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The Role of Argument Structure in Arabic Impoverished Agreement Constructions

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Impoverished agreement in Modern Standard Arabic has been studied extensively in the transformational model set forth in Chomsky's 1995 *Minimalist Program* (Benmamoun 2000, Mahfoudhi 2002, Mohammad 2000, among others). This paper analyzes the agreement asymmetry following the lexicalist Head-Driven Phrase Structure Grammar (HPSG) laid out in Sag, Wasow, and Bender (2003). An additional agreement constraint is proposed linking subject-verb agreement to argument structure.

1. Impoverished Agreement

Impoverished agreement in Modern Standard Arabic, the agreement contrast between (1) and (2) below, has been studied extensively in the transformational model set forth in Chomsky's 1995 *Minimalist Program* (Benmamoun 2000, Mahfoudhi 2002, Mohammad 2000, among others). This paper analyzes the agreement asymmetry following the lexicalist Head-Driven Phrase Structure Grammar (HPSG) laid out in Sag, Wasow, and Bender's 2003 *Syntactic Theory* (Henceforth SWB).

Modern Standard Arabic has two common sentence structures: Subject Initial or SVO and Verb Initial or VSO orders. In Subject Initial sentences the Verb agrees with the Subject in Gender, Number, and Person as in (1) (data from Benmamoun 2000).

- (1) a. t-taalib-aat-u ʔakal-na
the-student-fem.pl-nom eat.past-3rd.fem.pl
'The students ate.'
- b. * t-taalib-aat-u ʔakal-at
the-student-fem.pl-nom eat.past-3rd.fem.sg
'The students ate.'
- (2) a. ʔakal-at t-taalib-aat-u
eat.past-3.f.sg the-student-f.pl-nom
'The students ate.'
- b. * ʔakal-na t-taalib-aat-u
eat.past-3.f.pl the-student-f.pl-nom
'The students ate.'

However, in Verb Initial constructions like (2) the Verb agrees with the Subject only in Person and Gender, and not in Number, which remains singular as a default even with dual or plural

subjects.¹ This phenomenon is called impoverished agreement. Despite differences in word order and agreement (1a) and (2a) both have the same meaning;² in both cases [the (female) students] is the subject and [ate] is the verb.

Before an analysis of the agreement phenomenon can take place we must first account for the SVO VSO alternation. This alternation could be analyzed within HPSG as either a syntactic phenomenon or as a lexical phenomenon. If the alternation is syntactic then the grammar rules need to be modified, if it is lexical then the lexicon needs modification. I follow the spirit of SWB's strongly lexicalist framework and claim that the alternation is lexical in nature and posit a lexical rule³ whose input is an verb with its subject as its SPR value⁴ and whose output is a verb with its subject as the first member of its COMPS value list.

The remainder of the paper is organized as follows: Section 2 explains the relevant elements of SWB's Head-Driven Phrase Structure Grammar with an introduction of the type-hierarchy and valence features in 2.1, the grammar rules in 2.2, an application of HPSG to simple sentences in Modern Standard Arabic in 2.3, a discussion of the SHAC and subject-verb agreement in 2.4, and an explanation of argument structure in 2.5.

I present the aforementioned lexical rule for word order alternation in section 3.1; and in section 3.2 I propose the Argument Structure Agreement Principle (ASAP), a constraint that accounts for Impoverished Agreement in VSO sentences. The ASAP constrains a word to agree with the first member of its argument structure, which in both SVO and VSO sentences is its subject.

In section 4 I defend the cross-linguistic validity of the ASAP by applying it to three constructions in English: Yes/no questions in 4.1, existential *there* sentences in 4.2, and locative inversion in 4.3. 4.4 examines raising constructions of locative inversion and existential *there* sentences. Section 5 explores the interaction between the SHAC and the ASAP, our two agreement constraints, and section 6 contains my conclusions.

2. Head-Driven Phrase Structure Grammar

HPSG as set out in SWB has three basic tenets. First, it is surface oriented, which means that it disallows null elements. In this way it differs from minimalist analyses which often posit null heads to flesh out empty nodes of the tree. The terminal nodes of the tree representation of an utterance are all words associated with lexical items, not functional projections. Second, it is strongly lexicalist; most of the information relevant to the syntactic analysis comes from the lexical items themselves rather than depending on complex tree structures as in minimalist analyses. Lastly, it is constraint based; specific constructions have different constraints on them and constraints are

¹Moosally in her 1994 MA thesis suggests in passing that impoverished agreement is agreement in gender only; 3rd person singular is default.

²Mahfoudhi (2002) suggests some pragmatic difference, but both Benmamoun (2000) and Mohammad (2000) fail to indicate any difference in glosses from VSO to SVO word order. As such I will leave the investigation of any pragmatic differences between sentence (1a) and (2a) to future research.

³Shown in (17) in section 3.1 below

⁴The SPR and COMPS features are explained in section 2.2 below.

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.

$$(3) \text{ Noun } pos \left[\begin{array}{l} \text{HEAD} \left[\begin{array}{l} \textit{noun} \\ \text{AGR} \left[\begin{array}{l} \textit{agr-cat} \\ \text{PER} \\ \text{GEND} \end{array} \right] \end{array} \right] \end{array} \right]$$

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 what in HPSG are called the VAL (valence) features SPR (specifier) and COMPS (complement). If A is the head of a phrase, then A's COMPS feature is the list of syntactic elements that combine with A on the right, and the value of A's SPR value is the element that combines with A on the left.

