

Parallelity, modularity, psychological reality: crucial notions at the interfaces

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London, May 2016

This talk

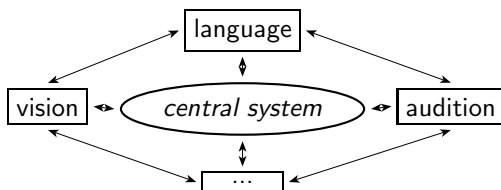
- Grammar architecture
- In general: The relationship between modules
- In particular: The relationship between c-structure and p-structure
 - 1 Introduction to my approach to the syntax→prosody interface
 - 2 Comment on the prosody→syntax interface (German case ambiguities)
 - 3 Critical cases: Bulgarian pronominal clitics and linear order
- Underlying motivation for the approach: computationally implementable *but also* in line with psycholinguistic assumptions
- Two important notions here are ‘modularity’ and ‘parallelity’

Modularity

- Concept greatly influenced by research into the decomposition of the mind/the brain into faculties
- Fodor (1983) assumes that modules are
 - specialised, high-speed computational systems
 - process a given input and provide an output according to module-specific vocabulary and principles
 - each module is encapsulated/isolated
 - when the computation within one module is completed:
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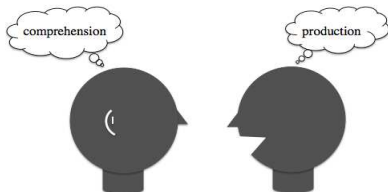
(and many more)

Modularity and language

- Does 'language' in itself also consists of modules? And if yes:
- Are these modules
 - isolated/encapsulated, contributing 'in parallel' to a language-internal 'central system', or
 - are they rather positioned in a linear order between FORM and MEANING, feeding into each other?

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- Does 'language' in itself also consists of modules? And if yes:
- Are these modules
 - isolated/encapsulated, contributing 'in parallel' to a language-internal 'central system', or
 - are they rather positioned in a linear order between FORM and MEANING, feeding into each other?
- And how can these two approaches account for the two processing tasks that any act of language belongs to:
 - 1 production (from meaning to form - generation in computational terms)
 - 2 comprehension (from form to meaning - parsing in computational terms)

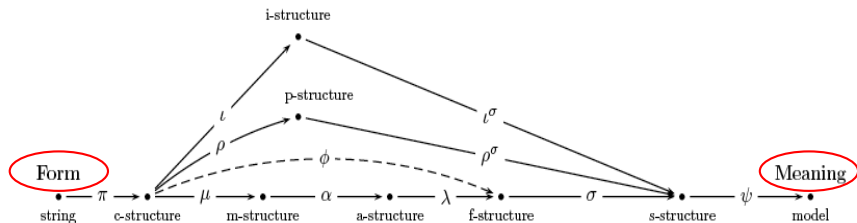


Modularity and language

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Modularity and language

- This question is not openly discussed (or answered) in LFG ...
- But the tension is implicitly present, where 'parallelly present' structures are positioned in a particular order between 'form and meaning'.



(Asudeh 2006)

Jackendoff's Parallel Architecture

- Generative capacity assigned to three modules of the grammar: Syntax, Phonology, and Semantics → each with own primitives and principles

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PA is nondirectional, but its constraints can be implemented in any order suited to particular processing tasks.

(Jackendoff 2010, 589)

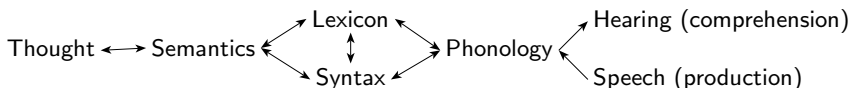
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- Proposes the following model of the PA in language production and comprehension:



(Jackendoff 2002, 197, modified)

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 - Are placed in a specific order depending on either comprehension or production
- Linear order verified through numerous experimental evidence:
- 1 research in speech errors
 - 2 studies with language-impaired subjects
 - 3 chronometric experiments
 - 4 event-related brain potentials (ERP)

production → meaning ... semantics — syntax — phonology ... form ← **comprehension**

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• Conclusion:

- 1 modules process a particular part of linguistic information via structure-specific principles and constraints
 - 2 modules are aligned in a specific way between FORM and MEANING
- Thus, reference to the particular act of language should be taken into account

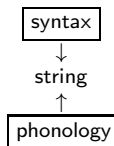
And Parallelity?

