

# Lexical-Functional Grammar

## Yehuda Falk

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## Introduction

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This textbook, like all textbooks, was born of necessity. When I went looking for a suitable textbook for my course on Lexical-Functional Grammar at the Hebrew University of Jerusalem, I discovered that there wasn't one. So I decided to write one, based on my lecture notes. The writing accelerated when, while I was on sabbatical at Stanford University (August 1999–February 2000), Dikran Karagueuzian of CSLI Publications expressed interest in publishing it. This book owes its existence in its present form to Dikran, and to the encouragement of Joan Bresnan, who sponsored me at Stanford.

This textbook is not intended as an introduction to syntax. Throughout, it is assumed that the reader is familiar with elementary concepts of syntactic theory and with contemporary derivational syntactic theory (Government/Binding theory and/or the Minimalist Program). I believe that this approach is conducive to opening up a dialog between different “camps” within generative syntactic theory. It is a mistake for any student of contemporary linguistic theory to be taught a single theoretical framework as if it represents an overriding consensus in the field. Being that derivational theories have a recognized centrality within the field, the assumption behind this book is that students are first introduced to a derivational theory, and then at a more advanced level learn alternatives. (Coincidentally, or not so coincidentally, this situation also matches my teaching experience.) This book is aimed at such students, and therefore attempts to motivate the concepts and formalisms of LFG in relation to derivational approaches. It is my hope that this approach will also make this book an appropriate one for professional linguists who wish to acquaint themselves with the basic principles and concepts of LFG.

Unlike most expositions of LFG, this book focuses on English. While much has been done in LFG on other languages, and the typological reach of LFG is one of its strongest points, I believe that there is pedagogical value in focusing on a single language, one that the student knows. Many students are initially turned off by having to wade through data from unfamiliar lan-

guages. (I can attest to this from personal experience.) This approach also provides a more cohesive view of the theory than jumping from language to language would. It allows us to develop a minigrammar for the language, as is standard in textbooks on other formal theories, such as Akmajian and Heny (1975) on the Standard Theory and Sag and Wasow (1999) on Head-driven Phrase Structure Grammar.

This textbook was written by a descriptively oriented generative syntactician for other descriptively oriented generative syntacticians. As a result, there are many issues that are important in LFG that are not raised here in any serious way. For example, there is no discussion of the mathematical properties of the LFG formalisms or of computational applications, even though both of these have always been central concerns in LFG research. Throughout, the formalism is justified on the basis of descriptive linguistic considerations. Similarly, there is no discussion here of “glue-language” semantics or other issues concerning the relation between LFG syntax and other components of the grammar. References are made to the literature on some of these issues, and the interested student can pursue them given the background provided by this book.

Like any living theory, LFG is continually developing, and there are disagreements about certain details among LFG linguists. The writer of a textbook must wrestle with the problem of exactly what perspective to present. Naturally, my own preferences (and research) have influenced the presentation of the material in this book, but I hope that I have been fair to LFG as a whole. Where there is no consensus and I have chosen one particular approach, I have noted this. I have also found, in composing the minigrammar of English, that I have had to develop analyses for parts of the syntax of the language which have not yet been adequately discussed in the LFG literature. These original analyses are to be found primarily in the chapters on control constructions and long-distance dependencies.

I would like to thank people who commented on the manuscript or helped me in other ways: Farrell Ackerman, Paul Bennett, Joan Bresnan, Aaron Broadwell, Mary Dalrymple, Malka Rappaport Hovav, Tsipi Kuper-Blau, Helge Lødrup, Irit Meir, Rachel Nordlinger, and Jane Simpson. In general, acknowledgment is due to the entire LFG community, a very supportive group of people. I would also like to thank my wife Brandel, who looked at parts of the manuscript with an editor’s eye and made helpful suggestions on wording. I would like to thank Dikran Karagueuzian, Chris Sosa, Kim Lewis Brown, and Tony Gee of CSLI Publications for all their help and support, and the two reviewers for CSLI for their comments, most



of which they will find incorporated in the text. Most importantly, I would like to thank all my students, past and present, who have taught me how to teach; I hope that some of what I have learned from them has found its way into the book. Of course, none of these people is to blame for any remaining problems. My computer accepts full responsibility; it put the mistakes in when I wasn't looking.

Finally, I would like to thank my wife Brandel and my sons Eli, Yoni, Mati, and Gabi for putting up with my obsession to get this textbook finished. Thank you.



## To the Student

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Welcome!

As stated in the introduction, the purpose of this textbook is to teach the theory of syntax called Lexical-Functional Grammar. The concepts of the theory are built up piece-by-piece throughout the book. As a result, it is important to realize that the individual chapters are not self-contained. Each builds on what came before and the results are subject to revision in subsequent chapters. A number of chapters have less essential appendices at the end; these should be considered optional.

The end-of-chapter exercises are an inherent part of the material in the text. In some cases, they give the student a chance to practice a topic covered in the chapter; in other cases, they point to an addition to the analysis developed in the chapter.

Finally, a few words about bibliography. In general, the important bibliographic references are cited in the end-of-chapter “Additional Readings” section, rather than in the text of the chapter itself. For this reason, the sources of most of the important concepts in LFG will not be mentioned where the concepts themselves are introduced. There are two reasons for this. First, centralizing the bibliography makes it easier to find the references. Second, most of the concepts we will be discussing are widely accepted in one form or another in the LFG community; while it is important to cite the original source, it is also important to recognize that they have become the basis on which all work in LFG is based. Another thing to keep in mind is that the bibliography focuses on LFG material. In general, there are no references to work in other theoretical frameworks on the basic constructions of English, most of which is probably already familiar to you. This is not because they are not important, but simply because the purpose of this book is to focus on LFG analysis.



# Welcome to Lexical-Functional Grammar

## 1.1 Introduction

**Generative linguistics** or **generative grammar**, a field of study that originates in the work of Noam Chomsky, is an attempt to discover the nature of the human language faculty, specifically of Universal Grammar (UG). The immediate goal of this approach to linguistics is to develop formal mathematically explicit models of various aspects of human language. It is through the development of such models that formal claims about language can be expressed and tested.

Much work in generative linguistics has focused on modeling the syntactic component, the component of language that deals with the combination of words into phrases, clauses, and sentences. This is not coincidental. Syntax, unlike such components as phonetics/phonology, semantics, and pragmatics, is a system that is purely internal to language. It does not interface with nonlinguistic cognitive or motor systems. It thus plays a central role in organizing the entire linguistic system.

Perhaps the best-known model of syntax within the generative tradition is the one known as transformational syntax. This is a model that has been developed by Chomsky and his associates since the 1950s. Various developments of this model are known by names such as the Standard Theory, the Extended Standard Theory, the Revised Extended Standard Theory, Government/Binding theory, and the Minimalist Program. Despite all the changes, reflected by the different names that transformational theory has taken, certain assumptions underlie all transformational theories. Among these assumptions are the following:

- Syntactic representations are immediate-constituent structures, conventionally represented as trees. The configuration of constituent structure trees defines all crucial concepts of syntax (such as c-command).

- Grammatical functions (also called grammatical relations) such as “subject” and “object” are not elements of syntactic representation. These functions/relations are notions derived from the constituent structure, with the subject configurationally higher than the object, and in some sense “external” (outside the VP, outside the V', etc.).
- A surface syntactic representation is the result of operations that take an existing constituent structure and change it into a similar but not identical constituent structure. These operations are called transformations, and are the source of the name “transformational grammar.” While the details of transformations have changed over the years, transformational operations have included movement of constituents from one position in the tree to another, the insertion or merger of new elements into an existing structure, and the deletion or erasure of elements. In such a theory of grammar, the most salient feature is the set of consecutive representations of a grammatical sentence, often called a derivation. For this reason, a transformational approach to syntax can also be called a derivational approach.
- While the role of the lexicon in transformational grammar has changed drastically over the years, it tends to be seen as relatively limited. The lexicon is generally seen as little more than a repository of idiosyncratic information. This is less true of some versions of derivational theories than others.

