

# Arabic relative clauses in HPSG

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## Abstract

In HPSG relative clauses have been analyzed in terms of phonologically empty heads in Pollard and Sag (1994) and in terms of a complex system of phrase types in Sag (1997). Modern Standard Arabic has a distinction between relative clauses with a definite antecedent, which are introduced by a special complementizer, and relative clauses with an indefinite antecedent, which are ‘bare’ clauses. Analyses eschewing empty heads and assuming a complex system of phrase types face a number of problems. An analysis in which relatives with an indefinite antecedent are headed by a phonologically empty complementizer is more satisfactory. Thus, in the case of Arabic, the approach of Pollard and Sag (1994) seems preferable to the approach of Sag (1997).

## 1 Introduction

Pollard and Sag (1994: Chapter 5) develop an analysis of relative clauses employing a number of phonologically empty heads. Sag (1997) rejects empty heads and instead makes use of a complex system of phrase types. Thus, for any language, major questions about relative clauses are:

- What phrase types are necessary?
- Are any empty heads necessary?

In this paper we will consider the implications of Modern Standard Arabic for these questions. We will argue that analyses which eschew empty heads face a number of problems and that an approach which employs an empty complementizer is more satisfactory.

## 2 The basic data

Arabic has two main types of finite relative clauses.<sup>1</sup> With a definite antecedent a relative clause consists of the element *ʔallaði* and a clause containing either a gap or resumptive clitic, as in (1).

- (1) a. *jaaʔa*            *l-walad-u*        [*llaði*            *qaabala*        \_\_\_\_  
          came.3.M.SG    DEF-boy-NOM    that. M.SG    met.3.M.SG

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<sup>↑</sup> We are grateful to Bob Levine, Stefan Müller, the reviewers for the HPSG conference, and the audience for helpful discussion of the issues discussed here. Any deficiencies are our responsibility.

<sup>1</sup> Arabic also has certain non-finite relatives, discussed e.g. in Melnik (2006). We will not consider how they should be analysed.

- l-malik-a]  
 DEF-king-ACC  
 ‘The boy who met the king came.’
- b. wajadtu l-kitab-a [llaði tuhib-**hu**  
 found.1.SG DEF-book-ACC that. M.SG like.3.F.SG-3.M.SG  
 Hind-un]  
 Hind-NOM  
 ‘I found the book that Hind likes.’

Here and subsequently we mark gaps by ‘\_\_\_’ and place resumptive clitics in bold. *?allaði* is inflected for number, gender and case, and has the following forms:

	Masculine	Feminine
Singular	<i>?allaði</i>	<i>?allati</i>
Dual-NOM	<i>?allaðaani</i>	<i>?allataani</i>
Dual-ACC/GEN	<i>?allaðayni</i>	<i>?allatayni</i>
Plural	<i>?allaðiina</i>	<i>?allaati-allawaati</i>

Table 1: Forms of *?allaði*

This makes it look like a pronoun. However, as we will see shortly, there is evidence that it is not a pronoun but a complementizer.

With an indefinite antecedent *?allaði* does not appear. We just have a ‘bare’ clause with either a gap or resumptive clitic, as in (2).

- (2) a. jaaʔa walad-un [qaabala \_\_\_ l-malik-a]  
 came.3.M.SG boy-NOM met.3.M.SG DEF-king-ACC  
 ‘A boy who met the king came,’
- b. wajadtu kitab-an [tuhib-**hu** Hind-un]  
 found.1.SG book-ACC like.3.F.SG-3.M.SG Hind-NOM  
 ‘I found a book that Hind likes’

Both definite and indefinite relatives are normally verb-initial, but subject-initial clauses sometimes occur.

Obviously, we must look more closely at the nature of *?allaði*. It agrees with the antecedent in number and gender. It also agrees with the gap or resumptive clitic since they agree with the antecedent. The following illustrate:

- (3) a. jaaʔa            l-walad-u        [llaði        qaabala        \_\_\_\_  
           came.3.M.SG   DEF-boy-NOM   that.M.SG   met.3.M.SG  
           l-malik-a]  
           the-king-ACC  
           ‘The boy who met the king came,’
- b. wajadtu        l-kitab-a            [llaði        tuhib-**hu**]  
           found.1.SG   DEF-book-ACC   that.M.SG   like.1.SG-3.M.SG.  
           ‘I found the book that I like’

In (3a), *llaði* is masculine singular in agreement with the antecedent *l-walad-u*, and the gap in subject position is also masculine singular, as shown by the associated verb. In (3b), *llaði* is masculine singular in agreement with *l-kitab-a*, and the clitic *hu* is also masculine singular. The situation with case is different. The case of the antecedent and relativized position are not necessarily the same. Where they differ, *ʔallaði* has the case of the antecedent and not that of the relativized position. Consider the following:

- (4) a. raʔaytu        l-waladayni            [llaðayni  
           saw.1.SG   DEF-boy.DUAL.ACC   that.M.DUAL.ACC  
           qaabala-**humaa**        l-malik-u]  
           met.3.M.SG-3.DUAL   DEF-king-NOM  
           ‘I saw the two boys whom the king met.’
- b. jaaʔa            l-waladaani            [llaðaani  
           came.3.M.DUAL   DEF-boy.DUAL.NOM   that.M.DUAL.NOM  
           qaabala-**humaa**        l-malik-u]  
           met.3.M.SG-3.DUAL   DEF-king-NOM  
           ‘The two boys whom the king met came.’

