Hybrid agreement as a conflict resolution strategy

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Abstract

Situations in which conflicting constraints clash can potentially provide linguists with insights into the architecture of grammar. This paper deals with such a case. When predicative modifiers of morphologically rich languages head relative clauses, they are involved in two, sometimes conflicting, agreement relationships. Different languages adopt different strategies in order to resolve situations of conflicting constraints. This paper focuses on Standard Arabic and the hybrid agreement strategy which it employs. It argues that the HPSG theory of agreement, which distinguishes between morphosyntactic and semantic agreement, constitutes an appropriate framework for accounting for the phenomenon. In addition, it shows that contrary to claims made by Doron and Reintges (2005), a non-derivational framework such as HPSG is adequate for accounting for this non-trivial agreement pattern. Moreover, with a constructional approach, whereby constraints can target syntactic structures above the lexical level, better empirical coverage is achieved.

1   Introduction

Situations in which conflicting constraints clash can potentially provide linguists with insights into the architecture of grammar. This paper deals with such a case. It examines the different strategies which languages use in order to resolve an agreement conflict which occurs in non-finite relative clauses. The strategy adopted by Standard Arabic (SA), namely hybrid agreement, poses a challenge to theories of grammar in general and agreement in particular. Indeed, Doron and Reintges (2005, p. 10) claim that the existence of this construction implies "that a linguistic structure is constructed procedurally rather than checked declaratively, in other words as a derivation rather than a representation". Thus, the main goal of the paper is to examine the implication of the SA hybrid agreement strategy on competing theories of agreement.

The structure of the paper is as follows. Section 2 lays the foundations by providing the required background and data of Standard Arabic and introducing the agreement conflict. Section 3 discusses and illustrates the four possible conflict resolution strategies, as they are realized in SA, Hebrew, Turkish, and Older Egyptian. Section 4 outlines a derivational account of the Standard Arabic construction, as proposed by Doron and Reintges (2005), and discusses its implications and predictions. The proposed analysis is introduced in section 5. The section begins with a presentation of an alternative theory of agreement (Corbett 1988; Pollard and Sag 1994; Kathol 1999; Wechsler and Zlatić 2003), which was motivated by similar yet distinct hybrid agreement phenomena and which was incorporated into

HPSG. This is followed by a detailed HPSG-based analysis of the SA construction. The conclusion, given in section 6, is that the HPSG framework and its theory of agreement provide a sophisticated mechanism for accounting for the challenging SA construction, as well as for other alternative conflict resolution strategies, resulting in better empirical coverage.

2 Modifiers, predicates, and predicative modifiers in Standard Arabic

Nouns, participles, and adjectives in Standard Arabic (SA) are inflected for NUMBER, GENDER, DEFINITENESS and CASE. When used attributively, adjectives and participles exhibit full agreement with the noun they modify.

(1) ra'aytu l-walad-a   a-TTawiil-a
    I.saw   the-boy.SM-ACC the-tall.SM-ACC

    "I saw the tall boy."

(2) ra'aytu mara'a-t-an   naa'im-a-tan
    I.saw   woman.SF-ACC sleeping.PTCP.SF-ACC

    "I saw a sleeping woman."

When used as predicates, they agree in NUMBER and GENDER with their subject and are usually marked with nominative case.

(3) al-walad-u   Tawiil-un
    the-boy.SM-NOM tall.SM-NOM

    "The boy is tall."

(4) al-mara'a-tu   naa'im-a-tun
    the-woman.SF-NOM sleeping.PTCP.SF-NOM

    "The woman is sleeping."

Finite relative clauses in SA are "linked" to the relative head with a relative complementizer. The relative complementizer of finite RCs in Standard Arabic has a NUMBER-GENDER-CASE inflectional paradigm and it exhibits full agreement with the relative head.

(5) al-walad-u   alladhii   ra'aythu-hu
    the-boy.SM-NOM REL.SM-NOM I.saw-him

    "the boy whom I saw"

(6) al-muqaabalat-u   allatii   HaDara-haa
the-meeting.SF-NOM REL.SF-NOM attended.3SM-ACC.SF

"the meeting that he attended" (Badawi et al., 2004)

The relative complementizer is morphologically definite. When the relative head is indefinite the relative complementizer is absent.

(7) muqaabalat-un   HaDara-haa
meeting.SF-NOM attended.3SM-ACC.SF

"a meeting that he attended"

Non-finite relative clauses (NF-RCs) are headed by participles and adjectives. Similarly to reduced relative clauses, NF-RCs are not "linked" to the relative head by a relative pronoun or relativizer. When the referent of the relative head is construed as the subject of the relative clause, the head of the RC, be it a participle or an adjective, exhibits full NUMBER-GENDER-CASE-DEFINITENESS agreement with the relative head.

(8)   a. 'ijtama9tu bi-rajul-in   saariq-in   qalam-an
          I.met   with-man.**SM-GEN** stealing.PTCP.**SM-GEN** pen-ACC

       "I met a man (who is) stealing a pen."

       b. 'ijtama9tu bi-l-rajul-i   a-ssaariq-i
          I.met   with-**the**-man.**SM-GEN** **the**-stealing.PTCP.**SM-GEN**
          qalam-an
          pen-ACC

       "I met the man (who is) stealing a pen."

The argument structure of the participle and the Case assigned to the arguments are identical to those of its finite counterpart.

(9) saraqa   l-rajul-u   qalam-an
stole.3SM the-man.SM-NOM pen-ACC

"The man stole a pen."

Alternatively, the referent of the modified noun can be construed as a non-subject argument of the participle, similarly to a non-subject relative clause. In this case, the subject of the relative clause is assigned nominative case, and a resumptive pronoun obligatorily appears in the relativized position.

This constructions imposes two different agreement constraints on the head of the NF-RC. As a noun modifier, it is required to exhibit full agreement with its head. As a predicate, it is required to exhibit NUMBER-GENDER agreement with its subject. Thus, when the relative head and the RC-internal subject differ in their NUMBER and GENDER features, a conflict arises.

3   Resolving conflicting constraints

Theoretically, there are four possible strategies for resolving the conflict:

1. Hybrid agreement

2. Avoidance

3. Agreement only with the relative head

4. Agreement only with the subject

Strategy 1

Strategy 1, namely hybrid agreement, is espoused by SA. As is illustrated in (10), the participle in (10a) is definite and marked with genitive case, in agreement with the relative head *l-mara* ('woman'), and exhibits a singular masculine morphological form, in agreement with its subject *zawj* ('husband'). The sentence in (10b) illustrates a similar agreement pattern with the adjective *jamil* ('beautiful').

