

English Free Relative Clause Constructions: From A Constraint-Based Perspective

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Like other Indo-European languages, English also employs a particular type of relative clause constructions, the so-called free-relative constructions, exemplified by the phrase like *what Kim ate*. This paper provides a constraint-based approach to these constructions. The paper begins with surveying on the properties of the construction. We will discuss two types of free relatives, their lexical restrictions, nominal properties, and their behavior with respect to extraposition and piped piping, and finiteness. Following this, we sketch basic theory of the constraint-based grammar, Head-driven Phrase Structure Grammar(HPSG) which is of relevance in this paper. As the main part of this paper, we then present our constraint-based analysis couched upon this framework.

1. Properties of Free Relatives

1.1 Basic Properties

There exist at large two types of free relatives in English as illustrated in (1)a and (1b).

- (1) a. Kim will do [what [you tell him to do]].
- b. Kim will do [whatever [you tell him to do]].

In the free relatives without *-ever* in (1)a, we can clearly identify the entity or location the bracketed free relatives refer to. But in those *wh-ever* free relatives in (1)b, it cannot be determined what entity or location they refer to. In this respect, following Quirk et al. (1985), we will refer to free relatives like (1) as specific free relatives and those like (2) as nonspecific free relatives.¹

Like interrogative constructions or relative clause constructions, free relatives use *wh*-elements. But the range of possible *wh*-words in free relatives is much more restricted:

- (2) a. *Lee wants to meet **who** Kim hired.
- b. *Lee bought **which** car Kim wanted to sell to him.
- (3) a. *You should help me **whyever** you help those deadbeat drinking companions of yours.
- b. *I will buy **whosever** books he is selling.

1.2 Sentential Properties

Despite these semantic and lexical differences, the two types of free relatives have similar syntactic structures. A close examination reveals that these free relative clauses all have bipartite structures: the *wh*-element and the clause with a missing phrase.

- (4) a. Kim ate [what [Lee offered ____ to her]].
- b. Kim will do [whatever [you tell him to do ____]].

The second part alone is an incomplete sentence with a missing element. This missing element is syntactically linked to the first part. Further we can observe here that like interrogative constructions and unlike regular relative clauses, free relatives have no antecedent relations with

any element either within themselves or within the sentence in question.

1.3 Nominal Properties

With respect to distributional possibilities, free relatives however externally act like nominal clauses. They appear in the contexts where only NPs can occur (Bresnan and Grimshaw 1978, Quirk et al. 1985).

- (5) a. I would consider [wherever she lives] a nice place to live.
- b. I will move to [wherever you want to live].
- c. John got the tapes from [wherever he keeps his books.]

Further unlike interrogative complements, free relatives in subject positions induce number agreement with the main verb (Bresnan and Grimshaw 1978, McCawley 1982, Quirk et al. 1985).

- (6) a. **What books he has written** isn't/*aren't certain.
- b. **What(ever) books** he has written *hasn't/haven't been sold well.

In interrogative constructions like (6a), it is the whole interrogative complement that determines the grammatical number of the main verb. But in free relative clauses like (6b), it is the wh-expression, *what(ever) books*, that induces agreement with the main verb.

1.4 Non-sentential properties

Free relatives clauses also behave differently from interrogative complements that exhibit sentential properties. Let us observe the contrast:

- (7) a. How much he bought isn't important to us.
- b. It isn't important to us how much he bought.
- (8) a. What Edward offered to her went into the trash.
- b. *It went into the trash [what Edward offered to her].

Unlike the interrogatives shown in (7)a and (7)b, free relatives cannot undergo *it* extraposition.

Pied piping is another phenomenon where we can observe a peculiar property of free relatives (cf. Bresnan and Grimshaw 1978).

- (9) a. I'd like to know which paper Kim is working on.
- b. I'd like to know on which paper Kim is working.
- (10) a. I'll reread whatever paper Kim has worked on.
- b. *I'll reread on whatever paper Kim has worked.

Examples in (9) show that interrogative clauses allow a preposition to be preposed along with the wh-phrase. But this is not possible in free relatives: it is ungrammatical to displace the preposition from the base position, as observed from (10b).

1.5 Nonfiniteness

Another interesting behavior of free relatives relates to their finiteness. Interrogative clauses can be either finite or infinite as shown in (11) (cf. Baker 1989).

- (11) a. I wonder who I should place my trust in.
b. I wonder who(m) to place my trust in.

