HPSG AND ARABIC

Head-driven Phrase Structure Grammar (HPSG)

HPSG is a monostratal constraint-based approach to syntax.

- As a monostratal approach it assumes that linguistic expressions have a single level of syntactic structure and hence has no movement processes.

- As a constraint-based approach it licenses linguistic expressions through a complex system of phrase types subject to appropriate constraints. For example, it has a type headed-phrase with sub-types including head-complement-phase and head-subject-phrase.

For introductions see Sag, Wasow, and Bender (2003), Kim and Sells (2008), Green (forthcoming), Kathol, Przepiórkowski and Tseng (forthcoming). (The last two are available from me.)

Subject-initial clauses

One possibility is that subject-initial clauses are just subject-initial structures of the kind that English has so that (1) has the structure in (2), where the SUBJ feature indicates what sort of subject a head requires.

(1) Mohammed-un akala a-ttufahat-a
    Mohammed-NOM ate.3SG.MASC the-apple-ACC
    ‘Mohammed ate the apple’.

(2)

\[
\begin{array}{c}
S \\
[\text{SUBJ} <>] \\
[1]\text{NP} \\
[\text{VP} \\
[\text{SUBJ} <[1]>] \\
\text{Mohammed-un akala a-ttufahat-a}
\end{array}
\]

Given that Arabic has verb-initial clauses, another possibility is that subject-initial clauses are verb-initial clauses with a subject that is fronted because it is a topic so that (1) has the structure in (3), where the SLASH feature connects a filler and a gap.

(3)
(2) is like a minimalist analysis in which the subject is in SpecTP. (3) is like a minimalist analysis in which the subject is in SpecCP or Spec TopP.

There seem to be arguments that some pre-verbal subjects are not topics. If this is right, then it is probable that both structures should be available.

Structures like (2) require verbs to have categories like the following:

(4) $\begin{bmatrix}
\text{HEAD } verb \\
\text{SUBJ } < \text{NP} > \\
\text{COMPS } < \text{NP} >
\end{bmatrix}$

**Verb-initial clauses**

One possibility for verb-initial clauses is that they are structures in which a head has both its subject and its complements as sisters. Within this approach (5) has the structure in (6).

(5) Akala Mohammed-un a-ttufahat-a ate.3SG.MASC Mohammed-NOM the-apple-ACC ‘Mohammed ate the apple’.
This approach requires a special phrase type, a head-subject-complement phrase, subject to an appropriate constraint as follows:

\[(7) \text{hd-subj-comp-ph} \rightarrow \]

Essentially this approach is taken to English auxiliary-initial sentences in Pollard and Sag (1994) and Ginzburg and Sag (2000).

An alternative approach treats post-verbal subjects as extra complements. This approach was originally proposed for Welsh verb-initial clauses in Borsley (1989). It gives the following structure for (5):
On this approach verb-initial clauses are head-complement phrases, subject to the following constraint:

(9) \( \text{hd-comp-ph} \rightarrow [\text{DTRS}<[1]\text{word}\text{COMPS}<[2],...,[n]>][\text{SS}[2]],...,\text{SS}[n]] > \text{HD-DTR}[1] \)

No special phrase type is required. However, an extra set of verbal categories like the following is required:

(10) \[
\begin{array}{c}
\text{HEAD}\verb
\text{COMPS}<\text{NP, NP}>
\end{array}
\]

These could be derived from the ordinary verbal categories by a lexical rule, as follows:

(11) \[
\begin{array}{c}
\text{HEAD}\verb
\text{COMPS}[2]
\end{array} \Rightarrow \begin{array}{c}
\text{HEAD}\verb
\text{COMPS}<[1]>\oplus[2]
\end{array}
\]

This approach is taken to English auxiliary-initial sentences in Sag, Wasow and Bender (2003).

On the extra complement analysis one expects post-verbal subjects to have something in common with other expressions which are the first member of a COMPS list. Borsley
(1995) argues that we find this in Welsh (subjects of verb-initial clauses trigger agreement in essentially the same way as objects of subject-initial clauses) but not in Arabic. He proposes that the extra complement analysis is appropriate for Welsh but not for Arabic.

**Subject-verb agreement**

An important difference between subject-initial and verb-initial clauses is that the verb agrees with subject in person, number and gender in the former but only in person and gender in the latter (verb always being singular). This was ignored in Borsley (1995).

(12) a-tullab-u wasal-u
    the-students 3PL.MASC-NOM  arrived 3PL.MASC
    ‘The students arrived’.

(13) wasala a-tullab-u
    arrived 3SG.MASC  the students 3PL.MASC-NOM
    ‘The students arrived’.

Assuming essentially with Sag, Wasow and Bender (2003: chapter 3) that verbs and their subjects have an AGR feature whose value includes PERSON, NUMBER and GENDER features we have the situation in (14) in subject-initial clauses and the situation in (15) in verb-initial clauses. \((numb\) is an unspecified value.)

\[
\begin{align*}
\text{Subject} & \quad \begin{array}{l}
\text{AGR} \, [1]_{-} \\
\end{array} \\
\text{Verb} & \quad \begin{array}{l}
\text{AGR} \, [1]_{-} \\
\end{array}
\end{align*}
\]

\[
\begin{align*}
\text{Verb} & \quad \begin{array}{l}
\text{AGR} \, \left[ \begin{array}{l}
\text{PERS} \, [1] \\
\text{NUMB} \, \text{sing} \\
\text{GEND} \, [2] \\
\end{array} \right] \\
\end{array} \\
\text{Subject} & \quad \begin{array}{l}
\text{AGR} \, \left[ \begin{array}{l}
\text{PERS} \, [1] \\
\text{NUMB} \, \text{numb} \\
\text{GEND} \, [2] \\
\end{array} \right] \\
\end{array}
\end{align*}
\]

One way to ensure these situations is with constraints on verbs.