(10) a. 'ijtama9tu bi-l-marat-i   [l-jaalis-i
          I.met   with-**the**-woman-GEN **the**-sitting.PTCP.**SM**-GEN
          zawj-u-haa]
          husband.**SM**-NOM-POSS.3SF

          "I met the woman whose husband is sitting."

      b. ra'aytu mra'a-t-an   jamil-an   wajh-u-haa
          I.saw   woman.SF-ACC beautiful.**SM**-ACC face.**SM**-NOM-POSS.3SF

          "I saw a woman with a beautiful face."

Thus, the agreement properties of the head of the RC are split between agreement with the relative head in CASE and DEFINITENESS and with the subject in NUMBER and GENDER. In addition, the relativized argument in the RC, a possessor in both cases, is instantiated with a resumptive pronoun, which refers back to the relative head. This construction is referred to as *na't sababi* in the Arabic tradition (Badawi et al., 2004).

Strategy 2

Modern Hebrew (MH), a related Semitic language, exhibits distinct behavior with respect to NF-RCs. Non-finite predicates can appear in two types of relative clauses in Modern Hebrew: *she*-RCs and *HA*-RCs. Relative clauses with the relativizer *she* license both subject and non-subject NF-RCs (as well as finite RCs).

(11) a. ha-'anashim   [**she**-mexakim   ba-taxana]
          the-people.PM **that**-waiting.PTCP.PM in-the-station

          "The people waiting in the station"

b. ha-'isha   [**she-**ba'al-a
   the-woman.SF **that-**husband.SM-POSS.3SF
   yoshev/yafe]
   sitting.PTCP.SM/beautiful.SM

   "The woman whose husband is sitting/beautiful"

Relative clauses with the relativizer *HA* are restricted to participles. The participle in MH exhibits full NUMBER-GENDER agreement with its subject, when it functions as a predicate, and with the modified noun, when it functions as a modifier. Case is not marked morphologically.

(12) (ha-)'anashim   [**ha-**mexakim   ba-taxana]
     (the-)people.PM **HA-**waiting.PTCP.PM in-the-station

     "(The) people waiting in the station"

The relativizer *HA*, which is homophonous with, and diachronically related to the definite marker *ha*, is prefixed to the participle. While the exact category of this prefix is controversial, it is nevertheless distinguished from the definiteness marker, hence the distinct glosses.[1] One distinguishing property is that while adjectival modification requires definiteness agreement, which is manifested by the co-occurrence (or absence) of the prefix *ha*, the relativizer *HA* appears regardless of the definiteness of the relative head. This is illustrated by sentence (12).

Relative clauses with the relativizer *HA* are restricted to subject NF-RCs. Thus, Modern Hebrew (MH) employs the second strategy listed above — avoidance. While subject NF-RCs with the relativizer *HA*, such as (12), are commonplace in MH, their non-subject counterparts are disallowed, as is seen in (13).

(13) *ha-'isha   [**ha-**yoshev/**ha-**yafe
     the-woman.SF **HA-**sitting.PTCP.SM/**HA-**beautiful.SM
     ba'al-a]
     husband.SM-POSS.3SF

     Intended meaning: "The woman whose husband is sitting/beautiful"

Strategies 3 & 4

Evidence of the use of strategies 3 & 4 are hard to come by. At this point I have not found examples of languages which exhibit both subject-predicate and head-modifier agreement *and* which resort to either of the strategies to resolve an agreement conflict in a NF-RC construction. Doron and Reintges (2005), however, discuss the NF-RC construction of Older Egyptian and Turkish, which demonstrate agreement patterns reminiscent of strategies 3 & 4.

In Older Egyptian participles do not agree with their subject. As heads of RCs, they do agree with the relative head in NUMBER and GENDER. CASE and

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[1] See discussion in Doron and Reintges (2005).

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DEFINITENESS are not marked. Thus, as is illustrated in (14), Older Egyptian exhibits an agreement pattern similar to strategy 3.

(14) mxʔt   tw   n(j)t rʕ [fʔ-ʔ(-w)-t   mʔʕt jm-s rʕ
scale.**FS** this.FS of.FS Re carry-IMPF-PASS-PTCP.**FS** justice in-3FS day
nb]
every

"this scale of Re in which justice is carried very day'
(Coffin Texts V 321:c-d/B1C])

Agreement only with the subject of a non-subject NF-RC is found in Turkish. Thus, in (15) below, the participle *sölye-diğ-im* ('say') agrees with its first person singular pronoun subject *ben-im*.

(15) [ben-im sölye-diğ-im]   söz-ler
I-GEN   say-PTCP.PRES/PAST-POSS.**1S** word/utterance-P

"the words I said"

Nevertheless, this cannot be considered a conflict resolution strategy, since the language does not exhibit head-modifier agreement.

An interesting case of alternating strategies is found in Talmudic Hebrew. Although, as was previously discussed, Modern Hebrew adopts avoidance as its strategy, in Talmudic Hebrew and especially in Hebrew texts from the Middle Ages there are examples of concurrent uses of the strategies 3 & 4 (Perets, 1967). Thus, participles which agree only with the relative head (16a) appear alongside participles which agree only with their subjects (16b).

(16)   a. ha-davar   [ha-mevukash   yedi'a-to]
the-thing.**SM** HA-expected.PTCP.**SM** knowledge.SF-POSS.3SM

"The think whose knowledge is expected"

    b. xovot   [ha-kavua   la-hem   zman]
debts.PM HA-defined.PTCP.**SM** to-them.PM time.**SM**

"Debts for which a time was defined"

It should be noted, however, that in this historical period, Hebrew was only used as a written language. Thus, the authors of these texts were not native speakers of the language.

The instability of the alternating strategies in Talmudic Hebrew and the fact the neither strategy survived the test of time suggest that these strategies are not favorable in such circumstances. Naturally, this cannot be taken as hard evidence. However, I have yet to find examples of other languages in which an agreement conflict occurs and which favor one agreement constraint over the other.

