



# Introduction

- ▶ Architecture of the grammar:
  - ▶ Phonology
  - ▶ Morphology
  - ▶ Syntax
  - ▶ Semantics
- ▶ Language as a pairing of form and meaning:

form	≈	phonology
meaning	≈	semantics
pairing	≈	syntax+morphology

# Goals of the talk

- ▶ Synthesis of morphology and syntax.
- ▶ Account for the morphology/syntax distinction through phonology.
- ▶ Discuss consequences for the architecture of the grammar.

# Syntax vs. Morphology

# Syntax vs. Morphology

Conceptual and theoretical arguments in favour of a unified module:

- ▶ There is no obvious functional distinction.
- ▶ Both are generative systems manipulating the same objects.
- ▶ Morphology can be highly regular (e.g., Turkish).
- ▶ What is a word?

# MWd and SWd

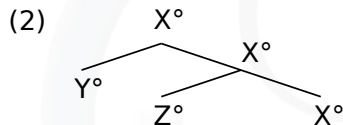
Embick & Noyer (2001) define the *Morphological Word* and the *Subword* as follows:

- (1) a. *Morphological Word*:  
At the input to Morphology, a node  $X^\circ$  is (by definition) a morphosyntactic word (MWd) iff  $X^\circ$  is the highest segment of an  $X^\circ$  not contained in another  $X^\circ$ .
- b. *Subword*:  
A node  $X^\circ$  is a subword (SWd) if  $X^\circ$  is a terminal node and not an MWd.

# Bare Phrase Structure

- ▶ *Merge* as the only structure-building operation.
- ▶  $X^{\circ}$ : minimal (non-projecting) head.
- ▶  $XP$ : maximal projection of  $X$ .

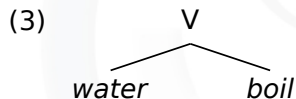
# MWd and BPS



- ▶ The definition of MWd (and indirectly SWd) refers to a “segment of an  $X^\circ$ ”.
- ▶ In BPS,  $X^\circ$  by definition cannot have segments.
- ▶ MWd and SWd cannot be defined in a BPS-approach.

# Bare Phrase Structure

- ▶ Suppose we have the structure in (3):

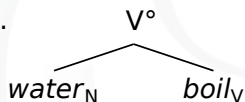


- ▶ We do not know at this point whether the derivation is going to yield *to boil water* or *water boiler*.

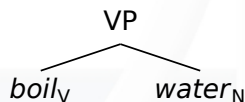
# Bare Phrase Structure

Representations such as those in (4) and (5) are not distinguished in BPS:

(4) a.



b.



Models of grammar are based on the intuition that there is a distinction between the word level and the phrasal level.

# Making sense of the intuition

1 7 3 7

# Prosodic hierarchy

Phonological structure contains a hierarchy of *prosodic constituents*:

- (5) Utterance (U)
- Intonational Phrase (IntP)
- Phonological Phrase ( $\varphi$ )
- Prosodic Word ( $\omega$ )
- Foot (Ft)
- Syllable ( $\sigma$ )
- Mora ( $\mu$ )

(cf. Nespors & Vogel 1986)

# Prosodic hierarchy

There are well-known correspondences between syntax and the prosodic hierarchy:

- ▶ Syntactic structures are mapped onto phonological (and intonational) phrases.
- ▶ Morphological structures are mapped onto prosodic words.

Makes sense.

# Really?

*(A moment of silent contemplation...)*

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# Optical illusion

It is not the structure-building mechanism that determines whether a structure is mapped onto prosodic words or phonological phrases.

Rather, it is the prosodic level onto which a structure is mapped that makes us perceive a structure as “morphological” or “syntactic”.

# Optical illusion

It is not the structure-building mechanism that determines whether a structure is mapped onto prosodic words or phonological phrases.

Rather, it is the prosodic level onto which a structure is mapped that makes us perceive a structure as “morphological” or “syntactic”.

# Proposal

- ▶ An optical (or rather acoustic) illusion:
- (6) a. PWd  $\approx$  “Morphology”  
b. PPhr  $\approx$  “Syntax”
- ▶ *Separation Hypothesis* (Beard 1988; cf. Halle & Marantz’s (1993) *Late Insertion*).
  - ▶ Syntax combines heads (i.e., feature bundles).
  - ▶ Word formation is not a morphological/syntactic matter.