2.2. Complements and Specifiers

The Head-Complement Rule (4) licenses a tree consisting of a mother node of type phrase (on the left side of the rule) dominating a head of type word (noted by the bold H on its immediate left) and all of the elements the head takes as the value of its COMPS feature.

$$(4) \text{ Head Complement Rule}^7 \left[\begin{array}{l} \textit{phrase} \\ \text{COMPS } \langle \rangle \end{array} \right] \rightarrow \mathbf{H} \left[\begin{array}{l} \textit{word} \\ \text{COMPS } \langle \boxed{1}, \dots, \boxed{n} \rangle \end{array} \right] \boxed{1}, \dots, \boxed{n}$$

A phrase can consist of a lexical head followed by all its complements.

⁵Only six phrase structure rules are proposed in SWB: The Head-Specifier, Head-Complement, and Coordination Rules will be described as they become relevant, as will the Head-Filler rule; HPSG also makes use of a Head-Modifier rule for attaching modifiers like PPs and APs to mother nodes, an Imperative Rule. There will likely end up being more rules when a full range of language characteristics is considered, though the total number will still be small.

⁶The model above is specific to English and motivated by data from English, but the architecture of the type hierarchy does vary language to language. The *agr-pos* features of a given language can be determined empirically by observing which parts of speech do in fact show agreement.

⁷SWB page 502

Note that the left side of the rule, the mother node, has an empty list, $\langle \rangle$, 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 head daughter. There is complete identity among like-tagged items.

The Head-Specifier Rule (5) licenses a tree consisting of a mother node of type *phrase* dominating a head (again noted by the bold H to its left) and the element it takes as the value of its SPR feature to form a larger syntactic unit of type *phrase*.

(5) Head Specifier Rule⁸

$$\left[\begin{array}{l} \textit{phrase} \\ \text{SPR } \langle \rangle \end{array} \right] \rightarrow \boxed{\text{I}} \mathbf{H} \left[\begin{array}{l} \text{SPR } \langle \boxed{\text{I}} \rangle \\ \text{COMPS } \langle \rangle \end{array} \right]$$

A phrase can consist of a (lexical or phrasal) head preceded by its specifier.

The element that the head takes as the value of its SPR feature precedes the head. The COMPS feature of the head daughter right-hand side of the rule is saturated; so the Head-Specifier Rule cannot apply to a head that can undergo the Head-Complement Rule. The head on the right-hand side of the rule is the equivalent of \bar{X} , as is any syntactic element with the COMPS feature saturated and the SPR feature unsaturated. The left hand-side of the rule, and any element with both the COMPS and the SPR saturated, is equivalent to an *XP*.

Both the Head-Complement Rule and the Head-Specifier Rule, and all other headed rules, are constrained by the Valence Principle and the Head-Feature Principle. The Valence Principle ensures that the valence features of the Head Daughter are the same as those of the Mother except for the changes specified by the grammar rule.⁹ The Head-Feature Principle ensures that the value for the HEAD feature (i.e. all of its sub-features and their values including AGR) of the mother node is tagged with the value of the HEAD feature of the head daughter.

2.3. Arabic in HPSG

Lets now apply these ideas to concrete examples from Arabic, this time with a type *verb* element. In (6) the COMPS feature is unsaturated and has $\langle \text{NP} \rangle$ as its value. In other words (6) is a transitive verb.

⁸SWB page 501; the version presented here is simplified to not include the feature STOP-GAP.

⁹For more precise descriptions of the Valence Principle and the Head-Feature Principle see SWB page 523

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

$$\left[\begin{array}{l} \text{HEAD} \\ \text{VAL} \end{array} \left[\begin{array}{l} \text{verb} \\ \text{FORM} \textit{fin} \\ \text{AGR} \left[\begin{array}{l} \text{PER } 3 \\ \text{NUM } \textit{sing} \\ \text{GEND} \textit{fem} \end{array} \right] \\ \text{SPR } \langle \text{NP} \rangle \\ \text{COMPS } \langle \text{NP} \rangle \end{array} \right] \right]$$

?akal-at

In contrast (7) has a saturated COMPS feature but has $\langle \text{NP} \rangle$ 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

$$\left[\begin{array}{l} \text{HEAD} \\ \text{VAL} \end{array} \left[\begin{array}{l} \text{verb} \\ \text{FORM} \textit{fin} \\ \text{AGR} \left[\begin{array}{l} \text{PER } 3 \\ \text{NUM } \textit{sing} \\ \text{GEND} \textit{fem} \end{array} \right] \\ \text{SPR } \langle \text{NP} \rangle \\ \text{COMPS } \langle \rangle \end{array} \right] \right]$$

?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

$$\left[\begin{array}{l} \text{HEAD} \\ \text{VAL} \end{array} \left[\begin{array}{l} \text{verb} \\ \text{FORM} \textit{fin} \\ \text{AGR} \left[\begin{array}{l} \text{PER } 3 \\ \text{NUM } \textit{sing} \\ \text{GEND} \textit{fem} \end{array} \right] \\ \text{SPR } \langle \text{NP} \rangle \\ \text{COMPS } \langle \rangle \end{array} \right] \right]$$

?akal-at

Notice that (7) and (8) take $\langle \text{NP} \rangle$ 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.