In (4a) the antecedent is accusative and the relativized position is also accusative. In (4b), the relativized position is again accusative, but the antecedent is nominative, and *ʔallaði* agrees with it. This suggests that *ʔallaði* is not a relative pronoun but a complementizer.<sup>2</sup>

Further evidence for this conclusion comes from the fact that *ʔallaði* is never part of a larger clause-initial phrase.<sup>3</sup> Thus, for example, (5a) is ungrammatical. Instead we have (5b).

<sup>2</sup> Aoun, Benmamoun and Choueri (2010) assume that *ʔallaði* is a complementizer, but they provide no arguments for this position.

<sup>3</sup> Sag (1997) assumes that English relative *that* is a pronoun although it is never part of a larger phrase. He assumes that it cannot be part of a larger phrase because it is nominative. There is no possibility of taking a similar approach to *ʔallaði* since it is not necessarily nominative.

- (5) a. \*l-wallad-u [[<sub>PP</sub> maʕ llaði] takallamta \_\_\_\_]  
 DEF-boy-NOM with that talked.2.M.SG  
 ‘the boy with whom you talked’  
 b. l-wallad-u [llaði takallamta maʕ-**hu**]  
 DEF-boy-NOM that talked.2.M.SG with-3.M.SG  
 ‘The boy that you talked with’

Similarly, (6a) is ungrammatical, and instead we have (6b).

- (6) a. \*ʔaʕrifu r-rajul-a [[<sub>NP</sub> ʔom llaði] \_\_\_\_]  
 know.1.M.SG DEF-man-ACC mother that.M.SG  
 maatat ]]  
 died.3.F.SG  
 ‘I know the man whose mother died.’  
 b. ʔaʕrifu r-rajul-a [llaði maatat  
 know.1.M.SG DEF-man-ACC that.M.SG died.3.F.SG  
 ʔom-**hu**]  
 mother-3.M.SG.  
 ‘I know the man whose mother died.’

Thus, *ʔallaði* is quite different from an interrogative pronoun, which can be part of a complex clause-initial phrase, as the following show:

- (7) [<sub>PP</sub> maʕa man] takallamta \_\_\_\_  
 with who talked.2.M.SG  
 ‘With whom did you talk?’  
 (8) [<sub>NP</sub> ʔom man] \_\_\_\_ maatat  
 mother who died.3.F.SG  
 ‘Whose mother died?’

It is fairly clear, then, that *ʔallaði* is not a pronoun but a special inflected complementizer. Its main use is in relative clauses. It also appears in free relatives such as the bracketed examples in (9).

- (9) a. jaaʔa [llaði \_\_\_\_ faaza fi  
 came.3.M.SG that.M.SG won.3.M.SG in  
 l-musabaqat-i]  
 DEF-competition-GEN  
 ‘The one that won the competition came.’  
 b. raʔaytu [llati ʔuhib-**haa**]  
 saw.1.SG that.F.SG like.1.SG-3.F.SG  
 ‘I saw the one (female) that I like.’

We assume that such free relatives are NPs consisting solely of a relative clause. (See Alqurashi 2012.) We also find *ʔallaði* in certain *wh*-questions, such as (10).

- (10) a. man llati aʕTa-**ha** Ahmad kitab-an  
 who that.F.SG gave.3.M.SG-3.F.SG Ahmad book-ACC  
 ‘Who did Ahmad give a book to?’  
 b. man llaði takalamta mʕa-**hu**  
 who that.M.SG talked.2.M.SG with-3.M.SG  
 ‘Whom did you talk to?’

We think that these may be headless clauses consisting of a *wh*-expression and a relative clause. Thus, it may well be that *ʔallaði* only appears in relative clauses. It does not appear in complement clauses, which are introduced by either *ʔan* or *ʔanna*, as the following illustrate:<sup>4</sup>

- (11) a. ʔiqtarhtu [ʔan yuʕarika Ahmad-un  
 suggested.1.SG that participate Ahmad-NOM  
 fi l-musabaqah]  
 in DEF-competition  
 ‘I suggested that Ahmad participate in the competition.’  
 b. qultu li-Ahmad [ʔanna Hind-an tuhibu-**h**]  
 said.1.SG to-Ahmad that Hind-ACC love.3.F.SG-3.M.SG  
 ‘I said to Ahmad that Hind loves him.’

