
Keywords: lexicon, Lexicalist Hypothesis, Tripartite Parallel Architecture, lexical licensing

1. Introduction

Most modern theories of grammar recognize that language is divided into two major parts: lexicon and grammar. Each of them consists of distinct principles. Lexicon is a list of arbitrary pairings of form and meaning, i.e. minimal signs in Saussurean terms, and grammar is a rule system for combining and ordering those listed signs. In the tradition of generative grammar, the creative power of language is in large part attributed to the free combinatorial rule system, or the computational system as it is referred to in the recent Chomskyan theory. On the other hand, the lexicon is often regarded as a storage of idiosyncrasies and exceptions.

The book under review is, according to the author, “an attempt to renovate the foundations of linguistic theory.” (p. 1) He proposes in this book that grammar and lexicon (more precisely the lexical entries listed in the lexicon) have basically the same architecture, which he calls the Tripartite Parallel Architecture. Another innovative idea pre-
sented in this book is *lexical licensing*. Jackendoff rejects the classical lexical insertion in syntactic derivation. Lexical items in the lexicon are integrated into syntactic structure by satisfying the constraints at the lexical interface instead of being inserted into the terminal nodes of phrase structure.

I see this book as a compelling criticism of standard lexicalist assumptions (including the Minimalist Program) as well as a reconceptualization of the architectural framework where many lexicalist theories (including LFG and HPSG) have been worked out. Standard theories within the lexicalist framework view the lexicon as a source of words and the syntax as a generative system of free combination. Over the past few years, however, more and more linguists have found that this simple division of labor between lexicon and syntax is unsatisfactory for analyzing various linguistic phenomena.

The purpose of this article is to show, through the arguments presented in Jackendoff's work, that the classical lexicalist view of the lexicon and its relationship with grammar/syntax is questionable. In much recent research on mapping between lexicon and syntax, it has been revealed that what was traditionally conceived as "lexical" can be analyzed in constructional or compositional terms (Goldberg (1995), Ackerman and Webelhuth (1998), among others). After a brief review of the book in Section 2, we will point out two assumptions which many lexicalist frameworks have posited: the Atomicity Thesis and Lexical Determinism. Then, we will show that a compositional/constructional approach can solve the problems arising from the lexicalist theories.

2. Outline of the Book

In Chapter 1, Jackendoff begins by discussing Chomsky's three "(virtual) conceptual necessities." (p. 11) What count as the conceptual necessities are the three interfaces, at which the computational system is connected with the articulatory-perceptual system (A-P), the conceptual-intentional system (C-I), and the lexicon. Then, he calls into question a number of assumptions which are often unchallenged but accepted in the tradition of generative grammar; e.g., that grammar performs derivations; that the fundamental operation of grammar is substitution; that the system of grammar is non-redundant; that lexical insertion/merge enters lexical items into phrase structure; and that
the fundamental generative component of the computational system is
the syntactic component and the phonological and semantic compo-
nents are interpretive.

In Chapter 2, we find the central idea of this book, the Tripartite Par-
allel Architecture of the computational system. This model consists
of three independent and parallel rule systems, “where phonology and
semantics are treated as generative completely on a par with syntax.”
(p. 39) The three representational structures are associated with each
other by PS-SS and SS-CS correspondence rules. The whole picture of
the model is illustrated below:

(1) Tripartite Parallel Architecture

<table>
<thead>
<tr>
<th>phonological formation rules</th>
<th>syntactic formation rules</th>
<th>conceptual formation rules</th>
</tr>
</thead>
<tbody>
<tr>
<td>phonological structures (PS)</td>
<td>syntactic structures (SS)</td>
<td>conceptual structures (CS)</td>
</tr>
<tr>
<td>PS-SS correspondence rules</td>
<td>SS-CS correspondence rules</td>
<td></td>
</tr>
</tbody>
</table>

In contrast to Chomsky’s Minimalist Program which singles out the
computational system of language as one component which can be
fruitfully studied in isolation, Jackendoff emphasizes interfaces between
this model of the language faculty and the architecture of the mind as a
whole, saying that the language faculty “fits naturally into a larger
hypothesis of the architecture of mind that might be called Representa-
tional Modularity.” (p. 41)

Chapter 3 is devoted to the examination of the syntax-semantics in-
terface. Here it is shown that the correspondence between syntactic
structure (SS) and conceptual structure (CS) is a many-to-many rela-
tion. Conceptual structure is an autonomous module of grammar that
contains its own primitives and combinatorial (generative) rules. Jack-
endoff argues for the autonomous nature of conceptual structure and
for a theory of semantic composition which he calls enriched composi-
tion. More details of enriched composition will be discussed later.

Chapter 4 discusses the lexical interface. The lexical interface is a
conceptual necessity since words somehow have to be incorporated into
sentences. However, this does not necessarily mean that words are in-
serted in syntactic derivations. He states that “no argument has been
given for lexical insertion except that it worked in the *Aspects* framework; it is just a 30-year-old tradition.” (p. 90) Instead of posit-
ing lexical insertion, he suggests a lexical licensing approach. On this
view, lexical items “license the correspondence of certain (near-) ter-
mal symbols of syntactic structure with phonological and conceptual
structures.” (p. 89) The lexical licensing approach leads to the claim
that “a lexical item is to be regarded as a correspondence rule, and the
lexicon as a whole is to be regarded as part of the PS-SS and SS-CS in-
terface modules.” (p. 89) A lexical item, e.g. *cat*, is regarded as a tri-
ple of phonological, syntactic, and semantic features, <$PS, SS, CS>$, as
exemplified below:

\[
\begin{array}{c}
\text{Word} \quad \text{SS} \quad \text{CS} \\
\text{\textit{k æ t}} \\
\sigma \quad [\text{count}] \\
\hline
\end{array}
\]

The hypothesis that a lexical item is a correspondence rule raises the
question about what size unit is involved in the lexicon. Although it is
assumed in general that the standard size of a lexical item is a word,
the size may vary from the maximal sentence to the minimal mor-
pheme. Larger-scale (i.e. phrasal) correspondence rules coordinate
maximal syntactic phrases with conceptual constituents. In this con-
nection, Jackendoff gives a detailed analysis of idioms and fixed ex-
pressions in terms of his Tripartite Parallel Architecture model in
Chapter 7.

