

Anaphorische Bindung

1 Anaphorische Pronomina und anaphorische Bindung

- Anaphorische Pronomina etablieren semantische Koreferenzbeziehungen zwischen dem Pronomen und einem Antezedenten
- Zwei Arten von anaphorischen Pronomina:
 - Reflexiv/Rezipropronominia: *sich, sich selbst, einander*
 - Personalpronominia: *er/sie/es, ihn/ihm, sie*
- Die beiden Typen von Pronomina sind komplementär verteilt und gehen einher mit unterschiedlichen syntaktischen Bedingungen für anaphorische Bindung.
 - a. Maria behauptet, dass Eva_i *sich_i* im Spiegel betrachtet.
 - b. * Maria_i behauptet, dass Eva *sich_i* im Spiegel betrachtet.
 - c. Maria_i behauptet, dass Eva *sie_i* im Spiegel betrachtet.
 - d. * Maria behauptet, dass Eva_i *sie_i* im Spiegel betrachtet.

2 Funktionale Bedingungen für anaphorische Bindung

Im Gegensatz zur Generativen Grammatik, die Bindung durch c-strukturelle Bedingungen (i.w. c-Kommando) beschreibt, definiert LFG die Beschränkungen für Bindung in der Hauptsache durch f-strukturelle Bedingungen.

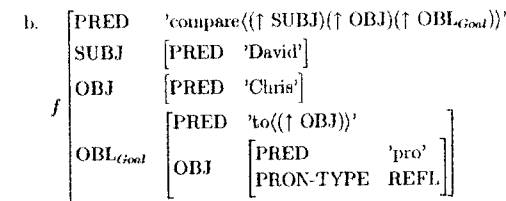
Dalrymple(1993) schlägt ein universales lexikalisch spezifiziertes Inventar funktionaler Bindungsconstraints vor, mit Formalisierung durch inside-out funktionale Beschreibungen.

2.1 Positive Bindungsconstraints

- Bestimmte anaphorische Pronomina (insbesondere Reflexivpronominia) müssen sich *in einer bestimmten syntaktischen Relation zu ihrem Bezugselement* befinden. Sie müssen **positiv spezifizierte Bedingungen** erfüllen.

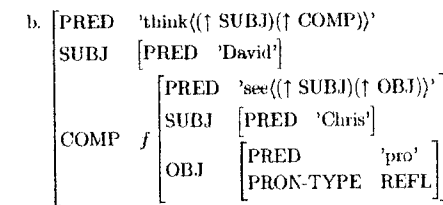
In (2) ist das SUBJekt des lokalen (subkategorisierenden) Prädikats der Antezedent des Reflexivpronomens *himself*.

- a. David_i compared Chris to *himself_i*.



In (3) ist das Reflexivpronomen vom intendierten Antezedens durch eine finite Satzgrenze (finite COMP) getrennt. Hier ist die Bindung nicht zulässig.

- a. * David_i thought that Chris had seen *himself_i*.



- Reflexivpronominia müssen einer **positiven Beschränkung** der syntaktischen Beziehung zwischen Pronomen und Antezedent genügen:

- Das Antezedens des englischen Reflexivpronomens *himself* muss sich innerhalb des *minimal vollständigen Kerns* (minimally complete nucleus) befinden, der das Pronomen enthält. (Bresnan et al, 1995).

Minimal Complete Nucleus containing an f-structure: The *smallest* f-structure that contains *f* and a SUBJ function.

- ⇒ Das Reflexivpronomen *himself* muss sich innerhalb der kleinsten F-Struktur befinden, die das Pronomen selbst und ein SUBJ enthält. Wir nennen dies die **Bindungsdomäne** der Anapher. Die Bindungsdomäne der Anapher *himself* ist also ihr **minimal vollständiger Kern** (minimally complete nucleus) (MCN).
- In (2) ist das Antezedens von *himself* im MCN von *himself* enthalten: Der MCN ist die F-Struktur *f*, sie enthält die Anapher und ihr Antezedens.
- In (3) ist das Antezedens von *himself* nicht im MCN von *himself* enthalten. Der MCN ist die F-Struktur *f*, sie enthält die Anapher aber nicht ihr Antezedens.

- Sprachen, die unterschiedliche lexikalische Arten von Anaphern besitzen, zeigen eine größere Variationsbreite von Bedingungen, und zeigen, dass die Bindungsbeziehungen nicht universell pro Sprache, sondern lexikalisch definiert werden müssen.
- Norwegisch hat ein reiches System von Anaphern (Hellan, 1998).

- Das Reflexivpronomen *seg selv* und das Rezipropronomen *hverandre* müssen lokal gebunden sein. Die Bindungsdomäne für *hverandre* ist aber größer als diejenige für *seg selv*.

seg selv muss von einem *Co-Argument* gebunden sein (d.h. vom selben PRED-Merkmal subkategorisiert sein).

