>
</tr>
<tr>
<td>OF ACT OF V-ING</td>
<td>M2 -ment</td>
</tr>
<tr>
<td></td>
<td>M3 -al</td>
</tr>
<tr>
<td>S2 GROUP THAT V's</td>
<td>discussion</td>
</tr>
<tr>
<td></td>
<td>argument</td>
</tr>
<tr>
<td></td>
<td>rebuttal</td>
</tr>
<tr>
<td>S3 ACT OR PROCESS</td>
<td>congregation</td>
</tr>
<tr>
<td>OF V-ING</td>
<td>government</td>
</tr>
<tr>
<td></td>
<td>copulation</td>
</tr>
<tr>
<td></td>
<td>establish</td>
</tr>
<tr>
<td></td>
<td>refusal</td>
</tr>
</tbody>
</table>

The issue that Jackendoff leaves unresolved, however, is whether the three readings he gives deverbal nouns are indeed products of three separate semantic rules, or of one ambiguous semantic rule; or even whether there is a principled way of
differentiating the two kinds of cases. This issue surfaces when we notice that some words in the table above can occur in more than one meaning slot. For example, refusal means "abstract result of act of refusing" (cf. S1) in a letter of refusal, and discussion means "act or process of discussing" (cf. S3) in our discussion lasted all night. If the semantic rules S1 and S3 are distinct, the claim would be that there are two homonymous lexical items refusal (related to refuse by (M3,S3) and (M3,S1) respectively) and two homonymous lexical items discussion (related to discuss by (M1,S1) and (M1,S3) respectively). But if S1 and S3 are the same rule, no such differentiation of lexical items would be implied.

We see this problem when we compare the semantic interpretation for nouns of the form Xousness (e.g., callousness) given by Aronoff (1976:38). Here too, three readings are possible:

(4) a. 'the fact that Y is Xous'
   His callousness surprised me.= The fact that he was callous surprised me.

b. 'the extent to which Y is Xous'
   His callousness surprised me.= The extent to which he was callous surprised me.

c. 'the quality or state of being Xous'
   Callousness is not a virtue.= The quality or state
of being callous is not a virtue.

The question is whether there are three discrete semantic rules associated with -ness, or only one ambiguous one. Jackendoff's system would appear to choose the former alternative. Aronoff, however, adopts the latter hypothesis. He proposes a system of WFRs which perform an operation that is "both syntacticosemantic and morphophonological" (op. cit.:85), and are governed by the "one suffix, one rule" principle. In this theory, each affix (strictly, the phonological operation of the WFR) is associated with a syntacticosemantic operation, and the question of cross-classification does not arise. We may conceptualize the WFR as follows:

(5)

```
Base Word
     ┌───┐
     │   │
Morphological rule -- WFR -- Semantic rule
     │   │
     └───┘
  Derived Word
```

The issue of whether an affix can be associated with more than one semantic rule is, as Aronoff observes, a difficult one to resolve on semantic grounds alone. But we need not confine ourselves to semantic intuition. We can instead examine whether a semantic operation has characteristic syntactic consequences which allow us to identify it, and whether the same consequences
consistently follow from the same semantic rule when it applies across a variety of affixes. We can also examine if more than one such identifiable semantic operation is paired with the same affix. The results of such a procedure reveal that Jackendoff's system is superior to that of Aronoff.

Let us, to begin with, consider again the list of verbs with Experiencer objects. The nominals of these verbs are formed with a variety of suffixes, as the sample in (6) shows:

(6) a. V, V+ment: amuse-amusement, excite-excitement
   b. V, V+(at)ion: irritate-irritation, inspire-inspiration
   c. V, V+ance: annoy-annoyance
   d. V, V+Ø: delight-delight, surprise-surface

At least four morphological rules are needed to relate causative verbs with Experiencer objects to their deverbal nominal derivatives. We have seen, however, that the syntactic and semantic relation between the verb and the noun is constant. The noun's subcategorization is regularly the "inverse" of the verb's (Subject corresponds to PP-complement, Object to Poss-NP); and the noun's semantic interpretation is regularly paraphrasable as "state of being V-ed." This semantic relation, which relates the nouns to a semantically coherent class of verbs, is crucial to any explanation of the noun's subcategorization. The semantic rule is thus clearly
identifiable (from its subcategorizational consequences), and can be readily distinguished from other semantic rules for deverbal nouns (which do not have the same subcategorizational consequences).

The semantic rule for verbs with Experiencer objects and their nominal derivatives must thus generalize across the morphological rules of -ment, -(at)ion, -ance, and Ø nominalization. The "thematic functions" hypothesis is now seen to carry such a generalization of a semantic rule to its logical conclusion. It proposes to isolate a single semantic relation, with its characteristic subcategorizational correlates, across not only paradigms wherein the "direction" of morphological derivation is held constant while the affixes are allowed to vary, but across paradigms wherein the "direction" of derivation itself varies.

Consider, on the other hand, how the facts in (6a–c) might be handled in a theory wherein lexical rules are modelled on WFRs, and the syntacticosemantic relation between the verb and the noun is inseparable from the morphological relation. Four rules will suffix -ment, -(at)ion, -ance, and Ø, to the verbs, and output nouns. Each of these rules will specify that the verb's object corresponds to the Poss-NP specifier of the noun, and its subject to an optional PP-complement; and that the noun has the interpretation "state of being V-ed." Thus even the weaker generalization that these verbs have "irregular,"
"skewed" nominalizations (compared to criticize-criticism) will be scattered across the four rules demanded by the morphological relations.

This is only one problem for lexical rules which imitate WFRs. For just as the same semantic rule may generalize across various morphological rules, the same morphological rule may generalize across various semantic rules (cf. annexation "the act of annexing," vexation "the state of being vexed"). When (for example) the same nominalizing suffix is attached to homonymous verb pairs, the result is homonymous noun pairs which are related to their verb bases by different semantic rules. We have already encountered such cases of homonymity. Recall that verbs like depress, exhaust, satisfy and agitate have two argument structures, with two corresponding patterns of nominalization. The semantic rules for the two kinds of verbs are here different: "state of being V-ed" in one case, "act(ion) of V-ing" in another. However, the morphological rule that both types of verbs undergo is the same:

\[
(7) \quad [X]_V \longrightarrow [X]_V{+}i_1n|N
\]

In fact, when we examine the nominalizations of Experiencer-object verbs more closely, we find that these nominals exhibit also a different type of homonymity: they occur in [-Count] and [+Count] pairs. When these nominals mean "state of being V-ed" (and are subcategorizationally parallel to a past
participial adjective), they must have a syntactic feature [-Count]. Evidence for this is that the nouns cannot have a plural form in the relevant subcategorizational frame.

(8) *the children's [amusements at] the stories
    annoyances
    delights
    [disappointments
    embarrassments
    excitement
    surprises
    interests in]

The non-pluralizability of the noun is here predictable from its stative interpretation. In general, nouns denoting states or qualities do not pluralize: compare John's sincerity (*sincerities), deafness(*es), dumbness(*es). We can formally express this property of the nouns in (8) by giving them a feature [-Count], as we do for a noun like sincerity.

There are, however, other contexts in which such nouns are apparently specified for a feature [+Count], for here plural forms are possible, as is the indefinite article a(n):

(9) a. The many amusements available to a tourist in Jamaica include surfing and skin-diving.

b. We missed the plane and lost our baggage, but these were minor annoyances (irritations).

c. John is an embarrassment and a disappointment to his family.
d. The chocolate chip cookies were a rare delight.

The contexts for the [+Count] nouns do not show the regular correspondences that we have noted, with the contexts for the related verbs and adjectives. Thus non-animate possessive NP specifiers are here possible, although non-animate NPs cannot occur as the objects of the verbs or the subjects of the adjectival predicates.

