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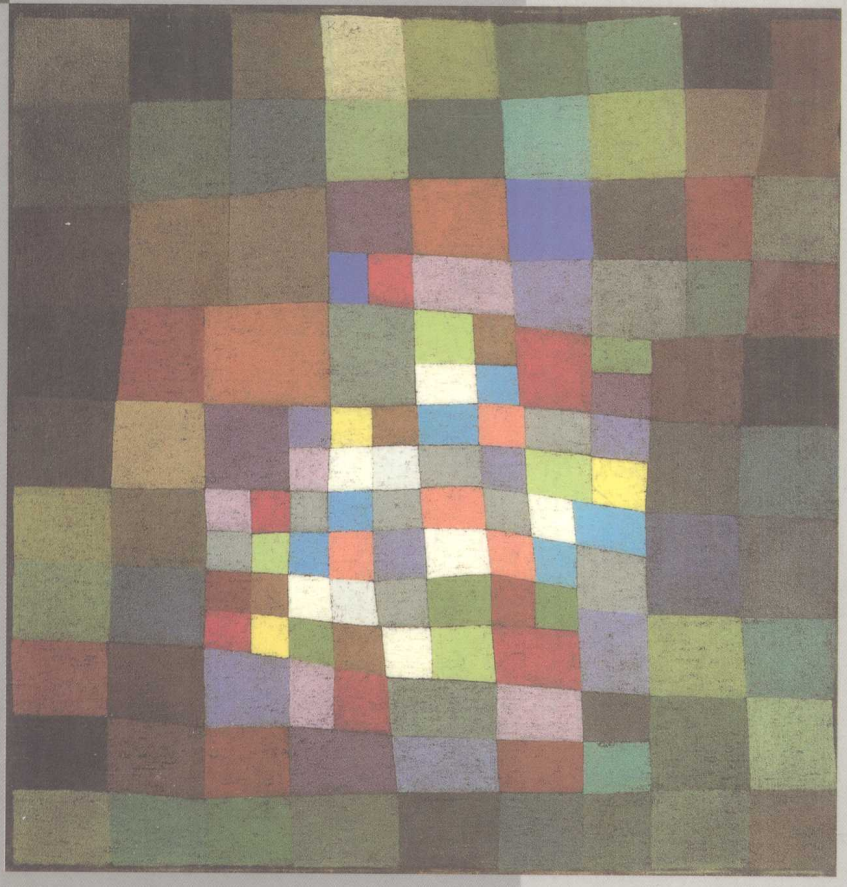
Lexical-Functional Syntax



Joan Bresnan

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Lexical-Functional Syntax

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Preface

What Is LFG?

LFG is a theory of grammar which has a powerful, flexible, and mathematically well-defined grammar formalism designed for typologically diverse languages. LFG has provided the framework for a substantial amount of descriptive and theoretical research on many languages, including those in Australia (Warlpiri and Wambaya), America (Navajo, Plains Cree, Greenlandic), Europe (Welsh, Irish, English, German, Dutch, West Flemish, Icelandic, Norwegian, Finnish, Russian, Serbian/Croatian), Africa (Chichewa, Ewe, Moroccan Arabic), South Asia (Malayalam, Hindi), and East Asia (Japanese) which are discussed and analyzed in the text and problem sets of this book.

How Is it Different?

LFG is closely attuned to the overt perceptible expressions of language, and to the abstract relational information that they directly express. LFG has a constraint-based, parallel correspondence architecture; it has no serial derivations (unlike transformational grammar); there are no "deep structures" or "initial structures." Abstract relations are locally distributed as partial information across words and overt fragments of structure, and may be monotonically synthesized in any order or in parallel. Being designed for a wide range of nonconfigurational and configurational language types, LFG departs radically from most other grammar formalisms in one striking way: it is noncompositional, allowing the "content" of a constituent to vary depending on its context.

These descriptions may sound mysterious to the newcomer, but LFG is simple. Field linguists doing primary research on languages have found it easy to use. And because LFG is mathematically well defined and simple, it is also easy to implement. It has been employed in many computational systems, ranging from state-of-the-art industrial wide-coverage grammars used for machine translation and processing to pedagogical systems implemented on personal computers.

LFG is being used as a representational basis in the new crop of data-driven approaches to language, including Optimality Theoretic syntax and probabilistic analysis of natural language. There is an International Lexical-Functional Grammar Association (ILFGA) and several websites for LFG resources:

http://www-lfg.stanford.edu/lfg/
http://clwww.essex.ac.uk/LFG/

What Is in this Book?

This book provides both an introduction to LFG and a synthesis of major theoretical developments in lexical-functional syntax since the mid to late 1980s. It can be used both as a textbook for students and as a reference text for researchers. Many references to current work are given, but the only background required is some familiarity with elementary formal constructs such as the definition of functions and relations, and an understanding of the basic syntactic concepts of constituent structure and X′ theory (such as in the short paper by Bresnan 1977). The problem sets provide a hands-on way of learning to use the formalism, analytic concepts, and variety of linguistic ideas that can be expressed.

