

# HPSG: Relative Clauses

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Pollard and Sag (1994, Ch5) provides an analysis of:

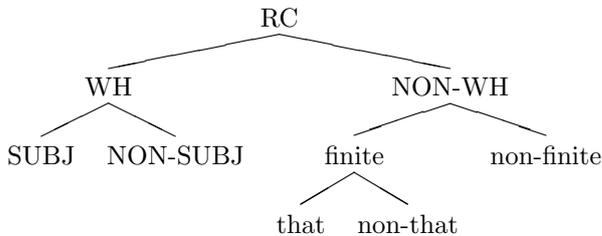
1. Head modifying RCs;
2. Relative-Correlative constructions;
3. Internally headed RCs.

English RCs are head modifying, and are the focus here.

More recently, Sag (1997) gives an analysis that does away with a lot of the machinery of the Pollard and Sag (1994) analysis, especially the ‘inaudibilia.’

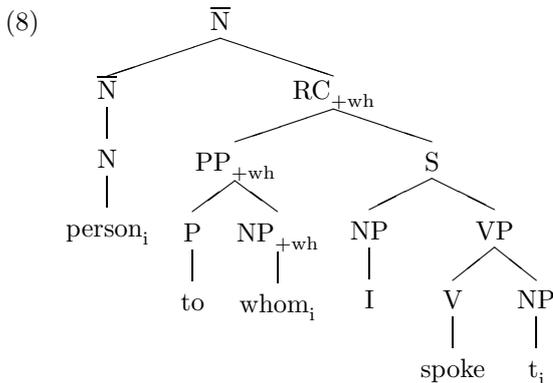
## 1 English (Head Modifying) RCs

### 1.1 Different Kinds of RC in English



- (1) The person who spoke to me [WH,subj]
- (2) The person to whom I spoke [WH,non-subj]
- (3) The person that spoke to me [that,subj]
- (4) The person that I spoke to [that,non-subj]
- (5) The person I spoke to [non-that]
- (6) The person to speak to [non-finite]
- (7) The person for us to speak to [non-finite]

The focus is on (2) here. Relative clauses are sentential constructions that modify  $\bar{N}$ s (the components are: head  $\bar{N}$ , relative pronoun, sentence, and relativized position (gap in English))



RCs involve three separate dependencies:

- Between Wh-Phrase (here  $PP_{+wh}$ ) and gap;

- Between Wh-item and RC (+wh: ‘Pied Piping’);
- Between head  $\bar{N}$  and RC.

## 2 Analyses

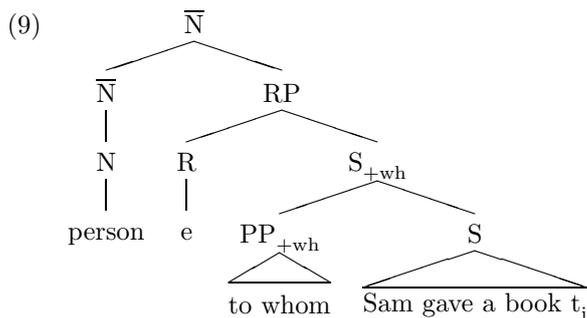
1. Wh-Movement to COMP (or SPEC of C)
2. GPSG;
3. HPSG;
  - Along the lines of GPSG, but with null relativizer R (to head RP);
  - ‘CP-IP’ analysis; R subcategorizes for both the S, and the proposed WH phrase.
  - *that*, in *student that  $\Delta$  left* is a relativizer
  - Other *that* relatives involve a different null relativizer

## 3 HPSG Analysis: Outline

The basic idea is that the S inside a relative clause is an ordinary one (albeit with a gap in it).