We conclude that *ʔallaði* is a special complementizer, probably used solely in relative clauses.<sup>5</sup>

A further point that we should note here is that relative clauses are rather like attributive adjectives. The latter also reflect the definiteness of the associated nominal, having the definiteness marker *al-* if the nominal is definite but not if it is indefinite. We have data like the following:

- (12) a. wajadtu l-kitab-a l-qadiim-a [llaði  
 found.1.SG DEF-book-ACC DEF-old- ACC that.M.SG  
 tuhib-**hu** Salwa]  
 like.3.F.SG-3.M.SG Salwa  
 ‘I found the old book that Salwa likes’

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<sup>4</sup> *ʔan* introduces a verb-initial clause, while *ʔanna* introduces a subject-initial clause with an accusative subject.

<sup>5</sup> The restricted distribution of *ʔallaði* is highlighted by Ouhalla (2004). However, he sees it as evidence that it is not a complementizer but a determiner. We see no reason to adopt such a radical position.

- b. wajadtu kitab-an qadiim-an [tuhib-**hu** Salwa]  
 found.1.SG book-ACC old-ACC like.3.F.SG-3.M.SG Salwa  
 ‘I found an old book that Salwa likes’

In both cases they show agreement in number, gender and case. The similarity is unsurprising if both relative clauses and attributive adjectives are adjuncts modifying a nominal constituent.<sup>6</sup>

A final point that we should note before we seek to develop an analysis is that there is evidence from the distribution of gaps and resumptive clitics that they are similar elements. They behave alike with respect to the Coordinate Structure Constraint. Thus, it is possible to have a gap in one conjunct and a resumptive clitic in the other, as the following illustrates:

- (13) l-fatatu [llati ?uibu — wa ?a\_ras  
 DEF-girl.NOM that.F.SG love.1.M.SG and care.1.M.SG  
 {alay-**ha**]  
 about-3.F.SG  
 ‘the girl that I love and care about’

Within HPSG, this suggests that both are realizations of SLASH as in Taghvaipour’s (2004) analysis of Persian and that there is no need to invoke a separate RESUMP feature as in Vaillette’s (2000) analysis of Hebrew relative clauses.

### 3 Analyses without empty heads

In this section, we will consider the possibility of an analysis of Arabic relative clauses with no empty heads and a system of phrase-types along the lines of Sag’s (1997) analysis of English relatives. We will consider a number of analyses and argue that all face some important problems.

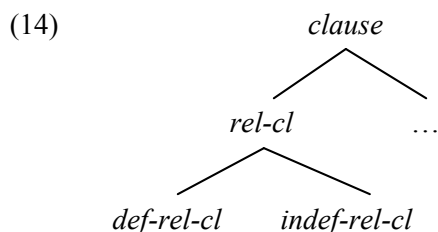
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<sup>6</sup> They differ in that adjectives precede while relatives follow a complement, as shown by the following:

- (i) ?aT-Tariiq-u l-jadiid-u ?ila r-riyadh-i  
 DEF-road-NOM DEF-new-NOM to DEF-riyadh-GEN  
 ‘the new road to Riyadh’
- (ii) ?aT-Tariiq-u ?ila r-riyadh-i llaði yabnuna-hu  
 DEF-road-NOM to DEF-riyadh-GEN that.M.SG build.3.M.PL-3.M.SG  
 l-?aan  
 now  
 ‘the road to Riyadh that they are building now’

The positioning of relatives is expected if they modify an NP. We will not try to deal with the positioning of adjectives.

An analysis of this kind will need a type *rel-cl* with two subtypes *def-rel-cl* and *indef-rel-cl*. Assuming *rel-cl* is a subtype of *clause*, we will have the following type hierarchy:



We might propose the following constraint on *rel-cl*:

$$(15) \text{ rel-cl} \Rightarrow \left[ \begin{array}{l} \text{HEAD}[\text{MOD NP}[1]] \\ \text{SLASH } \{ \} \\ \text{HD - DTR} [\text{SLASH } \{ \text{NP}[1] \}] \end{array} \right]$$

This essentially combines the constraint on English relative-clauses proposed by Sag (1997: 444) and his constraint on English non-wh-relative-clauses (Sag 1997: 451). It ensures that a relative clause modifies an NP, that it is [SLASH {}], and that its head-daughter has a SLASH value containing an NP coindexed with the value of MOD. The SLASH Amalgamation Principle, which we formulate following Ginzburg and Sag (2000: 199) as (16), will ensure that an argument of the head has the same value.

$$(16) \text{ word} \Rightarrow / \left[ \begin{array}{l} \text{SLASH } \{ [1] \cup \dots \cup [n] \} \\ \text{ARG - ST} < [\text{SLASH } \{ [1] \}], \dots, [\text{SLASH } \{ [n] \}] > \end{array} \right]$$

This is a default constraint, which will be important later. The coindexing in (15) ensures that the modified NP and the gap or resumptive clitic agree in number and gender.