- (4) a. Jon fortalte meg om seg selv
Jon told me about self
'Jon_i told me about self_i.'

b.
$$\left[\begin{array}{l} \text{PRED} \quad \text{'tell}((\uparrow \text{SUBJ})(\uparrow \text{OBJ})(\uparrow \text{OBL}_{\text{ABOUT}}))\text{' } \\ \text{SUBJ} \quad \left[\text{PRED} \quad \text{'Jon'} \right] \\ \text{OBJ} \quad \left[\text{PRED} \quad \text{'pro'} \right] \\ \text{OBL}_{\text{ABOUT}} \quad \left[\begin{array}{l} \text{PRED} \quad \text{'pro'} \\ \text{PRON-TYPE} \quad \text{REFL} \end{array} \right] \end{array} \right]$$

- c. De fortalte meg om hverandre
They told me about each other
'They_i told me about each other_i.'

hverandre muss im MCN gebunden sein.

- (5) a. * Hun kastet meg fra seg selv
She threw me from herself
'She_i threw me from herself_i.'

b.
$$\left[\begin{array}{l} \text{PRED} \quad \text{'throw}((\uparrow \text{SUBJ})(\uparrow \text{OBJ}))\text{' } \\ \text{SUBJ} \quad \left[\text{PRED} \quad \text{'Jon'} \right] \\ \text{OBJ} \quad \left[\text{PRED} \quad \text{'pro'} \right] \\ \text{ADJ} \quad \left\{ \left[\begin{array}{l} \text{PRED} \quad \text{'from}((\uparrow \text{OBJ}))\text{' } \\ \text{OBJ} \quad \left[\begin{array}{l} \text{PRED} \quad \text{'pro'} \\ \text{PRON-TYPE} \quad \text{REFL} \end{array} \right] \end{array} \right] \right\} \end{array} \right]$$

- c. De kastet meg til og fra hverandre
They threw me to and from each other
'They_i threw me to and from each other_i.'

- Sprachübergreifend wurden die folgenden vier **Bindungsdomänen** etabliert:

- **Co-Argument-Domäne:** Minimale Domäne definiert durch das PRED-Merkmal und eine grammatische Funktion die es regiert (z.B. Norwegisch *seg selv*)
- **Minimal Complete Nucleus (MCN):** Minimale Domäne die ein SUBJ enthält (z.B. Norwegisch *sin*)
- **Minimal Finite Nucleus (MFN):** Minimale Domäne die ein TENSE-Merkmal enthält (z.B. Norwegisch *seg*)
- **Root-Domäne:** die F-Struktur des gesamten Satzes (z.B. Chinesisch *ziji*)

- Formal können diese lexikalischen Bindungsconstraints durch *inside-out* functional (uncertainty) constraints definiert werden: die Anapher spezifiziert *inside-out* die Bindungsdomäne innerhalb derer sie ihren Antezedens binden muss.

- Die *syntaktische Relation zwischen Antezedens und Anapher* muss der Relation des *F-Kommandos* genügen:

F-command: f f-commands g iff f does not contain g , and all f-structures that contain f also contain g . (Dalrymple 2001, p.159)

- (6) a. f f-commands g :

b.
$$\left[\begin{array}{l} \text{SUBJ} \quad f \left[\begin{array}{l} \text{ } \\ \text{ } \end{array} \right] \\ \text{OBJ} \quad g \left[\begin{array}{l} \text{ } \\ \text{ } \end{array} \right] \end{array} \right]$$

c.
$$\left[\begin{array}{l} \text{SUBJ} \quad f \left[\begin{array}{l} \text{ } \\ \text{ } \end{array} \right] \\ \text{COMP} \quad \left[\text{SUBJ} \quad g \left[\begin{array}{l} \text{ } \\ \text{ } \end{array} \right] \right] \end{array} \right]$$

Problem mit funktionaler Kontrolle:

(7)
$$\left[\begin{array}{l} \text{SUBJ} \quad f \left[\begin{array}{l} \text{ } \\ \text{ } \end{array} \right] \\ \text{OBJ} \quad g \left[\begin{array}{l} \text{ } \\ \text{ } \end{array} \right] \\ \text{XCOMP} \quad h \left[\text{SUBJ} \quad \left[\begin{array}{l} \text{ } \\ \text{ } \end{array} \right] \right] \end{array} \right]$$

F-command (inside-out): f f-commands g iff $\neg(f \text{ GF}^*) = g$ (f does not contain g) and $((\text{GF } f) \text{ GF}^+) = g$ (all f-structures whose value for some grammatical function GF is f also contain g). (Dalrymple 2001, p.159)

- Die F-Kommando-Relation zwischen Anapher und Antezedens wird definiert wie folgt:

$((\text{GF}^* \text{ GF}_{\text{pro}} f) \text{ GF}_{\text{ante}})$

f : F-Struktur der Anapher;

$(\text{GF}^* \text{ GF}_{\text{pro}} f)$: Spezifikation der Bindungsdomäne;

GF_{ante} : grammatische Funktion des Antezedens

Diese Relation genügt der Relation des F-Kommandos: der Ausdruck denotiert genau diejenigen grammatischen Funktionen, die die Anapher in ihrer Bindungsdomäne f-kommandieren.

