

Linearisation as syntax-phonology mapping

Joost Kremers

Graduiertenkolleg "Satzarten"
J.W. Goethe Universität
Frankfurt am Main

GGs Tagung 2006
Stuttgart, 26-28 May

Syntax theory

- Syntactic structure is essentially hierarchical: it represents constituent structure.
- Utterances are essentially linear.
- What is the relation between the hierarchical and the linear structure?

The Big Question™: where does linear order come in: in syntax, or in phonology?

Syntax theory

- Syntactic structure is essentially hierarchical: it represents constituent structure.
- Utterances are essentially linear.
- What is the relation between the hierarchical and the linear structure?

The Big Question™: where does linear order come in: in syntax, or in phonology?

The solution — or is it?

- Syntax just represents hierarchical structure.
- Linear order is a requirement of the modality of language.

Chomsky thinks so too:

“(. . .) that order does not enter into the generation of the C-I interface, and that syntactic determinants of order fall within the phonological component.”

(Chomsky, to appear: 5)

The solution — or is it?

- Syntax just represents hierarchical structure.
- Linear order is a requirement of the modality of language.

Chomsky thinks so too:

“(. . .) that order does not enter into the generation of the C-I interface, and that syntactic determinants of order fall within the phonological component.”

(Chomsky, to appear: 5)

Linearisation

Chomsky (2004) argues that there are three possible ways to derive linear order from hierarchical structure:

- Construction-specific (“the worst case”)
- A head parameter, along with a principle that specifiers always precede their heads (Saito & Fukui 1998, Neeleman & Weerman 1999, Kremers 2003, Richards 2004).
- Order reflects hierarchy (Kayne 1994)

Linearisation

Chomsky (2004) argues that there are three possible ways to derive linear order from hierarchical structure:

- Construction-specific (“the worst case”)
- A head parameter, along with a principle that specifiers always precede their heads (Saito & Fukui 1998, Neeleman & Weerman 1999, Kremers 2003, Richards 2004).
- Order reflects hierarchy (Kayne 1994)

Linearisation

Chomsky (2004) argues that there are three possible ways to derive linear order from hierarchical structure:

- Construction-specific (“the worst case”)
- A head parameter, along with a principle that specifiers always precede their heads (Saito & Fukui 1998, Neeleman & Weerman 1999, Kremers 2003, Richards 2004).
- Order reflects hierarchy (Kayne 1994)

Linearisation

Chomsky (2004) argues that there are three possible ways to derive linear order from hierarchical structure:

- Construction-specific (“the worst case”)
- A head parameter, along with a principle that specifiers always precede their heads (Saito & Fukui 1998, Neeleman & Weerman 1999, Kremers 2003, Richards 2004).
- Order reflects hierarchy (Kayne 1994)

First assumption

Any approach within generative grammar toward linearisation makes three assumptions.

- Totality (Kayne 1994):
Given a tree K and the set T of terminals in K , for every pair $x, y \in T$, an ordering is defined, either $x > y$ or $y > x$.

First assumption

Any approach within generative grammar toward linearisation makes three assumptions.

- Totality (Kayne 1994):
Given a tree K and the set T of terminals in K , for every pair $x, y \in T$, an ordering is defined, either $x > y$ or $y > x$.

Second assumption

- Linear Correspondence (Ackema & Neeleman 2004):
If X is structurally external to Y, then Ph(X) is linearly external to Ph(Y).
 - Ph(X): the phonological material associated with X.
(Kremers 2007)



/zabc/

/abcz/

*/azbc/

*/abzc/

Second assumption

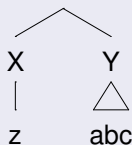
- Linear Correspondence (Ackema & Neeleman 2004):
If X is structurally external to Y, then Ph(X) is linearly external to Ph(Y).
- Ph(X): the phonological material associated with X.
(Kremers 2007)



/zabc/
/abcz/
*/azbc/
*/abzc/

Second assumption

- Linear Correspondence (Ackema & Neeleman 2004):
If X is structurally external to Y, then Ph(X) is linearly external to Ph(Y).
- Ph(X): the phonological material associated with X.
(Kremers 2007)



/zabc/
/abcz/
*/azbc/
*/abzc/

Third assumption

- The only *real* question to be answered is: how must the head parameter be integrated in the theory.