If we assume with Sag (1997) that complementizers are heads, definite relatives will be CPs, and we might propose the following constraints on the two subtypes of relative-clause:

$$(17) \text{ a. } \text{def-rel-cl} \Rightarrow [\text{SS|LOC|CAT}[\text{HEAD } c]]$$

$$\text{ b. } \text{indef-rel-cl} \Rightarrow [\text{SS|LOC|CAT}[\text{HEAD } v]]$$

These will ensure that definite relatives are headed by a complementizer and indefinite relatives by a verb. Of course, definite relatives cannot be headed by just any complementizer. However, if no other complementizers are [MOD NP], only *ʔallaði* will be possible here.

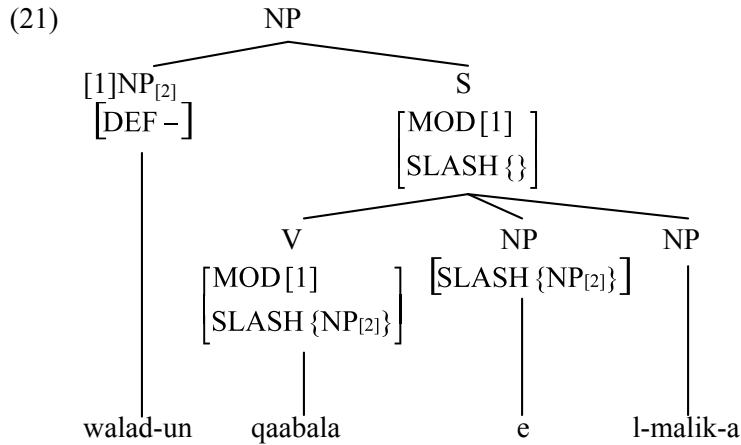
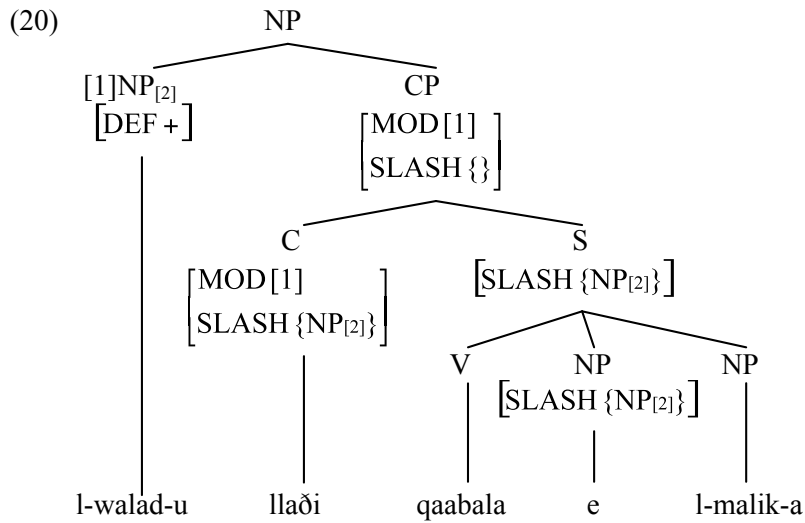




(19) *hd-adj-ph* ⇒

$$\left[ \begin{array}{l} \text{DTRS} < [1][\text{SS}[2]], [\text{SS} | \text{LOC} | \text{CAT} | \text{HEAD}[\text{MOD}[2]]] > \\ \text{HD} - \text{DTR} [1] \end{array} \right]$$

This will give the following schematic structures for the complex NPs in (1a) and (2a) (where we assume with Levine and Hukari 2006 that gaps are empty categories):



It looks as if the system of phrase types in (14), the constraints in (15) and (17), and appropriate lexical descriptions for forms of *ʔallaði* and finite verbs can handle the data fairly well. However, this analysis has two dubious features. Firstly, it entails that verbs in indefinite relatives are [MOD NP]

unlike verbs elsewhere, which are [MOD *none*]. Since they look just the same as verbs in other contexts, this seems rather dubious. Secondly, it assigns different CONTENT values to verbs in indefinite relatives and verbs in other contexts. As Sag (1997: 474) notes

There is no independent motivation for assigning a finite verb one kind of semantic content (a restricted index) when it appears as the highest verb in a relative clause and a completely different kind of interpretation (a *proposition* or *qfproa*) in all other contexts. Intuitively, finite verbs should have propositional content in all their uses ...