# Data

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# Arabic deverbal nouns

- (7) *ʔaqlaqa-nī -ntiqād-u -l-rajul-i -l-mašrūf-a*  
annoy-1sg.O criticising-NOM DEF-man-GEN DEF-project-ACC  
'The man's criticising the project annoyed me.'

## Properties:

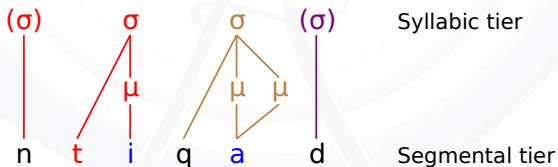
- ▶ Regular form (in most verb stems).
- ▶ *Event-Structure*.
- ▶ Subject takes genitive case.
- ▶ Object takes genitive case when no subject is present, otherwise accusative or PP.
- ▶ In other words: *Poss-ing* or *Ing-of* (Abney 1987).

# Arabic deverbal nouns

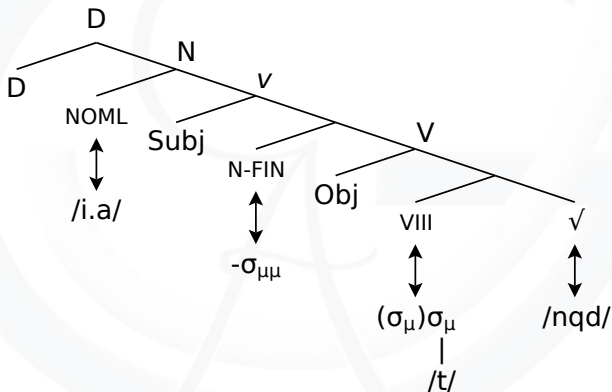
McCarthy & Prince's (1990) account:

Form: 'ntiqād

Root:	/nq d/	Nominalizer:	/i.a/
Stem VIII:	( $\sigma$ ) $\sigma_{\mu}$   t	Non-finite:	- $\sigma_{\mu\mu}$



# Arabic deverbal nouns



# Arabic deverbal nouns

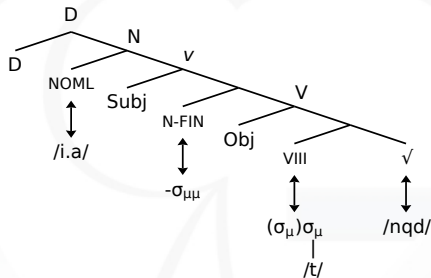
- ▶ The four morphemes in the word form *intiḡād* need to be combined.
- ▶ A syntactician's standard answer: head movement.
- ▶ Phonology needs to “know” that the four morphemes need to be combined; syntax does not.
- ▶ Syntax/phonology mapping principle:

## (8) *Input Correspondence*:

If A selects (a projection of) B,  $\Phi(A)$  selects  $\Phi(B)$ .

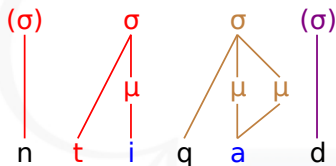
(Ackema & Neeleman 2004, cf. also Sadock 1992)

# Arabic deverbal nouns



- ▶ VIII selects  $v̄$ , N-FIN selects VIII, and NOML selects N-FIN.
- ▶ There is no need for a distinct subtree containing these four heads.
- ▶ By Input Correspondence, all four morphemes must be realised in a single form.

# Arabic deverbal nouns



- ▶ The phonology orders the four morphemes.
- ▶ *Segments* are linearised, *not* morphemes.
- ▶ Linear order is determined by phonological factors.
- ▶ The phonological form of a morpheme may (arbitrarily) require a specific linearisation (prefix, suffix).

# Phonological composition

- ▶ Syntax creates hierarchical feature structures (BPS, no linear order).
- ▶ The phonological chunks associated with syntactic heads are assembled into a phonologically licit form.
- ▶ Principles relevant to phonological composition:

- (9) a. Phonological principles
- b. Mapping principles

# Phonological composition

Phonological principles:

- ▶ Alignment
- ▶ Left-to-Right Association
- ▶ Language-specific rules and facts

Mapping principles:

- ▶ Input Correspondence
- ▶ Linear Correspondence

Syntactic structure only has an indirect influence on phonological form (including linear order).

