

Linearisation as repair

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- Derivation of linear structure from hierarchical structure.
- Is this sufficient?
- Is it really the right way to look at it?

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- To look a bit more closely at “linear” structure.
- To consider if it would be helpful to think of linearisation as “repair”.
- To sketch a model of linearisation in terms of the mapping from syntax to phonology.
- (As a subgoal) to consider where this leaves morphology.

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Standard approaches to linearisation in generative syntax make two fundamental assumption:

- Totality
- Linear Correspondence

(Cf. *Exclusivity Condition* and *Nontangling Condition*, Partee et al. 1993.)

Additionally, there is the belief that linear order is *all* that needs to be accounted for.

Totality

Every terminal node in the tree has a unique position in the linear sequence.

In the formulation of Kayne (1994):

- (1) Given a tree K and the set T of terminals in K :
- $$\forall x, y (x, y \in T \wedge x \neq y \mid x < y \vee y < x).$$

where $x < y$ means 'x precedes y'.

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Linear Correspondence

If two elements are sisters in the tree, they are adjacent in the linear string.

Formalised by Ackema and Neeleman (2004) (cf. Kremers 2007):

(2) Linear Correspondence:

If a node X is structurally external to a node Y , then $\Phi(X)$ is linearly external to $\Phi(Y)$.

where Φ is the linearisation function.

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Both assumptions are problematic:

- (3) with effort DGS
STUDENT GEBÄRDENSPRACHE LERNEN
student sign language learn
'the student learns sign language with difficulty'
- (4) anxiously DGS
SCHRANK_a KATZE_b HERUMGEHEN:Cl_b:Loc_a
closet cat walk about
'a cat is walking about anxiously on the closet'

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What about question formation through intonation?

(5) $\bar{\text{q}}$
tu sais danser?
you know dance
'do you know how to dance?'

French

Or case marking through tone?

(6) é-dól embártá
3-sees horse.ACC
'he sees the horse'

Maasai

(7) é-dól embartá
3-sees horse.NOM
'the horse sees him'

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- There is more going on than just the lining up of terminal elements.
- Sometimes elements are superimposed.
- The superimposed element is *non-segmental*.

Questions:

- What types of elements can be superimposed?
- What is the relation between the *associate* and its *anchor*?

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What types of elements can be superimposed?

- Functional elements (K° , $C^{\circ}[+wh]$, also Neg°)
- Adverbials

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What types of elements *cannot* be superimposed?

■ Predicates:

(8) * anxious
KATZE
cat
'the cat is anxious'

■ Non-pronominal arguments:

(9) * cat
HERUMGEHEN
walk around
'the cat is walking around'

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It would seem, however, that pronominal arguments *can* be superimposed:

(10) SCHRANK_a HERUMGEHEN:Cl_{animal}:LOC_a *DGS*
closet walk about
'it_{animal} is walking about on the closet'

Note that elements traditionally described as 'classifiers' in sign language are more likely to be pronominal in nature (Risler 2007, Sallandre 2007).

Questions

What is the relation between the *associate* and its *anchor*?

Anchor	Associate
Complement	F°
V	AdvP
Predicate	Argument

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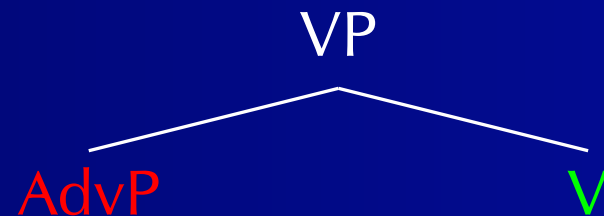
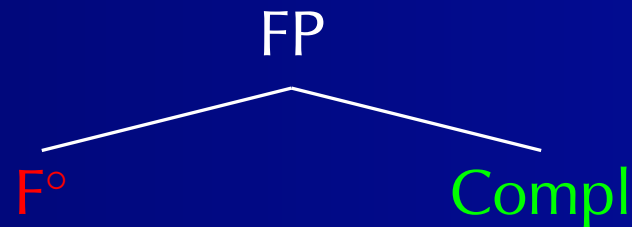
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Structural relations

Red = Associate, Green = Anchor.



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- Anchor and associate are structurally related, but not in a consistent way:
 - Either may project.
 - Either may be a head.

- At best, we can say that anchor and associate must be *sisters*.