While transformational theory represents the approach to syntax taken by most generativists, there are other approaches as well. These approaches are based on the rejection of some or all of these underlying assumptions of transformational syntax. This book is about one such alternative approach to syntax: Lexical-Functional Grammar, or LFG.

LFG rejects the assumptions of transformational theory, not its goals. The basic argument for the LFG approach to syntax is simply that certain transformationalist assumptions are incompatible with the search for a theory of Universal Grammar. LFG is therefore a variety of generative grammar, an alternative to transformational theory. In this book, we will occasionally compare the LFG approach with that of transformational theory, generally Government/Binding (GB) theory (Chomsky 1981, Chomsky 1986), and to a lesser extent the Minimalist Program (MP; Chomsky 1995).

LFG was developed in the mid-to-late 1970s, a period in which many different ideas about syntax were being explored. For example, this is the period in which many of the basic concepts of GB were developed. It was in

the late 1970s that Generalized Phrase Structure Grammar (GPSG; Gazdar, Klein, Pullum, and Sag 1984) was developed—a theory that has since evolved into Head-driven Phrase Structure Grammar (HPSG; Pollard and Sag 1994, Sag and Wasow 1999). And although it began in the early 1970s, this was also the formative period of the theory of Relational Grammar (Perlmutter, ed. 1983). Other attempts at modeling the syntactic component of grammar, many since forgotten, were also created then.

LFG developed in this period out of the work of two people. The first was Joan Bresnan, a syntactician and former student of Chomsky's, who had become concerned about psycholinguistic evidence that seemed to show that something was wrong with the concept of transformations. She started developing an alternative approach, which she called a Realistic Transformational Grammar, in which part of the work done by transformations in standard approaches was done in the lexicon instead (Bresnan 1978). The second person was Ronald M. Kaplan, a computational linguist/psycholinguist who was working on a parsing model called the Augmented Transition Network (ATN; Kaplan 1972). They realized that they were pushing in similar directions, and decided to collaborate. It is out of this collaboration that LFG was born, and to this day Bresnan and Kaplan are the key players in the LFG world.

To understand what LFG is and how it differs from transformational syntax, we will begin by examining the name of the theory: what is meant by “lexical,” what is meant by “functional,” and what is meant by “grammar”? As we discuss the literal meanings of the parts of the theory's names, we will also see related aspects of the theory. Throughout, we will point to differences between LFG and theories in the transformational tradition. Naturally, nothing that is said here is intended to detract from the importance of work done in these frameworks: many important insights into the workings of syntax have resulted from research in transformational grammar. Rather, the purpose is to argue that LFG provides a better model of syntax within which to express these insights.

## 1.2 “Lexical”

A lexical (or lexicalist) theory is one in which words and the lexicon play a major role. To some extent, this is true even in GB: the Projection Principle attributes certain syntactic patterns to properties of words. In the Minimalist Program the derivation begins with a “numeration” (set) of lexical items, which are merged into the structure in the course of the derivation. Some versions of GB even recognize the existence of lexical operations, such as

alterations to argument structures. These views in GB and MP depart from ideas in earlier transformational theory, and bring them closer to a lexicalist approach.

There are, however, some interesting ways in which words are not as important in GB and MP as (perhaps) they ought to be. One crucial way in which words are not important in transformational theory is that it does not, in any of its standard incarnations, adopt the Principle of **Lexical Integrity**.<sup>1</sup> We state the principle in preliminary form as (1).

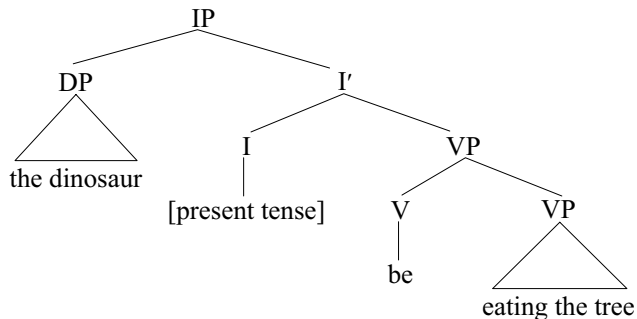
(1) **Lexical Integrity Principle** (preliminary)

Words are the “atoms” out of which syntactic structure is built. Syntactic rules cannot create words or refer to the internal structures of words, and each terminal node (or “leaf” of the tree) is a word.

One example of a violation of the Lexical Integrity Principle in transformational theory can be seen in the standard GB analysis of V-to-I movement constructions. Consider the sentence in (2a). Its underlying (D-structure) representation is shown in (2b).<sup>2</sup>

(2) a. The dinosaur is eating the tree.

b.



Consider the status of the word *is*, one of the “atoms” out of which this sentence is built according to the Lexical Integrity Principle. Under the GB analysis it is not a part of this structure; the syntax builds it through V-to-I movement. It is the syntactic adjunction of the V *be* to the present tense

<sup>1</sup>A notable exception is Di Sciullo and Williams (1987)

<sup>2</sup>Details distinguishing this particular version of the analysis from more elaborated ones (VP internal subject, exploded infl, etc.) are irrelevant.



feature in I that creates *is*. Furthermore, what is present in D-structure under I is not even a word: it is an inflectional feature. This analysis, then, violates the Lexical Integrity Principle, both by virtue of building a word through a syntactic operation and because the syntactic structure is created out of things other than words.<sup>3</sup>

The Lexical Integrity Principle is a proposed principle for a theory of syntax. Like the A-over-A Principle of Chomsky (1973), the Projection Principle of Chomsky (1981), the Greed and Procrastinate of Chomsky (1995), or any other hypothesized principle of grammar, it is a potential step toward the goal of a constrained theory of grammar. All such principles are worthy of exploration; the way to explore such a principle is to examine what kinds of analyses are consistent with it, and to explore its explanatory potential. The ultimate test of any proposed principle of language is its ability to lead to well-motivated analyses of linguistic facts.

The Lexical Integrity Principle carries a fair amount of plausibility. The essential claim behind it is that syntax cannot see the internal structure of words. It has long been noticed that word structure is different from phrase and sentence structure. This is the reason that while *semantics* and *phonology* refer indifferently to meaning/sound structure both above and below the level of the word, linguists have usually distinguished between structure above the level of the word (*syntax*) and structure below the level of the word (*morphology*). There are many ways to show that word structure is different from phrase and sentence structure. We will mention two here. First, free constituent order in syntax is common cross-linguistically; many languages lack fixed order of the kind that one finds in English. In morphology, on the other hand, order is always fixed. There is no such thing as free morpheme order. Even languages with wildly free word order, such as the Pama-Nyungan (Australian) language Warlpiri (Simpson 1991), have a fixed order of morphemes within the word. Second, syntactic and morphological patterns can differ within the same language. For example, note the difference in English in the positioning of head and complement between syntax and morphology.

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<sup>3</sup>In the Minimalist Program the syntax does not build words: *is* is taken from the lexicon. In this respect, it is more consistent with the Lexical Integrity Principle than older versions of transformational syntactic theory. However, as with the GB and earlier accounts, abstract inflectional features still occupy their own structural positions in the Minimalist Program. In addition, feature checking requires the syntax to analyze the internal structure of the inflected verb.

- (3) a. [<sub>V</sub> eat<sub>head</sub> tomatoes<sub>complement</sub>]  
 b. [<sub>N</sub> tomato<sub>complement</sub> eater<sub>head</sub>]

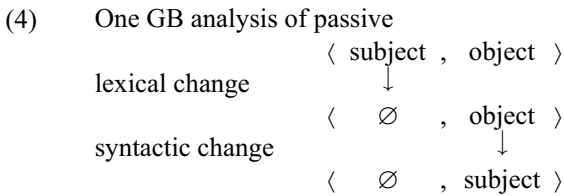
At the phrasal level, heads precede their complements, while at the level of the word heads follow their complements. If word structure is distinct from phrase and sentence structure, it stands to reason that the component of the grammar responsible for the latter is distinct from the one responsible for the former. This is essentially what the Lexical Integrity Principle says. Consequently, the Lexical Integrity Principle is a plausible component of a theory of syntax.

A theory that respects (some version of) the Lexical Integrity Principle can be said to be a lexicalist theory. This is a theory in which words play a central role in the syntax: syntactic structures are composed of words. It is also a theory in which the lexicon will play a central role, since it is the component in which words are created. LFG is a lexicalist theory in this sense.