At this point I believe it is evident that the phenomena described here poses challenges to theories of grammar in general and agreement in particular. In the

$$
\begin{array}{c}
\text{DP} \\
\diagup \quad \diagdown \\
\text{DP}_i \qquad\qquad \text{PTCPP}_i \qquad \lambda x_i\; V\;(Subj, \dots x_i \dots) \\
\text{[}_{\text{N}}\;\alpha\;\text{num.}\;\beta\;\text{gend.}\;\gamma\;\text{DEF.}\;\delta\;\text{Case]} \\
\qquad\qquad \text{PTCP} \qquad\qquad \text{TP}_i \\
\text{[}\varepsilon\;\text{num.}\;\zeta\;\text{gend.}\;\gamma\;\text{DEF.}\;\delta\;\text{Case]} \\
\qquad\qquad\qquad \text{T} \qquad \text{VP}_i \\
\qquad\qquad\qquad \text{[}\zeta\;\text{gend]} \\
\qquad\qquad\qquad\qquad \text{Subj} \qquad \text{VP}_i \\
\qquad\qquad\qquad\qquad \text{[}_{\text{N}}\;\varepsilon\;\text{num.}\;\zeta\;\text{gend]} \\
\qquad\qquad\qquad\qquad\qquad \text{V} \quad \dots\;\text{res-pron}_i\;\dots \\
\qquad\qquad\qquad\qquad\qquad \text{[}_{\text{N}}\;\alpha\;\text{num.}\;\beta\;\text{gen]}
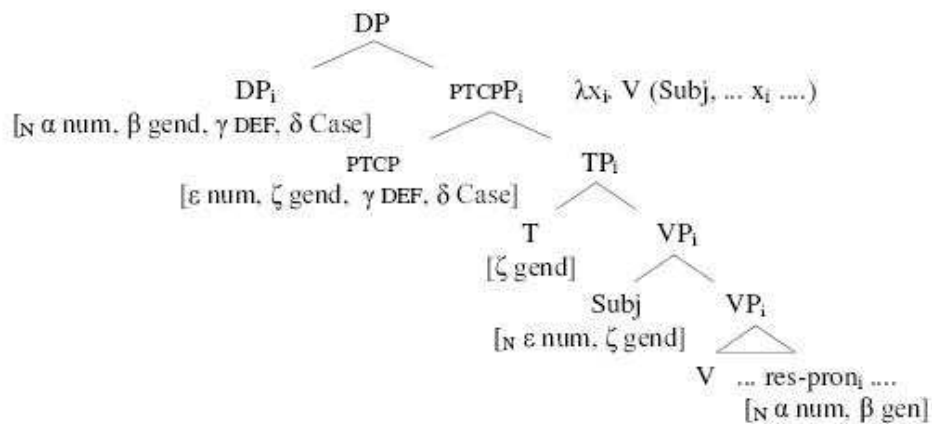\end{array}
$$

Figure 1: Non-subject NF-RCs (Doron and Reintges, 2005)

following sections I first present an outline of an analysis of the NF-RC proposed by Doron and Reintges (2005) and address the type of predictions it makes. Next I propose an alternative non-transformational analysis which builds on a theory of agreement which, as I show, provides an adequate framework for accounting for the phenomena at hand.

4 A derivational account of agreement mismatches in non-subject NF-RCs

Doron and Reintges (2005) propose an analysis of non-subject NF-RCs in Standard Arabic in a transformational framework. The locus of their analysis is the agreement checking mechanism, whereby the derivation of syntactic structures involves the movement of syntactic elements in the tree to positions where their features are checked. Doron and Reintges propose that the distinction between the hybrid agreement strategy of SA and the avoidance strategy of Modern Hebrew is in the possibility for erasure of checked agreement features. In SA, where checked agreement features are deleted in the derivation, the potential clash between the agreement features of the participle and the head noun is avoided. In Modern Hebrew, features are not erased, hence the clash and consequent avoidance of the construction. The syntactic derivation of non-subject NF-RCs in SA, as proposed by Doron and Reintges (2005), is given in figure 1.

Doron and Reintges take a step further by claiming that "[m]ore generally, these mismatches have implications for the overall architecture of linguistic structures. They imply that a linguistic structure is constructed procedurally rather than checked declaratively, in other words as a derivation rather than a representation" (Doron and Reintges, 2005, p. 42). Thus, they suggest that the parametrization of the erasure of checked features is a better account of the phenomena than the

parametrization of the procedural architecture of grammar.

Aside from the obvious challenge that Doron and Reintges pose to non-transformational syntacticians, a challenge which will be taken up in the following sections, their analysis makes two predictions. First, it predicts that non-subject NF-RCs in Modern Hebrew should be avoided only in cases where agreement features clash.[2] In other words, when the agreement features of the relative head and the subject of the RC match, non-subject NF-RCs should be possible. This prediction is not borne out by the data. Thus, MH avoids this construction regardless of the agreement properties of the two constituents, as is shown in (17).

(17) *ha-'isha   [ha-yoshevet/ha-yafa   axot-a]
      the-woman.**SF** HA-sitting.**PTCP**.**SF**/HA-beautiful.**SF** sister.**SF**-POSS.3SF

Intended meaning: "The woman whose sister is sitting/beautiful"

Second, the transformational analysis predicts the preeminence of the subject-predicate agreement constraint; since the position where subject-predicate agreement is checked is lower in the tree than that of head-modifier agreement, the former is checked first (Edit Doron, p.c.). Thus, strategy 3, where the participle agrees with the relative head and not with its subject is unavailable in principle. As was mentioned earlier, I have yet to find a language which uses strategy 3 to resolve this type of an agreement conflict, excluding, of course, the alternating strategies of Talmudic Hebrew. Thus, the second prediction tentatively holds.

In what follows I take up the challenge put forward by Doron and Reintges (2005) and propose a non-transformational analysis of the different available strategies of resolving conflicting constraints on agreement in the NF-RC, focusing mainly on SA and its hybrid agreement strategy. As a first step I outline a theory of agreement which, as I subsequently show, provides an adequate framework in which to account for the data.

5 A constraint-based analysis of agreement patterns in the NF-RC

5.1 A theory of agreement

The theory of agreement developed by Pollard and Sag (1994), Kathol (1999), and Wechsler and Zlatić (2003) in the HPSG framework, and within a descriptive approach by Corbett (1988), distinguishes between two types of structural agreement: *morphosyntactic agreement* (also referred to as 'concord'), and *index agreement* (also referred to as 'semantic agreement'). The two types are distinguished in terms of the features sets that they involve and in their domain of application.

Morphosyntactic agreement is associated with the formal realization of the word and generally involves the features: CASE, NUMBER, and GENDER. The

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[2] I thank Gilles Boyè for this observation.

domain of morphosyntactic agreement is generally 'local', or 'NP-internal', that is agreement between nominals, determiners and adjectives. An example of morphosyntactic agreement in Serbian/Croatian is given in (18) (Wechsler and Zlatić, 2003, p. 14).