- Die Beschränkung des F-Kommandos stellt sicher, dass Antezedens nicht zu tief eingebettet ist:

- (8) a. * David_i's father nominated himself_i.

b.
$$\left[\begin{array}{l} \text{PRED} \quad \text{'nominate}((\uparrow \text{SUBJ})(\uparrow \text{OBJ}))\text{' } \\ \text{SUBJ} \quad \left[\begin{array}{l} \text{PRED} \quad \text{'father'} \\ \text{SPEC} \quad \left[\text{PRED} \quad \text{'David'} \right] \end{array} \right] \\ \text{OBJ} \quad \left[\begin{array}{l} \text{PRED} \quad \text{'pro'} \\ \text{PRON-TYPE} \quad \text{REFL} \end{array} \right] \end{array} \right]$$

- Die Bindungsrelation $((GF^* GF_{pro} f) GF_{antc})$ kann für verschiedene Sprachen und Anaphern individuell eingeschränkt werden:

– Das Antezedens von *sin* im Norwegischen muss ein SUBJekt im Minimalen Finiten Nukleus sein:

$$\left(\left(\begin{array}{c} GF^* \\ GF_{pro} f \end{array} \right) \text{SUBJ} \right) \neg(\rightarrow \text{TENSE})$$

- (9) a. Jon ble arrestert i sin kjøkkenhave
Jon was arrested in self's kitchen garden
'Jon_i was arrested in his_i kitchen garden.'
b. *Vi arresterte Jon i sin kjøkkenhave
We arrested Jon in self's kitchen garden
'We arrested Jon_i in his_i kitchen garden.'

Gegeben die F-Struktur für das anaphorische Pronomen ist f , definieren sich die verschiedenen **Bindungsdomänen** wie folgt:

- **Co-Argument-Domäne:** $\left(\begin{array}{c} GF^* \\ GF_{pro} f \end{array} \right) \neg(\rightarrow \text{PRED})$
- **Minimal Complete Nucleus (MCN):** $\left(\begin{array}{c} GF^* \\ GF_{pro} f \end{array} \right) \neg(\rightarrow \text{SUBJ})$
- **Minimal Finite Nucleus (MFN):** $\left(\begin{array}{c} GF^* \\ GF_{pro} f \end{array} \right) \neg(\rightarrow \text{TENSE})$
- **Root-Domäne:** $(GF^* GF_{pro} f)$

2.2 Negative Bindungsconstraints

- Bestimmte Anaphern dürfen in einer bestimmten syntaktischen Bindungsdomäne *kein* Antezedens binden. Diese Anaphern spezifizieren **negative Bindungsconstraints**.
- Beispiel: Das englische Pronomen *him* darf nicht mit einem Co-Argument koreferent sein:

(10) *Chris_i nominated him_i.

Negatives Constraint: Der Antezedent des Pronomens *him* darf nicht in der Co-Argument-Domäne von *him* enthalten sein.

$$\neg \left[\left(\begin{array}{c} GF^* \\ GF_{pro} f \end{array} \right) GF_{antc} \right] \neg(\rightarrow \text{PRED})$$

- Sprachübergreifend sind dieselben Bindungsdomänen relevant wie für positiv definierte **Bindung**. Im Falle negativer Bindungsconstraints darf die Anapher mit *keiner* der Funktionen die durch das Constraint erfasst sind koreferent sein.

– **Co-Argument-Domäne:** Minimale Domäne definiert durch das PRED-Merkmal und eine grammatische Funktion die es regiert (z.B. Norwegisch *seg*)

– **Minimal Complete Nucleus (MCN):** Minimale Domäne die ein SUBJ enthält (z.B. Norwegisch *ham selv*)

– **Minimal Finite Nucleus (MFN):** Minimale Domäne die ein TENSE-Merkmal enthält (z.B. Hindi *askan*)

– **Root-Domäne:** die F-Struktur des gesamten Satzes (z.B. Yoruba *ó*)

2.3 Positive und negative Bindungsconstraints

- Da Bindungsrestriktionen lexikalisch mit bestimmten Anaphern assoziiert sind, erwarten wir, dass bestimmte Anaphern positive *und* negative Bindungsrestriktionen definieren.

- Norwegisches *ham selv* ist ein solcher Fall:

ham selv muss an ein Antezedens im MCN gebunden sein (*positives* Constraint). Darüber hinaus darf es nicht mit einem SUBJekt Co-Argument koreferent sein (*negatives* Constraint).

(11) a. Vi fortalte Jon om ham selv
we told Jon about self
'We told Jon_i about himself_i.'

b. Jeg ga Jon en bok om ham selv
I gave Jon a book about self
'I gave Jon_i a book about himself_i.'

(12) a. *Jeg lovet Jon å snakke om ham selv
I promised Jon to talk about self
'I promised Jon_i to talk about himself_i.'

b. *Jon snakker om ham selv
Jon talks about self
'Jon_i talks about himself_i.'

Übung 1

Zeichnen sie die F-Strukturen für (11) und (12) und erklären Sie die Grammatikalität bzw. Nichtgrammatikalität der angezeigten Koreferenzbeziehungen.

(13) Martin bad oss berätta för honom om honom själv
Martini asked us to talk to him_i about himself_i

Formulieren Sie geeignete Bindungsconstraints für diese Sprache, die die gegebenen Daten erfassen und erklären Sie, wie Ihre Prinzipien dies sicherstellen.

3 Bindung und Präzedenz

- Neben den funktionalen Bedingungen wird anaphorische Bindung in vielen Sprachen auch durch Präzedenz Restriktionen eingeschränkt. In LFG werden Präzedenzbedingungen durch *functional precedence* (*f-precedence*) definiert.