All three assumptions are incorrect. Well, at least partially.

Third assumption

- The only *real* question to be answered is: how must the head parameter be integrated in the theory.

All three assumptions are incorrect. Well, at least partially.

Third assumption

- The only *real* question to be answered is: how must the head parameter be integrated in the theory.

All three assumptions are incorrect. Well, at least partially.

Sign languages

- The most conspicuous data comes from sign languages:

(1)

STUDENT GEBÄRDENSPRACHE mit mühe LERNEN
(Leuninger 2005)

- Totality
 - There is no precedence relation between Ph(AdvP) and Ph(V).
- Linear Correspondence
 - Ph(AdvP) is linearly internal to Ph(VP).

Sign languages

- The most conspicuous data comes from sign languages:

(1)

STUDENT GEBÄRDENSPRACHE mit mühe LERNEN
(Leuninger 2005)

- Totality
 - There is no precedence relation between Ph(AdvP) and Ph(V).
- Linear Correspondence
 - Ph(AdvP) is linearly internal to Ph(VP).

Sign languages

- The most conspicuous data comes from sign languages:

(1)

STUDENT GEBÄRDENSPRACHE mit mühe LERNEN
(Leuninger 2005)

- Totality
 - There is no precedence relation between Ph(AdvP) and Ph(V).
- Linear Correspondence
 - Ph(AdvP) is linearly internal to Ph(VP).

Linearisation

Synchronicity: the simultaneous expression of two meaning-bearing elements.

The second question that we face in discussing linearisation is:

How can synchronicity be handled?

Linearisation

Synchronicity: the simultaneous expression of two meaning-bearing elements.

The second question that we face in discussing linearisation is:

How can synchronicity be handled?

Linearisation

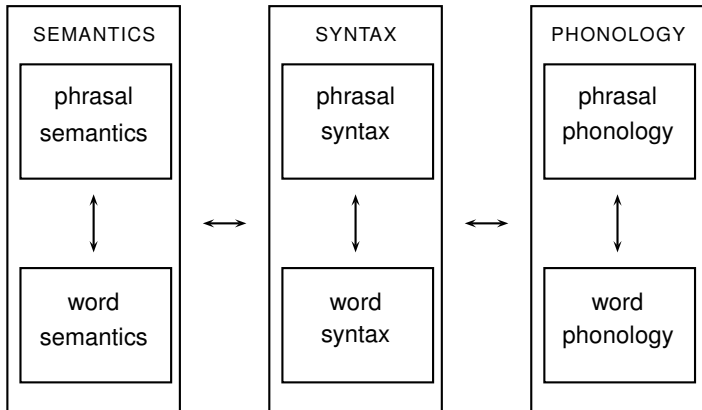
Synchronicity: the simultaneous expression of two meaning-bearing elements.

The second question that we face in discussing linearisation is:

How can synchronicity be handled?

The Language Faculty

(3)



(Jackendoff 2002, Ackema & Neeleman 2004)

Lexical mapping rules

- Lexical items are language-specific mapping rules:

$$(4) \quad \mathbf{tree}(x) \leftrightarrow [\mathbf{N}, \mathbf{count}] \langle \underline{\vartheta} \rangle \leftrightarrow /t^1i:/$$

- The same is true for affixes:

$$(5) \quad \lambda \mathbf{P}[\mathbf{P}(x)] \leftrightarrow [\mathbf{N}, \mathbf{count}] \langle \underline{\vartheta} \rangle \leftrightarrow /-\mathfrak{a}^1/$$

Prosodic hierarchy

Utterance (U)

Intonational Phrase (IntP)

Phonological Phrase (φ) ←

Prosodic Word (ω) ←

Foot (Ft)

