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Faculty of Philosophy
General Linguistics

Syntax & Semantics WiSe 2020/2021

Lecture 11: Lexical Functional Grammar I (Feature Descriptions)

15/12/2020, Christian Bentz

Overview

Organizational Note

Tutorial Week 6 is going to happen after the winter holidays (11/01-15/01/2021). The respective exercise sheets (LFG) will be handed out after the first lecture in the new year on **Thursday 7th January**.

Q&As

> *You wrote that in some syntactical frameworks, there are restrictions as to only allow bifurcation/binary branching, whereas other frameworks allow multifurcation. To my mind, bifurcation seems simpler/clearer. So I asked myself why one would like to allow multifurcation. I realized that for the example sentence, less rules are required when doing so. So is (one of) the reason(s) simplicity regarding the number of rules? Or are there other reasons? If so, what reasons?*

There is a discussion of *binary branching* in Müller (2019), p. 543 (Volume 2). One argument in favor of multifurcation is that it is hard to model the headedness relationships for multivalent verbs (e.g. ditransitives) in a strictly binary branching tree (see next slide).

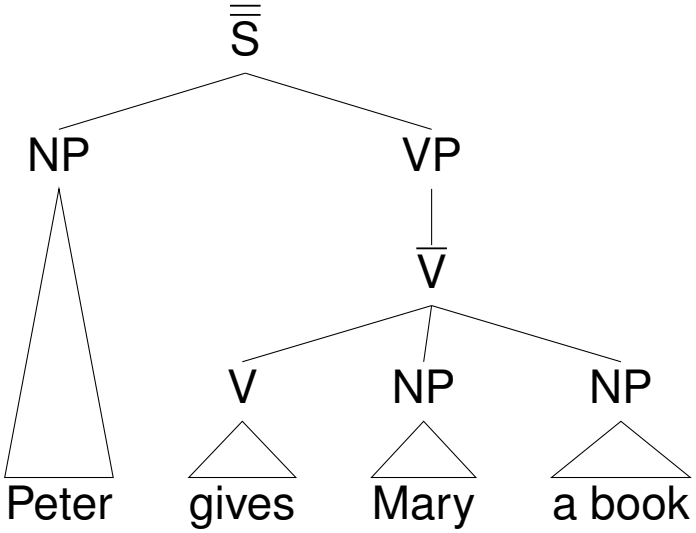
Remember from classical $\overline{X}$-theory that we have the rule:

$$\overline{\mathbf{X}} \rightarrow \mathbf{X}\ \overline{\overline{\mathbf{complement^*}}}$$

Which gives us for instance:

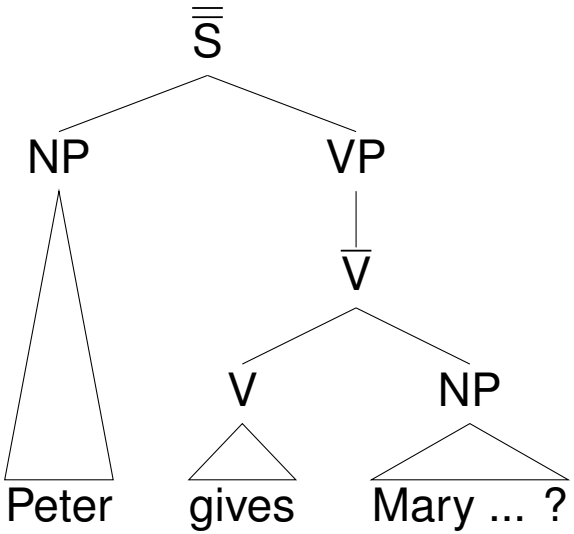
$$\overline{V} \rightarrow V\ NP\ NP$$

We can use this to model a ditransitive sentence:



Note: We didn't give the rule $\overline{\overline{S}} \rightarrow NP\ VP$ in the lecture on X-bar theory, since we did not deal with full sentences.

How would you model this under binarization?



The problem here is that you would have to posit an NP which heads another NP, but the indirect object (Mary) is generally not considered to head a constituent with the direct object (a book) as a complement. In G&B this is circumvent by having several V̄s under an IP, and by assuming a word order in deep structure which is different from surface structure (see Müller 2019, p. 111).

Q&As

> *For exercise 2.3 about passive in Government and Binding, the information in the slides was not really sufficient, since the by-phrase was not mentioned at all in the lecture and I did not even find information about it in the chapter about passive in GB in Müller. Were we supposed to research about this issue on our own?*

You should generally not assume that you can always find everything relevant for a particular task on the slides. Trying to extend a particular analysis for structures we haven't seen so far is part of what you should be able to do. Of course, then there might be different solutions, and discussing these is what tutorials are meant for.

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Section 1: Recap of Lecture 10 (G&B)

Additional Symbols in GB

Appart from the non-terminal symbols that we have introduced in the lectures on PSG and $\overline{\text{X}}$ theory,[1] there are further symbols introduced within GB. These are in particular:

- C: *Complementizer* (subordinating conjunctions such as *that*)
- I: *Finiteness* (as well as Tense and Mood); also *Infl* for *Inflection* in earlier work, and *T* for *Tense* in more recent work.
- D: *Determiner* (article, demonstrative); though this is equivalent to the symbol DET that we used before.

Müller (2019). Grammatical theory, p. 95.

[1] Note that the transition from $\overline{\text{X}}$ theory to GB is not clear cut, such that certain notational conventions can be found in both.

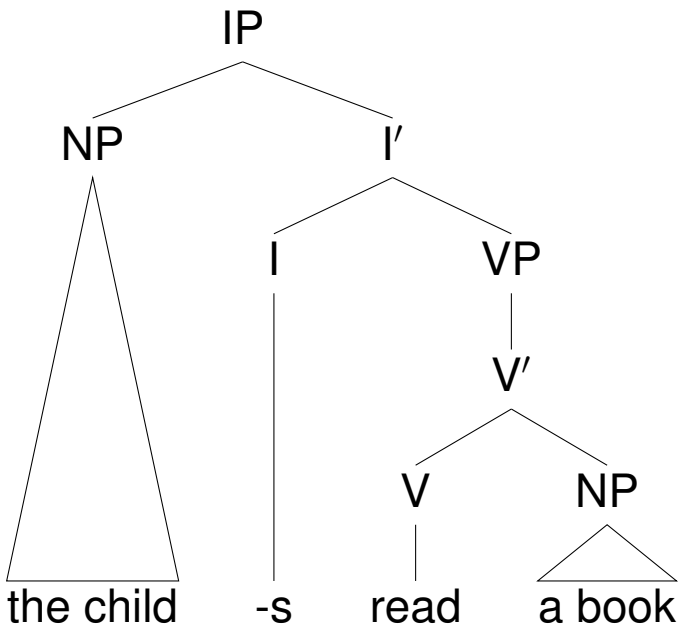
The CP and IP (and VP)

However, remember from last lecture on X-bar theory that in order to capture the recursive nature of human language there have to be rules with the same category symbol on the left- and right-hand side (e.g. $\overline{\text{N}} \rightarrow \text{A}\ \overline{\text{N}}$). Chomsky therefore introduced the **Complementizer Phrase (CP)** and the **Inflectional Phrase (IP)** as layers *above* the verb phrase such that:

1. $\text{CP} \rightarrow \text{C}'$
2. $\text{CP} \rightarrow \text{NP}\ \text{C}'$
3. $\text{C}' \rightarrow \text{C}\ \text{IP}$
4. $\text{IP} \rightarrow \text{NP}\ \text{I}'$
5. $\text{I}' \rightarrow \text{I}\ \text{VP}$
6. $\text{VP} \rightarrow \text{V}'$
7. $\text{V}' \rightarrow \text{V}\ \text{CP}$
8. $\text{V}' \rightarrow \text{V}\ \text{NP}$

Inflectional Phrase

Just as in X-bar theory, we have unary branches from highest level projections to intermediate level projections if there are no other elements involved in the phrase (e.g. VP $\rightarrow$ V′). Also, the subject (the child) is considered the **specifier** of the IP (often referred to as SpecIP), and the object *a book* is the **complement** of the IP.