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

$$\left[\begin{array}{l} \text{HEAD} \\ \text{VAL} \end{array} \left[\begin{array}{l} \text{verb} \\ \text{FORM} \textit{fin} \\ \text{AGR} \left[\begin{array}{l} \text{PER } 3 \\ \text{NUM } \textit{sing} \\ \text{GEND} \textit{fem} \end{array} \right] \\ \text{SPR } \langle \rangle \\ \text{COMPS } \langle \rangle \end{array} \right] \right]$$

Haalima ?akal-at (at-tuffaahat-a)

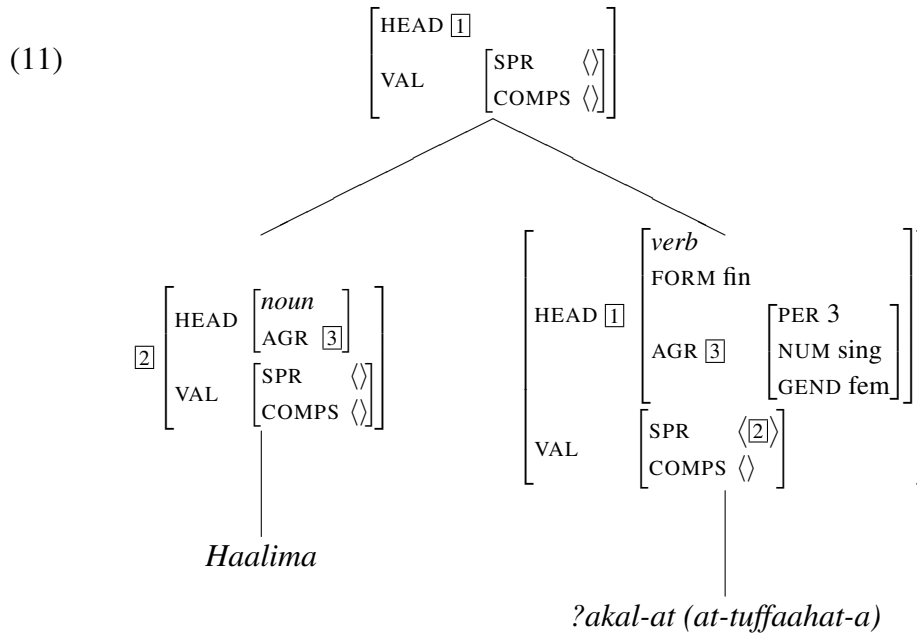
Ignoring the AGR features for the moment, the syntactic matrix in (9) is a type verb of FORM *fin* with fully saturated VAL features. In other words (9) is a finite verb that does not combine with anything more on the right or the left; i.e., (9) is a sentence. SWB propose that the root node of any main clause sentences is constrained to have the features specified in (10), the Initial Symbol.¹¹ The sentence (9) then conforms to the feature specifications required of a main clause sentence by the Initial Symbol (10).¹²

(10) Initial Symbol

$$\left[\begin{array}{l} \text{HEAD} \\ \text{VAL} \end{array} \left[\begin{array}{l} \text{verb} \\ \text{FORM} \textit{fin} \\ \text{SPR } \langle \rangle \\ \text{COMPS } \langle \rangle \end{array} \right] \right]$$

¹¹SWB page 521; simplified to not include the GAP feature.

¹²Note that the root node of (11) below is another representation of the sentence in (9) and also conforms to the feature specifications required by the Initial Symbol.



The tree representation of (9) with tags as constrained by the Head-Feature Principle is shown above in (11).¹³ The intransitive verb is the head of the sentence.¹⁴ The value of the HEAD feature is tagged between the head (the verb) and the root node (the sentence). This tagging is in accordance with the Head Feature Principle.

Note that the SPR value for the verb in (11) is tagged to the entire representation of the Subject as per the Head-Specifier Rule. The other set of tags on the tree indicate structure sharing between the AGR features of the verb and those of the verb’s nominal SPR value. This structure sharing is agreement in HPSG.

2.4. Agreement and the SHAC

In Minimalist approaches (Chomsky 1995) subject-verb agreement is treated as the checking of features in a Specifier-Head Relationship, a property of the relationship of elements by their relative location in the tree structure. In HPSG agreement is tagging, the structure-sharing of the AGR feature, and as such is a property of the words or lexical entries themselves, and not dependent on tree structure. Agreement in HPSG and is governed by a constraint on inflectional lexemes (*infl-lxm*) known as the Specifier Head Agreement Constraint or SHAC, shown in (12).

¹³The head daughter of (11) is either *?akal-at*, which is lexically an intransitive verb, or *?akal-at at-tuffaahat-a*. The latter case is a construction licensed by the Head-Complement Rule with the head daughter being the transitive verb form of *akal-at* which takes as the value of its COMPS feature the noun *at-tuffaahat-a*.

¹⁴For the transitive sentence, the phrase consisting of the transitive verb and its object complement is the head.

(12) Specifier Head Agreement Constraint¹⁵

$$\left[\begin{array}{l} \text{HEAD} \left[\text{AGR} \left[\text{I} \right] \right] \\ \text{VAL} \left[\text{SPR} \left\langle \left[\text{AGR} \left[\text{I} \right] \right] \right\rangle \right] \end{array} \right]$$