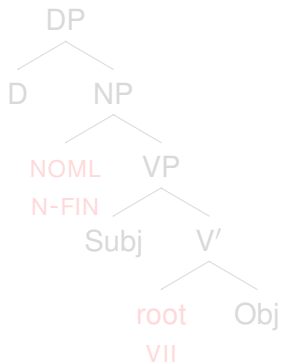
Syllable (σ) ←

Mora (μ) ←

Arabic morphology

- Arabic non-linear morphology is **synchronous**.
- The deverbal noun *nfiṣāl* 'agitation' has four morphemes:

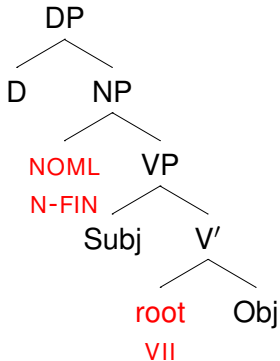
root	↔	/fʕʕl/
verb stem VII	↔	(σ _μ) σ _μ
		n
nominaliser	↔	/i a/
non-finite	↔	-σ _{μμ}



Arabic morphology

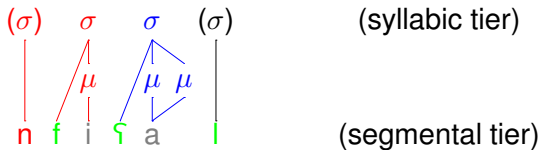
- Arabic non-linear morphology is **synchronous**.
- The deverbal noun *nfiṣāil* 'agitation' has four morphemes:

root	↔	/fʕi/
verb stem VII	↔	(σ _μ) σ _μ
		n
nominaliser	↔	/i a/
non-finite	↔	-σ _{μμ}



Arabic morphology

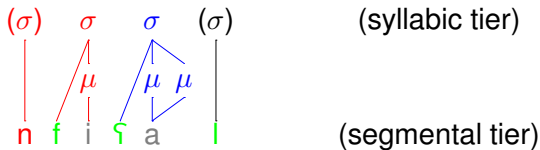
- Putting the morphemes together yields the following form:



- The linear order of the segments is derived in phonology:
 - Lexically specified: root and nominaliser morphemes; non-finiteness morpheme.
 - Universal principle: Left-to-Right Association.

Arabic morphology

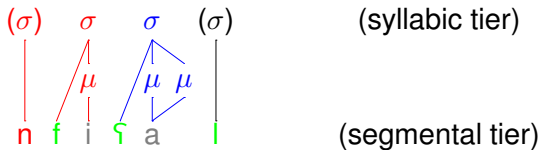
- Putting the morphemes together yields the following form:



- The linear order of the segments is derived in phonology:
 - Lexically specified: root and nominaliser morphemes; non-finiteness morpheme.
 - Universal principle: Left-to-Right Association.

Arabic morphology

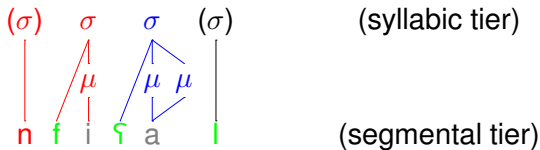
- Putting the morphemes together yields the following form:



- The linear order of the segments is derived in phonology:
 - Lexically specified: root and nominaliser morphemes; non-finiteness morpheme.
 - Universal principle: Left-to-Right Association.

Arabic morphology

- Putting the morphemes together yields the following form:



- The linear order of the segments is derived in phonology:
 - Lexically specified: root and nominaliser morphemes; non-finiteness morpheme.
 - Universal principle: Left-to-Right Association.