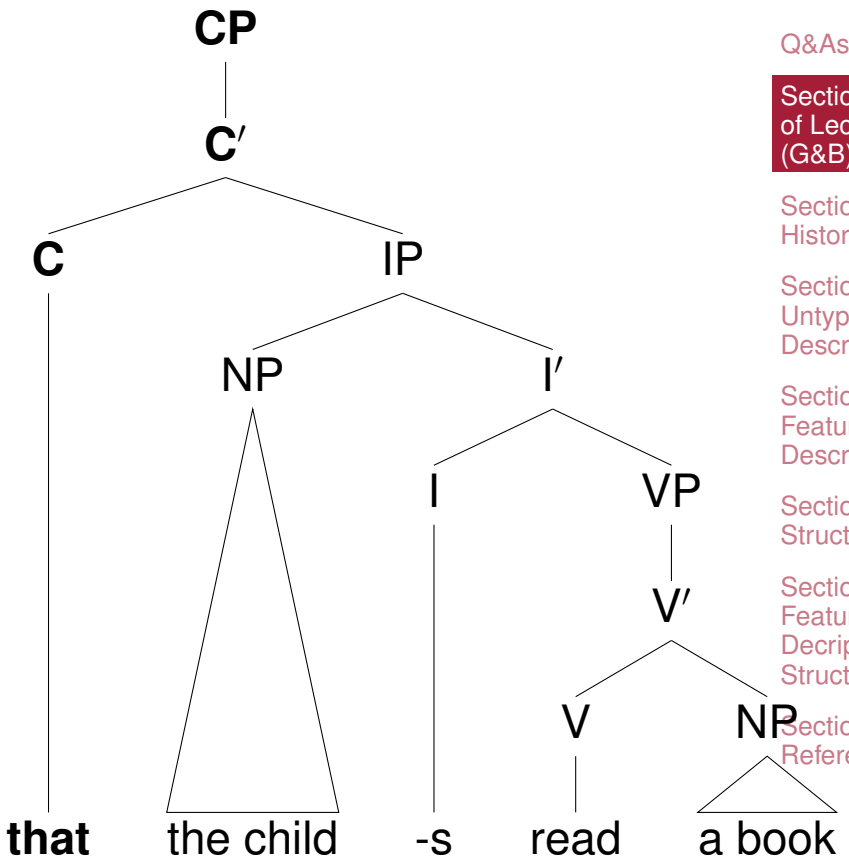
Important Take-Home-Message

As this example of inverted linear order (*-s visit*) shows, syntacticians – in the tradition of generative grammar – have grown accustomed to deviations between so-called *Deep Structure* (e.g. INFL VP) and *Surface Structure* (e.g. *visit-s*). This is seen as a necessary prerequisite for fitting all possible grammatical sentences of a given language into the same underlying mould.

Complementizer Phrase

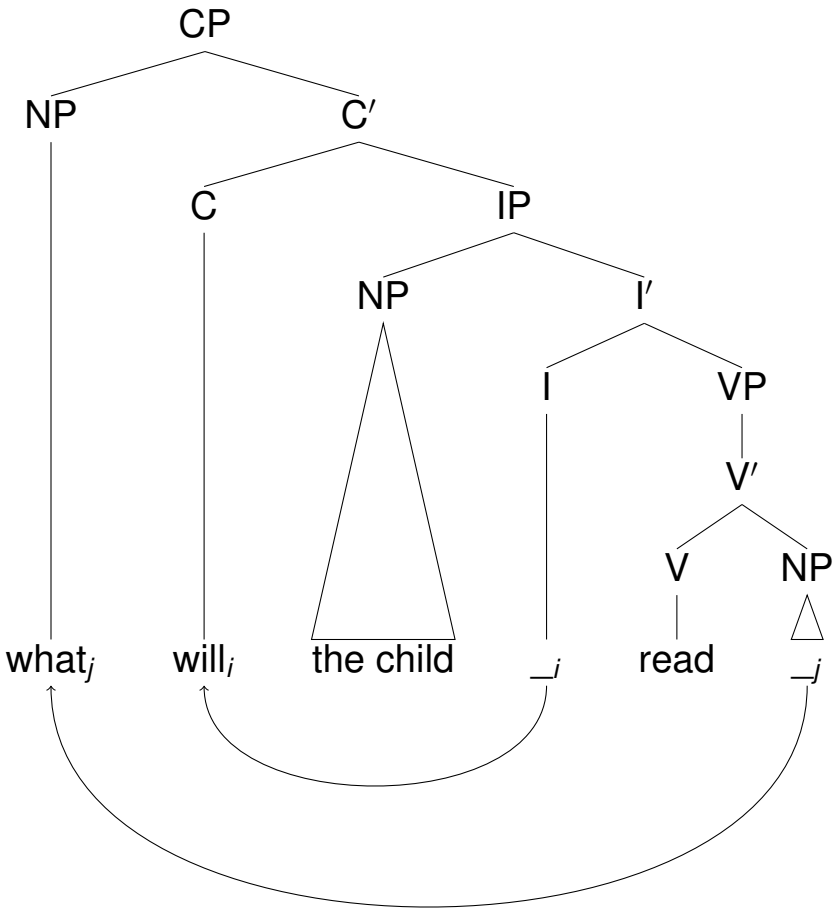
The CP is yet another level above the VP. It is relevant when a complementizer is used, but also for other syntactic phenomena, as we will see in the next section.

Note: The IP symbol essentially replaces the starting symbol S in GB analyses. Of course, we could keep the starting symbol and rewrite it into IP, but this would be somewhat redundant.



Wh-Questions

In wh-questions, it is assumed that the wh-word is in the complement position of the verb phrase in deep structure (i.e. *what* → *the book*). It then moves to the NP position of the CP to form the surface structure realization.