Drawing on his own research dating back to 1975, Jackendoff argues
in Chapter 5 that lexical entries are fully listed (*full entry theory*) and
that lexical rules only simplify lexical entries to reduce the information
cost of learning and listing them in the lexicon. Thus, lexical rules do
not create new entries at all (*lexical redundancy rules*). Under the so-
called Lexicalist Hypothesis, there are basically two analytical options
for accounting for the notion of ‘lexical relatedness’—relations between
lexical items and their ‘derived’ variants. They are (generative) word
formation rules and lexical redundancy rules. Most work in generative
morphology has explored the former approach, but Jackendoff (1975)
and the present book maintain the lexical redundancy rule approach.

In Chapter 6, more details of productive morphology in relation with
the Tripartite Parallel Architecture are discussed through a morphopho-
nological analysis of the English past tense morpheme. In his 1975 paper, Jackendoff maintained that “the regular English past tense is formed by a lexical rule, so that all regular past tenses are listed along with irregulars.” (p. 116) Now this idea is abandoned, and the regular inflection is derived by principles of free combination. This amounts to the claim that productive inflectional endings have their own lexical entries, just like regular words, in the lexicon.

Chapter 7 is devoted to the listed lexical items which are larger than a word, i.e. idioms and fixed expressions. Standard lexicalist theories (adopting the lexical insertion hypothesis in the Aspects style) had difficulty in handling these items. Since in his Tripartite Parallel Architecture model there is no operation of insertion in the interface between lexicon and syntax, lexical items are “licensed” via correspondence rules mediating the lexicon and the computational system. Therefore, a single lexical entry may fail to be uniformly associated with a single node in phrase structure; rather, it is possible to associate a lexical entry with multiple independent constituents in syntax.

The final chapter (Chapter 8, entitled “Epilogue: How Language Helps Us Think”) is concerned with more general issues. In this chapter, Jackendoff discusses the relationship between language and thought.

3. Lexicalism

As mentioned earlier, I regard this book as a cogent criticism of lexicalist frameworks in which most generative linguistic theories have been developed over the years. In this section, I would like to factor out fundamental ingredients of the lexicalist frameworks to show how Jackendoff’s proposals in this book approach the theoretical and analytical issues arising from Lexicalism.

Ever since Chomsky (1970) advocated the idea that was widely known as the Lexicalist Hypothesis or Lexicalism, a strict distinction between lexical and syntactic processes has been the basic assumption about the architecture of grammar within generative frameworks. This hypothesis has guided the development of generative theories to the present day.

Many lexicalist theories assume that the differentiation between lexical rules and syntactic rules follows directly from the modular distinction between syntax and lexicon. This autonomous module hypothesis is
most clearly asserted in Di Sciullo and Williams (1987) when they say that “the lexicalist hypothesis ... is not a principle of grammar but rather a consequence of the conception that grammar contains two sub-parts, with different atoms and different rules of formation.” (p. 2)

In the lexicalist view of the syntax-lexicon interface, the two modules interact in a very limited fashion. In particular, the lexicon is assumed to be located prior to syntax (at D-structure or S-structure) and as such, the output of the lexicon is the input to syntax. This idea, with some variations in detail, is what Borer (1998) calls a “linear model.”

The linear model accounts for the restricted interaction between syntax and lexicon by assuming that words, the output of the lexical component, are undecomposable units when they enter syntactic structure. In other words, syntax has no access to the internal parts of words. This is called the Lexical Integrity Principle (Bresnan (1982)) or the Atomicity Thesis of Words (Di Sciullo and Williams (1987)): “Words are ‘atomic’ at the level of phrasal syntax and phrasal semantics.” (p. 49) We summarize the Atomicity Thesis as follows:

(3) Atomicity Thesis of Words
The lexical information encoded in the lexical entry of a word cannot be altered or determined in syntax.

The Atomicity Thesis says that only lexical rules can affect lexical entries of words, that is, only lexical rules can change lexically determined features such as lexical categories, argument structures (valency of verbs), aspectual features, lexical semantic representations, etc.

Next, closely related to, but somewhat independent of, the Atomicity Thesis is the claim that the information encoded in the lexical entry of a verb to a large extent determines central properties of the clause. We will call this Lexical Determinism:

(4) Lexical Determinism
Syntactic behavior of verbs in general can be predicted by features that are lexically specified.

Lexical Determinism underlies much current work on verb semantics,

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1 The term Lexical Determinism is adopted from Ramchand (1998). See also Ackerman and Webelhuth (1998), where the Lexicalist Hypothesis is regarded as a cluster of proto-principles.
in particular, the verb class approach in Levin (1993). It also underlies LFG and the Minimalist Program. We find the strongest version of Lexical Determinism in the proposal that the verb’s lexical representations, in particular its thematic roles, are directly mapped onto syntactic structures—a hypothesis which is often referred to as the Uniformity of Theta Assignment Hypothesis (Baker (1988)).

In accordance with the Atomicity Thesis and Lexical Determinism, valency changing processes must be carried out in the lexicon since these processes directly change the lexically-specified relationships between a verb and its arguments. Within the framework of lexicalist theories (in LFG, for example), lexical rules are proposed to account for passivization, causative formation, resultative formation, etc. The so-called causative/inchoative alternation is also an instance of lexical rule because of its valency-changing nature. In LFG, for a given verb, the lexical entry specifies its semantic, functional, and categorial selection. The passive lexical entry based on this verb’s lexical entry likewise would be completely specified for those features. The lexical rule that derives the passive participle thus maps the former entry to the latter in the lexicon.

