Non-Restrictive Relative Clauses in Construction Based HPSG

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Abstract

This paper presents an account of English non-restrictive ('appositive') relative clauses (NRCs) in the framework of 'construction based' HPSG. Specifically, it shows how the account of restrictive relative clause constructions presented in Sag (1997) can be extended to provide an account of the syntax and semantics of NRCs and of the main differences between NRCs and restrictive relatives. The analysis reconciles the semantic intuition that NRCs behave like independent clauses with their subordinate syntax. A significant point is that, in contrast with many other approaches, it employs only existing, independently motivated theoretical apparatus, and requires absolutely no new structures, features, or types.

1 Introduction

Though superfi cially similar, English non-restrictive ('appositive') relative clauses (NRCs), as in (1a), differ phonologically, structurally, and semantically from restrictive relatives (RRCs), as in (1b).*

(1) a. Kim has three pets, which a neighbour looks after. [NRC]
b. Kim has three pets which a neighbour looks after. [RRC]

Phonologically, NRCs are set off prosodically (with 'comma intonation' in speech, and actual commas in writing). Semantically, the most obvious difference is that RRCs are interpreted restrictively, i.e. as intersective modifi ers. So, for example, the RRC in (1b) is interpreted as restricting the set of pets under consideration to a particular subset (those which the neighbour looks after). This intersective interpretation is presumably related to the fact that RRCs are incompatible with proper nouns, which are unproblematic with NRCs:

(2) a. Kim, who has three pets, lives round the corner. [NRC]
b. *Kim who has three pets lives round the corner. [RRC]

A common effect of the intersective interpretation is to introduce an implicit 'contrast set', which can be accessed subsequently by anaphors like *the others*, as in (3a). In contrast, NRCs are interpreted as simply adding information about their antecedents, and have a 'totality' interpretation. So (1a) implies that the neighbour looks after *all* Kim's pets. Consequently there is no possible antecedent for *the others* in (3b).

(3) a. Kim has three pets, which a neighbour looks after. #The others fend for themselves. [NRC]

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b. Kim has three pets which a neighbour looks after. The others fend for themselves. [RRC]

Syntactically, there are two main differences. First, NRCs are always finite and +WH (hence they do not permit *that* or zero relative pronouns):

(4) a. *He is looking for Kim, about whom to spread rumours.
b. *Kim, (for us) to talk to, has just arrived.
c. *Kim, (that) I admire, has just arrived.

Second, while RRCs are always nominal modifiers, NRCs take a much wider range of antecedents:

(5) Kim was a skeptic/really nice/in a bad mood, which I didn't think she would be. (NP/AP/PP)
(6) Kim won the race, which was a relief/I didn't think she could. (S/VP)

Previous accounts of the differences between NRCs and RRCs have often involved giving them radically different structures (e.g. Ross, 1967; Emonds, 1979), sometimes involving major theoretical innovations, including novel kinds of grammatical operation and structure (McCawley, 1988), new levels of representation (Safir, 1986; Fabb, 1990), or entirely new conceptions of grammatical structure (Espinal, 1991; Burton-Roberts, 1999). This paper will present a very different view. I will present an account of the syntax and semantics of NRCs that uses only existing, independently motivated, apparatus: essentially, just the syntax that is required for RRCs, and the semantics and pragmatics required for the interpretation of normal anaphora. Specifically, I will show how the 'construction based' account of the syntax of RRCs presented in Sag (1997) can be extended straightforwardly to provide an empirically adequate account of the syntax and semantics of NRCs, including some phenomena that appear not to have been previously noted.[1]

The paper is structured as follows. Section 2 will look in more detail at the semantics of NRCs, focusing on the differences between NRCs and RRCs, and will provide an analysis which accounts for some novel phenomena. Section 3 will summarize the key ideas of Sag (1997)'s syntactic analysis of RRC, and present data that motivate a similar approach to the syntax of NRCs. I will then show how this account can be integrated with the semantic analysis and adapted to capture the syntactic differences between RRCs and NRCs. Section 4 provides a conclusion.

[1] Space precludes a systematic review of the literature (but see Vries (2002), especially Chpt 6, for an excellent overview). Analyses which assume that NRCs and RRCs have broadly similar syntactic structures include those of Jackendoff (1977), Perzanowski (1980), and Kempson (2003). Within the framework of HPSG, the only work on this or related constructions that I am aware of is Holler (2003)'s account of German non-integrated Wh-clauses, which differs from this analysis in being framed in the non-construction based approach of Pollard and Sag (1994), and in suggesting the need for extra theoretical apparatus.

2 Semantics

A very widespread and appealing view of the semantics of NRCs is that non-restrictive relative pronouns are like normal anaphoric pronouns, and NRCs are interpreted like independent clauses, outside the scope of sentential operators (i.e. with 'wide scope'). In this section, I will exploit an insight due to Sells (1985, 1986) to provide a semantics for NRCs which is consistent with this 'discourse anaphora' view, and with some apparently contradictory data which suggest that NRCs have, paradoxically, both wide and narrow scope *simultaneously*.

The underlying intuition here can be seen by comparison of examples involving NRCs, like (1a), and an example like (7). These have very similar interpretations. Notice, for example, that both normal pronouns and non-restrictive relative pronouns show the 'totality' interpretation:

(7) Kim has three pets. A neighbour looks after them. #The others fend for themselves.

Likewise, compatibility with a wide range of antecedents is reminiscent of normal pronouns. Compare (6) with (8):[2]

(8) Kim won the race. It was a relief/I didn't think she could do it.

In fact, as with normal anaphoric pronouns, the antecedent of an non-restrictive relative pronoun need not be a grammatical constituent at all. In (9a) *which* has a 'split' antecedent. In (9b), *which* is interpreted as something like "the fact that the person I was put in touch with had the same first name as me":

(9) a. Kim bought Sandy *a book*, and Sam bought her *a pen*, which they gave her for Christmas.
b. They put me in touch with someone with the same name first name as me, which I thought was a good omen.

