

# A Reconsideration of English Relative Constructions<sup>i</sup>

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## Abstract

A main goal of this article is to lend support to the view that the construction is the proper level of description for accounting for grammatical phenomena. I assume that there is a spectrum of complexity for constructions, along the lines of Culicover (1999) and Culicover and Jackendoff (2005). At one end of the spectrum are very regular correspondences between form and function that in more traditional approaches to grammar have been described as ‘rules’, in the middle there are more complex constructions that inherit many of their properties from the regular correspondences but deviate from them in specified ways, and at the other end are correspondences that are highly idiosyncratic and opaque. The main point, which echoes the perspective of many if not all constructionalist approaches to grammar, is that constructions do not differ from one another in completely arbitrary ways, but cluster around the regular correspondences of a language, while maintaining their special distinguishing properties of form and function.

In support of this view I propose a reformulation of Sag’s (1997) constructional account of English relative constructions. I show how it is possible to characterize the various types of relatives in such a way that almost all of their properties follow from more general properties of the language, and in some cases possibly even from universals. Nevertheless there are some special facts about relative constructions that need to be specified explicitly, and these contribute to their grammatical complexity.

One goal of this paper is to clearly separate the properties of relative clauses that follow in virtue of their being embedded in NPs from the properties that must be stipulated. It appears, in fact, that it is not necessary to say very much at all about the properties of relative clauses *qua* relative clauses — they look in virtually all respects like other embedded clauses in English. A second goal is to show how relative clauses and other relative constructions constitute a natural class, and do not require any special stipulations. Moreover, the binding relations that govern gaps in relative clauses follow directly and uniformly from the general interpretation assigned to relatives, as specified in the constructions that express their form-meaning correspondences. In the end, it appears that the only true idiosyncrasy of relatives that must be stated explicitly is that an overt *wh*-XP in initial position in infinitival relatives must be PP.

## 1. Inheritance and complexity

An important insight of accounts of linguistic structure that are formulated in terms of constructions is that inheritance can be used to catalogue the relatedness among them. The general idea is that some construction B is an instance of a more general construction A, such that B inherits the properties of A and specifies some of its own in addition.

It is easy to see that the complexity of a set of constructions can be reduced to the extent that properties of constructions are inherited. This is a central point of Jackendoff (1975) and it goes back to the earliest work in generative grammar on the use of notational conventions to capture generalizations (Chomsky 1965: 42-45; Chomsky and Halle 1968: Chapter 3). In particular, if A and B share properties for some principled reason, then the description should explicitly take account of this fact. The description then distinguishes the ‘natural’ situation where there are shared properties from the situation in which A and C (for example) share no properties. The metric for computing complexity is formulated so that the sharing of properties between A and B counts as more economical than does the non-sharing case of A and C. In current terms, the more properties that B inherits from A, the less complex the description of the set of constructions.

Sag (1997) formulates inheritance relations between relative clauses in the notation of Head-driven Phrase Structure Grammar (HPSG). HPSG is well-suited to illuminating inheritance relations in syntax, because it permits the enumeration of types that have particular featural characterizations. For instance, on Sag’s account, all relative clauses must satisfy the following constraint (1997: 44).

(1) rel-cl

$$\left[ \begin{array}{l} \text{HEAD} \\ \text{CONTENT} \end{array} \left[ \begin{array}{l} \text{MC} \quad - \\ \text{INV} \quad - \\ \text{MOD} \quad \left[ \text{HEAD} \quad \textit{noun} \right] \end{array} \right] \right] \textit{proposition}$$



This constraint says that the relative clause cannot be a main clause (notated as [MC –]), that it does not show inversion (notated as [INV –]), and that it modifies a noun (notated as [MOD [HEAD *noun*]]).<sup>2</sup>

On Sag's analysis, all relative clauses satisfy the *rel-cl* constraint, whether they are finite or non-finite, whether the relative proform is a subject or a non-subject, or whether or not there is a relative proform. All that needs to be specified in the description of the infinitival relative, for example, are those properties that distinguish it from all other relative clauses, i.e. those that it does not inherit in virtue of being a relative clause (as well as those that it inherits in virtue of being infinitival).

Inheritance of constructional properties thus captures a generalization, in precisely the way envisioned by markedness theory (Chomsky 1964, 1965).<sup>3</sup> If a particular type of relative clause required inversion, for example, then it would be necessary to stipulate this fact explicitly, since otherwise this special type of relative clause would inherit [INV –] from *rel-cl*.

A particularly important aspect of the constructional approach is that such an idiosyncrasy is not impossible, but simply costly in terms of the complexity metric. While it can be accommodated in the description of the synchronic grammar of the language, it would be reasonable to expect that it would be rare, at least in the dialects of the language and in other languages where [INV –] is a feature of *rel-cl*. Where such an idiosyncratic property does appear, it might be expected that it would coexist with an otherwise identical construction that does obey [INV –], and that the more idiosyncratic construction would have a special interpretation that the regular one does not share. As far as I know, such costly idiosyncrasies do not exist, although they are logically possible; all of the cases of idiosyncrasy discussed in this article are of the type where a property of a particular construction supplements those inherited from more general constructions.

## 2. Relatives as constructions – Sag (1997)

With the general relationship between inheritance and complexity in mind, let us look at the set of relative constructions in English described by Sag (1997). I focus, as Sag does, on the restrictive relatives that are embedded in noun phrases.

The common properties of relative clauses in Sag's account are given in (1). With the exception

of [INV –] and [MC –], and that they are clauses, there are no properties that all relative clauses share. For example, not all relative clauses show an overt A' chain, that is, a constituent in a non-argument position and a corresponding gap. In fact, not all relative clauses have an overt constituent in A' position, and not all relative clauses have a gap.<sup>4</sup> And, furthermore, not all relatives are clauses.

In finite clauses, subjects, objects, oblique arguments and adjuncts may be relativized. There may be a relative proform in initial position (2), or *that* (3), or zero, (4). Zero is excluded when what is relativized is the highest subject (4a). A relativized subject of an embedded clause is possible in a zero relative (4d). *That* and zero are also possible in relatives modifying the heads *time*, *place* and *reason* (5).