(10) a. The evening's chief amusement (excitement) was a strip-tease by a male dancer.
   (Cf. '*Something amused the evening; *the evening was amused'.)

b. The day's surprises were not yet at an end.
   (Cf. '*Something surprised the day; *the day was surprised'.)

Also, the [+Count] nouns, unlike the [-Count] nouns, cannot take the verb's subject as an optional PP-complement:

(11) a. *Mary's interests in the stories

   b. Mary's interests include stamp-collecting and head-hunting.

The specification of strict subcategorizational and selectional features for the noun thus differs according to whether it is [-Count] or [+Count]. We must therefore postulate two lexical
Observe now that the [+Count] nouns are paraphrasable not as "state of being V-ed," but as "events, activities, objects, etc., that V." The countable and uncountable nouns must therefore be produced from (or related to) the verb by distinct semantic rules. Thus the difference in meaning correlates with the differentiation of lexical items based on syntactic considerations, proving again our point that it is possible to motivate distinct semantic rules on grounds other than purely semantic or intuitive ones. Now, the semantic rule "events, activities, objects, etc., that V" generalizes across nouns with a variety of affixes (amusements, irritations, annoyances, surprise0s). But more interestingly, the morphological rules of ment, (at)ion, ance and 0 are also seen to cut across the two semantic rules "state of being V-ed" and "events . . . that V." The morphological relation between the verb and the [-Count] noun is in every case the same as that between the verb and the [+Count] noun; only the semantic relation differs.
Consider another case of homonymity: the noun assurance. In (13), assurance is ambiguous between the two readings "action, or result of action, of Viogtl and "state of being Ved," shown in (131) and (1311) respectively.

(13) The hare's assurance that he would win the race
   (i) failed to comfort the tortoise.
   (ii) was matched only by his laziness.

But the noun is disambiguated when it occurs with a to-NP complement, or with a plural morpheme. Compare (14)-(15):

(14) The hare's assurance to the tortoise
   (i) was given in the presence of all the spectators.
   (ii)*was matched only by his laziness.

(15) The hare's assurances
   (i) failed to comfort the tortoise.
   (ii)*were matched only by his laziness(es).

In (15) and (14), only the non-stative reading of assurance is possible. The ungrammaticality of (14ii) shows that the noun with the stative meaning "confidence, sureness" does not subcategorize a "Goal" argument, an entity to whom the assurance is given. The ungrammaticality of (15ii) shows that (like other stative nouns) assurance on this reading cannot be [+Count].

There must therefore be two lexical items assurance, related to
the verb by the same morphological rule but by different semantic rules.8

We have now identified at least three semantic rules for nominalizations, which must intersect four morphological rules. This is illustrated in the table below. I have introduced, in parentheses, lexical items which intuitively meet the specifications of (M1,S3), (M2,S3), and (M4,S3), for the sake of completeness.

(16)

<table>
<thead>
<tr>
<th>Semantic Rules</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Morphological Rules</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>M1,-ment</td>
</tr>
<tr>
<td>M2,-(at)ion</td>
</tr>
<tr>
<td>M3,-ance</td>
</tr>
<tr>
<td>M4,Ø</td>
</tr>
</tbody>
</table>

This is precisely the cross-classification of morphological and semantic relationships noticed by Jackendoff. We have, however, succeeded in tying the semantics to observable consequences, justifying the separation of semantic rules. If we now require the same lexical rule to specify morphological and semantic information, we will need twelve rules instead of seven, to
relate the nouns in (16) to their verbs. If we identify yet another semantic rule, we will need sixteen rules instead of eight; and so on. The loss of generalization is apparent.

Observe that the data above cannot be dismissed as idiosyncratic (i.e., as products of "semantic drift"). The semantic regularity of the nouns in the first column of (16) is not in question. For the nouns in the second column, we were able to give a paraphrase with a variable. This is the traditional method of expressing regular semantic relationships, and one which Aronoff informally adopts. We might note that it is the readings "action of V-ing" and "event or state of being V-ed" that Aronoff (op. cit.:33) himself suggests as the expected reading of deverbal nouns, and these are precisely the two readings of assurance that we have identified.

This suggests that the inappropriateness of the WFR model for this data arises from the inadequacy of the model itself. For the justification for separating a theory of word formation from a theory of word analysis is that existing words tend to be peculiar, and acquire idiosyncracies. When such idiosyncracies are removed and only regularities are taken into account, we must expect a "match" between the two theories; as Aronoff observes, it is "possible, but highly unlikely," that the rules for analyzing existing words are radically different from the rules for making up new words.
Let us outline more explicitly how the WFR model will handle facts like those in (16), to see at what points the model is inappropriate. Aronoff assumes each word in the lexicon to be a fully specified entity (as we have); there are no partially specified lexical entries. The two subcategories of (e.g.) amusement must therefore be given two fully specified lexical entries. Further, the syntactico-semantic operation of a WFR "specifies the semantics of the output as a compositional function of the meaning of the base, and assigns the output to a specific major lexical category in a specific subcategorization" (op. cit.:85, emphasis added). If so, the same syntactico-semantic operation cannot have produced (e.g.) both the [-Count] and [+Count] nouns amusement, which have different subcategorizations. This again accords with our analysis, and confirms that the WFR which performs the morphological operation of -ment attachment does not perform a unitary syntactico-semantic operation. We must rather speak of a WFR which consists of the -ment attachment rule, and of (at least) two syntactico-semantic operations: "state of being V-ed," and "events . . . that V." The meaning and the subcategorization of the derived noun amusement depends on which of these two operations has applied.

But here there is a problem. We have hypothesized diverging paths from the morphological to the semantic part of a WFR, and bifurcated the latter part:
(17) WFR #ment

Morphology: \([A] \longrightarrow [A]_{V} \#\text{ment} \]

Syntax and Semantics:

"state of being V-ed" "events . . . that V"

Noun, \([-\text{Count}]\) Noun, \([+\text{Count}]\)

However, the postulation of such bifurcations is not a mere matter of filling in the details of a WFR's semantic operation; it violates the "very strict 'one suffix, one rule' basis" (op. cit.:89) of the theory. To preserve this principle, we must postulate at least two WFRs of -ment for the case above, with one morphological and one syntacticosemantic operation each.

The "one suffix, one rule" principle is more clearly seen in the unitary base hypothesis. This hypothesis states that "the syntacticosemantic specification of the base, though it may be more or less complex, is always unique" (op. cit.:48). Under the provision for "complexity," a WFR may refer to the "category, subcategory, selection and lexically governed entailment and presupposition" of its base. What the unitary base hypothesis prohibits is a disjunction in the base, with semantic operations and derived subcategorizations sensitive to this disjunction; for this would again bifurcate the WFR. Consider for example the affix #able, which (Aronoff notes) attaches to verbs (acceptable) and, less productively, to nouns (objectionable, marketable, profitable, knowledgeable, sizeable, saleable,
fashionable), to form adjectives. The deverbal adjectives have a reading "capable of being Xed (where X is the base)," while the denominal adjectives have a reading "characterized by X (where X is the base)." Since the form of the suffix, its Level (or boundary) specification, and the category of the output, is the same in both cases, we might try to combine deverbal and denominal -able into one rule. This hypothetical rule would operate on either a verb or a noun, with the semantic operation varying with the lexical category of the base:

(18) (hypothetical) WFR #able

\[ [A]_X \rightarrow [[A]_X#able]_A \]

where X=N or V

Syn-sem op.1 Syn-sem op.2

Base: X=N Base: X=V

'characterized by N' 'capable of being V-ed'

The unitary base hypothesis prohibits the disjunction in (18), and precludes the possibility of a single #able WFR.