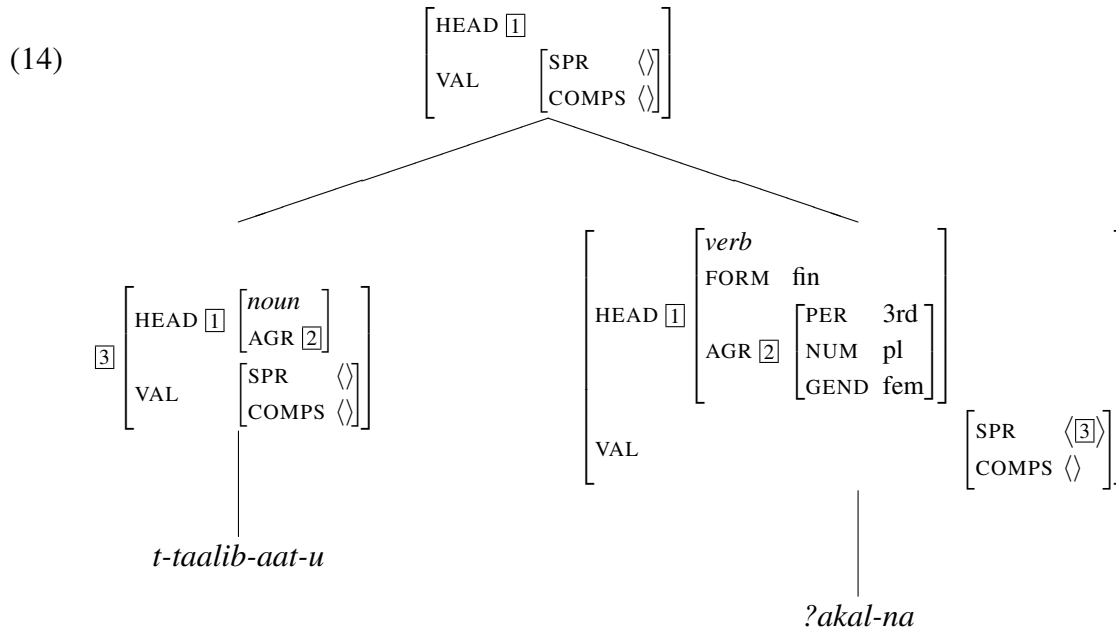
Infl-lxm is a subtype of *lexeme* and is the supertype dominating *cn-lxm* (common nouns) and *verb-lxm*. SHAC mandates that whatever AGR value an *infl-lxm* has, it is tagged with the AGR value of the item the *infl-lxm* takes as the value of its SPR feature. In this approach determiners and possessors are analyzed as the SPR values of unsaturated type *noun* elements. NPs that are the subject of sentences are analyzed as the SPR values of unsaturated type *verb* elements.

To illustrate the SHAC let us look back at our original example of a subject initial sentence in Arabic, reproduced as (13) below:

- (13) a. t-taalib-aat-u ?akal-na
 the-student-fem.pl-nom eat.past-3rd.fem.pl
 ‘The students ate.’
- b. * t-taalib-aat-u ?akal-at
 the-student-fem.pl-nom eat.past-3rd.fem.sg
 ‘The students ate.’

(14) lays out the relevant syntactic features of the grammatical sentence (13a). The SHAC correctly predicts the agreement of (13a). The ungrammaticality of (13b) is also accounted for as a Head-Specifier construction that violates the SHAC.

¹⁵SWB page 495.



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).

¹⁶HEAD and VAL are SYN (syntax) features, I have omitted all SEM (semantics) features from the representations in this paper.

(15) Argument Realization Principle¹⁷

$$\left[\begin{array}{l} \text{SYN} \\ \text{ARG-ST } \boxed{A} \oplus \boxed{B} \end{array} \left[\begin{array}{l} \text{VAL} \left[\begin{array}{l} \text{SPR } \boxed{A} \\ \text{COMPS } \boxed{B} \end{array} \right] \end{array} \right] \right]$$

The tagged letters indicate structure-sharing of (possibly empty) lists. The ARP ensures that the value of ARG-ST for a word consists of the value of SPR followed by the value of COMPS for that word. The value of ARG-ST for a transitive verb would consist of two noun phrases. In SVO sentences the subject precedes the verb and the object follows it. In VSO sentences the subject follows the verb and the object follows the subject. In both cases though the ARG-ST list for the verb is the same, namely the verb's subject followed by its object.

As previously shown, the SHAC accounts for subject-verb agreement in subject initial (SVO) sentences. In its current formulation however, the SHAC fails to make any account of impoverished agreement and VSO sentences. The analysis presented below suggests that subject-verb agreement in Arabic VSO sentences is not determined by the SHAC, a constraint on the SPR value of the verb, but rather a constraint on the verb's ARG-ST value.

3. The Argument Structure Agreement Principle

3.1. Word Order

As mentioned in the introduction, any account of Impoverished Agreement must first have an explanation of the word order alternation between SVO and VSO sentences. My account, following the strongly lexicalist approach of SWB, will be a lexical rule. But are there reasons besides SWB's lexical inclination that the alternation should not be analyzed syntactically, as a change to the grammar rules?

- (16) a. ?akal-at t-taalib-aat-uat-tuffaahat-a
eat.past-3.f.sg the-student-f.pl-nomthe-apple.sg-acc
'The students ate the apple.'
- b. * ?akal-na t-taalib-aat-uat-tuffaahat-a
eat.past-3.f.pl the-student-f.pl-nomthe-apple.sg-acc
'The students ate the apple.'

Consider the transitive VSO sentence pair shown in (16). One way to account for the word order syntactically would be to propose a second Head-Specifier Rule that licenses a phrase with the SPR value to the right of the head verb. On this analysis the Head-Complement Rule would only accept a head with a saturated SPR value, meaning the specifier would need to be the argument immediately to the right of the head and only then would the COMPS value follow. Under this proposal the subject in a VSO sentence would be the NP value of the verbs SPR feature, just as in SVO sentences.

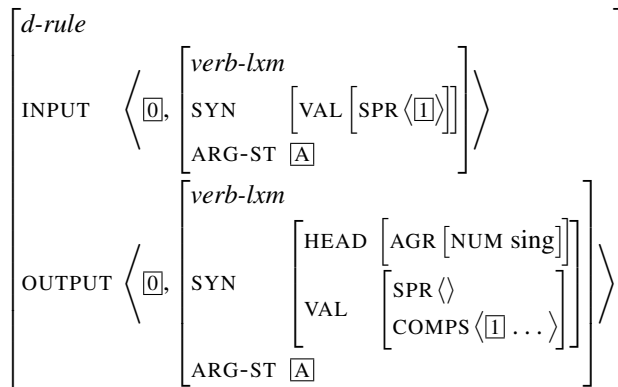
¹⁷SWB page 494; simplified to not include GAP feature.