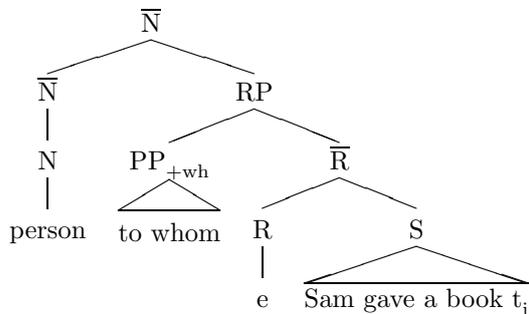
### 3.1 First Approximation

A phonetically empty relativizer (R, an ‘operator’) combines with an S to make something that can modify an  $\bar{N}$ .



### 3.2 Second Approximation

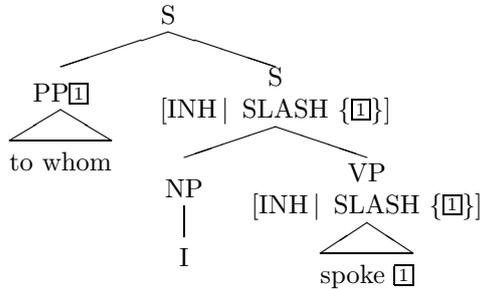
However, there is a problem with this analysis, so a slightly different analysis of the  $[_R e]$  is taken, where it combines first with the S, and then with the  $XP_{+wh}$ .



## 4 Component Parts of the Analysis

### 4.1 Wh-Phrase–Gap dependency

This is a normal unbounded filler-gap dependency, with XP the filler of the gap in the S.



### 4.2 Wh-item/RC dependency: ‘Pied Piping’

- (10) I distrust...
- books *which*<sub>i</sub> the government takes an interest in  $t_i$
  - books *in which*<sub>i</sub> the government takes an interest  $t_i$
  - books *an interest in which*<sub>i</sub> the government has taken  $t_i$
  - ...
  - books *the height of the letters on the covers of which*<sub>i</sub> the government regulates  $t_i$

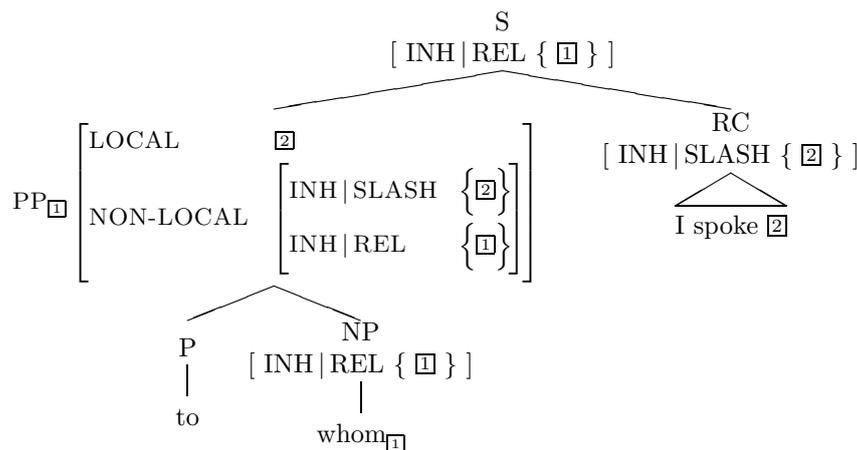
- (11) books [<sub>RC</sub> [<sub>NP</sub> the height of [<sub>NP</sub> the letters on [<sub>NP</sub> the covers of [<sub>NP</sub> which ]]]] [<sub>S/NP</sub> ... ]

The feature that makes the RC into an RC (e.g. ‘+wh’):

- starts on the Wh-item (relative pronoun);
- is not a head feature;
- percolates an unbounded distance.

Pollard and Sag (1994, Ch5) code it as a nonlocal feature, INH | REL, whose value is a set of indices.<sup>1</sup>

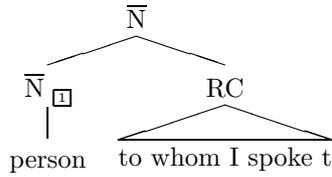
The INH | REL value on a relative pronoun is closely related to its index: if a relative pronoun INH | REL value is {1}, then its own index 1.