The similarity can also be seen in the contrast in (10), which shows that an 'idiom part' like *headway* can be associated with an RRC, but not an NRC (Vergnaud, 1974). As (11) shows, pronominal anaphora is similarly impossible.

(10) a. *The headway, which the students made last week, was amazing. [NRC]
b. The headway which the students made last week was amazing. [RRC]

(11) *The headway was amazing. The students made it last week.

One aspect of the 'wide scope' behaviour of NRCs is that they can have independent illocutionary force (Peterson, 2004). For example, (12a) shows an NRC with the force of an assertion embedded in a question, (12b) has an assertion embedded in a denial. Someone who utters (12c) will be taken to have made an

[2] No normal pronoun takes the same range of antecedents as *which*, so no single pronoun can be used to paraphrase all of (5), cf *Kim was nice. I did not think she would be (*it).*

assertion, and also a bet for £50.

(12) a. Are linguists, who use the IPA, invariably clever people?
b. Linguists, who use the IPA, are not invariably clever people.
c. If United win today, which I bet you £50 they won't, they will be top of the league.

Other evidence of wide scope interpretation comes from the interaction of NRCs with VP ellipsis, propositional attitude verbs, negation, and negative polarity items.

Unlike RRCs, NRCs do not give rise to strict/sloppy ambiguity with VP ellipsis (McCawley, 1988). The RRC example (13a) is ambiguous, depending on whether *her* in the elided VP *recognized the man who took her wallet* is interpreted as referring to *Sandy* or *Kim*. The NRC example (13b) is unambiguous: the elided VP in (13b) is interpreted as *saw the man*, as though the content of the NRC was not part of the VP at all.

(13) a. Kim recognized the man who took her wallet, and so did Sandy. [RRC]
b. Kim recognized the man, who took her wallet, and so did Sandy. [NRC]

NRCs are typically interpreted outside the scope of propositional attitude verbs. The most natural reading of (14a) attributes to Kim a belief about linguists in general, and is consistent with her having no beliefs at all about the IPA. By contrast, the most natural reading of (14b) requires that Kim has beliefs about the IPA and linguists who use it. In fact, the NRC in (14a) is interpreted as an assertion of the speaker's. It is as if the content of the NRC is not part of the clause that contains it.

(14) a. Kim believes that linguists, who use the IPA, are clever. [NRC]
b. Kim believes that linguists who use the IPA are clever. [RRC]

Similarly, NRCs are naturally interpreted outside the scope of sentence negation. In (12b) above, the main clause is a denial, but the NRC it contains is interpreted as an assertion. Likewise, while it is possible to focus negation on part of an RRC, this is not possible with an NRC (Jackendoff, 1977):

(15) a. *We didn't talk to the man, who married SUSAN. [NRC]
b. We didn't talk to the man who married SUSAN. [RRC]

NRCs cannot contain 'externally licensed' negative polarity items (NPIs). The ungrammaticality of (16a) suggests that the NRC is outside the scope of the negative quantifier; (17a) suggest the NRC is outside the scope of the interrogative operator. Notice that NPIs in the corresponding RRCs are unproblematic.

(16) a. *No one, who had anything to drink, suffered ill effects. [NRC]
b. No one who had anything to drink suffered ill effects. [RRC]

(17) a. *Did Sam interview a witness, who saw anything incriminating? [NRC]
b. Did Sam interview a witness who saw anything incriminating? [RRC]

So far, the picture is rather consistent. It has often been claimed that this extends to the interaction of NRCs and quantification: specifically, that NRCs take wide scope with respect to quantified NPs, and so cannot attach to, or contain pronouns bound by, external quantifiers. Data like the following seem to support this claim (Ross, 1967):

(18) a. *Every/No plane, which has an engine in its tail, is a failure. [NRC]
b. Every/No plane which has an engine in its tail is a failure. [RRC]

Unfortunately, the claim is false. Sells (1985, 1986) points out examples like (19a), with an indefinite in the scope of *every*:

(19) a. Every chess set comes with a spare pawn, which you will find taped to the top of the box.
b. Every American film producer pays the lead actress, who hates his guts, a fortune. [Kamp and Reyle (1993, 255)]

The following summarizes a number of cases of NRCs attached to, and apparently in the scope of, a variety of quantified NPs:

(20) a. Many/Most/Few/No/At least 10 candidates, all/some/three of whom have sent in their CVs, have agreed to a face to face interview.

In fact, NRCs can attach to *any* quantified NP. Consider the following, paralleling (18a) but entirely natural.

(21) Every/No modern plane, which may or may not have an engine in its tail, is prone to this sort of problem.

It is not obvious how this can be reconciled with the observations about wide scope above. One suggestion would be that NRCs normally have wide scope, but can under certain circumstances take narrow scope. This is what Sells (1985) seems to suggest. However, this will not do, because NRCs can exhibit wide and narrow scope *simultaneously* (this seems not to have been previously noticed).

Consider (22a). This has several readings, but the most natural have *a spare pawn* in the scope of *every* (i.e. it is a possibly different spare pawn for each chess set), and both NPs in the scope of *believes*. This is summarized in (22b), using $>$ for 'outscopes'.[3]

(22) a. Sam believes every chess set comes with a spare pawn, which Kim thinks is usually taped to the top of the box with its base uppermost.
b. believes $>$ every chess set $>$ a spare pawn

Notice that the NRC is in the scope of the indefinite *a spare pawn* (it contains the pronoun *its* which is bound by the indefinite). The 'outscopes' relation is transitive,

[3]Giving *every chess set* and *a spare pawn* scope wider than *believes* would give an interpretation that one might paraphrase as "Every chess set is associated with a spare spawn. Sam believes they come together". This reading requires that the speaker herself believes that every chess set has an associated spare pawn. While clearly a possible reading, it is not the most salient.

so we would expect the NRC to be in the scope of *believes*:

(23) believes $>$ every chess set $>$ a spare pawn $>$ NRC

But this does not reflect what (22a) means. To put it simply, (22a) says something about what Kim thinks, it is not about what Sam believes Kim thinks. To put it another way, (22a) does *not* entail (24a). The NRC is *not* in the scope of *believes*.