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-auxiliary 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 lexical rule in (17), the output of which can be the head flat Head-Complement construction.²⁰ The rule’s input value is a verb-lexeme with a subject specifier while its output value is a verb-lexeme with no specifier and a subject as the first of its complements.²¹

(17) VSO Lexical Rule.



The COMPS value lists of both the INPUT and OUTPUT are underspecified as to the number of items they contain. This allows the rule to apply to non-transitive verb lexemes, transitive verb lexemes, double transitive, etc. In a sense this rule “moves” the subject from the SPR value to the first member of the COMPS list. If the ARP were to apply to the INPUT it would yield an SVO verb and if it were to apply to the OUTPUT it would yield a VSO verb, but the ARG-ST values of both verbs would be identical.

¹⁸See Mohammad (2000) for a discussion of VP constituency in Arabic VSO sentences.

¹⁹As presented in Pollard and Sag (1994)

²⁰After undergoing the correct lexical rules for person and gender inflection.

²¹I use this proposal to reanalyze yes/no sentences in section 4.1, parallel to the analysis in Pollard and Sag (1994).

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:

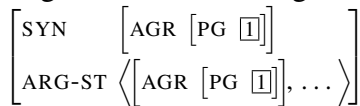
²²Page 259, the opening paragraph of section 8.7.4.

²³There 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*.

²⁴SWB’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.

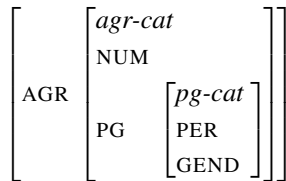
²⁵Determiner-noun agreement is beyond the scope of this paper, but see Benmamoun (2000) for a discussion of a similar nominal agreement phenomenon in the Arabic construct state.

(19) Argument Structure Agreement Principle

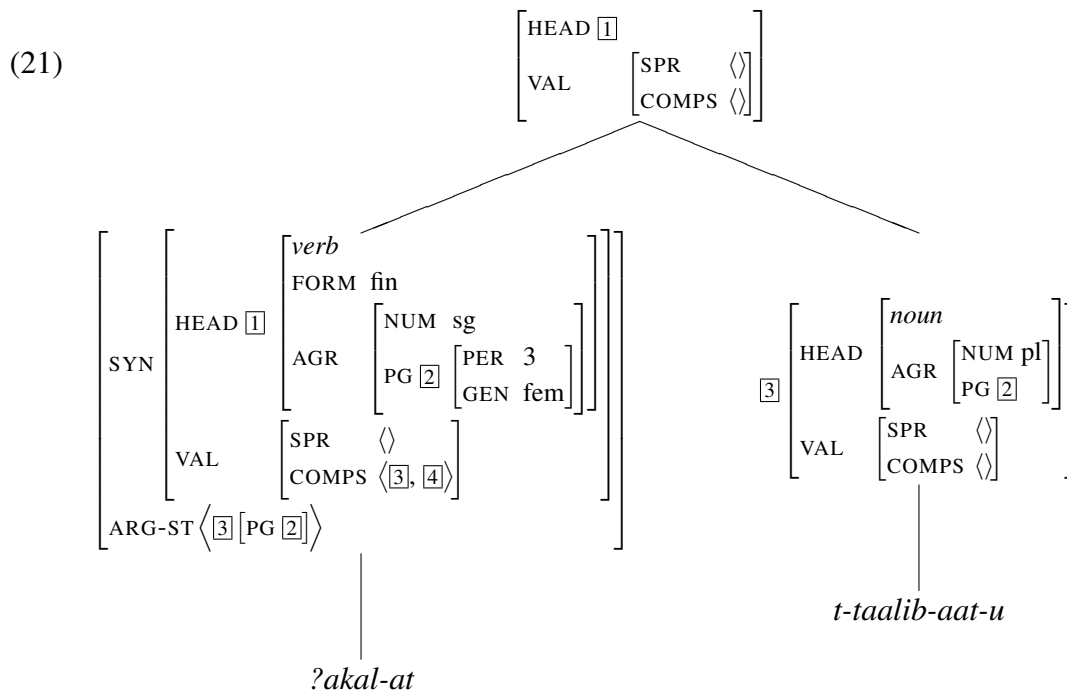


That PER and GEND are the only AGR features targeted suggests that they are grouped together as a sub-feature of AGR that I will call PG. This is illustrated in (20):

(20) Sub-features of AGR



(21) below lays out the relevant features of sentence (2a) from section 1 in a tree diagram. The HEAD value of the mother node is tagged with the HEAD value of the head (leftmost) daughter, the verb, due to the Head Feature Principle. The COMPS value of the verb is tagged with the entire entry for the subject complement.



The subject complement is also tagged as the first (and only) member of the verbs ARG-ST list and as such is constrained by the ASAP such that the PG value of the verb are tagged with the PG value of the first argument. The mother node has no ARG-ST feature, as it is not a word, and the ARG-ST feature of the subject complement is omitted since its value is an empty list. Note that the NUM feature of the verb and the subject do not match, since in Arabic NUM is not constrained by the ASAP.

The VSO Lexical Rule generates verbs²⁶ 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 SHAC and the ASAP divide the work of agreement in Arabic.