- **F-Precedence:**

f *f-precedes* g ($f <_f g$) iff for all $n_1 \in \phi^{-1}(f)$ and for all $n_2 \in \phi^{-1}(g)$, n_1 *c-precedes* n_2 .

- Beispiel Englisch:

The antecedent of a pronoun must *f-precede* the pronoun.

- (14) a. Joan spoke to Ron_i about himself_i.
 b. * Joan spoke about himself_i to Ron_i.

4 Bindung und Argumentstruktur

- Schließlich kann Bindung durch Restriktionen bezüglich der Abbildung A-/F-Struktur eingeschränkt sein.

- Thematische Hierarchie der Argumentstruktur:

AGENT > BENEFACTIVE/GOAL > RECIPIENT/EXPERIENCER > INSTRUMENT > THEME/PATIENT > LOCATIVE

- Thematische Beschränkung für Bindung: *The anaphor must be a-commanded by the antecedent.*

f *a-commands* g iff f maps to a thematic role that is higher on the thematic hierarchy than the role that g maps to.

- Sells(1988) zeigt, dass Bezug auf die thematische Hierarchie notwendig ist, um z.B. Bindungsrestriktionen im Albanischen zu erfassen. Thematische Restriktionen gelten auch im Norwegischen.

Norwegisch erlaubt zwei Passivierungsvarianten (für ditransitive Verben) (d.h. hier gilt nicht der AOP!)

- (15) a. Vi overlot Jon pengene.
 we gave Jon money
 'We gave John the money.'
 b. Jon ble overlatt pengene.
 Jon was given money
 'John was given the money.'
 c. Pengene ble overlatt Jon.
 Money was given Jon
 'The money was given Jon.'

- (16) Barnet ble fratatt sine foreldre.
 child was taken self's parents
 'The child_i (MALEFACTIVE) was deprived of self's_i parents (THEME). / * The child_i (THEME) was taken away from self's_i parents (MALEFICIENT).'

In der ersten (grammatischen) Lesart *a-kommandiert* das Antezedens die Anapher, im Gegensatz zur zweiten (ungrammatischen) Lesart.

- Ähnliche Phänomene finden wir auch im Englischen:

(17) * Joan spoke about Ron_i to himself_i.

Die Bindung ist funktional lizenziert (*himself* ist gebunden im MCN. Sie erfüllt die Bedingung der *f-precedence* (das Antezedens *f*-precedes die Anapher). Die Bedingung verletzt aber die Bedingung des A-Kommandos: die Anapher (*himself* - GOAL) *a*-kommandiert das Antezedens (*Ron* - THEME)

5 Multiple Ebenen der Grammatik zur Beschreibung von Bindungsrestriktionen

Die Vielgestaltigkeit der Bedingungen für Anaphorische Bindung bestätigt die Architektur paralleler Ebenen in der Lexikalisch-Funktionalen Grammatik:

- c-strukturelle Bedingungen: Präzedenz (*f-precedence*)
- f-strukturelle Bedingungen: lexikalisch-funktionale Definition von Bindungsdomänen, Antezedens- und Anaphernrestriktionen (inside-out functional uncertainty zur Definition von Pfadbedingungen und Bindungsdomänen, funktionale Charakterisierung der Bindungsdomänen)
- a-strukturelle Bedingungen: thematische Hierarchie

Eine rein auf konfiguralen (c-strukturellen) Kriterien beruhende Analyse (wie z.B. c-Kommando in der Generativen Grammatik) ist gezwungen, dies vielfältigen Bedingungen *sprachübergreifend* auf c-strukturelle Unterschiede zurückzuführen.

6 Literatur

- Mary Dalrymple (2001): Lexical-Functional Grammar, Kapitel 11.
 Joan Bresnan (2001): Lexical-Functional Syntax, Kapitel 10.
 Yehuda Falk (2001): Lexical-Functional Grammar, Kapitel 7.

chapter 16

Lexical-Functional Grammar

0. ALTERNATIVE THEORIES

The first fifteen chapters of this textbook are an introduction to syntactic theory from one particular perspective. That is the perspective of the Chomskyan Principles and Parameters (P&P) approach (and its descendant: Minimalism). While a large number of syntacticians (perhaps even a majority) operate using the assumptions and formalisms we've developed so far in this book, not everyone does. In this chapter and the next, we look at two other popular formalisms: *Lexical-Functional Grammar (LFG)* and *Head-Driven Phrase Structure Grammar (HPSG)*.

In many ways, these theories have the same basic goals and assumptions as P&P syntax. LFG and HPSG are considered to be generative grammars, just like P&P. Where all these theories differ is in the precise formulation of the rules and constraints. We will have something to say about choosing among formalisms at the end of chapter 17, but to a great degree it comes down to a matter of the range of phenomena one wants to account for and one's preferred means of formal expression. My inclusion of these approaches is not meant to imply that they are better than P&P, nor to imply that P&P is better than them. They should simply be viewed as alternatives.