(24) a. Sam believes [Kim thinks it (the spare pawn) is usually taped to the top of the box with its base uppermost].
b. believes $\not>$ NRC.

The same point can be made (perhaps more simply) in relation to (25), which also demonstrates that this phenomenon is not just a reflection of some property of propositional attitude verbs like *believe*.

(25) No properly trained linguist, who would have come across this issue during her training, would have made that mistake.

Here the relative pronoun (and the pronoun *her*) are apparently bound by the negatively quantified NP *no properly trained linguist*, so the NRC must be in the scope of the NP.

(26) *No properly trained linguist* $>$ NRC

Normally, such an NP will license an NPI such as *ever* in its scope, as in the following RRC:

(27) No properly trained linguist that had **ever** come across this issue during her training would have made that mistake.

But this does not happen in the NRC. Not surprisingly given the impossibility of externally licensed NPIs described above, putting *ever* in (25) leads to ungrammaticality:

(28) *No properly trained linguist, who would **ever** have come across this issue during her training, would have made that mistake.

Thus, we conclude (29), directly contradicting (26):

(29) *No properly trained linguist* $\not>$ NRC.

There seems to be a genuine paradox here. However, while the actual treatment proposed in Sells (1985) cannot deal with it, Sells' central insight about what is going on seems to be correct, and provides the basis for a solution. What Sells observed is that this apparently inconsistent behaviour of having wide scope and taking quantified NP antecedents is not unique to NRCs. The same thing occurs with normal anaphoric pronouns in independent clauses. For example, just as we have (30a), we get (30b):

(30) a. Every chess set comes with a spare pawn, which you will find taped to the top of the box.

b. Every chess set comes with a spare pawn. You will find it taped to the top of the box.

Moreover, the conditions under which this is possible are similar. Broadly speaking, they are conditions where there is some signal of discourse continuity which triggers the kind of accommodation process known as 'telescoping' or 'modal subordination' (e.g. (Roberts, 1989, 1996), Poesio and Zucchi (1992)).[4]

Thus, where (31a/b) are both bad because the antecedent of the pronoun is in the scope of negation, the choice of irrealis tense which makes (32a) acceptable also works for an NRC, making (32b) acceptable.

(31) a. *Sam doesn't own a car. She drives it too fast.
b. *Sam doesn't own a car, which she drives too fast.

(32) a. Sam doesn't own a car. She wouldn't be able to drive it anyway.
b. Sam doesn't own a car, which she wouldn't be able to drive anyway.

Likewise, the unacceptability of (18a), repeated here as (33a), is paralleled by that of (33b). The acceptability of the examples in (21), repeated as (34a), is paralleled by that of (34b).

(33) a. *No/Every plane, which has an engine in its tail, is a failure.
b. *No/Every plane is a failure. It has an engine in its tail.

(34) a. Every/No modern plane, which may or may not have an engine in its tail, is prone to this sort of problem.
b. Every/No modern plane is prone to this sort of problem. It may or may not have an engine in its tail.

This extends to the 'paradoxical' cases: (35a) and (35b) have the same interpretation, the same 'paradoxical' combination of wide and narrow scope-like properties. In (36a) and (36b) we see the same combination of an illicit NPI in the same clause as a pronoun bound by a negative quantifier.

(35) a. Sam believes every chess set comes with a spare pawn, which Kim thinks is usually taped to the top of the box with its base sticking up.
b. Sam believes every chess set comes with a spare pawn. Kim thinks it is usually taped to the top of the box with its base sticking up.

(36) a. No properly trained linguist, who would have (*ever) come across this issue during her training, would have made that mistake.
b. No properly trained linguist would have made that mistake. She would have (*ever) come across this issue during her training.

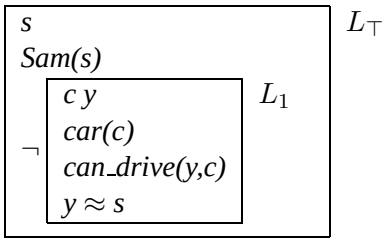
This insight provides a way of giving a Discourse Representation Theory (DRT, Kamp and Reyle, 1993) style semantics for NRCs that accounts for the semantic

[4] I will have nothing to say here about what these conditions are: all that matters is that they are essentially the same in NRCs and discourse anaphora.

differences between NRCs and RRCs and resolves the apparent narrow/wide scope paradox.

First, consider the interpretation of a restrictive relative such as the following, and the associated Discourse Representation Structure (DRS):[5]

(37) Sam$_s$ doesn't own a car$_c$ which$_c$ she$_y$ can drive.



In words, this says that there is an individual *s*, named *Sam*, and it is not the case that there are individuals *c* and *y*, where *c* is a car and *y* is anaphorically related to the individual *s*, such that *y* can drive *c*. Intersective semantics and narrow scope arise because the discourse variables (*c* and *y*) and conditions from the RRC and the noun *car* appear in the same box, in the scope of negation. Consistent with most analyses (including, e.g. Pollard and Sag, 1994) I assume that the grammar co-indexes *car* and the relative pronoun (which therefore contributes neither a discourse variable nor conditions).

Now consider an example with an NRC such as (32b), or an example with an independent clause like (32a), both repeated here:

(38) a. Sam doesn't own a car, which she wouldn't be able to drive (anyway).
b. Sam doesn't own a car. She wouldn't be able to drive it (anyway).

Suppose that these are treated exactly alike.[6] In particular, suppose that the content of the NRC goes into the 'top box' just as though it was the content of an independent clause (notice that proper nouns and indexicals are also treated in this way); and suppose the relative pronoun introduces a discourse variable (*w*), and a condition (*w*≈*c*) associating it with its antecedent, just as if it was a normal pronoun. The resulting DRS is given in (40), where, for readability, the content of the NRC is shown below a dotted line.

