Morphology —like syntax— is in the eye of the beholder

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Introduction

- Architecture of the grammar:
  - Phonology
  - Morphology
  - Syntax
  - Semantics

- Language as a pairing of form and meaning:
  
  form $\approx$ phonology
  meaning $\approx$ semantics
  pairing $\approx$ 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°”.

In BPS, X° by definition cannot have segments.

MWd and SWd cannot be defined in a BPS-approach.
Suppose we have the structure in (3):

(3) \[
\begin{array}{c}
V \\
\text{water} & \text{boil}
\end{array}
\]

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. \[ V^\circ \]
     \[ \text{water}_N \quad \text{boil}_V \]
     b. \[ \text{VP} \]
     \[ \text{boil}_V \quad \text{water}_N \]

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
Prosodic hierarchy

Phonological structure contains a hierarchy of *prosodic constituents*:

(5) Utterance (U)
    Intonational Phrase (IntP)
    Phonological Phrase (φ)
    Prosodic Word (ω)
    Foot (Ft)
    Syllable (σ)
    Mora (μ)

(cf. Nespor & 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...)

1 7 3 7

1 7 3 7
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 ≈ “Morphology”
b. PPhr ≈ “Syntax”

- Syntax combines heads (i.e., feature bundles).
- Word formation is not a morphological/syntactic matter.
Data
Arabic deverbal nouns

(7) ʔaqlaqa-nī -ntiqād-u -l-rajul-i -l-mašrūʕ-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: i\textit{ntiqād}

| Root: /nqd/ | Nominalizer: /i.a/ |
| Stem VIII: (σ)σμ | Non-finite: -σμμ |

Syllabic tier

Segmental tier
Arabic deverbal nouns
Arabic deverbal nouns

- The four morphemes in the word form *intiqād* 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:

  \[(8) \textit{Input Correspondence}: \quad \text{If A selects (a projection of) B, } \Phi(A) \text{ selects } \Phi(B).\]
  
Arabic deverbal nouns

- VIII selects $\sqrt{}$, N-FIN selects VIII, and NOML selects N-FIN.
- There is no need for a distinct substree containing these four heads.
- By Input Correspondence, all four morphemes must be realised in a single form.
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) \[ \text{face: } \textbf{presumably} \]
     \[ \text{hands: } \text{(POSSIBLE) SVEN WORK:3 GO:Perf:3} \]
     ‘Presumably, Sven has gone to work already.’

(11) \[ \text{face: } \textbf{possible} \]
     \[ \text{hands: } \text{(POSSIBLE) SVEN WORK:3 GO:Perf:3} \]
     ‘Sven has possibly gone to work already.’

(Happ & Vorköper 2006: 363)
Nonmanuals in sign language

(12) a. **head:** \textit{neg}  \\
**hands:** MOTHER FLOWER BUY  \\

b. **head:** \textit{neg}  \\
**hands:** MOTHER FLOWER BUY  \\
‘Mother does not buy a flower’

c. * **head:** \textit{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 $v_P$, the structure is as follows:

(13)

```
Neg
  /   \
Neg  vP
    /  \ 
MOTHER v
     /   \ 
      FLOWER VP
           BUY
```
Nonmanuals in sign language

\[
\begin{array}{c}
\text{IntP} \\
\phi \\
\text{MOTHER}_\omega \\
\phi \\
\text{FLOWER}_\omega \\
\phi \\
\text{BUY}_\omega \\
\end{array}
\]

(14) \(\neg \iff [\text{Neg} \, uV] \iff hs\)

- \(hs\) is realised autosegmentally.
- Left-to-Right Association and Input Correspondence associate \(hs\) with \(BUY\).
Nonmanuals in sign language

\[ MOTHER_{\omega} \quad \text{IntP} \quad \phi \quad \text{FLOWER}_{\omega} \quad \phi \quad \text{BUY}_{\omega} \quad \hs \quad \text{(head tier)} \]

\[ \text{(segmental tier)} \]

\[(14) \quad \neg \leftrightarrow \begin{bmatrix} \text{Neg} \\ uV \end{bmatrix} \leftrightarrow \hs \]

- \( hs \) is realised autosegmentally.
- Left-to-Right Association and Input Correspondence associate \( hs \) with \( \text{BUY} \).
Nonmanuals in sign language

Alternative realisation:

(15) \[ \neg \leftrightarrow \begin{bmatrix} \text{Neg} \\ uV \end{bmatrix} \leftrightarrow hs \]

(16) \[
\begin{array}{c}
\text{IntP} \\
\phi
\end{array} 
\begin{array}{c}
\phi \\
\text{MOTHER}_\omega \quad \text{FLOWER}_\omega \quad \text{BUY}_\omega
\end{array} 
\begin{array}{c}
hs \\
(\text{head tier})
\end{array}
\]

\[
\begin{array}{c}
\phi \\
F_\omega
\end{array} 
\begin{array}{c}
\phi \\
(\text{segmental tier})
\end{array}
\]
Nonmanuals in sign language

(17) head: \( neg \)

\( \underbrace{\text{INDEX}_3 \ FLOWER \ BUY} \)

‘She does not buy a flower’
(Pfau 2008: 26)

(18) \[
\text{IntP} \quad \text{hs} \\
\quad \phi \\
\text{IX-FLOWER}_\omega \quad \text{BUY}_\omega
\]

(head tier)

(segmental tier)
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:

\[(22) \quad \&^\circ \leftrightarrow \sigma|\omega \quad \kappa^w \quad \varepsilon\]

- 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 -\textit{um}-

(26)  a. \textit{aral} – \textit{um\cdot aral}  
   b. \textit{sulat} – \textit{s\cdot um\cdot ulat}  
   c. \textit{gradwet} – \textit{gr\cdot um\cdot adwet}  