Thus, the analysis seems rather unsatisfactory.<sup>8</sup>

Sag (1997) avoids assigning special CONTENT values to verbs in English bare relatives by introducing a special *head-relative-phrase* subtype of *head-adjunct-phrase* subject to the following constraint:<sup>9</sup>

(22)

$$hd-rel-ph \Rightarrow \left[ \begin{array}{l} \text{HEAD } noun \\ \text{CONT } \left[ \begin{array}{l} \text{INDEX [1]} \\ \text{RESTR [2] } \cup \{ [3] \} \end{array} \right] \\ \text{HD - DTR } \left[ \begin{array}{l} \text{INDEX [1]} \\ \text{RESTR [2]} \end{array} \right] \\ \text{NON - HD - DTRS } < [\text{CONT [3]} \textit{proposition}] > \end{array} \right]$$

On this approach the CONTENT value of a relative clause and hence the verb that heads it is a *proposition*. If we adopt this approach, verbs in indefinite relatives will no longer have a special CONTENT value.

What are the implications of this approach for definite relatives? There seem to be two possibilities. Firstly, we might assume that the combination of definite NP and definite relative is not an instance of *head-rel-phrase*. However, this seems counterintuitive. Secondly, we might assume that definite relatives and hence *?allaði* have a *proposition* as their CONTENT value. This approach, however, assigns the same interpretation to *?allaði* as other complementizers, and thus makes its restricted distribution rather surprising.

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<sup>8</sup> If relative clauses have a restricted index, it will not be possible for them to be a subtype of *clause* if one assumes with Ginzburg and Sag (2000) that the type *clause* has the CONTENT *message*.

<sup>9</sup> In Sag (1997) the internal structure of phrases is encoded by the features HD-DTR and NON-HD-DTRS. In more recent work, e.g. Ginzburg and Sag (2000), the latter is replaced by the feature DTRS.

Thus, definite relatives seem problematic for this approach. Notice also that it is still necessary within this approach to assume that verbs in indefinite relatives are [MOD NP] and not [MOD *none*]. Hence, this approach has some important weaknesses.

A rather different analysis is possible if we adopt the Generalized Head Feature Principle (GHFP) of Ginzburg and Sag (2000). In the preceding discussion we have assumed with Sag (1997) that a headed phrase and its head daughter have the same value for HEAD and that the CONTENT value of a headed phrase is the identical to that of the head daughter except in the case of a head-adjunct structure, where it is identical to that of the adjunct. The Generalized Head Feature Principle can be formulated as follows:

(23)

$$hd-ph \Rightarrow \left[ \begin{array}{l} \text{SYNSEM} / [1] \\ \text{HD - DTR} [\text{SYNSEM} / [1]] \end{array} \right]$$

It requires a headed phrase and its head daughter to have the same SYNSEM value by default. As a default principle it can be overridden. Hence, if we adopt this principle, we can assume that the MOD value of an indefinite relative is NP and the CONTENT value of an indefinite relative a restricted INDEX without assuming that verbs have these values. To do this we could replace (17b) by the following much more complex constraint:

(24) *indef-rel-cl*  $\Rightarrow$

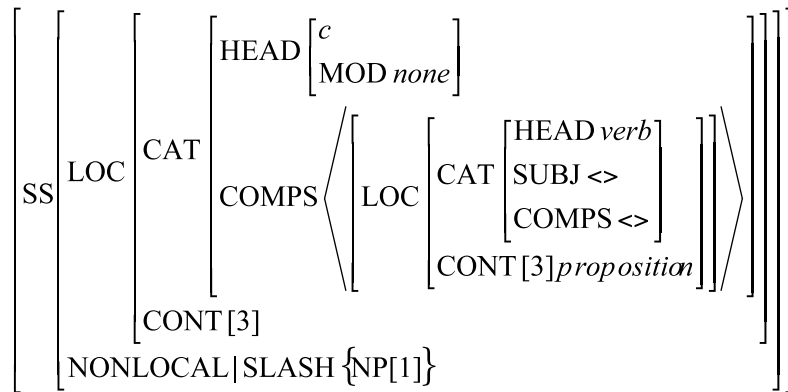
$$\left[ \begin{array}{l} \text{SS|LOC} \left[ \begin{array}{l} \text{CAT} \left[ \begin{array}{l} \text{HEAD} \left[ \begin{array}{l} \text{MOD} \left[ \begin{array}{l} \text{LOC} \left[ \begin{array}{l} \text{CAT NP[DEF -]} \\ \text{CONT} \left[ \begin{array}{l} \text{INDEX [1]} \\ \text{RESTR [2]} \end{array} \right] \end{array} \right] \end{array} \right] \end{array} \right] \end{array} \right] \end{array} \right] \end{array} \right] \\ \text{CONT} \left[ \begin{array}{l} \text{INDEX [1]} \\ \text{RESTR [2]} \cup \{[3]\} \end{array} \right] \\ \text{HD - DTR} [\text{CONT [3]} \textit{proposition}] \end{array} \right]$$

This ensures that indefinite relatives have a restricted INDEX as their CONTENT value and have a head daughter whose CONTENT value is a proposition. The GHFP will ensure that the head is a verb. The constraint also ensures that indefinite relatives modify an indefinite NP. Hence there is no need to associate this information with the verbs that head indefinite relatives and they can be [MOD *none*] like verbs elsewhere.