In contrast, free relatives allows only finite clauses.

- (12) a. Kim always wears [what(ever) he should wear].
b. *Kim always wears [what(ever) to wear ____]

1.6 Summary

So far we have observed various properties of free relative constructions. The main properties we have observed are: in terms of lexical properties, free relatives incorporate a limited set of *wh*-words. As far as their external syntax is concerned, they exhibit NP properties, supported by their distributional and number agreement facts. With respect to extraposition and piping, free relatives behave differently from interrogative constructions. Finiteness facts again distinguish free relatives apart from interrogatives and restrictive relatives. In what follows, we offer an analysis accounting for these properties within the framework of a constraint-based grammar.

2. Background and Basics of the Constraint-Based Analysis

Our treatment of English free relatives is couched upon the constraint-based framework of HPSG one of whose theoretical foundations lies in the utilization of multiple inheritance. The inheritance mechanism, armed with hierarchical classifications of linguistic objects, has been incorporated by earlier work in HPSG (Pollard and Sag 1987, Flickinger 1987, among others) to eliminate redundancies in the structure of the lexicon. The concept of hierarchical classification is essentially assigning words to specific types, and an assignment of those types to superordinate types (*supersorts*). Each type is declared to obey certain constraints corresponding to properties shared by all members of that type. The technique of hierarchical inheritance further ensures that a type inherits all the constraints of its supertypes. Thus a word assigned to a type, in addition to its own constraints, obtains all the constraints associated with its supertypes. This system then allows us to express cross-classifying generalizations about words, while accommodating the idiosyncrasies of individual types on particular subtypes of words.

The same general method has been applied to the grammar of phrases, in particular to English relative clauses by Sag 1996. This analysis exploits the power of multiple inheritance hierarchies in factoring out dependency relations and clausal functions into distinct informational dimensions. Under this proposal, generalizations about particular constructions (e.g., relative clause constructions), analogous to those about words, are expressed in terms of constraint inheritance in a multiple inheritance type hierarchy. This mode of analysis, expressing generalizations about phrases with the simplicity, lays out a brief picture of how various kinds of factored information are interwoven together. Constructional information, represented as constraints on particular constructions, restricts the possible combination of syntactic units. The structure of a phrase or clause is, thus, determined from the interaction of the lexical properties of the head and the constraints on the construction type of which the phrase or the clause is an instance.

Space limitations do not allow us to discuss the details of this analysis. Readers are asked to refer to Pollard and Sag 1994, Sag 1996.

3. A Constraint-Based Analysis

3.1 Lexical Entries

We have observed that the set of *wh*-words that can occur as free-relatives is basically different from that of *wh*-words that can appear in restrictive relatives. The only possible *wh*-words that can

occur in specific free relatives are *what*, *why*, and *where*. For this lexical difference, we distinguish the free relatives words from others in that the former bear nonempty specifications for the features FREE-REL(F-REL) which takes a set of referential indices as its value (cf. Jakobson 1982).²

(13) a. what:

$$\left[\begin{array}{l} \text{CAT NP} \\ \text{CONTENT | INDEX [1]} \\ \text{F-REL } \{\{1\}\} \end{array} \right]$$

b. whatever

$$\left[\begin{array}{l} \text{CAT NP} \\ \text{CONTENT [1] (all [2])thing ([2])} \\ \text{F-REL } \{\{2\}\} \end{array} \right]$$

We assume that like the other nonlocal features SLASH and WH, F-REL generated from a lexical entry is subject to the lexical amalgamation constraint as given in (32).

(14) Lexical Amalgamation of F-REL:

$$\text{word} \Rightarrow \left[\begin{array}{l} \text{ARG-ST } \langle [\text{F-REL } [1]], \dots [\text{F-REL } [n]] \rangle \\ \text{F-REL } \{\{1\} \cup \dots \cup n\} \end{array} \right]$$

The constraint ensures that if a verb's subject or complement has F-REL value, the verb itself also has F-REL value. This lexical amalgamation simplifies the statement of the inheritance of F-REL specifications, combined with the Nonlocal Feature Principle in (33).