(18) ov-a   star-a   knjig-a
    this-NOM.F.SG old-NOM.F.SG book-NOM.SG(F)

Index agreement, on the other hand, is determined by meaning, or more specifically reference. Thus, when two elements share referential indices they in fact refer to the same entity. The feature set which is generally involved in this type of agreement includes the features PERSON, NUMBER, and GENDER. These features are grammaticalizations of semantic anchoring conditions. Thus, for example, the English noun *boy* must refer to a single masculine entity.

The domain of index agreement generally includes pronouns and finite verbs. An example of an utterance where semantic agreement overrides morphosyntactic agreement is given in (19) (Pollard and Sag, 1994, p. 69). The noun *hashbrowns*, although formally plural, refers to a singular entity and therefore triggers singular agreement on the auxiliary *is*. Thus, subject-verb agreement in this case involves semantic agreement, and not morphosyntactic agreement.

(19) The hashbrowns at table nine is getting angry.

This approach to agreement is motivated by a phenomenon referred to in the literature as 'hybrid agreement' or 'mixed agreement'. A Serbian-Croatian example of such a case is given in (20).

(20) Ta   dobra   **deca**   su   doš-l-a
    that.SF good.SF children AUX.3P come.PPRT.PN

    "Those good children came." (Wechsler and Zlatić, 2003, 51)

The collective noun *deca* 'children' triggers feminine singular agreement on NP-internal items, in this case the determiner *ta* ('that') and the adjective *dobra* ('good'). This is the manifestation of morphosyntactic agreement. Semantic agreement, on the other hand, is manifested in subject-verb agreement, where the finite auxiliary *su* is inflected for third person plural, in agreement with the semantic properties of the subject *deca*.

In HPSG this approach is realized by defining two distinct sets of agreement properties: morphosyntactic (CONCORD) and semantic (INDEX). In the unmarked case the overlapping features in the two sets are token-identical (21a), while in hybrid nouns the morphosyntactic NUMBER and GENDER features do not match their corresponding semantic features (21b).

(21)   a. unmarked' agreement

$$
\begin{bmatrix}
\text{CAT} \mid \text{HEAD} \mid \text{CONCORD}
\begin{bmatrix}
\text{NUMBER} & \boxed{1} \\
\text{GENDER} & \boxed{2} \\
\text{CASE} & \textit{case}
\end{bmatrix} \\
\text{CONT} \mid \text{INDEX}
\begin{bmatrix}
\text{NUMBER} & \boxed{1} \\
\text{GENDER} & \boxed{2} \\
\text{PERSON} & \textit{pers}
\end{bmatrix}
\end{bmatrix}
$$

b. hybrid agreement

$$
\begin{bmatrix}
\text{... CONCORD}
\begin{bmatrix}
\text{NUMBER} & \textit{sing} \\
\text{GENDER} & \textit{fem} \\
\text{CASE} & \textit{case}
\end{bmatrix} \\
\text{...INDEX}
\begin{bmatrix}
\text{NUMBER} & \textit{plur} \\
\text{GENDER} & \textit{neuter} \\
\text{PERSON} & \textit{pers}
\end{bmatrix}
\end{bmatrix}
$$
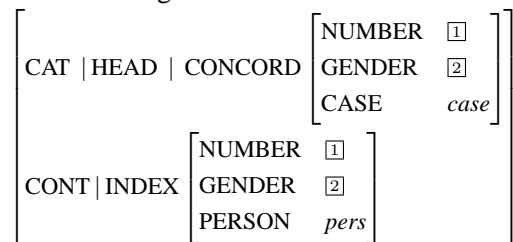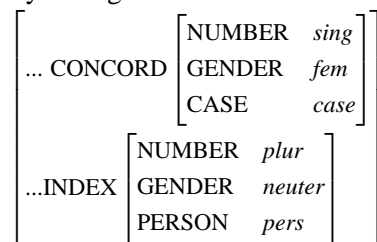
The bifurcation of agreement properties is used in the literature to account for similar complex agreement phenomena in various languages (e.g., English, Russian, Dutch, and Spanish) in the HPSG framework (Pollard and Sag (1994); Kathol (1999); citetVan-Eynde03) and other approaches (Corbett, 1988). In what follows I will proposed that this theory of agreement is advantageous for accounting for the agreement pattern of Standard Arabic NF-RCs. There is, however, an important distinction that needs to be made between hybrid nouns, such as *deca*, and the predicative modifiers discussed here.

The conflicts that need to be resolved by hybrid nouns are 'internal', or 'self-imposed'. They are the result of a mismatch between the formal properties of a noun and its semantic reference. This is a lexical property of a particular closed class of lexemes. Put in the traditional asymmetric terms of 'controller' and 'target', the hybrid noun is an agreement controller with two targets.

$$\boxed{\text{TARGET}} \quad \longleftarrow \quad \boxed{\text{CONTROLLER}} \quad \longrightarrow \quad \boxed{\text{TARGET}}$$

The agreement conflict exhibited by non-subject NF-RCs, on the other hand, is an 'external' conflict imposed on the head by virtue of its function as both a predicate and a modifier in a completely regular and productive construction. In this case the non-finite predicative modifier is an agreement target of two controllers.

$$\boxed{\text{CONTROLLER}} \quad \longrightarrow \quad \boxed{\text{TARGET}} \quad \longleftarrow \quad \boxed{\text{CONTROLLER}}$$

This distinction notwithstanding, in the following section I will show that this theory of agreement provides a key to the analysis of the conflict resolution strategies which are in the focus of this paper.
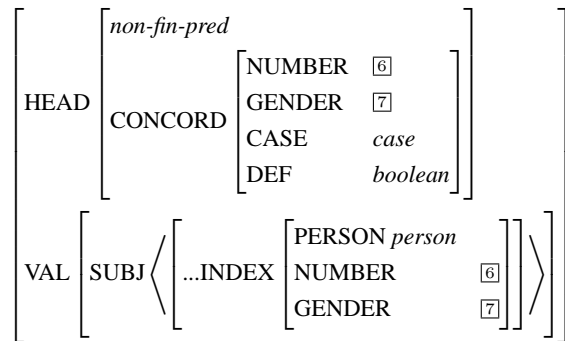
5.2   The analysis

The proposed analysis builds on the theory of agreement described in the previous section and on "standard" HPSG assumptions. At the heart of the analysis are

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four constraints, henceforth A-D, which constitute the assumptions required for accounting for the NF-RC constructions.