We need of course to ask about the implications of this approach for definite relatives. One possibility would be to retain the approach outlined

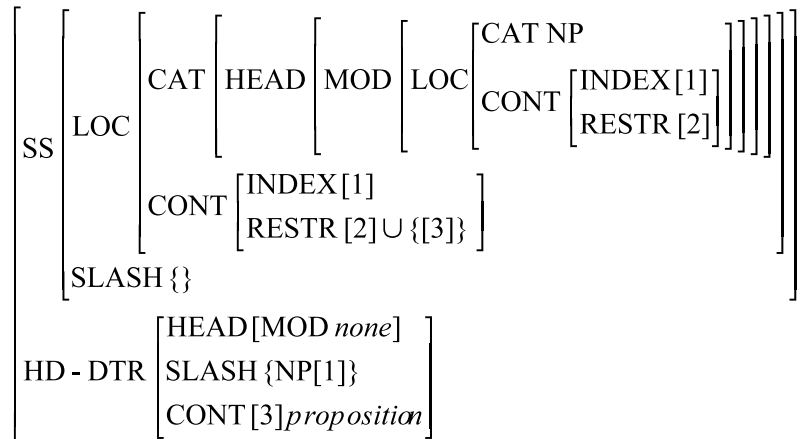
above, that is to have a very simple constraint on definite relatives and to attribute their main properties to the complementizer *?allaði*. This, however, would mean that we have radically different analyses for definite and indefinite relatives. An alternative would be to assume that *?allaði* like verbs denotes a proposition and is [MOD *none*]. We might propose descriptions of the following form:

(25)



We could then attribute the properties of relative clauses to a more complex constraint on relative clauses:

(26) *rel-cl*  $\Rightarrow$



We could propose the following constraints on the two subtypes of relative-clause:

(27) a. *def-rel-cl* ⇒

$$\left[ \text{SS|LOC} \left[ \text{CAT} \left[ \text{HEAD} \left[ \begin{array}{c} c \\ \text{MOD|LOC|CAT NP[DEF +]} \end{array} \right] \right] \right] \right]$$

b. *indef-rel-cl* ⇒

$$\left[ \text{SS|LOC} \left[ \text{CAT} \left[ \text{HEAD} \left[ \begin{array}{c} c \\ \text{MOD|LOC|CAT NP[DEF -]} \end{array} \right] \right] \right] \right]$$

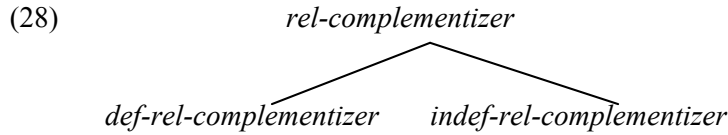
The problem with this approach is that there is nothing here to ensure that definite relatives are headed by *?allaḍi* and not other complementizers such as *?an* or *?anna*.

It looks, then, as if there are two main possibilities if we want to analyse Arabic relative clauses without invoking empty heads. One possibility is to treat definite and indefinite relatives in quite different ways. This seems unsatisfactory given that apart from the fact that one has an overt complementizer and the other doesn't, they are quite similar. The other possibility is to assimilate verbs to *?allaḍi* or *?allaḍi* to verbs. The problem with the former approach is that it makes it quite surprising that verbs in relative clauses look just like verbs elsewhere. The problem with the latter is that it makes the restricted distribution of *?allaḍi* surprising.

#### 4 An analysis with an empty head

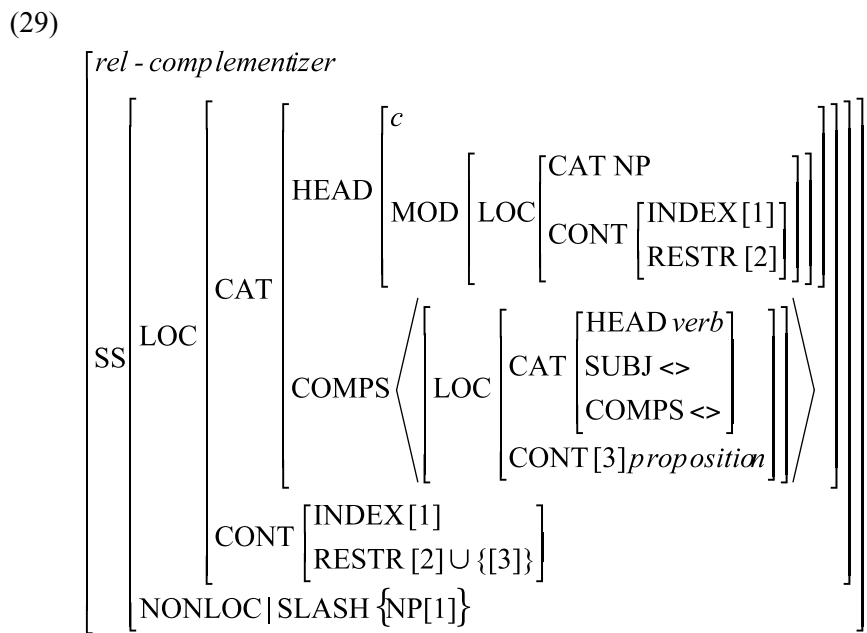
We have seen that various problems arise for analyses of Arabic relatives like Sag's (1997) analysis of English relatives, which avoid empty heads and employ a complex system of phrase types. It looks, then, as if we should consider an analysis more like Pollard and Sag's (1994: Chapter 5) analysis of English relatives, one, that is, in which indefinite relatives are headed by a phonologically empty counterpart of *?allaḍi*. We will argue that this is more satisfactory than the approach we have just considered.

