Facts about the interaction of morphology and subcategorization have been discussed by a number of investigators [Siegel 1973; Aronoff 1976; Allen 1976; Wasow 1977, 1980; Roeper & Siegel 1978] and more recently in depth [Carlson & Roeper 1981; Roeper 1981; Williams 1981; and Kayne 1982]. In the more propitious cases, anecdotes, with some refining and reorganizing, lead to theories, which can then be tested, reformulated and integrated with other emerging systems of grammar. This paper is an effort in this spirit. It focuses on a sampling of (perhaps familiar) data on affixation and its effects on subcategorization.

I will argue that affixation affects subcategorization systematically and predictably, based on two parameters of morphological change: (1) lexical category and (2) thematic structure. Section 1 presents a variety of deverbal affixes and their effects on subcategorization. In section 2 I show that these effects can be derived from a theory of morphology which consid-

1 This paper is a revision and development of some of the ideas which appear in Randall [1982]. Discussions with with many people helped to shape these ideas, including Chuck Clifton, Henry Davis, Joe Emonds, Lyn Frazier, Paul Kiparsky, Michael Rochemont, Tom Roeper and J-R Vergnaud. In addition to them, I would like to thank participants in the colloquium at UC Irvine where parts of this work were presented. I am grateful to the Killam Foundation for their support during the time that this paper was written. I was also supported in part by NIMH grant # MH 35347 Sloan Foundation grant # 78-4-14, and NSF grant # BNS 8014326 during the time when some of these ideas were developing.

2 This claim might seem trivial, given the relation between subcategorization and 0-structure that follows from the Projection Principle; i.e., that subcategorization entails 0-marking. This could lead to the incorrect assumption that a change in 0-structure necessarily implies a change in subcategorization. In what follows, the crucial cases that I will consider are cases in which there is no overlap between the two, where a change in 0-structure does not necessarily entail a change in subcategorization. The instances of non-overlap arise from the fact that subcategorization is restricted to government while 0-marking is not. The contrast, in Chomsky's terms, is between direct and indirect 0-marking; in Williams' [1981] terms, between internal and external arguments.

3 Williams [1981] proposes a theory based on thematic structure as well (argument structure, in his terms) in which restrictions on morphologically derived forms follow from two types of operations — one which internalizes, one which externalizes, an argument of the base form (Williams' external argument corresponding to an argument in non-subcategorized position). Ultimately, it may turn out that the two approaches are consistent, and complement each other; however, we will not attempt to explore this question here.

QUADERNI DI SEMANTICA / Vol. V, no. 1, June 1984
ers the <<morphological distance>> between base and derived forms and propose the Inheritance Principle as the core principle of how subcategorization in derived forms is determined. Sections 3 and 4 examine the parameters on which the Inheritance Principle is based, category change and thematic change. In section 5, after looking at additional data, I revise the Inheritance Principle to the Thematic Inheritance Principle. The Thematic Inheritance Principle is a more accurate statement, as it not only accounts for the data of the earlier version but also makes additional predictions, about the interactions among morphological change, thematic structure and the inheritance of subcategorized elements. The final section considers a number of questions that this theory raises and some promising directions for future work.

1. Constraints on the inheritance of complements

One of the most common effects of affixation is to disallow complements of a base form from being <<inherited>>; that is, taken directly from a base subcategorization into a derived subcategorization. Though every complement type is subject to this restriction (Adv, PP, S, NP, Adj), we will focus here (given our space limitations) on PP complements.

Across forms derived from a wide variety of affixes, a similar restriction holds:

(1) a. drive trucks for a living
    collect garbage in a hurry
    discover new stars with computers
    propose ideas to the committee

b. a driver of trucks *for a living
   the collection of garbage *in a hurry
   the discovery of new stars *with computers
   the proposal of ideas *to the committee

In all cases, only one complement can be inherited into the derived form. The restriction is more specific though. The inherited complement must be the object of the verb. Consequently, neither (a) intransitive verbs nor (b)

---

4 In a few cases, affixation appears to admit additional complements. Out- is one such affix, as in Bill out-Kennedyed Kennedy (from Carlson & Roep [1980], but see fn. 10, below). Re- will also sometimes have this effect (as in Sue rethought the solution), though its operation is much more limited, as will be shown below (see also Randall [1982: 95-96]). The productive lexical causative rule adds on Adj or a PP frame as in This juicer can squeeze oranges flat/into discs or The dinosaurs ate the trees bare. See Dowty [1979]; Randall [1981]; and Rivière [1982].
transitive verbs used intransitively will be able to inherit any complements at all. The forms in (2) do not have the expected (and semantically feasible) counterparts in (3).

