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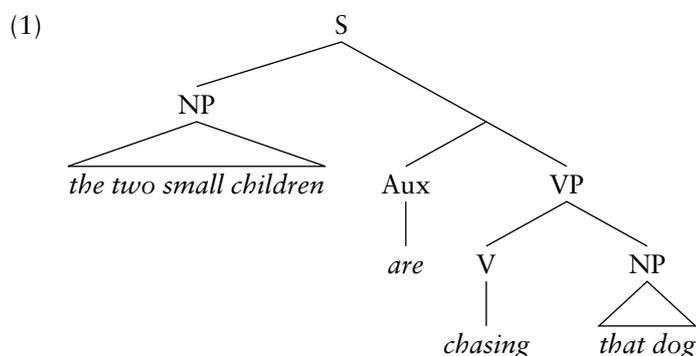
In this structure, *the two small children* and that *dog* are noun phrases (NPs), in which the words cannot be separated, and there is also a verb phrase (VP). When the phrases are freely broken up, the result is ungrammatical or different in meaning:

(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'

```
                                    S
        ┌───────────┬──────────┬────────┬────────┬──────────┬────────┐
        NP          Aux        V        NP       NP         NP
        /\          |          |        /\       /\         /\
  wita-jarra-rlu  ka-pala  wajili-pi-nyi  yalumpu  kurdu-jarra-rlu  maliki
  small-DUAL-ERG  pres-3duSUBJ chase-NPAST that.ABS child-DUAL-ERG  dog.ABS
```
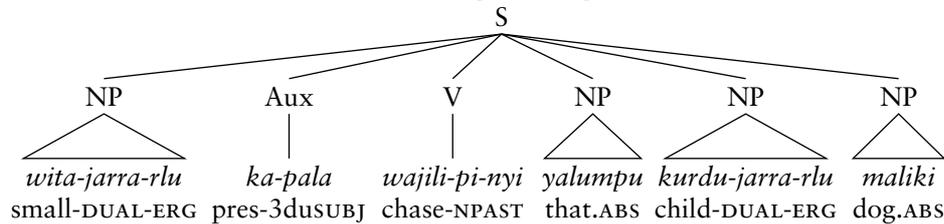
It is not true that Warlpiri lacks phrases altogether: syntactic analysis has shown that some phrases (NPs but not VPs) do optionally occur, and there is evidence for a somewhat more articulated clause structure including a focus position to the left of Aux.[2] But phrases are not essential to the expression 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

happen to be highly configurational. As a result, there has been a vast lack of knowledge of typological variation of language among the scientific establishment in computer science, logic, philosophy, and even among many theoretical linguists of a formal bent.

Although Warlpiri lacks English-style phrase structure, and English lacks Warlpiri-style case and agreement forms of words, there is evidence that they have a common organization at a deeper level than is apparent from their differing modes of expression. Similar conceptual units are expressed by the two languages – objects and their relations and motions, events and their participants, and human emotions, actions, and aims. And at an appropriate level of abstraction, similar grammatical constraints emerge.[3] For example, in English, a reflexive pronoun can be an object coreferring with the subject, but cannot be a subject coreferring with the object:

(4) a. *Lucy is hitting herself.*
     b. **Herself is hitting Lucy.*

And the same is true in Warlpiri:

(5) a. *Napaljarri-rli   ka-nyanu paka-rni.*
         Napaljarri-ERG PRES-REFL hit-NONPAST
         'Napaljarri is hitting herself.'
     b. **Napaljarri   ka-nyanu paka-rni.*
         Napaljarri. ABS PRES-REFL hit-NONPAST
         'Herself is hitting Napaljarri.'