(27) $[v, +ag] \leftrightarrow \begin{array}{c} \omega | \sigma \sigma \\ u \quad m \end{array}$
English -ing

(28) \[[N, uV] \leftrightarrow \bigwedge \sigma|_\omega\]
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
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 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 $\leftrightarrow$ $\phi$-final stress (*read the book*)
    b. Head-final VP $\leftrightarrow$ $\phi$-initial stress (*das Buch lesen*)

Nespor et al. (2008):

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

- Assume that φ-stress assignment depends on hierarchical structure.
- In a structure $[\text{VP V Obj}]$, φ-stress is assigned to the object.
- Assume stress alignment rules:

  \[
  \begin{align*}
  (32) \quad & \text{a. head-initial: } \omega | \phi \\
  & \quad \quad \quad \quad | \\
  & \quad \quad \quad \times \\
  \quad \quad \quad \quad \times \\
  \text{b. head-final: } \phi | \omega \\
  & \quad \quad \quad \quad | \\
  & \quad \quad \quad \times \\
  & \quad \quad \quad \times 
  \end{align*}
  \]

- Requires distinguishing φ-stress from other types of stress.
- Compatible with theories of prosodic bootstrapping (e.g., Christophe et al. 2008)
Linearisation: focus

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

(33) a. $[\text{Gianni ha RISO}]_f$
   Gianni has laughed
   ‘Gianni laughed’ (context: What happened?)

b. $\text{Ha riso GIANNI}_f$
   has laughed Gianni
   ‘Gianni has laughed’ (context: Who laughed?)

(34) Focus alignment: $\emptyset |_{\text{IntP}}$
    $|$
    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)  \[ C, +wh \leftrightarrow \ldots |_{\text{IntP}} \]
      \[ \leftarrow \]
      \[ \text{H} \]

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

- Stranding and licensing
- Syntactic vs. morphological complex heads
Ackema & Neeleman (2007) assume that syntactic word formation involves movement:

(37)
Stranding and licensing

Accordingly, word formation should allow stranding of modifiers:

(38)  a. *the [city centre] [of [a prosperous medieval [in Northern Italy]]]

       b. *[parent hood] [(of) [a [responsible [from Glasgow]]]]

And licensing of of arguments:

(39)  driver *(of) a truck
Stranding and licensing

A morphological theory of word formation does not have this problem:

(40)
However, BPS allows us to do “syntactic” word formation without movement:

(41) \[
\begin{array}{c}
\text{XP} \\
\text{Spec} \quad X \quad \text{Comp} \\
\quad Y \quad X
\end{array}
\]

(42) \[
\begin{array}{c}
X \\
\text{Spec} \quad X \quad \text{Comp} \\
\quad Y \quad X
\end{array}
\]
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$_i$, I have bought a t$_i$ pot.

However, the same is true for certain phrases:

(44) *Blue$_i$, I have bought a t$_i$ tea pot.
Lexical Integrity

Consider also the following data:

(45) a. Čërnogo į ja rešila ne pokupat’ [NP tī 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.’
(Perel’tsvaig 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 revolters 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.

\[
\text{SEM} \leftrightarrow \text{SYN} \leftrightarrow \text{PHON}
\]

➤ This principle is violable, as e.g. movement shows.
➤ The lower on the prosodic hierarchy, however, the stronger it becomes.
Isn’t this trivial?

- There are several special cases:
  - Sem. simplex ↔ syn. head ↔ PWd
  - Sem. complex ↔ syn. phrase ↔ PPhr
  - Proposition ↔ clause ↔ U

- Because GSI is violable, so are these.
- Deviations are generally language-specific and must be learnt.
Parallel domains?
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

```
  DP
    D
    NOML
      Subj
      N-FIN
      vP
      v'
      VP
        Obj
        VIII
        √

       √

  √
```
Phonological composition
Phonological composition

(σ)  σ
  /  \\
 n    μ
  /  \\
  t    q
  /  \\
   d

VIII  √
Phonological composition
Phonological composition

Diagram:

```
(σ)  σ  σ
 n   μ  μ
   μ  μ
   μ
```

```
N-FIN

v′

VP

Obj

VIII

√
```
Phonological composition
Phonological composition

```
(σ)  σ  σ
  /   /   /
 n   μ   μ
|   /   /  
| t i q a 
|   /   /  
| μ μ μ d
```
Phonological composition
Phonological composition

![Phonological tree diagram]

Neg

Neg

vP

MOTHER

v

VP

FLOWER

BUY
Phonological composition

```
Neg
Neg
vP
MOTHER
v
VP
FLOWER
BUY
```

Diagram:

```
MOTHER_ω

\[ \varphi \]

<table>
<thead>
<tr>
<th>FLOWER_ω</th>
</tr>
</thead>
<tbody>
<tr>
<td>BUY_ω</td>
</tr>
</tbody>
</table>
```

\[ \text{VP} \]

\[ \text{IntP} \]

\[ hs \]
Phonological composition

Neg
Neg
vP
MOTHER
v
VP
FLOWER
BUY

Neg
Neg
vP
MOTHER
v
VP
FLOWER
BUY

MOTHERω
FLOWERω
BUYω
φφ
IntP
hs

MOTHERω
FLOWERω
BUYω
φφ
IntP
hs
Phonological composition

Neg
  \[vP\]
  Neg
  MOTHER
  v
  FLOWER
  BUY

IntP
\[hs\]
\[\phi\]
MOTHER\(\omega\)
FLOWER\(\omega\)
BUY\(\omega\)
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.


Agbayani, Brian & Chris Golston. 2010. Second-position is first-position: Wackernagel’s Law and the role of clausal conjunction. Ms. California State University, Fresno


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