These strong lexicalist assumptions underlie Levin and Rappaport Hovav’s (1998) work on verb semantics. They claim that the activity and accomplishment uses of manner of motion verbs (e.g. Susan walked for an hour and Susan walked to the store, respectively) involve different lexical semantic templates with a shared semantic constant \textit{WALK}, as illustrated below (Levin and Rappaport Hovav (1998)):

\begin{itemize}
  \item (5) Activity \textit{walk}:
    \begin{itemize}
      \item \textit{ACT}(x)
      \item \textit{[WALK]}_{\text{MANNER}}
    \end{itemize}
  \item (6) Accomplishment \textit{walk}:
    \begin{itemize}
      \item \textit{GO}(x, y)
      \item \textit{[WALK]}_{\text{MANNER}}
    \end{itemize}
\end{itemize}

According to their analysis, it is a lexical rule of English that takes the lexical entry of the activity verb as input and produces the lexical entry of the accomplishment verb as output. They say that “the availability of the multiple meanings does not have to be listed in the lexical entry of any individual verb.” (p. 197)

Note that this rule “ignores” the content of the phrasal constituent (usually a Goal PP) which is mandatory when the verb is interpreted as \textit{GO}(x, y). Under the lexicalist’s assumption that the lexical repre-
sentation must be determined prior to syntax (Lexical Determinism), the lexical rule applies to the lexical entry and produces the derived lexical entry without reference to phrasal elements.

4. Cocomposition and Construction

In recent years, many works have exhibited a growing trend towards shifting the burden from the lexical information encoded in individual verbs to the information created compositionally or constructionally by larger syntactic objects (Goldberg (1995), Alsina et al. (1997), Butt and Geuder (1998), Ackerman and Webelhuth (1998)). Jackendoff's present work shares much in spirit with these proposals. His theory of semantic composition is based on a hypothesis which he calls enriched composition (Jackendoff (1997: 49)):

(7) Enriched composition
   a. The conceptual structure of a sentence may contain, in addition to the conceptual content of its LCSs, other material that is not expressed lexically, but that must be present in conceptual structure either (i) in order to achieve well-formedness in the composition of the LCSs into conceptual structure (coercion, to use Pustejovsky's term) or (ii) in order to satisfy the pragmatics of the discourse or extralinguistic context.
   b. The way the LCSs are combined into conceptual structure is determined in part by the syntactic arrangement of the lexical items and in part by the internal structure of the LCSs themselves (Pustejovsky's cocomposition).

A theory of semantic composition that embodies enriched composition contrasts with standard theories of composition, which according to Jackendoff underlie much work in formal semantics and Chomsky's LF representations. These theories are called syntactically transparent semantic composition:

(8) Syntactically transparent semantic composition
   a. All elements of content in the meaning of a sentence are found in the lexical conceptual structures (LCSs) of the lexical items composing the sentence.
   b. The way the LCSs are combined is a function only of the way the lexical items are combined in syntactic structure (including argument structure). In particular,
In what follows, we will discuss how a composition approach involving the notion of enriched composition provides alternative analyses to a verb class model for alternation phenomena, in particular, causative-inchoative alternation in English (Levin (1993), Levin and Rappaport Hovav (1995)) and a lexical approach to locative inversion in English (Bresnan (1994)).

4.1. Cocomposition

In Chapter 3 of the present book, following Pustejovsky’s (1995) idea, Jackendoff proposes a compositional analysis of the multiple readings of the verb begin in the following examples:

(9) a. Mary began the novel.
    b. Mary began the beer.

The verb begin denotes the inception of an activity. The exact nature of the activity implied in (9a) and (9b) differs in accordance with the semantics of the complement. Thus, a possible range of the activities that begin in (9a) denotes would involve something like reading or writing, but not drinking or appreciating, the novel. But the same verb form may be interpreted as the inception of activities such as drinking or (possibly) bottling, but not reading, the beer in (9b).

Within a lexicalist theory that embodies the Atomicity Thesis and Lexical Determinism, the multiplicity in the verb meaning would be represented as independent lexical entries associated with the same verb form. Accordingly, one has to list up separate lexical entries (say, begin₁ for reading and writing something, begin₂ for drinking something, ...) in the lexicon. This leads to a proliferation of lexical entries for a single verb form (Ackerman and Webelhuth (1998)).

Instead of listing all the possible meanings of a single verb, Jackendoff (and Pustejovsky (1995)) assume that the two different uses of the verb begin can be explained in terms of the composition of the verb with the complement. In this view the internal semantic structure of the complement nouns determines the interpretation of the phrasal composition of lexical items. The acceptable readings with respect to begin stipulate either a characteristic activity one performs with an object or what one performs in creating these objects (begin to write the
novel). In composing the verb’s LCS with the semantics of the complement nouns, one has to look inside the semantic content of the object. This is untenable under the Atomicity Thesis because the internal structure of individual LCSs plays no role in how those LCSs are composed.

Along the same lines, Ramchand (1998) shows that in Scottish Gaelic the verb iarraidh has a lexical entry which is partially specified and thus must be composed with other lexical entries to yield fully specified verb meanings. In (10), the verb cooccurs with the imperfective aspect particle ag-. It is stative and assigns the EXPERIENCER and THEME θ-roles to the subject (Alasdair) and the object (biscaid) respectively. In (11), on the other hand, the same verb stem appears with the perfective aspect particle air-, and the sentence is non-stative. The subject and the object appear to be assigned a different set of θ-roles, AGENT (Alasdair) and PATIENT (biscaid); hence, the translation in English.

(10) Tha Alasdair ag iarraidh biscaid.
    Be-pres Alasdair ag want-VNOUN a biscuit
    ‘Alasdair wants a biscuit.’

(11) Tha Alasdair air biscaid iarraidh.
    Be-pres Alasdair air a biscuit want-VNOUN
    ‘Alasdair has got/requested a biscuit.’
    ‘Alasdair has wanted a biscuit.’