# Nonmanuals in sign language

Sign languages have so-called *nonmanual components*:

(10) **face:** presumably DGS

**hands:** (POSSIBLE) SVEN WORK:3 GO:Perf:3  
'Presumably, Sven has gone to work already.'

(11) **face:** possible

**hands:** (POSSIBLE) SVEN WORK:3 GO:Perf:3  
'Sven has possibly gone to work already.'  
(Happ & Vorköper 2006: 363)

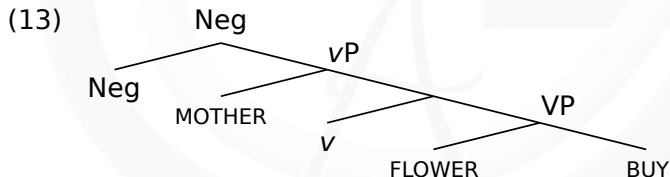
# Nonmanuals in sign language

- (12) a. **head:** *neg* DGS  
**hands:** MOTHER FLOWER BUY
- b. **head:** *neg*  
**hands:** MOTHER FLOWER BUY  
'Mother does not buy a flower'
- c. \* **head:** *neg*  
**hands:** MOTHER FLOWER BUY  
'Mother does not buy a flower'  
(Pfau 2002)

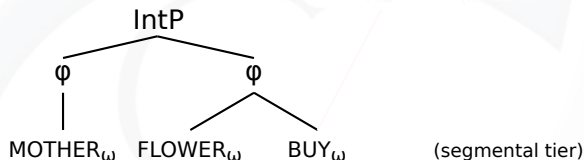
- ▶ In both sentences, negation is sentential.

# Nonmanuals in sign language

- ▶ Negation takes the form of a head shake and must be represented as an autosegmental feature.
- ▶ Assuming that the negation selects  $vP$ , the structure is as follows:



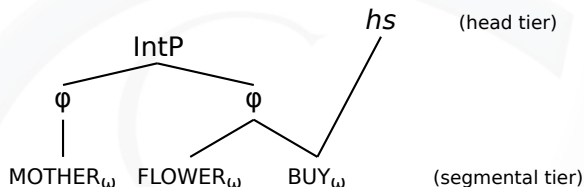
# Nonmanuals in sign language



$$(14) \quad \neg \leftrightarrow \begin{bmatrix} \text{Neg} \\ uV \end{bmatrix} \leftrightarrow \begin{matrix} hs \\ | \\ \omega \end{matrix}$$

- ▶ *hs* is realised autosegmentally.
- ▶ Left-to-Right Association and Input Correspondence associate *hs* with BUY.

# Nonmanuals in sign language



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# Latin *-que*

(19) *bonī puerī bonae-que puellae*  
good boys good-and girls  
'good boys and good girls'

- ▶ Embick & Noyer (2001) argue that *-que* attaches to the first MWd of its complement.

# Latin *-que*

Note the following data (Embick & Noyer 2001: 576):

(20) a. *circum-que ea loca*  
around-and those places  
'and around those places'

b. *contrā-que lēgem*  
against-and law  
'and against the law'

(21) a. *in rēbus-que*  
in things-and  
'and in things'

b. *dē prōvinciā-que*  
from province-and  
'and from the  
province'

*-que* attaches after the first PWD (Agbayani & Golston 2010).

# Latin *-que*

- ▶ Latin *-que* is a *prosodic* morpheme:

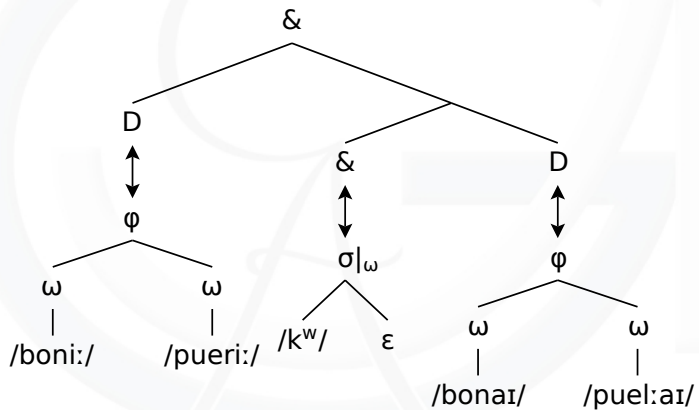
(22)  $\Lambda \leftrightarrow \&^\circ \leftrightarrow$

$$\begin{array}{c} \sigma|_{\omega} \\ \swarrow \quad \searrow \\ k^w \quad \varepsilon \end{array}$$

- ▶ The phonological form of *-que* specifies that it is a syllable that must appear at the right edge of a PWd.