What Is Not in this Book?

Research in LFG is the cooperative effort of an international community of diverse researchers, of which the author of this book – though one of the original developers of the theory – is just one. The goal of presenting a coherent and accessible view of the major developments in lexical-functional syntax has inevitably led to some neglect of important topics and alternatives. The deliberate omissions are these. I have omitted coverage of Optimality Theoretic syntax based on LFG (sometimes called "OT-LFG"); references can be found in Bresnan (1997a, 1998a, 1998b) and Sells (forthcoming), but this area is growing very rapidly. I have also omitted any account of probabilistic analysis of language using LFG, such as Data-Oriented Parsing ("DOP-LFG"); see Bod and Kaplan (1998), Johnson et al. (1999), Bod (1999) for several different approaches. This book is devoted to lexical-functional *syntax* and makes no attempt to cover current research in semantics within the LFG framework. (See Dalrymple 1999 for one recent line of research in semantics for LFG.) The very new development of Constructive Morphology is also not covered. (See Nordlinger 1998b, Barron 1998, Sadler 1998b, Sells 1999a, Lee 1999a, 1999b, and Sharma 1999.) New developments in coordination and feature resolution also had to be omitted because of time and space constraints (Dalrymple and Kaplan 1997, 1998). The

history of the development of LFG and its relation to other theories is also omitted and awaits another author. Despite these omissions, the reader of this book will have no trouble following current research, which can be closely tracked from the website resources mentioned above.

How to Use this Book

In teaching LFG from this text, I do not attempt to teach all of the formalism developed in part II at once. Instead I break chapter 4 into three parts:

- sections 4.1–4.5, followed by problem set 1;
- sections 4.6–4.7, followed by problem set 2;
- sections 4.8–4.9 (read with chapter 7).

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For the personal support which made it possible for me to finish writing this book, and for the inspiration of living with a finisher and a champion, I also thank Marianne.

Contents

Part I On the Architecture of Universal Grammar

Introduction

The search for a universal design of grammar has long motivated research in linguistic theory. Language is both universal among humans and specific to us. Any child can acquire fluent mastery of any of the thousands of human languages, given sufficient exposure, but no animal has this capacity. These simple facts have suggested to many linguists that there must be a universal design of grammar, a common organizing structure of all languages that underlies their superficial variations in modes of expression. If this universal grammar is a biologically given form of knowledge, as many linguists assume today, then study of the invariants of the structure of human languages may tell us something fundamental about the human mind.

This rationalist, universalist conception of linguistics has a long intellectual tradition, appearing in the works of philosophers and grammarians of the past six centuries. In this century it has been revived by Noam Chomsky. Chomsky's great achievement is to couple the universalist conception of language from the tradition of philosophical grammar with a far more precise model of linguistic structure adapted from the mathematics of formal systems developed in this century. This powerful combination of ideas, called "generative grammar," has revolutionized linguistic theory. In the methodological paradigm of generative grammar, formal representations of linguistic structures are developed and empirically tested against native speakers' knowledge of their language. Universal grammar limits the space of formal structures.

Generative grammar holds that language cannot be adequately characterized solely in terms of a formal description of its overt constituents, or "surface structure." A more abstract representation is also needed to represent the implicit linguistic knowledge of speakers. Chomsky has conceived of this abstract representation as a "deep" or initial structure which undergoes sequential serial operations (transformations) to derive the overt perceptible form. It is to explain how these abstract formal structures are acquired by speakers that Chomsky developed his rationalist epistemology: human beings possess an innate faculty specialized for language which enables them to acquire complex human languages despite the poverty of stimulus in their learning environment.[1]

Towards the end of the twentieth century, new formal ideas began to achieve prominence in linguistic theory, making use of parallel rather than serial structures and computations, and comparative evaluation of multiple overt structures

rather than serial derivation of individual overt structures. These ideas are embodied in a family of nonderivational, constraint-based linguistic theories and in approaches based on optimization (both statistical and discrete). These newer theories are compatible with different linguistic epistemologies drawing on structuralist and functional/typological ideas which have both predated and coexisted with generative grammar. One such theory is lexical-functional grammar (LFG) (Kaplan and Bresnan 1982), which is the topic of this book.

Part I of this book empirically and informally motivates the LFG architecture by looking at the core linguistic phenomena which inspired it: nonconfigurationality, movement paradoxes, and the lexicality of relation changes such as passivization. Part II shows how the intuitive ideas of part I can be formally modelled as flexible correspondence mappings between parallel structures (categorial structure and functional structure). Part III presents a theory and typology of structure–function correspondences, and several case studies of languages in which syntactic functions are created morphologically rather than by constituent structures. Part IV motivates functional structure by showing how invariances of language are captured on functional structures and outlines a theory of how functional structures are projected from argument structures.