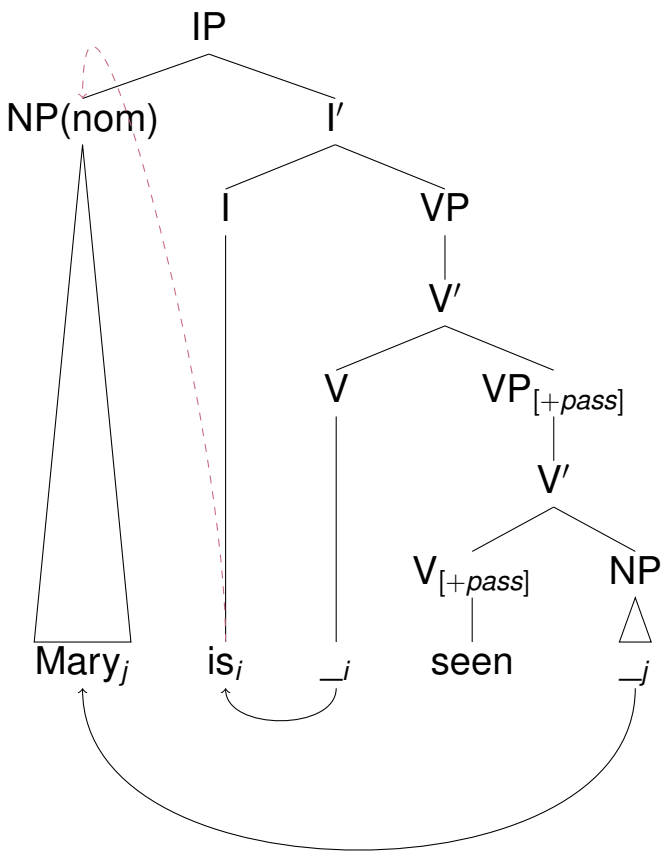
Passive (S-Structure)

In the corresponding **passive sentence**, firstly, the subject of the active sentence is cancelled. This allows for the accusative object of the active sentence to move into the NP position of the IP. Also, a new verb (is) is "recruited" from the lexicon. This is enabled by the additional rewrite rule:

9. $V' \rightarrow V\ VP$

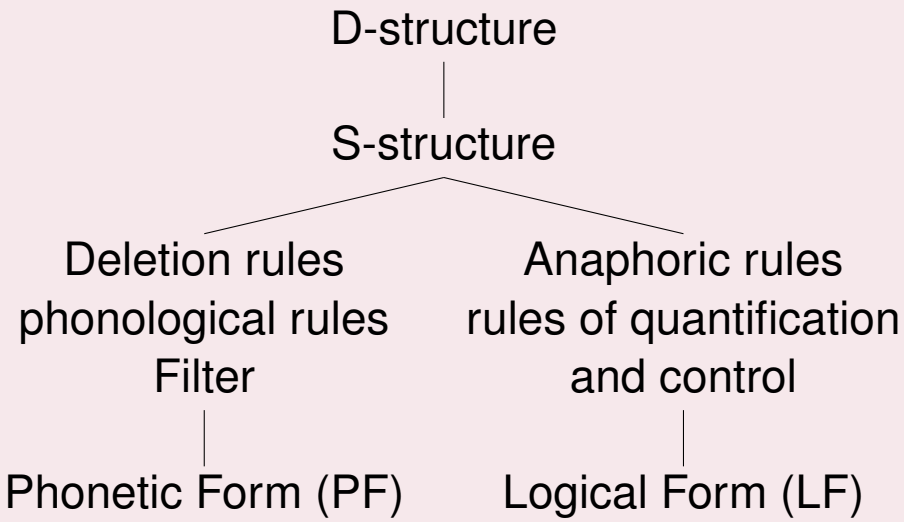
Hence, nominative case is then assigned by the auxiliary *is* to the new subject. Accusative case is "absorbed", i.e. not assigned anymore.

see also Black (1999), p. 30-31



The T Model

The T (Y) model (called by its shape when you invert it) is a schematic representation of all the underlying processes assumed for generating well formed sentences in GB theory.



Müller (2019). Grammatical theory, p. 88.

Important Take-Home-Message

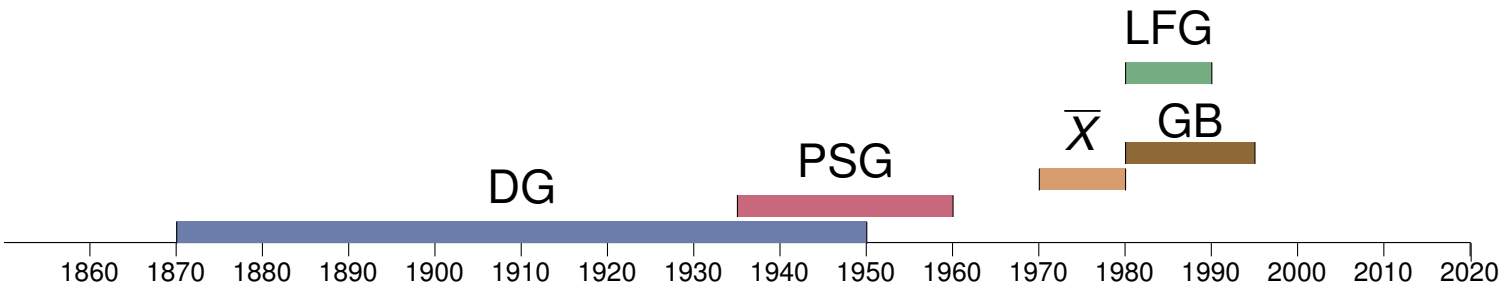
What is called *S-structure* or *surface structure* in GB theory is not necessarily the actual string of characters or phonemes that you might read or hear. Rather, there are two further levels which intervene between S-structure and the actual phonetic realization. For instance deletions and phonetic rules might still apply.

Section 2: Historical Notes

Historical Perspective

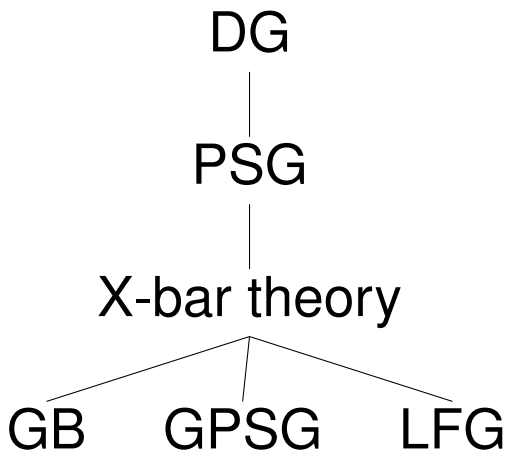
"Lexical Functional Grammar (LFG) was developed in the 80s by Joan Bresnan and Ron Kaplan (Bresnan & Kaplan 1982). LFG forms part of so-called West-Coast linguistics: unlike MIT, where Chomsky works and teaches, the institutes of researchers such as Joan Bresnan and Ron Kaplan are on the west coast of the USA [...]. Bresnan & Kaplan (1982) view LFG explicitly as a psycholinguistically plausible alternative to transformation-based approaches."

Müller (2019). Grammatical theory, p. 222.



Note: The chronology bars indicate the rough time period where the first and foundational works relating to a framework were published. All of the theories discussed here still have repercussions also in current syntactic research.