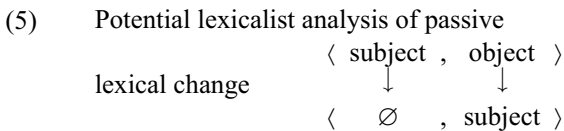
Marantz (1997) purports to provide evidence against lexicalism, going so far as to declare lexicalism “dead, deceased, demised, no more, passed on”. However, nowhere does he actually address the heart of lexicalism: the Lexical Integrity Principle and the idea that structure above the level of the word differs from structure below the level of the word. Instead, Marantz argues that words are not unique in having idiosyncratic semantics, or that the “phonological word” does not correspond to the “semantic word”. However, the Lexical Integrity Principle is not about phonology or semantics, but about syntax. As we will see more clearly later in this chapter, while phonology and semantics are related to syntax, they are not identical to syntax. We will also get a clearer picture of the LFG conception of the Lexical Integrity Principle as the chapter progresses. The observation that minimal units of phonology and semantics do not correspond to each other is irrelevant to the question of whether a theory of syntax should be based on the Lexical Integrity Principle.

However, lexicalism goes beyond the Lexical Integrity Principle. Consider the passive construction. There have been many analyses of passivization proposed in the long history of transformational theory. Some, such as the incorporation analysis of Baker (1988), see the passive morpheme as a separate syntactic constituent that combines syntactically with the verb. Such analyses clearly violate the Lexical Integrity Principle in the same ways as V-to-I movement: the atoms of syntax are not words, and the syntax builds

words.<sup>4</sup> However, there is another transformational analysis, outlined in Chomsky (1981), which treats the passive morpheme as a signal of a lexical change in the verb's argument structure ( $\theta$  grid in GB terminology). The passive morpheme causes the subject argument to be suppressed. This results in a lexical argument structure with an object argument but no subject argument. As a result of a principle of GB called Burzio's Generalization, the verb also loses its ability to "assign Case." In the syntax, the object argument becomes the subject by undergoing NP movement, a movement triggered by the object not getting Case in situ. The NP movement is thus an indirect result of the lexical change in argument structure. This can be shown informally by the following chart.



This is an essentially lexical analysis of the passive, since the syntactic change is triggered by the lexical change. However, the realization of the active object argument as subject is still inexplicably attributed to a derivational syntactic process. From the perspective of lexicalist syntax, there is a clear alternative, in which there is no syntactic derivation. (Again, this is an informal demonstration.)



Such an account is simpler, in that it unifies the two changes associated with the passive construction.

There is also evidence that the lexicalist account is superior to the mixed lexical-syntactic GB approach, as discussed by Bresnan (1982a; 1995b). One such piece of evidence, a very strong one, comes from the fact that passiviza-

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<sup>4</sup>For arguments against the incorporation analysis of passivization from a GB perspective, and in favor of the lexicalist GB approach, see Falk (1992).

tion feeds other lexical processes. For example, participles with no obligatory nonsubject arguments can be morphologically converted into adjectives through zero-derivation. In the resulting adjectival passive, the subject of the passivized verb is the subject of the adjective.

- |     |    |   |         |
|-----|----|---|---------|
| (6) | a. | The present was given (to the zookeeper).                             | (Theme) |
|     | b. | the ungiven present   | (Theme) |
|     | c. | *The zookeeper was given.<br>(cf. The zookeeper was given a present.) | (Goal)  |
|     | d. | *the ungiven zookeeper  | (Goal)  |
| (7) | a. | The T-rex was fed (a Triceratops sandwich).                           | (Goal)  |
|     | b. | an unfed T-rex  | (Goal)  |
|     | c. | *A sandwich was fed.<br>(cf. A sandwich was fed to the T-rex.)        | (Theme) |
|     | d. | *an unfed sandwich  | (Theme) |

The simplest description of such facts is that the only change is the change of category; there is no change of grammatical functions as a result of the conversion. The appropriate argument is the subject of the adjectival participle because it is the subject of the verbal participle. A transformational account would have to attribute the Theme argument becoming the subject of the adjectival passive to a different process than in the verbal passive, because lexically the Theme is the object of the passive verb.

The preceding discussion shows that a lexicalist theory will have fewer transformations and shorter derivations than a typical transformational theory. The ultimate limit that one can reach is no transformations and no derivation. In fact, lexicalist argumentation generally leads to the conclusion that syntax is not derivational.<sup>5</sup> For this reason, the term “lexicalist” is often synonymous with “nontransformational” or “nonderivational.” LFG is also lexicalist in this sense.

Nonderivational theories are more plausible as psychological and computational models of human language than derivational theories. Transformational theories are, by the nature of what a transformation is, nonlocal theories of syntax. However, human language processing is local. Consider the VPs in (8).

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<sup>5</sup>An early example of this is Brame (1976).

- (8) a. hears herself  
 b. \*hears myself

Even without the larger context of a full clause, it is clear that (8a) is grammatical and (8b) is not. This is determined from information internal to the VP; the larger IP (or S) is clearly unnecessary. In derivational theories, agreement is a result of feature copying/checking between I (or T or AGR<sub>S</sub> or AUX) and its specifier. Thus, although there is no larger structure in these examples, transformational theories must hypothesize one. The grammaticality judgments cannot be determined purely from properties internal to the VP. Theories based on the notion that processing is local are thus more realistic. In a lexicalist framework, the verb form *hears* includes the information that it takes a third person singular subject; processing can thus be made local. Further examples of the locality of processing can be found in Bresnan and Kaplan (1982: xlv). Similarly, when we produce utterances we often produce sentence fragments which lack some element necessary for grammaticality in transformational theory. Language production is thus also local.

A consequence of taking a nonderivational approach to syntax is that syntactic structures are built **monotonically**; that is to say, information can be added but it cannot be changed or deleted. Transformations are, by definition, change of information. Monotonicity is also a computationally plausible constraint on syntax.

Nonderivational theories are also **constraint-based**. Grammaticality cannot be dependent on properties of derivations, since there are no derivations. What determines grammaticality is the satisfaction of static simultaneous constraints. Of course, transformational theories are partially constraint-based as well (GB's  $\Theta$  Criterion, Case Filter, Binding Principles; MP's Principle of Full Interpretation), but much of the determination of grammaticality is the result of the well- or ill-formedness of the derivation.

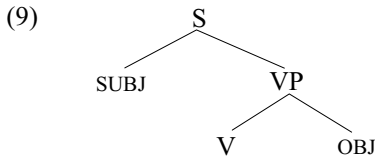
So besides being a theory in which the lexicon plays a major role, LFG is a nonderivational theory, one that has no D-structure/S-structure distinction. There is just one level of constituent structure. LFG calls this **c-structure**.

## 1.3 “Functional”

### 1.3.1 Grammatical Functions

The word *functional* means different things to different people in linguistics.

What it means in LFG is **grammatical functions**, notions like subject and object (also called grammatical relations). The role of grammatical functions has long been a matter of dispute in generative syntax. The standard transformationalist view has been that grammatical functions are universally defined on the basis of c-structure configurations, roughly (9).<sup>6</sup>



Under such a view, grammatical functions are not part of the basic vocabulary of syntax. Syntax deals with c-structural configurations only. Whatever properties grammatical functions are thought to have are derived from the configurations that define them. For example, the fact that only subjects can be controlled is attributed to the unique structural properties of the subject position (in GB, specifically the fact that V does not “govern” the subject position).

However, this view has been challenged. The basic idea behind the alternative is that each element in the syntax is there because it has a function (or bears a relation to the clause). Thus, grammatical functions (or grammatical relations) ought to be part of the vocabulary of syntactic theory. It is interesting that while GB claims to reject this view, there are certain relational features to the architecture of the theory. For example, the notion “government” as understood in GB is basically a relational notion: a governee bears some grammatical relation to the governor. Similarly, the “complete functional complex” of Chomsky’s (1986) Binding Theory is a functionally defined unit. Finally, “Case” as generally used in GB and MP is largely a cover term for grammatical functions.