As a beginning syntactician, you might wonder why you should bother looking at alternative approaches. After all, a significant part of the literature and research being done in syntax uses the assumptions and formalisms developed in the first fifteen chapters. Shouldn't we just pick one formalism

and stick with it? To be honest, most researchers do just this; they do their work within only one formalism. For example, I do almost all of my research within the P&P approach. But this doesn't mean that I shouldn't be familiar with other formalisms too. An important body of work is conducted in these formalisms, and their results are often directly relevant to work being done in Chomskyan P&P syntax. Being able to interpret work done in these alternative approaches is a very useful skill (and unfortunately, one rarely taught to beginning syntacticians). The results found in other approaches to syntax have often affected the development of P&P theory. For example, the lexical approach to passives (whereby the passive morphology affects the thematic and case assigning properties of the underlying verbal morphology) replaced an earlier purely transformational approach to passives. This idea was borrowed from LFG. Similarly, the idea of feature checking is directly related to the notion of unification found in both LFG and HPSG. So I encourage you to keep an open mind and consider the advantages of being familiar with more than one formalism.

1. C-STRUCTURE

One major part of LFG is almost identical to the approach taken in the rest of the book. This is the idea that the words of a sentence are organized into constituents, which are represented by a tree, and generated by rules. In LFG, these trees are called the *c-structure*, and are roughly equivalent to the S-structure in P&P.¹ Many LFG theorists adopt X-bar theory, but it is not as strictly applied to all languages. For example, LFG posits a flat (VP-less) structure for many VSO languages (Kroeger 1993) and "free word order" or "non-configurational" languages like Warlpiri (Simpson 1991). This said, most LFG c-structures look just like the S-structure trees we have built elsewhere in this book. There is one major exception to this: since there is no movement, there are (for the most part) no traces (nor are there any other null elements).

¹ Because LFG doesn't use transformations, there is no D-structure. Phrase structure rules directly build the c-structure (= S-structure). Displaced items are dealt with in other ways. See below.

2. FUNCTIONS

As you might guess from its name, there are two driving forces in Lexical-Functional Grammar: the lexicon (which we explore in section 3 below) and functions. The notion of function is borrowed from math and computer science. A *function* is a rule that maps from one item to another.² There are really two kinds of functions in LFG, which can be a bit confusing. The first kind are called *grammatical functions* and are things like subject, object, etc. We called these grammatical relations in chapter 4. When a practitioner of LFG talks about functions, they are primarily talking about grammatical functions. The other kind of function refers to the principles that map between the different parts of the grammar, such as the mapping between the c-structure and the structure that represents the grammatical functions. This is called an *f-structure*. We are going to look at grammatical functions here, then turn to the mapping relations in section 4.

In P&P syntax, grammatical functions or relations are read off of the tree. That is, you know what the subject of a sentence is by looking for the NP that is in the specifier of TP. In LFG, grammatical functions are not defined by a tree; instead, they are primitive notions (meaning they can't be derived somehow). Every sentence has an f-structure that represents grammatical functions. In the f-structure, a particular NP will be identified as being the subject of the sentence, quite independent of the tree structure associated with the sentence. In the sentence *Diana loves phonology*, *Diana* is equated with the SUBJ grammatical function. This equation is usually represented in what is called an *Attribute Value Matrix (AVM)*; the item on the left is the attribute or function, the item on the right is the value attributed to that function:

- 1) [SUBJ [PRED³ 'Diana']]

Attributes can have various kinds of values, including other AVMs. For example, the value for the SUBJ function in sentence (2) is itself a matrix containing other functions:

- 2) The professor loves phonology.

² If you are unfamiliar with this notion you might want to consult a good "mathematics for linguists" textbook, such as Allwood, Andersson and Dahl (1977).

³ The term PRED here is a bit confusing, since 'Diana' is an argument of the clause. PRED here can be, very loosely, translated as the semantic head of the AVM.

example, the fact that the verb specifies that its subject must be third person singular (as marked by the suffix *-s*). If the subject has number or person features, then those features must match the verb's subject features in the f-structure. This is forced by the fact that the f-structure (in mathematical terms) solves for, or is the solution to, the set of functional equations known as the functional description. If the features didn't match, then the f-structure wouldn't unify. Notice that this is a very similar notion to the idea of feature checking, discussed in chapter 12. Feature checking also ensures compatibility of features coming from different parts of the sentence. Minimalism simply uses movement, rather than functional equations, to guarantee this. Both systems have their advantages; LFG's system has a certain mathematical precision and elegance that P&P movement and feature checking do not. By contrast, P&P/Minimalism is able to derive word order differences between languages from feature checking and movement. Minimalism thus provides a slightly more explanatory theory of word order than LFG, which uses language-specific phrase structure rules. It is not at all clear which approach is preferable.

There are a number of constraints on f-structures. Three of these conspire together to result in the LFG equivalent of the theta criterion:

- 14) a) *Uniqueness*: In a given f-structure, a particular attribute may have at most one value.
- b) *Completeness*: An f-structure must contain all the governable grammatical functions that its predicate governs.
- c) *Coherence*: All the governable grammatical functions in an f-structure must be governed by a local predicate.

(14a) is also the constraint that forces unification. All f-structures must meet these constraints.

4.1 Why F-structures?

We now have a fairly detailed sketch of the basics of LFG. Before turning to some implementations of the model dealing with some of the empirical issues we've looked at elsewhere in this book, it is worth considering why the LFG model uses f-structures. The answer is fairly straightforward: Information about a particular grammatical function may come from more than one place in the tree and, more importantly, the sources of information do not have to be constituents. Falk (2001) gives the example of the pair of following sentences:

- 15) a) The deer are dancing.
- b) The deer is dancing.