- (2) a. the book which is on the table [Subject]  
 b. the book which you put \_\_\_ on the table [Object]  
 c. the table on which you put the book \_\_\_ [Oblique object]  
 d. the time when you put the book on the table \_\_\_ [Adjunct]
- (3) a. the book that \_\_\_ is on the table [Subject]  
 b. the book that you put \_\_\_ on the table [Object]  
 c. \*the table that you put the book \_\_\_ [Oblique object]
- (4) a. \*the book \_\_\_ is on the table [Subject]  
 b. the book you put \_\_\_ on the table [Object]  
 c. \*the table you put the book \_\_\_ [Oblique object]  
 d. the book [you said [ \_\_\_ is on the table]] [Embedded subject]
- (5) a. The time (that) I left was a bit after midnight.  
 b. The place (that) I live is accessible to work.  
 c. The reason (that) I called is not important

In infinitival relatives, there can be a relative proform only in an initial PP. Hence there is no proform when the subject is relativized (6) or when a non-subject NP is relativized (7)-(8).

- (6) the man  $\left\{ \begin{array}{l} \text{who should} \\ \text{*who to} \\ \text{to} \end{array} \right\}$  clean the kitchen

- (7) a. the book (\*which) to put \_\_\_ on the table  
 b. the table (\*which) to put the book on \_\_\_  
 c. the table on which to put the book \_\_\_

- (8) the time  $\left\{ \begin{array}{l} \text{*when} \\ \text{at which} \\ \emptyset \end{array} \right\}$  to put the book on the table \_\_\_

Finally, there are ‘reduced’ relatives. These are present participial predicates (9) or passive participial predicates (10), adjective phrases (11) and prepositional phrases (12). The reduced relatives lack a relative proform and always relativize the ‘subject’,<sup>5</sup> hence they lack an apparent gap.

- (9) the book (\*which) sitting on the table
- (10) the book (\*which) written by Tolstoy
- (11) a book (\*which) so interesting  
(would be fun to read)
- (12) a book (\*which) about syntactic theory<sup>6</sup>

I refer to these constructions as ‘relatives’, because there is no *prima facie* reason to call them ‘clauses’. Relative clauses are also relatives, and they are clauses.

As can be seen from this brief summary, there are a number of morphosyntactic properties that can be used to characterize the different relatives. Some of these are correlated, and others appear to be independent of one another.

- (13) a. finite | infinitival | participial
- b. relativized subject | relativized non-subject
- c. relativized NP | relativized non-NP
- d. A' constituent | no A' constituent
- e. overt gap | no overt gap
- f. single word A' constituent |  
          phrasal A' constituent
- g. NP A' constituent | non-NP A' constituent

On a classical approach to syntactic constructions, such as Chomsky (1977) we would assume that there is a uniform structure for all relatives, and treat the various idiosyncrasies of the different types as potentially part of the ‘periphery’. At the same time, we would seek principled accounts of as many idiosyncrasies as possible.

The constructional approach taken by Sag, on the other hand, is to accept the various superficially distinct construction types as they are, and to formulate their various properties in terms of an inheritance hierarchy. The type *wh-subj-rel-cl* is a special case of *wh-rel-cl*, which in turn is a special case of *rel-cl*, and so it inherits the properties of (1). Sag accounts for the fact that a finite relative can have a relative pronoun that is a subject, but an infinitival relative cannot, by stipulating that the type *wh-subject-rel-cl* is an instance of the type *wh-rel-cl* and of the type *fin-hd-subj-ph*. Thus it inherits all properties of relatives with *wh*-phrases in initial position, and it

is a finite clause with a subject (1997: 452). Crucially, this property of infinitival relatives does not follow from anything.

The inheritance hierarchy can be represented explicitly by linking the various types. Sag’s complete hierarchy for *wh*-relatives is reproduced in Figure 1.

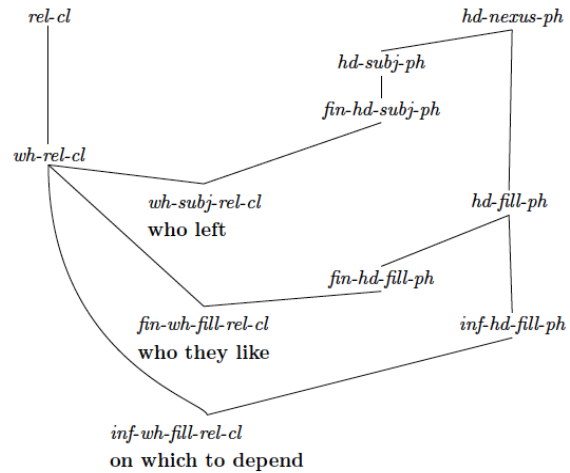


Figure 1. Inheritance hierarchy for *wh*-relatives (Sag 1997: 464)

There are a number of respects in which the subject of the infinitival relative does not pattern like the subject of the finite relative. While finite relatives systematically have overt subjects, an infinitival relative may have an overt subject (and the complementizer *for*) only if there is no overt *wh*-form.

- (14) a. the woman for you to talk to \_\_\_
- b. the woman to whom to talk \_\_\_
- c. \*the woman to whom for you to talk \_\_\_

This constraint is shared with infinitival questions.

- (15) a. I wonder who to talk to \_\_\_
- b. \*I wonder who for you to talk to \_\_\_

Sag accounts for this idiosyncrasy of the infinitival relative by stipulating, through a constraint, that when the infinitival has a filler, it lacks an overt subject – see Figure 2.

TYPE	CONSTRAINTS	ISA				
<i>inf-hd-fill-ph</i>	<table border="1" style="border-collapse: collapse;"> <tr> <td style="padding: 2px;">HEAD</td> <td style="padding: 2px;">[<i>comp</i> VFORM <i>inf</i>]</td> </tr> <tr> <td style="padding: 2px;">HD-DTR</td> <td style="padding: 2px;">[SUBJ &lt; X &gt;]</td> </tr> </table>	HEAD	[ <i>comp</i> VFORM <i>inf</i> ]	HD-DTR	[SUBJ < X >]	<i>hd-fill-ph</i>
HEAD	[ <i>comp</i> VFORM <i>inf</i> ]					
HD-DTR	[SUBJ < X >]					

Figure 2. Constraint that rules out subjects in infinitival questions and relatives with overt fillers (Sag 1997: 461).

The constraints define the type *inf-hd-fill-ph*, that is, an infinitival phrase with a filler (an A' constituent). The constraint HEAD specifies that such a type has an infinitival verb form, and the constraint HD-DTR specifies that it has a null subject ('<X>'). The ISA constraint specifies that this type of phrase is a phrase that has a filler, and hence inherits all properties of such a phrase that are not specified here.

Moreover, if there is a filler in an infinitival relative, it must be a PP.