The first challenge to the c-structural approach to grammatical functions came from Paul Postal and David Perlmutter in a series of lectures at the Summer Institute of the Linguistic Society of America in 1974. These lectures developed into the theory of Relational Grammar (Perlmutter, ed 1983), a theory based on the idea that the syntactic representation of a

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<sup>6</sup>There have been several variants of this, depending the specifics of the theory of structure and categories. The reader should feel free to substitute the appropriate category labels and intermediate nodes.

sentence is a network of grammatical relations, and that syntactic rules are expressed in terms of grammatical relations.

The LFG claim is that grammatical functions are elements of syntactic representation, but of a kind of syntactic representation that exists in parallel to c-structure. This level of representation is not a tree structure. Instead, it is based on the idea that grammatical functions are like features, and the elements that have specific functions are the values of these feature-like functions. The representation of grammatical functions also includes features of a more conventional nature. It is called **f-structure**, where (because of a happy accident of English) one can think of *f* as standing for either *function* or *feature*. (The standard interpretation is that *f-structure* stands for *functional structure*.)

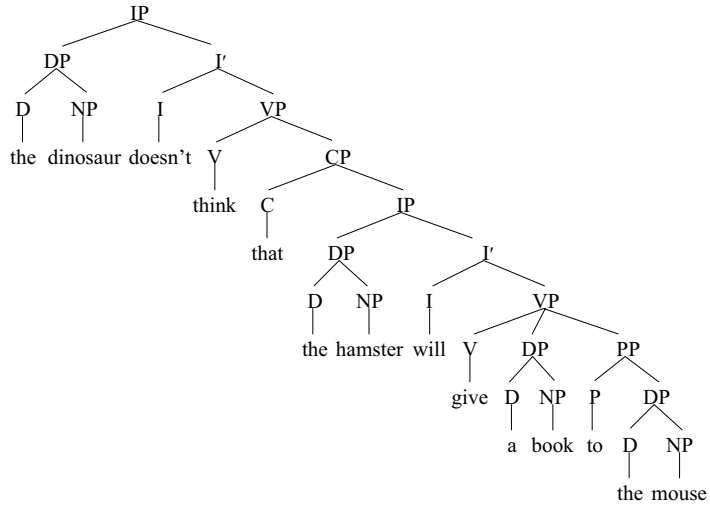
Unlike c-structures, f-structures are not familiar from derivational theories of syntax. We will first examine what an f-structure looks like, and then we will discuss the motivations for hypothesizing f-structure and the consequences for the general architecture of linguistic theory.

### 1.3.2 F-structure

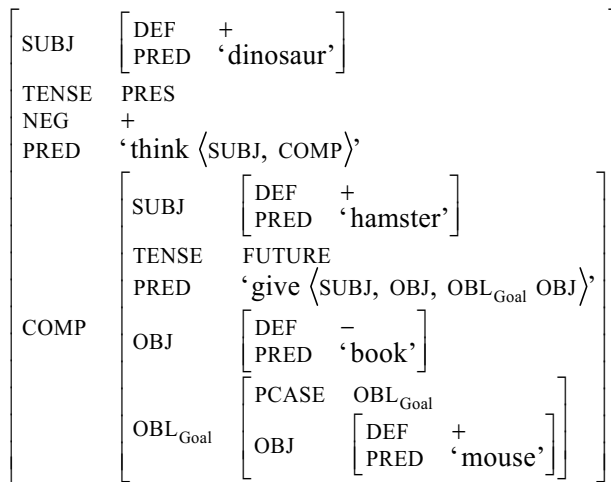
To make the notion of f-structure concrete, let us consider a sentence and its c-structure and f-structure.

- (10) a. The dinosaur doesn't think that the hamster will give a book to the mouse.

b. c-structure



c. f-structure:



The f-structure is what is sometimes called an **attribute-value matrix** (or **AVM**). An attribute is a feature or function name; unlike the more familiar notation for features in phonology, the attribute name precedes the value.



Thus, the phonological feature (11a) would appear as (11b) in an AVM.

- (11) a. [+voiced]  
 b. [VOICED +]

Let us take a closer look at the f-structure in (10c). It contains five attribute names: SUBJ, TENSE, NEG, PRED, and COMP. To the right of each attribute name is its value. Three of the attributes, TENSE, NEG, and PRED, are features; they have simple values. The other two attributes, SUBJ and COMP, are functions; their values are smaller f-structures (AVMs) within the larger f-structure.<sup>7</sup> Let us consider these one-by-one.

- The feature TENSE is an inflectional feature, like PERS(on), NUM(ber), CASE, GEND(er), etc. Such features are represented in f-structure in LFG, not in c-structure.
- The feature NEG is also an inflectional feature. Note that both [TENSE PRES] and [NEG +] are contributed by the word *doesn't*.
- The feature PRED is very important. The idea behind it is that the existence of meaningful items is relevant to the syntax. Of course, the meaning itself is not part of syntactic representation, but certain aspects of meaning are. First, the syntax needs to be able to distinguish between meaningful elements and dummy (or expletive) elements. The PRED feature serves to represent meaningfulness; its value is represented conventionally as the word itself in single quotation marks. For pronouns, which are meaningful but get their reference elsewhere in the sentence or discourse, the special PRED value 'PRO' is used.<sup>8</sup> In this example, we also see another kind of syntactic relevance of meaning: the verb *think* takes two arguments ("assigns two  $\theta$  roles" in GB/MP terminology): one bearing the function SUBJ, and the other bearing the function COMP. A PRED value with a specification of arguments is sometimes called a **lexical form**. It is ultimately derived from the verb's argument structure (**a-structure**). The two functions that appear as

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<sup>7</sup>Note that the term "f-structure" is thus ambiguous: it can refer either to the entire representation of the sentence or to some AVM within the representation.

<sup>8</sup>The f-structure [PRED 'PRO'] should not be confused with the PRO of transformationalist theories.

attributes in the f-structure are the same ones subcategorized for by the verb.

- The attribute SUBJ is a grammatical function, corresponding roughly to the traditional intuitive notion “subject” (just as N corresponds roughly to the traditional “noun”). Its value is a subsidiary f-structure consisting of the features DEF(initeness) and PRED and their values. The lexical form of *think* specifies that the value of the SUBJ function fills the first argument position of the verb.
- The function COMP(lement) is the grammatical function of clausal complements. It fills the second argument position of *think*, and its value consists of the attributes SUBJ, TENSE, PRED, OBJ, and OBL<sub>Goal</sub>.

Most of the rest of f-structure (10c) should be straightforward. What does require some explanation is the final argument in the lexical form of *give*, and the representation of the PP that fills this argument position. The PP *to the mouse* consists of a head P *to* and its OBJ *the mouse*. The PP functions as an **oblique** argument: an argument whose “role” is identified morphologically (by a preposition in English). “Role” in this context generally means thematic role, although sometimes the prepositional marking is idiosyncratic. The preposition is similar to semantic Case (in fact, many languages use Cases in this context). For the last argument of *give*, the preposition *to* marks the DP as bearing the thematic role of Goal. In LFG, the oblique functions are treated as a class of grammatical functions OBL<sub>0</sub>; in the present case, OBL<sub>Goal</sub>. Since the preposition *to* is what identifies the argument as an OBL<sub>Goal</sub>, its prepositional Case (PCASE) feature also has the value OBL<sub>Goal</sub>. Finally, it is not the PP itself (which has the function OBL<sub>Goal</sub>) that is the final argument of *give*; instead, it is the OBJ within the PP. For this reason, the lexical form of *give* specifies a path through the f-structure, OBL<sub>Goal</sub> OBJ, as the syntactic realization of the argument.

One additional clarification is in order concerning f-structures. We have seen that meaningfulness is represented by the feature PRED. Of course, sometimes there are meaningless elements in syntax. Such elements include expletives and idiom chunks, as in:

- (12) a. *It* seems that this book will be interesting.  
 b. The teachers kept *tabs* on the students.