(2)  
   a. sleep in haystacks  
       fret about every little thing  
       dive for coral  
   b. fly in circles  
       drive to California  
       dance through the forest  

(3)  
   a. a sleeper in haystacks  
       a fretter about every little thing  
       a diver for coral  
   b. a flier in circles  
       a driver to California  
       a dancer through the forest  

Similarly, verbs which take more than one obligatory complement will not be able to form nominals in this manner. Consider verbs requiring an NP PP sequence:

(4)  
    *the putter of men on the moon  
    *the hander of scalpels to surgeons  
    *the leaner of ladders against buildings  
    *the situater of factories in various cities  
    *the positioner of mannequins in poses  

Not just forms in -er are blocked, however. The verbs of (5), which require two complements, cannot form nominals when affixed with any of the forms we have looked at:

(5)  
    a trip in circles  
    a letter to California  
    a path through the forest  

Note that certain nominals derived from (2b) can appear with these complements:  
(i)  
    a flight in circles  
    a drive to California  
    a dance through the forest  

But these complements are not inherited. Nonderived nouns can take identical complements, and these must be subcategorized by the particular noun:  
(ii)  
    a trip in circles  
    a letter to California  
    a path through the forest  

Similar facts have been discussed with respect to dative complements to derived nouns: a letter to Bill; a present for Susan (Wasow [1980] among others); and agent by-phrases which are needed independently of passives: a symphony by Beethoven; a portrait by Rembrandt (Wasow [1980] citing Bresnan [1972]).
(5)  *puttment (abuttment)
    *ansion (expansion)
    *eanment (convenement)

(Note that the problem is not phonological, as shown by the parallel examples in parentheses). And where these verbs can form nominals in these affixes, they cannot be given the intended readings:

(6)  *the situation of factories in various cities
    *the position of mannequins in poses

The apparent restriction on deverbal nouns extends to deverbal adjectives as well. Assuming a standard analysis for -able adjectives in which the object moves into subject position (cf. Roeper et. al. [1981]; Kayne [1982]), we find that only the NP object may appear; no complements subcategorized to appear beyond the object are permitted.

(7)  Calculus is learnable *with difficulty
    Mary is excitable *with kisses
    John was excusable *from the table
    The car was driveable *to Mexico

In contrast, when the complements occur outside, in nonsubcategorized positions, they may appear:

(8)  Calculus is learnable with the right kind of instruction
    Mary is excitable on airplanes
    John is excusable under the circumstances
    The car will be drivable in a week

The same restriction holds for passive adjectives:

> Aronoff [1976] points out the forms:
> (iii) 'dividable into three parts
divisible into three parts
and notes the stress differences in cases such as:
> (iv) Volvos are comparable to Saabs
    Volvos are *comparable to Saabs

Both of these alternate lexical forms (divisible and comparable) are derived at level 1 (in Kiparsky's [1982] sense), before the output of a productive -able rule. Subcategorization of complements is allowed in these adjectives just as in nonderived adjectives such as proud PP, happy. S. Aronoff also notes [chapter 4 fn. 41 that the general restriction on -able complements does not apply to passives, «...it would thus appear that an externally unmotivated feature of the WFR Xable forbids PPs which are subcategorized by the verb X to appear after the adjective Xable.» It will be shown below that the feature is not idiosyncratic but distinguishes -able from verbal passives, -er from nominal -ing, etc., in a systematic way.)
The letter was unsent *to Sue
The story was untold *to the kids
John is unknown *to be a communist

It is not the case, though, that all deverbalizing affixes operate like the ones examined so far (-er, -ion, -y, -al, -ment -able, passive adjective). Process -ing nominals allow the full range of subcategorizations, with both optional and obligatory complements:

(10) a. optional PP
    the collecting of garbage in a hurry
    the discovering of new stars with computers
    the proposing of ideas to the committee
    the placing of students in jobs

b. obligatory PP
    the putting of men on the moon
    the handing of scalpels to surgeons
    the leaning of ladders against buildings
    the situating of factories in various cities
    the positioning of mannequins in poses

Other affixes behave similarly to -ing. Consider verbal prefixes: un-, re-, over-, mis-, dis-, counter-. These can also occur with both optional and obligatory PP subcategorizations:

(11) a. optional PP
    Mary untied the knot with an icepick
    The teacher reinterested John in Shakespeare
    I overindulged myself on Reese's pieces
    The lawyer misrepresented Julia's position to the judge
    John disconnected the swing from the elm tree
    Mary counterbalanced the weight with bricks

b. obligatory PP
    The seamstress unpinned the pattern from the silk
    The nurse rehanded the scalpel to the surgeon
    The streets overflowed with milk and honey
    John mistook Mary for her sister

The affixes discussed so far fall into two classes: those that disallow all but a direct object complement to be inherited (-er, the nominalizing affixes: -ion, -y, -al, -ment; -able, and passive adjective); and those that allow

7 The first two cases are from Wasow [1980], who gives them a ? rather than a *. The third is from Roeper & Siegel [1978].
full inheritance of their base verb's complements (-ing and verbal prefixes: re-, un-, over-, mis-, dis-, counter-). At this point we can ask whether there is any principled distinction between these two classes. The most obvious distinctions do not apply: prefix/suffix, endocentric/exocentric, level 1 (+)/level 2 (-). I claim that the distinction is not arbitrary, as it might seem at this point. The inheritance behavior of an affix is predictable from the interaction of two independent parameters: category and thematic structure. We turn to this claim below.

2. The Inheritance Principle

An affix can affect a lexical item principally with respect to two parameters: category and thematic structure. -Able, for example, affects both: it changes a verb into an adjective and blocks the assignment of agent to subject. With the two parameters +.category change and +.thematic structure change, there are four possible outcomes. These, in turn, can be used to define the morphological distance between a derived form and its base.

(12) a. Morphological distance: the morphological distance, \( d \), between a derived form and its base encodes two measures,

\[
\begin{align*}
(i) & \pm \text{category change (}C\text{):} \\
(ii) & \pm \text{thematic structure change (}\theta\text{)}.
\end{align*}
\]

Where \(+C+\theta\), \(d=2\); where \(+C-\theta\) and \(-C+\theta\), \(d=1\); where \(-C-0\), \(d=0\).

\[
\begin{array}{c|c|c}
\text{category change} & \text{thematic change} \\
\hline
+ & + & 2 \\
+ & - & 1 \\
- & + & 1 \\
- & - & 0 \\
\end{array}
\]

A third effect that an affix can have is on a form's meaning. In fact the earlier formulation of this theory [Randall 1982] made reference to meaning rather than thematic structure. I have revised the formulation for several reasons. First, of the three parameters — meaning, category and thematic structure — meaning is the only one which is not structure-relevant. Second, the effect on meaning across the range of affixes is relatively unsystematic. Third, although the theory of thematic structure is at this point somewhat undeveloped, a formulation of inheritance based on this concept is potentially more specific and in turn more predictive than one based on meaning. As the theory of thematic structure develops, of course, theories based on it can be more closely examined.

Chomsky [1981: 125] proposes the principle:

(24) if some NP governed by \(V\) is assigned no Case, then the VP of which \(V\) is the head assigns no 0-role.

This is a possible explanation for why -able and verbal passive, which we look at below, do not assign a 0-role to subject. What is of primary interest here, however, is not the mechanism by which this happens but the fact that affixes such as -able work this way.
The affixes which map into the upper left hand cell, where \( d=2 \), are exactly those affixes which can inherit only NP; the affixes which map into the other three cells are not so restricted:

<table>
<thead>
<tr>
<th>thematic change</th>
<th>category change</th>
</tr>
</thead>
<tbody>
<tr>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>adjectival passive:</td>
<td>ergatives</td>
</tr>
<tr>
<td>-er, -ingA</td>
<td>-ion, -y, -al,</td>
</tr>
<tr>
<td>nominalizing affixes:</td>
<td>verbal prefixes: re-,</td>
</tr>
<tr>
<td>-y, -ment, etc.</td>
<td>mis-, un-, dis-, etc.</td>
</tr>
<tr>
<td>-ingN</td>
<td>-ingN</td>
</tr>
</tbody>
</table>

Based on this breakdown, we can now formally state an inheritance principle for derived forms:

(14) **Inheritance Principle:** a derived form inherits the complements of its base form according to the morphological distance between them:

(i) inherit the full subcategorization, where \( d\leq1 \);
(ii) inherit the unmarked subcategorization, otherwise.

