The Role of Argument Structure in Arabic Impoverished

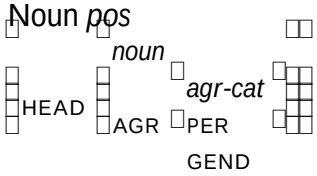
subjects.[1] This phenomenon is called impoverished agreement. Despite differences in word order and agreement (1aS1.95T11.9550010011.955001487.177037rd

inherited predictably from a Type Hierarchy. Because of its lexicalist and constraint-based nature the grammar has one other desirable feature: there are very few Phrase Structure rules.[5]

2.1. Part of Speech and Valence

HPSG categorizes syntactic elements by part of speech (*pos* in the type hierarchy with subtypes: *noun, verb*, etc.), and by saturation level, whether or not that element still needs to combine with other elements. Part of speech is a value of the HEAD feature. The parts of speech noun, verb, and det (determiner) are a subtype of *pos* called *agr-pos* because these parts of speech have AGR (agreement) features.[6] A basic noun *pos* element is presented in (3) below, without the AGR values specified.

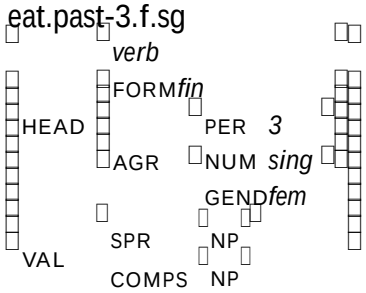
(3) Noun *pos*



The entry in (3) could be a noun, a nom, or a noun phrase (roughly *N*, $\bar{N}$, and *NP* in standard X-Bar Theory). The difference among those three noun pos elements lies in their level of saturation. Saturation refers to

Note that the left side of the rule, the mother node, has an empty list, , for the value of its COMPS feature, this is a notational convention for a saturated VAL feature, one that does not combine with anything else. The Head of type word is the equivalent of the *X* in X-Bar Theory, the left side of the Head-Complement rule, with its saturated COMPS feature is the equivalent of $\bar{X}$. The list that is the value of the COMPS feature of the head on the right side of the rule is tagged with the actual syntactic elements that follow. Tags are a notation for structure-sharing between two or more elements, in this case between the lexical items following the head daughter and the value of the COMPS feature of the

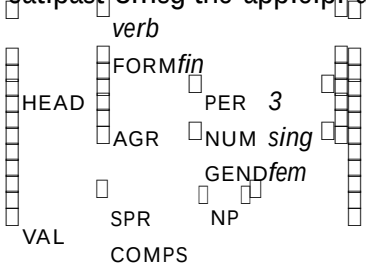
(6) eat.past-3.f.sg



?akal-at

In contrast (7) has a saturated COMPS feature but has $\langle \rangle_{NP}$ as the value of its SPR feature. (6) is the head daughter that combines with the NP *at-tuffaahat-a* under the mother node (7) as licensed by the Head-Complement Rule. The Head-Feature Principle ensures that the HEAD values of (6) and (7) are tagged.[10]

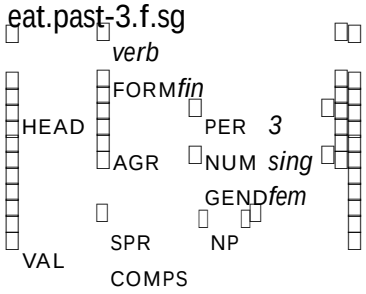
(7) eat.past-3.f.sg the-apple.pl-acc



?akal-at at-tuffaahat-a

(7) is a VP consisting of a transitive verb and its direct object, but the syntactic feature matrix is identical for a VP consisting of an intransitive verb as in (8):

(8) eat.past-3.f.sg

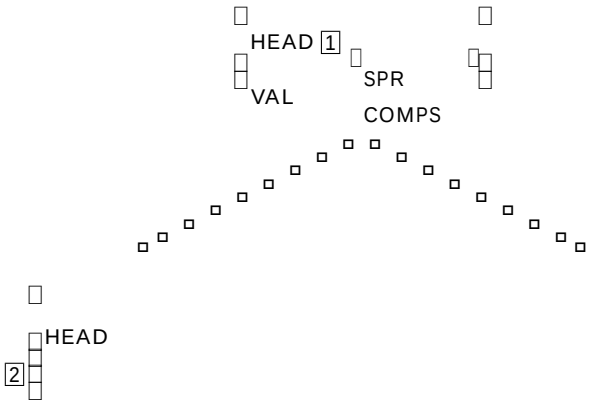


?akal-at

Notice that (7) and (8) take $\langle \rangle_{NP}$ as their SPR value. The Head-Specifier Rule licenses (9) as the mother node of the NP *Halima* and the head daughter (7) or (8).