Naturally, these items will not have PRED features. In fact, it is crucial that they not be meaningful elements, i.e. that they lack PRED features. Instead, they have a feature, called FORM, that individuates them and allows them to be selected for. The f-structures associated with *it* and *tabs* are:

- (13) a.  $\left[ \begin{array}{ll} \text{FORM} & \text{it} \\ \text{PERS} & 3 \\ \text{NUM} & \text{SG} \end{array} \right]$   
 b.  $\left[ \begin{array}{ll} \text{FORM} & \text{tabs} \\ \text{NUM} & \text{PL} \end{array} \right]$

The lexical forms of these uses of *seem* and *keep* will indicate that they have nonthematic arguments. Since the argument structure is indicated inside angle brackets, a nonthematic argument can be placed outside the angle brackets:<sup>9 10</sup>

- (14) a. ‘seem <COMP> SUBJ’  
 b. ‘keep-tabs-on <SUBJ, OBL<sub>on</sub> OBJ> OBJ’

In addition, the lexical entries of these verbs will require FORM feature values for their nonthematic arguments. The f-structure of (12b) is:

- (15)  $\left[ \begin{array}{ll} \text{SUBJ} & \left[ \begin{array}{ll} \text{DEF} & + \\ \text{PRED} & \text{'teacher'} \\ \text{NUM} & \text{PL} \end{array} \right] \\ \text{TENSE} & \text{PAST} \\ \text{PRED} & \text{'keep-tabs-on (SUBJ, OBL}_{on} \text{ OBJ) OBJ}' \\ \text{OBJ} & \left[ \begin{array}{ll} \text{FORM} & \text{tabs} \\ \text{NUM} & \text{PL} \end{array} \right] \\ \text{OBL}_{on} & \left[ \begin{array}{ll} \text{PCASE} & \text{OBL}_{on} \\ \text{OBJ} & \left[ \begin{array}{ll} \text{DEF} & + \\ \text{PRED} & \text{'student'} \\ \text{NUM} & \text{PL} \end{array} \right] \end{array} \right] \end{array} \right]$

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<sup>9</sup>In some early LFG papers, including many in Bresnan, ed. (1982), nonthematic arguments were omitted from the verb’s lexical form. The notation that has been adopted since, and is used here, formalizes the fact that they are selected for by the verb, even though they are not thematic arguments.

<sup>10</sup>Note that “OBL<sub>on</sub> OBJ” in the lexical form of *keep tabs on* is a single argument, not two arguments.

It is important to note that f-structure has a completely different geometry and completely different properties from c-structure. C-structure is built out of NPs, VPs, etc., and represents membership in hierarchically larger and larger groupings of elements. F-structure is composed of attributes (features and functions) and their values. It is not composed of a hierarchical arrangement of categories, and lacks a representation for certain elements of c-structure (such as the VP constituent). That is to say, although some of the information represented in f-structure resembles “underlying” structure information in transformational theory, the levels cannot be related to each other by movement. They are completely different structures.

### 1.3.3 Motivation

We turn now to the motivation for “functional.” That is to say: why hypothesize f-structure in addition to c-structure? We will answer this question from two different perspectives. First, we will discuss the motivation for representing grammatical features at a level distinct from c-structure. We will then address the more central question concerning the role that LFG gives grammatical functions.

We begin with features. The essential observation behind the LFG approach is that features cannot always be associated with the c-structure constituents that they describe. Consider the following sentence:

(16) The deer are in the forest.

The features of the SUBJ of this sentence are:

(17) 
$$\begin{bmatrix} \text{DEF} & + \\ \text{PRED} & \text{'deer'} \\ \text{NUM} & \text{PL} \end{bmatrix}$$

However, these features come from two different elements of the c-structure. The DP *the deer* is unspecified for number, as evidenced by the sentence *The deer is in the forest*. The feature structure of the DP is:

(18) 
$$\begin{bmatrix} \text{DEF} & + \\ \text{PRED} & \text{'deer'} \end{bmatrix}$$

By virtue of its position in the c-structure tree and English-specific rules relating structure and function, *the deer* will appear in the f-structure of our sample sentence as:

$$(19) \quad \left[ \begin{array}{l} \text{SUBJ} \\ \left[ \begin{array}{l} \text{DEF} \quad + \\ \text{PRED} \quad \text{'deer' } \end{array} \right] \end{array} \right]$$

The [NUM PL] feature of the SUBJ comes from lexical entry of *are*. The features of *are* are:<sup>11</sup>

$$(20) \quad \left[ \begin{array}{l} \text{SUBJ} \quad \left[ \text{NUM} \quad \text{PL} \right] \\ \text{TENSE} \quad \text{PRES} \\ \text{PRED} \quad \text{'be } \langle \dots \rangle \end{array} \right]$$

That is to say, *are* is a present tense form of *be* with a plural subject.<sup>12</sup>

(19) and (20) are partial f-structures for the sentence. However, since we are building an f-structure for a single sentence, the SUBJ features from the two sources have to come together. The resulting f-structure is (21).

$$(21) \quad \left[ \begin{array}{l} \text{SUBJ} \quad \left[ \begin{array}{l} \text{DEF} \quad + \\ \text{PRED} \quad \text{'deer' } \\ \text{NUM} \quad \text{PL} \end{array} \right] \\ \text{TENSE} \quad \text{PRES} \\ \text{PRED} \quad \text{'be } \langle \dots \rangle \\ \vdots \quad \quad \quad \vdots \end{array} \right]$$

This merging of feature structures is called **unification**. Unification is a central concept of feature-based approaches to syntax, including LFG, but also certain other frameworks like HPSG. The point here is that unification is part of the reason to consider f-structure an independent level of syntactic representation. It allows us to represent together features that belong to a single conceptual part of the syntactic structure of the sentence even if the features come from several places in the actual syntactic structure. A theory like LFG, in which grammatical features are represented independently of

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<sup>11</sup>We will ignore the details of the lexical form.

<sup>12</sup>*Are* can also have a singular *you* as subject; we ignore this complication here.

constituent structure, does not need mechanisms of feature percolation and the like.

A side-effect of unification is that it accounts automatically for the ungrammaticality of a sentence like:

(22) \*The lion are in the forest.

That is to say, agreement is an automatic result of unification. Unlike *deer*, the noun *lion* is inherently singular. It therefore has the lexical feature [NUM SG]. On the other hand, as we have seen, *are* includes the lexical feature [SUBJ [NUM PL]]. Since *the lion* is in the structural position associated with the function SUBJ, the [NUM SG] feature of *the lion* and the [SUBJ [NUM PL]] feature of *are* must unify. However, the result is that the SUBJ NUM feature is inconsistent with itself: it must be simultaneously singular and plural. Since this is impossible, the sentence is ungrammatical. Thus, unlike transformational theories, LFG does not need any special mechanisms like cosuperscripting or feature checking or SPEC-head relations to enforce agreement. Feature checking is part of unification. More generally, much of what is modeled by movement in transformational theory is modeled by unification in LFG. Unlike movement-based theories, a unification-based theory does not need to hypothesize structural arrangements of elements which differ from that which is accessible from the visible, superficial form of a sentence.

The primary justification for f-structure relates to the status of grammatical functions. As discussed earlier, transformational grammar considers grammatical functions to be a derivative concept that can be defined in terms of the c-structure configurations in (9) above. LFG denies this, and claims that grammatical functions are an independent concept. Such a claim, of course, needs to be proven. The way to prove it is to show that there are languages in which concepts like subject and object are relevant for which the c-structure configuration in (9) cannot be supported. It is to this that we now turn.

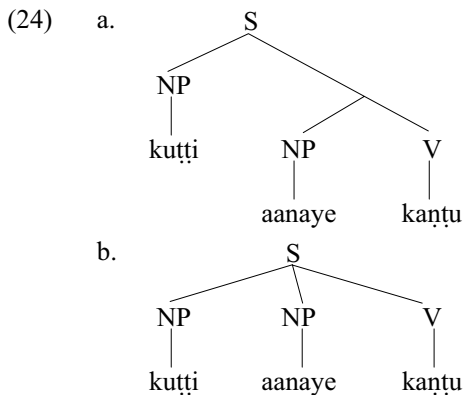
First, however, a caveat. We are interpreting transformationalist statements about constituency as an empirical claim about c-structure. However, the arguments often given for such structures are not based on standard constituency tests such as distribution and order, but on what LFG claims to be function-related phenomena such as anaphora. It is thus possible to view a configuration such as (9) as nothing more than an idiosyncratic way of representing grammatical functions. If putting a constituent in the [SPEC,

IP] position is nothing more than a notation for SUBJ, then constituency tests are irrelevant. However, it is a rather strange representation for grammatical functions, and would leave transformational theory with no theory of c-structure.