Nominal agreement is realized in two distinct sets of agreement properties: morphosyntactic (CONCORD) and semantic (INDEX). As shown in (21a), the NUMBER and GENDER features of 'unmarked' (i.e., not 'hybrid') nouns are token-identical in the two complexes {**A**}. Participles, and adjectives have nominal morphosyntactic agreement properties (i.e., GENDER, NUMBER, CASE, DEFINITE-NESS) as well as semantic agreement properties. Moreover, they can can function as either predicates, modifiers, or predicative-modifiers.

Subject-predicate agreement is realized in the matching of the semantic INDEX properties of the NP subject with their corresponding CONCORD properties of the predicate. In the case of finite verbs, these properties include: PERSON, NUMBER and GENDER. Participles and adjective, unlike finite verbs, are not marked for PERSON. Thus, subject-predicate agreement with predicative adjectives and participles involves the properties NUMBER and GENDER {**B**}.

(22) Subject-Verb Agreement with Non-finite Predicates

$$
\begin{bmatrix}
\text{HEAD} & \begin{bmatrix}
\textit{non-fin-pred} \\
\text{CONCORD} & \begin{bmatrix}
\text{NUMBER} & \boxed{6} \\
\text{GENDER} & \boxed{7} \\
\text{CASE} & \textit{case} \\
\text{DEF} & \textit{boolean}
\end{bmatrix}
\end{bmatrix} \\
\text{VAL} & \begin{bmatrix}
\text{SUBJ} \left\langle \begin{bmatrix}
\text{...INDEX} & \begin{bmatrix}
\text{PERSON} \textit{person} \\
\text{NUMBER} & \boxed{6} \\
\text{GENDER} & \boxed{7}
\end{bmatrix}
\end{bmatrix} \right\rangle
\end{bmatrix}
\end{bmatrix}
$$

As modifiers, participles and adjectives are subject to a number of constraints. First, noun modifiers structure-share the INDEX of the noun they modify {**C**} (Pollard and Sag, 1994, p. 55) .

(23) Head-Modifier Coindexation

$$
\begin{bmatrix}
\text{CAT | HEAD | MOD} \begin{bmatrix} \text{CONT} \begin{bmatrix} \text{INDEX} \boxed{5} \end{bmatrix} \end{bmatrix} \\
\text{CONT} \begin{bmatrix} \text{INDEX} \boxed{5} \end{bmatrix}
\end{bmatrix}
$$
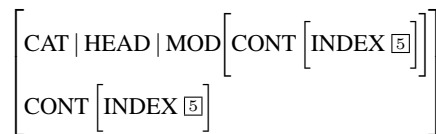
In addition, as was described earlier, attributive modifiers in Standard Arabic exhibit full morphosyntactic agreement (i.e., NUMBER, GENDER, DEFINITENESS, and CASE) with the morphosyntactic agreement properties of the noun they modify.

(24) Attributive Modifiers in Standard Arabic

$$
\left[\text{CAT} \left[\begin{array}{l} \text{HEAD} \left[\begin{array}{l} \textit{attr-mod} \\ \text{CONCORD} \; \boxed{9} \\ \text{MOD} \left\langle \ldots \left[\begin{array}{l} \text{CAT} \mid \text{HEAD} \left[\begin{array}{l} \textit{noun} \\ \text{CONCORD} \; \boxed{9} \end{array} \right] \\ \text{CONT} \left[\text{INDEX} \; \boxed{5} \right] \end{array} \right] \right\rangle \\ \text{PRD -} \\ \text{SUBCAT} \langle \rangle \end{array} \right] \\ \text{CONT} \left[\text{INDEX} \; \boxed{5} \right] \end{array} \right]
$$
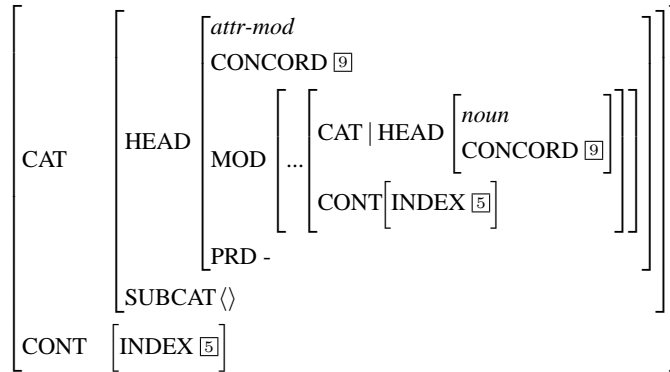
When participles or adjectives are predicative-modifiers they exhibit *partial morphosyntactic agreement* with the noun they modify — only in DEFINITENESS and CASE — and full semantic agreement {**D**}. This property, a clear departure from 'unmarked' constraints, is what enables the language to adopt its particular conflict resolution strategy.

(25) Predicative Modifiers in Standard Arabic

$$
\left[\text{CAT} \left[\begin{array}{l} \text{HEAD} \left[\begin{array}{l} \textit{pred-mod} \\ \text{CONCORD} \left[\begin{array}{ll} \text{CASE} & \boxed{3} \\ \text{DEF} & \boxed{4} \\ \text{NUMBER} & \textit{num} \\ \text{GENDER} & \textit{gend} \end{array} \right] \\ \text{MOD} \left\langle \ldots \left[\begin{array}{l} \text{CAT} \mid \text{HEAD} \left[\begin{array}{ll} \textit{noun} \\ \text{CONCORD} \left[\begin{array}{ll} \text{CASE} & \boxed{3} \\ \text{DEF} & \boxed{4} \\ \text{NUMBER} & \textit{num} \\ \text{GENDER} & \textit{gend} \end{array} \right] \end{array} \right] \\ \text{CONT} \left[\text{INDEX} \; \boxed{5} \right] \end{array} \right] \right\rangle \\ \text{PRD +} \\ \text{SUBCAT} \left\langle \text{NP,...} \right\rangle \end{array} \right] \\ \text{CONT} \left[\text{INDEX} \; \boxed{5} \right] \end{array} \right]
$$
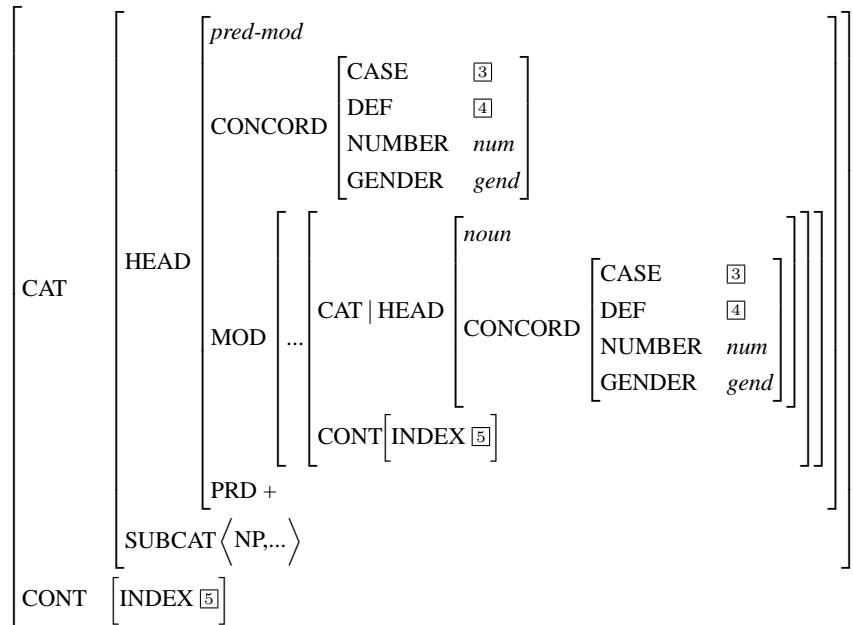
At the constructional level, the NF-RC construction is similar to reduced relative clauses in English (e.g., *the man standing in the doorway*). Sag (1997) proposes that a reduced relative clause is a predicate that is missing a subject. This construction is licensed by a *reduced-rel-cl* type, in which the INDEX of the unexpressed subject (PRO) is coindexed with that of the MOD value.