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- The anchor is an open-class item.
- The associate belongs to a limited-member set:
 - Functional (closed class): C, Neg, Case, Pronoun.
 - Facial adverbs in sign language.
- The anchor is the semantic “center”, while the associate specifies it in some fashion.
- This relation probably follows from the structural sisterhood relation.

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- The anchor is (by definition) segmental.
- The associate is (by definition) non-segmental.
- The fact that the associate belongs to a limited-member class probably follows from its non-segmental nature.

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Requirements for *simultaneous realisation*:

- A segmental anchor.
- A non-segmental associate.
- A sisterhood relation.

It seems, then, that what is taking place is that the linearisation procedure is attempting to express the (non-ordered) sisterhood relation *directly*.

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(1) Given a tree K and the set T of terminals in K :
$$\forall x, y (x, y \in T \wedge x \neq y \mid x < y \vee y < x).$$

Totality is an inadequate descriptive generalisation. It is certainly *not* a guiding principle in linearisation.

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What about Linear Correspondence?

(2) Linear Correspondence:

If a node X is structurally external to a node Y , then $\Phi(X)$ is linearly external to $\Phi(Y)$.

This appears to be incorrect as well, since it is violated by every simultaneity example we have seen.

However, it may nonetheless play a role in linearisation.

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We know that items are (usually) linearly ordered.

Suggestion:

Linear order is the repair strategy that is employed in phonology when two sister nodes cannot be realised simultaneously.

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- Linear order is a strategy of the phonological system.
- We probably need some form of ordering parameters (head parameter).
- Crucially, such parameters are *phonological* in nature.
- That is, there can be no reference to linear order in syntax.

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Derivation of phonological structure involves more than just linearisation.

- Phonological structure consists of a number of autonomous *tiers* (Goldsmith 1976).
- Syntactic elements are associated through mapping rules with phonological material (Jackendoff 2002, Ackema and Neeleman 2004):

$$(11) \text{MAN}_{\langle e,t \rangle} \leftrightarrow \begin{bmatrix} \text{N, sg} \\ \text{count} \end{bmatrix} \leftrightarrow /mæn/$$

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- The various phonological chunks that the mapping rules produce must be assembled into a phonological structure.
- Required principles:
 - Simultaneous realisation of sister nodes
 - If this fails: LC + ordering parameters
 - Left-to-Right Association (and language-specific exceptions)

An example: Sign language

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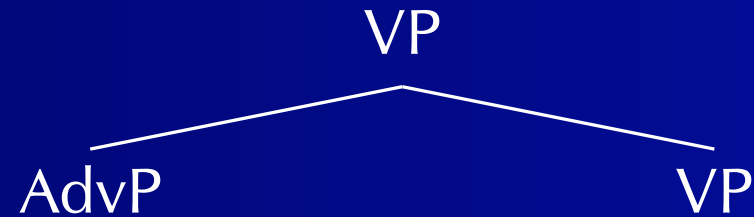
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■ Syntax:



■ Phonology:

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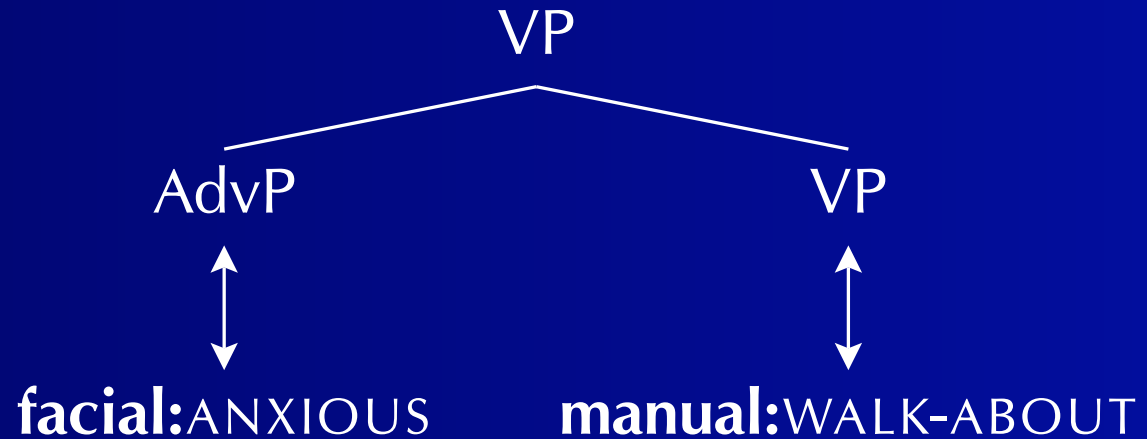
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■ Syntax:



■ Phonology:

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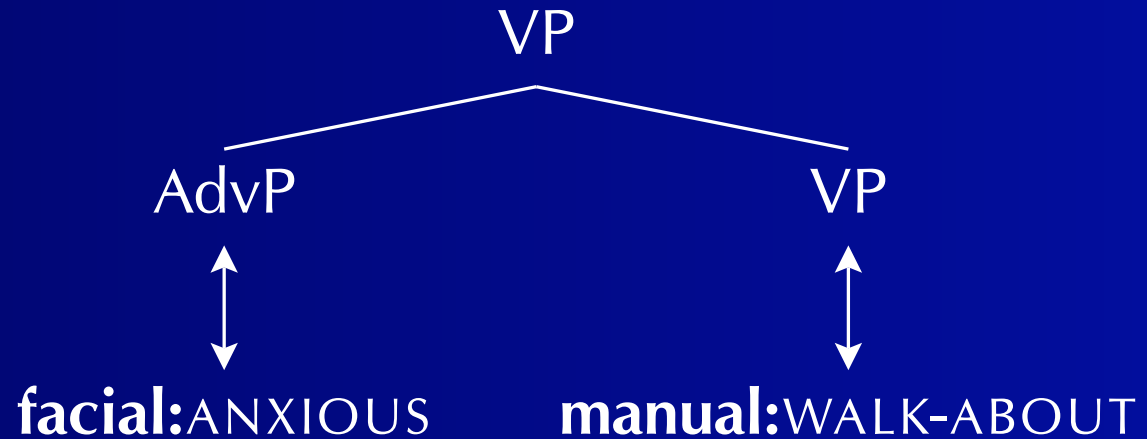
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■ Syntax:



■ Phonology: **facial:** ANXIOUS

manual: WALK-ABOUT

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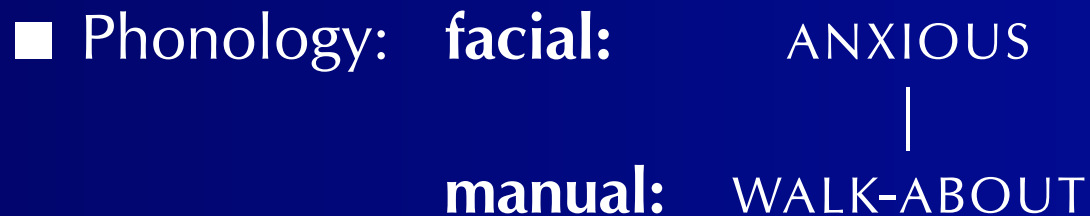
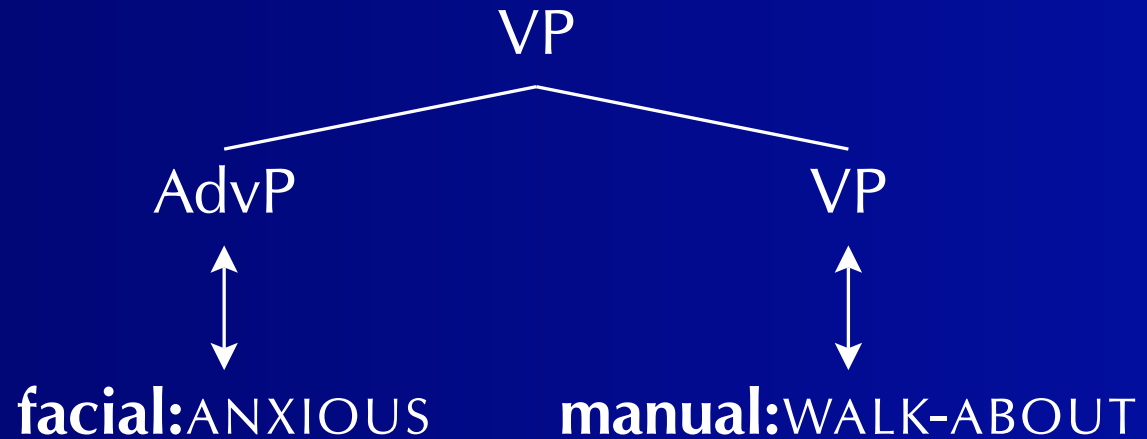
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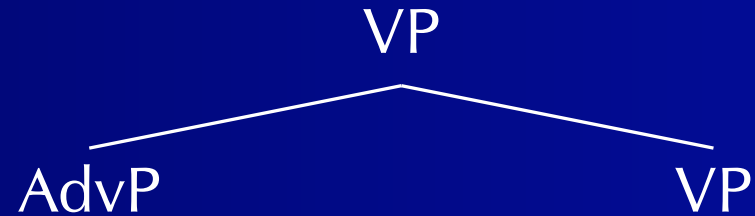
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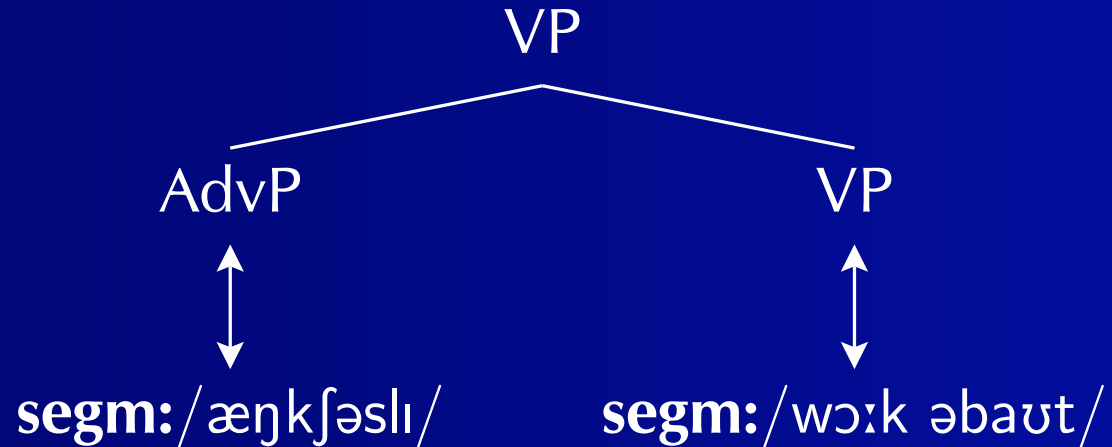
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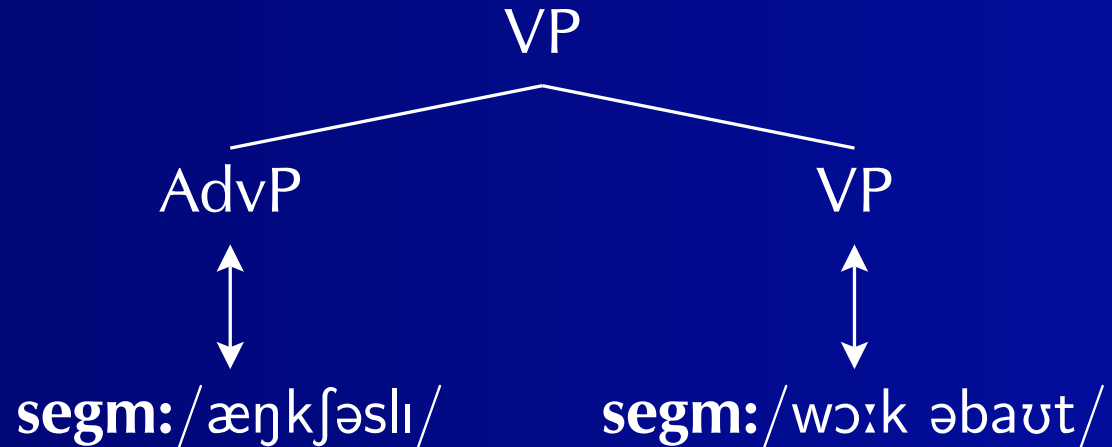
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■ Syntax:



■ Phonology: segmental: /wɔ:k əbaʊt/

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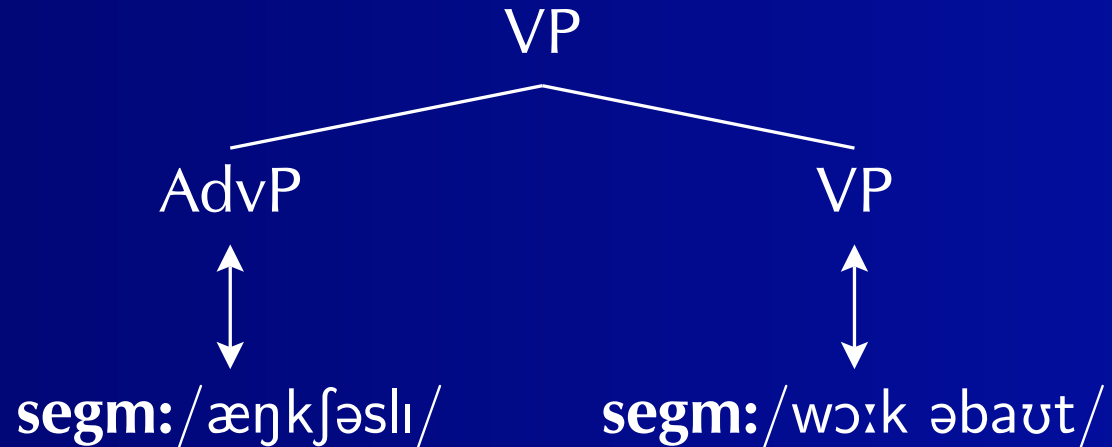
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■ Syntax:



■ Phonology: segmental:

/æŋkfəsli/
/wɔ:k əbaʊt/

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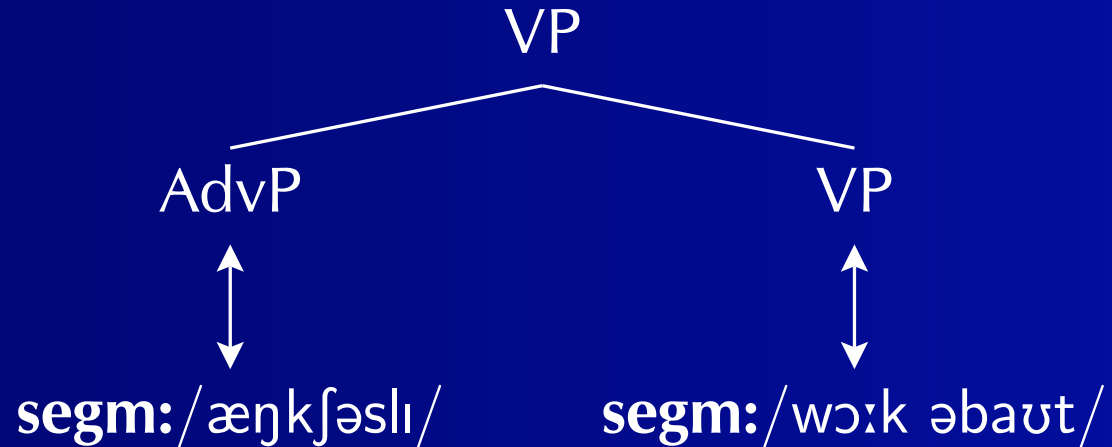
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■ Syntax:



■ Phonology: segmental: /wɔ:k əbaʊt/ /æŋkfəsli/

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Arabic deverbal nouns (*masdars*) have a verbal core and a nominal shell:

(12) ⁱntiqād-u -l-rağul-i -l-mašrūf-a
criticising-NOM the-man-GEN the-project-ACC
'the man's criticising the project'

The masdar form contains four morphemes (cf. McCarthy and Prince 1990, Kremers 2007):

root:	/nqd/	nominaliser:	/i a/
stem VIII:	(σ)σ _μ	non-finite:	σ _{μμ}
	t		

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Form: ⁱntiqād

root:	/nqd/	nominaliser:	/i a/
stem VIII:	(σ)σ _μ	non-finite:	σ _{μμ}
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Form: ⁱntiqād

root:	/nqd/	nominaliser:	/i a/
stem VIII:	(σ)σ _μ	non-finite:	σ _{μμ}
	t		

syllabic tier

segmental tier

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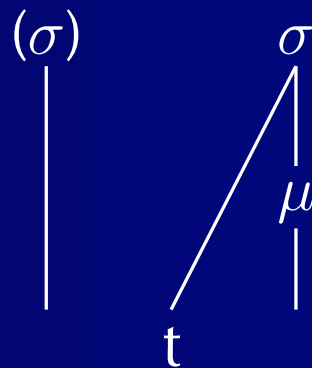
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Form: ⁱntiqād

root:	/nqd/	nominaliser:	/i a/
stem VIII:	(σ)σ _μ	non-finite:	σ _{μμ}
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syllabic tier