Syntactic Framework Tree

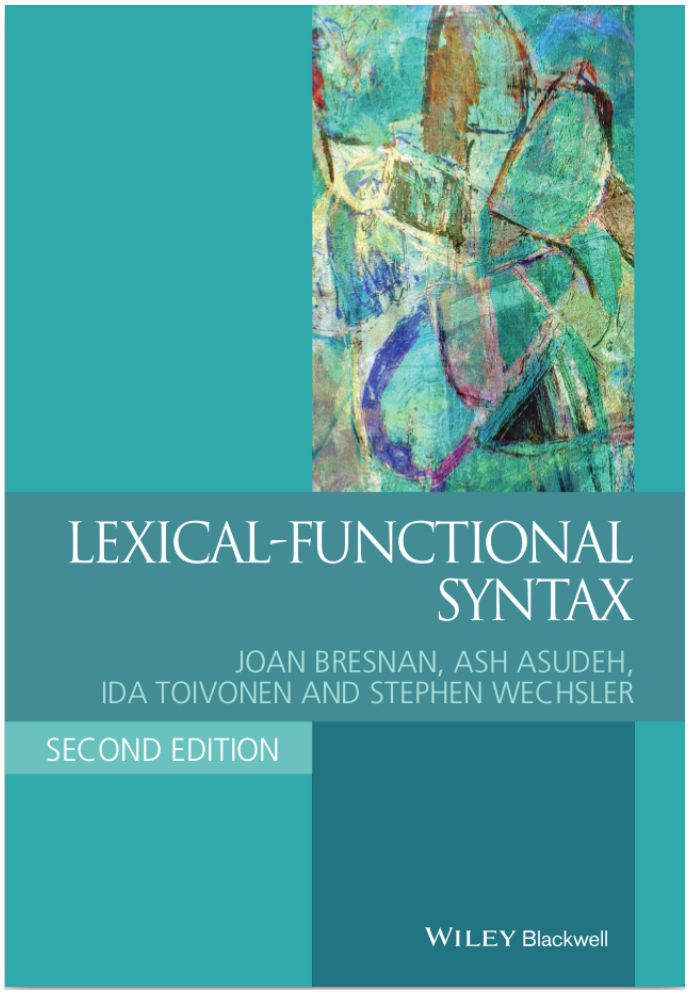


DG: Dependency Grammar
PSG: Phrase Structure Grammar
GB: Government & Binding
GPSG: Generalized Phrase Structure Grammar
LFG: Lexical Functional Grammar

What is LFG?

"LFG (lexical-functional grammar) 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 [...]"

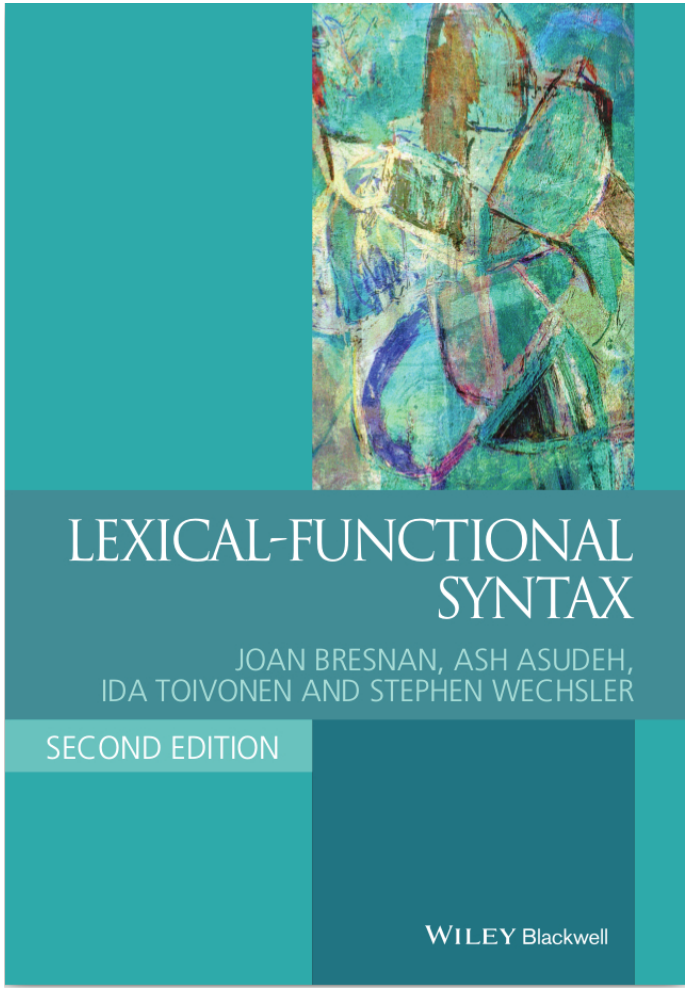
Bresnan et al. (2016).
Lexical-Functional Syntax, p. xi.



How is it different?

- "LFG is closely attuned to the **overt perceptible expressions** of language [...]"
- "[...] there are **no 'deep structures'** or 'initial structures.'"
- "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."

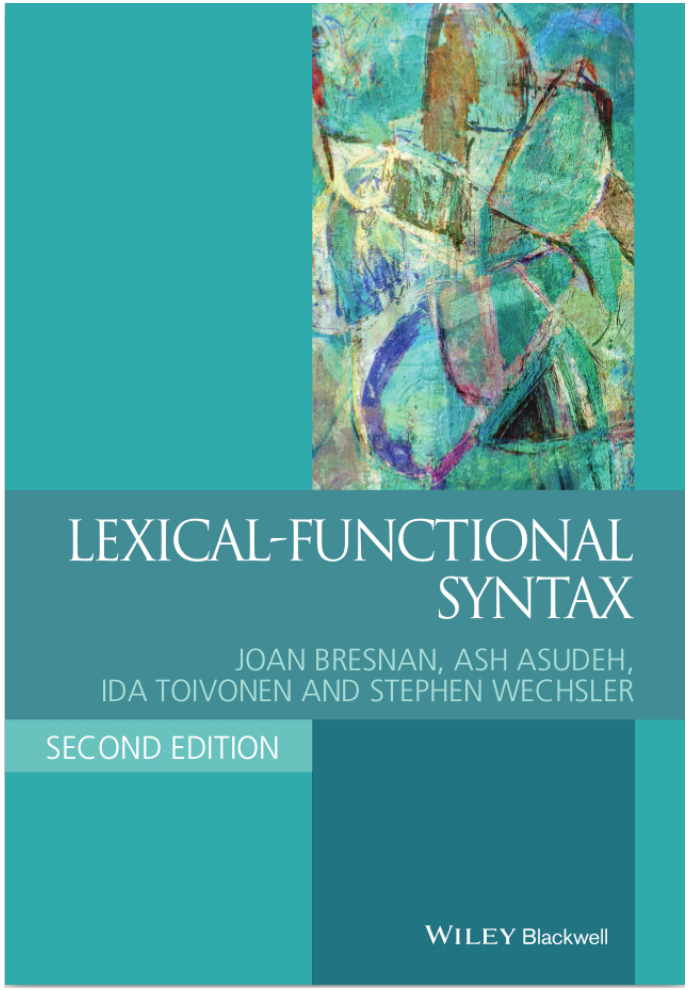
Bresnan et al. (2016).
Lexical-Functional Syntax, p. xi.