2 A reviewer says that if begin meant “to start an activity typically performed on things of the type denoted by the object,” then one would not need to look inside the meaning of the object since “[the verb] simply takes the meaning of the object directly as a whole.” What this statement is supposed to mean is not clear to me. If “the meaning” here is meant to be information about prototypical activities related to the object, the reviewer’s statement is, I believe, more or less on a par with the cocompositional analysis. Another possibility suggested by the reviewer is that the kind of activity involving the beer (treated as a quantifier) is left undetermined in semantic composition and left to pragmatics. This analysis cannot be assessed unless one supplements a theory about how pragmatics determines the designation of activity in question. I agree that context demands a specific interpretation of the verb; however, the question is whether such information is “lexical” or part of our world knowledge. I follow Pustejovsky (1995) and Jackendoff (1997) and assume that the relevant information is what is encoded in the lexical representation of the object noun—qualia structure, as they call it. We will return to this topic in 4.1.2 and 4.2.6.
It appears, then, that the lexical entry which corresponds to a single lexical item (a verb) in one language contains information which is somewhat underspecified and determines the syntactic behavior and interpretation of the corresponding verb only in conjunction with the lexical information encoded in independent lexical items. The lexical representation of the verbal expression in question is spelled out separately by two independent lexical items, *iarraidh* and *air*, as illustrated below:

(12) Lexeme 1: (Verb) IARRAIDH: Arg1 seeks to obtain for self the object denoted by Arg2

Lexeme 2: (ASP) AIR: Arg1 Arg2

\[<\Theta_{ext} \Theta_{int}>\]

The two components of meaning are only unified at the level of phrasal composition, i.e. syntactic structure. As noted by Ramchand, the standard lexicalist theory does not provide a plausible account of the Scottish Gaelic verbal expressions since examples like these are in clear violation of Lexical Determinism.

4.1.1. Verb Classes and Lexical Determinism

In support of the parallel architecture model incorporating cocomposition, we will examine some “idiosyncratic” behaviors of causative verbs observed by Levin and Rappaport Hovav (1995) and Kageyama (1996). We will show that they appear to be “idiosyncratic” because their analyses of verb semantics are conducted within the (strong) lexicalist framework where the Atomicity Thesis and Lexical Determinism serve as guiding principles. We will demonstrate that the cocomposition analysis offers an adequate treatment of this somewhat problematic behavior of causative verbs.

In Levin and Rappaport Hovav’s (1995) analysis, the alternation between the causative use and the inchoative use as in (13a) and (13b) is accounted for in terms of the representations of lexical information depicted in (14a, b):

\[<\Theta_{ext} \Theta_{int}>\]

\[<\Theta_{ext} \Theta_{int}>\]

3 For more discussions on the problems of the verb class approach to alternations, see Ono (2000).
In their view, the causative verb in (14a) is detransitivized if the causer is not linked to the external argument, as illustrated in the argument structure \(<\phi <y>>\) in (14b).

Notice that Levin and Rappaport Hovav's account is based on lexicalist assumptions, in particular, Lexical Determinism. We have already seen this with respect to the examples in (5) and (6). This lexicalist account immediately encounters a difficulty when a verb shows unexpected patterns of syntactic behavior. The verb bake, for example, is ambiguous between a change of state sense and a creation sense, and only when it denotes a change of state event—not a creation event—is it subject to detransitivization, as shown in the contrast in (15) and (16).

The question arises as to how we constrain the detransitivization in the latter case.

A possible answer to this question is that the verb form corresponds to multiple lexical entries. Levin and Rappaport (1989) claim that the creation sense of the change of state verb derives from what they call Lexical Subordination, which applies to a given LCS and generates a new LCS. The lexical entry of the change of state verb in (17a) turns into the lexical entry of the creation verb in (17b):

They claim that bake\(_2\) resists detransitivization. But there is no principled reason why the LCS with the CREATE function does not have an inchoative counterpart.

Another problematic case is a class of agent-oriented causative verbs. The verb clear, for example, does not alternate when it has a human agent subject as in (19):
(18)  a. The wind cleared the sky. (natural force)  
     b. The sky cleared.
(19)  a. The waiter cleared the table. (human agent)  
     b. *The table cleared.

Based on the contrast between (18) and (19), Levin and Rappaport Hovav (1995: 104-106) propose a semantic constraint that alternating verbs denote an event that comes about spontaneously without the intervention of a (human) agent. The verb clear in (19) cannot be detransitivized because the change of state does not happen spontaneously, i.e., tables are things that are cleared through the intervention of a human agent. On the other hand, the event denoted by the same verb in (18) takes place without the intervention of a human agent.

Using the same reasoning, they explain why the verb break cannot be detransitivized in the following expressions:

(20)  a. He broke his promise/the contract/the world record.  
     b. *His promise/The contract/The world record broke.

Although break is a typical alternating verb, it cannot be detransitivized when used with such complements as promise, contract, or record. Our knowledge of the world tells us that these entities can only be "broken" by human beings. Thus, break in this use is agent-oriented and as such it is not subject to detransitivization.4

Recall that Lexical Determinism says that the syntactic behavior of lexical items is determined solely by lexical information encoded in individual lexical entries. Under this assumption, the constraint on detransitivization would have to be embodied in lexical representations by assuming that the non-alternating versions of the verbs are specified for

4 For an alternative account of this matter, see Kageyama (1996). A reviewer has pointed out that the presence of a human agent is irrelevant to the alternation in question since the following sentence (with a non-agent subject) does not have an intransitive counterpart either:

   (i)  a. Today's weather broke the world record for greatest rainfall in a single day.  
     b. *The world record for greatest rainfall in a single day broke.

Note that (i) is not a counterexample to our analysis. Our analysis does not claim that agency is relevant to the alternation; rather, what is crucially relevant here is that the causer (not necessarily a human agent) must be involved in a process of change of state (i.e. breaking a record) until the process is completed.
some diacritic feature, say, [+human agent]. In this view of lexical entries, the two variants of the verbs in question would have distinct lexical specifications, as shown below:

(21) a. verb₁: [x CAUSE [y BECOME <STATE>]]
    b. verb₂: [x CAUSE [y BECOME <STATE>]]

\[x= [+\text{human agent}]\]

Such a theory fails to capture the fact that the interaction of the verbal semantics with semantic information from the complement itself determines the alternation.