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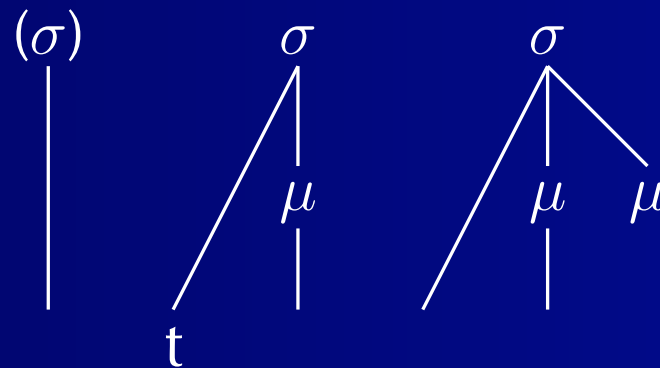
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Form: ⁱntiqād

root:	/nqd/	nominaliser:	/i a/
stem VIII:	(σ)σ _μ	non-finite:	σ _{μμ}
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syllabic tier

segmental tier

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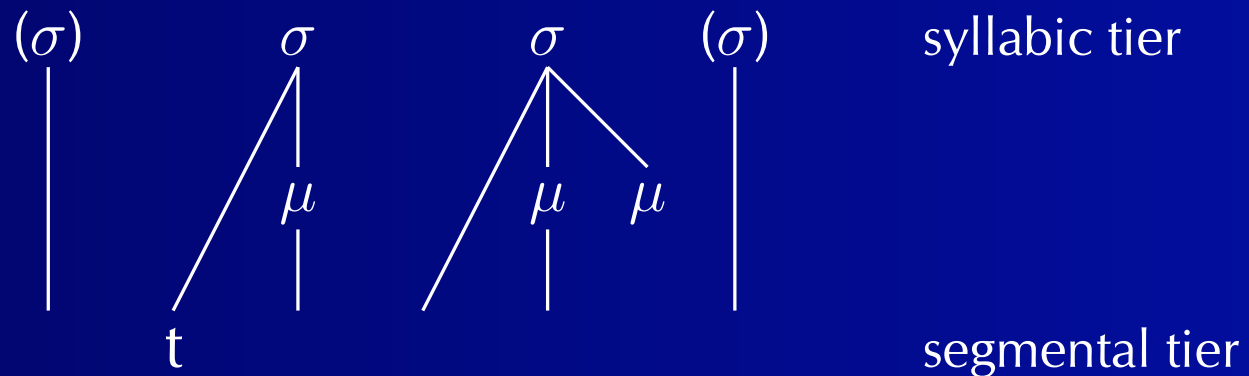
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Form: ⁱntiqād

root:	/nqd/	nominaliser:	/i a/
stem VIII:	(σ)σ _μ	non-finite:	σ _{μμ}
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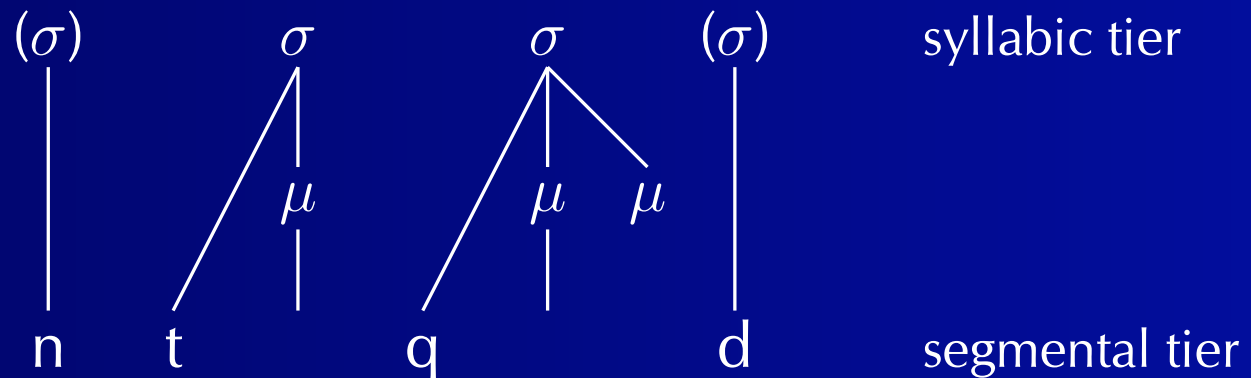
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Form: ⁱntiqād