- (16) a. the man to whom to talk \_\_\_
- b. \*the man who to talk to \_\_\_

In this respect infinitival relatives contrast with infinitival questions, which permit an NP filler in initial position; see (15a). Sag accounts for this property of infinitival relatives with the constraint in Figure 3.

TYPE	CONSTRAINTS	ISA
<i>inf-wh-fill-rel-cl</i>	[NON-HD-DTRS <PP>]	<i>wh-rel-cl</i> & <i>inf-hd-fill-ph</i>

Figure 3. Constraint that allows only PP fillers in infinitival relatives (Sag 1997: 480).

Since this type of relative clause is *inf-hd-fill-ph*, it must have a filler. And since it is *wh-rel-cl*, it must have a *wh*-filler. The constraint [NON-HD-DTRS <PP>] specifies that this filler must be a PP.

While there are many other details that can be noted about various relative clause types, this brief summary should convey the flavor of the approach. It is instructive to note, for example, that the constraint that rules out a *wh*-subject NP in an infinitival relative (*\*the woman who to go*), that *wh-subject-rel-cl* is an instance of the type *fin-hd-subj-ph*, is different from the one that rules out a *wh*-non-subject NP in an infinitival relative (*\*the woman who to talk to*), Figure 3. These constraints, while observationally accurate, do not distinguish the idiosyncrasies from the regularities, because they are all couched in a uniform representation and have equal weight. Crucially, a comparable description would apply to an alternative English in which infinitival relatives were fully regular and the idiosyncrasies regarding subjects and PP fillers applied to finite relatives, for example.

There are various ways in which to rearrange the inheritance hierarchy so that the properties of the relative clause types are accurately captured.

Simply arranging types does not convey a picture of what is natural and systematic and what is idiosyncratic, however. In the end, the question is what are the true regularities, and what are the true idiosyncrasies? An optimal characterization of the possible forms of English relative clauses would correlate generality with simplicity of description. In the next section, I reformulate Sag's inheritance hierarchy using a different inventory of relevant properties, and I argue that doing so yields a clearer and somewhat simpler picture of how this group of constructions is organized.

### 3. Simplifying the description

Let us consider the morphosyntactic properties of relative clauses that may enter into the formulation of constructions. There are two types of clauses, main and embedded. A relative clause must be embedded, that is, not a main clause. A clause in English may have a zero complementizer or initial *wh*-phrase, but only embedded clauses may have *for-to* or *that*. A *wh*-expression may be a word or a phrase. These properties of clauses are organized in Figure 4.<sup>7</sup>

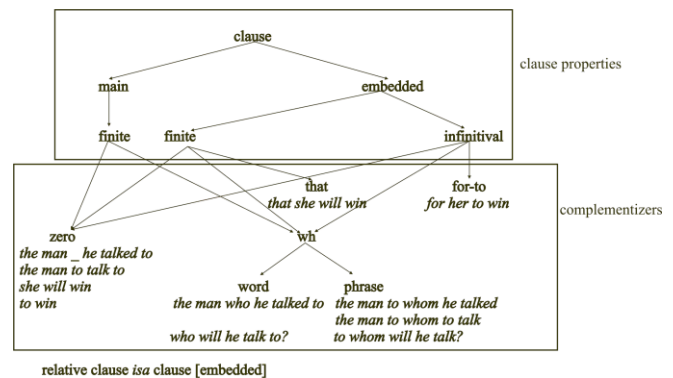


Figure 4. Summary of clause properties

Since a relative clause is [embedded], it will have all of the properties of [embedded] associated with [clause], and all of the properties of [clause], unless otherwise specified. Thus, if it is an embedded clause, it can be [finite] or [nonfinite], if it is [finite] it can be [zero], [that] or [wh], and so on. Figure 4 distinguishes eleven different types of relative clauses in terms of these properties – e.g. following the path from [clause] through [main] to [phrase] defines 'finite tensed main clause with initial wh phrase' and so on. There are no explicitly relational properties, e.g., whether there is an overt subject, whether the subject is relativized or whether there is a filler-gap relation.

The problem, now, is to decide how to formulate constructions that express the properties

that define canonical and exceptional syntactic structures, and their corresponding interpretations. Recall that our goal is to find a characterization of the various constructions so that their predictable properties are properly accounted for by inheritance. I take the primitive components of visible syntactic structure themselves to be the properties that define individual constructions, that is, just those given in Figure 4. So, for example, a finite clause is a constituent of category S with the feature [FINITE], and a finite relative clause is the syntactic configuration in which the finite clause is an adjunct to an N, as in (17).

(17) [NP ... N S[FINITE]]

Descriptions such as these, with their correspondences to conceptual structure, define the constructions of the language.

If a clause is [embedded], then it will inherit all of the properties of [embedded] and [clause] unless otherwise specified. Crucially, the way that the alternatives are framed in Figure 4 does not allow for the possibility that an embedded clause can be both [for-to] and [wh]. Since these are mutually exclusive primitive syntactic properties of embedded clauses, and infinitival clauses are embedded, they are mutually exclusive properties of infinitival relatives (and infinitival questions, which are not shown in Figure 4). Thus cases such as *\*to whom for you to talk* are directly ruled out – there is no need to stipulate that a *wh*-phrase and a subject cannot coexist in clause-initial position.

Let us focus on the part of the inheritance hierarchy dealing with relative clauses. Figure 5 notes just those types that do not follow from [embedded] or [clause].

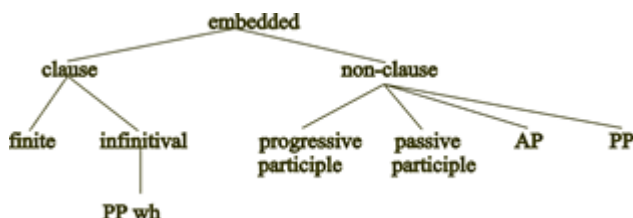


Figure 5. Type hierarchy for English relatives

By convention, mention of the type PP *wh* excludes those possibilities not mentioned, so there are no ‘non-PP *wh* infinitival’ relative clauses. If no alternatives are mentioned, as in the case of [finite], all possibilities for [clause] are allowed.

Note that the participial, AP and PP adjuncts are [embedded] but not [clause]. Making this

distinction allows us to sidestep the [zero/wh/that/for-to] alternatives of Figure 4, which are applicable only to clauses. While Sag calls these relative clauses, and they are often referred to as reduced relative clauses, they differ from true relative clauses in four respects: (i) they lack tense inflection, which is a sign of clauses, (ii) they relativize only the subject argument, which is not a property of English relative clauses, (iii) they lack both the head and tail of a chain, and (iv) they can be complements of *be*, which is also not a property of English relative clauses. They are in fact predicates, not clauses, and should be designated as such.