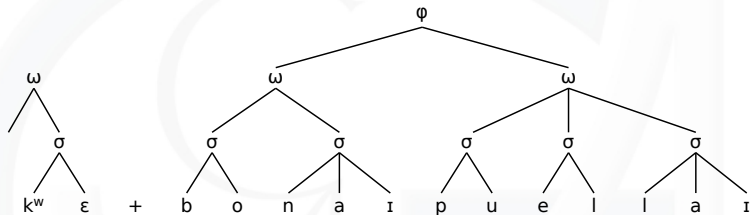
# Latin -que

(23)

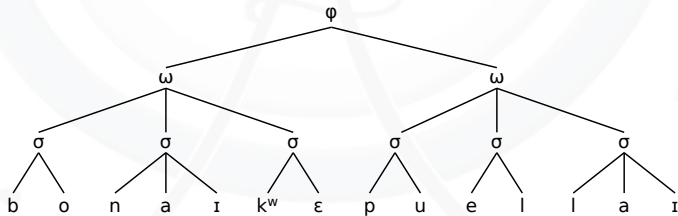


# Latin *-que*

(24)



(25)



# Tagalog *-um-*

- (26) a. *aral - um·aral*  
b. *sulat - s·um·ulat*  
c. *gradwet - gr·um·adwet*

(27)  $[v, +ag] \leftrightarrow$

$\omega$		$\sigma$		$\sigma$
		u		m



# Syntax vs. Morphology

- ▶ The phonological form of lexical items plays a role in phonological composition.
- ▶ There is no need to “prepare” a tree for phonology.
- ▶ There is no need to distinguish between syntactic and morphological structures.
- ▶ “Morphemes” may specify additional phonological properties, such as alignment (pre-/suffix) or prosodic structure.

# Syntax above the word

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# Syntax above the word

- ▶ The data so far are morphological data.
- ▶ A syntactic analysis of these is possible by assuming the phonological form of “morphemes” is partially prosodic.
- ▶ Question: Does this analysis extend above the “word” level?

# Linearisation

Linearisation seems a prime candidate:

- ▶ Linear order is primarily a modality requirement (an “external factor”).
- ▶ Syntactic structure is underspecified for linear order.
- ▶ There are item-specific (i.e., irregular) linearisations (Jackendoff 2002):

- (29) a. **so/how/very/too** good  
b. good **enough**

# Linearisation: head/comp

Truckenbrodt (1995):

- (30) a. Head-initial VP  $\leftrightarrow$   $\varphi$ -final stress (*read the **book***)  
b. Head-final VP  $\leftrightarrow$   $\varphi$ -initial stress (*das **Buch** lesen*)

Nespor et al. (2008):

- (31) a. Stress realised as pitch/intensity:  $\varphi$ -initial stress, comp-head  
b. Stress realised otherwise:  $\varphi$ -final stress, head-comp



# Linearisation: focus

Samek-Lodovici (2005) (cf. also Féry 2010):

- (33) a. *[Gianni ha RISO]<sub>f</sub>*  
Gianni has laughed  
'Gianni laughed' (context: *What happened?*)
- b. *Ha riso GIANNI<sub>f</sub>*  
has laughed Gianni  
'Gianni has laughed' (context: *Who laughed?*)

- (34) Focus alignment:  $\varphi$  |<sub>IntP</sub>  
|  
foc

# Intonational contours

- (35) a. John left for Rome. (L%)  
b. John left for Rome? (H%)

Suppose (35b) differs syntactically from (35a) in having a [+wh] C head. Then we can say:

- (36)  $[C, +wh] \leftrightarrow \dots |_{\text{IntP}}$   
          |  
          H

# Counterarguments

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# Counterarguments

- ▶ No free affix order languages.
- ▶ No LD-dependencies within words (e.g., no movement).
- ▶ Affixes are functional, i.e., no need for IS- or checking-driven movement.
- ▶ Affixes specify alignment restrictions in their phonological forms.