(15) Nonlocal Feature Principle (NLFP)

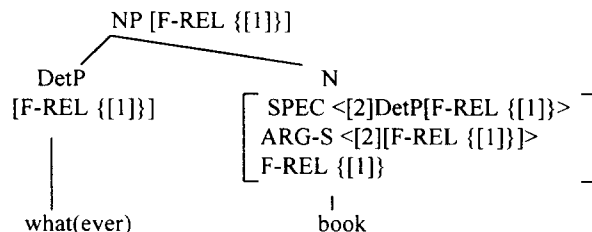
$$\text{hd-nexus-ph} \Rightarrow \left[\begin{array}{l} \text{NONLOCAL } \{\{1\}\} \\ \text{HEAD-DTR | NONLOCAL } \{\{1\}\} \end{array} \right]$$

This principle regulates the distribution of nonlocal values, REL and QUE, originated from wh-words. The principle, obeyed by all types of *head-nexus-phrase*, guarantees that the F-REL value of a phrase is the F-REL value of its head-daughter. The key point of this analysis is that no daughter actually passes its nonlocal value to its mother. All inheritance is in fact mediated by the head daughter thru the constraint.

The feature F-REL can originate from the determiner as in (34).

(16) a. I will buy whatever book he likes.

b.

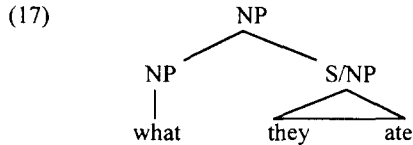


The lexical amalgamation prompts the lexical head to bear the feature F-REL. The NLFP ensures that this value is identical with that of the head NP.

3.2 General Constraints

Free relatives are instances of relative constructions in the sense that the whole phrase is basically a nominal phrase, consisting of a wh-word and a sentence missing an element. We have observed

that free relative constructions exhibit various nominal properties. In particular, the fact that the free relative *wh*-word, not the whole clause, induces the number agreement leads us to take the preceding *wh*-element to be the head of a noun phrase and the rest to be a modifier, as represented in (17).



This mode of structure tells us that free relative constructions are the nominal constructions with the free relative head and an adnominal sentence with an element missing, which we will call *free-rel-clause* henceafter.

We express this generalization in terms of the constraint on the type *free-rel-clause*:

(18) Constraint on *free-rel-cl*

free-rel-cl => [HEAD | MOD [NP[F-REL *neset*]]]

This constraint explains the unacceptability of sentences (19): they are all ruled out simply because the free relative clause modifies a *wh*-word whose F-REL value is empty.

- (19) a. *Lee wants to meet [who [Kim hired].
 b. *Lee bought [which car [Kim wanted to sell to him]].
 c. *I will buy [whosoever books [he is selling]].

Another general constraint on free relatives is about finiteness. We have observed in Section 1 that both specific and nonspecific relative clauses are subject to a constraint that no infinitive clause is allowed.

- (20) a. *Tom always wears what to wear.
 b. *Tom always wears whatever to wear.

The general constraint that instances of these must have [VFORM *fin*].

(21) Constraint on *free-rel-cl*

free-rel-cl => [HEAD [VFORM *fin*
 MOD [NP[F-REL *neset*]]]]

3.3 Non-Subject Free Relative Clauses

Now let us consider what kind of constraint each subtype of free relative clause observes. Observe free relative clauses whose missing elements are non-subjects:

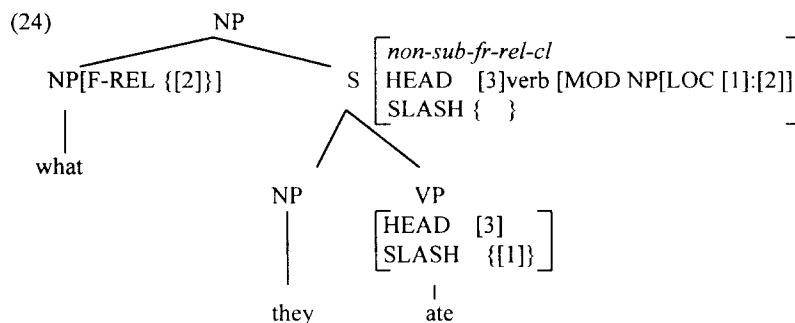
- (22) a. I ate [what [they ate ____]].
 b. I will show you [what [you can open the bottle with ____]].

The common property these non-subject-free-relatives carry is that there is a missing element. And this missing element needs to be bound off before it modifies the free relative word. The constraint in (23) expresses this.