root:	/nqd/	nominaliser:	/i a/
stem VIII:	(σ)σ _μ	non-finite:	σ _{μμ}
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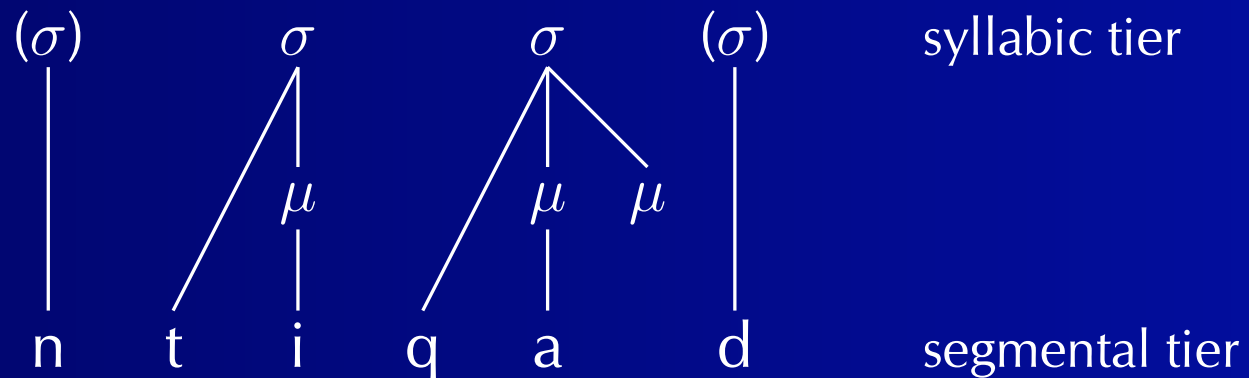
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Form: ⁱntiqād

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stem VIII:	(σ)σ _μ	non-finite:	σ _{μμ}
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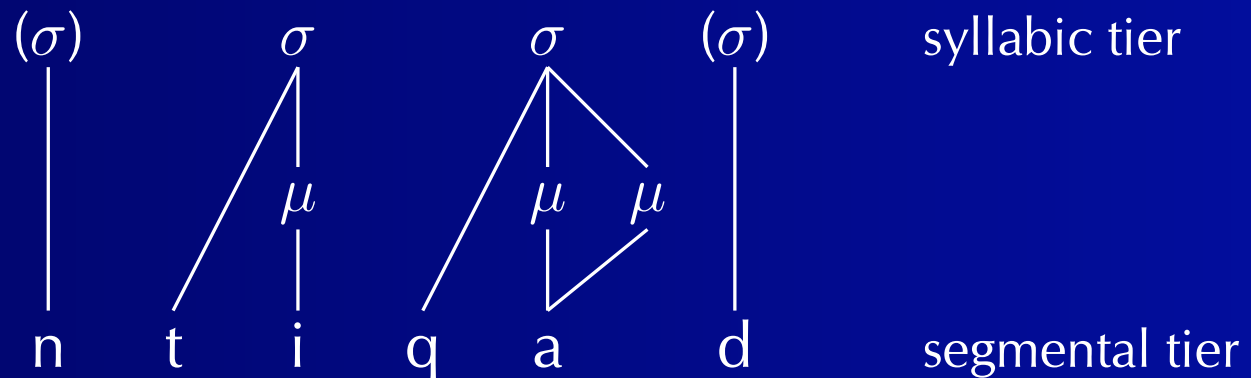
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Form: ⁱntiqād

root:	/nqd/	nominaliser:	/i a/
stem VIII:	(σ)σ _μ t	non-finite:	σ _{μμ}



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- The four morphemes are integrated to form a single word form (prosodic word).
- “Linearisation” of the segments is mediated by *phonological* information:
 - Syllabic morphemes
 - Left-to-Right Association
 - Spreading
 - The language-specific requirement for a final extrametrical syllable
- That is, syntax plays no role here.

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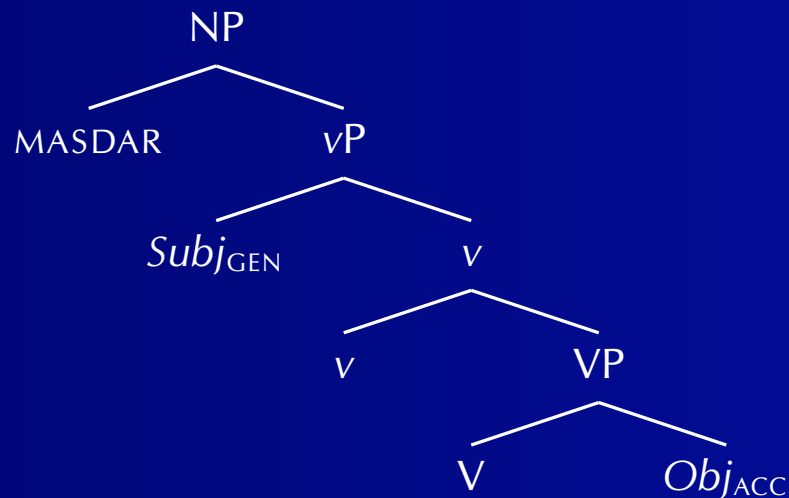
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- Morphology = morphology, syntax = syntax. Why bother?
- (Arabic) deverbal nouns must be formed in syntax.
- They project first as verbs, then switch category to nouns.