The «unmarked» subcategorization (developing a formulation by Carlson & Roeper [1980]), is defined as in (15):

(15) **Unmarked subcategorization:** the unmarked subcategorization of a form \( V X Y \) is

(i) \( V X \) where \( X=NP \);
(ii) \( V \) otherwise

(\( X \) or \( Y \) may be null)

The Inheritance Principle (14) translates into (16):

---

10 *Out-* prefixation is deliberately omitted from (13). As a verbal prefix, it would naturally belong in the lower right cell, but unlike the other verbal prefixes, *out-* restricts its application to intransitive verbs. While on the surface, it appears that *out-* itself is detransitivizing a transitive verb, only verbs which can independently be detransitivized can take *out*. A detailed discussion appears in Bresnan [1980: 332-334].
This is precisely the categorization needed to handle the data presented in section 1. In the following sections we examine the parameters of category change and thematic change in more detail, and examine individual affixes in these terms.

3. Category change

Category change is defined as a change in major lexical category (N, A, V). It is assumed (following Lieber [1980]; Williams [1981]; Kiparsky [1982]) that all suffixes bear a lexical category and head the forms to which they attach. Also assumed is a set of phonologically null suffixes which operate like other suffixes in that they may or may not invoke changes of category or thematic structure. Each affix, including the null affixes, may cause at most one change of category, which it does uniformly, across the forms to which it attaches.

The chart in (13) is relatively transparent with respect to the categories of derived items. All of the adjective- and noun-forming suffixes appear in the two left cells. In the right cells, ergatives can be treated with a null \( \_v \) suffix; verbal inflectional suffixes are all cases of \( \_v \). With respect to passive verbs, it has been proposed that their internal categorial features differ from active verbs: \([+V] \) versus \([+V-N] \) (cf. Chomsky [1981: 67]). Here, however, it is major lexical category that is critical; here, therefore, passive verbs count as verbs. Verbal passive, then, in this framework, is an operation which does not change lexical category.

11 The question of null affixes is an interesting and controversial one (see, among others, Kiparsky [1982]; Lieber [1982]). Evidence that such forms exist comes from categorial change. But whether null affixes should be invoked to handle all instances of thematic change without categorial change is unclear. From the standpoint of a systematic theory, this may be an elegant move but it has not always been done. Often, lexical rules which manipulate thematic structures or subcategorization frames have been proposed with no mention of affixation. (See Randall [1981] for an analysis of causatives along these lines; Keyser & Roeper [1982]; Chomsky [1981]; and Burzio [1981]; for relevant treatments of ergatives).

12 In the next section, this is formalized as part of a more general principle of morphological change, the Uniformity Principle of Chomsky [1981].
4. Thematic change

At this point, within the theory of thematic structure, many questions are open: the number of thematic roles, how particular roles are defined, the ways in which thematic structures can be altered, and so on. One recent principle, which we will call the "Uniformity Principle" [Chomsky 1981: 126] has been proposed as a possible constraint on morphological operations. It ensures that a morphological process operates uniformly with respect to thematic role across its applications.

(17) (his (27)) Each morphological process either
   (i) transmits \( \theta \)-role uniformly
   (ii) blocks \( \theta \)-role uniformly
   or
   (iii) assigns a new \( \theta \)-role uniformly

Assume, in accordance with this principle, that in both +0-changing and -0-changing cases, thematic role assignment is affected uniformly by each affix. As mentioned above, category is also affected uniformly across each affix. This fact can be incorporated into the Uniformity Principle, and restated as (18).

(18) The Uniformity Principle: Each morphological process
   {A) either (i) transmits \( \theta \)-role uniformly
       (ii) blocks \( \theta \)-role uniformly
       or (iii) assigns a new \( \theta \)-role uniformly
   and
   (B) either (i) transmits category uniformly
       or (ii) assigns a new category uniformly

Principle (18) finely differentiates a set of possible effects that an affix may have on \( \theta \)-structures. Given the Uniformity Principle, (18), the + and -0-changing processes of the Inheritance Principle can be thought of essentially as:

(19) \{i) -0-changing operations are those which transmit all \( \theta \)-roles of a base form to a derived form;
    (ii) +0-changing operations are all others \(^{13}\).

\(^{13}\) It is possible to consider how the +0 and -0 operations are related to the three cases of (18A). The -0 cases are all a subset of (i). The +0 cases may entail any of the changes in (i) to (iii). Often, two simultaneous changes occur and it is an open question whether three simultaneous changes are possible with one affixation. This issue is not addressed here.
Below, we examine more closely the thematic changes involved in the operation of each affix, to show that it is in fact 0 change that is crucial to inheritance. We begin with the + 0-changing affixes.