(23) Constraint on *non-sub-fr-rel-cl*

$$\text{non-sub-fr-rel-cl} \Rightarrow \left[\begin{array}{l} \text{HEAD | MOD [NP[LOCAL [1]]} \\ \text{SLASH \{ \}} \\ \text{HD-DTR [SLASH \{\{1\}\}]} \end{array} \right]$$

The following structure reflects this constraint.



According to the constraint on *free-rel-cl*, the NP that the clause modifies must have a non-empty F-REL value. This is what happens here. Note also that the constraint (23) guarantees that structure-sharing relation between the LOCAL value of the missing element and that of the wh-free relative word. This restriction blocks the sentences like (25).

- (25) a. *Tom ate [[when] they ate].
 b. *Now is [[what] I need you].

3.4 Subject Free Relative Clauses

Now consider the free relatives where the wh-word functions as the subject.

- (26) a. What happened upset him.
 b. They welcomed whatever visitors came their way.

In several respects, these subject free relatives are analogous to reduced relatives like (27).

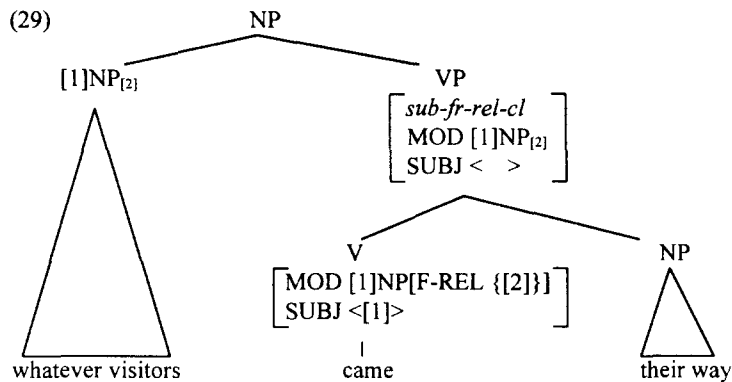
- (27) a. The person [hassled by the police yesterday] protested
 b. the person [standing on my foot] ...

In both types of relatives in (26) and (27) the antecedent semantically serves as the subject of the modified clause. Both types of relative clauses obey the constraint that no subject is realized. The constraint (28) expresses this restriction.

(28) Constraints on *sub-fr-rel-cl*

$$\text{sub-fr-rel-cl} \Rightarrow \left[\begin{array}{l} \text{SUBJ} < > \\ \text{HD-DTR} \left[\begin{array}{l} \text{HEAD verb [MOD [1]NP]} \\ \text{SUBJ} <[1]NP> \end{array} \right] \end{array} \right]$$

The structure (29) represents an instantiation of this constraint.



Further evidence for the finite VP modifying structure comes from the agreement:

- (30) a. **Whatever** books have been written by the author *is/are marked up with her notes.
 b. **What** book has been written by the author is/*are gone into the trash.

Given that grammatical agreement is a syntactic phenomenon, the contrast in (30) leads us to have the assumed wh-headed phrase as shown in (29).

3.4 Local and Temporal Free Relative Clauses

But more complexity arises when free relative constructions function as noun phrases.

- (31) a. Here is [where I bought the food ____].
 b. She dreams of [when she will finally have her Ph.D. ____].
 c. I would consider [wherever she lives ____] a nice place to live.

The whole clauses here are NP's. The issue arises as to the categorical mismatch between the free relative head and the missing element. It appears that the missing elements in (31) are all adverbial elements and cannot be NP's. However, there is reason to argue that the missing elements here can be treated as externally NP's.

Larson (1985) observes the dual properties of the so-called bare NP adverbs, such as *moment*, *day*, *week*, *yesterday*, *place*, *direction*, and so forth. They externally take the form of simple NPs but internally exhibit distributional parallels with other adverbial categories.

- (32) a. John arrived that moment.
 b. You have lived some places warm and sunny.
 c. We were headed that direction.

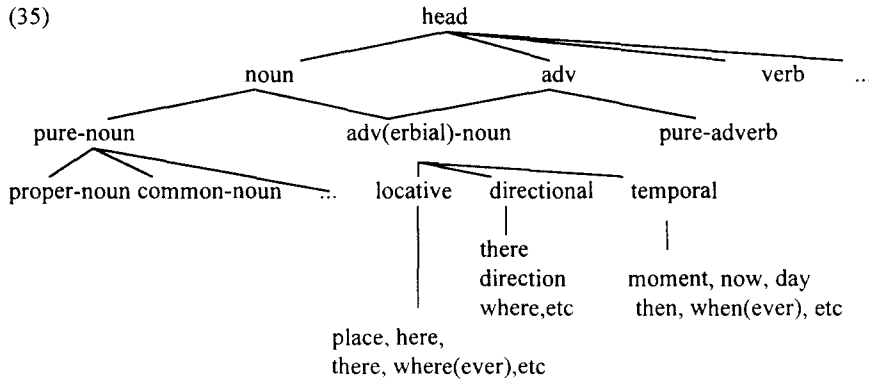
This predicts they freely alternate with other adverbial elements.