This last observation suggests a further simplification. It is reasonable and conventional to view a relative clause as denoting a property, in the sense that it contains an open argument that must be bound externally. If this is correct, then it is reasonable to say that anything can be a relative (clause or otherwise) if it can correspond to a property in CS, that is, if it has the semantic representation  $\lambda x.F(x)$ . As discussed below, introduction of the lambda notation makes it possible to account for the relation between the head of the relative clause and the relativized position within the relative clause without requiring a chain in the syntactic representation. If we add the lambda notation to our description of the relative constructions, what follows is that the only stipulations that we have to make are the following:

1. relatives are interpreted as properties
2. English relatives are adjoined to the right of the head in NP (as in Sag’s *rel-cl*(1))
3. if there is a relative proform, it must be in or dominated by the constituent in clause-initial position (in English)
4. an infinitival relative clause must be [PP] (in English)<sup>8</sup>

The only idiosyncratic stipulation, then, is the last. It is clear that this is the correct result, because the same condition does not hold for *wh*-questions – cf. *wonder who to talk to* vs. *\*the woman who to talk to*.

To sum up, then, there are several English relative and relative clause constructions. Their properties are fully predictable from general properties of English syntax, except for one. All the others are inherited from one of the following generalizations: relatives are interpreted as



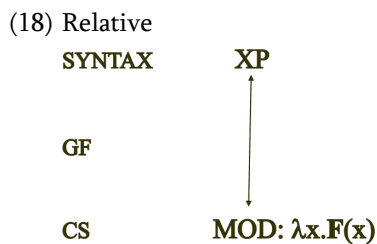
properties, relative clauses are clauses, relative clauses are embedded. What is not entirely predictable, however, is what form a constituent corresponding to a property may take in English, how an English relative clause gets to be interpreted as a property, and where the embedding takes place.

Given the foregoing observations, the properties of relatives can be described in terms of a set of correspondences between syntactic form and meaning, along the lines of the Parallel Architecture of Jackendoff (1997, 2002). These are taken up in the next section.

#### 4. Relative correspondences

##### 4.1. A construction type

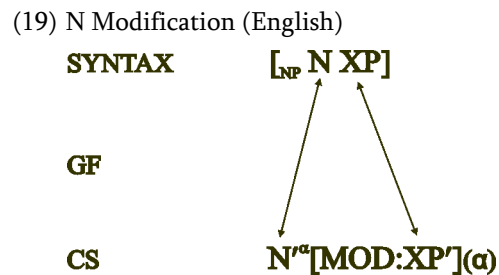
Relatives as a group are constructions where a constituent corresponds to a property. This correspondence defines a general construction type *relative*, as follows. The property is represented as  $\lambda x.F(x)$ . The variable  $x$  must be bound by the head of the NP that the relative modifies.<sup>9</sup> The syntax-CS correspondence is shown in (18), where MOD stands for ‘modifier’.



I assume, following Culicover and Jackendoff (2005: Chapter 9) that there is no syntactic movement, but that a relative clause contains a gap that is linked in CS to a variable in the lambda calculus. If there is an A' constituent in non-canonical position, it corresponds to an antecedent in CS that binds the variable. If there is no A' constituent in non-canonical position, the construction supplies the antecedent for the binding relation. Thus the various types of relative clauses are not directly related to one another through a common syntactic derivation, but through their correspondences with the same core conceptual structure representation.<sup>10</sup> I take up the details of how the interpretations are computed immediately below.

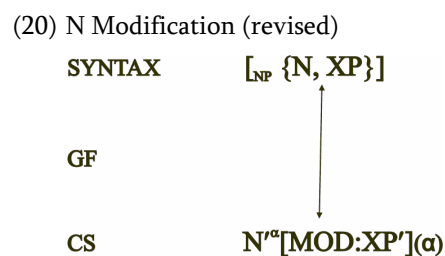
##### 4.2. Embedded relatives

One general correspondence concerns the configuration in which English relatives are embedded, namely  $[_{NP} N XP]$ . XP is interpreted as a modifier of N. Hence it must be a relative (not necessarily a relative clause) whose variable is bound by N', the CS representation corresponding to N. In the correspondence in (19),  $\alpha$  is used to index the binding relation between the head and the variable and XP' represents the CS representation corresponding to XP, which is independently given by (18), and so not repeated here.



N Modification is a construction. It specifies the correspondence between a form and a meaning. What is important to observe about it is that the binding relation between  $N'^{\alpha}$  and  $\alpha$  is specified by the construction itself. If there is a gap in the relative clause, it does not correspond directly to  $\alpha$ , but to the variable in the lambda expression. The variable is substituted for  $x$  by lambda reduction, so that the antecedent comes to bind it in the corresponding position in F.

It is plausible that (19) is the English version of a more general schema that is identical to (19) except that there is no specification of linear order in NP.<sup>11</sup> If this is the correct analysis,<sup>12</sup> then N Modification can be separated into the syntax-CS correspondence (20) and the phrase structure rule (or the equivalent formulation of the linearization of the constituents) for English (21).



(21)  $N \rightarrow N XP$

Since  $N \leftrightarrow N'$  is independently given as a lexical correspondence, the contribution made by the Relative correspondence (18) and N Modification (19) is that in the English NP, (i) XP follows the head, (ii) XP has the function of a modifier (corresponding to [MOD [HEAD *noun*]] in (1)), and (iii) there must be a variable  $\alpha$  in XP' corresponding to XP that is bound by  $N'^\alpha$ .

How this last condition is satisfied depends on the syntax of XP. In the case of a relative clause there are several possibilities, as we have seen in our description in §3. Consider first the *wh*-relative, as in (22).

- (22)  $[_{NP} N [_s wh-N \dots [e] \dots ]]$   
 [e.g. the woman who I saw [e]]

I assume that the correspondences for the relative pronouns are lexical. For example, the lexical entries for *who*, *which* and *where* are as in (23).

- (23) Relative proforms
- |                   |                  |                     |
|-------------------|------------------|---------------------|
| who               | which            | where               |
| ↑                 | ↑                | ↑                   |
| $\alpha_{person}$ | $\alpha_{thing}$ | $\alpha_{location}$ |

When there is an overt relative pronoun, the variable  $\alpha$  in the CS representation corresponds to and is thus licensed by the pronoun, while the remainder of the representation corresponds to the relative clause and the head of the NP. In this case, [I saw [e]] corresponds to  $\lambda x. SEE(EXP:ME, THEME:x)$  and *woman* to  $WOMAN^\alpha$ . The interpretation is then

- (24)  $WOMAN^\alpha [MOD: \lambda x. SEE(EXP:ME, THEME:x)](\alpha)$

Pied-piping is a bit more complex – I discuss it in §4.4 below.