If, on the other hand, the syntactic structure of transformational theory really is a c-structure, then it must be tested empirically. In fact, there are languages that cast doubt on this kind of approach. In the first place, there are languages that have free constituent order. Japanese is one such language; we will use the example of the Dravidian language Malayalam (Mohanan 1982). Note the possible orders of the words in the sentence ‘The child saw the elephant’.

- (23) a. Kutṭi      aanaye      kaṇṭu.      (SOV)  
          child.NOM elephant.ACC saw  
          ‘The child saw the elephant.’  
      b. Aanaye kutṭi kaṇṭu.      (OSV)  
      c. Aanaye kaṇṭu kutṭi.      (OVS)  
      d. Kaṇṭu aanaye kutṭi.      (VOS)  
      e. Kaṇṭu kutṭi aanaye.      (VSO)  
      f. Kutṭi kaṇṭu aanaye.      (SVO)

Consider two possible hypotheses as to the structure for such a sentence.



The (a) structure, in some variant, is the transformationalist view, which places the SUBJ in a structurally higher position than the OBJ. Multiple applications of movement would be required to derive all the surface word

orders from such a structure. On the other hand, with a flatter structure, as in (b), all that one has to say is that the ordering is free. Since all three constituents are sisters, all of the possible orderings would result.

Of course, the argument in the preceding paragraph can be countered. In a theory with unconstrained movement, any word order can be derived from any D-structure. If SUBJ-OBJ asymmetries in binding or quantifier scope are taken axiomatically to mean a relation of asymmetric c-command, the (a) structure must be the structure of the sentence. In fact, this is the general approach taken in transformationalist studies of languages like these. However, the evidence that has generally been presented for this has generally involved grammatical functions, not constituent structure per se. The facts of Malayalam present no independent evidence for treating the verb and OBJ as forming a constituent that excludes the SUBJ, and the description of the language is simpler if we assume no such constituent. But if there is no verb+OBJ constituent in Malayalam, SUBJ and OBJ cannot be universally defined in terms of c-structure.

Even more strikingly, there are languages that present positive evidence against a VP constituent. This evidence comes from languages like the Pama-Nyungan Australian language Warlpiri (Simpson 1991) and the non-Pama-Nyungan Australian language Wambaya (Nordlinger 1998). (The examples here come from Wambaya.) In these languages, the auxiliary (*infl*) occurs in second position. One constituent must precede the *infl* and the rest follow. With the single exception of the auxiliary, constituent order is completely free. (In these examples, the *infl* is italicized.)

- (25) a. Dawu *gin-*                    *a*    alaji    janyi- ni.  
          bite 3SG.M.ERG- PST boy.ABS dog- ERG  
          ‘The dog bit the boy.’  
       b. Alaji *gin-a* dawu janyi-ni.  
       c. Alaji *gin-a* janyi-ni dawu.  
       d. Dawu *gin-a* janyi-ni alaji.  
       e. Janyi-ni *gin-a* alaji dawu.  
       f. Janyi-ni *gin-a* dawu alaji.

Multiword constituents can precede *infl*.



- (26) [Naniyawulu nagawulu baraj- bulu]  
 that.DU.ABS female.DU.ABS old.person- DU.ABS  
*wurlu- n duwa.*  
 3DU.NPST- PROG get.up  
 ‘The two old women are getting up.’

This gives us a test for constituenthood in Wambaya: if there is a VP constituent, it should be able to precede infl. Strikingly, it cannot.

- (27) a. \*[Daguma janji] *ng-* *a* ngawurniji.  
 hit dog.ABS 1SG.ERG- PST 1SG.ERG  
 ‘I hit the dog.’  
 b. \*[Janji daguma] *ng-* *a* ngawurniji.

This suggests that it is not enough to account for the freedom of constituent ordering in Wambaya by allowing constituents to be moved out of the Wambaya VP; Wambaya does not seem to have a VP! But Wambaya can be shown to have SUBJs and OBJs, just like any other language. SUBJs and OBJs are Case-marked differently and are crossreferenced by different pronominal (agreement) markers on the infl. As in many languages, only SUBJs can serve as the antecedents of reflexives, and only SUBJs can be controlled in nonfinite subordinate clauses. Wambaya also has a switch-reference system in which certain subordinate clauses are marked for whether their SUBJ is the same as or different from the main clause SUBJ. As Nordlinger (1998) shows in detail, attempts that have been made to account for languages like Wambaya within a c-structural/derivational approach have all failed to account for the facts of these languages: movement analyses, parallel c-structure analyses, and the “polysynthesis” theory of Baker (1996). In Wambaya, then, we have an example of a language in which SUBJ and OBJ are rather similar to the same concept in more familiar languages, but cannot be distinguished in terms of being part of a VP constituent. This requires some independent representation of grammatical functions.

The conclusion is that while the structure in (9) does characterize SUBJ and OBJ in English, it does not do so universally. This means that grammatical functions cannot be universally dependent on constituent structure position. Languages like English, in which a VP constituent distinguishes SUBJ from OBJ, can be called **configurational** languages, while languages like Japanese, Malayalam, Warlpiri, and Wambaya can be called **nonconfigurational**. The existence of nonconfigurational languages provides

crucial evidence for the independence of grammatical functions from c-structure, and thus for f-structure.

### 1.3.4 Consequences

The conclusion that there is a level of f-structure distinct from c-structure has interesting consequences for an overall theory of the nature of language in general and the nature of syntax in particular. In this section we will explore this.

A sentence is an expression of several different types of linguistic information. We can identify at least the following:

- information/discourse/pragmatics
- meaning/semantics
- argument structure/thematic roles
- syntactic constituent structure
- sounds (phonology/phonetics)

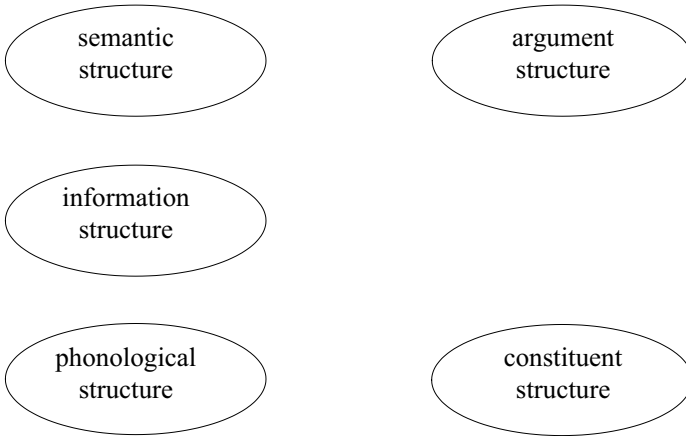
There are two ways that this can be conceptualized.

The approach taken by transformational theory has generally been that (with the possible exception of phonology) these are different aspects of the same kind of structure. Syntactic constituent structure is taken to be the basic form of structure and the other kinds of information are expressed in terms of it. For example, the thematic role Agent is represented by a chain whose foot is in an “external” position ([SPEC, IP] or [SPEC, VP], depending on the exact version of the theory). Such a theory has a certain conceptual simplicity: all rules of language are stated over the same primitives, and all properties of a single element in the sentence can be determined from a single kind of structure.

There is an alternative approach, which sees each of these kinds of information as part of a distinct kind of structure. Under this alternative, information structure, semantic structure, argument (or thematic) structure, syntactic constituent structure, and phonological/phonetic structure<sup>13</sup> are distinct subsystems of language, each with its own primitives and its own internal rules of organization. This can be schematized as follows:

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<sup>13</sup>This is an oversimplification. Any specific instantiation of this approach may draw the borders differently, depending on what empirical evidence is found. For example, it is possible that phonological structure and phonetic structure are distinct, or that thematic structure and semantic structure are the same.