- (33) I'll put my books in the box/the same place I put them yesterday/here/there.

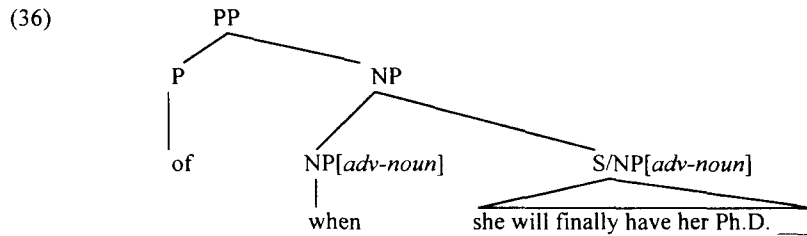
The class of these bare-NP adverbs are lexically determined (cf. Larson 1985).

- (34) a. John arrived *(during) this vacation.
 b. You have lived *(at) some location near Seoul.
 c. We were headed *(to) that course.

Though the words *vacation*, *location*, and *course* all semantically have a certain temporal, locative, or directive meaning, they obligatory require proper prepositions. This in turn means that adverbial usages of noun phrases depend on the lexical properties of their heads. Given these lexical facts, we construct the categorial hierarchy as follows.



As given in (35), the wh-words *when*, *where*, are taken to be the instances of *adv-noun*. Since the type *adv-noun* is a subtype of *noun*, a phrase projected by the members of this type will be able to occur anywhere an NP is selected for. Further their adverbial properties ensure that they can function as temporal, locative, and directional modifiers. This mode of treatment assigns the following structure to the sentence (31c).



The sentence missing an adverbial-noun NP modifies the free relative word, *when*. Notice here that there is no categorial mismatch between the two (see the constraint on *non-sub-free-rel*). Let us see the constraint on *free-rel-cl* again.

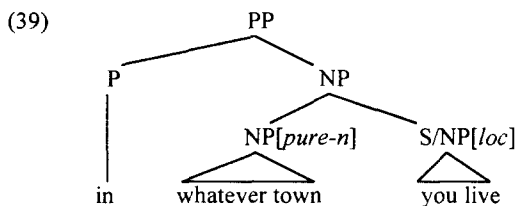
(37) Constraint on *fr-rel-cl*

$$fr-rel-cl \Rightarrow \left[\text{HEAD} \left[\begin{array}{l} \text{VFORM } fin \\ \text{MOD [NP [F-REL } neset]] \end{array} \right] \right]$$

The constraint states that *free-rel-cl* modifies an NP element, including bare NP adverbs typed as *adverb-noun* in our analysis. This predicts that all adverbials that cannot be lexically defined as *NP[adv-noun]* do not participate in free relative clause constructions. This prediction is borne out:³

- (38) a. ??I will live in whatever town you live ____.
 b. I will live in whatever town you live in ____.

The present analysis assigns the following structure to (38a).



The possible category of the missing element is NP[loc], a subtype of the type NP[adv-noun]. But the head that the free-rel-clause modifies is an NP projected from the category of *pure-noun*. This conflict explains the ungrammaticality of (38a).

Notice that even a prepositional argument cannot participate in free relative constructions (data from Bresnan and Grimshaw 1978).

- (40) a. *I'm interested in whatever subjects I think [I should be interested ____].
 b. *I'll speak to whatever group [you're willing to speak ____].
 c. *I'll work on whatever problems [you don't work ____].
 d. *John will be arrested by whoever [Kim was arrested ____].

The present analysis, where no PP gapped sentence can modify a free relative word because of the general constraint on *free-rel-cl*, has no difficulty in predicting the ungrammaticality of these sentences: the gapped elements are all PP's, and cannot be NPs including bare NP adverbs.