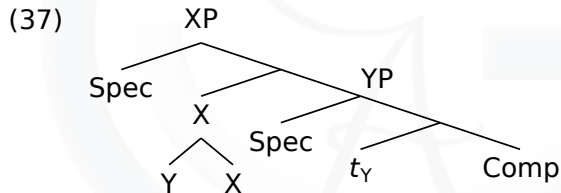
# Counterarguments

Ackema & Neeleman (2004, 2007) discuss various arguments in favour of a separate morphology module:

- ▶ Stranding and licensing
- ▶ Syntactic vs. morphological complex heads

# Stranding and licensing

Ackema & Neeleman (2007) assume that syntactic word formation involves movement:



# Stranding and licensing

Accordingly, word formation should allow stranding of modifiers:

- (38) a. \*the [city<sub>i</sub> centre] [of [a prosperous medieval [t<sub>i</sub> [in Northern Italy]]]]  
b. \*[parent<sub>i</sub> hood] [(of) [a [responsible [t<sub>i</sub> [from Glasgow]]]]]

And licensing of arguments:

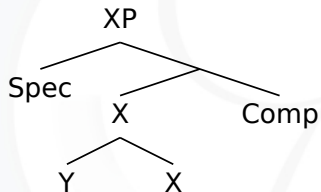
- (39) driver \*(of) a truck



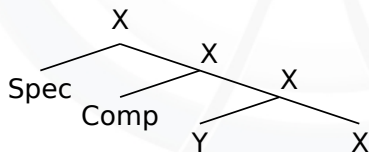
## Stranding and licensing

However, BPS allows us to do “syntactic” word formation *without* movement:

(41)



(42)



# Lexical Integrity

One difference between syntactic and morphological complex heads is *Lexical Integrity*:

- ▶ Subextraction of parts of words is not possible.
- ▶ Features of parts of words are not accessible for syntax.

# Lexical Integrity

For example, a compound cannot be split up:

(43) \*Tea<sub>i</sub>, I have bought a t<sub>i</sub> pot.

However, the same is true for certain phrases:

(44) \*Blue<sub>i</sub>, I have bought a t<sub>i</sub> tea pot.

# Lexical Integrity

Consider also the following data:

- (45) a. *Čěrnogo<sub>i</sub> ja rešila ne pokupat' [NP t<sub>i</sub> xleba]!*  
black I decided not to.buy bread  
'I decided not to buy black bread.'
- b. *V vagon ona xodila restoran obedat'.*  
to carriage she went restaurant to.dine  
'She used to go dine in a carriage restaurant.'  
(Pereltsvaig 2008: 8, 10)

# Lexical Integrity

Sometimes selectional restrictions of nonheads do percolate up:

- (46) a. *verbouw-plannen*    *aan het huis*  
reconstruction-plans on the house  
'reconstruction plans for the house'
- b. ... *Benghazi, the grootste door opstandelingen tegen*  
... Benghazi, the largest by    revolvers            against  
*Gaddafi bestuurde stad*  
Gaddafi governed city  
'... Benghazi, the largest city governed by opposition forces  
against Gaddafi'

# Lexical Integrity

Hebrew compounds (Borer 1989, 2009) are construct states with certain restrictions:

- ▶ Nonhead cannot be modified.
- ▶ Nonhead cannot be coordinated.
- ▶ Nonhead is not referential.
- ▶ Meaning is nontransparent.
- ▶ Pronominal reference to head or nonhead separately is not possible.
- ▶ Head+nonhead complex is semantically opaque, i.e., a semantic unit.

# Generalised Structural Integrity

- (47) *Generalised Structural Integrity*  
A unit on one level of representation (semantic, syntactic, phonological) corresponds to units on the other two levels of representation.

SEM ↔ SYN ↔ PHON

- ▶ This principle is violable, as e.g. movement shows.
- ▶ The lower on the prosodic hierarchy, however, the stronger it becomes.

# Generalised Structural Integrity

Isn't this trivial?