*?allaḍi* and its phonologically empty counterpart will of course have many properties in common, but this is no problem since we can treat them as two subtypes of a single type as follows:



The properties that the two complementizers share can be associated with the type *rel-complementizer* and the properties which are limited to *ʔallaði* or its phonologically empty counterpart can be associated with the two subtypes.

The type *rel-complementizer* will have the following description:



This is essentially the description that we originally proposed for *ʔallaði* minus the stipulation that the modified NP is [DEF +]. It will ensure that relative clauses modify an NP and contain a gap or a resumptive clitic with the same index, thus ensuring that the NP and the gap or resumptive clitic agree in number and gender. It will also ensure that the CONTENT value of a relative clause is a restricted index, with the restrictions stemming from its complement and the NP it modifies. Among other things, this means that there is no need for the special *head-relative-phrase* type.

The two subtypes will have the following descriptions:

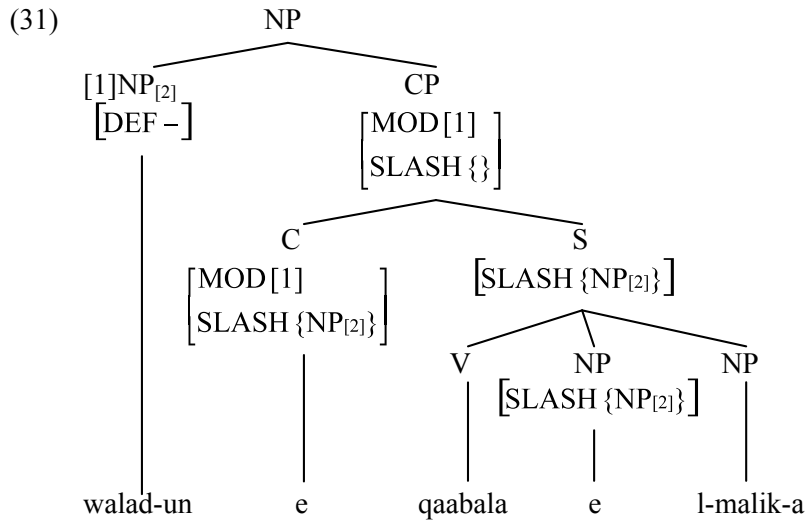


b.

$$\left[ \begin{array}{l} \textit{indef - rel - complementizer} \\ \text{PHON } \langle \rangle \\ \text{SS | LOCAL | CAT | HEAD | MOD[DEF -]} \end{array} \right]$$

*def-rel-complementizer* will have various different forms depending on the value of the features NUMBER, GENDER and CASE in the modified NP. *indef-rel-complementizer* is phonologically empty.

With these descriptions, definite relatives will have the structure in (20), and indefinite relatives will have a similar structure, as in (31).



Thus, definite and indefinite relatives have essentially the same structure and differ only in the phonology of their heads. In this analysis, verbs in indefinite relatives have the same category and content as elsewhere, and *ʔallaḏi* has a description which makes it unsurprising that it is restricted to relative clauses. The analysis also entails a simpler system of phrase types. Not only does it not need the *head-relative-phrase* type, there is also no need for the types of *def-rel-cl* and *indef-rel-cl*. The distinctive properties of the two types of relative clause stem from the properties of their heads.