[10](11) below shows the features tagged by the Head-Feature Principle.

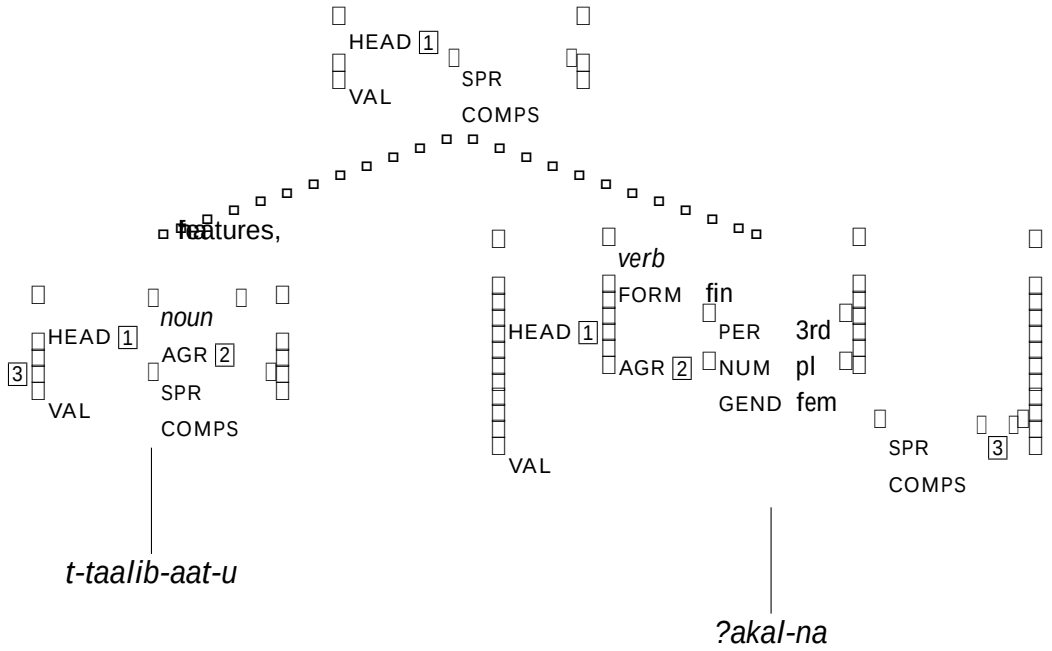
(11)



(12) Specifier Head Agreement Constraint[15]

$$\begin{bmatrix} \text{HEAD} & \begin{bmatrix} \text{AGR} & \boxed{1} \end{bmatrix} \\ \text{VAL} & \text{SPR} \left\langle \begin{bmatrix} \text{AGR} & \boxed{1} \end{bmatrix} \right\rangle \end{bmatrix}$$

(14)



The entire value of the HEAD feature of the mother node in (14), including all of its sub-features, is tagged with that of the head daughter, the right-most daughter in this case, due to the Head-Feature Principle. SHAC constrains the AGR features of the subject and the verb to be tagged. As in (11) above the SPR value of the head daughter is tagged with the entire entry for the subject. As such the SHAC correctly predicts the agreement in SVO sentences in Modern Standard Arabic.

2.5. Argument Structure

Argument structure (ARG-ST) is an interface level between syntax and semantics.[16] ARG-ST is a feature of words and lexemes in the grammar. The value of ARG-ST is a list of syntactic elements and is governed by the Argument Realization Principle (ARP), a constraint on type word, shown in (15).

[16]HEAD and VAL are SYN (syntax) features, I have omitted all SEM ha

(15) Argument Realization Principle[17]

SYN VAL S

The details of such a proposal would need to determine sentential and phrasal constituency, namely how to deal with the specifier subject appearing between the verb and its object.[18] Constituency aside though, the real problem with this approach is that analyzing the subject as the SPR value of a verb wrongly predicts that the SHAC will apply, triggering full agreement on the verb by tagging the AGR features of the subject and the verb.

What we want is an analysis in which the subject is not a specifier. Borsley (1987)[19] suggests that VSO sentences in Welsh are constructions of the Head-Subject-Complement schema. The Head-Subject-Complement schema is a rule that predicts a flat-structure and was used in Pollard and Sag (1994) to analyze subject-auxilliary inversion in yes/no questions, though it does not appear in the version of HPSG described in SWB.