But consider now how the base of the nominalization rules of -ment, -(at)ion, -ance and Ø must be specified. We see that these suffixes surface on both "regular" and "skewed" nominalizations:

(19) a. i. John's acknowledgement of the letter
ii. the children's amusement (at his antics)

b. i. the annexation of Oudh by the British

ii. the children's irritation (at his antics)

c. i. John's acceptance of Mary's resignation

ii. the children's annoyance (at his antics)

d. i. John's display of courage

ii. the children's surprise (at his antics)

We have shown that the pattern of nominalization, and its semantics, is dependent on a disjunction in the syntacticosemantic specification of the base. The disjunction is not in the category, but in the subcategory. Let us illustrate this with the rule of #ment.

(20) [A]_V----> [[A]_V#ment]_N

Syn-sem Base 1: Syn-sem Base 2:
V with Experiencer Object V with non-Experiencer Object
Semantic operation: Semantic operation:
state of being V-ed action of V-ing
Subcategorization: Subcategorization:
inverse of V's parallel to V's

There is no way to collapse the bases or the operations in (20) without loss of descriptive adequacy. The unitary base hypothesis thus forces us to postulate two sets of affixes -ment, -(at)ion, -ance and Ø, for the data in (19).
The result of the "one suffix, one rule" principle, therefore, is the proliferation of homonymous affixes: if there are $n$ different semantic operations associated with an affix, we must treat the affix as $n$ different affixes. This is clearly unsatisfactory, and the "one suffix, one rule" principle (from which the unitary base hypothesis follows) must be given up.

But it is apparent that the maintenance of the "one suffix, one rule" principle is essential for maintaining the integrity of the WFR as a rule relating a base word to a derived word at two levels simultaneously: the morphological, and the (syntactico)semantic. If this principle held, we should have been able to state the relation between two words $A$ and $B$ simply as "$A$ is derived from $B$ by the WFR of $W$." Everything about the morphological, the syntactic, and the semantic relation of $A$ to $B$ would follow from this simple statement. Let us illustrate this by assuming, for the sake of argument, that the WFR of $+ee$ has a unitary base $[V, +transitive, +animate object]$ (as suggested by Aronoff), and performs a unitary semantic operation, (roughly) "recipient of the action of $V$." Now if we said that employee was derived from employ by the WFR of $+ee$, it would follow that employ was a transitive verb with an animate object; the meaning of the derived word would also follow from the rule, in a straightforward way. In contrast, to say now that agitation or derivation is derived from agitate or derive by the $-(at)ion$ WFR is to say very little; for the WFR no longer has a
unique base, and no longer uniquely determines the semantic and the subcategorizational relationship between the base and the output. All that the statement now tells us for certain is the morphological relationship. To determine the syntactic and semantic relationship, we must probe again into the syntacticosemantic subclass of the base ("is it an Experiencer-Object verb or not?"), and ascertain which semantic operation has applied to this base.

In vertically bifurcating the semantic part of a WFR, then, we have also bifurcated the WFR laterally, separating the morphological process of word formation from the syntacticosemantic process. In section 5 I suggest that this separation has consequences for the morphology that are not undesirable.

3. A Model

Our data suggest that the rules of affixation which output the morphological forms of words are not themselves specified with semantic operations, but that they are able to access a set of independently existing semantic operations in the lexicon. Such a model would explain the "sharing" of semantic rules by a range of affixes, and eliminate the redundant statement of the same semantic rule as part of a number of affixation rules. As regards the semantic operations, we may hypothesize that there
are basically two kinds of operations available. One kind would relate argument structures (specified in terms of thematic functions), and result in the observed regularities in the subcategorizational frames of related words. Instances of this kind would be the rules we gave in Chapter Three as redundancy rules, repeated here as (21)-(23).

(21) S1: Causativization–Decausativization

\[
\begin{align*}
&\begin{array}{c}
+\text{N (i.e. N or A)} \\
+\text{NP—(PP)} \\
(\text{Experiencer, (X)})
\end{array} \\
&\begin{array}{c}
-\text{N (i.e. V)} \\
+\text{NP—NP} \\
(\text{Causer, Experiencer})
\end{array}
\end{align*}
\]

(22) S2: Inheritance 1

Filter: *\text{N, (Causer, Experiencer)}

\[
\begin{align*}
&\begin{array}{c}
\text{V} \\
+\text{NP—NP} \\
(\text{Argument, Argument})
\end{array} \\
&\begin{array}{c}
\text{N} \\
+\text{NP—NP} \\
(\text{Argument, Argument})
\end{array}
\end{align*}
\]
The other kind of operation (we may hypothesize) does not relate argument structures, and (therefore) does not give rise to subcategorizational regularities. The words produced by the latter kind of operation would have more idiosyncratic meanings and syntactic features. Among operations of this kind, have identified one we may call Concretization, which produces [+Count] nouns like amusement:

Let us now hypothesize that an affixation rule specifies the following information. It specifies the category (or categories) of its input, the category of its output, the boundary, shape and position of the affix; and a list of morphologically permitted bases. This much is essentially the morphological part of the Aronovian WFR. For the semantics, let us hypothesize that the rule contains a reference to a list of semantic rules. Thus the #ment affixation rule may be given as in (25):

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List of morphological bases:
  beX (bewilder)
  enX (enjoy)
  Xcite (excite)
  Xuse (amuse)
  etc.

Semantics:
Rule S1 (Causativization-Decausativization)
Rule S2 (Inheritance)
Rule S4 (Concretization)
etc.

Suppose now the lexicon contains the following lexical entry.

(26) amuse
    [ /phonological representation/ ]
    V
    +NP ___ NP
    (Causer, Experiencer)
    [ mapping: (redundant) ]

Rule (25) says that given such a verb Xuse, we can suffix #ment
to it to form a noun. For the semantics of the noun, it refers us to rules (21)- (24) above. The lexicon tells us that \textit{amuse} has the argument structure \textit{(Causer, Experiencer)}. Rule (21) says that for verbs with this argument structure, there may be nouns or adjectives with the argument structure \textit{(Experiencer, (X))}. Thus we assign \textit{amusement} this argument structure, and enter the word in the lexicon. (We assume that the feature \textit{[-Count]} for the noun is predictable from its semantic interpretation; cf. fn.3 above.) Next we take the same morphological form \textit{amusement}, and apply the rule (22) above; but the output of this rule is filtered out. Running down the list, we find that Concretization is applicable. Thus to the same noun-form \textit{amusement} we assign a reading "causer of state" and a feature \textit{[+Count]}, deriving another noun \textit{amusement}, which we enter in the lexicon.

We thus have the following relationships between \textit{amuse} and its derivatives:
This entry expresses the fact that the two nouns *amusement* are derived from *amuse* by the same morphological rule, but by different semantic rules. The correlation between the argument structure and the syntactic frame is provided by the thematic-syntactic mapping specified in the previous chapter. In (27), the preposition *at* selected by the noun may be regarded as "costless" if an appropriate characterization of the thematic function *X* can be given.
Let us now specify another affixation rule, which derives adjectives from verbs and nouns.

(28) M2: #ed

\[ [X]_Y \rightarrow [[X]#ed]_A \]

Y=V or N

List of morphological bases:

.

.

Semantics:

Rule S1 (Causativization-Decausativization)

etc.

Notice that this affixation rule accesses the same semantic rule S1 as the #ment rule did. Following a procedure similar to that outlined above, we derive an adjective amused from amuse. We now have the following morphological and semantic relationships between amused and its nominal and adjetival derivatives:
(29)

amuse

\[
/\text{phon. repr.}/ \\
V \\
+NP ___ NP \\
(Causer, Experiencer) \\
\text{mapping: (redundant)} \\
\]

by M1

amusement

\[
/\text{phon. repr.}/ \\
N, +Count \\
\text{other features} \\
\]

by S4

amused

\[
/\text{phon. repr.}/ \\
A \\
+NP ___ (PP) \\
(Experiencer,(X)) \\
\text{mapping: (redundant)} \\
P=at \\
\]

by S1

by M2
The network above shows that while the two nominal derivatives share a morphological relation with *amuse* but have different semantic relationships, the [-Count] noun and the adjective have the same semantic relationship with *amuse*, differing only in the morphological relationship. The subcategorizational correspondences in the frames of *amuse*, *amused* and *amusement* [-Count] now follow from this semantic relationship, and the thematic-syntactic mapping. The fact that the adjective and the [-Count] noun both select the same preposition *at* may be regarded as non-coincidental if the thematic function *X* in their argument structures is taken into account, and the selection of the preposition is dependent on this thematic function.