The ASAP must constrain the PG features, person and gender, and the SHAC must minimally constrain number agreement. It is hard to discern whether the SHAC only constrains number or constrains all of the AGR features.²⁷ In either case full agreement would appear since the specifier is necessarily the first argument on the ARG-ST list.

4. Implications

The ASAP is in some sense always in effect, but its effects can only be observed in situations where the SHAC fails to apply. Modern Standard Arabic provides such a situation in its verb initial sentences. In English three constructions for which it can be argued that the SHAC fails to apply, in which a post verbal subject triggers agreement with the verb, are yes/no questions, existential *there* clauses, and locative inversion sentences.²⁸ In these constructions I argue that the subject is not a specifier, or for some other reason not bound by the SHAC, and thus some other constraint must account for the agreement found. My suggestion is that this constraint is (a version of) the ASAP proposed for Arabic verb-initial constructions, though in English the ASAP appears to constrain all three AGR features, PER, NUM, and GEN, rather than just PER and GEN as it does in Modern Standard Arabic.

4.1. *Yes/No Questions*

In yes/no questions such as the pair in (22), agreement occurs between the initial verb and the NP subject following it.

²⁶More precisely, verb lexemes that can in turn be the INPUT value for inflectional lexical rules for agreement.

²⁷It is also conceivable, though difficult to argue, that the SHAC might constrain NUM and PER but not GEN or NUM and GEN but not PER.

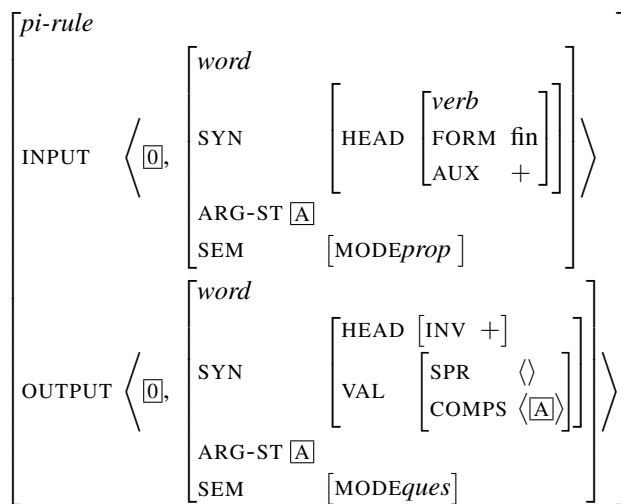
²⁸Thanks to Jeff Runner for suggesting the latter two areas of investigation to me.

- (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 the SPR value of the initial verb (an auxiliary) to an empty list while leaving the argument structure unaffected³⁰. Post inflectional rules relate words to words, so the Inversion Lexical Rule goes into effect after the SHAC has constrained the AGR features of the initial verb and the subject.

(23) Inversion Lexical Rule³¹



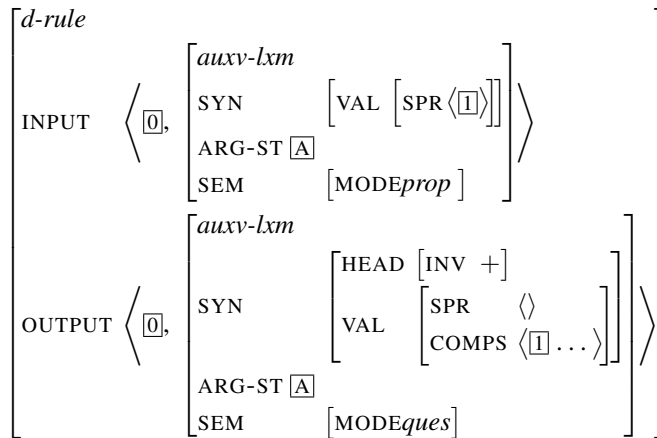
An alternative analysis, which would obviate the need for such a post inflectional rule, would be to extend the Argument Structure Agreement Principle to English. This approach is similar to the analysis of yes/no questions in Pollard and Sag (1994). The lexical rule (24) which account for the word order is the analog of the VSO Lexical Rule, (17) in section 3.2. It does resemble (23) above, but it is a derivational rule relating lexemes to lexemes rather than a post inflectional rule.

²⁹(22c.) is acceptable in some dialects of English.

³⁰The rule also changes the value of the SEM feature MODE from *prop* to *ques*.

³¹Adapted from SWB pages 410-411.

(24) ASAP Inversion Lexical Rule



The OUTPUT of (24) can undergo inflectional agreement and head a sentence licensed by the Head-Complement Rule. Since *auxv-lxm* is a subtype of *verb-lxm* agreement is constrained by the ASAP which in English constrains number as well as person and gender.

4.2. Existential *there* Sentences

In existential *there* sentences, such as those shown in (25), agreement occurs between the verb and the argument following it.

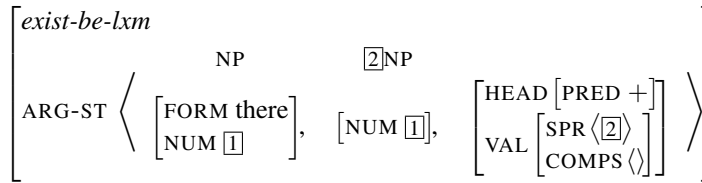
- (25) a. There is a tuxedo in the closet.
- b. There are tuxedos in the closet
- c. * There are a tuxedo in the closet.
- d. * There is tuxedos in the closet.