Psycholinguistic Plausibility

"LFG has attracted interest beyond linguistics proper, and has been incorporated into psychological theories of language acquisition, perception, and production, as well as into computational systems of language processing."

Bresnan et al. (2016).
Lexical-Functional Syntax, p. 85.



Languages analyzed by LFG

Arabic, Arrernte, **Bengali**, **Danish**, **English**, **French**, Georgian, **German**, Hungarian, Indonesian, **Italian**, **Irish**, Japanese, Korean, Malagasy, Mandarin Chinese, Murrinh-Patha, **Norwegian**, **Polish**, **Portuguese**, **Spanish**, Tigrinya, Turkish, **Urdu/Hindi**, **Welsh**, Wolof

According to Müller (2019). Grammatical theory, p. 222.

Language Families[2]

Afro-Asiatic, Austronesian, Atlantic-Congo, **Indo-European**, Japonic, Kartvelian, Pama-Nyungan, Sino-Tibetan, Southern Daly, Turkic, Uralic

[2] According to Glottolog 4.0, https://glottolog.org/.

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Section 3: Untyped Feature Descriptions

Feature Descriptions

"In the previous chapter, we talked about sets of feature-value pairs, which can be used to describe linguistic objects. In this chapter, we will introduce feature descriptions which play a role in theories such as LFG, HPSG, Construction Grammar, versions of Categorial Grammar and TAG (and even some formalizations of Minimalist theories (Veenstra 1998)). This chapter will therefore lay some of the groundwork for the chapters to follow."

Müller (2019). Grammatical theory, p. 206.

Beware Terminological Confusion

"**Feature structures** are complex entities which can model properties of a linguistic object. Linguists mostly work with **feature descriptions** which describe *only parts of a given feature structure*."

Müller (2019). Grammatical theory, p. 206.

Alternative terms for *feature structures*:

- feature-value structure
- attribute-value structure

Alternative terms for *feature descriptions*:

- attribute-value matrix (AVM)
- feature matrix

Untyped Feature Descriptions

A typical example of **untyped feature descriptions** are matrices that contain inflectional information of a given word form. In this particular context, the *feature values* are often given without the *feature labels*, since there is little syncretism between feature values which could make them ambiguous.

Example from GB theory (Lecture 7):

$$\textit{drank}: \begin{bmatrix} +\textit{past} \\ 3\textit{pers} \\ +\textit{sg} \end{bmatrix}.$$

Notational Conventions

However, to be maximally specific we will here use *upper case letters* for **feature labels**, and *lower case italics* for **feature values**, and always give both in the feature descriptions.

Example from Müller describing a person:

$$\begin{bmatrix} \text{FIRSTNAME} & \textit{max} \\ \text{LASTNAME} & \textit{meier} \\ \text{DATE-OF-BIRTH} & \textit{10.10.1985} \end{bmatrix}$$

Example from above for *drank*:

$$\begin{bmatrix} \text{TENSE} & \textit{past} \\ \text{PERSON} & \textit{3} \\ \text{NUMBER} & \textit{sg} \end{bmatrix}$$

Glossing and Feature Descriptions

Note that the **glossings** we find in grammatical example sentences can be directly *translated into feature descriptions*. We therefore might assume that if there is a gloss, then this is relevant grammatical information that should go into a feature description, while if there is none, then the feature description is basically empty.

Ayacucho Quechua (quy, Quechuan)

(1) wayna runa mikuy-ta yanu-n
young man.NOM.SG food-ACC cook-PRS.3SG
"The young man cooks the food."

Example

Glossing:

(2) wayna runa mikuy-ta yanu-n
young man.NOM.SG food-ACC.SG cook-PRS.3SG
“The young man cooks the food.”

Feature Description:

wayna:
[]

runa:
$$\begin{bmatrix} \text{CASE} & \textit{nom} \\ \text{NUMBER} & \textit{sg} \end{bmatrix}$$

mikuy-ta:
$$\begin{bmatrix} \text{CASE} & \textit{acc} \\ \text{NUMBER} & \textit{sg} \end{bmatrix}$$

yanu-n:
$$\begin{bmatrix} \text{NUMBER} & \textit{sg} \\ \text{PERSON} & \textit{3} \\ \text{TENSE} & \textit{prs} \end{bmatrix}$$

Note: Henceforth, we will order the feature-value pairs alphabetically inside the matrix from top to bottom.

Empty Morphemes

In some theories of morphology, **empty morphemes** are posited (in parallel to empty slots in a tree structure as discussed in the lecture on GB) whenever there is no overt morphological marker for a grammatical function which *in theory* should be there. This could be represented by a feature label without value in the feature description matrix...

runa-∅-ta
man-∅-ACC

$$\begin{bmatrix} \text{NUMBER} & \_ \\ \text{CASE} & \textit{acc} \end{bmatrix}$$

runa-kuna-ta
man-PL-ACC

$$\begin{bmatrix} \text{NUMBER} & \textit{pl} \\ \text{CASE} & \textit{acc} \end{bmatrix}$$

Empty Morphemes

... However, emtpy features **are not considered here in feature descriptions**. As an alternative, we might assume that the lack of a marker means that all *theoretically possible* grammatical functions are possible, except the one that is not explicitely marked. For Ayacucho Quechua, there is an overt plural marker, but no overt singular marker. Hence, whenever the plural marker is lacking, singular is assumed as the NUMBER value.

runa-ta
man-ACC.SG

$$\begin{bmatrix} \text{NUMBER} & sg \\ \text{CASE} & acc \end{bmatrix}$$

runa-kuna-ta
man-PL-ACC

$$\begin{bmatrix} \text{NUMBER} & pl \\ \text{CASE} & acc \end{bmatrix}$$

Note: in the glossing, this is then often represented by using a dot (ACC.SG), which according to the Leipzig glossing rules indicates that a marker (i.e. -ta) is assigned both singular number and accusative case. Another option would be to just drop the SG glossing.

Syncretism

A problem related to empty morphemes is so-called **syncretism** of word forms. We can construe inflectional paradigms by assuming certain theoretical features like CASE, NUMBER, GENDER, etc. The theoretical grids can then be filled by the actual word forms used for these grammatical feature combinations. However, the set of different word types rarely matches these grids exactly in the sense that each cell would be filled by a different word type. We talk about a form being *syncretic* if it fills different cells.

Paradigm for *Frau* 'woman':

	NOM	**ACC**	**DAT**	**GEN**
SG	Frau	Frau	Frau	Frau
PL	Frauen	Frauen	Frauen	Frauen

Paradigm for *Mann* 'man':

	NOM	**ACC**	**DAT**	**GEN**
SG	Mann	Mann	Mann	Mannes
PL	Männer	Männer	Männern	Männer

Syncretism and Disjunction

In feature descriptions, **each word form gets a separate description**. If there is syncretism across a whole feature (i.e. all forms for the values of CASE are the same), then the feature can be dropped. If there is only partial syncretism, then it is indicated by using disjunction, i.e. the 'or' symbol $\vee$.