Below I give additional samples of affixation rules, and of the lexical entries related by these rules. Notice again the recurrence of the semantic rules S1, S2 and S3 above in the specifications of these affixation rules.
List of morphological bases:
Xate (irritate)
Xify (glorify)
Xcite (excite)
etc.

Semantics:
Rule S1 (Causativization-Decausativization)
Rule S2 (Inheritance)
Rule S4 (Concretization)
etc.

(31) illustrates how this rule relates the two senses of agitate to the two senses of agitation and the adjective agitated. (I use the term "Ext(ernal) Theme" to denote the first argument of GO-posit.ext. We may speculate that the two senses of agitate are themselves related by a redundancy rule like the following:

\[
\begin{align*}
\left[ V \right] & \quad \leftarrow \quad \left[ V \right] \\
\left( \text{GO-posit.ext. ...} \right) & \quad \left( \text{GO-posit.int. ...} \right)
\end{align*}
\]
(31) agitate

[agitate

V
+NP____NP
(Causer, Ext. Theme)
mapping: (redundant)]

by M3 by S2

agitation

[agitation

N
+NP____NP
(Causer, Ext. Theme)
mapping: (redundant)]

by M2 by S1

agitated

[agitated

A
+NP____(PP)
(Experiencer,(X))
mapping: (redundant)
P=at, over]
List of morphological bases:

Xor (terror)

etc.

Semantics:

Rule S1 (Causativization-Decausativization)

etc.
(33) M5: #en

\[ [X]_A \rightarrow [[[X]_A \#en]_V \]

List of morphological bases:
.
.

Semantics:
Rule S1 (Causativization-Decausativization)
etc.

(34) M6: #ness

\[ [X]_A \rightarrow [[[X]_A \#ness]_N \]

List of morphological bases:
.
.

Semantics:
Rule S3 (Inheritance)
etc.
(35) horror

\[ \text{/phon. repr.}/ \]
\[ N \]
\[ +NP\_\_\_(PP) \]
\[ (\text{Experiencer}, (X)) \]
\[ \text{mapping: (redundant)} \]
\[ P=at \]

by M4 by S1

horrify

\[ \text{/phon. repr.}/ \]
\[ V \]
\[ +NP\_\_\_NP \]
\[ (\text{Causer}, \text{Experiencer}) \]
\[ \text{mapping: (redundant)} \]

by M2

horrified

\[ \text{/phon. repr.}/ \]
\[ A \]
\[ +NP\_\_\_(PP) \]
\[ (\text{Experiencer}, (X)) \]
\[ \text{mapping: (redundant)} \]
\[ P=at \]

by S1
(37)

sad

\[\text{/phon. repr./}\]
\[A\]
\[+NP\]
\[(\text{Experiencer})\]
\[\text{mapping: (redundant)}\]

by S1

by M5

by M6

by S3

sadness

\[\text{/phon. repr./}\]
\[N\]
\[+NP\]
\[(\text{Experiencer})\]
\[\text{mapping: (redundant)}\]

sadden

\[\text{/phon. repr./}\]
\[V\]
\[+NP\]
\[+NP\]
\[(\text{Causer, Experiencer})\]
\[\text{mapping: (redundant)}\]
4. Implications for Productivity and Semantic Coherence

Our conception of the process of word formation, which allows us to examine the morphological and the semantic process each in their own right, gives us a slightly different perspective on notions like "productivity" and "semantic coherence." Consider first productivity.

Aronoff shows that the morphological productivity of an affixation rule varies with the morphology of the base. Thus given the deadjectival nominalizing suffixes *ness and +ity, *ness is in general the more productive suffix; but for adjectives of the form Xile, +ity is more productive than *ness (servile, servility, *servileness). That is, there are more Xility words than Xileness words in the language. Similarly, *ment is very productive with enX and beX verbs (Aronoff op. cit.:53, Marchand 1969:332). Aronoff therefore suggests that a productivity index be associated with each morphological form of the base of a WFR. We may indicate this as in (38):

(38) affix *ment

Forms of the base: beX, p. index 1
enX, p. index 1
Xcite, p. index 3
etc.

Given the assumption that the semantic base and the semantic operation of a WFR are unique, this is as much as can be said.
about the productivity of a WFR, in Aronoff's theory.

It appears, however, that there is another dimension to the phenomenon of productivity, which our view of word formation enables us to capture. We have said that an affixation rule may have access to more than one semantic operation. The same rule can therefore produce words belonging to different sense-groups. It transpires that such a rule can exhibit a preference for one of the semantic operations available to it, and produce more words of that sense-group than of any other. Thus consider Marchand's comments (op. cit.:332) on the suffix \#ment.

Marchand first notes that \textit{\textbf{ment}} nouns can have one of four readings: (1) "act or fact of ", e.g. appointment, development; (2) "something concrete or material connected with ", e.g. advertisement, equipment; (3) "the state of being -ed", "chiefly from verbs denoting mental or emotional states," e.g. astonishment, embarrassment; and (4) "the place connected with ", e.g. encampment, settlement.

Marchand's sense group (3) is of course the class we have identified as the nominalizations of Experiencer-object verbs, derived by our rule S1 (see (21) above). Of this sense group, Marchand observes that it has been especially productive for the last 150 years. The following words, all with the basic meaning "embarrassment, bewilderment" or the like, were coined in the 19th century: astoundment, bedevilment, bemuddlement, bepuzzlement, besetment, betanglement, bewilderment, bewitchment, dazement, dazzlement.
disillusionment, dispiritment, displeasurement, flusterment, huddlement, muddlement, perplexment. More recent are perturbment 1901, puzzlement 1922.

The earliest words in this sense group that Marchand cites are astonishment and amazement, in the 16th century. Considering that "by 1300, -ment was obviously a derivative suffix," the semantic rule S1 appears to have become available to the #ment suffixation rule relatively late, and to have reached its peak of productivity three centuries later.

Suppose now that not only the morphological forms of the base of #ment, but also the semantic operations it permits, are each assigned an index of productivity. We may then conceptualize the history of the semantics of #ment in the following way.

(39) 14th century: Inheritance
16th century: Inheritance (higher productivity)
Decausativization (lower productivity)
19th century: Decausativization (higher productivity)
Inheritance (lower productivity)

Assigning an index of productivity to permitted semantic operations might also explain why it is excitement, rather than excitation, which is related to the Experiencer-object verb excite. We may speculate that while the morphological base Xcite is equally productive with the suffixes #ment and +(at)ion, the Decausativization rule has a higher productivity with #ment than...
Consider next the phenomenon of "semantic coherence." A derived word is said to be semantically coherent, in Aronoff's theory, to the extent that its semantics is predictable from the semantics of its base and the (supposedly unitary) semantic operation of the WFR. Aronoff associates semantic coherence with productivity, and productivity (as we have seen) with the morphology of the base (op. cit.:62-63). Thus in this theory, the coherence of a derived word may vary with the morphology of the base. For example, +ity derivatives from the base Xile, which (we have seen) is a highly productive base for this suffix, would be expected to be more coherent than +ity derivatives from the less productive base Xous. Similarly, since ment attaches most productively to enX and beX verbs, we would expect enXment and beXment nouns to be more coherent than other Xment nouns. Moreover, a WFR which has few morphological restrictions on its base is hypothesized to be likely to be more productive, and therefore produce more coherent words, than a WFR with many such restrictions.