(25a) and (25b) show the alternation between singular and plural in grammatical sentences. When the argument following the verb is singular as in (25a) the existential verb *be* appears in the singular form *is*. When the argument following the verb is plural as in (25b) the verb appears in the plural form *are*. There is no change in the expletive subject *there*. (25c.) and (25d.) are ungrammatical due to mismatch in agreement between the verb and the following argument. In (25c.) the verb is plural while the following argument is singular, and in (25d.) the verb is singular while the following argument is plural.³²

SWB analyze the number agreement in existential *there* constructions by constraining the ARG-ST list of the existential-be lexeme so that the first argument is *there* (has the value [FORM *there*]) and the NUM values of the first and second argument are tagged as in (26). Thus when SHAC applies between *there* and *be* it also constrains the NUM value of the argument following *be*. I propose that with one small change to the treatment of expletive elements the agreement properties will follow straightforwardly from the ASAP, thus allowing a simplified analysis of existential-be sentences.

³²SWB point out that (25d.) is acceptable in some dialects of English.

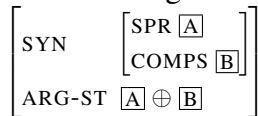
(26) SWB's *exist-be-lxm*



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, considering that ARG-ST is an interface level between syntax and semantics. If it were the case that the valence features universally lined up with the ARG-ST list according to the Argument Realization Principle then one of the levels of representation would be redundant. The reason that both the valence features SPR and COMPS and the argument structure, ARG-ST, are necessary is that there are in fact situations in which there is a mismatch between the two. I propose to modify the Argument Realization Principle stipulate that semantically null elements on the valence feature lists do not get mapped onto the ARG-ST list. In other words, all elements on the SPR and COMPS lists do get realized into the ARG-ST list except those elements that are semantically null.

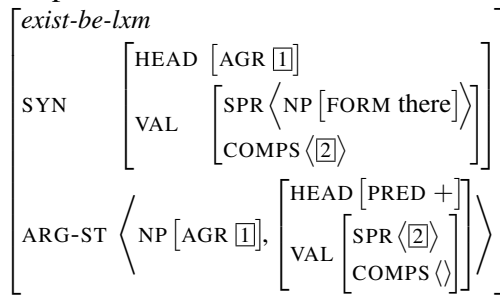
The ASAP analysis will adopt this modification of the ARP shown in (27).

(27) Modified Argument Realization Principle



All items in $\boxed{A} \oplus \boxed{B}$ are realized on the ARG-ST list except those items which are SEM \emptyset (null).

With the modified ARP in effect the first member of the ARG-ST list in existential *there* sentences will be the NP following the verb, which triggers agreement in sentences like (25). The updated lexical entry for existential-be is shown in (28) below.

(28) Proposed *exist-be-lxm*

Agreement can now be easily explained between the verb *be* and the following argument. *There* is the SPR value for *be*, but since it is semantically null it is not on the ARG-ST list. The argument that *be* takes as its COMPS feature is the first element the ARG-ST list. The ASAP then ensures that there is agreement between the verb and the first argument so that in (25a) where *tuxedo* is singular *be* is also singular and in (25b) where *tuxedos* is plural, *be* is also plural. (25c.) and (25d.) are then ungrammatical because of their violation of the ASAP.

4.3. *Locative Inversion*

Though the locative inversion construction is a bit more complex, I suggest a similar analysis exploiting the ASAP. The basic alternation is shown in (29)³³:

- (29) a. A lamp was in the corner.
 b. In the corner was a lamp.
 c. There was a lamp in the corner.

(29a) is a straightforward sentence, (29b) is a locative inversion sentence, and (29c.) is a semantically related example of an existential *there* construction. The intuition that the ASAP analysis tries to capture is that the ARG-ST values of (29a.-c.) are identical. Agreement in the locative inversion construction is between the verb and the argument following the verb as shown in (30):

- (30) a. In the corner was a lamp.
 b. In the corner were several lamps.
 c. * In the corner were a lamp.
 d. * In the corner was several lamps.

As in the yes/no question examples (22) and the existential *there* examples (25) agreement in (30a) and (30b) is singular and plural respectively. Again mismatch between the verb and the following argument is ungrammatical, in (30c.) with plural verb and singular argument, and (30d.) with singular verb and plural argument.

³³Examples (29a) and (29b) from Bresnan (1994) , (29c.) and (30b-d) adapted from Bresnan (1994).

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 Rule³⁴

$$[phrase] \rightarrow \mathbb{I}[GAP \langle \rangle] \mathbf{H} \left[\begin{array}{l} \text{HEAD} \left[\begin{array}{l} verb \\ \text{FORM } fin \end{array} \right] \\ \text{VAL} \left[\begin{array}{l} \text{SPR } \langle \rangle \\ \text{COMPS } \langle \rangle \end{array} \right] \\ \text{STOP-GAP } \langle \mathbb{I} \rangle \\ \text{GAP } \langle \mathbb{I} \rangle \end{array} \right]$$

A phrase can consist of a head with a gap preceded by an expression that meets whatever requirements the head places on that gap.

The Head-Filler Rule states that a phrase can consist of a element followed by a phrase from which it is missing. The GAP feature indicates that an element is missing and what that element is. The STOP-GAP feature on the head daughter signals that the missing element is to combine with the rest of the phrase.

Since the feature GAP indicates missing syntactic and semantic material it does need to be accounted for by the Argument Realization Principle. (32) shows the interaction between the GAP feature and the ARP.