Word form: *Frau*

$$\begin{bmatrix} \text{NUMBER} & sg \end{bmatrix}$$

Word form: *Frauen*

$$\begin{bmatrix} \text{NUMBER} & pl \end{bmatrix}$$

Word form: *Mann*

$$\begin{bmatrix} \text{CASE} & nom \vee acc \vee dat \\ \text{NUMBER} & sg \end{bmatrix}$$

Word form: *Mannes*

$$\begin{bmatrix} \text{CASE} & gen \\ \text{NUMBER} & sg \end{bmatrix}$$

Word form: *Männer*

$$\begin{bmatrix} \text{CASE} & nom \vee acc \vee gen \\ \text{NUMBER} & pl \end{bmatrix}$$

Word form: *Männern*

$$\begin{bmatrix} \text{CASE} & dat \\ \text{NUMBER} & pl \end{bmatrix}$$

Note: we could also take grammatical gender into account to the effect that GENDER would always be *fem* for Frau and Frauen, and *masc* for *Mann* and *Männer*. Similarly, PERSON features could be included, i.e. the value would be 3 in all cases.

Disjunction: Alternative Notation

Instead of working with disjunctions inside the feature discriptions, we could also consider to have separate feature descriptions and then apply disjunctions to these.

Word form: *Mann*

$$\begin{bmatrix} \text{CASE} & \textit{nom} \\ \text{NUMBER} & \textit{sg} \end{bmatrix} \vee \begin{bmatrix} \text{CASE} & \textit{acc} \\ \text{NUMBER} & \textit{sg} \end{bmatrix} \vee \begin{bmatrix} \text{CASE} & \textit{dat} \\ \text{NUMBER} & \textit{sg} \end{bmatrix}$$

Embedding

One feature description might be embedded in another feature description, as in the example below from Müller (2019), p. 206.

FIRSTNAME	*max*
LASTNAME	*meier*
DATE-OF-BIRTH	*10.10.1985*
FATHER	FIRSTNAME peter LASTNAME meier DATE-OF-BIRTH 10.05.1960 FATHER ... MOTHER ...
MOTHER	...

Paths

"In feature descriptions, a *path* is a sequence of features which immediately follow each other. The *value of a path* is the feature description at the end of the path. Therefore, the value of FATHER|DATE-OF-BIRTH is *10.05.1960*."

Müller (2019), p. 206.

FIRSTNAME	*max*	
LASTNAME	*meier*	
DATE-OF-BIRTH	*10.10.1985*	
FATHER	FIRSTNAME	peter
	LASTNAME	meier
	DATE-OF-BIRTH	10.05.1960
	FATHER	...
	MOTHER	...
MOTHER	...	

Embedding: Linguistic Example

A linguistic example of embeddings of feature descriptions is *derivational morphology*, which can create a new word form out of a word form that functions as a stem for derivational affixes.

Word form: *help*

$$\begin{bmatrix} \text{POS} & \textit{noun} \vee \textit{verb} \end{bmatrix}$$

Word form: *helpful*

$$\begin{bmatrix} \text{POS} & \textit{adj} \\ \text{STEM} & \begin{bmatrix} \text{POS} & \textit{noun} \vee \textit{verb} \end{bmatrix} \end{bmatrix}$$

Embedding: Linguistic Example

A linguistic example of embeddings of feature descriptions is *derivational morphology*, which can create a new word form out of a word form that functions as a stem for derivational affixes.

Word form: *unhelpful*

$$\begin{bmatrix} \text{POS} & \textit{adj} \\ \text{STEM} & \begin{bmatrix} \text{POS} & \textit{adj} \\ \text{STEM} & \begin{bmatrix} \text{POS} & \textit{noun} \vee \textit{verb} \end{bmatrix} \end{bmatrix} \end{bmatrix}$$

Embedding: Linguistic Example

A linguistic example of embeddings of feature descriptions is *derivational morphology*, which can create a new word form out of a word form that functions as a stem for derivational affixes.

Word form: *unhelpfully*

$$\begin{bmatrix} \text{POS} & \textit{adv} \\ \text{STEM} & \begin{bmatrix} \text{POS} & \textit{adj} \\ \text{STEM} & \begin{bmatrix} \text{POS} & \textit{adj} \\ \text{STEM} & \begin{bmatrix} \text{POS} & \textit{noun} \vee \textit{verb} \end{bmatrix} \end{bmatrix} \end{bmatrix} \end{bmatrix}$$

Lists

In some cases, it is not just a single value that a feature can take, but rahter several values. Therefore, we can use a **list of feature values** as in the example below from Müller (2019), p. 207. Note that a list is *different from disjunction*, since the former is essentially an 'and' statement, whereas the latter is an 'or' statement.

$$\begin{bmatrix} \text{FIRSTNAME} & \textit{max} \\ \text{LASTNAME} & \textit{meier} \\ \text{DATE-OF-BIRTH} & \textit{10.10.1985} \\ \text{FATHER} & \ldots \\ \text{MOTHER} & \ldots \\ \text{DAUGHTER} & \left\langle \begin{bmatrix} \text{FIRSTNAME} & \textit{clara} \\ \text{LASTNAME} & \textit{meier} \\ \text{DATE-OF-BIRTH} & \textit{10.10.2004} \\ \text{FATHER} & \ldots \\ \text{MOTHER} & \ldots \\ \text{DAUGTHER} & \langle\rangle \end{bmatrix} \right\rangle \end{bmatrix}$$

Lists: Linguistic Examples

Going beyond the word level, we might want to capture the feature description, for example, of whole phrases such as *the green house*. In this particular example, we assume a HEAD feature for *house*, and a list of feature descriptions for the *complements* (COMP).[3]

phrase: *the green house*

$$\begin{bmatrix} \text{HEAD} & \begin{bmatrix} \text{POS} & \textit{noun} \\ \text{CASE} & \textit{nom} \vee \textit{acc} \vee \textit{dat} \\ \text{NUMBER} & \textit{sg} \end{bmatrix} \\ \text{COMP} & \left\langle \begin{bmatrix} \text{POS} & \textit{det} \end{bmatrix}, \begin{bmatrix} \text{POS} & \textit{adj} \end{bmatrix} \right\rangle \end{bmatrix}$$

[3]Note that we use *complement* here in a general sense, i.e. everything which is not the head of the phrase. This is similar to what we will see in Head-Driven Phrase Structure Grammar, though in HPSG the article would be called a *specifier*.

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Section 4: Typed Feature Descriptions

Types

In so-called **typed feature descriptions** the type determines the template of feature labels that can (but do not have to be) filled with values.

Müller (2019), p. 208.

Feature structure of the type *person*:

person	
FIRSTNAME	*firstname*
LASTNAME	*lastname*
DATE-OF-BIRTH	*date*
GENDER	*gender*
FATHER	*person*
MOTHER	*person*
CHILDREN	*list of person*

Types & Atomic Types (Values)

Note that both the *type* and the *feature values* are written in lower case italics. This is not a coincidence, since feature values are also types, though without any further features subcategorized under them. They are hence called **atomic types**.