- ▶ There are several special cases:
  - ▶ Sem. simplex  $\leftrightarrow$  syn. head  $\leftrightarrow$  PWd
  - ▶ Sem. complex  $\leftrightarrow$  syn. phrase  $\leftrightarrow$  PPhr
  - ▶ Proposition  $\leftrightarrow$  clause  $\leftrightarrow$  U
- ▶ Because GSI is violable, so are these.
- ▶ Deviations are generally language-specific and must be learnt.

Parallel domains?

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# Phonological composition

- ▶ Phonological composition appears non-local.
- ▶ Phonological restrictions can influence syntax: Heavy-NP Shift, focus alignment, wh-movement (Richards 2006).
- ▶ Feedback from phonology to syntax seems required.

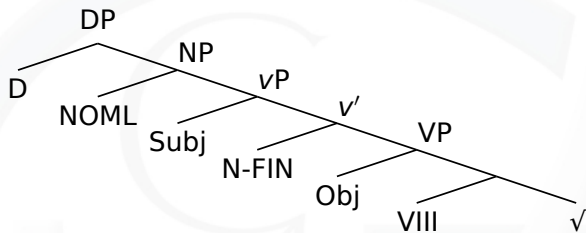
# Architecture of the grammar

- ▶ Phonological structure is composed in parallel with syntactic structure.
- ▶ Phonological structure may feed back into syntax, forcing the selection of two competing syntactic structures.
- ▶ A parallel architecture such as that of Jackendoff (1997, 2002) seems adequate to express this.
- ▶ Note: Jackendoff does not account why *syntactic* structure is the way it is (semantics and phonology get their own “system”, so should syntax).

# Architecture of the grammar

- ▶ Syntax is a combinatorial, symbolic system (cf. Boeckx 2010, Deacon 1997).
- ▶ Semantics and phonology are similarly combinatorial systems, with their own principles.
- ▶ On top of this sits a system of constructions, somewhat like Jackendoff's.

# Phonological composition

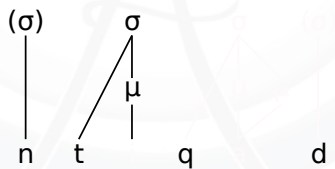


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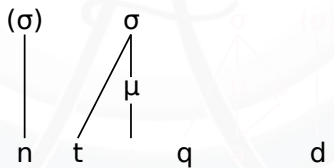
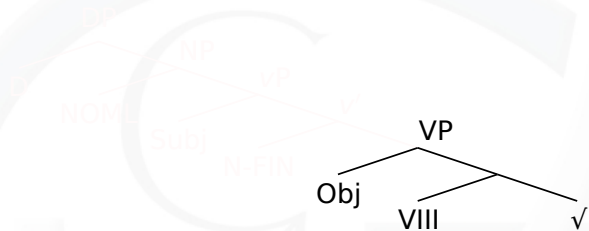