My analysis is equivalent to Borsley's in that the VSO sentences have a flat structure. But rather than appeal to another grammar rule, the word order alternation is explained by the derivational

An important theoretical concept to understand about lexical rules is that they do not, in fact, change one lexeme into another. SWB explain this concisely: [22]

> Despite the metaphor suggested by the feature names INPUT and OUTPUT, and the informal procedural language we use to describe them, lexical rules do not change or otherwise operate on lexical sequences. Rather they relate lexical sequences to other lexical sequences.

The last thing that the VSO Lexical Rule does is to specify that the NUM value of the OUTPUT is singular. This does not account for the agreement facts, but simply stipulates that in the cases when the NUM feature is not constrained to agree it remains in the singular form. This is an empirical observation which rules out sentence pairs like (18) in which the impoverished number agreement remains plural even with a singular subject.

(18) * ?akal-na t-taalib-a
eat.past-3.f.pl the-student-f.sg
'The student ate.'

3.2. Agreement

An analysis of word order has been proposed but agreement still needs to be accounted for. The analysis needs provide for three empirical observations about Arabic. First, the subject complement is constrained to agree with the verb in person and gender; second, object complements are not constrained to agree with the verb;[23] and third, subject and object complements are not constrained to agree with each other.

These facts make it problematic to constrain the COMPS feature of the head verb, especially considering that in SVO sentences there is no agreement between the head and its COMPS value. The logical feature to constrain is the head verb's ARG-ST. In both SVO and VSO sentences the subject is the first argument on the ARG-ST list. SWB already make use of the ARG-ST list to constrain the subjects of finite verbs to be nominative, and use the concept *outrank* to assign accusative case.[24] I propose to add a further constraint tagging the AGR features of a verb with those of the verb's first argument.

This new constraint, which I call the Argument Structure Agreement Principle (ASAP), is on type verb-lxm a subtype of infl-lxm.[25] ASAP tags the AGR features PER and GEND of a lexeme with the PER and GEND features of the first member of that lexemes ARG-ST list, as in (19) below:

[22]Page 259, the opening paragraph of section 8.7.4.

[23]There are languages that do have verb-object agreement, so a constraint based theory of Universal Grammar would presumably include a constraint governing object complements, a *CHAC*.

[24]SWB's Case Constraint, page 245, section 8.4.5. Outrank is also an important part of SWB's formulation of Binding Theory, page 222 section 7.9.

[25]Determiner-noun agreement is beyond the scope of this paper, but see Benmamoun (2000) for a discussion of a similar nominal agreement phenomenon in the Arabic construct state.

(19) Argument Structure Agreement Principle

The VSO Lexical Rule generates verbs[26] that can head sentences licensed by the Head-Complement Rule. The Argument Structure Agreement Principle constrains verb lexemes to agree with their subject, the ranking argument on their ARG-ST list, in person and gender. It is important to note that the ASAP constrains all verbs. The ASAP is even in effect on verbs that can head SVO sentences which are also constrained by the SHAC. This raises a question of how the

(22) a. Does he have mustard?
b. Do they have mustard?
c. * Do he have mustard?
d. * Does they have mustard?

In (22a) *does* agrees with the third-person-singular subject *he* while in (22b) *do* agrees with the non-third-person-singular subject *they*. (22c.) is ungrammatical due to the agreement mismatch between the third-person-singular subject *he* and the non-third-person-singular-verb *do*. (22d.) is also ungrammatical due to the mismatch in agreement between subject (non-third-person-singular) and the verb (third-person-singular).[29]

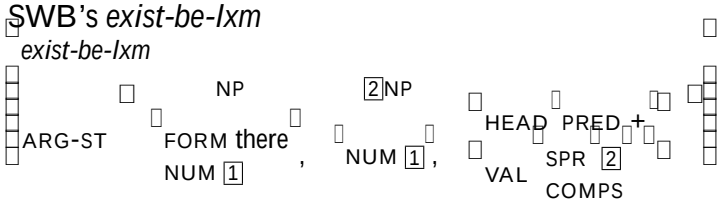
SWB analyze these sentences by positing a post-inflectional lexical rule, or *pi-rule*, the Inversion Lexical Rule shown in (23). This rule changes

(24) ASAP Inversion Lexical Rule

d-rule

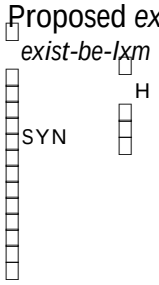
INPUT

(26) SWB's *exist-be-lxm*



There in these existential constructions is the SPR value of the verb, but it is also an expletive; that is, *there* offers no semantic contribution to the sentence. It is somewhat counterintuitive to place an expletive element in the ARG-ST list value,