Proposal

- Back to the original problem: linearisation.
- Arabic has **syllabic** morphemes, i.e. (morpho)syntactic elements that map onto a syllabic structure.
- Proposal: syntactic structures map onto phonological structures consisting of φ 's and ω 's.
- For example, the head parameter (head-first):

$$[X' X^a YP^b] \leftrightarrow \{ \omega^a \varphi^b \}$$

Proposal

- Back to the original problem: linearisation.
- Arabic has **syllabic** morphemes, i.e. (morpho)syntactic elements that map onto a syllabic structure.
- Proposal: syntactic structures map onto phonological structures consisting of φ 's and ω 's.
- For example, the head parameter (head-first):

$$[X' X^a YP^b] \leftrightarrow \{ \omega^a \varphi^b \}$$

Proposal

- Back to the original problem: linearisation.
- Arabic has **syllabic** morphemes, i.e. (morpho)syntactic elements that map onto a syllabic structure.
- Proposal: syntactic structures map onto phonological structures consisting of φ 's and ω 's.
- For example, the head parameter (head-first):

$$[X' X^a YP^b] \leftrightarrow \{ \omega^a \varphi^b \}$$

Proposal

- Back to the original problem: linearisation.
- Arabic has **syllabic** morphemes, i.e. (morpho)syntactic elements that map onto a syllabic structure.
- Proposal: syntactic structures map onto phonological structures consisting of φ 's and ω 's.
- For example, the head parameter (head-first):

$$[X' X^a YP^b] \leftrightarrow \{ \omega^a \varphi^b \}$$

Syntax-Phonology Interface

- Principles known from the literature on the syntax-phonology interface (Selkirk 1986, Nespor & Vogel 1986, Truckenbrodt 1999):
 - WRAP-XP: $XP^a \leftrightarrow \varphi^a$
 - ALIGN-XP: $[Y XP^a] \leftrightarrow \{ \omega^* \varphi^a \}$
- Note: ALIGN-XP resembles the head parameter. As Truckenbrodt (1995) notes, there is indeed a correlation between the two.

Syntax-Phonology Interface

- Principles known from the literature on the syntax-phonology interface (Selkirk 1986, Nespor & Vogel 1986, Truckenbrodt 1999):
 - WRAP-XP: $XP^a \leftrightarrow \varphi^a$
 - ALIGN-XP: $[Y XP^a] \leftrightarrow \{ \omega^* \varphi^a \}$
- Note: ALIGN-XP resembles the head parameter. As Truckenbrodt (1995) notes, there is indeed a correlation between the two.

Syntax-Phonology Interface

- Principles known from the literature on the syntax-phonology interface (Selkirk 1986, Nespor & Vogel 1986, Truckenbrodt 1999):
 - WRAP-XP: $XP^a \leftrightarrow \varphi^a$
 - ALIGN-XP: $[Y XP^a] \leftrightarrow \{ \omega^* \varphi^a \}$
- Note: ALIGN-XP resembles the head parameter. As Truckenbrodt (1995) notes, there is indeed a correlation between the two.

Syntax-Phonology Interface

- Principles known from the literature on the syntax-phonology interface (Selkirk 1986, Nespor & Vogel 1986, Truckenbrodt 1999):
 - WRAP-XP: $XP^a \leftrightarrow \varphi^a$
 - ALIGN-XP: $[Y XP^a] \leftrightarrow \{\omega^* \varphi^a\}$
- Note: ALIGN-XP resembles the head parameter. As Truckenbrodt (1995) notes, there is indeed a correlation between the two.

Linearity

- Synchronicity supports the hypothesis that linear order is a requirement of the modality.
- What are the properties of synchronicity? What are the limitations?
 - Inventory of synchronicity phenomena.
 - Can the properties and limitations be related to the modality (i.e. the structure of the phonological system)?

Linearity

- Synchronicity supports the hypothesis that linear order is a requirement of the modality.
- What are the properties of synchronicity? What are the limitations?
 - Inventory of synchronicity phenomena.
 - Can the properties and limitations be related to the modality (i.e. the structure of the phonological system)?

Linearity

- Synchronicity supports the hypothesis that linear order is a requirement of the modality.
- What are the properties of synchronicity? What are the limitations?
 - Inventory of synchronicity phenomena.
 - Can the properties and limitations be related to the modality (i.e. the structure of the phonological system)?