Feature structure of the type *person*:

person	
FIRSTNAME	***firstname***
LASTNAME	***lastname***
DATE-OF-BIRTH	***date***
GENDER	***gender***
FATHER	***person***
MOTHER	***person***
CHILDREN	***list of person***

Typed Feature Descriptions: Linguistic Example

When we deal, for instance, with *word forms* in our linguistic analyses, we might define a feature structure for the type *word*. Note, however, that the content of this structure is dependent on the theory we adopt, and the particular language we analyze.

Possible feature structure of the type *word*:

word	
ASPECT	*aspect*
BOUNDEDNESS	*boundedness*
CASE	*case*
GENDER	*gender*
MOOD	*mood*
NUMBER	*number*
PERSON	*person*
POS	*pos*
TENSE	*tense*
etc.	

Note: BOUNDEDNESS is here introduced to distinguish between *morphemes* and *words*, morphemes are *bound*, words are *unbounded* (according to the traditional definition.)

Important Question

Should we deal with differences between parts-of-speech at the level of *types* or at the level of *features*? – We will here take POS as separate types with their own feature structures.

Feature structure of the type *word*:

word	
ASPECT	*aspect*
BOUNDEDNESS	*boundedness*
CASE	*case*
GENDER	*gender*
MOOD	*mood*
NUMBER	*number*
PERSON	*person*
POS	***pos***
TENSE	*tense*
etc.	

Feature structure of the type *noun*:

noun	
BOUNDEDNESS	*boundedness*
CASE	*case*
GENDER	*gender*
NUMBER	*number*
PERSON	*person*
etc.	

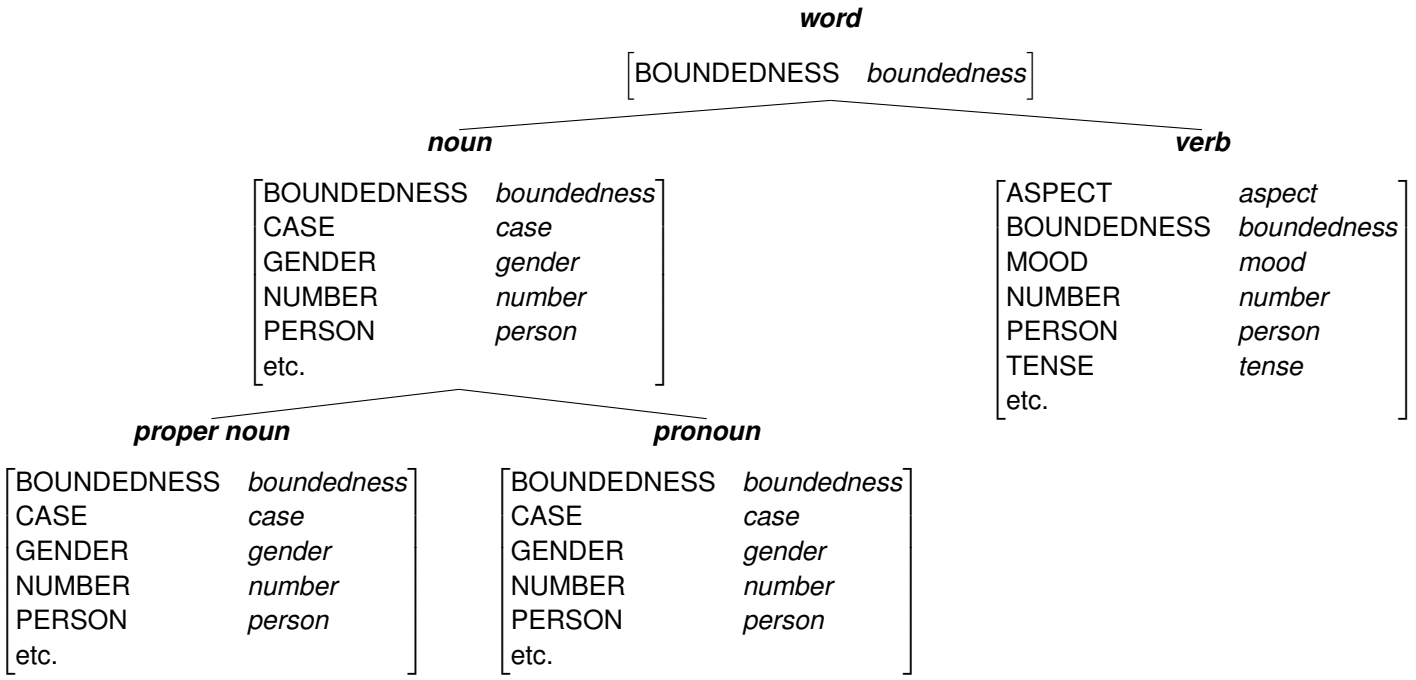
Feature structure of the type *verb*:

verb	
ASPECT	*aspect*
BOUNDEDNESS	*boundedness*
MOOD	*mood*
NUMBER	*number*
PERSON	*person*
TENSE	*tense*
etc.	

Note: In fact, if we decide to deal with POS at the level of types, then the type *word* would not have to contain all the POS specific features anymore, but just the BOUNDEDNESS feature. See type hierarchy on the next slide.