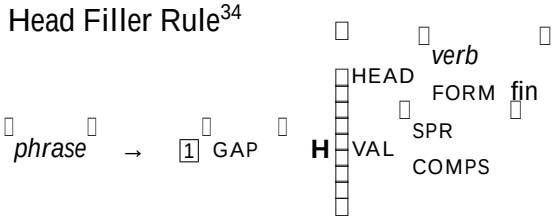
(28) Proposed *exist-be-lxm*



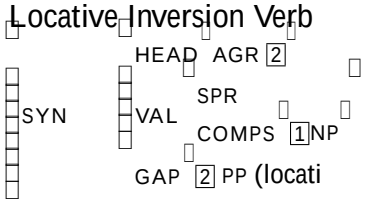
The ASAP analysis of these constructions is again that the argument following the verb (*a lamp* or *several lamps*) is the first element on the verbs ARG-ST list. This is harder to justify than the expletive *there* analysis because the locative argument *in the corner* is not semantically null, by definition it provides information about location.

I analyze locative inversion sentences as a construction of the Head-Filler Rule in (31).

(31) Head Filler Rule[34]



(33) Locative Inversion Verb



(35) SWB's *srv-lxm* [35]

The ASAP constrains the AGR features of the entire subordinate VP to be tagged with the AGR features of the subject complement, which is the

One analysis is that in English the SHAC constrains PER and the ASAP constrains NUM. However, sentences like (38) show that the ASAP can constrain PER as well.

(38) Am I sunburned?

Be in (38) agrees with the first person singular subject *I*. When the ASAP is in effect and the SHAC is not, as in (38), the ASAP constrains all of the AGR features. And when the SPR value of a verb is that verb's first argument all the AGR features are constrained minimally by the ASAP and possibly by the SHAC as well. Only when there is a mismatch between the element in a verb's SPR value and that verbs first argument do the SPR and the SHAC conflict. Expletive *there* is specified to be [PER 3] and is not specified for any other AGR values. Thus when *there* triggers the SHAC it only constrains the verb such that it is [PER 3]. Still this precludes the PER feature from being tagged to the PER feature of the verb's subject complement in (37). When in conflict the SHAC disallows the ASAP from constraining the PER feature. Presumably then SHAC is a stronger constraint than the ASAP, but more data about mismatch SPR and first argument values in a number of languages would have to be examined to conclusively determine this crosslinguistically.

6. Conclusions

The ASAP analysis correctly accounts for the details of Impoverished Agreement in Modern Standard Arabic. Word order is accounted for by the VSO Lexical Rule which has as it's OUTPUT verbs that can head sentences licensed by the Head-Complement Rule. The ASAP in Modern Standard Arabic constrains all verbs to agree in person and gender to their first argument.

The ASAP analysis has been extended to account for the agreement details of yes/no questions, existential *there* sentences, and locative inversion sentences in English. Yes/no questions were analyzed similarly to VSO sentences in MSA. The word order was a result of the sentence being licensed by the Head-Complement Rule. The head of the sentenc, an auxiliary, was licensed by a derivational rule for inversion, and the ASAP constrained agreement. The ASAP analysis of existential *there* sentences involved modifying the ARP such that expletive elements were not realized in the ARG-ST value. Locative inversion sentences were analyzed as a construction of the Head-Filler Rule with the locative PP as the value of the verbs GAP feature. The constraints on subject-raising-verb lexeme were modified to account for agreement between the main clause verb and the subject complement of the subordinate clause.

Finally some evidence that the SHAC is a stronger constraint in English than the ASAP was presented. The relative strength of the SHAC and the ASAP may vary language to language. The evidence presented has shown that in English the SHAC minimally constrains PER, and in MSA the SHAC minimally constrains NUM. In MSA the ASAP constrains PER and GEND, while in English the ASAP seems to constrain NUM PER and GENd, though SHAC is able to disallow the ASAP's constraint of PER. That the ASAP can account for agreement detail in both MSA and in English suggests that might be an active constraint in other languages. The details of which features are constrained by the SHAC and which by AGR, as well as the relative strength of the two constraints, must be determined empirically by looking at language specific data.

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UNIVERSITY OF ROCHESTER WORKING PAPERS IN THE LANGUAGE SCIENCES — VOL. 3, NO. 1

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