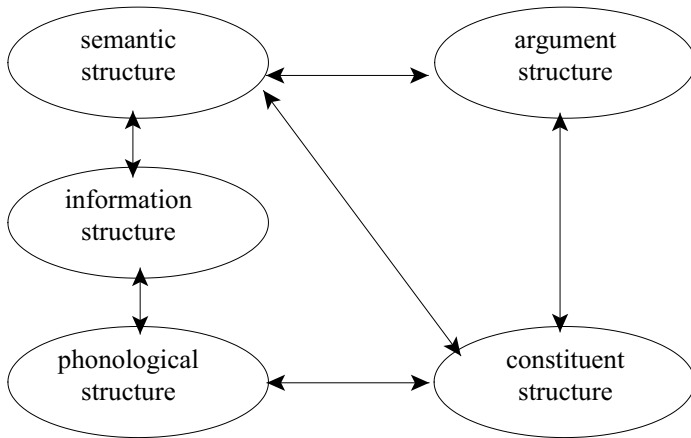


These levels of representation all exist in parallel; no one is prior to any of the others. A theory of language that is based on such a model can be said to have a **parallel** architecture.

However, this is not enough for a theory with parallel architecture. Besides different kinds of primitives and rules for each dimension of linguistic structure, a system of **correspondence** is required to map between the levels.<sup>14</sup>

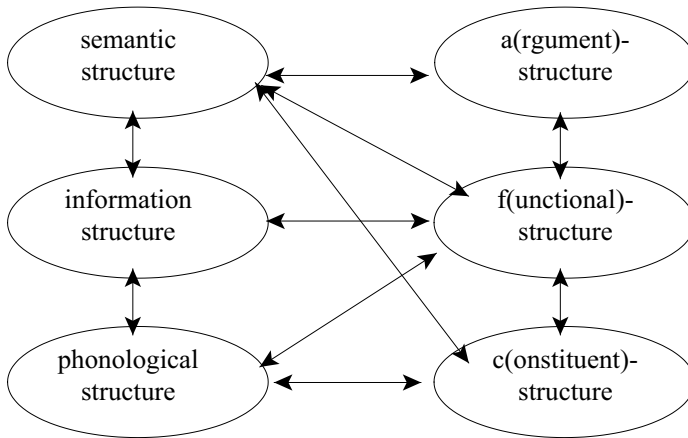
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<sup>14</sup>This diagram is for purposes of illustration only. I will not argue for any specific aspect of this diagram. In particular, exactly which levels are directly related by correspondence rules needs to be determined independently.



Such a theory therefore needs correspondence functions, or “projection” functions. LFG is said to have a **projection architecture** connecting the different levels of representation. Determining all the properties of a particular element in a modular system requires examining the corresponding item (or items) in each of the projections.

The conclusion reached in the previous section that c-structure and f-structure are formally different representations with their own primitives and their own organization makes sense given the concept of parallel, correspondence-based architecture. It simply adds an additional level: f-structure.



The three structures on the right side of this diagram are the syntactic levels, which are the ones on which LFG focuses.<sup>15</sup> However, by virtue of its adoption of a parallel architecture, other levels can be hypothesized for an LFG grammar.

The LFG assumption of parallel architecture, and its claim that grammatical functions and features are a kind of linguistic information distinct from constituency, provide an elegant solution for a potential problem with the Lexical Integrity Principle. The problem is apparent when we consider the following.

- (28) a. The dinosaur *ate* the tree.  
 b. The dinosaur *did eat* the tree.
- (29) a. My dinosaur is *hungrier* than yours.  
 b. My dinosaur is *more hungry* than yours.

In the (a) examples, a single word is italicized, while in the (b) sentences a two-word sequence is highlighted which seems to serve the same function as the single word in (a). In a nonlexicalist framework such facts can be accounted for by treating *ate* as a combination of *did* and *eat*, and by treating *hungrier* as a combination of *more* and *hungry*. Details aside, this kind of

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<sup>15</sup>although there has naturally been work on other aspects of language in LFG, particularly semantics.

analysis has been standard in transformational syntax since Chomsky (1955). The challenge for a lexicalist theory is how to express such relationships within the confines of Lexical Integrity, which does not allow words to be built in the syntax.

A closer look shows that cases like these pose no problem for LFG. The Lexical Integrity Principle designates words as the atoms out of which “syntactic structure” is built. However, as we have seen, there are two levels of “syntactic structure” in LFG: c-structure and f-structure. The one that is built out of words is c-structure; f-structure consists of abstract attributes (features and functions) and their values. We can state the Lexical Integrity Principle as follows.

(30) **Lexical Integrity Principle**

Morphologically complete words are leaves of the c-structure tree and each leaf corresponds to one and only one c-structure node.

However, the equivalence of the (a) and (b) sentences in (28) and (29) is in grammatical features. The verb form *ate* includes within it both the lexical properties of *eat* (the PRED feature, in LFG terms) and the past tense feature. With *did eat*, these two features are separated. Since features are involved, the level of representation at which *eat* and *did eat* are equivalent is f-structure. The f-structure representation of the two sentences in (28) is:

$$(31) \left[ \begin{array}{l} \text{SUBJ} \left[ \begin{array}{l} \text{DEF} \quad + \\ \text{PRED} \quad \text{'dinosaur'} \\ \text{NUM} \quad \text{SG} \end{array} \right] \\ \text{TENSE} \quad \text{PAST} \\ \text{PRED} \quad \text{'eat' } \langle \text{SUBJ, OBJ} \rangle \\ \text{OBJ} \left[ \begin{array}{l} \text{DEF} \quad + \\ \text{PRED} \quad \text{'tree'} \\ \text{NUM} \quad \text{SG} \end{array} \right] \end{array} \right]$$

Lexical integrity as understood by LFG is thus limited to c-structure. It is a limited sort of lexical integrity, which is better able to deal with featural equivalence of words and word sequences than an approach in which all aspects of the internal structure of a word are invisible to the syntax. LFG’s version of the Lexical Integrity Principle balances the similarities and the differences between words and phrases. It also provides a more complete response to the objection raised by Marantz (1997) to lexicalism on the

grounds that the “semantic word” and the “phonological word” do not coincide. The LFG conception of “word” is a purely c-structural concept. Not only does the Lexical Integrity Principle say nothing about semantics and phonology, it does not even apply to the functional aspect of syntax. The relations between the smallest element of c-structure (the word), the smallest unit of semantics (the “semantic word”), and the prosodic constituent often described as the “phonological word” will be a question for the theories of correspondence between c-structure and these other modules of the grammar.

## 1.4 “Grammar”

Like transformational theory, LFG is a variety of generative grammar, an approach to the study of language that has its origins in the work of Noam Chomsky. Generative grammar has several central aims.

- The discovery of linguistic universals in an attempt to determine the nature of Universal Grammar (UG):

The main task of linguistic theory must be to develop an account of linguistic universals that, on the one hand, will not be falsified by the actual diversity of languages and, on the other, will be sufficiently rich and explicit to account for the rapidity and uniformity of language learning, and the remarkable complexity and range of the generative grammars that are the product of language learning. (Chomsky 1965: 27–28)

- the discovery of a psychologically real model of linguistic competence that can be incorporated into a performance model, and the study of the mathematical properties of the competence model

No doubt, a reasonable model of language use will incorporate, as a basic component, the generative grammar that expresses the speaker-hearer’s knowledge of the language; but this generative grammar does not, in itself, prescribe the character or functioning of a perceptual model or a model of speech production.... To my knowledge, the only concrete results that have been achieved and the only clear suggestions that have been put forth concerning the theory of performance ... have come from studies of performance models that incorporate generative grammars of specific kinds... (Chomsky 1965: 9,10)

In brief, mathematical study of formal properties of grammars is, very likely, an area of linguistics of great potential. It has already [1965]

provided some insights into questions of empirical interest and will perhaps some day provide much deeper insights. (Chomsky 1965: 62)

- the formal explicit statement of the machinery of the theory of language and rules of specific languages

We can determine the adequacy of a linguistic theory by developing rigorously and precisely the form of the grammar corresponding to the set of levels contained within this theory, and then investigating the possibility of constructing simple and revealing grammars of this form for natural languages. (Chomsky 1957: 11)

If the grammar is, furthermore, perfectly explicit—in other words, if it does not rely on the intelligence of the understanding reader but rather provides an explicit analysis of his contribution—we may (somewhat redundantly) call it a *generative grammar*. [italics original]. (Chomsky 1965: 4)

As the above citations show, these are all aims that one finds expressed very explicitly in Chomsky's early writings laying out the generative approach. Oddly, one can very seriously question the degree to which Chomsky's work over the past two decades still has these as its goals. For example, recent transformational theory has tended to ignore counterexamples to some of its basic claims, often taking refuge behind an artificial distinction between “core grammar” and “periphery”, as in the following quote from Chomsky (1981: 8).