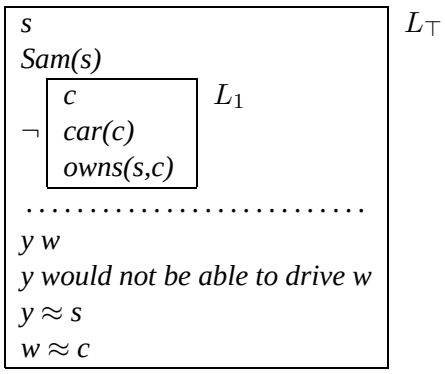
(39) a. Sam$_s$ doesn't own a car$_c$, which$_w$ she$_y$ wouldn't be able to drive.
b. Sam$_s$ doesn't own a car$_c$. She$_y$ wouldn't be able to drive it$_w$.

[5]For readability, I have put discourse variables as subscripts in the sentence. This, and following, DRSs are non-standard in giving 'labels' like $L_\top$, $L_1$to DRSs. The role of these labels will be clarified below.

[6]The approach predicts that not all cases will be exactly alike. For example, if an NRC is associated with a non-final NP, it may introduce material which can be picked up by later anaphora. Compare:

a. I loaned Kim, who is very fond of Dickens$_i$, a copy of his$_i$ best novel.
b. #I loaned Kim a copy of his$_i$'s best novel. She is very fond of Dickens$_i$.

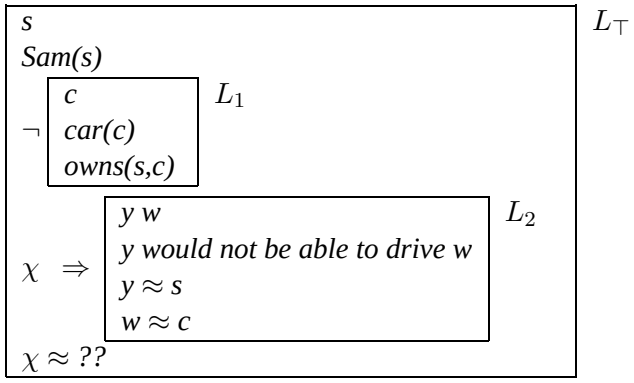
(40)



The final condition, *w*≈*c*, which associates the discourse variable of *which* (or *it*) to its antecedent (the discourse variable associated with *car*), is problematic for the rules of DRS interpretation. Because the discourse variable *c* was introduced in a subordinate DRS, it is not accessible to this condition. So (40) is *improper*. This is what explains the deviance of examples like (31a,b) (*Kim doesn't have a car. *She drives it too fast*).

We can explain why (38a/b) are *not* problematic if we assume that some kind of accommodation process (modal subordination) occurs, whereby the hearer creates an appropriate accessible antecedent that will render the DRS proper. One way of thinking about this is as putting the content of the NRC in (38a) (and the second clause in the case of (38b)) into the consequent of a conditional, whose antecedent χ can be thought of as a kind of anaphor (Poesio and Zucchi, 1992). See (41).

(41)

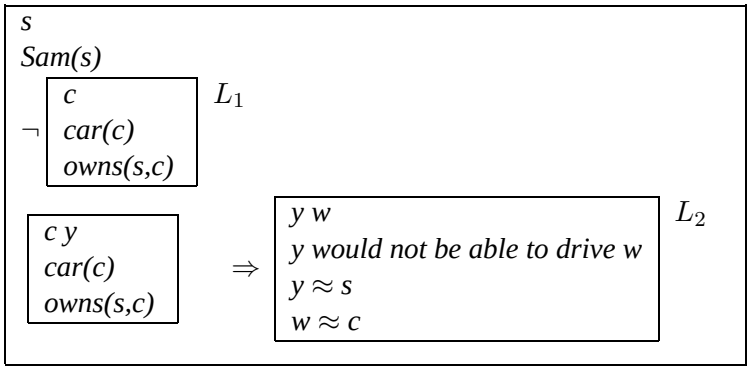


Interpreting this DRS involves finding an antecedent for χ — resolving the condition '$\chi \approx$??'. The simplest resolution, based on conditions associated with the element that produced the need for accommodation (*c*), will be derived from L_1— something like (42a) or (42b), corresponding to *a car that Sam owns*, and *a car that she owns*, respectively.

(42) a. $\chi \approx$ [*c y* / *car(c)* / *owns(s,c)*] b. $\chi \approx$ [*c y* / *car(c)* / *owns(y,c)* / *y ≈ s*]

In either case the accessibility requirements will be satisfied and a proper DRS will be produced. If χ is resolved as (42a), (41) is equivalent to (43), whose truth conditions are essentially those of (44) — the correct interpretation for these examples.[7]

(43)



(44) Sam doesn't own a car. If Sam owned a car she wouldn't be able to drive it.

In summary, the idea is that RRCs are interpreted compositionally, in the normal way, but NRCs are interpreted non-compositionally, essentially as independent clauses, so their content goes into the 'top box'. This accounts for all the 'wide scope' phenomena described above. Notice that this does not require any novel theoretical apparatus (apart from independent clauses, 'top box' attachment is independently required for the interpretation of other proper names and indexicals). Moreover, relative pronouns in NRCs are essentially normal anaphoric pronouns. As such, their interpretation may, under certain circumstances trigger accommodation processes that appear to bring them under the scope of their antecedents, thus accounting for the possibility of narrow scope with respect to quantifiers, and the apparently paradoxical mixture of simultaneous wide and narrow scope described above. Notice again that no novel theoretical apparatus is involved: everything required is independently needed for normal anaphora.