The form of the subject noun is identical in both of these sentences. However, in terms of meaning, it is plural in (15a) and singular in (15b). Let's assume that the lexical entry for the form 'deer' lacks any specification for number:

16) *deer* N (↑PRED) = 'deer'

The number associated with the subject function in the sentences in (15) comes from the auxiliary:

- 17) a) *are* T (↑TENSE) = present
 (↑SUBJ NUM) = pl
- b) *is* T (↑TENSE) = present
 (↑SUBJ NUM) = sg

While the number comes from the auxiliary, it is only really a property of the subject. The NUM feature still gets mapped to the SUBJ function, because of the functional annotation (↑SUBJ NUM) = pl. Similar facts are seen in "free word order" or "non-configurational" languages, like the aboriginal Warlpiri language spoken in Australia. Contra the principle of modification we discussed in chapter 3, in Warlpiri, words that modify one another do not have to appear as constituents on the surface. Since information can come from various parts of the tree, this points towards a system where functional information is not read directly off the tree; instead, an f-structure-like level is motivated.⁵

You can now try General Problem Set 1

5. ASSORTED PHENOMENA

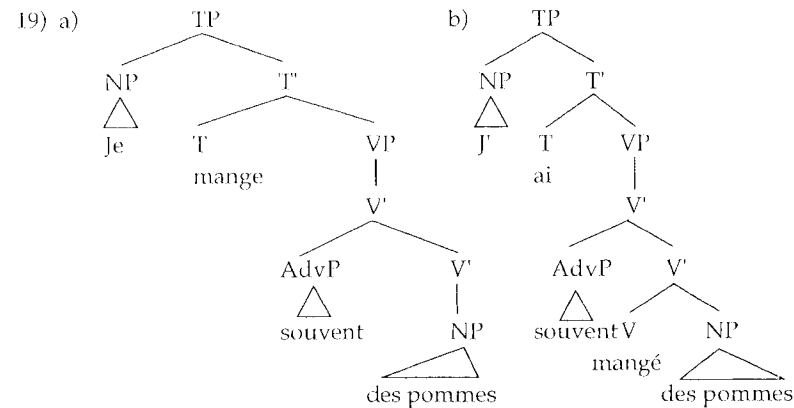
Having now quickly laid out the fundamentals of LFG (c-structure, f-structure, the lexicon, etc.), we turn to how various phenomena discussed in other parts of this book are treated in LFG.

⁵ It is worth briefly mentioning how P&P deals with these same facts. At D-structure, these units do form constituents. A transformation, known as *scrambling* (see the problem sets in chapter 11), then reorders the elements so they don't surface as constituents. Both approaches achieve essentially the same results with different underlying assumptions.

5.1 Head Mobility

In chapter 9, we analyzed alternations between the position of a tensed verb and the position of auxiliaries in languages like French, Vata, or Irish as involving head-to-head movement. In French, the main verb alternates in its position relative to adverbs, depending upon the presence or absence of an auxiliary. When an auxiliary is present, the verb stays in its base position. When there is no auxiliary, the verb moves to T. Although LFG has no movement, it has a related account of these phenomena. LFG simply posits that tensed verbs and untensed participial forms belong to different categories. This is called *head mobility*. Tensed verbs are of category T, whereas untensed forms are of category V:

- 18) a) *mange* T (\uparrow PRED) = 'eat <(\uparrow SUBJ), (\uparrow OBJ)>'
 (\uparrow TENSE) = present
 b) *mangé* V (\uparrow PRED) = 'eat <(\uparrow SUBJ), (\uparrow OBJ)>'
 c) *ai* T (\uparrow TENSE) = present⁶



You'll notice that in (19a) the VP has no head V. This is allowed in LFG, but not in P&P theory (as it violates the endocentric properties of X-bar theory).

In English, both participles and tensed verbs are of the category V; only auxiliaries are of category T:

- 20) a) *eat* V (\uparrow PRED) = 'eat <(\uparrow SUBJ), (\uparrow OBJ)>'
 (\uparrow TENSE) = present
 b) *eaten* V (\uparrow PRED) = 'eat <(\uparrow SUBJ), (\uparrow OBJ)>'
 c) *have* T (\uparrow TENSE) = present

⁶ The sentence *J'ai souvent mangé des pommes* also bears what are called aspect features. We leave these aside here.

This means that both the participle and the tensed form will appear in the VP and no outward appearance of head movement will arise.