4.1. +0-changing operations

The +0-changing affixes, which change thematic structure, appear in the top two cells of (13). They are repeated in (20):

<table>
<thead>
<tr>
<th>category</th>
<th>change</th>
</tr>
</thead>
<tbody>
<tr>
<td>adjectival passive</td>
<td>+0</td>
</tr>
<tr>
<td>-er -ing</td>
<td>0</td>
</tr>
<tr>
<td>nominalizing affixes:</td>
<td></td>
</tr>
<tr>
<td>-ion, -y, -al,</td>
<td></td>
</tr>
<tr>
<td>-ment, etc.</td>
<td></td>
</tr>
<tr>
<td>ergatives</td>
<td></td>
</tr>
</tbody>
</table>

Consider first the +0+C affixes, in the left cell.

4.1.1. +θ+C

There are many possible ways for thematic structures to be altered. Across all of the +θ+C affixes, however, there is one crucial thematic change which occurs: the assignment of agent is blocked. Assume, then, that this is the criterion which defines an operation as +θ-changing. In all of the +θ+C cases, agent is assigned neither internally nor in a by NP prepositional phrase.

(21)

a. the kite is flyable *by experts
b. the unflown kite *by experts
c. the flying kite *by experts
d. the flier of the kite *by experts

e. the flight of the kite *by experts

14 Some speakers treat certain derived nominals parallel to -ing nominals and allow both groups full inheritance. For these speakers, these particular affixes are 0-C forms, members of the lower left cell of (13).

15 To avoid confusion, here blocking refers to a complete blocking of 0-role, not a blocking of 0-role to a particular position. In the case of verbal passive, which is examined in more detail below, while agent (and any other 0-role) is blocked from being assigned to subject, it is not blocked completely, as it can appear in a PP complement. Therefore, in our terms, verbal passive does not block the assignment of agent, merely transfers it elsewhere.

16 It is usually assumed that -er forms themselves absorb the role of agent. But across -er forms, many thematic roles can be expressed aside from agent: instrument (mixer, beater, blotter, blender, chopper); locative (holder, container); theme (roaster, fryer (as in chickens); shiner (as in black eye)). This point emerged in discussions with Tom Roeper.
This behavior is not conditioned by all affixations. Looking ahead to two \(-\theta\) affixes, verbal passive and process \(-ing_{\theta}\), we see that in neither case is agent blocked:

(22) a. the kite was flown by experts  
    b. the flying of kites by experts

Notice, further, that a specifier cannot be interpreted as an agent in any of these cases:

(23) *the experts' kite is flyable  
    *the experts' unflown kite  
    *the experts' flying kite  
    *the experts' flight of the kite

This interpretation is possible, however, in the \(-\theta\) case, \(-ing_{\theta}\):

(24) the experts' flying of the kite

4.1.2. \(+\theta-C\)

The class of negative verbs of (25) has been claimed to be lexically related to the transitive verbs of (26) (cf. Keyser & Roeper [1982])\(^{17}\).

(25) a. The Renault drove slowly down the road  
    b. The clothes are hanging on the line.

(2.6) a. NP drove the Renault slowly down the road  
       b. NP is hanging the clothes on the line

In the cases of (25), as in those of (21), the assignment of agent is blocked. Here, to, by NP agents are ungrammatical:

(27) a. the Renault drove slowly down the road *by Mary  
    b. the clothes are hanging on the line *by John

The lack of an agent in the lexically-derived ergatives is one characteristic which differentiates them from syntactically-created middles (28), which have what has been referred to as an «implied» agent:

\[\text{Verbs of the types in (25) and (26) have been referred to as inchoatives (25) and causatives (26) (cf. Jackendoff [1975] for example). More recent accounts have challenged these traditional categorizations. Randall [1981] argues against classifying forms such as (26) as causatives; Keyser & Roeper ([1982], following Burzio [1981]) consider the forms in (25) to be ergatives. The analyses of these later works are assumed here.}\]
(28)  
  a. Renaults drive easily  
  b. The clothes hang easily

The notion of «implied agent» (suggested by Fiengo [1980]) is used by Keyser and Roeppe to distinguish the two types, as follows:

...the implication of (5d) [= (28b)] is that it is easy for someone to hang clothes while there is absolutely no implied agent in (7) [= (25b)].

This distinction, in which ergatives lose the agent role while middles retain agents in an implicit sense, supports including the ergative as a +θ − C operation.