‘Parallelity’ (in this context) means

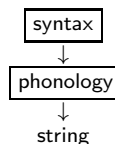
- generative capacity, in that each component has its own principles and constraints that contribute to the analysis of a language phenomenon – exist ‘in parallel’
- also a reference to the overlapping of structures during incremental processing

‘Parallelity’ does *not* mean: encapsulated structures building up ‘in parallel’, to be aligned with the output of other components.

parallel approach: encapsulated modules



linear approach: communicating modules



The syntax–prosody interface

Creating a ‘map’ for production and comprehension:

- Two different modules, each with its own principles and vocabularies
- c-structure and p-structure

The syntax-prosody interface

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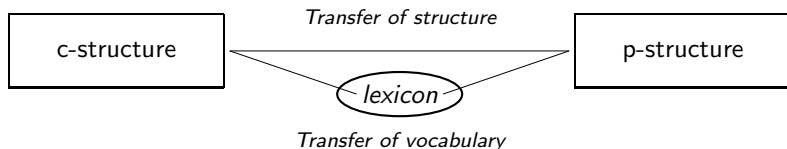
- Two different modules, each with its own principles and vocabularies
- c-structure and p-structure
- The **p-diagram**: a compact, syllable-based representation of p-structure

↑	↑	↑
PHRASING	(... ...) _ω	
...	
SEGMENTS	/am/ /ra/	
V.-INDEX	S ₁ S ₂	

- 1 abstract linear representation of speech over time,
- 2 lack of any morphosyntactic/semantic information
- 3 encodes prosodic phrasing, but does not rely on prosodic trees
- 4 compact, but can include all kinds of relevant information
- 5 p-structure includes a number of postlexical/postsyntactic phonological processes

The syntax-prosody interface

- Information exchanged between c- and p-structure needs to be 'translated'
- In the approach presented here, information is exchanged on the basis of two transfer processes:



Transfer of vocabulary - the lexicon

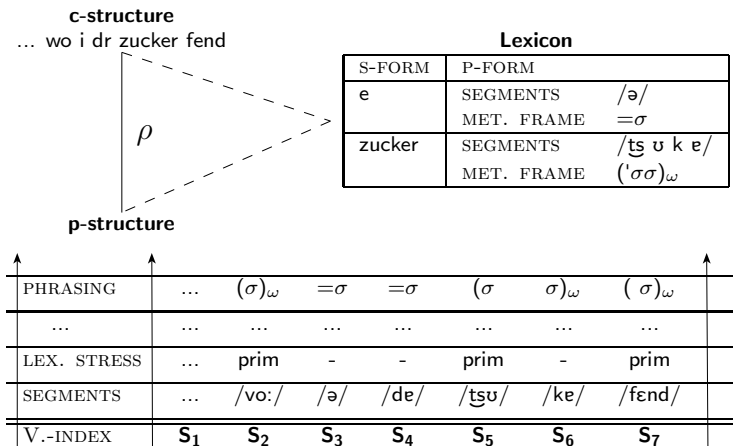
- Operates only on the lexical level
- Requires extension of the lexical form
- Consider the following example (from Swabian):

(1) I han en fragt wo e dr **zucker** fend
 I have him asked where I the sugar find
 'I asked him where I can find the sugar.'

CONCEPT	S-FORM			P-FORM	
I	e	PRON	(↑ PRED) = 'pro' (↑ PRONTYPE) = pers (↑ NUM) = sg (↑ PERS) = 1	SEGMENTS	/ə/
				MET. FRAME	=σ
SUGAR	zucker	N	(↑ PRED) = 'zucker' (↑ NUM) = sg (↑ GEN) = masc	SEGMENTS	/t͡s u k e/
				MET. FRAME	('σσ) _ω

Transfer of vocabulary (ρ)

Transfer of metrical, segmental, and lexical prosodic information:



Transfer of structure (‡)