5.2 Passives

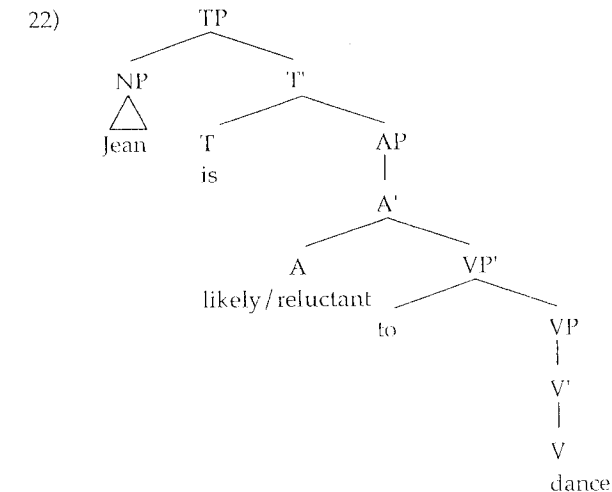
LFG's basic grammatical functions allow us to do passives in just one step, which all happens in the lexicon. In LFG there is no syntactic component to passives. Instead there is a simple lexical change associated with the passive morphology:

- 21) a) *kiss* V (\uparrow PRED) = 'kiss <(\uparrow SUBJ), (\uparrow OBJ)>'
 +en \Downarrow \Downarrow
 b) *kissed_{pass}* V (\uparrow PRED) = 'kiss < \emptyset (\uparrow SUBJ) >'

When the lexical entry in (21b) is inserted into a c-structure, the original object is directly placed into the subject position. There is no movement.

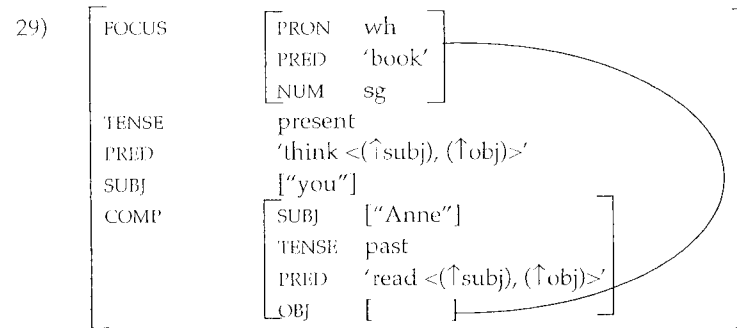
5.3 Raising and Control

Before getting into LFG's analysis of raising and control constructions, we need to introduce the theory's treatment of non-finite complements. In most versions of LFG, these are not treated as CPs. Instead, they are most often treated as VP constituents. The special category VP' has been created to host *to*. Nearly identical c-structures are used for both raising and control:



5.4 *Wh-movement: Long Distance Dependencies*

The sharing of feature structures (as expressed by the curved line) is also used to define long distance dependencies such the relationship between a *wh*-phrase and the gap (or trace) it is associated with. There is a special grammatical function: FOCUS, which is found in *wh*-constructions. I'll abstract away from the details, but in English, this function is associated with the specifier of CP. The element taking the FOCUS function must share features with some argument (this is forced on the sentence by the constraint of coherence). The following is the f-structure for the sentence *Which novel do you think Anne read?* (COMP is the function assigned tensed embedded clauses.)



The FOCUS shares the features of the OBJ function of the complement clause, indicating that they are identical.

There is much more to *wh*-dependencies in LFG than this simple picture. For example, LFG has an account of island conditions based on f-structures. There is also an explicit theory of licensing *wh*-dependencies. For more on this see the readings in the further reading section at the end of the chapter.

You can now try Challenge Problem Sets 1-3

6. CONCLUSION

This concludes our whirlwind tour of Lexical-Functional Grammar. A single chapter does not give me nearly enough space to cover the range and depth of this theory, and as such doesn't give LFG the opportunity to really shine. I've glossed over many details and arguments here, but I hope this chapter gives you enough information to pursue further reading in this alternative framework. Remember that the results derived in frameworks like LFG

can give us insights about the way human language works. If we're clever enough, we should be able to incorporate these insights into the P&P or Minimalist framework, too. Similarly, a student of LFG should be able to use the insights of Minimalism or P&P to inform their theorizing. Remember that syntactic theories are only hypotheses about the way syntax is organized. We really don't know which approach, if any of these, is right. So by looking at other theoretical approaches we question our basic assumptions, and consider new alternatives.

IDEAS, RULES, AND CONSTRAINTS INTRODUCED IN THIS CHAPTER

- i) **C-structure:** Constituent structure. The tree in LFG. Roughly equivalent to S-structure in P&P.
- ii) **Grammatical Function:** Same thing as a grammatical relation. Common grammatical functions: SUBJ = subject; OBJ = object; PRED = predicate; XCOMP = open complement (non-finite clause); COMP = closed complement (finite embedded clause); FOCUS = the function associated with *wh*-phrases
- iii) **F-structure:** The level of representation where grammatical functions are unified.
- iv) **Attribute Value Matrix (AVM):** A matrix that has an attribute (or function) on the left and its value on the right. The set of all AVMs for a sentence form the sentence's f-structure.
- v) **A-structure:** Argument structure. The LFG equivalent of the theta grid.
- vi) **Variables:** LFG uses variables (f_1, f_2, f_3, \dots , etc.) for each node on the c-structure which are used in the mapping between c-structure and f-structure.
- vii) **Functional Equation:** An equation that maps one variable to another (e.g., $(f_1 \text{ SUBJ}) = f_2$ says that f_2 maps to f_1 's SUBJ function).
- viii) **F-description:** The set of all functional equations. Defines the mapping between c-structure and f-structure.
- ix) **Annotated C-structure:** A c-structure annotated with the functional equations which map it to the f-structure.
- x) **Metavariable:** A variable over variables. \uparrow = my mother's variable, \downarrow = my variable.