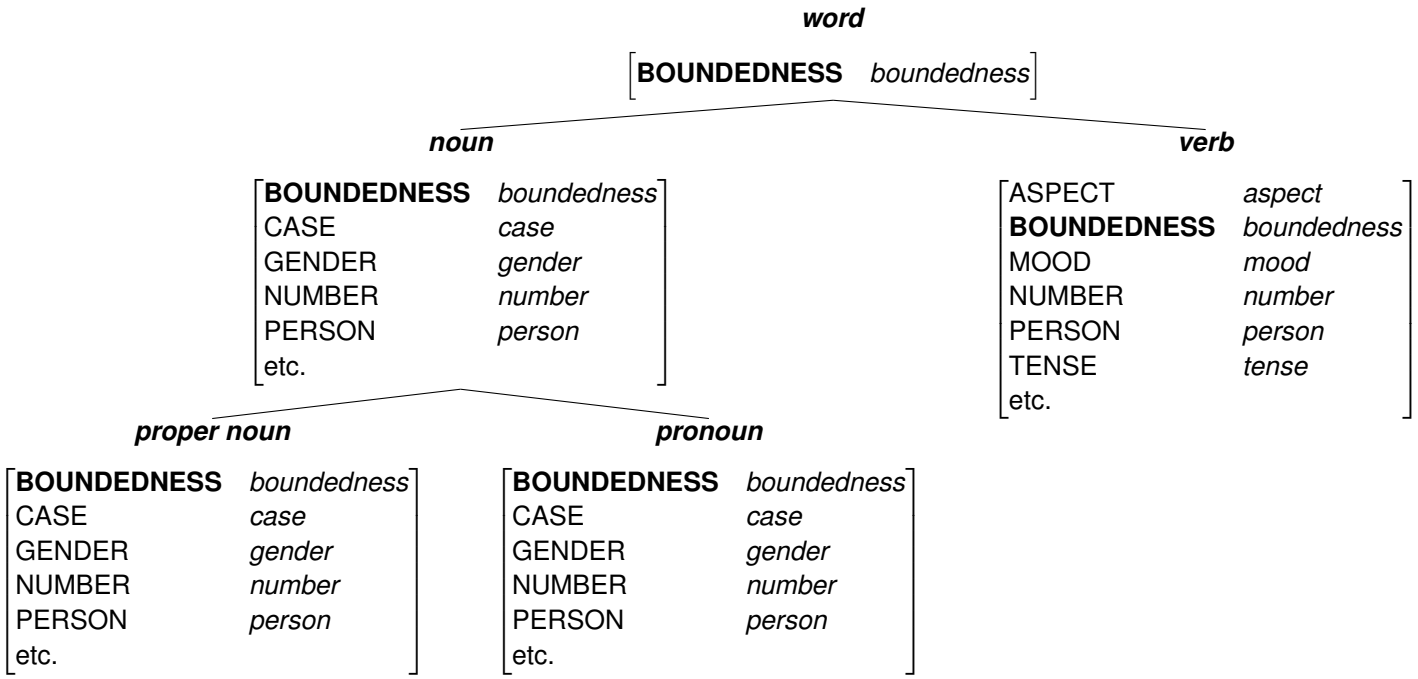
Type Hierarchies

Type hierarchies display the hierarchical relationships between different types, i.e. they display which type is a *subordinate* or *superordinate* of which other type.



Inheritance

Subordinate types **"inherit"** the features of their superordinate types. E.g. the feature BOUNDEDNESS is *multiply inherited* to all the subordinate types in this tree. It is the feature that all words share.



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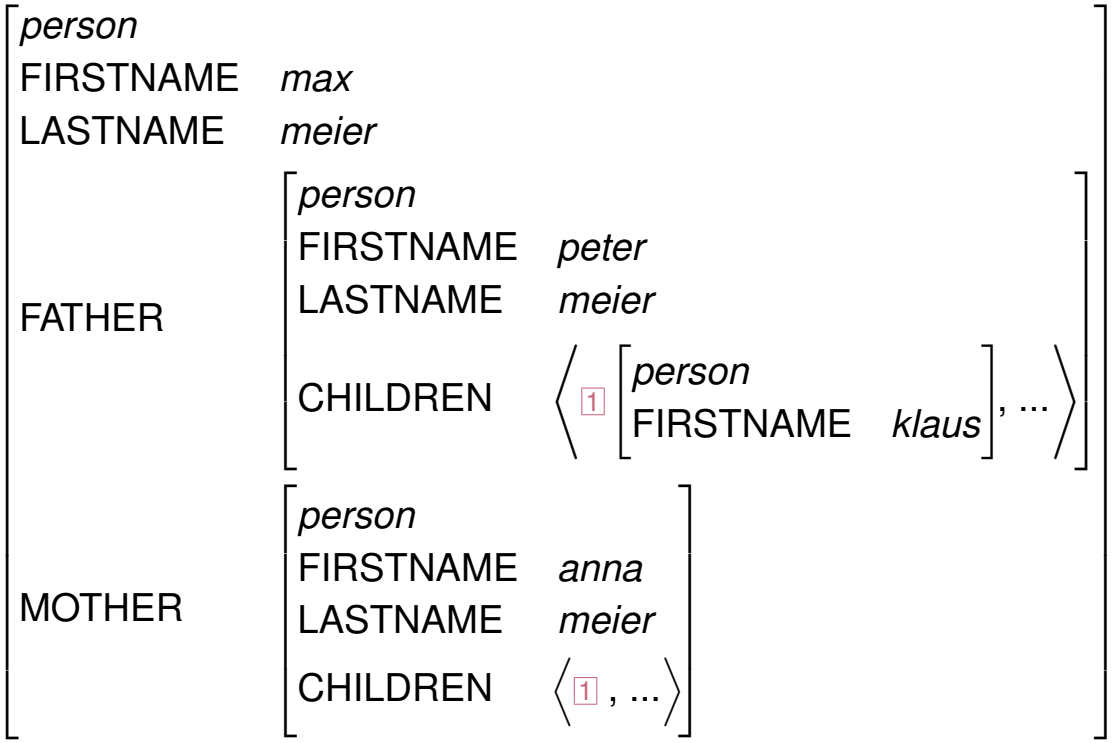
Section 5: Structure Sharing

Structure Sharing

Structure sharing can be used to indicate that an *identical feature structure* is used in different parts of the feature description.

Müller (2019), p. 211.



Structure Sharing: Lingustic Example

A linguistic example of structure sharing is **agreement**. In the example below, between determiner, adjective and noun in German.

phrase: *das grüne Haus*

$$\begin{bmatrix} \textit{phrase} & & \\ \text{HEAD} & \begin{bmatrix} \textit{noun} & \\ \text{CASE} & \boxed{1}\ \textit{nom} \vee \textit{acc} \\ \text{GENDER} & \boxed{2}\ \textit{neut} \\ \text{NUMBER} & \boxed{3}\ \textit{sg} \end{bmatrix} & \\ \text{COMP} & \left\langle \begin{bmatrix} \textit{determiner} & \\ \text{CASE} & \boxed{1} \\ \text{GENDER} & \boxed{2} \\ \text{NUMBER} & \boxed{3} \end{bmatrix}, \begin{bmatrix} \textit{adjective} & \\ \text{CASE} & \boxed{1} \\ \text{GENDER} & \boxed{2} \\ \text{NUMBER} & \boxed{3} \end{bmatrix} \right\rangle \end{bmatrix}$$

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Section 6: Feature Decriptions and Structures

Difference: Feature Descriptions and Structures

"If we return to the example with people from the previous sections, we can capture the difference between a **model [feature structure]** and a **[feature] description** as follows: if we have a model of people that includes first name, last name, date of birth, gender and hair color, then it follows that every object we model also has a birthday. We can, however, decide to omit these details from our descriptions if they do not play a role for stating constraints or formulating searches."

Müller (2019), p. 217.

Feature structure
assumed for the word *Frau*:

$$\begin{bmatrix} \textit{noun} & \\ \text{CASE} & \textit{case} \\ \text{GENDER} & \textit{gender} \\ \text{NUMBER} & \textit{number} \\ \text{PERSON} & \textit{person} \\ \text{etc.} & \end{bmatrix}$$

Feature description
assumed for the word *Frau*:

$$\begin{bmatrix} \textit{noun} & \\ \text{GENDER} & \textit{fem} \\ \text{NUMBER} & \textit{sg} \\ \text{etc.} & \end{bmatrix}$$

Section 7: References

References

Black, Cheryl A. (1999). *A step-by-step introduction to the Government and Binding theory of syntax*. SIL.

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Müller, Stefan. 2019. *Grammatical theory: From transformational grammar to constraint-based approaches. Third revised and extended edition.* ***Volume I***. Berlin: Language Science Press.

Thank You.

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