This constraint holds in Warlpiri whether or not the subject is discontinuous. Indeed, this grammatical constraint on reflexive pronouns as subjects appears to be universal across languages. Apparent exceptions to this generalization have been found in some languages of the type called "ergative" (Kibrik 1985), but it has been argued that in some ergative languages the grammatical subject may correspond to the patient rather than the agent (Marantz 1984, Melc'uk 1988, Manning 1994). In such a language, *Lucy* in (4b) and not the reflexive pronoun would be the subject, and the universal generalization would stand.[4]

Thus while phrase structure does not universally correspond to conceptual structure, the more abstract grammatical functions it expresses – such as subject and object – do appear across languages. These grammatical functions represent classes of varying forms of expression that are equivalent under the correspondence mappings to argument structure (discussed below).

Here is the first choice point in the design of universal grammar: how to capture the abstraction of grammatical functions such as subject and object? The overwhelmingly predominant tendency in modern linguistic theory – due to Chomsky – has been to define them as the familiar configurations of English phrase structure: the subject is an NP in configuration (6a), and the object is an NP in configuration (6b):

(6) a.

S
   (NP)   . . .

b.

VP
   V   (NP)
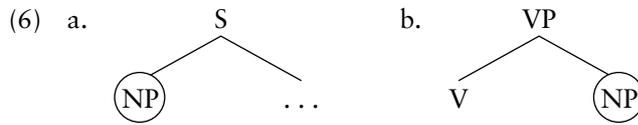
For a language like Warlpiri, this choice amounts to the claim that it does have English-style phrase structure after all – not on the surface, where conditions on word order hold, but at an underlying level of representation at which the grammatical conditions on reflexive pronouns hold.[5] Let us refer to this as the *configurational design of universal grammar*. It is illustrated in (7)–(8):

(7) English:

$\Rightarrow$

(8) Warlpiri:

$\Rightarrow$

S
   NP   Aux   V   NP   NP   NP
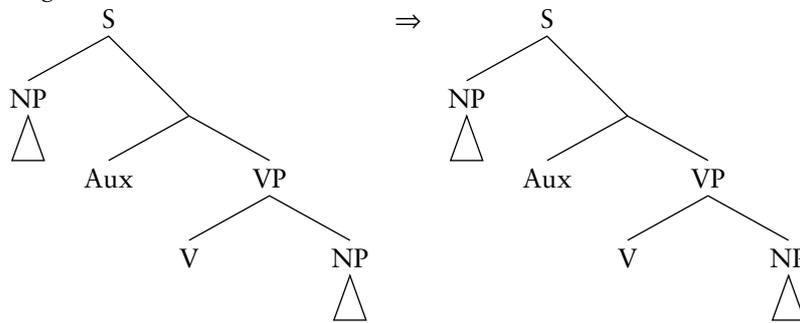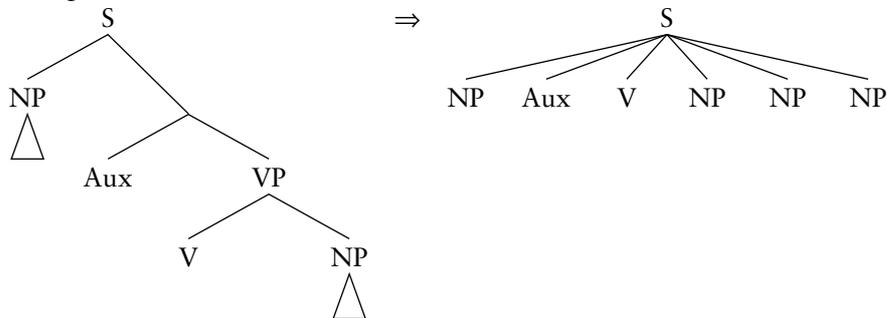
Now it might be true that all languages do have an abstract level of grammatical structure which closely matches the surface organization of the grammars of English and other European languages. Perhaps it just happens that the biologically based universal design of grammar really does have the form of the language of the colonizers. But there is no evidence for this: for example, *none* of the properties of phrases that I mentioned – contiguity under permutation, grouping for pronunciation, ordering relative to other elements, and substitutability – supports the existence of a VP in Warlpiri, and what evidence there *is* for phrases in Warlpiri shows clearly that there is no VP in our original sense.[6] Moreover, there is evidence that the constraints on reflexive pronouns depend not directly upon phrase structure configurations, but on factors such as predication relations,

which are at best only partially reflected in phrase structure configurations.[7] Therefore the "deep" or underlying VP that must be postulated in (8) is devoid of the original constituency properties of VPs.