3 Syntax: HPSG Analysis

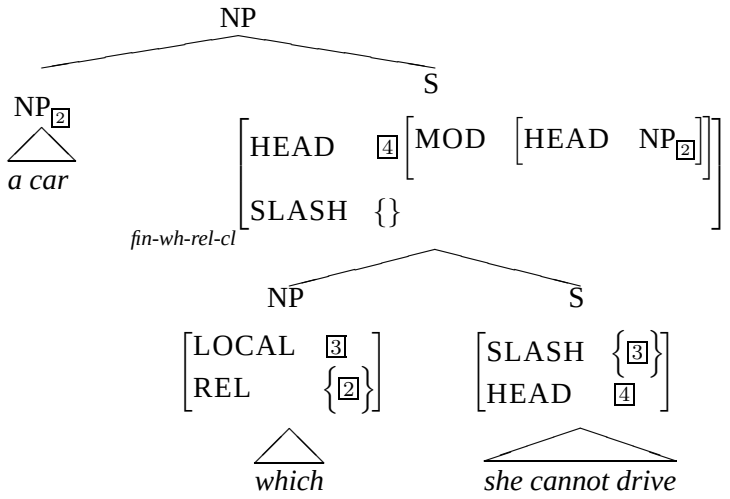
In this section, I will provide a treatment of the syntax of relative clauses which captures the syntactic differences between RRCs and NRCs and is compatible with the semantics described above. Specifically, I will argue that Sag (1997)'s syntax for RRCs is also appropriate for NRCs, and show how it can be interfaced with the semantics presented in Section 2 and how it can be adapted to capture the special syntactic properties of NRCs.

The main features of Sag (1997)'s treatment of RRCs can be seen in (46), which represents the italicized part of (45).

[7] The occurrences of *c* in L_1 are independent of those in the conditional structure L_2. For example, *c* could be replaced with *x* everywhere in L_1 without affecting things. But using different names would complicate the presentation.

(45) Sam does not own *a car which she cannot drive*.

(46)



RRCs are the adjunct daughters in *head-adjunct* structures headed by NP.[8] Accordingly, they are specified as HEAD | MOD | HEAD NP. Apart from this, they are essentially normal *head-filler* structures, whose daughters are the phrase containing the relative pronoun (the filler) and a sentence with a gap in it (the head). As usual, the LOCAL value of the filler appears in the SLASH value of the head daughter — so it will be passed down, eventually satisfying part of the subcategorization requirement of *drive*. The effect is as if the relative clause was 'reconstructed' as '*she cannot drive which*'. The only other significant point is that the index of the modified NP (*a car*), written as the subscript 2 on the NP, is an element of the REL value of the filler daughter of the relative clause. The lexical entry for the relative pronoun identifies this REL element with its index. Putting this together, the argument structure and indexation is along the lines of *a car*$_{2}$ *(such that) she can drive which*$_{2}$.

Sag's analysis is *construction-based*, in the sense of allowing grammatical properties to be associated directly with constructions, rather than requiring that they are projected from lexical or grammatical formatives. Constructions are organized in type or sort hierarchies, where constraints on higher sorts are inherited by lower ones. For example, constraints which require relative clauses to be subordinate clauses and nominal modifiers are associated with a sort *rel-cl*. A subsort of this, *wh-rel-cl*, bears the constraint that identifies the index of the modified nominal with an element of the REL value of the filler daughter of the clause. A further subsort, *fin-wh-rel-cl*, imposes a finiteness requirement (*inter alia*). Taken together with other, orthogonal, constraints relating to the classification of constructions as

[8]This is a simplification: according to Sag, only WH-relatives are adjoined to NP, non-WH relative clauses (e.g. *everyone she trusts*, *someone to talk to*) are sisters of N'. Nothing hangs on this here. In particular, though the analysis presented here gives RRCs and NRC identical syntactic structures, it is compatible with RRCs attaching to N', and NRCs attaching to NP, as proposed by Jackendoff (1977).

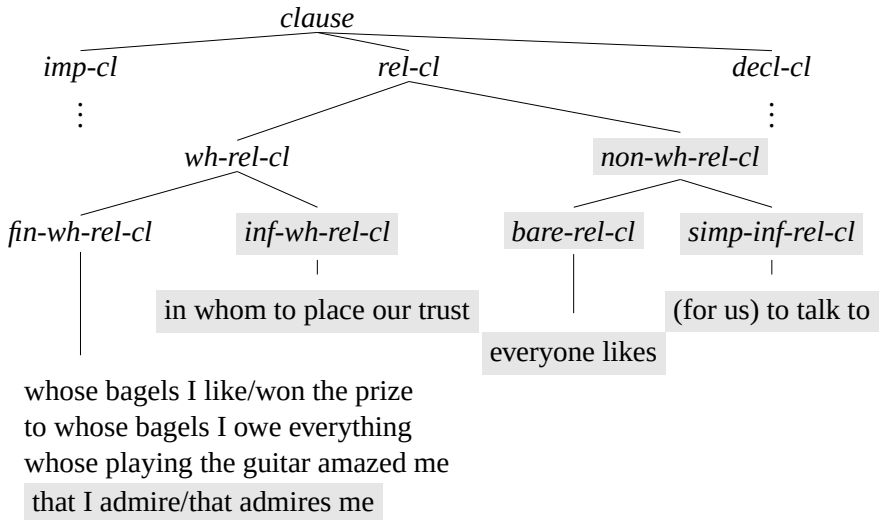


Figure 1: Classification of relative clauses according to Sag (1997). Subtypes of *rel-cl* which cannot function as NRCs are 'greyed out'. Notice that possible NRCs all lie on the left branch under *rel-cl*.

head-filler or *head-adjunct*, etc., these constraints mean that the relevant part of (45) has the structure given in (46). The various sorts that Sag discusses imply a classification of RRCs as in Figure 1.[9]

Despite the differences between them, there is good motivation for assuming that NRCs and RRCs have essentially the same structure.