An interesting consequence of the constructional formulation is that *that*- and zero-relatives must be distinguished from *wh*-relatives. *Wh*-relatives are licensed by the lexical relative pronoun constructions, as well as by N-Modification. In the case of *that*- and zero-relatives, there is no *wh*-form, so the variable  $\alpha$  must be licensed by the N-Modification construction itself. This is the correct result, and is consistent with Hoffmann's (2011) argument that, contra Sag (1997), *that*-relatives are to be treated on a par with zero-relatives and not with *wh*-relatives.<sup>13</sup>

### 4.3. Connectivity

Following a proposal in Culicover and Jackendoff (2005: Chapter 7), I take an A' construction to be a special case of connectivity. An A' construction is characterized by a constituent in a non-argument position (usually but not always in clause-initial position), and a gap in the position corresponding to the syntactic function of the A' constituent. In connectivity, a constituent is interpreted as the argument of an open expression, and the variables in the constituent are linked to the operators in the open expression through lambda reduction (Sternefeld 2001). The general correspondence is given in (25).

- (25) Connectivity
- |                           |            |
|---------------------------|------------|
| SYNTAX                    | $[_s X Y]$ |
| GF                        | ↙ ↘        |
| CS                        | ↘ ↙        |
| Condition: X c-commands Y | $Y'(X')$   |

What this correspondence says is that even if X is not linked to a gap in Y in an apparent syntactic chain configuration, if X c-commands Y then Y' can be interpreted as a function applied to X'. Connectivity arises from a range of syntactic configurations where the interpretation licenses the functional application shown in (25). For instance, in a pseudo-cleft we have the *wh*-clause applied to the focus, e.g.

- (26) [What Mary ate [e]] was a doughnut.

Here, *what Mary ate* corresponds to  $\lambda x. EAT(MARY,x)$ , *doughnut* translates to DOUGHNUT, and the correspondence for the copula ultimately produces the interpretation

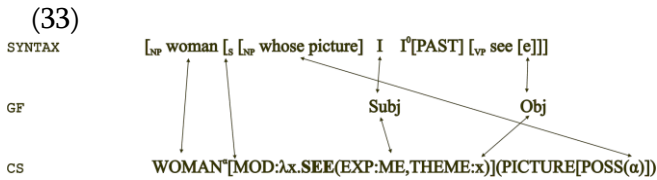
- (27)  $[\lambda x. EAT(MARY,x)](DOUGHNUT)$

which is equivalent to  $EAT(MARY,DOUGHNUT)$  after lambda-reduction. (For formal accounts of connectivity, see Jacobson (1994) and Sternefeld (2001).)

In an A' construction, the A' constituent (that is, X in (25)) is interpreted as the argument of the function corresponding to the remainder of the sentence, which contains the gap. Thus, the composition of *who* and [I saw [e]] of (22) yields (28).





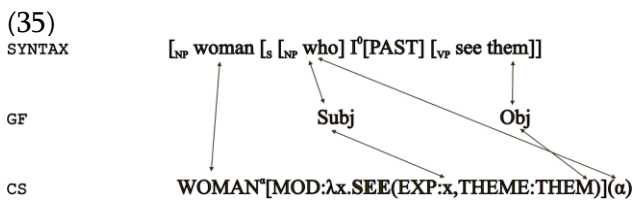


Lambda-reduction substitutes the representation PICTURE[POSS:α] for the variable *x*, which produces the CS representation in (34), where WOMAN<sup>α</sup> binds the possessor of PICTURE.

(34) WOMAN<sup>α</sup>[MOD:SEE(EXP:ME, THEME: PICTURE[POSS:α])]

Lambda-reduction may thus be seen as ‘reconstruction’ in the sense in which it was envisioned in transformational analyses such as Chomsky (1977) (see Sternefeld 2001).

Next, consider the case in which the relative proform is a subject, as in *who saw them*. Here, the *wh*-phrase corresponds to the variable but there is no gap. The correspondence is shown in (35).



The key here is that *who* corresponds to *x*, because it is the subject, and Subj corresponds to the EXP role of SEE by default; it also corresponds to α, because of the lexical entry of *who*. So by lambda-reduction, WOMAN<sup>α</sup> binds EXP:α. Note that it is not necessary to make any special stipulation for the case in which the *wh*-phrase is the subject. And because *wh*-, *that* and zero are alternative clause-initial configurations, the presence of *who* excludes the other possibilities.<sup>16</sup>

The correspondences for the *that*-relative and zero-relative are similar to the ones for the *wh*-relatives. The difference is that the variable α is licensed by the N Modification correspondence (20) itself, since there is no lexical form that corresponds to it directly. While *that* and zero appear to be in free variation in general, there are certain special properties of zero relatives that are arguably attributable to processing factors. For example, in standard English it is not possible to have a zero relative when the highest subject is relativized, e.g.

(36) You shouldn't have a dog  
\*(that) dislikes other dogs.

Chomsky and Lasnik (1977) attribute this restriction to a grammaticalized constraint that avoids the garden path effect associated with the absence of *that*. There are well-formed zero relatives of this type in non-standard English presentational sentences, e.g.,

(37) There's a guy outside says he's seen your brother.

For discussion of the contexts in which these relatives occur, see Harris and Vincent (1980) and Tagliamonte et al. (2005).

In addition, it is generally less acceptable to extrapose a zero relative (38a) and to have topicalization in a zero relative (38b), compared with a *that*-relative.

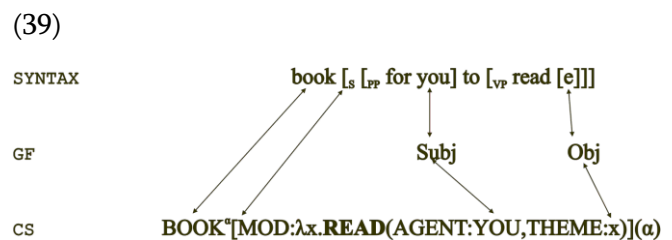
(38) a. A movie just came out  
\*(that) everyone wants to see.  
b. He's the man \*(that) at the party,  
I gave your phone number to.

Again, I hypothesize that these variations in acceptability are not a matter of grammar *per se*, but arise from the interaction between the grammar and the interpretive process.