However, Aronoff notes that although "productivity goes hand in hand with semantic coherence, . . . we have no real evidence as to which of these is primary, or even whether they are really distinct matters." In this context, it is striking that the [-Count] nominalizations of Experiencer-object verbs are always semantically coherent, regardless of the particular
affix on the noun, or the morphology of the base; whereas the [+Count] derivatives are not so semantically coherent. This suggests that the coherence is a property of individual semantic operations, i.e., that our rule S1, which relates argument structures, is more coherent than our rule S4. Moreover, the coherence of an affixation rule as such appears to be a function of the semantic operations it permits or prefers. We may illustrate this by comparing Aronoff’s account of the coherence of deadjectival nouns in *ity and *ness, with that in our system.

Recall that nouns of the form Xousness have three readings: (a) the fact that Y is Xous, (b) the extent to which Y is Xous, and (c) the quality or state of being Xous. Aronoff observes that *ness derivatives have only these three readings, while *ity derivatives have these readings plus "other readings: technical senses, concrete nouns, count nouns" (op. cit.:38). He designates deadjectival nouns with the three readings above as semantically coherent, and correlates the greater productivity of *ness with its greater coherence.

We now find that there are [+Count] nouns nouns in *ness as well. We find also that the semantics of the *ity nouns is coherent only when they are [-Count], and that the semantics of the *ness nouns is not coherent when they are [+Count]. Thus the semantics of the nouns *credulity(*ies), garrulity(*ies), loquacity(*ies), pugnacity(*ies), sagacity(*ies),
tenacity(*ies), and vivacity(*ies), derived from the (less productive) base Xous, and fragility(*ies), servility(*ies), derived from the (more productive) base Xile, is transparent. The semantics of the [+Count] +ity derivatives in (40) is not so transparent (examples from Aronoff):

(40) a. How many varieties of fish are there in the pond?
b. All the town's notables and notorieties were there.
c. They admired his dress, but only as a curiosity.
d. What a monstrosity!
e. There are many discontinuities in your story.

Similarly, the semantics of the [+Count] #ness derivatives in (41) is not so transparent.

(41) a. I remembered his many kindnesses.
b. The awkwardnesses of the evening were soon forgotten.
c. There are many weaknesses in your analysis.

In (41), Xness does not mean "the fact, quality, state or extent of being X." Kindnesses, weaknesses and awkwardnesses mean "instances of kindness, weakness or awkwardness," just as discontinuities means "instances of discontinuity."

The interesting fact is that #ness appears to produce fewer [+Count] derivatives than +ity. Now, we have hypothesized that there are two kinds of semantic operations accessed by
affixation rules; one relating argument structures (and assigning coherent readings), and another kind which is more idiosyncratic. The +ity rule appears to allow both kinds of operations, while the #ness rule appears to favor the former. This "preference" is what we have suggested be formalized in terms of indices of productivity for permitted semantic operations. The greater semantic coherence of #ness nouns that Aronoff notes is a reflex of this preference.

5. Residual Issues.

The central insight of the theory of word based morphology is that the semantics of word formation must be based on the word, and not on the morpheme. There are morphemes without meaning; there are morphologically complex words whose meanings are not the sum of the meanings of their morphemes; there are words which share morphemes without sharing any meaning (stand, understand, withstand; take, undertake). The meaning of a derived word, insofar as it is predictable, is predictable from the meaning of a word from which it is derived. "The sign gravitates to the word."

This is undoubtedly a valuable insight. Thus the semantic relationships between the words in each column of (42) are transparent to the intuitions of the native speaker, while such semantic relationships as may exist between the words in each column of (43) are not:
A theory of the semantics of productive word formation must therefore begin at the level of the word, and not of the morpheme.

The premise of word based morphology, however, is that the theory of the structure of words must also begin with the level of the word. Here we run into problems, for the affix does not "gravitate" to the word: there are "regularly derived words, semantically transparent, formed with affixes which we know to be alive and well in their operation, which on the surface do not appear to have been derived from words" (Aronoff op. cit.:88). Let us take Aronoff's example, the suffix +ee, which forms nouns whose meaning is a function of the meaning of related transitive verbs with animate objects. This suffix appears sometimes on the verb, and sometimes "on the root of that verb, which can be obtained by deleting its last morpheme" (loc. cit.):
Typically, verbs of the form $Xate$ have derivatives of the form $Xee$ instead of the expected $*Xatee$. The point of attachment of the suffix is thus predictable from the morphology of the base. A possible solution, then, would appear to be to allow the affixation rule to vary with the morphology of the base: i.e., to say that each morphological form of the base defines a stem for the suffix to attach to, which may or may not be identical to the word.

But in a theory built on the "one suffix, one rule" principle, where a WFR is a monolithic rule that outputs the form of a derived word as well as its meaning and subcategorization, this choice is not available. If the morphological base of the $+ee$ WFR is $evacu-$ or $nomin-$, while the semantic base is $evacuate$ or $nominate$, there is no unitary base. If the attachment rule for the suffix is sometimes word-based and sometimes stem-based, there is a bifurcation in the attachment rule; it is no longer the "same rule" (cf. Aronoff, op. cit.:89-94). In this theory there is only one option, and that is to let the suffix regularly attach to the word, and then to "adjust" the shape of the incorrect output to the "vagaries..."
of reality" by rules of truncation.13

Below I discuss some problems with truncation rules. The point of this discussion is that an examination of the morphological process of word formation brings us to the same conclusion that the examination of the syntacticosemantic process did: the "one suffix, one rule" principle cannot be maintained. There is no single rule of word formation that outputs the form as well as the meaning of a derived word.

The obvious question about truncation is why it invariably operates only before + boundary (Level I) suffixes, and never before # boundary (Level II) suffixes. These two classes of affixes were first postulated by Siegel (1974),14 and are retained by Aronoff (op. cit.:79ff.) Given two classes of affixes, Siegel showed that there is an interesting correlation between the boundary and the manner of attachment of the suffix. The + boundary suffixes may attach to stems as well as to words; the # boundary suffixes attach only to words. Truncation recaptures this distinction at the surface; but in a theory wherein both types of suffixes attach only to words, the correlation between truncation and the + boundary appears accidental.

A more important question is what exactly truncation rules delete. They are presented as rules which "delete a morpheme which is internal to an affix, in the following general manner:
where X and Y are major lexical categories."
(op. cit.:88)

However, it appears that truncation rules must also (sometimes) erase internal labelled bracketing.

In order to see why this is so, we must remember that this theory of word formation purports to provide a motivated labelled bracketing for words entering the phonological cycle. As Aronoff observes, such labelled bracketing had previously been sometimes determined in an "arbitrary and high-handed" manner. In view of this, Brame (1974) proposed the Natural Bracketing Hypothesis as a constraint on the assignment of internal bracketings. His constraint was based on the observation that the string constituting the domain of application of the cycle of rules "itself shows up elsewhere as an independent phonetic word sequence" (op. cit.:55). To express this relation between a bracketed substring and its occurrence as an independent word, Brame proposed the following definition,

(45) Definition

Two strings in phonological representations are said to be equipotent if they are identical and at least one of the two is not represented as a proper substring in phonetic representations.
and the following constraint:

**Natural Bracketing Hypothesis**

For a substring $\psi$ to be bracketed, it must be equipotent to a string $\sigma$.

This constraint rules out bracketings like $[[\text{ortho}[\text{dox}]y]]$ or $[[\text{aristo}[\text{crat}]y]]$, since dox and crat do not occur as words. However, it still permits a bracketing $[[\text{filter}]]$ for a word like filter, given the existence of a word fill. To avoid the possibility of this bracketing, Brame suggested a stronger version of the Natural Bracketing Hypothesis:

**Strong Natural Bracketing Hypothesis**

For a substring $\psi$ of a string $\phi$ to be bracketed, $\psi$ must be equipotent to a string $\sigma$, and the meaning of $\phi$ must be a compositional function of the meaning of $\sigma$ and $\phi - \psi$ ($\phi$ minus $\psi$).