(26) *reduced-rel-cl* $\Rightarrow$ $\begin{bmatrix} \text{HEAD} \begin{bmatrix} \text{MOD} \begin{bmatrix} ...\text{INDEX}\ \boxed{1} \end{bmatrix} \end{bmatrix} \\ \text{SUBJ} \left\langle \begin{bmatrix} ...\text{INDEX}\ \boxed{1} \end{bmatrix} \right\rangle \end{bmatrix}$

It should be noted that for Sag the specification of a MOD value and the coindexation are not lexical properties of the head of the RC, rather they are defined constructionally, as a property of the type *reduced-rel-cl*.

Sag's analysis cannot be straightforwardly applied to NF-RCs in SA. First, unlike reduced relative clauses in English, in which the relativized position is necessarily the subject, NF-RCs in SA are not restricted to the relativization of a particular grammatical function. Moreover, I assume, contra to Sag's analysis, that the MOD property of the NF-RC is lexically specified for the participle/adjective. This captures the dual role of participles and adjectives as both predicates and modifiers. At the same time, the link between the indices of the relative head and the relativized position is defined constructionally, in order to account for the two variants (subject NF-RCs and non-subject NF-RCs).

In subject NF-RCs the INDEX feature of the relative head is token-identical to the INDEX feature of the unrealized SUBJ.

(27) *subject-non-fin-rel-cl* $\Rightarrow$ $\begin{bmatrix} \text{HEAD} \begin{bmatrix} pred\text{-}mod \\ \text{MOD} \begin{bmatrix} ...\text{INDEX}\ \boxed{1} \end{bmatrix} \end{bmatrix} \\ \text{SUBJ} \left\langle \begin{bmatrix} ...\text{INDEX}\ \boxed{1} \end{bmatrix} \right\rangle \end{bmatrix}$

In non-subject NF-RCs the INDEX feature of the relative head is token-identical to the INDEX feature of the resumptive pronoun. Note that the exact HPSG analysis of resumptive pronouns is immaterial here. The proposed representation, where the nonlocal feature RESUMP stores the index of the resumptive pronoun and is propagated similarly to other nonlocal features, is taken from Vaillette (2002).

(28) *non-subject-non-fin-rel-cl* $\Rightarrow$ $\begin{bmatrix} \text{HEAD} \begin{bmatrix} pred\text{-}mod \\ \text{MOD} \begin{bmatrix} ...\text{INDEX}\ \boxed{1} \end{bmatrix} \end{bmatrix} \\ \text{SUBJ} \langle \rangle \\ \text{HD-DTR} \begin{bmatrix} \text{RES-PRON} \mid ...\text{INDEX}\ \boxed{1} \end{bmatrix} \end{bmatrix}$

The avoidance of non-subject NF-RCs in Hebrew is accounted for by the absence of the *non-subject-non-fin-rel-cl* phrase type in the grammar of the language. Note, that this approach removes the burden of the account from the lexical level to the constructional level. This step is necessary in order to prevent the licensing of ungrammatical MH sentences such as (17) above, whose ungrammaticality cannot be accounted for by a feature mismatch (since no mismatch occurs).

Example analyses

As a final step, an illustration of the analysis will be given using partial descriptions of the participles which head the two constructions. Consider the following minimal pair;(29) exemplifying subject NF-RCs and (30), non-subject NF-RCs.

(29) al-banaat-u   l-waahibaat-u   l-maal-a
     the-girls.FP-NOM the-giving.PART.FP-NOM the-money.MS-ACC

     "The girls who are giving the money"

(30) al-marat-u   [l-waahib-u
     the-woman.SF-NOM the-giving.PART.MS-NOM

     zawj-u-haa   l-maal-a]
     husband.MS-NOM-POSS.3FS the-money.MS-ACC

     "The woman whose husband is giving the money"

Two phrase types and four constraints are used in order to account for the two constructions. In order to facilitate the exposition, table 1 lists the four constraints together with the tag labels of the values which are constrained by them, as they appear in the proposed descriptions (figures 2 & 3).

{A} noun-internal agreement	1	2
{B} subject-predicate agreement	6	7
{C} noun-modifier agreement (index)	5	
{D} partial noun-modifier agreement (concord)	3	4

Table 1: Lexical Constraints

This proposal provides a unified account of the two constructions by subjecting them to identical lexical constraints. As is evident from figures 2 and 3, the descriptions of the participles of the subject NF-RC and the non-subject NF-RC are almost identical. One crucial difference, of course, is the resumptive pronoun, which appears only in the non-subject NF-RC construction.