Hence an alternative taken in the development of LFG is to choose a more abstract representation of the grammatical functions subject and object, one which is neutral between the differing modes of expression of languages. On this alternative, grammatical functions are *not* reducible to phrase structure configurations as in (7). They are classes of differing formal expressions that are mapped into argument structure in equivalent ways. Thus we have a differing picture of the grammatical structures of English and Warlpiri:

(9) English:

(10) Warlpiri:
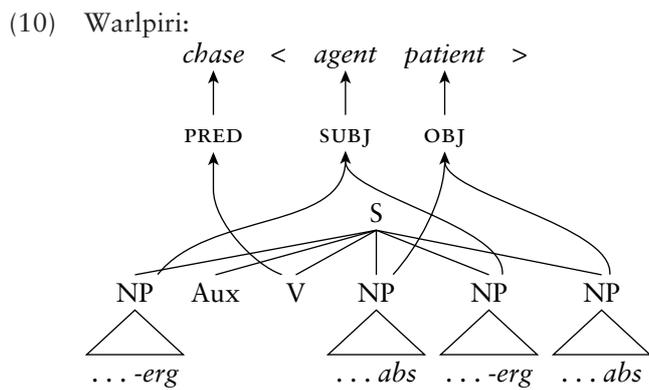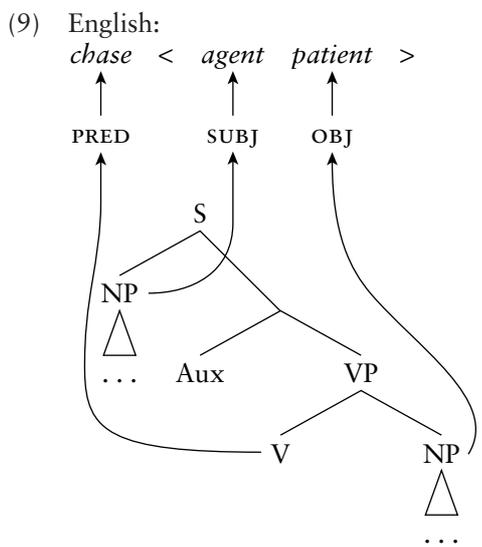
In this design, the grammatical functions subject and object are equivalence classes which serve as the relators, or "links," between two formally different, parallel structures: (i) the *argument structure*, which includes just those participants in events and situations that are grammatically expressed, and (ii) the *expression*

structure, which consists of the modes of expression of the language. While phrase structure configurations distinguish the subject and object functions in English, the case inflections – "erg(ative)" and "abs(olutive)" – distinguish the same functions in Warlpiri. These functions differ overtly, as we have seen, but they show a similar system of correspondences to the argument structure. The system of functions that relates these two structures has been mathematically modelled by the *functional structures* of lexical-functional grammar (chapter 4). Let us refer to this as the *relational design of universal grammar*.

Does this choice of representations for grammatical functions make any difference, or are they just notational variants? In fact, there are interesting empirical consequences of the choice of design. The configurational design implies that specific elements of phrase structure – NPs, VPs, and their relations – appear not only in representing the modes of expression of English and similar European languages, but also in representing deeper aspects of grammatical organization: the abstract syntactic functions and the semantic predicate argument structures of all languages. The relational design, in contrast, implies that it is the distinctive structure of predicators and arguments and their grammatical functions that are relevant at the deeper levels. Let us now turn to evidence concerning the representation of predicate argument structure.