(Brame 1974:56-58)

As Aronoff observes, it would be desirable for such a constraint on natural bracketing to follow from a theory of morphology. He remarks:

The question now naturally arises whether a constraint like that imposed by the Strong Hypothesis is a basic theoretical entity, or whether it falls out from more general principles. There obviously is some device which assigns these natural bracketings, and this device should have some other motivation than the mere fact
that assigns natural bracketings.

... Within the theory of morphology outlined above, a new word is always formed by performing some phonological operation on an already existing one. ... The meaning of the new word will also be a compositional function of the meaning of the word it contains. Since members of major lexical categories are always labelled (N, V, Adj, Adv), since all regular WFRs operate on such labelled words, and since there is no reason to assume that these labels are erased in the course of the application of a WFR, WFRs will, unless otherwise constrained, produce labelled bracketings in their output. It is clear that all the constraints imposed on intraword bracketings by the Natural Bracketing Hypothesis are direct consequences of this theory. In fact, given this theory, no other bracketing is possible. (op. cit.: 25)

With this in mind, consider the following derivations (suggested by Aronoff), assuming first that truncation leaves internal bracketings intact.

(46) a. Base [evacu+ate]\textv\ b. [incis(e)+ion]\textn

WFRs [[evacu+ate]+ee]\textv\textn \[[incis(e)+ion]+ive]\textn\texta

Truncation \[1\ 2\ 3\ \] \[1\ 2\ 3\]

\[\rightarrow 1\ 0\ 3\ \] \[1\ \emptyset\ 3\]

Output [[evacu \textv+ee]\textn \[[incis(e) \textn+ive]\texta

The outputs of (46) are the inputs to the phonological cycle. Here, there are labelled brackets [ ]\textv\ around evacu-, and [ ]\textn around incise-. The Natural Bracketing Hypothesis is violated: neither evacu nor incise shows up as a word.

Consider also the following derivations of communicative. In (47), the result of truncating the first -At is shown15; in

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(48), the result of truncating the second -At is shown.

(47)

a. Base
[communicate]_V

WFRs
[[communicate]_V +At +ion]_N

[[[[communicate]_V +At +ion]_N +ive]_A

1st At-truncation

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Output

[[[[communicate]_V +At +ive]_N +ive]_A

Once again, the output makes the false claim that communicate shows up as a verb, and communicate as a noun.
Here there is an extra noun cycle on communicate, again violating the Natural Bracketing Hypothesis.

These violations can perhaps be rectified if we assume that truncation rules delete the labelled bracketings "outside" the truncating morpheme. This will erase the internal verb brackets in evacuee, the internal noun brackets in incisive, and (assuming that the second -At truncates in communicative) the internal noun brackets in communicative.

Notice, however, that truncation must not erase the outer (noun) bracketing in the following derivation (assuming again that the second -At truncates):
Here the output is appropriately bracketed only if truncation leaves bracketings intact. This means that truncation must trigger erasure of bracketing only in some cases; it is not clear that such a restriction can be formalized. Moreover, truncation rules apply not cyclically, but in a block after all WFRs (op. cit.:91). They must thus have access to internal bracketing at any depth; they are a very powerful type of rule, which can undo the work of any WFR.

The only motivation for retaining truncation in the morphology is the "one suffix, one rule" principle. Since we have shown (from an examination of the semantics of word formation) that this principle must in any case be given up, there remains very little justification for truncation rules. But without truncation rules, the notion of a WFR falls apart.

Recently, Lieber (1980) has argued, from a purely morphological point of view, for autonomous components of "lexical structure" and "lexical semantics." She shows that in languages like German and Latin, the sorts of stems for nouns, verbs and adjectives which form bases for derivation and compounding are also the sorts of stems which form bases for

$[[\text{irrit}+\text{ate}]_v+\text{At}+\text{ion}]_n$

1 2 3 4

1 2 $\emptyset$ 4
inflectional processes. This is strong support for the view that
the lexicon contains not only words, but related stems. Lieber
hypothesizes that each major category N, V, A in the lexicon is
subdivided into "lexical classes," consisting of words of that
category type and related stems. The items in a lexical class
are related by a "morpholexical rule." Thus for English she
gives illustrative lexical classes of verbs like the following:

(50) (=her(30)) Class a: Xduce " Xduct
{(produce, product), (conduce, conduct), . . .}

Class b: Xscribe " Xscript
{(prescribe, prescript), (inscribe, inscript),
(describe, descript), . . .}

Class c: Xmit " Xmis
{(permit, permis), (commit, commis),
(transmit, transmis), . . .}

(51) (=her(31)) Class d: X " Xate
{(form, formate), (represent, representate),
(procrastin, procrastinate), (evapor, evaporate), . . .}

In this theory, both members of the lexical class are available
to the (morphological) rules of word formation. All allomorphy
is confined to the stem. The information about which member of
the lexical class is the word, and which the stem, is provided
by subcategorizational frames in the lexicon: the stem is given a frame which requires a following affix.

A detailed consideration of the morphological process of word formation is outside the scope of this thesis. However, we might note that in separating the morphological rules of affixation from the semantic rules of word formation, we may have made it possible to reconcile a theory of "lexical structure" such as Lieber's, with Aronoff's view of "lexical semantics." We may now weaken the hypothesis of word based morphology to apply only to the semantics of word formation, and say that the semantic base of (e.g.) evacuee is the word evacuate, although the morphological base is evacu-. As Lieber observes, the relation between the morphological base and the semantic base provided by the morpholexical rules. Thus words like stimulate, stimulant and stimulable can be related without morphologically deriving the latter two forms from stimulate, for

(v)erbs in -ate . . . belong to a lexical class which is defined by the morpholexical rule X-Xate. Thus, every individual form Xate is related by morpholexical rule to the corresponding X which is the base for affixation of -ant and -able. (op. cit.:223)

These observations suggest that the (morphological part of) the affixation rules given in the previous section can be refined in the following way. First, the base may be given as a variable, which may be either a lexical category or a stem. Secondly, the
list of morphological bases may be given in terms of morpholexical classes. The morphological part of the +ee affixation rule may thus be as in (52):

(52) \[ [A]_X \longrightarrow [[A]_X + ee]_N \]

\[ X = \text{Stem or Verb} \]

Forms of the base: \( XVy \) (pay, employ)
\[ X(\text{~Xate}) \) (evacu-evacuate, nomin-nominate)

etc.

Observe that with such a revision of affixation rules, we can allow morphologically complex but semantically non-compositional words (e.g. prob+able, rectify, gustate+ion) to be formed by the same affixation rules that apply in productive word formation. Such words will have a morphological base, but no semantic base. Thus when a noun gustation is formed from the stem gustate, the semantic rule will look for a verb *gust or *gustate, from which to derive its meaning. When this search fails, no rule-governed meaning will be assigned to the word, and an idiosyncratic meaning for this word will have to be specified in the lexicon.
6. Concluding Remarks

I have argued that there is a type of lexical rule which relates the argument structures (given in terms of thematic functions) of derivationally related words, and suggested that the domain of this rule type coincides with what Wasow (1980) has identified as the "minor" lexical rule. Lexical items related by this kind of rule display regular patterns of subcategorizational correspondences; such correspondences are here viewed as arising out of the principles governing the assignment of thematic functions to syntactic frames. The semantic rules relating lexical items were seen to be independent of the affixation rules that output the morphological forms of words. The separation of these rules in the lexicon was supported by evidence from word formation.