The last class of +θ − C forms is the verbal passive. While adjectival passives, (29a), obey the Inheritance Principle for +θ + C forms, and are barred from taking any complements but a direct object, verbal passives, (29b), inherit full subcategorizations:

(29)  
  a. the letter was unsent *to Sue  
     the story was untold *to the kids  
     these chocolates are unfilled *with strawberry cream  
     the tree was untrimmed *with candy canes  
  b. the letter was sent to Sue  
     the story was told to the kids  
     the chocolates are filled with strawberry cream  
     the tree was trimmed with candy canes

In terms of thematic structures, the two types differ in how the agent is realized. In the +θ adjectival passives, the agent is blocked; in the −θ verbal passives it is not (cf. fn 5).

(30)  
  a. the kite was unflown *by experts  
     the island was uninhabited *by humans  
     the land was undeveloped *by the realty company  
  b. the kite was flown by experts  
     the island was inhabited by humans  
     the land was developed by the realty company

Here again, un-, which attaches only to adjectives, ensures that the passives in (30a) are adjectival.

In considering the categorial and thematic properties of the operations on the chart in (13) in more detail, we have seen that the particular aspect of thematic change which is crucial is whether or not the assignment of agent is obligatorily blocked (obligatorily, because in many of the −θ constructions, e.g. -ing, verbal passive, agents can be optionally omitted, even where they are not blocked by the operation).
4.2. $-\theta$ affixes

The two classes of $-\theta$ affixes, $+C$ and $-C$ are repeated from the table in (31):

<table>
<thead>
<tr>
<th>$-\theta$</th>
<th>$+C$</th>
<th>$-C$</th>
</tr>
</thead>
<tbody>
<tr>
<td>-ing</td>
<td>verbal prefixes: re-, mis-, un-, dis-, etc.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>inflectional affixes</td>
<td></td>
</tr>
</tbody>
</table>

4.2.1. $-\theta +C$

-ing process nominals are parallel in many ways to process nominals formed from the $+\theta$ affixes, -tion, -y, -al, -ment, etc., both structurally and semantically.

(32) a. the collecting of butterflies
    the directing of traffic
    the appointing of committees
    the discovering of new microbes
    the proposing of new roads

b. the collection of butterflies
    the direction of traffic
    the appointment of committees
    the discovery of new microbes
    the proposal of new roads

Recall (22b) and (24), discussed above, in which -ing forms allowed agents to appear both in a by NP phrase and in the specifier:

(22b) the flying of kites by experts
(24) the experts’ flying of the kite

This is the case across all -ing forms, but not across the other process nominals, which are $+\theta+C$.

(33) the collecting/*ion of butterflies by novices
the directing/*ion of traffic by policemen
the appointing/*ment of committees by presidents
the discovering/*y of new microbes by researchers
the proposing/*al of new roads by planners

Kayne [1982] offers an interesting treatment of derived forms based on configurational facts. While certain aspects of his system are compatible with this one, there are cases in which the predictions diverge. For example, he would predict as grammatical cases such as these (as well as (6), above). It may be possible to formulate a system which is configurational but at the same time consistent with the data given here. At this point, though, this remains a problem for future research.
A second difference between the two types of process nominals is related to the notion «implied agent», discussed in section 4.1.2., above. The distinction between middle verbs and ergatives was that middles retain an implied agent, even when no explicit agent appears, whereas ergatives do not. A parallel distinction appears between -ing nominals and the other process nominals: -ing nominals appear to retain an implied agent whereas the other process nominals do not.

(34) Butterflies collect easily (middle) Butterflies collect by the gate (ergative)

(35) The collecting of butterflies takes a long time.

*The collection of butterflies takes a long time.

4.2.2. −θ-C

The remaining −θ cases, in the lower right cell of (13), are the inflectional suffixes and verbal prefixes. While the inflectional system has had various treatments with respect to its relation to derivational morphology (including, most recently, Williams [1981]; Lieber [1980]; Kiparsky [1982]; Anderson [1982]), there is agreement overall that inflectional affixation and thematic structure do not interact. The complement structure of an inflected form is identical to the complement structure of the uninflected verb.