First notice that, like RRCs, NRCs appear to form constituents with their antecedents. Syntactic operations such as topicalization, raising, etc. invariably treat NRCs as though they form a constituent with their antecedents. It is impossible to topicalize (etc) the antecedent of an NRC without also topicalizing (etc) the NRC:

(47) a. Sandy, who I'm sure you remember, I see Δ regularly.
b. *Sandy, I see, Δ, who I'm sure you remember, regularly. [Topicalization]

(48) a. Sandy, who I'm sure you remember, always seems Δ helpful.
b. *Sandy always seems Δ, who I'm sure you remember, helpful. [Raising]

Notice that this is not just the result of some kind of surface adjacency requirement for NRCs and their antecedents, because there is no such requirement. For example, (49a) contains an NRC with a VP antecedent; in (49b) Heavy NP shift has moved the complement complement of the verb over the NRC — essentially

[9]Relative clauses are a kind of clause (imperatives and declaratives are other kinds), *clause* is a subsort of *phrase*, and hence *sign*. There are two simplifications in Figure 1: (a) I ignore reduced relatives (*red-rel-cl*, e.g. *overlooking the park*), which are an immediate subsort of *rel-cl*; (b) given the treatment of extraction in Bouma et al. (2001) there is no need for the distinction Sag makes between subtypes of *wh-rel-cl* involving subject and non-subject extraction.

putting the NRC *inside*, rather than adjacent to, the antecedent:[10]

(49) a. . . . noticing the cyst, which he hadn't for a long time . . .
b. . . . noticing, which he hadn't for a long time, the purple cyst that grew out of Horace's forehead . . .

The assumption that NRCs and RRCs have the same syntactic structure predicts that NRCs should extrapose and stack in the same way as RRCs. This prediction is confirmed:[11]

(50) a. I saw someone yesterday that I hadn't seen for years. [RRC]
b. I saw Kim yesterday, who I hadn't seen for years. [NRC]

(51) a. We tried to talk to footballers who are successful who (also) have good family lives. [RRC]
b. We tried to talk to Michael Owen, who is successful, who (also) has a good family life. [NRC]

Finally, consider the way possessive marking applies to NPs with NRCs and RRCs. Possessive *'s* always attaches to the extreme right edge of its host NP:

(52) a. The King of England's mother left early.
b. *The King's of England mother left early

As one would expect, it also attaches after an RRC, as in (53a). Significantly, it also attaches after an NRC:[12]

(53) a. The child *that ruined the party*'s mother left early. [RRC]
b. Prince Alphonso, *who ruined the party*'s, mother left early. [NRC]

Notice it is quite impossible to put the possessive before the relative in either case:

(54) a. *The child's *that ruined the party* mother left early. [RRC]
b. *Prince Alphonso's – *who ruined the party* – mother left early. [NRC]

This follows automatically if the structures are similar: in both the possessive marker will be inside the NP, not on its the right edge. It is not obvious how the ungrammaticality of (54b) can be explained otherwise.

Turning now to the semantics, the conclusion that NRCs and RRCs have essentially the same structure poses a challenge, given the very different semantic analyses proposed for them in Section 2.

As regards the RRCs, there is very little difficulty: all that is necessary is that the semantic conditions associated with the relative clause go into the same 'box' as the conditions associated with the noun, producing the intersective interpreta-

[10] This is based on an attested example, cited by Potts (2002, p85, note 21).

[11] Extraposition and stacking are also evidence against a surface adjacency constraint (in the case of stacking, only the first NRC in a stack would satisfy such a constraint).

[12] Some speakers find examples like (53b) less than perfect, presumably because of some difficulty placing *'s* after an intonation break (the same effect occurs after any pause).

tion. This is just normal compositional interpretation and will be unproblematic in almost any framework. However, getting the content of NRCs into the 'top box' will be a problem for many frameworks, including that of Pollard and Sag (1994), where the Semantics Principle operates in a broadly compositional fashion (the CONTENT of a mother is derived from that of the daughters in the manner determined by the semantic head daughter). Notice that neither of the two 'semi-compositional' devices, BACKGROUND projection and Quantifier-Storage (using the QSTORE feature) can be used here. The former is inappropriate because the content of NRCs is not presupposed (e.g. it is often asserted, and cannot be canceled).[13] The latter would not guarantee wide scope, since it would, wrongly, allow NRCs to take scope in the same way as quantifiers. In particular, it would allow them to appear inside the scope of items such as NPI licensors, propositional attitude verbs, etc.

However, the desired result can be achieved straightforwardly in the framework of Minimal Recursion Semantics (MRS, Bouma et al., 2001) or Underspecified DRT (UDRT, Frank and Reyle, 1995).

In these approaches, DRS conditions are associated with *labels* — intuitively, conditions with the same label belong to the same DRS box (cf. the examples in Section 2, which have labels on the boxes). Embedding relations between boxes are represented as relations between labels. The intersective interpretation of an RRC arises because the label on the nominal's conditions is identified with the label on RRC's conditions. A wide scope interpretation arises if the conditions on the NRC are assigned the label on the top box ($L_\top$). See Figure 2.[14]

From a theoretical point of view, this means that an additional mode of semantic combination for *head-adjunct* structures must be recognized. In addition to intersective combination (used for RRCs and other intersective modifiers) and scopal combination (lexically selected by modal adverbs like *probably* and non-intersective adjectives like *alleged*, etc), the theory must allow *head-adjunct* structures to be associated with a 'top-level', 'global scope' form of interpretation (like proper names and indexicals).

Of course, with English relative clauses RRCs and NRCs are subject to different syntactic restrictions, so the choice of intersective vs global scope semantics is not totally free. The remaining task is to account for these restrictions.

As regards RRCs, the main restriction is that they must attach to NP. NRCs

[13]The following contrast demonstrates that NRC content cannot be canceled:

a. Kim did not regret that she resigned. She didn't resign.

b. #We met Kim, who resigned. She didn't resign.

The content of the complement of *regret* is presupposed, so (a) presupposes "she (=Kim) left". This is the same as the content of the NRC in (b). The second clause in (a) just cancels the presupposition, and (a) is felicitous. The content of the NRC cannot be canceled in this way, hence (b) is bizzare.