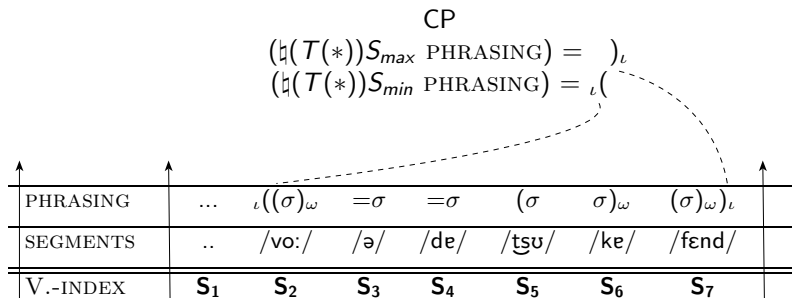
- Higher levels of syntactic structure translated into prosodic structure
 - For example, via Selkirk (2011)'s *match theory*:
- Every CP matches an Intonational Phrase (ι):
- $T(*)$ refers to all terminal nodes under the current node
 - $\natural(f) \equiv \rho(\pi^{-1}(f))$
 - where S_{max} refers to the *last* syllable within the scope of CP
 - where S_{min} refers to the *first* syllable within the scope of CP

$$\begin{array}{c}
 \text{CP} \\
 (\natural(T(*))S_{max} \text{ PHRASING}) = \quad)_{\iota} \\
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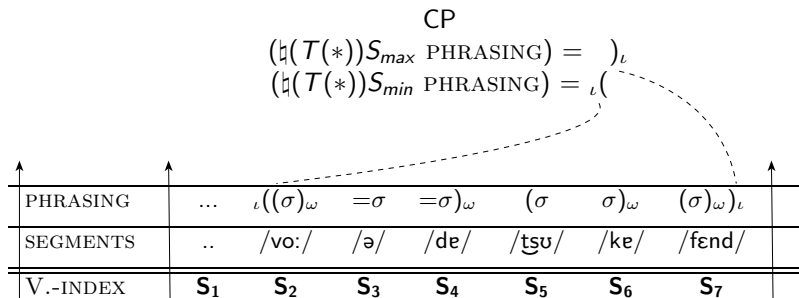
- $T(*)$ refers to all terminal nodes under the current node
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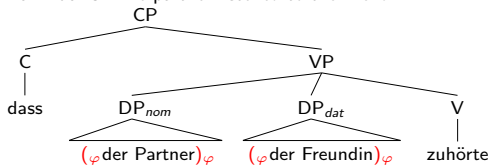
Reversibility of the *transfer of structure*?

- Mismatches between prosodic and syntactic structure are indicators that *transfer of structure* is not fully reversible
- Consider the German ambiguities:

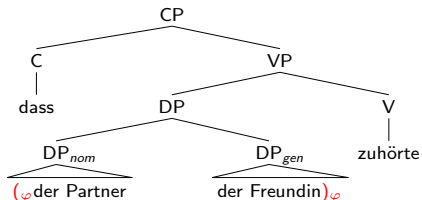
(2)	Alle Everyone	waren was	überrascht surprised	dass that
	[der Partner]_{DP1} the.ART.MASC.NOM partner		[der Freundin]_{DP2} the.ART.FEM.GEN/DAT friend	zuhörte listened

'Everyone was surprised that [the friend's partner listened // the partner listened to the friend].'

a. **Dative:** The partner listened to the friend



b. **Genitive:** The friend's partner listened



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indicators of φ boundary	condition	% of speakers
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Duration	Dat	47
Reset	Dat	40
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- If the clause was unambiguous, e.g., with a masculine construction:

*Der Partner **des** Freundes*

→ prosodic phrasing would not matter

⇒ The syntactic phrasing would ALWAYS be unambiguous!

Structure exchange during *comprehension*

- It is for these reasons that the prosodic phrasing of p-structure is only **checked** and not automatically transferred during comprehension

- Dative:*

PHRASING) _φ
...
SEGMENTS	[de ^e]	[pa ^b]	[tne]	[de ^e]	[fʁœ̃ʁən]	[din]
V.-INDEX	S ₁	S ₂	S ₃	S ₄	S ₅	S ₆

- VP → DP DP V

$$\{ (\mathfrak{h}(T(*)) S_{max} \text{ PHRASING}) =_c \varphi$$

$$\text{PHPBREAK} \in \mathfrak{o}^*$$

$$|(\mathfrak{h}(T(*)) S_{max} \text{ PHRASING}) \neq \varphi \}$$

→ **Conclusion:** Direction matters!!