What about the type *rel-cl*? It is fairly easy to dispense with this type as well. The constraint in (15) ensures that a relative clause modifies an NP with the same index as the NP value of SLASH, but this is also ensured by (29). The only nonredundant feature of (15) is the stipulation that relative clauses are [SLASH {}]. There is an obvious alternative way to ensure this. In most head complement structures, if the complement has a non-empty SLASH value, the SLASH Amalgamation Principle requires the head to have the same value. However, there are situations in which the head should not have

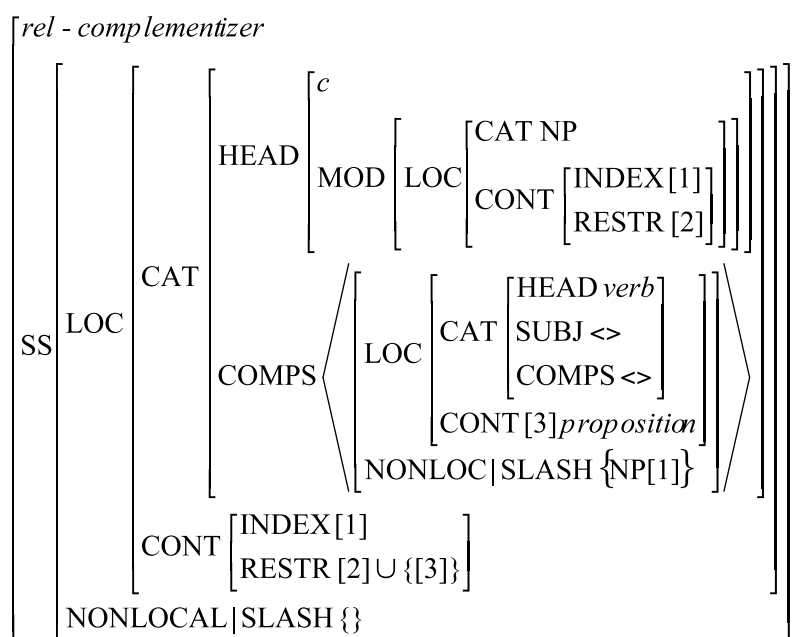


this value. For example, in (32) the infinitival complement of *easy* is [SLASH {NP}] but *easy* must be [SLASH {}].

(32) Kim is easy to impress.

If the SLASH Amalgamation Principle is a default constraint, this can be ensured by stipulating that *easy* takes a complement which is [SLASH {NP}] but is itself [SLASH {}]. We can take the same approach here. That is, we can replace (29) by (33).

(33)



With this revision there is no need for a type *rel-cl* subject to some constraint. Relative clauses are just head-complement structures, whose properties stem from the lexical items that head them, in the case of indefinite relatives a phonologically empty one.

Essentially this analysis makes relative clauses rather like attributive adjectives, which, as we noted in Section 2, they resemble in being sensitive to the definiteness of the modified NP. No special types are required for attributive adjectives. Similarly no special types are required for relative clauses.

On this analysis, relative clauses are not a subtype of *clause*. This might seem like a problematic conclusion. However, we do not think that it is. It does not follow from the fact that relative clauses are called clauses that they are a subtype of *clause*. It is traditional to refer to the bracketed expressions in the following as adverbial clauses:

- (34) a. Kim left [before Lee arrived].  
b. Lee arrived [after Kim left].

However, it is widely accepted that such expressions are in fact PPs. (See e.g. Huddleston and Pullum (2002: 599–601).) On this view they are not a subtype of *clause*.

It seems, then, that there are good reasons for preferring an analysis of Arabic relatives with a phonologically empty head and no special phrase types to an analysis with no phonologically empty heads and a complex system of phrase types. Thus, whatever may be the case with other languages, with Arabic it looks as though the kind of approach developed in Pollard and Sag (1994) is preferable to the approach developed in Sag (1997).

## 5 Conclusions

Relative clauses have a basically clausal internal structure but are modifiers of nominal constituents rather like adjectives. Pollard and Sag (1994: Chapter 5) employ a set of phonologically empty heads to capture this dual nature. The heads take a clausal complement and head a phrase which is a nominal modifier. Sag (1997) rejects this approach and develops a complex system of phrase types, in which the dual nature of relatives is mainly the product of a special *head-rel-phrase* type.

In the case of Arabic definite relatives it seems natural to attribute the dual nature to the complementizer *ʔallaḏi* given that it seems to be confined to relative clauses. But then a problem arises with indefinite clauses. If they are analyzed in much the same way as Sag analyzes English bare relatives, then either definite and indefinite relatives have quite different analyses or the natural analysis of *ʔallaḏi* must be abandoned, in which case its restricted distribution is quite surprising.

We have argued that the best account of the Arabic data involves the assumption that indefinite relatives are headed by a phonologically empty counterpart of *ʔallaḏi*. On this analysis, definite and indefinite relatives have essentially the same analysis. Both are head-complement structures, whose properties stem from their head. The properties of definite relatives stem from *ʔallaḏi* and it is unsurprising that it is confined to relative clauses. Verbs have the same category and content in indefinite relatives as elsewhere. The analysis also has no need for special phrase types, no *rel-cl*, *def-rel-cl* and *indef-rel-cl* and no *head-rel-ph*. At least in the case of Arabic, then, the approach to relative clauses developed in Pollard and Sag (1994) seems preferable to that developed in Sag (1997).

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