<sup>1</sup>English allows only one relative pronoun per relative clause, so the set is a singleton, other languages are more flexible.

### 4.3 Head $\bar{N}$ and RC

This is a normal head-adjunct structure.



Notice:

- Notice the meaning of *(the) person to whom I spoke* is roughly ‘the x such that x is a person and I spoke to x’
- The RC is ‘+wh’, but the mother  $\bar{N}$  is not.

To get it right, we must do the following:

- Add the CONTENT of the RC to the restriction set of the sister  $\bar{N}$ , and pass it up to the mother;
- Identify the index of the  $\bar{N} = \boxed{1}$  with the REL value of the RC (this will ensure that it is the same as the index on the relative pronoun which is passed down to the trace position);
- Terminate the INH|REL dependency.

Pollard and Sag (1994) suggest the easiest way to do this is with an empty ‘operator’: a phonetically null relativizer, which will be the head of the RC.

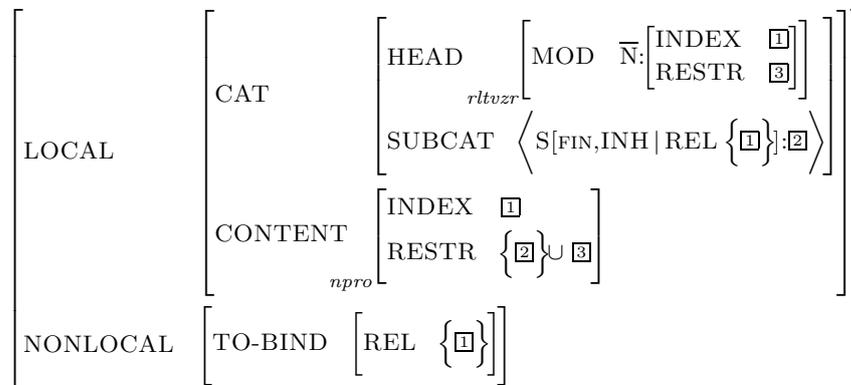
## 5 Technical Details and Refinements

The properties of this relativizer are straightforward:

- it must make sure the RC can modify an  $\bar{N}$ ; so it should be HEAD|MOD: $\bar{N}$ ; (recall, MOD is a head feature)
- to get the semantics right, it should union the semantics restrictions of the  $\bar{N}$  with those of the complement S; ...
- and identify the index on the  $\bar{N}$  ( $\boxed{1}$ , say) with the REL value on the S;
- to stop the INH|REL value going any higher, it should be NON-LOCAL|TOBIND|REL  $\boxed{1}$

### 5.1 Null-Relativizer (preliminary version)

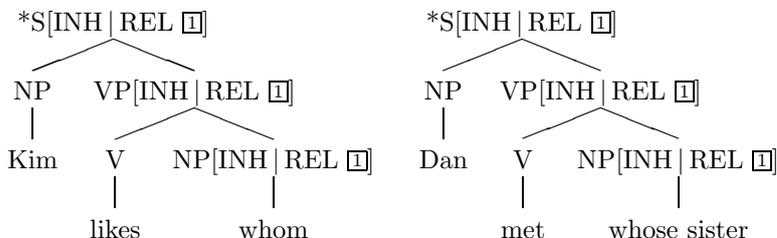
PHON is <>, SYNSEM is:



## 5.2 A Problem

However, there is a problem with this analysis: (12) and (14) are ungrammatical:

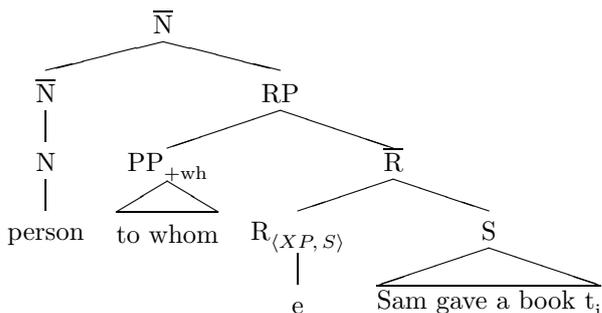
- (12) \*This is the person [Kim likes whom].  
 (13) This is the person [whom Kim likes  $\Delta$  ]  
 (14) \*This is the person [Dan met whose sister].  
 (15) This is the person [whose sister Dan met  $\Delta$  ]



Intuitively, the problem is that relative pronouns must be fronted in RCs (“Wh-movement is obligatory”); that is, the S inside the RC must be slashed, but there is no way to force this.

The empty relativizer cannot force it, because it is not a sister of the S (it is an aunt); the problem could be overcome if it was a sister . . . ,

This leads Pollard and Sag (1994) to suggest the second structure:



## 5.3 Null-Relativizer (revised): CP/IP

Instead of subcategorizing for an S, this version has the relativizer subcategorize for an XP and an S (and this S must be slashed).

Of course, we still have to:

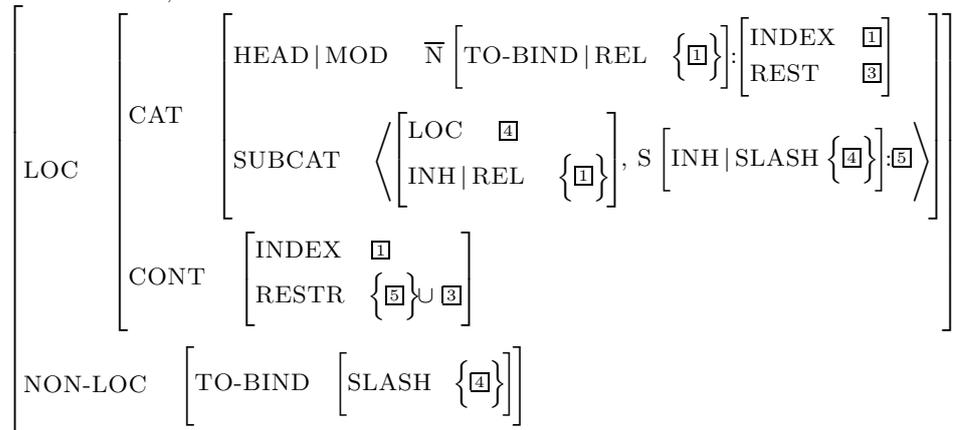
- top the INH | REL dependency going any higher;
- get the semantics right;
- get the local value of the XP down into the S (down to the trace);
- stop the SLASH value going any higher.

The relativizer can do this as follows:

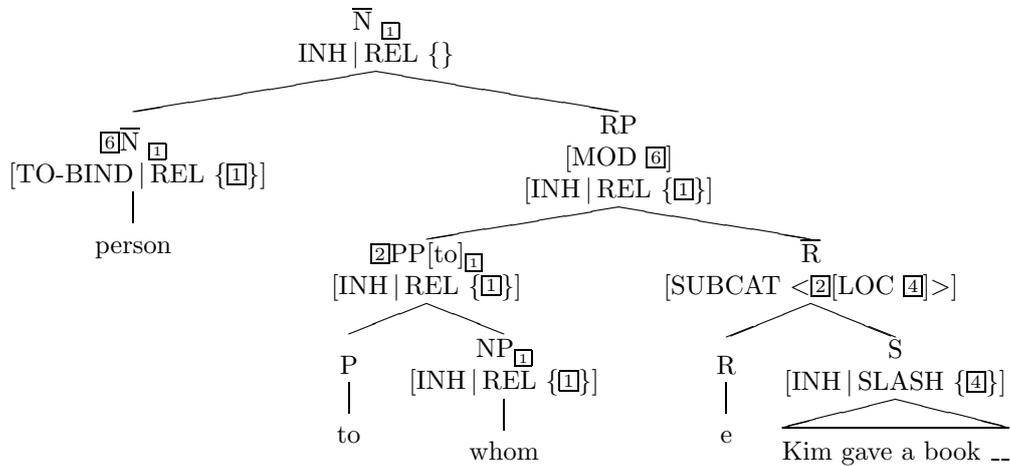
- It can require the S to be slashed, by saying this on its SUBCAT list:  
 $SUBCAT \langle XP, S [ INH | SLASH \{ \square \} ] \rangle$
- Since R is the head, it can stop the SLASH going any higher by binding it off:  
 $NON-LOCAL | TO-BIND | SLASH \{ XP \}$
- the other tasks could be achieved if we could somehow arrange for the  $\bar{N}$  to be marked as TO-BIND | REL { $\square$ } and have  $\square$  as its index, . . .
- but this is not a problem: adjuncts specify what the things they modify must look like via the