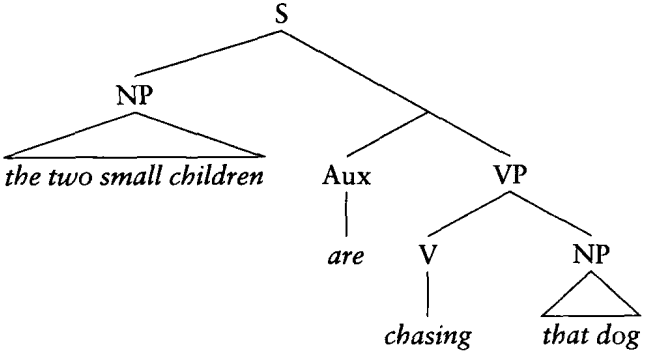
Note

1 Chomsky's 'poverty of stimulus' argument for universal grammar has attracted criticism (e.g. Van Valin 1994, Pullum 1997). The most controversial aspect is not the conclusion that humans have innate biological capacities that support language – no one doubts that the phonological structure of language is supported by our innate articulatory and perceptual systems – but the assumption that these capacities are specialized for acquiring grammatical systems – and grammatical systems of the specific types advocated by Chomsky. It is also true that sophisticated theories of learning may permit inferences about nonoccurring data which enrich the informativeness of the stimulus (e.g. Tesar and Smolensky 1998, Boersma and Hayes 1999).

1 Nonconfigurationality

One fundamental problem for the design of universal grammar is the great variability in modes of expression of languages. Languages differ radically in the ways in which they form similar ideas into words and phrases. The idea of two small children chasing a dog is expressed in English by means of a *phrase structure* in which conceptual components of the whole – the two small children and the dog being two such components – correspond to single phrases. Phrases are groups of contiguous words which are units for substitutions, remain together as units under stylistic permutations and paraphrases of a sentence, constrain the pronunciation patterns of sentences, and are subject to ordering constraint relative to other words and word groups. The (simplified) phrase structure of an English sentence is illustrated in (1):

(1)

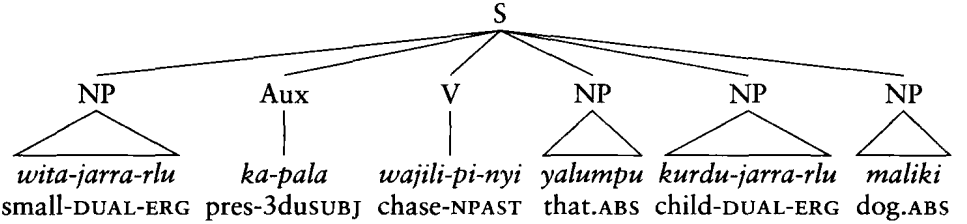


In this structure, *the two small children* and that *dog* are noun phrases (NPs), in which the words cannot be separated, and there is also a verb phrase (VP). When the phrases are freely broken up, the result is ungrammatical or different in meaning:

(2) a. **The two small are chasing that children dog.*
b. **The two small are dog chasing children that.*
c. **Chasing are the two small that dog children.*
d. **That are children chasing the two small dog.*

The simple correspondence between conceptual units and phrases seems so natural to the English speaker as to appear a necessary feature of language itself – but it is not. Consider Warlpiri, a language of the people who have inhabited Australia since long before the colonization of that continent by English speakers.[1] Example (3) shows the phrase structure of a Warlpiri sentence expressing the same idea as the English sentence (1). But in Warlpiri, every permutation of the words in the sentence is possible, with the same meaning, so long as the auxiliary (Aux) tense marker occurs in the second position. In particular, the word orders of all of the bad English examples in (1) are good in Warlpiri.

(3) 'The two small children are chasing that dog'



It is not true that Warlpiri lacks phrases altogether: syntactic analysis has shown that some phrases (NPs but not VPs) do optionally occur, and there is evidence for a somewhat more articulated clause structure including a focus position to the left of Aux.[2] But phrases are not essential to the expression of conceptual units. The coherence of a conceptual unit in Warlpiri is indicated by means of word *shapes* rather than word *groups*: noncontiguous words that form a conceptual unit must share the same formal endings – case and number morphology. Thus in (3) the word for 'small' shares the dual and ergative endings *-jarra* and *-rlu* with the word for 'child' which it modifies, and these endings differ from those of the words for 'dog' and 'that', which are null.

This difference between Warlpiri and English exemplifies a broad crosslinguistic generalization observed by many students of linguistic typology: across languages, there often appears to be an inverse relation between the amount of grammatical information expressed by words and the amount expressed by phrases. Languages rich in word structure (morphology) may make more or less use of fixed phrase structure forms (syntax). But languages poor in morphology overwhelmingly tend to have rigid, hierarchical phrase structures. The generalization is quite spectacular in some of the radically nonconfigurational languages of Australia, but there is evidence for it also in the other language types we will examine in part III. We can summarize this generalization with the slogan, "Morphology competes with syntax."

The idea that words and phrases are alternative means of expressing the same grammatical relations underlies the design of LFG, and distinguishes it from other formal syntactic frameworks. In addition, we cannot discount the effect of "configurational bias." Through historical accident, the resources of modern science and technology have been dominated by states whose national languages