On the cocomposition account, it is assumed that there is only one sense for bake, and that any other readings are derived through generative mechanisms in composition with the verb's nominal complements. For the expression in (16), the creation sense is created in part by the meaning of a cake, by virtue of its being an artifact. The result of cocomposition is a semantic representation at the level of phrasal composition; an option that is not available in the standard lexicalist framework.

Such a representation may be readily integrated in Jackendoff's Tripartite Parallel Architecture Model because the phrasal semantics of the VP can be composed independently through rules of conceptual composition. In the creation use of the verb bake, we know, from the meaning of the complement, that the verb denotes an event involving something that comes into existence. Our knowledge about how a cake comes into existence constitutes part of the lexical meaning of cake and that knowledge gives rise to the interpretation that the action denoted by the verb is creative. Along the same lines, promise and the other nouns in (20) provide information about the involvement of an animate agent in the event. This is the source of the agent-oriented reading of the verb.

4.1.2. A Cocompositional Account

Having laid out the problems in the lexicalist theory and a basic idea (cocomposition) in Pustejovsky's and Jackendoff's theory, we are now in position to explain the irregular patterns of syntactic behavior of the verbs in question.

First, along with Levin and Rappaport Hovav (1995) and many others, we assume a bievent analysis of the semantics of causative verbs: the whole event denoted by the verbs is divided into subparts, a causing event and a resulting event. Assume further that lexical repre-
sentations contain the structured level of representation called event structure, where the subevent components are specified for the participants in the whole event. A typical change-of-state causative verb, say, open, has the following representation:

(22) Event Structure: $e_1(x) e_2(y)$

LCS: $[x \text{ ACT}] \text{ CAUSE } [y \text{ BECOME } <\text{STATE}>]$  

In (22), $e_1(x)$ is the causing event where $x$, the causer/agent of action, is the main participant, and $e_2(y)$ is the resulting event where $y$ is the object/patient of action. The reason that $y$ is the only participant involved in the resulting subevent is that the entity undergoes a change of state without the intervention of the causer.

Inchoative verbs corresponding to causative verbs in (22) have a lexical semantic representation as shown below:

(23) Event Structure: $e_2(y)$

LCS: $[x \text{ ACT}] \text{ CAUSE } [y \text{ BECOME } <\text{STATE}>]$  

Along with Levin and Rappaport Hovav (1995) and Kageyama (1996), we assume that the $x$ argument of the function ACT is lexically saturated in (23) via existential quantification (Levin and Rappaport Hovav) or identification of $x$ with $y$ (Kageyama) and that it is not linked to the syntactic subject since the causing event involving $x$ is missing. We posit here that syntax and lexical semantics are mediated by event structure—a version of the Aspectual Interface Hypothesis (Tenny (1994)).

Drawing on a generalization made by Van Voorst (1992) and Maruta (1998), among others, we suggest that alternating verbs denote an event where a causer starts a process of change of state without being further involved in the process; whereas, non-alternating causative verbs denote an event where the causer must continue to exert its force on the entity throughout the event to keep the process going (Van Voorst (1992: 517)). The latter is represented as the involvement of the causer in the result event ($e_2$) as shown in (24):

(24) Event Structure: $e_1(x) e_2(x, y)$

LCS: $[x \text{ ACT}] \text{ CAUSE } [y \text{ BECOME } <\text{STATE}>]$  

The detransitivized counterpart of (24) would have an event structure that involved solely the subevent $e_2(x, y)$. Under our approach, then, $x$ must be linked to a syntactic element since it is present in event structure. The event structure, then, contradicts the lexical conceptual structure of inchoatives where $x$ is lexically saturated and cannot be syntactically realized. With this distinction between alternating and
non-alternating causative verbs, we suggest that all the non-alternating versions of the verbs discussed in the previous section eventually have the semantic representation in (24). The question is, then, how do they get the event structure in (24)?

We propose that the event structure emerges in combination with the semantic structure of nominals. Assume that nominals have an event structure. The event structure of a nominal primarily involves as its participant the entity that the nominal denotes. Window, for example, has the event structure e(y) where y is the entity that window denotes. Combined with a lexical representation of a causative verb such as break, the semantic representation of the VP break the window is something like (22); hence, it may correspond to the inchoative counterpart. On the other hand, nominals like promise are prototypically brought about by the activity where one or more participants, other than the entities denoted by the nominals, are involved. We would like to capture this intuitive sense by assuming that the event structure of such nominals includes two, rather than one, participants, i.e. e(x, y). In composition with this event structure of promise, the phrasal semantics of break a promise exhibits something like (24). Along the same lines, our compositional analysis claims that the conceptual/semantic representation in (24) is contributed in part by the meaning of complement nouns.

We are claiming here that the semantic structure of a nominal contains much more information than “semantic roles” or “argument structure,” to which most lexicalist theories conventionally attribute the semantics of nominals (Di Sciullo and Williams (1983), for example). The representation of meaning for the nominals discussed so far, i.e. cake in bake a cake, table in clear the table, promise, etc. in break a promise, must include how they come into existence, what they are used for, how they are related to a larger category, and so on. This information is encoded in what Pustejovsky (1995) calls the qualia structure. The event structure of nominals discussed above is, I assume, associated with the qualia structure and the former makes use of the information included in the latter.

4.2. Construction

As noted earlier, in Jackendoff’s Tripartite Parallel Model, lexical items are integrated into the phrase structure via correspondence rules mediating lexicon and syntax. This conception of the lexical interface
enables us to assume that a lexical item (or a listeme in Di Sciullo and Williams's (1983) terminology) may be multiple phrasal constituents corresponding to conceptual constituents. Such syntactic units are called "constructional idioms" in Jackendoff's theory (Jackendoff (1990, 1997)), "constructions" (Goldberg (1995), Butt and Geuder (1998)), or "complex predicates" (Alsina et al. (1997), Ackerman and Webelhuth (1998)).