#### 4.5. Infinitival relatives

Let us turn now to infinitival relatives. In general, an infinitive may have a *for*-phrase, a *wh*-phrase, or zero in initial position. The *for*-phrase marks the subject. If there is no *for*-phrase, the subject function is not realized overtly. There are four possibilities, shown in (39)-(43).

In the first correspondence, the *for*-phrase corresponds to subject, as specified by the correspondence for infinitives in general, the gap corresponds to *x*, and the variable is licensed by N Modification. GF marks the grammatical functions Subj and Obj that mediate between the syntactic structure and the CS (Culicover and Jackendoff 2005).

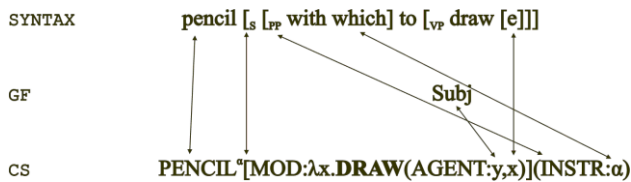


In the second correspondence, the relative proform corresponds to the variable, its role is specified by the preposition, and the gap corresponds to *x*. According to the correspondence



for relatives with an A' constituent in clause-initial position, the corresponding representation for this constituent is the argument of the lambda expression. I represent *with which* as INSTR(UMENT): $\alpha$ .<sup>17</sup>

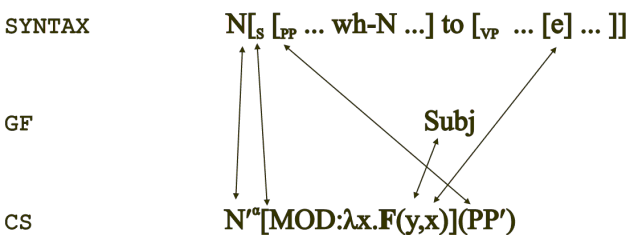
(40)



Lambda-reduction allows the variable to be bound by the head of the NP. The variable  $y$  is interpreted as the arbitrary controlled subject of the infinitive, which does not correspond to an overt syntactic constituent.<sup>18</sup>

As noted earlier, a clause-initial phrase in an infinitival relative must be a PP. That restriction must be specified in a correspondence explicitly when the VP is infinitival, as in (41).

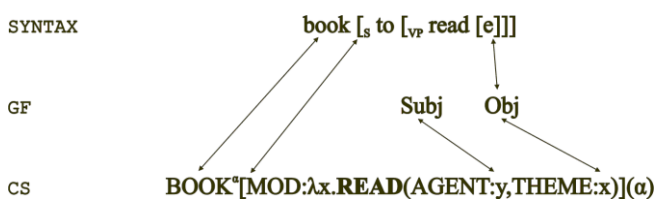
(41) infinitival *wh*-relative



The rest of the structure of the PP does not have to be given explicitly in the correspondence, since it is independently defined for the language. To the extent that the restriction to PP relatives does not follow from any general principle or pattern, but is idiosyncratic to the construction, it counts as a genuine constructional cost.

In the third schema, there is no overt subject, so the subject GF corresponds to a variable that must be bound by control, or assigned an arbitrary interpretation.

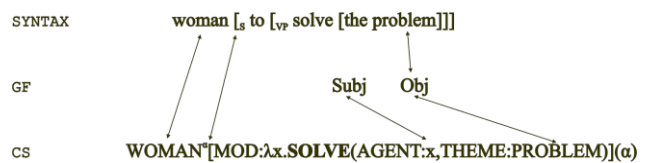
(42)



The gap corresponds to  $x$ , and therefore to the variable after lambda-reduction. Because there is no relative proform to specify the variable, the variable is again introduced by the N Modification correspondence.

Finally, in the fourth schema, there is no gap. But because the clause is infinitival and lacks a subject, the subject GF corresponds to a free argument in CS. In this particular case, the variable is not treated as arbitrary control, because it is bound by the head noun of the NP, through lambda-reduction, and the N Modification correspondence is satisfied, as in (43).

(43)



Lambda reduction yields (44).

(44) WOMAN $\alpha$ [ $\lambda x$ .MOD:SOLVE(AGENT: $\alpha$ , THEME:PROBLEM)]

In this way we explain straightforwardly why it is possible to have infinitival relatives like those in (45).

- (45) a. the man [to see [e]]
- b. the man [to do the job]

In (45a), there is no overt subject. If Subj corresponds to  $x$ , as in  $\lambda x$ .SEE( $x,y$ ), then the second argument  $y$  will not be bound, which leads to semantic ill-formedness, since English does not have implicit non-subjects. (46) illustrates this:

(46) MAN $\alpha$ [MOD: $\lambda x$ .SEE( $x,y$ )]( $\alpha$ )  $\Rightarrow$   
\*MAN $\alpha$ [MOD:SEE( $\alpha,y$ )]

So the choice of variables must be  $\lambda x$ .SEE( $y,x$ ), where  $y$  corresponds to Subj and is interpreted as a arbitrarily controlled argument.

In (45b), there is only one variable in the interpretation, so it must correspond to Subj, and the interpretation is well-formed.

(47) MAN $\alpha$ [MOD: $\lambda x$ .DO( $x$ ,JOB)]( $\alpha$ )  $\Rightarrow$   
MAN $\alpha$ [MOD:DO( $\alpha$ ,JOB)]

This explanation for the possibility of infinitival relatives raises the question of why not all languages with infinitives permit infinitival

relatives.<sup>19</sup> This question is of course not specific to the current analysis – in fact, it arises under any analysis of any phenomenon which is arguably possible in a language but does not occur. It arises in particular for any language in which an infinitive is treated on a par with sentences, either in terms of the syntax, the semantics, or both. There are two cases, *wh*-infinitival relatives, and zero-infinitival relatives. With respect to the former, Sabel (2006) proposes that *wh*-infinitives are possible only if the left periphery of an infinitive may contain “a base-generated phonetically realized element”, clearly a constructional stipulation. With respect to the latter, it may be that bare infinitives in languages that lack infinitival relatives do not correspond to properties, in contrast to infinitives in English, which would again be a constructional stipulation. However, this is only a speculation, and a definitive solution would require a significantly broader investigation than is possible here.

Another point that should be noted regarding infinitival relatives is that the CS representations here are systematically incomplete. What is missing is the deontic interpretation. The relative clause *for you to see* means ‘who/that you should see’, the relative clause *to see* means ‘that one should see’, *to do the job* means ‘who/that should do the job’ and so on. This semantic idiosyncrasy is further evidence that we are dealing with distinct (but related) constructions in this domain, albeit constructions that are very closely linked to one another in an inheritance hierarchy.