A number of issues remain for further research. First, a detailed examination of a wider range of such lexical rules is necessary if we are to give content to the theory of thematic functions, and to the thematic-syntactic mapping. Second, given that we have postulated separate morphological and semantic rules of word formation, questions arise as to the constraints on each type of rule, and on the principles governing the accessibility of semantic rules to affixation rules. Much is known concerning the notion "possible morphological rule"; a similar characterization of the notion "possible semantic rule" is lacking. It is to be hoped that we can isolate a small number
of "basic" semantic operations such as Causativization, Decausativization, Inheritance, and so on, as the set of possible relationships between argument structures. Such a characterization of possible relationships might also allow us to formulate general principles governing the assignment of semantic operations to affixes. Thus we may ask if verbs and adjectives are ever related by a rule of Inheritance; or if nouns and adjectives are ever related by anything but a rule of Inheritance.

Again, we have suggested that deverbal nominalizing and adjectivalizing affixation rules may share semantic operations, as may denominal and deadjectival verbalizing suffixes. This situation, where diverse affixes access a single semantic rule, contrasts with the situation of suffixes like adjective-forming -ed or -able. Here a single suffix (we have argued) may attach to either a noun or a verb; but the semantic operations accessed by the suffix vary, depending on the category of the input. We need to develop a theory which tells us why this state of affairs obtains, rather than its opposite. That is, why do nouns and adjectives function together in semantic rules, rather than nouns and verbs? A possible answer is that only those lexical categories which can be abbreviated in terms of a system of syntactic features can function together in semantic rules. Thus an investigation of the semantics of word formation may also give us insights into the system of features for the
decomposition of lexical categories.
FOOTNOTES TO CHAPTER FOUR

1 Some of the material in this chapter has been presented at the Western Conference on Linguistics (1979) and the annual meeting of the Canadian Linguistic Association (1980).

2 See also Newmeyer (1979).

3 He remarks: "It is not clear that we are dealing with three separate readings rather than one tripartite or ambiguous one. I lean towards the latter, but due to the present state of the art of semantics, and perhaps to my own incompetence, I will leave this very interesting question open" (op. cit.:38, fn.5).

   For arguments that n-ways ambiguous words should be treated as n lexical items, see McCawley (1968).

4 Chomsky (1965:215) suggests that "if the traditional view that syntactic categorization is in part determined semantically can be substantiated in any serious way, it can be expressed by a redundancy rule determining syntactic features in terms of semantic ones." The consistent correlation between the stativity of a noun and the feature [-Count] would appear to be a good candidate for such a rule: [+stative] ----> [-Count].
5 Hust (1978) stresses this point.

6 Newmeyer (1979) makes the same point. The case of excitement, excitation is unique among our examples in exhibiting a morphological variation which apparently coincides with semantic variation. However, we have noted that the conditioning factor here is not the semantic rule, but the purely morphological fact that the base Xcite is equally productive with the suffixes -ment and (at)ion.

We might note that another test for homonymity (i.e. words produced by the same morphological operation but different semantic operations) is to examine further derivational processes that apply to words. Thus given a "regular" noun satisfaction and a "skewed" noun satisfaction derived from satisfy [+ [ +Animate]], we find that the prefix dis- attaches only to the latter:

(i) Mary's dissatisfaction with the dress
(ii) *the dissatisfaction of the requirements of lexical insertion by the lexical entry
The adjective satisfied also undergoes dis- prefixation.

(iii) Mary seems dissatisfied.

This test in fact leads Aronoff to recapture a distinction between a noun government "body that V's" and a noun government "act or process of V-ing," that is provided by Jackendoff's system in (3) above. Aronoff (op. cit.:54) first attempts to
place a negative restriction on the denominal adjectival suffix -al: -al "does not attach to the class of nouns of the form X\_ment (i.e. the class of nouns of the form X\_ment, where X is an independently occurring verb)." This fails to account for (iv):

(iv) The funds were used for purely governmental purposes.

Aronoff then notes that governmental in (iv) corresponds semantically to the "extended substantivization" in (v), rather than the "directly deverbal" sense of government in (vi):

(v) His government was defeated by a wide margin.

(vi) His government of the country has been roundly criticized.

He proposes that "the difference between the two senses of government can be represented in purely structural terms as being that between X\_ment and X\_\_ment; governmental is clearly derived from the former. If, therefore, we state the constraint (on -al attachment, R.A.) on X\_ment, then governmental is no longer an exception" (loc. cit.). In other words, there are two nouns government.

Notice that -al, when it attaches to constitution or institution, again means "pertaining to the constitution or institution" rather than "pertaining to the act or process of constituting or instituting" (constitutional amendment, institutional reform). This suggests that the relevant restriction involves the semantics of the nominal base rather than its internal structure. As Aronoff (op. cit.:120) observes,
the suffix +ic(al) generally attaches to nouns "which denote inherently definite things," e.g. globe, region, dialect, continent, excrement, etc. An appropriate characterization of its semantics might avoid the following two problems raised by Aronoff's solution. First, it is not clear how the internal bracketing is lost for one sense of government. The only mechanism for loss of internal bracketing in this theory is "semantic drift." But the meaning of government "body that V's" is nowhere near as idiosyncratic as that of words like transmission (of a car) and Prohibition (a period in U.S. history), which are considered to have "drifted" and lost internal structure; and there are other deverbal nouns with the same meaning, e.g., administration, association, congregation, organization.

Secondly, the negative restriction on the base violates the Adjacency Condition of Siegel (1977) and Allen(1978), to which there are no other known counterexamples:

(1) No WFR can involve X and Y, unless Y is uniquely contained in the cycle adjacent to X.

In a theory of morphology governed by this condition, it becomes impossible for a WFR to refer to any conceivable property of the base at any possible cyclic depth. Rules which crucially involve the notions denominal, deverbal and deadjectival are not allowed... For example, a rule which states that a suffix X may attach only to denominal adjectives cannot be formulated, ... since such a rule relates two items which are not in adjacent cycles; e.g.:
If the -al affixation rule is to be restricted to non-deverbal nouns Xment, it must "look inside" the outer noun brackets.

Interestingly, Pesetsky (1979:36) cites an adjectival suffix -isk in Russian which does not attach to "abstract nouns" which "lack semantically well-formed plurals," (e.g., nouns in -ost or -istv), and observes:

the verb upravit' 'to administer' yields a nominalization upravilenije, which has both meanings of the English word administration, i.e. a body of people who administer and the process of administering... -isk can apply to this word, but the meaning of the result is compositional only of the former, non-abstract meaning.

7 Notice that we need to distinguish the optionality of a to-NP complement to assurance in its non-stative reading, from the absence of a to-NP complement to assurance in its stative reading. Compare the discussion of optional elements in verb subcategorization in Chapter One, fn.1.

8 The possibility of two nominalizations for assure suggests that like depress, etc., this verb takes both Experiencer and non-Experiencer objects. As we would expect if the object of assure on one reading were an Experiencer, there is a related adjective assured:
(i) The hare seems assured that he will win. The [-Count] noun and the adjective both undergo self-prefixation.

(ii) The hare seems very self-assured.

(iii) The hare's self-assurance was remarkable.

However, I have been unable to fully unravel the complexity in the semantics of assure. Thus the verb and the adjective have another reading wherein the verb is not a "verb of saying," and nothing is claimed about the mental state of the verb's object or the adjective's subject:

(iv) His slow and steady pace assured the tortoise of victory.

(v) Victory now seems assured to the tortoise. (said by a spectator)

(vi) The tortoise now seems assured of victory. (said by a spectator)

There is no noun assurance on this reading.

Rardin (1975) notes the existence of homonymous [-Count] and [+Count] nouns, where "the feature [+Count] appears to be associated with interpretations of one type, [-Count] with another" (op.cit.:36). Using the many/much test, he shows that decision is [+Count], but indecision is [-Count] (examples from Rardin):

(vii) Did Martha make any decisions? Some, but not many.