1.1   Predicate Argument Structure

It has been observed (Marantz 1984) that the representation of grammatical functions in terms of phrase structure categories such as NP and VP predicts asymmetries between these functions because of their asymmetric depth of embedding in the phrase structure representation:

(11)
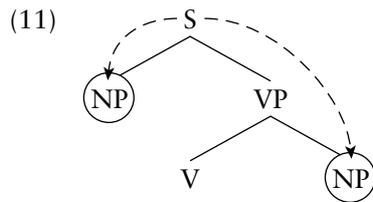
As we see in (11), the object forms a phrasal unit with the verb, while the subject forms a phrasal unit not with the verb, but with the verb phrase. And such asymmetries *do* show up. We have already seen the asymmetry between reflexives as subjects and objects in (4) and (5). Another example is the formation of idioms. With transitive verbs idioms are generally formed from a verb and its object, and not from a verb and its subject. For example, all of the examples in (12) have idiomatic interpretations, while those in (13) have only literal interpretations:

(12)   idiomatic:
    a.   *John blew his stack.*
    b.   *Mary gave me a piece of her mind.*
    c.   *Fred flipped his wig.*
    d.   *Susan takes the cake.*

(13)   nonidiomatic:
    a.   *His stack blew John.*
    b.   *A piece of Mary's mind gave me problems.*
    c.   *Fred's wig flipped his friends.*
    d.   *The cake takes Susan.*

There are exceptions: subject–verb idioms like *Your goose is cooked, The roof caved in on us*, and even (12b), where the idiomatic NP (*a piece of her mind*) is not the immediate object of the verb *give*. Such exceptions could be accounted for by hypothesizing that at the deepest level of structure, where semantic relations among predicates and arguments are represented, the NPs are indeed objects of their verbs, and that they are displaced from the object position in the derivation of the examples actually observed. Thus the fundamental idea is that semantic units of predicate argument structure correspond to deep phrase structure units.

But when we look more closely at the patterns of idioms and lexicalized expressions, a finer structure emerges (Kiparsky 1987, O'Grady 1998): it appears that there is a hierarchy among the semantic roles of arguments involved in the creation of idiomatic expressions. I give a simplified representation in (14):

(14)   *agent > beneficiary > recipient > . . . > patient/theme > location*

Essentially, the agent is the participant in an event that causes or controls the action; the beneficiary is the participant who benefits from an action; the recipient is a participant who receives something, as in giving; the patient is the participant that undergoes the effect of the action; and the location can also be a participant in an action, event, or situation.

Verbs combine to form idioms most easily with arguments from the lower end of the hierarchy; as we ascend the hierarchy, idioms become increasingly rare. Thus there are idioms formed from a verb together with a phrase that replaces a literal locative argument:

(15)   Verb + locative:
    a.   *Mary <u>put</u> John <u>to shame</u>.*
    b.   *Mary's innocent look <u>took</u> John <u>in</u>.*
    c.   *This office has <u>gone to the dogs</u>!*

The verbs *put, take*, and *go* all take literal locative arguments, as in *Mary put her work to one side, She took the cat in through the window*, and *You shouldn't go to the dogs for advice*. And it is these arguments that can be replaced by constant expressions to form idiomatic combinations with the verbs, as in (15). Similarly,

there are idioms formed from a verb together with a phrase that replaces a literal patient argument:

(16)   Verb + patient:
      a.   *John <u>blew</u> <u>his stack</u>.*
      b.   *Mary <u>gave</u> me <u>a piece of her mind</u>.*
      c.   *Fred <u>flipped</u> <u>his wig</u>.*
      d.   *Susan <u>handed</u> me <u>a can of worms</u>.*

And there are idioms formed from a verb together with phrases that correspond to a patient and a locative:

(17)   Verb + patient + locative:
      a.   *Don't <u>let</u> <u>the cat</u> <u>out of the bag</u>.*
      b.   *It's like <u>carrying</u> <u>coals</u> <u>to Newcastle</u>.*

But idioms based on a verb with the higher roles, beneficiary, recipient, or agent, are exceedingly rare and often even difficult to imagine.[8] The same hierarchy also accounts for the exceptional cases noted above, without recourse to the idea of movement of underlying NPs: in *The roof caved in* and *Your goose is cooked*, for example, the idiomatic subject is a patient-like argument of the verb, not an agent.