#### 4.6. Non-clausal relatives

I conclude by considering those relatives that are not clausal, and do not appear superficially to contain a syntactic gap. Recall that by ‘relative’ I mean any XP that can be interpreted as a property, that is, as an expression of the form  $\lambda x.F(x)$ . These XPs are in fact the class of predicates. In the lexical entry for the head of a predicate that can serve as a relative there must be an external argument, so that it can be predicated of something. If the XP is *angry at Sandy*, for example, the CS interpretation is  $[\lambda x.ANGRY(x,SANDY)]$ , if it is *eating cookies*, the CS interpretation is  $[\lambda x.EAT(x,COOKIES)]$ , if it is *on the table*, the CS representation is  $[\lambda x.ON(x,TABLE)]$ , and so on. Notice that there is a variable in the interpretation even though there is no syntactic gap.<sup>20</sup>

If one of these predicates is the right sister to N in NP, then N Modification licenses the

interpretation in which  $x$  is bound by the head, e.g.

- (48) a. a man angry at Sandy  
 $MAN^\alpha[MOD: \lambda x.ANGRY(x,SANDY)](\alpha)$   
 =  $MAN^\alpha[MOD: ANGRY(\alpha,SANDY)]$
- b. a dog eating cookies  
 $DOG^\alpha[MOD: \lambda x.EAT(x,COOKIES)](\alpha)$   
 =  $DOG^\alpha[MOD: EAT(\alpha,COOKIES)]$
- c. cake on the table  
 $CAKE^\alpha[MOD: \lambda x.ON(x,TABLE)](\alpha)$   
 =  $CAKE^\alpha[MOD: ON(\alpha,TABLE)]$

That these predicates can function as relatives follows directly from the N Modification correspondence with no additional stipulation. It is sufficient that the Relative correspondence for the predicates licenses  $\lambda x.F(x)$  and that the N Modification correspondence licenses the external argument and the variable.<sup>21</sup>

#### 4.7. Appositive and free relatives

There are two other constructions in English that are typically referred to as ‘relatives’, appositive relatives (49a) and free relatives (49b).

- (49) a. It started to rain, which I really resented.  
 b. Sam will eat what(ever) you serve him.

Both are called ‘relatives’ because they have certain formal properties that resemble those of restrictive relatives – they have *wh*-forms in A’ position, and they have gaps when the *wh*-form is not a subject.

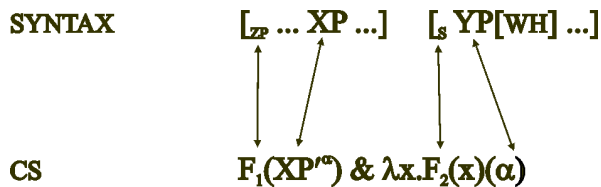
Are these ‘relatives’ to be incorporated in the analysis above? On the face of it, the answer is ‘no’. An appositive relative is not necessarily embedded in an NP, doesn’t necessarily have a nominal antecedent, is not interpreted as a modifier. A free relative is not embedded in any phrase, although it is not a main clause, lacks an antecedent, and is interpreted referentially.

In fact, what these ‘relatives’ have in common with relatives is part of their interpretation. The interpretation of the restrictive relative associates the interpretation  $\lambda x.F(x)$  with the relative, and takes this to be a MOD of the head. The same  $\lambda x.F(x)$  is in the interpretation of the appositive and free relative, as defined by the respective constructions. In the case of the appositive relative, the interpretation is coordinate, with the antecedent of the relative proform incorporated into the interpretation of the appositive, which corresponds to the lambda notation. So the



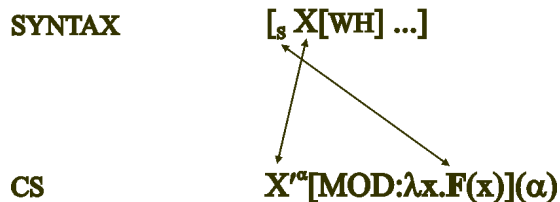
interpretation of (49), for example, is ‘It started to rain and I really resented it’, where *it* refers to ‘It started to rain.’ The general correspondence is given in (50).  $F_1$  is the interpretation corresponding to the expression that contains the antecedent XP, which may be XP itself, and  $F_2$  is the interpretation of the appositive relative exclusive of the relative proform.

(50) Appositive



The construction for the free relative is similar to that of the appositive, in that the lambda expression forms part of the interpretation. The free relative denotes a set of entities as specified by the *wh*-phrase, and a property of these entities. For example, in (49b) the free relative denotes ‘THING/STUFF  $\alpha$  such that you serve him  $\alpha$ ’. The general form of the correspondence is given in (50).

(51) Free relative



## 5. Summary

We have seen that it is straightforward to describe distinct relative constructions by specifying their syntactic properties and the meanings that correspond to them. The properties that follow from more general constructions of the language or from universals do not need to be specified for each construction. Those properties that do not follow from anything constitute costs for the constructions with respect to the grammar as a whole. Those that follow from universals are cost-free except for what is specific to the language.

The situation for relatives then turns out to be quite transparent, and somewhat simpler than Sag’s original analysis suggests. The major observations are these:

1. Relative clauses are clauses, and inherit certain properties in virtue of this. Clauses, and therefore finite relative clauses may be zero-, *that*- or *wh*-, but not a combination. Infinitival clauses, and therefore infinitival relative clauses are zero, *for-to*, or *wh*-, but not a combination.
2. The interpretation of relatives is inherited from general principles. One interpretation principle covers zero- and *that*-relative clauses. The interpretation of overt A’ constituents follows from the interpretation principle for connectivity.
3. It is necessary to stipulate that the *wh*-phrase in an infinitival relative must be PP.

What does this tell us about constructions, and how we should describe them? It suggests that we should seek analyses that minimize the complexity of descriptions as much as possible. It may not be possible to account for everything in terms of fully general rules and principles – there may be true idiosyncrasies. This does not mean, however, that there are no genuine generalizations. The analysis of English relatives offered here shows that in fact relatives in English are very regular, and that it is possible to precisely isolate the properties that they inherit in virtue of being English expressions that express properties, and distinguish them from those properties that are truly idiosyncratic.

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## Notes

<sup>1</sup> I am grateful to William Schuler, Detmar Meurers, Bob Levine, Thomas Hoffmann, and audiences at the University of Tübingen for very useful advice and comments. Two anonymous reviewers offered numerous comments and questions that have led to significant improvements, and I thank them for their efforts. I alone am responsible for any and all errors.