(viii) Did Martha show any indecision? Some, but not much.
However, since indecision is stative and synonymous with indecisiveness, he concludes that it is deadjectival. He gives a similar argument for a dual, deadjectival as well as deverbal, source for determination. Compare the ambiguity of (ix) (example from Rardin):

(ix) The committee's determination(s) angered Bill.

[-Count] reading: its determined state

[+Count] reading: what it determined

Notice that there is an adjective determined which appears to be derived from the intransitive verb determine:

(x) Goodenough determined to win the election.

(xi) Goodenough is determined to win the election.

If the subject of (x) is an Experiencer, this might be an argument that the Causer is optional in the input to the rule deriving the adjectival passive. However, such a modification does not appear to account for (xii)-(xiii):

(xii) John opposes the changes.

(xiii) John is opposed to any change.

An explanation of these facts must await further research.

9 Thus it may be specified that the +ee WFR requires verbs which are transitive and take animate objects, or that the prefix re# attaches only to verbs that entail a change of state (John punched Bill, *John repunched Bill; John punched the holes in the paper, John repunched the holes in the paper).
There is in fact a third class of **able** adjectives. These are the ones whose meanings are related to intransitive verbs. (Hust (1978) notes this fact, and credits the observation to Chapin (1967)).

(i) The weather is changeable.
(Cf. The weather changes.)

(ii) John is adaptable.
(Cf. John adapts easily.)

(iii) Foodstuffs are perishable.
(Cf. Foodstuffs perish.)

(iv) The weather is variable.
(Cf. The weather varies from day to day.)

These adjectives can be given the generalized reading "capable of X-ing (where X is the base)." So our hypothetical WFR (18) (below) strictly needs three branches, not two; but we shall ignore this point in the discussion.

Compare Aronoff's comment (op.cit.:48) on the treatment of the ambiguity of **fashionable** ("in fashion," or "capable of being fashioned") and **sizeable** ("having great size," or "capable of being sized"): "Such a consistent correlation of homophony and ambiguity can only be accounted for on the hypothesis that we are dealing here with two different affixes, each with its own meaning and each with its own base."
Conversely, if \( n \) different affixes take part in a semantic operation, we need \( n \) different semantic operations.

12 We shall thus postulate homonymous affixes only in the cases where (i) the Level specifications of the affixes are not the same, or (ii) where the lexical categories output by the affixes are not the same. (Examples of the former kind are the adjectivalizing suffixes +able and #able, discussed by Aronoff (op. cit.). Examples of the latter kind would be (i) the -en in redden, which is a verbalizing suffix, and the -en in broken, which is a variant of the adjectivalizing suffix -ed; (ii) noun-forming and adjective-forming -al (approve, approval, globe, global); and (iii) verb-forming and adjective-forming un- (untie, unexplored).) A variation in the "semantics of the suffix" will not be taken as evidence for homonymous suffixes.

Allen (1978) makes a similar point, that the identification of a suffix should be effected independently of its semantics. Compare her comment on the adjectivalizing suffix -ed:

. . . it was demonstrated that the -ed suffix is a Level II, word-boundary suffix, #ed. Data presented in support of this argument included examples of both denominal and deverbal -ed. In all cases, denominal and deverbal -ed showed identical types of interactions with other morphological affixes. I will therefore assume that -ed is a single adjectivalizing suffix which attaches to both nouns and verbs. (op. cit.:289, fn.21).
One argument given by Aronoff (op. cit.:48) for homonymous suffixes in the case of denominal #able and deverbal #able is that "the denominal adjectives always take the nominal ending #ness and never +ity (fashionableness, *fashionability; sizeableness, *sizeability), while the deverbal adjectives show no real preference (acceptableness, acceptability; movableness, movability)." This argument is, however, defective. It must be remembered that Aronoff postulates a total of not two, but three -able suffixes: two deverbal (+able and #able), and one denominal (#able). What is at issue is not the distinction between the +able and (either of) the #able suffixes; the issue is whether there is a distinction between the two #able suffixes. Now +ity and #ness suffixation can serve as a test for +able versus #able. This is because, under the hypothesis of a "Level-ordered" morphology, + boundary suffixation precedes # boundary suffixation. (Thus the fact that movable takes +ity as a suffix shows that the -able in that form is +able, and not #able.) Note (however) that +ity and #ness suffixation cannot distinguish between deverbal #able and denominal #able.

13 Aronoff also invokes truncation for dealing with two other problems, namely (i) the problem of productive word formation from a stem which never shows up as a word, and (ii) the problem of derived words sharing a meaning which is absent from the base word. The first problem is illustrated by instances of *X, Xion,
Xive in English (e.g., *incise, incision, incisive; cf. Aronoff (op. cit.:29) for documentation of this data). To account for this, Aronoff suggests that (all) Xive/Xory words are derived from Xion, and not X. This solution involves truncation. In support of this analysis, Aronoff presents a historical argument ("the -ion form entered the language before the -ive form"), a distributional argument ("the total number of words of the form Xion far outnumbers the total number of words in all other suffixes combined"), and a third argument, which goes as follows:

when X does occur as an independent verb, and the semantics of X and Xion do not correspond exactly, the meaning of Xive, etc., always corresponds to that of Xion.

None of these arguments is very forceful. From the point of view of our previous discussion, what these data seem to suggest is that the affixation rules for deverbal nouns and adjectives often share the same semantic rule. That is, instead of a two-step derivation where (a) the -ion rule adds or subtracts a meaning from its base X, and (b) the -ive/-ory rules operate on the abstract base Xion to retain this (modified) meaning, we can envisage a derivation where a rule which modifies the meaning of X is shared by both -ion and -ive/-ory. This might provide a clue to the paradigm *X, Xion, Xive/Xory.

14 Siegel argued that Level I affixation rules preceded Level II.
affixation rules, with the cyclic stress rules intervening. She showed that such an organization of the morphology explains why (i) Level I affixes are stress-determining and take stress, while Level II affixes are stress-neutral and stressless; (ii) the phonological conditions on the base of the affix may include information about stress for Level II affixes but not for Level I affixes; and (iii) Level II affixes are generally found "outside" Level I affixes.


Aronoff leaves open the question of which -At truncates in Xate+Ation. His rule (18) (op. cit.:95) deletes the first -At. But truncation of the second -At appears to be necessary to account for some stress facts noted by Brame (1972), as Aronoff (op. cit.:101, 114) observes. Brame shows that the stress difference in Xatory words like divinatory (presuffixal stress) and assimilatory (pre-presuffixal stress) is predictable from whether the morpheme -ate is part of the base verb or part of the suffix. In Brame's analysis, these words must have the bracketings shown below when they enter the phonological component:

\[
[[\text{divin}] \text{At} +\text{Or} +\text{y}] \quad [[\text{assistmil}+\text{At}] \text{Or} +\text{y}] \\
V_A \quad V_A
\]

In Aronoff's theory, assimilatory will have the following
derivation prior to truncation (ignoring the brackets):

assimilate

assimilate + At +ion

assimilate + At +ion +ory

Two rules of truncation, -At truncation and -ion truncation, must apply to this output. Now if the first -At truncates, the -At in assimilatory will appear outside the verb brackets.

On the other hand, if the second -At truncates, the -At truncation rule here cannot be the same rule as that in evacuate (as Aronoff observes). Notice also that truncating part of the suffix is equivalent to saying that the form of the suffix which attaches to Xate is -ion and not -ation.

She writes:

... there is no more reason to believe that semantics should be part of the formal mechanics of word formation, than there is to suppose that semantics is part of the formal mechanisms of sentence syntax (i.e., phrase structure, transformations). It has long been a basic tenet of generative syntax that the syntax and semantics constitute autonomous components of the grammar. The claim will be made below that the "syntactic" or structural aspects of word formation should also be autonomous form lexical semantics. (op. cit.:109)


________. (1977). Alternatives to the Tensed-S and Specified
Subject Conditions. *Linguistics and Philosophy* 1:381-411.