The interplay between the four lexical constraints entails that the morphosyntactic agreement properties of the participle are split and matched against two different elements, namely the subject and the relative head. Although appropriate for the hybrid agreement pattern of non-subject NF-RCs, constraint D, which requires only *partial* modifier-head agreement, does not seem to apply to subject NF-RCs, where the relative head and the participle exhibit *full* agreement. Thus, this unified account can potentially license ungrammatical sentences such as the one given in (31), where the participle exhibits partial DEFINITENESS-CASE agreement with the relative head, as required, and NUMBER-GENDER agreement properties which do not match those of the relative head.
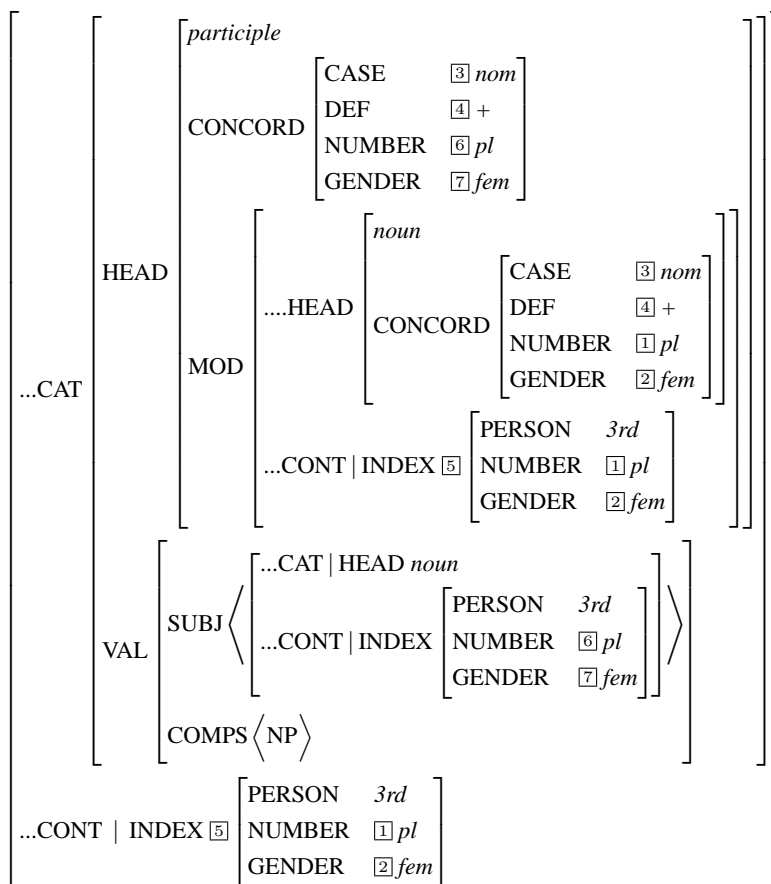
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$$
\left[\begin{array}{l}
\ldots\text{CAT}
\left[\begin{array}{l}
\text{HEAD}
\left[\begin{array}{l}
\textit{participle} \\[2pt]
\text{CONCORD}
\left[\begin{array}{ll}
\text{CASE} & \boxed{3}\,\textit{nom} \\
\text{DEF} & \boxed{4}\,+ \\
\text{NUMBER} & \boxed{6}\,\textit{pl} \\
\text{GENDER} & \boxed{7}\,\textit{fem}
\end{array}\right] \\[12pt]
\text{MOD}
\left[\begin{array}{l}
\ldots\text{HEAD}
\left[\begin{array}{l}
\textit{noun} \\[2pt]
\text{CONCORD}
\left[\begin{array}{ll}
\text{CASE} & \boxed{3}\,\textit{nom} \\
\text{DEF} & \boxed{4}\,+ \\
\text{NUMBER} & \boxed{1}\,\textit{pl} \\
\text{GENDER} & \boxed{2}\,\textit{fem}
\end{array}\right]
\end{array}\right] \\[12pt]
\ldots\text{CONT}\mid\text{INDEX}\;\boxed{5}
\left[\begin{array}{ll}
\text{PERSON} & \textit{3rd} \\
\text{NUMBER} & \boxed{1}\,\textit{pl} \\
\text{GENDER} & \boxed{2}\,\textit{fem}
\end{array}\right]
\end{array}\right]
\end{array}\right] \\[30pt]
\text{VAL}
\left[\begin{array}{l}
\text{SUBJ}\left\langle
\left[\begin{array}{l}
\ldots\text{CAT}\mid\text{HEAD}\;\textit{noun} \\[2pt]
\ldots\text{CONT}\mid\text{INDEX}
\left[\begin{array}{ll}
\text{PERSON} & \textit{3rd} \\
\text{NUMBER} & \boxed{6}\,\textit{pl} \\
\text{GENDER} & \boxed{7}\,\textit{fem}
\end{array}\right]
\end{array}\right]\right\rangle \\[20pt]
\text{COMPS}\left\langle\text{NP}\right\rangle
\end{array}\right] \\[24pt]
\ldots\text{CONT}\mid\text{INDEX}\;\boxed{5}
\left[\begin{array}{ll}
\text{PERSON} & \textit{3rd} \\
\text{NUMBER} & \boxed{1}\,\textit{pl} \\
\text{GENDER} & \boxed{2}\,\textit{fem}
\end{array}\right]
\end{array}\right]
$$

Figure 2: The head of a subject NF-RC

(31) *al-banaat-u   l-waahib-u   l-maal-a
the-girls.FP-NOM the-giving.PART.MS-NOM the-money.MS-ACC

"The girls who are giving the money"

This potential problem is prevented by the constraint on *subject-non-fin-rel-cl* phrase type, shown in (27), which states that the INDEX value of the modified noun is token-identical to the INDEX value of the unexpressed subject. Consequently, the NUMBER-GENDER properties, tagged $\boxed{1}$ & $\boxed{2}$, are token-identical to their respective properties, tagged $\boxed{6}$ & $\boxed{7}$. Thus, the combination of lexical and phrasal constraints achieves the expected result — full morphosyntactic agreement between the participle and the relative head.

The potential for hybrid agreement is exploited, on the other hand, in the licensing of non-subject NF-RCs. The NUMBER and GENDER properties in the CONCORD complex of the participle/adjective ($\boxed{1}$ & $\boxed{2}$) are not token-identical to those in the INDEX complex ($\boxed{6}$ & $\boxed{7}$). The constructional definition of the *non-subject-non-fin-rel-cl* phrase type ensures the full agreement between the re-