   This pattern cannot be naturally explained in terms of the phrase structure groupings that are motivated by contiguity, substitutability, reorderings, and phonological phrasing: the conceptual unit expressed by the verbs and locative-replacing prepositional phrases in (15a, b), for example, is not a contiguous unit in the phrase structure of English, since verbs (in English) are in closest structural relation to their objects. Thus, the real generalization appears to be that arguments are semantically composed with their predicates in accordance with a hierarchy of semantic roles which reflects the lexical semantics of predicators.[9] Indeed, there is crosslinguistic evidence for the existence of such a hierarchy in the native languages of America, Africa, and Oceania. The hierarchy may well be universal.[10]

   Even more striking evidence comes from a syntactically ergative language, where the patient of a transitive verb is the subject:[11]

(18)   <   *ag*   *pt*   >
            | |
     . . .   SUBJ

With respect to the thematic hierarchy of (14) the patient is the lowest argument of the argument structure; with respect to the phrase structure representation of (11) the subject NP lies outside of the VP, where it does not form a phrasal unit with the verb. Thus in such a language the predictions of the two designs of universal grammar diverge: idioms based on verb + patient should exist under

the relational design of universal grammar, but should *not* exist under the configurational design.

Evidence from Dyirbal, a syntactically ergative language of Australia, supports the relational design.[12] In the following examples, a Dyirbal verb and noun stem are compounded to create an idiom; in each case the noun stem corresponds to the patient argument of the verb:

(19) **bana-l** < *ag*   *pt*   >
     'break' |

                      buŋgu
                      'knee'
     buŋgu + **bana-l** 'bend over, fold'

In (19) the idiomatic expression for "bend over, fold" is created by combining the verb "break" with the noun stem for "knee," which corresponds to the argument that undergoes the action denoted by the verb. In English this argument would be an object of the verb, but in Dyirbal, it is the subject. The same is shown by example (20):

(20) **wuga-l** < *ag*   *rec*   *th*   >
     'give' |

                           mala
                           'hand'
     mala + **wuga-l** 'give a hand to, help'

Here again the idiom is created by combining the verb 'give' with the nominal stem for 'hand', parallel to the English idiom "give a hand." The crucial point is that the 'hand' argument in Dyirbal is not the object of the verb, as it is in English, but the subject. The same is shown by (21), 'pull a smile':

(21) **yambu-l** < *ag*   *pt*   >
     'pull' |

                      miyey
                      'smile'
     miyay + **yambu-l** 'make smile, laugh'

In each case, it is the hierarchy of roles in argument structure rather than the hierarchical position of arguments in the syntactic tree that constrains idiom formation.

What appeared at first to support the configurational design of universal grammar turns out to support the relational design. The predicate argument structure that represents the conceptual participants in events and situations has a distinctive structure of its own, which cannot be assimilated to the expression structures of English and other European language.[13]

1.2 Conclusion

In conclusion, an important source of empirical motivation for the relational design of universal grammar adopted by LFG is the existence of phrase structure nonconfigurationality. Although various degrees of nonconfigurationality occur across languages, as we will see in part III, the Australian languages are among the best exemplars of the phenomenon (Simpson 1991, Austin and Bresnan 1996, Nordlinger 1998b). This nonconfigurationality is possible because the same grammatical information can be specified by word *shapes* as by word *groups*; the functional structure of LFG characterizes this grammatical information in an abstract, neutral way, without configurational bias. Thus in "lexical-functional grammar" the term "lexical" refers to the fundamental fact that words, or lexical elements, are as important as syntactic elements in expressing grammatical information, and the term "functional" refers to the fact that this grammatical information is not identified with particular structural forms of expression, but is viewed as a system of abstract relators of expressions to eventualities.