[14]In MRS terms, the value of CONTENT | HOOK | LABEL on an RRC is identified with CONTENT | HOOK | LABEL of the head noun, with NRCs it is identified with CONTENT | HOOK | GTOP.

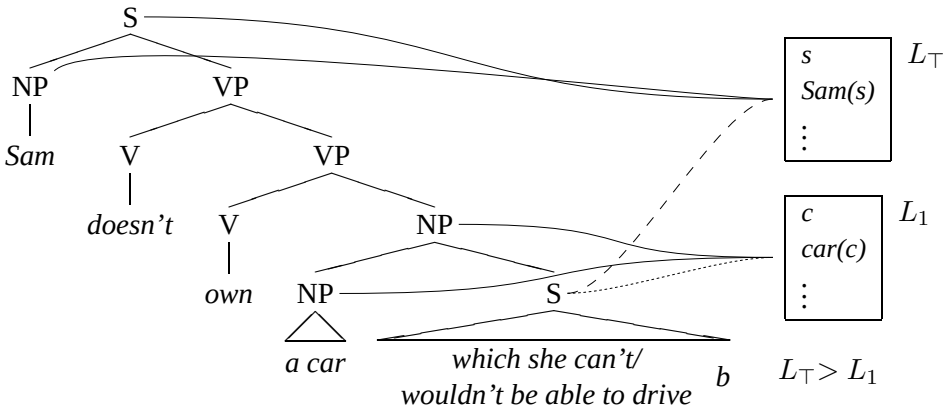


Figure 2: Alternative Semantic Interpretations for Relative Clauses: Lines link syntactic nodes with the associated DRS boxes. NRC content goes into the 'top' box ($L_\top$) as indicated by the dashed line. RRC content goes into the same box as the content of the NP it modifiers (L_1, the dotted line). $L_1$is subordinate to $L_\top$.

must be WH- and finite, and cannot have *that* or zero relative pronouns. So the following are excluded:

(55) a. *Kim, everyone likes, has just arrived. (-WH, finite, zero)
b. *Kim, (for us) to talk to, has just arrived. (-WH, non-finite)
c. *Kim, that I admire, has just arrived. (-WH, finite, *that*)
d. *He is looking for Kim, about whom to spread rumours. (+WH, non-finite)

In terms of Sag's classification, this means we must exclude: *inf-wh-rel-cl*, subtypes of *non-wh-rel-cl*, and relative clauses introduced by *that* as NRCs:

(56) a. *Kim, everyone likes, has just left. (*bare-rel-cl*)
b. *Kim, (for us) to talk to, has just left. (*simp-inf-rel-cl*)
c. *Kim, that I admire has just left. (a subsort of *fin-wh-rel-cl*)
d. *Kim, in whom to place our trust, has just left. (*inf-wh-rel-cl*)

That is, in terms of Figure 1, we have to exclude everything that is not on the left branch under *fin-wh-rel-cl* (and under *fin-wh-rel-cl* we must exclude *that* relatives).

One obvious approach might be to simply introduce NRCs as a subtype of *fin-wh-rel-cl* (and nowhere else). Non-finite NRCs would automatically be excluded. However, there would then be no place in the sort hierarchy where the distinctive properties of RRCs (especially, the intersective semantics) could be stated. In particular, associating these properties with *wh-rel-cl* or *rel-cl* would mean they would be, wrongly, inherited by NRCs as well as RRCs. Instead, we would have leave these higher types unspecified for the NRC/RRC distinction, and associate 'RRC-properties' with at least two nodes in the hierarchy (*inf-wh-rel-cl* and *non-wh-rel-cl*). This is undesirable.

Fortunately, a more radical approach is possible. To begin with, suppose we assume (counter-factually) that any relative may function either restrictively or non-restrictively. This can be expressed as the constraint in (57).

(57) *rel-cl* $\rightarrow$ (*intersective-semantics* $\vee$ *global-scope-semantics*)

(in words: relative clauses can be intersective or non-restrictive). While this will lead to over-generation as regards NRCs, it correctly allows any kind of relative to function intersectively.

Next, suppose also that we remove the 'HEAD | MOD | HEAD *noun*' requirement that Sag associates with *relc-cl*. Either kind of relative will in principle then be allowed to modify anything. This will also lead to a certain amount of over-generation. However, we can immediately fix this, because though the requirement is incorrect for relatives in general, it is still correct for *restrictive* relatives, so we can restore its intended effect by (58):

(58) (*rel-cl* $\wedge$ *intersective-sem*) $\rightarrow$ [HEAD | MOD | HEAD *noun*]

(in words: restrictive relatives are always nominal modifiers).

As things stand, NRCs can attach to anything. This is perhaps too liberal. The following data suggests they should perhaps only adjoin to 'maximal projections' (i.e. outside complements):

(59) a. ?Kim kicked, which I wish she hadn't, Sandy.
b. Kim kicked Sandy, which I wish she hadn't.

The following constraint fixes this (this would also be an appropriate place to specify 'comma intonation' via a restriction on the PHON attribute):

(60) (*rel-cl* $\wedge$ *global-scope-sem*) $\rightarrow$ [HEAD | MOD | HEAD [COMPS <>]]

(in words: NRCs can only attach 'outside' complements)

The problem now is that we have overgeneration of NRCs because we have not dealt with the special restrictions on their syntax. Specifically, nothing excludes examples like (56), repeated here, as NRCs.