Verbal prefixes present a superficially more complicated picture. Consider cases like (36):

(36) a. Mary zipped her jacket up
    Mary rezipped her jacket *up

b. John washed the car down
    John rewashed the car *down

Here, the verbal prefixes seem to be acting like +θ forms, disallowing all but the direct object. Examples like (11), above, however, show that unlike +θ forms, prefixed forms can in some instances inherit full subcategorizations. If the limitation in (36) were conditioned by the Inheritance Principle, we would expect this limitation to occur uniformly across each prefix (as it does with the +θ cases of (33)). Second, even without the Uniformity Principle, the limitation on prefixes still cannot be stated in terms of inheritance, since the formulation for the unmarked subcategorization will not accommodate cases like (37) or (38):

(37) a. Mary climbed (over) the fence
    Mary reclimbed (*over) the fence

b. The arrow pierced (through) the target
    The arrow repierced (*through) the target
(38) a. Mary thought about the solution
Mary rethought ("about") the solution
b. John worked through the proof
John reworked (*through) the proof

According to the Inheritance Principle, the subcategorization of the derived form is a subset of the subcategorization of the base. But in (37) and (38), the derived forms take NP even where the base forms do not. Therefore, it cannot be the Inheritance Principle that is dictating the subcategorization of these forms.

The limitation on complements in prefixed forms is conditioned by principles of a different sort. Though a full discussion is beyond the scope of this paper, we can briefly take up the examples above. In cases like (37) and (38), the restriction is tied to the fact that the prefix adds a resultant-state meaning to the verb. This addition forces the verb to change type (here, a process verb becomes an event verb) and the array of complements that the verb takes may change, consequently. Cases like (36) are limited by a similar restriction. Here the resultant state added by re- is specified a second time by the particle. This double specification is redundant and is disallowed on pragmatic grounds, by a Redundancy Restriction (see Randall [1981] for discussion; see also Carlson & Roeper [1980: 141-142]). With independent mechanisms to account for the behavior of prefixed forms when they do not show the full inheritance predicted of them, the Inheritance Principle and the Uniformity Principle can be maintained intact.

5. A thematic hierarchy and result nominals

A further set of deverbal forms which have not yet been discussed are result nominals such as (39):

(39) a. the finding appeared in the journal
the typing is stacked on the desk
the cooking is starchy
b. the discovery arrived at the museum
the construction weighs 11 tons
the proposal is on the top of the pile

These forms are +θ+C; they are nouns whose thematic structures are altered. Assignment of agents is blocked:

(40)  
a. *the finding by the scientists appears in the journal  
*the typing by the secretary is stacked on the desk  
*the cooking by the chef is starchy  
b. *the discovery by Leakey arrived at the museum  
*the construction by the masons weighs 11 tons  
*the proposal by the committee is on the top of the pile

Notice that in these forms the restriction of complements is even stricter than in other derived forms. No complements may appear at all. Forms based on transitive verbs may not include their objects. When they do, their interpretation changes. They can no longer be given result readings, but may be interpreted only as process nominals:

(41)  
a. the finding of the fossils  
the typing of the manuscript  
the cooking of Indian food  
b. the discovery of the new element  
the construction of the sculpture  
the proposal of the idea

Given the Inheritance Principle as it stands, these facts are not predicted. We expect only that as in the other +θ+C forms, complements beyond the direct object will be blocked but that the direct object itself will be permitted.

There is a natural way to extend the theory to accommodate result nominals. Notice first that deleting an object is itself an operation that changes thematic structure. Therefore, when process nominals of either sort (+θ nominals: -tion, -y, -al, -ment, etc., or -θ -ing nominals) undergo object deletion, the output is necessarily +θ. Second, the thematic role of the deleted object in all cases is theme. The generalization appears to be, then, that under +θ-changing operations, if the theme is not inherited, then no other 8-roles may be.

This generalization expresses a fact which is inherent in the notion of a thematic hierarchy, in which thematic roles are ordered in relation to one another. Consider the following ordering:

20 As mentioned above (see fn. 5), there are cases where result nominals and by-phrases are compatible; e.g. the decision by May, the invention by Edison. The agents here are not inherited, however. The same holds true for specifiers. While in derived forms, specifiers may be given agent readings (Leakey's discovery arrived at the museum), the agentive role is by no means required. Any number of relationships may hold between Leakey and his discovery. The discovery may, for example, be something which Leakey, a curator at the museum, wrote about, but did not himself discover.

21 Jackendoff [1972] develops a thematic hierarchy which differs from this one: (1) Agent (2) Goal, Source, Location, etc. (3) Theme. His system also differs in the fact that an argument may bear more than one thematic role. The assumption here (following Chomsky [1981]) is that an argument can bear one and only one thematic role (cf. his Theta Criterion).
(42) 1. Theme
    2. Agent
    3. Goal, Source, Location, Instrument, etc.

We will refer to this hierarchy as the 0-Hierarchy.