Further Reading

For further readings which examine the evidence and issues of nonconfigurationality in more detail, Austin and Bresnan (1996) and Nordlinger (1998b) are recommended as particularly accessible.

Notes

1   See Dixon (1981) on the history and nature of Australian languages. Of the English colonization of Australia he writes, "I have chosen to write plainly, to talk of the white 'invasion' of Aboriginal Australian lands, avoiding euphemisms such as 'settlement', and not to gloss over murder – of people, tribes, and languages" (Dixon 1981: xiv). The Warlpiri grammatical phenomena discussed here come from Hale (1981) and Simpson (1983a, 1991).

2   See Austin and Bresnan (1996) for details.

3   The following illustration is from Simpson (1983a); see also Hale (1973).

4   There are some languages in which the most prominent argument structure role (sometimes called the "logical subject") plays the same role in binding as the grammatical subject (Kroeger 1993, Manning 1996). See part IV.

5   This hypothesis has taken several forms. One is that the underlying structure is a deep structure, which undergoes transformational "scrambling" rules to derive the modes of expression peculiar to Warlpiri (Hale 1973). But as Hale (1994) points out, the complete absence of movement rules elsewhere in Warlpiri renders this hypothesis unattractive. Another is that the underlying structure is a "lexical structure," which is not transformationally related to the surface forms, but represents the universal component of Warlpiri grammar in the phrasal forms of English (Hale 1983). This view has been criticized by Speas (1990) for adopting different theories of grammar for different language types, and has subsequently been abandoned by Hale (1994). A third and more recent form of the hypothesis based on work by Jelinek (1984) and

Baker (1991) assumes that overt NPs are not arguments but adjuncts to incorporated pronouns; see Austin and Bresnan (1996), Nordlinger (1998b), and Croft (1997) for criticism of the latter hypothesis.

6   The Aux in Warlpiri follows the first phrase of the sentence; the parts of a noun phrase can appear together in this position, but not the parts of a verb phrase. See Simpson (1991), Austin and Bresnan (1996), and Nordlinger (1998b) for more detailed discussion.

7   See part IV.

8   One involving an agent, verb, and patient together is *The cat's got your tongue*. Avery Andrews also points out idiomatic *The photography bug has bitten Fred* versus literal examples such as *The photography bug has eaten Fred* or *Folk dancing has bitten Fred*, and idiomatic *What's eating him*? versus literal *What's chewing on him*? or *That's eating him*. Manning (1996: 152) cites an attested example *The vultures are circling*.

9   Nunberg et al. (1994) suggest that idiom formation correlates with the animacy of arguments, and use this generalization to argue against the configurational approach of Marantz (1984) and others. O'Grady (1998) presents evidence favoring the thematic hierarchy over the animacy approach of Nunberg et al.

10   The evidence consists of the patterns of noun incorporation (Mithun 1984), and of the historical sequence in which pronouns become agreement markers (Givón 1976, 1984).

11   For a review of recent alternative analyses of ergativity and arguments in support of the present analysis of (syntactic) ergativity, see Manning (1994).

12   For information on the grammar of Dyirbal, see Dixon (1972). The examples of idioms in Dyirbal were provided by Bob Dixon with the assistance of Avery Andrews (personal communication).

13   There is a strong temptation in the configurational approach to postulate an initial phrase structure as a pure representation of the thematic hierarchy in terms of embedding within VPs. Though the same categorial labels and relations are used in the initial and derived phrase structures, completely different criteria are used to determine what is a "VP." Manning (1994) critically discusses this approach in relation to ergative languages.