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- Arabic masdars demonstrate another repair strategy:
Instead of linearising two terminals, they are integrated into a single prosodic word.
- Prosodic structure is crucial for this.

Proposal: Prosodic structure is relevant for the linearisation of syntactic structures as well.

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For example:

- Standard correspondence rules between syntax and phonology (Selkirk 1984, Nespor and Vogel 1986, Truckenbrodt 2007):

$$(13) X \leftrightarrow \omega$$

$$(14) XP \leftrightarrow \varphi$$

- Head parameter:

$$(15) \text{Head-initial: } [_{XP} X YP] \leftrightarrow \omega \varphi$$

$$(16) \text{Head-final: } [_{XP} X YP] \leftrightarrow \varphi \omega$$

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Syntactic structures are mapped onto *prosodic frames*, which provide a template in which the structure must be linearised.

(17) John threw the ball (right) in

(18) John threw (*right) in the ball

English verb phrase mapping rule:

(19) $[_{VP} V_a XP_b] \leftrightarrow \omega_a^* \varphi_b^*$

NB: The object XP corresponds to the *first* φ in the prosodic frame.

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(19) $[_{VP} V_a XP_b] \leftrightarrow \omega_a^* \varphi_b^*$

(20) threw the ball right in
 ω $\{ \omega \quad \omega \}_\varphi$ $\{ \omega \quad \omega \}_\varphi$

(21) *threw right in the ball
 ω $\{ \omega \quad \omega \}_\varphi$ $\{ \omega \quad \omega \}_\varphi$

(22) threw in the ball
 ω ω $\{ \omega \quad \omega \}_\varphi$

The position of morphology

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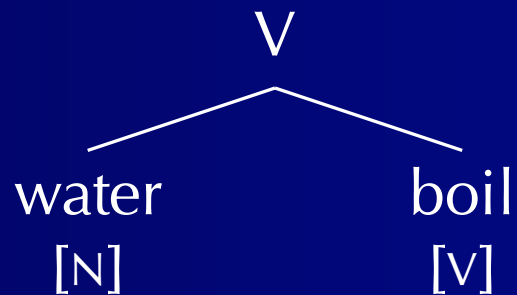
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- Both deverbal nouns and particle verbs show interaction between syntax and morphology.
- Linearisation of morphological structures is mediated by phonological information.
- The same is arguably true for the linearisation of syntactic structures.
- *Proposal*: The structure-building mechanism does not distinguish between syntax and morphology. The distinction is a phonological one.

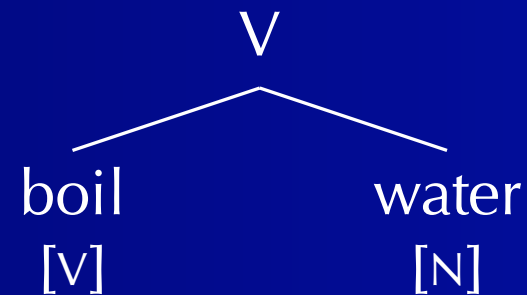
Bare phrase structure

NB: *bare phrase structure* does not allow us to distinguish between syntactic and morphological trees!

(to) boil water:



water boiler:



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It is not the structure-building mechanism that determines whether a structure is mapped onto a phonological phrase or onto a prosodic word. Rather, it is the prosodic level onto which a structure is mapped that determines whether we consider a structure to be “morphological” or “syntactic”.

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- Linearisation is not a simple matter of lining up the terminal elements.
- In essence, the phonological component attempts to retain the unorderedness (simultaneity) of sisterhood.
- When this fails (which is most of the time) a repair strategy is used: linearisation.
- The structure-building component does not distinguish between syntax and morphology; the distinction is a phonological illusion.

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