3.6 More on the Matching Effect

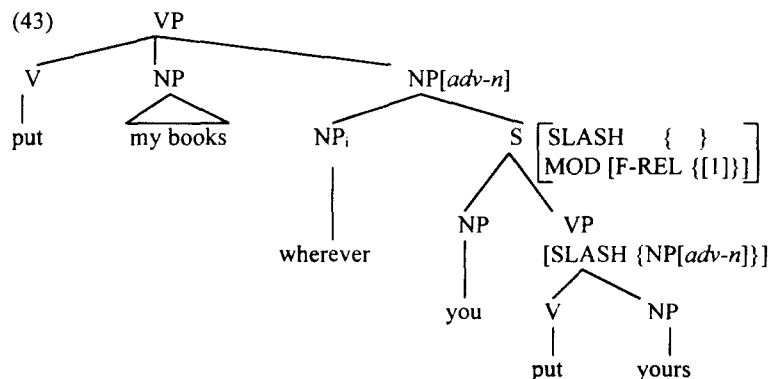
The next question arises as to how to deal with free relatives that overtly occupy an NP complement position.

- (41) a. I will put my books [in the box].
 b. I'll put my books [wherever [you put yours ____]].

The free relative in (41)b seems to serve as a PP complement. But as expected, our analysis assumes that the predicate *put* can select either a PP[loc] or a locative NP[adv-noun], a locative bare NP adverbial.

- (42) a. John put that book here/there/someplace warm and sunny.
 b. *John put that book some location/some area.

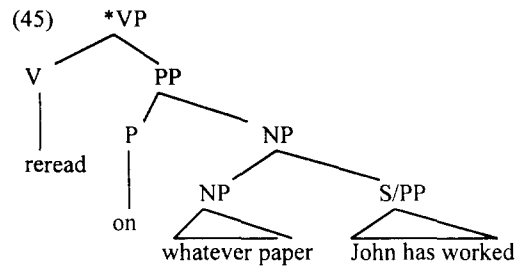
Given this assumption, our analysis assigns the following NP-headed structure to (42)b:



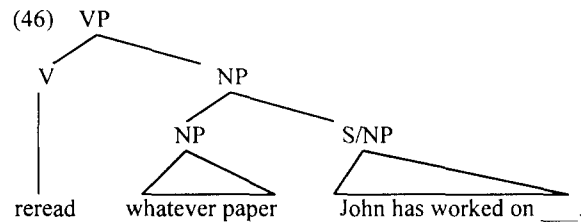
This mode of analysis will also easily account for the impossibility of pied piping in free relatives (cf. Bresnan and Grimshaw 1978).

- (44) a. I'll reread whatever paper John has worked on.
 b. *I'll reread [on [whatever paper] [John has worked]].

Our analysis assigns the structure (45) to (44b).



This structure violates two constraints. It first violates the Valence Principle: the verb selects not a PP complement, but an NP complement. Further, there is a mismatch between the gapped element and the free relative head. But (65a) has no such violations as can be seen in (67).



4. Conclusion

Our proposed analysis, first of all, presents a precise analysis of English free relatives within a nonderivational, constraint-based perspective, without appealing to transformational operations or invisible categories of any kind. The key point of this analysis is to factor out generalizations about dependency relations and clausal functions into distinct informational dimensions. This factorization allows us to capture generalizations about English free relative clause constructions in terms of constraint inheritance in a multiple inheritance type hierarchy.

Notes:

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1. There exist *wh-ever* free relatives with specific readings and plain *wh* free relatives with non-specific readings.

- a. John is speaking with whatever applicant his secretary called the day before.
- b. Do what the babysitter tells you to do.

For detailed discussion on the semantics of free relatives, refer to Jacobson (1990), Grosu (1996), among others.

2. We assume the nonlocal feature REL is partitioned into three subtypes, RESTRICTIVE-REL, NON-

RESTRICTIVE-REL, and FREE-REL. The lexical properties determine the possible set of wh-words that can occur in each type of relative clauses. For the treatment of restrictive relative clause constructions, see Sag (1996).

3. Most of the English native speakers we consulted do not allow the proposition dropping in free relative clause constructions. But literature such as Bresnan and Grimshaw (1979) and Larson (1985) all accept examples like (38)a. We tentatively assume this variation comes from the relaxation on the constraint between the wh-free relative head and the gapped element: To those who allow preposition dropping in a certain context, the matching of nominal features may be enough. We leave open a detailed discussion of this dialectal variation for future research.

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