(61) a. *Kim, everyone likes, has just left. (*bare-rel-cl*)
b. *Kim, (for us) to talk to, has just left. (*simp-inf-rel-cl*)
c. *Kim, that I admire has just left. (a subsort of *fin-wh-rel-cl*)
d. *Kim, in whom to place our trust, has just left. (*inf-wh-rel-cl*)

Intuitively, excluding bare relatives (*bare-rel-cl*) is equivalent to allowing only relative clauses which are head-filler constructions (in a *bare-rel-cl* like *someone everyone likes* there is no filler for the missing object of *likes*, compare the filler *who* in *someone who everyone likes*). Excluding non-finite relative clauses (*inf-wh-rel-cl* and *simp-inf-rel-cl*) is the same as allowing only finite relative clauses. In fact, Sag already has a type *fin-head-filler-phrase* which combines these require-

ments.[15] Thus, we can exclude (60a,b,d) by the following stipulation (presumably a reflection of more abstract principles, e.g. the finiteness restriction is surely related to the fact that NRCs are interpreted as essentially independent clauses):

(62) (*rel-cl* $\wedge$ *global-scope-sem*) $\rightarrow$ *fin-head-filler-phrase*

(in words, roughly: NRCs must be finite, and have preposed wh-phrases)

It remains to exclude NRCs with *that* such as (61c). This requires a little more work. Of course, the problem only arises because Sag analyzes *that* as a relative pronoun. If this is wrong, and it is not a relative pronoun, then there is nothing more to say: *that*-relatives will not be filler-head phrases, and so will be excluded by (62). However, as Sag observes, the grammaticality of (63) in some dialects suggests that *that* is a relative pronoun in at least those dialects.[16]

(63) This is the pencil that's lead is broken. [Hudson (1990)]

First, consider the difference in CONTENT between relative pronouns in RRCs and NRCs. Recall the assumption above that relative pronouns in RRCs contribute nothing to the semantics (i.e. they have no role other than ensuring correct variable binding), whereas relative pronouns in NRCs are genuine anaphoric pronouns, which contribute at least a condition of the form $x \approx y$.

Now consider the nature of REL values, which are the distinguishing attribute of relative pronouns (and whose percolation is responsible for pied-piping effects in relative clauses). It is normally assumed that REL values are sets of indices, reentrant with CONTENT | INDEX values in relative pronouns. This is different from QUE values, which perform a similar function in interrogatives. QUE values are sets of *npro*s — that is, intuitively, CONTENT values: indices with associated RESTR(iction)s. Compare the lexical entries for relative and interrogative *who* in (64), based on Pollard and Sag (1994):

(64) *who* (relative) *who* (interrogative)

$$\begin{bmatrix} \text{CAT} & \text{NP} \\ \text{CONT} & \underset{npro}{\left[\text{INDEX } \boxed{1}\right]} \\ \text{REL} & \left\{\boxed{1}\right\} \end{bmatrix} \qquad \begin{bmatrix} \text{CAT} & \text{NP} \\ \text{CONT} & \underset{npro}{\boxed{1}\begin{bmatrix}\text{INDEX } \boxed{2} \\ \text{RESTR} \left\{ person(\boxed{2}) \right\}\end{bmatrix}} \\ \text{QUE} & \left\{\boxed{1}\right\} \end{bmatrix}$$

Suppose this assumption about REL values is wrong. Suppose instead that they are sets of *npro*s, just like QUE values. The implication is that the REL values of non-restrictive relative pronouns will have non-empty RESTRs, whereas in restrictives the corresponding values will be empty. This can be expressed as

[15] Sag defines a *fin-head-filler-phrase* as a *head-filler-ph* whose head daughter is a saturated finite clause, i.e. HD-DTR | HEAD | VFORM *fin* and HD-DTR | SUBJ <>.

[16] It is also possible that *that* NRCs should not be excluded, see e.g. Quirk et al. (1972, p871).

(65a) and (65b).

(65) a. (*rel-cl* ∧ *global-scope-sem*) →
[NON-HD-DTR | REL { [RESTR *ne-set*] }]
b. (*rel-cl* ∧ *intersective-sem*) →
[NON-HD-DTR | REL { [RESTR *e-set*] }]

The exclusion of *that* from NRCs will then follow from the assumption that it has empty RESTRs, expressing the fact that, thought it is a relative pronoun, it is not a 'real' (anaphoric) pronoun.

This proposal is not unmotivated. Consider the analysis of 'epithet' relative expressions like *which beverage* in (66).

(66) a. Kim refused a drink of beer, which beverage she never touches.
b. Kim threatened to resign, which offer were were happy to accept.
c. Kim is always optimistic, which property I have always admired.

A natural analysis of these is as a kind of 'derived relative pronoun'. Since the content of such expressions will certainly have non-empty RESTRictions (at least a restriction of *which beverage* to beverages), the current proposal predicts they should be in complementary distribution with *that* in relative clauses. This prediction is confi rmed. Where *that* is excluded from NRCs, 'epithet' relative expressions can appear in NRCs like (66), but are excluded from RRCs:

(67) a. *Kim refused a drink of beer which beverage she never touches. [RRC]

This section has argued that the kind of syntax that Sag (1997) provides for RRCs is also appropriate for NRCs. It has shown how Sag's treatment can be combined with the semantics introduced in Section 2 to provide an account of the syntactic properties of NRCs, and the differences between NRCs and RRCs. A notable feature of the treatment is that, apart from the modifi cation to REL values suggested to deal with '*that*-relatives', it has required absolutely no new structures, features, types or operations.

4 Conclusion

This paper has provided an account of English NRCs which deals with their main syntactic and semantic properties, and captures the similarities and differences between NRCs and RRCs. The essence of the analysis is that NRCs are syntactically subordinate but behave semantically like independent clauses. The key ingredients of the analysis are, from the syntactic side, Sag (1997)'s treatment of restrictive relatives, and, from the semantic side (i) the idea of NRCs as having wide-scope, hence being introduced (like proper names and indexicals) into the 'top box' of the discourse structure, and (ii) the idea that pronouns in NRCs work like normal pronouns, triggering accommodation processes under appropriate conditions. The

analysis exploits a variety of devices in a novel way, but (modification of REL values apart) it has employed only existing, independently motivated, structures, features, and types. This seems a significant result considering the radical innovations that have sometimes been thought necessary.

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