If we reject the extra complement analysis of verb-initial clauses, verbs in subject-initial clauses and verbs in verb-initial clauses will have essentially the same categories. However, following much HPSG work we can propose that the former are \([\text{INV} (\text{ERTED}) \, -]\) and the latter \([\text{INV} (\text{ERTED}) \, +]\)

We can then propose the following constraints on verbs:
Clitics

Arabic clitics can probably analyzed as pronominal affixes in the same way as Romance clitics have been, e.g. in Miller and Sag (1997).

Miller and Sag assume that the basic combinatorial potential of a word is encoded by the feature ARG(UMENT)-ST(RUCTURE), whose value is a list of synsem objects (combinations of syntactic and semantic information).

When all the synsem objects are canonical, the relation between the values of ARG-ST, SUBJ and COMPS is as follows:

\[
\text{ARG-ST < [1], [2], ..., [n] >} \\
\text{SUBJ < [1] >} \\
\text{COMPS < [2], ..., [n] >}
\]

However, ARG-ST lists may also contain affixal synsem objects. These do not appear in the value of SUBJ or COMPS. Instead they are realized by affixes.

On this approach a verb with an ordinary NP object, e.g. that in (19), will have the category in (20).

(19) Mohammed raʔa Salwa.
Mohammed saw-PAST-3-MASC-SG Salwa
‘Mohammed saw Salwa.’
A verb with an object clitic, e.g. the verb in (21), will have the category in (22).

(21) Mohammed raʔa-ha.
Mohammed saw-PAST-3-MASC-SG-her
‘Mohammed saw her.’

(22) 
[HEAD  
verb 
SUBJ<[1]>  
COMPS<>

A preposition with an ordinary NP object, e.g. that in (23), will have the category in (24).

(23) maʔa Salwa
with Salwa

(24) 
[HEAD  
prep 
SUBJ<>
 COMPS<[1]>
 ARG - ST <[1]NP > ]

A preposition with an object clitic, e.g. that in (25), will have the category in (22).

(25) maʔa-ha
with-her

(26) 
[HEAD  
prep 
SUBJ<>
 COMPS<>
 ARG - ST <NP_{\text{aff}} > ]
Noun phrases

A noun + complement noun phrase such as (27) is straightforward.

(27) kitaab-un fi n-naHw
   book-INDEF about syntax
   ‘a book about syntax’

The noun will have the category in (28) and the example will have the structure in (29) (ignoring the ARG-ST feature).

(28)
```
[HEAD noun
  SPR <>
  COMPS<[1]>
  ARG-ST<[1]PP>]
```

(29)
```
[hd-comp-ph]
  HEAD noun
  SPR <>
  COMPS <>
```

```
  [HEAD noun
   SPR <>
   COMPS<[2]>]
```

```
  kitaab-un fi n-naHw
```

An issue arises about noun phrases with a possessor such as (30).

(30) kitaab-u Salwa fi n-naHw
    book-NOM Salwa about syntax
    ‘Salwa’s book about syntax

In HPSG analyses of English possessors are analyzed realizations of the SPR feature, giving categories like (31) and structures like (32).
There are, however, two reasons for treating Arabic possessors as extra complements, giving categories like (33) and structures like (34).

(33)

[HEAD noun
SPR <>
COMPS <[1], [2]>
]
This analysis accounts (a) for the fact that possessors always follow the associated noun, and (b) for the fact that they can be realized as a clitic, as in (35).

(35) kitaab-u-ha fi n-naHw
    book-NOM-her about syntax
    ‘her book about syntax’

This will involve the category in (36) and the structure in (37).

(36)

```
[HEAD noun ]
[ SPR <>]
[COMPS<[1]>]
[ARG-ST<NP_{eff},[1]PP>]
```
A further issue arises about attributive adjectives, which after a possessor and before any ordinary complement.

(38) kitaab-u Salwa l-jadiid-u fi n-naHw
    book-NOM Salwa the-new about syntax
    ‘Salwa’s new book about syntax’

Attributive adjectives are standardly analyzed as modifiers combining with a nominal constituent to form a larger nominal constituent.

It is fairly easy to apply this approach to Welsh and Persian in which Attributive adjectives precede both possessors and ordinary complements. The Welsh example in (39) can have the analysis in (40).

(39) Ilyfr newydd Megan am gystrawen
    book new Megan about syntax
    ‘Megan’s new book about syntax.’

See Samvellian (2007) for analysis of Persian NPs along these lines.
A different approach is necessary for Arabic. One possibility is to assume that attributive adjectives are optional extra complements. This is an approach taken to verbal adjuncts in Bouma, Malouf and Sag (2001).

On this approach kitaab in (38) has the category in (41) and (38) has the structure in (42).

(41)  
```
[HEAD noun  
SPR <>  
COMPS < NP, AP, PP >]
```

(42)  
```
[hd - comp - ph]  
HEAD noun  
SPR <>  
COMPS <>
```

Another possibility would be to assume that Arabic has a special phrase type, a head-complement-adjunct phrase, allowing a head to have its complements and optional adjuncts as sisters.

Other issues in noun phrases are the nature of the definite article, agreement between attributive adjectives and nouns and the absence of the definite article with possessed nouns. These matters are discussed in connection with Hebrew in Wintner (2000).

**Other references**

A number of issues in Maltese syntax, including clause structure and noun phrase structure, are discussed in Müller (2009).

Resumptive pronouns in Hebrew are discussed in Vaillette (2001).
REFERENCES