<sup>2</sup> It is actually possible to have inversion in a relative clause when there is an initial negative topic. E.g.,

- (i) a. a candidate  
who under no circumstances would I vote for  
b. these candidates,  
none of whom would I vote for, ...

Inversion in these cases is not a property of the relative clauses, but of the negative topic, although it is the head that is inverted. See Culicover (1991), for a discussion of such examples.

<sup>3</sup> For more extensive discussion of this point, see Hoffmann (2011: Chapter 6).

<sup>4</sup> In Chomsky (1977) it is simply assumed that all relative clauses contain A' chains, and that they are present in the structure even if there is no overt evidence for them. As a consequence, it is necessary to analyze some relative clauses in terms of invisible movement of invisible operators that create invisible gaps. For general arguments against such an approach to syntax, see Culicover and Jackendoff (2005: Chapters 2 and 3).

<sup>5</sup> The scare quotes around 'subject' are intended to suggest that what is relativized is the argument that would be the subject if the relative was a finite clause.

<sup>6</sup> It may be that in *a book about syntactic theory*, the PP is an argument. Note, though, that *a book about syntactic theory* can be paraphrased by *a book which is about syntactic theory*, and *The book is about syntactic theory* is quite unexceptional. Such facts suggest that *about syntactic theory* can also function as a predicate.

<sup>7</sup> I exclude free relatives from this characterization. They are not main clauses, but do not seem to have many properties of relative clauses beyond their A' chains. I take up the question of how they are to be handled under a constructionalist approach in §4.7.

<sup>8</sup> Such relatives are in fact completely impossible in Danish, Swedish, Norwegian and German as well (Sabel 2006).

<sup>9</sup> A representation along these lines includes the types of information given in the attribute-value matrixes of HPSG, such as Sag's (1997) *rel-cl*, displayed in a different and, I believe, more transparent way.

<sup>10</sup> It is natural to extend this approach to all A' constructions, including interrogatives and topicalization, and in fact I do so in Culicover (in preparation). How the lambda expression fits into the overall interpretation has to be specified in each construction. It is through the common semantics that we can account for many of the similarities between A' constructions observed by Chomsky (1977). However, the behavior of A' constructions with respect to the extraction constraints of Ross (1967) and others must be explained in other terms, perhaps the processing complexity of long distance dependencies (see Hawkins 1999).

<sup>11</sup> I use the term NP here to refer to the phrase headed by N without intending any specifics regarding the status of the DP hypothesis.

<sup>12</sup> It is plausible that (**Fehler! Verweisquelle konnte nicht gefunden werden.**) is a component of the universal 'tool box' of constructions made available by UG, in the sense of Culicover and Jackendoff, (2005: Chapter 1). Whether the full range of XP is used for relatives in every language is an open question, as is the question of whether languages that lack embedded relative clauses *per se* permit reduced relative constructions. Downing (1978: 375f.) observed that all languages have relative clauses, but that not all have relative clauses embedded in NP, and concluded that "a universal characterization of the notion 'relative clause' can only be given in semantic terms." For more recent discussion, see Vries (2005).

<sup>13</sup> Hoffmann (2011: Chapter 6) argues that relative clauses should be organized into subtypes that take into account correlations between register and the pied-piping/preposition-stranding distinction. Preposition-stranding appears to be associated with a more informal register than pied-piping. Since the question of register is orthogonal to the formal description of the constructional possibilities, I do not address it in my analysis here.

<sup>14</sup> Here and throughout I omit consideration of the 'fine structure' of the left periphery. Questions regarding the branching structure, the status of Spec, and the presence or absence of invisible heads do not appear to be germane to a constructional analysis, at least not at this stage of the analysis.

<sup>15</sup> What remains to be accounted for, among other things, is why a relative pronoun cannot be embedded more deeply in the clause-initial constituent, as in

- (i) a. \*(This is) the woman<sub>k</sub>  
[from the lawyer [who sued whom<sub>k</sub>]]<sub>i</sub>  
Sandy received a letter t<sub>i</sub>  
b. \*(This is) the woman<sub>k</sub>  
[that Sandy was rude to whom<sub>k</sub>]]<sub>i</sub>  
everyone knew t<sub>i</sub>

The question is why *from the lawyer who sued whom* and *that Sandy was rude to whom* do not inherit the property of satisfying the relative clause construction, while phrases such as *from whose lawyer* and *sitting on next to a picture of whom* do. In fact it appears that the constraints of Ross (1967) apply to the linking of the

head N (in this case *woman*) with the relative proform in situ. If there is no movement in this construction, it follows that such constraints are not constraints on extraction or even constraints on A' chains in the strict sense. An alternative account in terms of processing complexity may prove to be revealing in such a case; see Hofmeister et al. (in press) and references cited there.

<sup>16</sup> The incompatibility of *wh* and *that* is a property of English. Other languages permit both to appear in the same clause; see, e.g., Bayer (2002).

<sup>17</sup> I gloss over a number of details in this representation that are orthogonal to the main points of this article, such as whether *with which* is an argument or an adjunct, and whether the semantic representation of **DRAW** should include an event variable.

<sup>18</sup> Here I am assuming the analysis of control of Culicover and Jackendoff (2005), inspired by the HPSG analysis of Pollard and Sag (1994) where there is no syntactic PRO, but a linking between a GF and the appropriate CS argument.

<sup>19</sup> Thanks to an anonymous referee for highlighting this question.

<sup>20</sup> It is of course possible to stipulate that there cannot be a variable in the interpretation unless there is a gap in the syntactic representation. Doing so would reduce all relatives to relative clauses, with invisible structure for those that are not superficially clausal. Given that it is straightforward to state the correspondence for a non-clausal predicate without making this assumption, it would be necessary to find some motivation for the stipulation beyond the fact that they can all be interpreted as properties. For extensive discussion of the consequences of imposing syntactic uniformity for constructions where there is semantic uniformity, see Culicover and Jackendoff (2005: Chapters 2 and 3).

<sup>21</sup> Interestingly, a predicate nominal cannot function as a relative.

- (i) \*a woman a doctor [cf. a woman who is a doctor]

This would follow directly if the interpretation of a predicate nominal, unlike the other predicates, lacks an external argument in its CS representation. However, the formal semantics literature treats predicate nominals on a par with predicate adjective phrases (see, for example, Partee (1992: 113-15)). I am not able to pursue this question here.

## Processing Information

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