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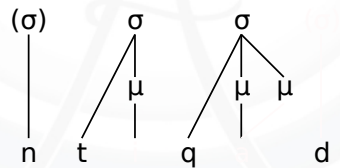
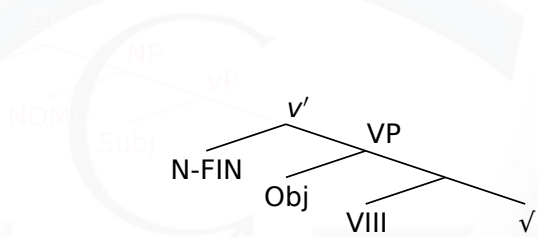
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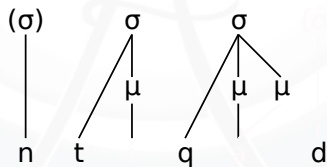
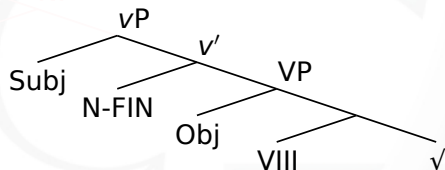
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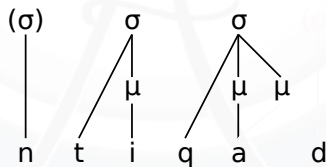
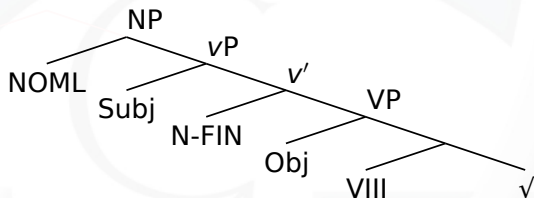
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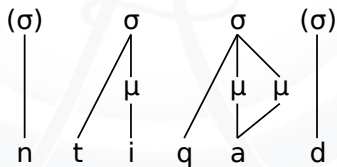
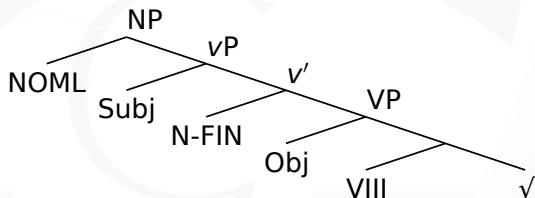
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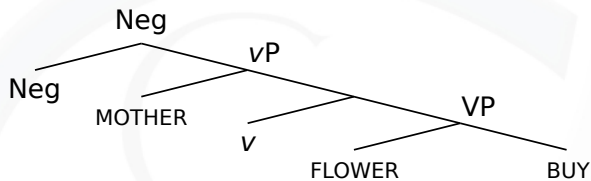
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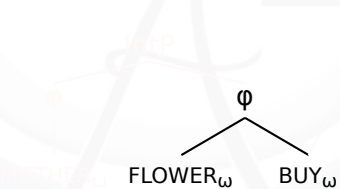
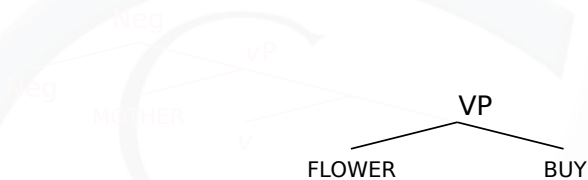
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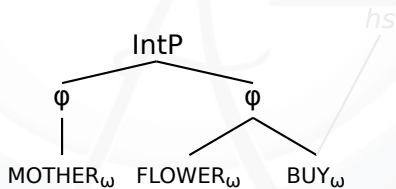
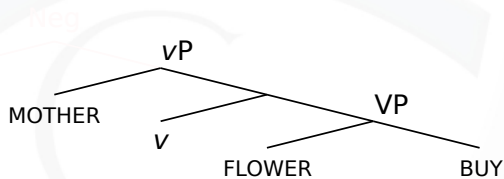
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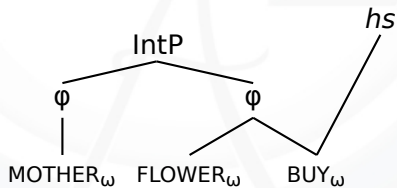
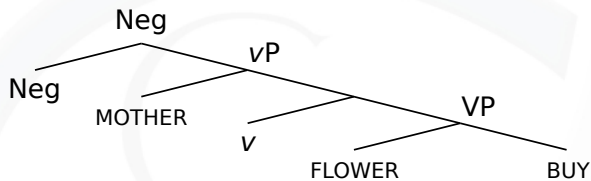
# Phonological composition



# Phonological composition



# Phonological composition



# Summary

- ▶ The syntax/morphology distinction is an optical illusion.
- ▶ Differences between “word-level” and “phrasal level” structures must be accounted for phonologically.
- ▶ The influence of phonology on the form of a linguistic structure is much larger than generally assumed; e.g., linearisation is phonological.