MOD feature, so we can just state these restrictions.

PHON is <>, SYNSEM is:



(S should also be *finite* and *unmarked*)



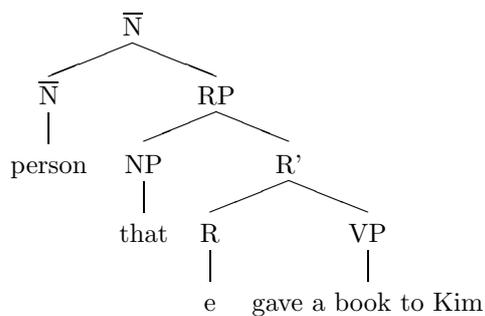
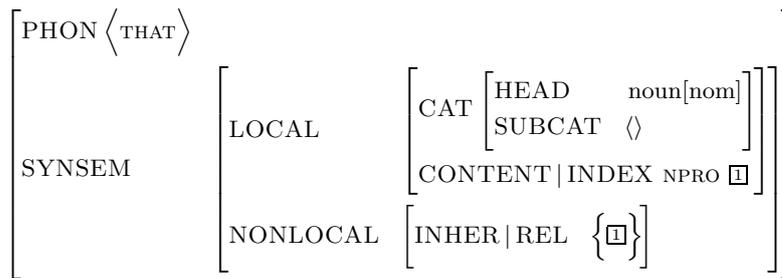
## 6 Implications/Extensions

### 6.1 *That* Relatives

“That” relatives are often thought of as ‘non-Wh’, and *that* is treated as not being a relative pronoun. For example, it does not allow pied piping:

- (16) a. the person to whom I spoke  
 b. the person that I spoke to  
 c. \*the person to that I spoke t

However, P&S observe that this follows if *that* is a *nominative* relative pronoun. On this view, Relativizer *that*:

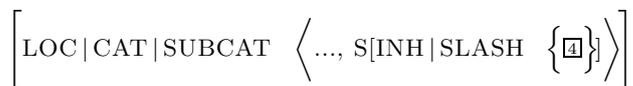


## 6.2 Complex NP Constraint

Extraction from relative clauses is disallowed:

- (17) I found [ a book [ which<sub>i</sub> Pat had given Δ<sub>i</sub> to the tall student ] ]  
 (18) \*Which student<sub>j</sub> did you find a book [ which<sub>i</sub> Pat had given --<sub>i</sub> to --<sub>j</sub> ]

The CNPC follows from the SUBCAT of the relativizers, where the S's SLASH value is a singleton set:



## References

- Carl J. Pollard and Ivan A. Sag. *Head-Driven Phrase Structure Grammar*. University of Chicago Press, Chicago, 1994.
- Ivan A. Sag. English relative clause constructions. *Journal of Linguistics*, 33(2):431–484, 1997. URL <ftp://ftp-csli.stanford.edu/linguistics/sag/rel-pap.ps.gz>.