We will present a constructional analysis of locative inversion in English. A number of analyses of locative inversion have been proposed within the standard lexicalist framework. We will take a brief look at Bresnan's (1994) and Levin and Rappaport Hovav's (1995) works on this topic and show that they have difficulty accounting for the classes of verbs that appear in the construction. Then, we will propose an account primarily based on Jackendoff's linguistic model.

4.2.1. Locative Inversion Construction

Like other much debated linguistic phenomena, locative inversion has attracted attention from various approaches to human language. From a lexical semantic point of view, locative inversion has been assumed to be a diagnostic for testing the unaccusativity of verbs, i.e., only certain classes of intransitive verbs can appear in locative inversions. From a functionalist view, it provides a number of interesting questions about the information packaging mechanism in a sentence, in particular, about the topic-focus structure (Birner (1994)). Bresnan and Kanerva (1989) and Bresnan (1994) have abstracted two generalizations about locative inversion out of data taken from English and Chichewa: (i) that the argument structure of the locative inversion verb is $<$Theme Location$>$, and (ii) that the theme phrase bears a discourse function focus. Because of the first generalization about the argument structure of locative inversion, agentive transitive verbs and unergative verbs are in general excluded from the construction. In other words, verbs most commonly found in locative inversion are verbs of "exis-

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5 The discussions in this section is part of the research reported in Ono (2001), where a typological comparison is made between English and Japanese locative inversions.
tence and appearance”—typically unaccusative verbs such as be, come, appear, etc.

(25)  a. In the village is a well.
     b. To the village came those visitors.
     c. Among the guests was sitting my friend Rose.

Generalization (i) also implies that the location phrase must be an argument of the verb.

The observed argument structure generalization is, according to Bresnan, closely related to the second generalization about the discourse function of locative inversion sentences. The inverted theme phrase is interpreted as having presentational focus in discourse. Bresnan (1994) notes, “In presentational focus, a scene is set and a referent is introduced on the scene to become the new focus of attention. In the core cases, a scene is naturally expressed as a location, and the referent as something of which location is predicated—hence, a theme. This imposes a natural selection of the <th loc> argument structure.” (p. 90)

4.2.2. Lexicalist Theory

Bresnan’s (1994) account of locative inversion hinges on the lexicalist assumptions, i.e. the Atomicity Thesis and Lexical Determinism, about the architecture of grammar. Thus, given the lexical specification of the argument structure of a verb, the lexical mapping theory in LFG maps, in a principled way, the verb’s arguments (thematic roles) onto partial specifications of syntactic functions. In short, with the argument structure, syntactic function, and discourse function specifications, the lexical representation of a locative inversion verb can be presented as follows:

(26)  \[ < \text{th} \quad \text{loc} > \]

\[ \quad | \quad | \]

\[ \text{O} \quad \text{S} \]

focus

If (26) were all there was to say about the locative inversion construction, it would pick out all and only the verbs with this argument structure specification; however, in reality, a wide range of verbs can be found in locative inversion. Among the verbs which are apparently in conflict with the lexical representation in (26) are activity verbs such as the ones below ((27a) is cited from Bresnan (1994), (27b, c) from Levin and Rappaport Hovav (1995)):
(27) a. Through the window on the second story was shooting a sniper.
   b. On the third floor worked two young women called Maryanne Thompson and Ava Brent, who ran the audio library and print room.
   c. Inside swam fish from an iridescent spectrum of colors

Faced with these examples Bresnan suggests a process that turns certain agentive verbs into verbs of existence or appearance. This process is called "presentational overlay." Recall that Bresnan associates presentational focus with the <th loc> argument structure. She claims that presentational focus overlays a theme-locative predication on the lexical argument structure of the activity verb, as illustrated below:

\[
\begin{align*}
\text{lexical argument structure:} & \quad <ag> \\
\text{presentational overlay:} & \quad <th\ loc> \\
\text{O} & \quad \text{S} \\
\text{focus}
\end{align*}
\]

By virtue of the shift of meaning through the presentational overlay, the agentive verbs will meet the argument structure requirement for locative inversion. The presentational overlay is, thus, like an extrax-lexical argument structure which is integrated with the lexical argument structure of the verb.

Working also within the lexicalist framework, Levin and Rappaport Hovav (1995) propose an alternative approach to the variety of verbs in locative inversion. They have abandoned a lexical semantic constraint on locative inversion verbs in favor of a discourse functional constraint. Instead of assuming that one can define semantically coherent verb classes for locative inversion, they claim that the restriction on the verbs found in the construction follows from a discourse constraint on locative inversion. The verbs in the locative inversion construction must be informationally light, in the sense that they "represent evoked or inferable information in context, and therefore contribute no new (i.e. discourse new) information to the discourse." (p. 230) Informational lightness of the verb in locative inversion is required by the information packaging function of the construction where the theme argument must bear the most unfamiliar (important) information in the discourse. The information the verb conveys must be relatively less
unfamiliar, predictable from the content of the theme argument.

It should be noted that the accounts proposed by Bresnan and Levin and Rappaport Hovav are in effect incompatible with the general leading idea of Lexicalism—syntactic behaviors are predictable from lexical meanings (Lexical Determinism). In Bresnan's theory, the discourse function alters the lexical argument structure. In Levin and Rappaport Hovav's view, the presence of a verb in locative inversion crucially depends on the information content that the verb contributes to the discourse, irrespective of its membership in a lexical-semantic verb class.