# References

- Abels, Klaus & Ad Neeleman. 2009. Universal 20 without the LCA. In José M. Brucart, Anna Gavarro & Jaume Sola (eds.), *Merging features*, chap. 4, 60–79. Oxford: Oxford University Press. URL <http://ling.auf.net/lingBuzz/000279Abney>,
- Steven. 1987. *The English noun phrase in its sentential aspect*. Ph.D. thesis, MIT. MIT Working Papers in Linguistics
- Ackema, Peter & Ad Neeleman. 2004. *Beyond morphology: Interface conditions on word formation*. Oxford: Oxford University Press
- Ackema, Peter & Ad Neeleman. 2007. Morphology  $\neq$  syntax. In Gillian Ramchand & Charles Reiss (eds.), *The Oxford handbook of linguistic interfaces*, chap. 10, 325–352. Oxford: Oxford University Press
- Agbayani, Brian & Chris Golston. 2010. Second-position is first-position: Wackernagel's Law and the role of clausal conjunction. Ms. California State University, Fresno
- Beard, Robert. 1988. On the separation of derivation from morphology: Toward a lexeme/morpheme-based morphology. *Quaderni di Semantica* 9. 3–59
- Borer, Hagit. 1989. On the morphological parallelism between compounds and construct. In Geert Booij & Jaap van Marle (eds.), *Yearbook of morphology 1*. Dordrecht: Foris
- Borer, Hagit. 2009. Afro-asiatic, semitic: Hebrew. In Rochelle Lieber & Pavol Stekauer (eds.), *The Oxford handbook of compounding*. Oxford: Oxford University Press. URL <http://www-bcf.usc.edu/~borer/borer%202008.pdf>
- Christophe, Anne, Séverine Millotte, Savita Bernal & Jeffrey Lidz. 2008. Bootstrapping lexical and syntactic acquisition. *Language and Speech* 51(1). 61–75
- Deacon, Terrence. 1997. *The symbolic species: The co-evolution of language and the brain*. New York: W.W. Norton & Co
- Embick, David & Rolf Noyer. 2001. Movement operations after syntax. *Linguistic Inquiry* 32(4). 555–595
- Féry, Caroline. 2010. Focus as prosodic alignment. URL <http://www.uni-koeln.de/phil-fak/ids1/linguistik/workshops/>. Talk at the Cologne International Workshop On Prosody, 3 July, 2010
- Halle, Moris & Alec Marantz. 1993. Distributed morphology. In Kenneth Hale & Samuel Jay Keyser (eds.), *The view from Building 20: Essays in linguistics in honor of Sylvain Bromberger*, chap. 3, 111–176. Cambridge, MA: The MIT Press
- Happ, Daniela & Marc-Oliver Vorköper. 2006. *Deutsche Gebärdensprache: ein Lehr- und Arbeitsbuch*. Frankfurt am Main: Fachhochschulverlag

# References

- Jackendoff, Ray. 1997. *The architecture of the language faculty*, vol. 28, Linguistic Inquiry Monograph. Cambridge, MA: The MIT Press
- Jackendoff, Ray. 2002. *Foundations of language: Brain, meaning, grammar, evolution*. Oxford: Oxford University Press
- Kremers, Joost. 2009. Recursive linearization. *The Linguistic Review* 26(1). URL <http://user.uni-frankfurt.de/~kremers/research.html>
- McCarthy, John & Alan Prince. 1990. Prosodic morphology and templatic morphology. In Mushira Eid & John McCarthy (eds.), *Perspectives on Arabic linguistics ii*, vol. 72, Current Issues in Linguistic Theory, 1-54. Amsterdam/Philadelphia: John Benjamins
- Nespor, Marina, Shukla Mohinish, Ruben van de Vijver, Cinzia Avesani, Hanna Schraudolf & Caterina Donati. 2008. Different phrasal prominence realizations in VO and OV languages. *Lingue e Linguaggio* 7(2). 139-168. URL <http://hdl.handle.net/10281/6919>
- Nespor, Marina & Irene Vogel. 1986. *Prosodic phonology*. Dordrecht: Foris
- Pereltsvaig, Asya. 2008. Split phrases in colloquial Russian. *Studia Linguistica* 62(1). 5-38
- Pfau, Roland. 2002. Applying morphosyntactic and phonological readjustment rules in natural language negation. In Richard Meier, Kearsy Cormier & David Quinto-Pozos (eds.), *Modality and structure in signed and spoken languages*, chap. 11, 263-295. Cambridge: Cambridge University Press
- Pfau, Roland. 2008. The grammar of headshake: A typological perspective on German Sign Language negation. *Linguistics in Amsterdam* 1. 34-71
- Richards, Norvin. 2006. Beyond strength and weakness. Ms. Boston, MIT
- Sadock, Jerrold M. 1992. *Autolexical syntax*. Chicago: University of Chicago Press
- Samek-Lodovici, Vieri. 2005. Prosody-syntax interaction in the expression of focus. *Natural Language and Linguistic Theory* 23. 687-755
- Truckenbrodt, Hubert. 1995. *Phonological phrases: Their relation to syntax, focus and prominence*. Ph.D. thesis, Cambridge, MA: The MIT Press