[E]ach actual “language” will incorporate a periphery of borrowings, historical residues, inventions, and so on, which we can hardly expect to—and indeed would not want to—incorporate within a principled theory of UG.... What a particular person has inside his head is an artifact resulting from the interplay of many idiosyncratic factors, as contrasted with the more significant reality [sic] of UG (an element of shared biological endowment) and core grammar (one of the systems derived by fixing the parameters of UG in one of the permitted ways).

Recent derivational approaches have also not taken computational properties of grammars to be linguistic evidence. They also have eschewed formal statements of rules and principles of the kind that was typical of earlier derivational theories, in which phrase structure rules and transformations



were stated in painstaking detail, and is still typical of LFG and other nonderivational theories. In this sense, LFG may be truer to the goals of generative grammar than Government/Binding theory and the Minimalist Program.

The search for linguistic universals must be based on research into typologically different languages. This is implicit in Chomsky's statement that the theory of universals should be one that "will not be falsified by the actual diversity of languages." Consequently, generative linguistics can only be properly carried out in conjunction with typological work. As we have already seen, there are typological problems with GB/MP, such as the assumption that grammatical functions are uniformly represented in constituent structure. LFG, on the other hand, has always involved the description of typologically disparate languages, with fewer preconceptions about how languages might differ. In the words of Austin and Bresnan (1996: 263), "theoretical economy and explanatory elegance are unreliable guides to truth." The theory of LFG has been developed in light of what has been discovered about these languages. As a result, LFG is a typologically more plausible model of language, in which the constraints on syntax are derived from a broader understanding of linguistic diversity. Ultimately, this approach is more likely to provide true explanations for linguistic phenomena.

The development of LFG has involved the collaboration of people working on linguistic description, computation, and psycholinguistics. As mentioned at the outset, LFG began with the collaboration of a theoretical/descriptive linguist and a computational linguist/psycholinguist. Bresnan and Kaplan (1982) discuss the relation between linguistic competence and linguistic performance. They show that transformational theories of linguistic competence do not meet the goal expressed by Chomsky (1965) that a theory of linguistic performance will incorporate a theory of competence as one of its components. As discussed above, LFG is designed to conform to what is known about the computation of language, and thus is more likely to be incorporable into a theory of performance. There are research groups developing computational models of language, both comprehension and production, based on LFG.

LFG also has, as we will see in the next three chapters, a well-developed formalism. As in early transformational grammar, and unlike GB/MP, linguistic descriptions must be expressed in a rigorous formalism and not in informal prose. It is thus possible to examine whether an analysis conforms to the data.

In this textbook, we will develop an explicit grammar for much of the syntax of English as we develop the formalism of the theory. We will thus see how LFG can be used to produce an actual grammar.

### Additional Readings

The conceptual basis for LFG is laid out in Bresnan and Kaplan (1982). Early psycholinguistic studies can be found in Bresnan, ed (1982) as well; for a more recent discussion, see Pinker (1996). The properties of unification-based grammars are discussed in Shieber (1986). Parallel, correspondence-based architecture is discussed and argued for (from a non-LFG perspective) by Jackendoff (1997), who calls it “representational modularity.”

The argument for a lexical analysis of the passive construction dates back to Bresnan’s pre-LFG work (Bresnan 1978), and was further developed in Bresnan (1982; 1995; 2001 Chapter 3). The Lexical Integrity Principle and the c-structure/f-structure distinction is discussed in Bresnan and Mchombo (1995).

Nonconfigurational languages have featured prominently in work on LFG, with continual arguments against transformational and configurational analyses. Early discussions can be found in Mohanan (1982) and Simpson (1983). Chapter 1 of Nordlinger (1998) provides extensive critical discussion of recent analyses of nonconfigurational languages in the GB/MP tradition.

Mathematical properties of LFG grammars have been discussed in Kaplan and Bresnan (1982) and many of the papers in Dalrymple, Kaplan, Maxwell, and Zaenen, eds. (1995). For a description of one computational project involving comprehension and production of language on the basis of LFG, see Butt, King, Niño, and Segond (1999).

### Exercises

1. What English sentence does each of the following f-structures represent?

a.

SUBJ	<table style="border-collapse: collapse;"> <tr><td style="padding-right: 10px;">PRED</td><td>‘PRO’</td></tr> <tr><td style="padding-right: 10px;">PERS</td><td>1</td></tr> <tr><td style="padding-right: 10px;">NUM</td><td>SG</td></tr> </table>	PRED	‘PRO’	PERS	1	NUM	SG								
PRED	‘PRO’														
PERS	1														
NUM	SG														
TENSE	PRES														
PRED	‘believe ⟨SUBJ, COMP⟩’														
COMP	<table style="border-collapse: collapse;"> <tr> <td style="border-right: 1px solid black; padding-right: 10px;">SUBJ</td> <td style="border-right: 1px solid black; padding-right: 10px;"> <table style="border-collapse: collapse;"> <tr><td style="padding-right: 10px;">PRED</td><td>‘constituent’</td></tr> <tr><td style="padding-right: 10px;">NUM</td><td>PL</td></tr> <tr><td style="padding-right: 10px;">ADJ</td><td>{[PRED ‘syntactic’]}</td></tr> </table> </td> </tr> <tr> <td style="border-right: 1px solid black; padding-right: 10px;">TENSE</td> <td style="border-right: 1px solid black; padding-right: 10px;">PRES</td> </tr> <tr> <td style="border-right: 1px solid black; padding-right: 10px;">PRED</td> <td style="border-right: 1px solid black; padding-right: 10px;">‘move ⟨SUBJ⟩’</td> </tr> <tr> <td style="border-right: 1px solid black; padding-right: 10px;">ADJ</td> <td style="border-right: 1px solid black; padding-right: 10px;">{[PRED ‘quickly’]}</td> </tr> </table>	SUBJ	<table style="border-collapse: collapse;"> <tr><td style="padding-right: 10px;">PRED</td><td>‘constituent’</td></tr> <tr><td style="padding-right: 10px;">NUM</td><td>PL</td></tr> <tr><td style="padding-right: 10px;">ADJ</td><td>{[PRED ‘syntactic’]}</td></tr> </table>	PRED	‘constituent’	NUM	PL	ADJ	{[PRED ‘syntactic’]}	TENSE	PRES	PRED	‘move ⟨SUBJ⟩’	ADJ	{[PRED ‘quickly’]}
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PRED	‘move ⟨SUBJ⟩’														
ADJ	{[PRED ‘quickly’]}														

b.

OBJ	[ PRED 'Hammerstein' ]
TENSE	PAST
PRED	'send <SUBJ, OBJ, OBJ2>'
SUBJ	[ PRED 'Rodgers' ]
OBJ2	[ PRED 'song' ]
	DEF -
	NUM SG

c.

SUBJ	[ PRED 'idea'	ADJ { [ PRED 'colorless' ] }	ADJ { [ PRED 'green' ] } ]
	NUM PL		
TENSE	PRES		
PRED	'sleep <SUBJ>'		
ADJ	{ [ PRED 'furiously' ] }		

2. Note the values of the function ADJ (adjunct) in (1a,c). Why do you suppose the value of ADJ is a set of smaller f-structures instead of a single smaller f-structure?
3. Give the f-structures of the following sentences.
  - a. Mary had a little lamb.
  - b. A funny thing happened on the way to the forum.