Intermediate Summary

Summing up: two transfer processes are assumed:

- 1 **transfer of vocabulary**: association of c-structure and p-structure via lexical s- and p-form. Completely reversible.
- 2 **transfer of structure**: c-structure phrasing is translated into prosodic phrasing. Not (or only to a specific extent) reversible \Rightarrow direction matters!

Non-reversibility seems to be restricted to prosodic phrasing only:

- \rightarrow Postlexical phonological processes seem to be fully reversible
- \rightarrow Even true if the phenomenon involves a considerable adjustment of syntactic linear order

Linear order alteration

- General assumption: c-structure encodes the hierarchical structure and **linear order** of the string

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- But: some phenomena are governed by p-structure constraints only
- Consider the following Bulgarian pronominal clitics:

(4) Petko =mi =go dade včera
 Petko me.dat it.acc gave yesterday
 'Petko gave it to me yesterday'

- | | | | | | |
|----|--------|-------|------|-------|-------|
| a) | včera | =mi | =go | dade | Petko |
| b) | včera | Petko | =mi | =go | dade |
| c) | *Petko | =mi | =go | včera | dade |
| d) | *=mi | =go | dade | Petko | včera |
| e) | dade | =mi | =go | Petko | včera |

Linear order alteration

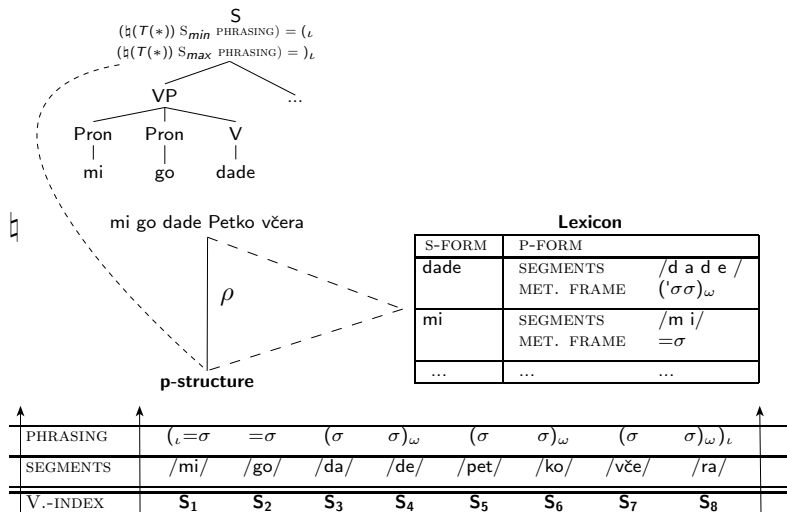
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 b) včera Petko =mi =go dade
 c) *Petko =mi =go včera dade
 d) *=mi =go dade Petko včera
 e) dade =mi =go Petko včera

- Bulgarian pronominal clitics are syntactically placed in front of the verb
 ⇒ If in initial intonational phrase position: **prosodically** replaced to follow the verb

Bulgarian clitics at the syntax-prosody interface



Two views on p-structure

- **Strong** approach (prosodic inversion, insertion, etc...)
- **Weak** approach (an optimal candidate is elected via the application of a number of constraints):

Optimality theory

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→ Possible constraints to apply:

- ALIGN(R, CL, L, V) and NONINITIAL_INT_P
- Ranking: NONINITIAL_INT_P \gg ALIGN(R, CL, L, V)
- 2) would be the winner - 'lower-ranked' violation

Two views on p-structure – weak approach

However: candidate 2) is syntactically **not** motivated

→ unmotivated placement should then be allowed for all (syntactic) positions:

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⇒ Assuming the same procedures for postlexical phonology, the number of candidates quickly rises to Millions (see also Karttunen (1998))

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- Introduced a new approach to the syntax– prosody interface, which is modelled according to these assumptions and which provides a kind of underlying road map for production and comprehension processes
- Different phenomena gave insights in a variety of interface aspects: German dative/genitive alternation showed that the relationship between syntactic and prosodic structuring is not necessarily reversible; Bulgarian clitics provided a case where the linear order suggested by c-structured is altered in prosody

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- Different phenomena gave insights in a variety of interface aspects: German dative/genitive alternation showed that the relationship between syntactic and prosodic structuring is not necessarily reversible; Bulgarian clitics provided a case where the linear order suggested by c-structured is altered in prosody
- And a more general comment on movement and filtering in postlexical phonology

Thank you!

... questions, comments...?

References