4.2.3. A Constructional View

I follow, in part, Jackendoff's (1990) idea of "constructional idioms," and propose that the locative construction is a correspondence rule mapping between a particular conceptual structure and a certain set of multiple phrasal constituents. This means that the locative inversion construction itself carries an inherent meaning. This form-meaning pairing is listed in the lexicon of English as a single lexical item. From this constructional meaning it follows that the semantic restriction observed in the previous analyses is imposed on locative inversion verbs. I assume here that the conceptual structure associated with the locative inversion construction is something like (29):

(29) CS: \[
\text{[State BE ([Thing], [Place AT [Thing]])]}
\]

At the lexical level, (29) serves as the lexical semantic template for the class of verbs of existence, e.g. dwell, remain, stay. At the phrasal level, (29) may correspond to the syntactic frames depicted below:

(30) SS:
   a. \[
   [\text{S NP VBE PPLOC}]
   \]
   b. \[
   [\text{S PPLOC VHAVE NP}]^6
   \]

Subscripts are added for the sake of convenience here. (30a) and (30b) are skeletal constructions which do not inherently correspond to

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^6 The syntactic frame implies that the PP is the subject. This is consistent with Bresnan's (1994) analysis of the locative subject in English and Chichewa. But if it is associated with the copular verb have, the locative subject cannot be a PP (*In the box has some books. / The box has some books in it.*). We leave open such details about the HAVE construction. Also, we put aside questions about semantic fields or domains that these constructions are used for, i.e. the relationship between location and possession, for instance. See Freeze (1992).
any specific lexical verbs. If these constructions are not integrated with any lexical verbs, the default lexical forms *be* and *have* are associated with the constructions respectively. In other words, *be* and *have* are copula verbs, which have no specific lexical representations. I assume here that the HAVE construction is simply the inverse of the BE construction. The former treats the location, rather than the theme, as the “the logical subject” (cf. Pinker (1989) for a similar treatment of BE and HAVE).

The choice between (30a) and (30b) depends on the discourse function that specifies the topic-focus alignment in a sentence. The conceptual structure in (29) may correspond either to the BE frame or to the HAVE frame depending on whether the NP bears the presentational focus or relatively less familiar information. Contrary to what Bresnan and Levin and Rappaport Hovav claim, however, we do not assume that the discourse function may affect the lexical representation of locative inversion verbs, or that the semantics of locative inversion may be attributed to the discourse function.

4.2.4. The Interaction between Lexical and Construction Meanings

Our approach to the locative construction subsumes the semantic constraint on the verbs under the requirement that the semantics of the verb integrate into the semantics of the locative construction. In what follows, we will see how our construction-based analysis accounts for the range of verb classes associated with the locative construction.

In Goldberg’s (1995) theory of constructions, a verb is associated with a given construction if the event type that the verb denotes matches the event type the construction denotes. The verb’s event type integrates into the event type of the construction when the participant roles of the verb are semantically identified (*fused*, to use Goldberg’s term) with argument roles specified by the construction. For example, the verb *hand* can be associated with the ditransitive construction since the verb, denoting a transfer event that involves the hander, handed, and handee roles, matches up with the event type of the ditransitive construction of which argument structure designates agent, patient, and goal arguments.

In our account of locative inversion, matching between the verb and the construction is based on a convergence of lexical and constructional meanings. This explains why in most typical cases verbs of existence appear in locative constructions.
(31) a. Among the guests was sitting my friend Rose.
b. On the corner was standing a woman.

(32) \[ \text{State BE ([\text{Thing }], \text{Place AT [\text{Thing }]])} \]
The lexical conceptual structure of these verbs (31) is completely on a par with the conceptual structure of the construction in (32).

4.2.5. Inference Rules

Given that the integration of the verb's lexical meaning and the meaning of a given construction is based on the matching between the lexical conceptual structure of the verb and the extralexical conceptual structure of the construction, we will have apparent problems with other classes of verbs conventionally associated with the locative construction. Verbs in the inherently directed motion verb class (come, go) and in the appearance verb class would have the following lexical conceptual structures:

(33) a. To the village came many visitors.
b. \[ \text{Event GO ([\text{Thing }], \text{Path TO [\text{Thing }]])} \]

(34) a. On the horizon appeared a large ship. (Levin (1993))
b. \[ \text{Event INCH ([\text{State BE ([\text{Thing }], \text{Place AT [\text{Thing }]])}]}) \]
We assume that an inference rule is at work here. That is, the semantics of the locative construction and the lexical conceptual structures of the motion/appearance verbs are integrated via inference rules proposed in Jackendoff (1990, 1997). The rules are defined over conceptual structure by virtue of their cognitive content. We assume here the following rule:

(35) Inference Rule

At the termination of \[ \text{Event GO ([\text{Thing }], \text{Path TO [\text{Thing }]])} \]
it is the case that \[ \text{State BE ([\text{Thing }], \text{Place AT [\text{Thing }]])} \]
Note that this rule captures logical redundancies between conceptual structures. By virtue of the inference rule, the lexical conceptual structures of verbs of motion and appearance can be associated with the conceptual structure of the existence sense, and it in turn associates with the constructional meaning.

4.2.6. Mismatches

Having shown that the analysis we present accounts for the semantic restriction of locative inversion verbs in terms of the integration of the lexical meaning of the verbs with the constructional meaning, we will now turn to apparent mismatches between the lexical conceptual struct-
ture of verbs and the conceptual structure designated by the locative construction. As noted earlier, despite the mismatches in meaning, quite a considerable number of activity verbs can appear in the locative construction. Some additional examples are given below (Hoekstra and Mulder (1990)):

(36)  

a. In this bed has slept an important member of the royal family.

b. In this restaurant used to eat the famous encyclopedists.

c. Under the table always snores a big fat cat.

d. In that cave appears to have dwelt a giant five-headed monster.

We have pointed out that these examples pose a serious problem for lexicalist theories since lexically determined semantic properties of the verbs do not meet the semantic constraint on locative inversions. In other words, the syntactic behavior of the verbs is not predictable from the lexical meanings.

We would like to suggest that the semantic "mismatches" at issue here will disappear if we take into account more detailed information about lexical items. Informally, people associate certain locations (settings) with certain stereotypical events or scenes that they encounter in the world. Thus, given a certain location, we have expectations about what kinds of events or activities happen there. This information is encoded as part of the locative noun’s qualia structure. By virtue of information encoded in the qualia structure of locative nominals it is possible to integrate the lexical semantics of the verb with the semantics of the construction. After integrating the lexical conceptual structure of the verb, the conceptual structure corresponding to the locative inversion construction in (37a) is as in (37b):

(37)  

a. \[ S \ [PP On the third floor] [V worked] [NP two young women] ]

b. BE ([two young women], [AT [the third floor]])

WITH/BY [ACT ([two young women])] ]

Notice that the WITH/BY component of the conceptual structure is that of the verb work, which is a simple activity verb with the LCS [ACT (x)].