(32) Modified Argument Realization Principle with GAP Feature

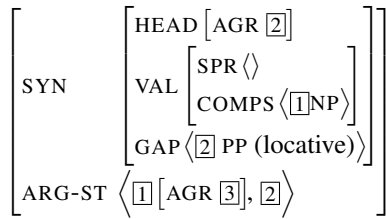
$$\left[\begin{array}{l} \text{SYN} \left[\begin{array}{l} \text{VAL} \left[\begin{array}{l} \text{SPR } \mathbb{A} \\ \text{COMPS } \mathbb{B} \ominus \mathbb{C} \end{array} \right] \\ \text{GAP } \mathbb{C} \end{array} \right] \\ \text{ARG-ST } \mathbb{A} \oplus \mathbb{B} \end{array} \right]$$

No item in $\mathbb{A} \oplus \mathbb{B}$ is SEM \emptyset (null).

Under this analysis the ASAP constrains agreement for locative inversion sentences in the same way it does for existential *there* sentences. (33) below is the lexical entry for a verb in a locative inversion sentence.

³⁴SWB page 503

(33) Locative Inversion Verb



The Head-Complement Rule licenses the verb and its subject complement. The Head-Filler Rule license the VP to be preceded by its GAP value, the locative PP. AGR values are tagged between the head and the first argument as stipulated by the ASAP. This analysis accounts for (30a) in which both verb and complement are singular, and (30b) in which both verb and complement are plural. It also correctly rules out (30c.) and (30d.) as ungrammatical due to violations of the ASAP.

4.4. Raising

One possible problem with the extension of the ASAP to account for these three phenomena of English is that two of the three constructions, existential *there* sentences and locative inversion sentences, occur in raising constructions.

- (34) a. A lamp seems to be in the corner.
 b. In the corner seems to be a lamp.
 c. There seems to be a lamp in the corner.

(34a) is a standard raising construction, and both the SHAC and the ASAP predict the correct agreement. In the locative inversion raising sentence, (34b), and in the existential *there* raising sentence, (34c.), neither the SHAC nor the ASAP correctly account for the agreement. In both (34b) and (34c.) the main clause raising verb is agreeing with the subject complement of the embedded clause. One possible solution is to modify the constraints on subject-raising-verb-lexemes (*srv-lxms*). SWBs *srv-lxm* is shown in (35) below:

(35) SWB's *srv-lxm*³⁵

$$\left[\begin{array}{l} \text{srv-lxm} \\ \text{ARG-ST} \left\langle \left[\underline{1} \right], \left[\begin{array}{l} \text{SPR} \langle \underline{1} \rangle \\ \text{COMPS} \langle \rangle \\ \text{INDEX } s_2 \end{array} \right] \right\rangle \\ \text{SEM} \left[\text{RESTR} \langle \left[\text{ARG } s_2 \right] \rangle \right] \end{array} \right]$$

This lexical entry captures the intuition that in (34a) a lamp is the first element on the ARG-ST value for both the main verb *seems* and, due to the ARP, for the subordinate clause VP *to be a lamp in the corner*. The value $[\text{INDEX } s_2]$ indicates that this element of the ARG-ST list is part of the subordinate clause. Specifying the semantic value $[\text{RESTR} \langle \left[\text{ARG } s_2 \right] \rangle]$ ensures that the subordinate clause is an argument of the main clause. To accommodate existential *there* sentences we need to specify that the SPR value, not necessarily the first argument, is the element that is tagged between the main clause verb and the subordinate VP. This modification is shown in (36):

(36) Modified *srv-lxm*

$$\left[\begin{array}{l} \text{srv-lxm} \\ \text{SYN} \left[\text{VAL} \left[\text{SPR} \langle \underline{1} \rangle \right] \right] \\ \text{ARG-ST} \left\langle \dots, \left[\begin{array}{l} \text{SPR } \underline{1} \\ \text{COMPS} \langle \rangle \\ \text{INDEX } s_2 \end{array} \right] \right\rangle \\ \text{SEM} \left[\text{RESTR} \langle \left[\text{ARG } s_2 \right] \rangle \right] \end{array} \right]$$

(36) says that whatever the value of the SPR feature is for the subject-raising-verb, it is identical to SPR value for the subordinate clause that the subject-raising-verb takes as an argument. In cases like (34a) the SPR value is the first argument of the main clause verb and the subordinate clause is the second argument. In locative inversion raising sentences like (34b) the main clause verb has no SPR value. The locative PP is the GAP value of the verb and so the subordinate clause is actually the first argument. In existential *there* sentences like (34c.) the main clause verbs SPR value is an expletive element, and as such does not get mapped onto the ARG-ST list. The SPR value for both the main clause verb and the subordinate VP is *there*, but the subordinate clause is again the first argument of the main verb.

³⁵pg. 367

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 first argument of the subordinate verb. In sentences where the subordinate VP is the first argument of the verb (i.e. locative inversion sentences and existential *there* sentences) the ASAP will further constrain the AGR features of the main clause verb to be tagged with those of the subordinate VP. In this way the ASAP can account for the agreement in (34b) and (34c.).

5. Interaction of the SHAC and the ASAP

The subsets of features constrained by the ASAP and the SHAC must vary language to language in order to account for the language specific data. It is also conceivable possible that the strength of the two constraints vary in that the effect of one of the constraints rules out the application of the other. One clue as to how the SHAC and the ASAP interact in English can be found in (37), suggested by SWB:

- (37) a. There was you ...
b. ? There were you ... (such that *you* is plural)
c. There was me ...

The examples in (37) sound a bit unnatural out of context. But (37a) is found in song lyrics (until there was you) and all three examples can be found in list form (Who was in your dream? There was me, and there was you, and there were you three.). What seems to be happening is that the verb specifier *there* is constraining person agreement while its first argument (a subject complement) is constraining number agreement.

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 verb's 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 its 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 sentence, 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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