- xi) $\hat{T}=\downarrow$: "All the functional information I contain, my mother also contains."
- xii) $(\hat{T}_{SUBJ})=\downarrow$, $(\hat{T}_{OBJ})=\downarrow$: "I am the subject of the node that dominates me" or "I am the object of the node that dominates me."
- xiii) **Unification**: All the features and functions associated with the f-structure must be compatible. (Similar to feature checking in P&P.)
- xiv) **Uniqueness**: In a given f-structure, a particular attribute may have at most one value.
- xv) **Completeness**: An f-structure must contain all the governable grammatical functions that its predicate governs.
- xvi) **Coherence**: All the governable grammatical functions in an f-structure must be governed by a local predicate.
- xvii) **Head Mobility**: The idea that lexical items can take different categories depending upon their features. E.g., a tensed verb in French is of category T, whereas an untensed one is a V. This derives head-to-head movement effects.
- xviii) **Lexical Rule of Passives**: Passives in LFG are entirely lexical. There is no syntactic movement:
- xix) **Open function (XCOMP)**: A function with a missing argument (e.g., a non-finite clause).
- xx) **Functional Control**: The LFG equivalent of control, indicated with a curved line linking two AVMs in an f-structure.
- xxi) **Raising vs. Control**: In LFG raising vs. control reduces to a lexical difference. The SUBJ function in raising constructions isn't thematic, but is in control constructions.

FURTHER READING

- Bresnan, Joan (2001) *Lexical-Functional Syntax*. Oxford: Blackwell.
- Dalrymple, Mary, Ronald Kaplan, John Maxwell and Annie Zaenen (eds.) (1995) *Formal Issues in Lexical-Functional Grammar*. Stanford: CSLI Publications.
- Falk, Yehuda N. (2001) *Lexical-Functional Grammar: An Introduction to Parallel Constraint-Based Syntax*. Stanford: CSLI Publications.

Kaplan, Ronald (1995) The formal architecture of Lexical-Functional Grammar. In Mary Dalrymple et al. (eds.), *Formal Issues in Lexical-Functional Grammar*. Stanford: CSLI Publications. pp. 7-27.

Kaplan, Ronald and Joan Bresnan (1982) *Lexical-Functional Grammar: A formal system for grammatical representation*. In Joan Bresnan (ed.), *The Mental Representation of Grammatical Relations*. Cambridge: MIT Press. pp. 173-281.

A lot of material on LFG can be found on the web:

<http://www.lfg.stanford.edu/lfg>

<http://www.essex.ac.uk/linguistics/LFG/>

Further reading on other theories:

Edmondson, Jerold and Donald A. Burquest (1998) *A Survey of Linguistic Theories* (3rd ed.). Dallas: Summer Institute of Linguistics.

Sells, Peter (1985) *Lectures on Contemporary Syntactic Theories*. Stanford: CSLI Publications.

GENERAL PROBLEM SET

1. ENGLISH

[Application of Skills; Intermediate]

Draw the annotated c-structures and f-structures for the following sentences. (It may also be helpful to write out lexical entries for each of the words detailing the information each word contributes):

- Susie loves the rain.
- Joan thinks that Norvin is likely to write a paper.
- What have you read?

CHALLENGE PROBLEM SETS

CHALLENGE PROBLEM SET 1: ICELANDIC (AGAIN)

[Critical Thinking; Challenge]

Go back to the questions on quirky case in Icelandic in previous chapters and review the data. These data caused problems for us with our case driven theory of movement and our theory of PRO. Do these same problems arise in LFG? Why or why not?

CHALLENGE PROBLEM SET 2: TRANSFORMATIONS OR NOT?*[Critical Thinking; Challenge]*

Construct the design for an experiment that would distinguish between a transformational approach, and a non-transformational approach like LFG.

CHALLENGE PROBLEM SET 3: WANNA-CONTRACTION*[Critical and Creative Thinking; Challenge]*

How might LFG account for *wanna*-contraction (see chapter 11) if it doesn't have movement or traces?

chapter 17

Head-Driven Phrase
Structure Grammar

0. INTRODUCTION

Another major formalism for syntactic theory is *Head-Driven Phrase Structure Grammar* or *HPSG*. HPSG is also a generative theory of grammar. It shares with P&P and LFG the goal of modeling how human language is structured in the mind. HPSG and LFG in particular have many things in common. For example they both make use of a highly enriched lexicon, and the Attribute Value Matrix (AVM) notation we saw with LFG.¹

As with our discussion of LFG, a short chapter like this cannot hope to properly cover the rich variety of work done in HPSG. In order to get a fuller picture you'll need to look at some of the primary sources of material listed in the further reading section at the end of this chapter; in particular, Sag, Wasow and Bender (2003) is a very accessible work. Another small caveat is in order before we launch into the details of the theory. For pedagogical reasons, I have couched the presentation here so that someone who has read the first 15 chapters of this book can relate the material here to what they already understand. Sometimes in order to do this, I've had to use metaphors and analogies that many practitioners of HPSG would disagree with. For example, I often state that some theoretical device in HPSG is the "equivalent" of something else in P&P or LFG. By this, I generally mean "does roughly the same kind of work;" I do not mean that they are necessarily notationally or empirically equivalent – as they are not.

¹ With some significant differences in notation and assumptions.