A revised Inheritance Principle can now be stated which integrates the facts about result nominals and the notion of the 0-hierarchy. Let us call it the Thematic Inheritance Principle:

(43) Thematic Inheritance Principle: a $+C$ operation which blocks the assignment of a 0-role blocks the assignment of all 0-roles lower on the 0-Hierarchy.

The stipulation that the operation be $+C$ is included to handle the ergative and verbal passive cases, discussed in section 4.1.2. Recall that ergative blocks agent entirely; verbal passive, like -able, blocks the assigning of agent to subject, allowing it to surface elsewhere, but both otherwise allow full inheritance. Since the ergative and passive operations are $-\theta-C$, (43) will not apply. The Thematic Inheritance Principle accounts for the $+\theta+C$ operations which were covered by the original Inheritance Principle but, further, accounts for the even more restricted inheritance behavior of result nominals, and does so with less rather than more theoretical machinery.

6. A summary and some open questions

In this paper I have developed a system which predicts when verb subcategorizations may be inherited into deverbal forms. The Inheritance Principle, (14), claimed that two interacting features of morphological operations determine inheritance. The two features are categorial change and thematic structure change, thematic structure change referring in particular to the blocking of the assignment of a thematic role.

It was found that in most cases where blocking occurs, it is the assignment of the agent that is blocked. In result nominals, however, it is the theme. This finding led to a revision of the Inheritance Principle, the Thematic Inheritance Principle, based on a thematic hierarchy, in which there can be inheritance of the 0-roles above the blocked role on the hierarchy, but not below it.

There are several issues which remain open. One concerns the nature of the Thematic Inheritance Principle. Why are the two crucial parameters what they are; that is, why are category change and thematic change the crucial determinants of inheritance? It may turn out that one or both follow from other principles of grammar. One intriguing speculation in this direction is implied in note 2, above, which mentions the connection that Chomsky [1981], draws between 0-structure and subcategorization.
Assuming this connection, the fact that 0-structure is a crucial determinant of inheritance is natural. From this point of view, however, one aspect of my proposal which does not immediately look natural is the existence of a category of operations in which thematic structure is changed yet subcategorization is fully inherited (+ 0 -C operations). This category of operations, in which subcategorization and 0-marking are not isomorphic, is of crucial interest, in light of Chomsky's proposal. The Projection Principle predicts that these operations should affect only <<external arguments>> (in Williams' terms), or «indirectly 0-marked positions» (in Chomsky's). In the system presented here, this is borne out, in the ergatives. It is noteworthy that the categorization of deverbal affixes that I have motivated here provides independent justification for this aspect of the Projection Principle. It is an encouraging result that investigations into what are traditionally distinct grammatical domains should converge in such explicit ways.

Another area still to be explored fully is the relation between thematic change and semantics. In the present analysis, verbal prefixes such as re- were considered to be neutral with respect to 0-structure. But clearly re- is not neutral with respect to meaning, which is what was claimed to be responsible for independent limitations on its subcategorization. It might be that the limitation found with re- is a consequence of the Thematic Inheritance Principle, if it were the case that the semantic change that re- imposes is actually a type of thematic change.

A final question concerns the interaction of the principles governing morphological structures. For instance, it appears that the Thematic Inheritance Principle makes reference to only one of three possible ways in which morphological operations can affect 0-roles, i.e., blocking the assignment of a 0-role. But this brief survey has not covered any morphological operations which assign new 0-roles (e.g. the lexical causative and, perhaps, out-prefixation). Are there systematic interactions between these types of rules and thematic inheritance?

While these questions and others remain to be looked at, I hope that this study has shown a profitable way in which morphological operations and their effects beyond the word can be examined.

References

Carlson, G. and T. Roeper [1980], Morphology and subcategorization: case and the unmarked complex verb, in Hoekstra, T., van der Hulst and M. Moortgat (eds.).

Chomsky, N. [1981], Lectures on Government and Binding, Foris, Dordrecht.


Hoekstra, T., H. Van der Hulst and M. Moortgat, eds. [1980], Lexical Grammar, Foris, Dordrecht.


Kayne, R. [1982], Unambiguous paths, in May, R. And J. Koster, eds. Levels of Syntactic Representation, Foris, Dordrecht.

Keyser, J. and T. Roeper [to appear], On middle verbs in English, in Linguistic Inquiry), XIV.

Kiparsky, P. [1982], Lexical Phonology and Morphology, MIT manuscript, Cambridge.


— [1982], Morphological Structure and Language Acquisition, Ph. D. Dissertation, University of Massachusetts, Amherst.