$$
\left[\ldots \text{CAT} \left[\begin{array}{l}
\text{HEAD} \left[\begin{array}{l}
participle \\
\text{CONCORD} \left[\begin{array}{ll} \text{CASE} & \boxed{3}\ nom \\ \text{DEF} & \boxed{4}\ + \\ \textbf{NUMBER} & \boxed{6}\ \textbf{\textit{sg}} \\ \textbf{GENDER} & \boxed{7}\ \textbf{\textit{masc}} \end{array} \right] \\
\text{MOD} \left[\begin{array}{l}
\text{....HEAD} \left[\begin{array}{l} noun \\ \text{CONCORD} \left[\begin{array}{ll} \text{CASE} & \boxed{3}\ nom \\ \text{DEF} & \boxed{4}\ + \\ \text{NUMBER} & \boxed{1}\ sg \\ \text{GENDER} & \boxed{2}\ fem \end{array} \right] \end{array} \right] \\
\text{...CONT | INDEX } \boxed{5} \left[\begin{array}{ll} \text{PERSON} & 3rd \\ \text{NUMBER} & \boxed{1}\ sg \\ \text{GENDER} & \boxed{2}\ fem \end{array} \right]
\end{array} \right]
\end{array} \right] \\
\text{VAL} \left[\begin{array}{l}
\text{SUBJ} \left\langle \left[\begin{array}{l} \text{...CAT | HEAD } noun \\ \text{...CONT | INDEX} \left[\begin{array}{ll} \text{PERSON} & 3rd \\ \text{NUMBER} & \boxed{6}\ sg \\ \text{GENDER} & \boxed{7}\ masc \end{array} \right] \end{array} \right] \right\rangle \\
\text{COMPS} \left\langle \text{NP} \right\rangle
\end{array} \right] \\
\text{...CONT | INDEX } \boxed{5} \left[\begin{array}{ll} \text{PERSON} & 3rd \\ \textbf{NUMBER} & \boxed{1}\ \textbf{\textit{sg}} \\ \textbf{GENDER} & \boxed{2}\ \textbf{\textit{fem}} \end{array} \right] \\
\text{... RESUM-PRO} \left[\text{....INDEX } \boxed{5} \left[\begin{array}{ll} \text{PERSON} & 3rd \\ \text{NUMBER} & \boxed{1}\ sg \\ \text{GENDER} & \boxed{2}\ fem \end{array} \right] \right]
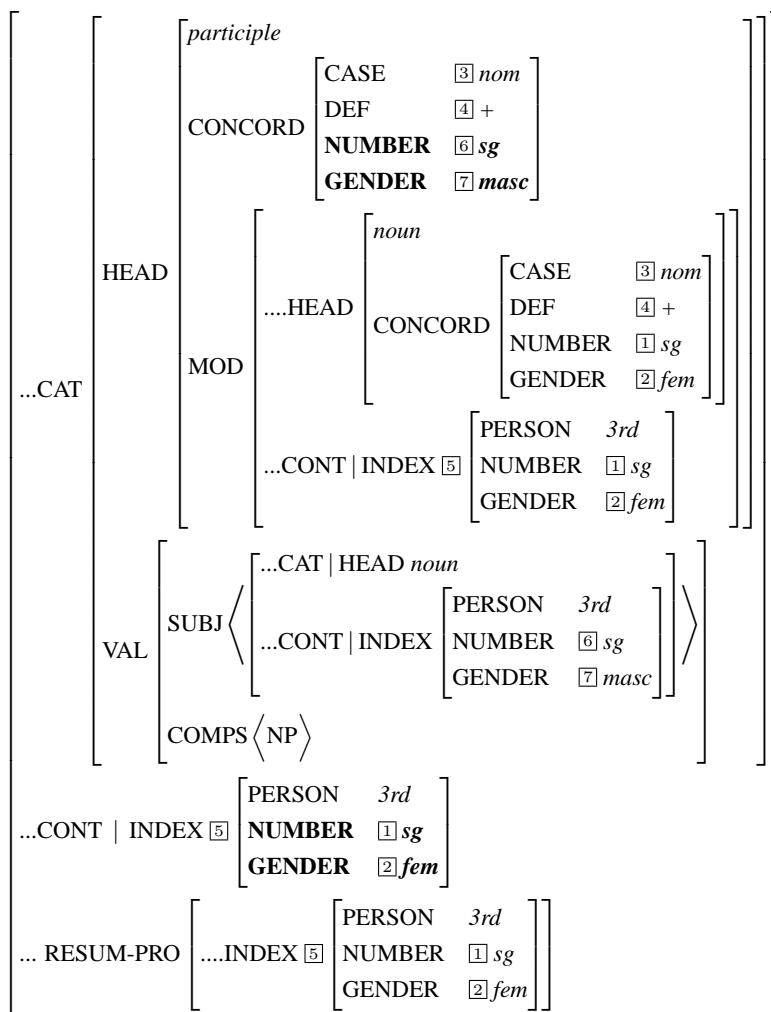\end{array} \right]
$$

Figure 3: The head of a non-subject NF-RC

sumptive pronoun and the relative head.

To summarize, the proposed architecture provides a unified way of accounting for the split agreement strategy adopted by SA, without requiring major construction-specific stipulations. The morphosyntactic agreement properties of the head of the NF-RC are split into NUMBER-GENDER and DEFINITENESS-CASE, where the former are those properties which occur at the intersection of morphosyntactic and semantic agreement, while the latter are specific to morphosyntactic agreement.[3] The heads of non-subject NF-RCs exhibit hybrid agreement, in that their morphosyn-

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[3]It could be speculated that the fact that SA has four morphologically marked agreement properties of which two occupy the intersection between the two types of agreement and two are specific to a particular type is what enables SA to adopt hybrid agreement. This is not the case with Modern Hebrew, for which all the morphologically marked agreement properties occur only at the intersection, hence its avoidance of the construction.

tactic PERSON-NUMBER properties do not match their semantic counterparts. In subject-non-finite-RCs full agreement is attained as a consequence of the constructional constraint which matches the INDEX properties of the unrealized SUBJ with those of the relative head.

6 Conclusion

The conflict resolution strategy adopted by SA, whereby the agreement properties of the head of the non-subject NF-RC are split between those which agree with the relative head and those which agree with the subject, provides a serious challenge to any formal linguistic theory. An adequate theory should unquestionably provide an account for such a construction, as well as for other existing strategies. Moreover, a bigger challenge for a linguistic theory is to incorporate the account into a larger context.

The theory of agreement presented here was originally proposed in order to account for similar, yet distinct cases of hybrid agreement in diverse languages. However, unlike the phenomenon which motivated this theory, where hybrid agreement is a reflex of an 'internal' conflict, hybrid agreement in the constructions discussed in this paper is used as a strategy to resolve 'external' conflicting constraints. Nevertheless, as was shown, the concept of two types of agreement and its implementation in the HPSG framework provided the appropriate background for accounting for the rare and 'exotic' construction in SA. Consequently, this provides original supporting evidence for a theory of agreement which distinguishes between morphosyntactic and index agreement, and consequently extends the implications of the theory. Moreover, by adopting the current constructional approach, whereby constraints can targets syntactic structure above the lexical level, better empirical coverage is achieved.

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