Contrary to what the lexicalist theories posit, our analysis does not suggest that the verbs which are found in the locative construction be seen as having an appearance or existence interpretation. Instead, the semantic interpretation results from the integration of lexical semantic
representations of unergative verbs into the conceptual structure of the construction.7

5. Lexicon and Morphology

As stated in Section 3 of this paper, two conflicting ideas can be noted about the lexicon within lexicalist frameworks. In one view, the lexicon is nothing more than a list—it could be a list of morphemes, or of all actually occurring words of the given language (Jackendoff (1975), Di Sciullo and Williams (1987)). Alternatively, the lexicon can be seen as a component which hosts not only lists, but also rules that actually produce words; in this conception the lexicon emerges as an generative component of the grammar (Aronoff and Anshen (1998)).

In Jackendoff's view of the lexicon as embodying the full entry theory with lexical redundancy rules, the lexicon of a language is a mere list of existing items, which the speaker/hearer of the language has to memorize in one way or another. The size of an individual's (mental) lexicon, therefore, theoretically varies from person to person.

Notice, again, that there is no autonomous word formation component in Jackendoff's model since words are either listed or formed by regular rules of combination that just happen to apply within X0. Jackendoff proposes a dichotomy of morphological rules: productive and semiproduc tive rules. Productive lexical rules are regular rules of combination in the computational system that "just happen to apply

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7 One of the EL reviewers has pointed out that our analysis wrongly predicts that a wide range of verbs, including ditransitive verbs, can readily be associated via inference with the locative construction, as shown below:

(i) a. I have donated some money to the church.
   b. *To the church have donated I some money.

Suppose that the verb's lexical conceptual structure contains a motion component as in the following:

(ii) [CAUSE (x, [GO (y, [AT z])])]

Given this, then the inference rule in (35) would yield [BE ([money], [AT [the church]])] from [GO ([money], [AT [the church]])]. However, it does not suffice to trigger locative inversion since locative inversion is regarded here as a “constructional idiom” in the sense of Jackendoff (1990). The locative construction is a correspondence rule connecting the conceptual structure in (29) and syntactic frames in (30b). (ib) does not fit into the syntactic frame in (30b); hence, it does not serve as a constructional idiom.
within X^0 constituents" (p. 118), while semiproductive rules are lexical redundancy rules that relate lexical entries listed in the lexicon. On this view, the word *banana* is listed in the lexicon but *bananas* is not; the latter is generated from the former by a rule combining the stem with the productive plural morpheme below:

\[
(38) \quad \text{Wd}_a \quad \text{N} \quad \text{[Entity PLUR [Entity ]}_b]_a
\]

\[
\text{Wd} \quad \text{Cl}_c \quad \text{N} \quad \text{Af}_c
\]

\[
\mid \quad \text{[sing ]} \quad \mid
\]

\[
\mid \quad \text{[count ]}_b \quad \text{plur}
\]

Productive morphemes have their own lexical entries listed in the lexicon. Semiproductive morphemes, on the other hand, do not have independent lexical entries. Under the full entry theory, a derived nominal such as *destruction* has its own lexical entry, which is added to the individual’s lexicon without reference to the lexical entry of its source (*destroy*). Thus, *destruction* and *destroy* just happen to be listed independently in the lexicon. Lexical redundancy rules serve to reduce the “cost” of listed lexical items.

The productive/semiproductive distinction plays a crucial role in Jackendoff’s model since it differentiates the distinct modes of morphological processes; however, Jackendoff does not make explicit how this dichotomy of morphological rules work out. In my view, productive and semiproductive word formation rules (irrespective of whether they are categorized as inflection or derivation) form a scale along which rules are more or less productive or non-productive. A rule’s position along this scale is possibly determined in terms of quantitative and/or qualitative considerations (Aronoff and Ashen (1998)). Jackendoff himself notes that “there may be something of a cline in semiproductive processes, shading toward productive ones.” (p. 231, fn 10) If so, a simple division of morphological rules does not hold.

As mentioned above, a mental lexicon is an individual-based list of items. Thus, it may happen that a word meets all the criteria for being a word of the language (in the sense that it satisfies phonological, morphological, and semantic conditions for qualifying as a potential word in the language) but it is not listed in an individual’s mental lexicon. Take the word *rigidification* for example. This word is, according to Aronoff and Ashen (1998), most unlikely to be listed in the English-speakers’ mental lexicons. But few people would have difficulty analyzing or producing it. If, as the full entry theory of the lexicon
says, semiproducive morphemes (in this particular case, ify, tion) were not associated with independent lexical entries, it would be impossible in principle to understand and use unlisted words.

In the “Final Remarks” to Chapter 5, Jackendoff notes that some important issues are left open. One of them would appear to be the problem addressed above. One possible solution would be to assume that some lexical redundancy rules help certain semi-regular lexical entries be isolated and listed in the lexicon so that they are used just like the regular plural affix in (38). As a matter of fact, in his 1975 paper Jackendoff notes that “after a redundancy rule is learned, it can be used generatively, producing a class of partially specified possible lexical entries.” (p. 668) Then, the distinctions between “productive” and “semiproducive” and between “rules of grammar” and “lexicon” will begin to blur.

6. Conclusion

The past thirty years of research in the interface between grammar/syntax and lexicon has seen the development of various versions of Lexicalism. In spite of the early emphasis by lexicalist theories on the Atomicity of lexical items in syntax and the notion of Lexical Determinism in recent studies, there is a growing trend in the lexicalist framework towards shifting the burden from the lexical information encoded in individual words to the information created compositionally or constructionally by larger syntactic objects. Jackendoff’s work should be understood in this context of on-going reforms of the traditional lexicalist framework.

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