A Theory of Relative Clause Attachment

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Outline

1. Relative clause phenomena
2. HPSG analysis: Generalized Modification
3. A New Theory of Relative Clause Attachment
   - Preliminaries: LRS
   - The syntactic part
   - The semantic part
4. Conclusion

Construal

(1) a. A man who was wearing a hat arrived yesterday.
    b. A man arrived yesterday who was wearing a hat.

(2) a. I gave every book which I had read to my sister.
    b. I gave every book to my sister which I had read.
Relative clause phenomena

Obligatory RC

Certain determiners (e.g. *derjenige/diejenige/dasjenige*) require the presence of a RC (Alexiadou et al. 2000)

(3) **diejenige (Frau) ** *( die dort steht )
the+that woman who there stands
‘the very woman who is standing there’

(4) Ich habe **diejenige (Frau) ** bewundert, *( die dort steht).*
I have the+that woman admired who there stands.
‘I’ve admired the very woman who is standing there.’

Extraposed RC marks wide scope

Williams’ Generalization:
When an adjunct $\beta$ is extraposed from a “source DP” $\alpha$, the scope of $\alpha$ is at least as high as the attachment site of $\beta$ (the extraposition site).


(5) a. *I looked for **anything** very intensely that will/would help me with my thesis.*
   b. I looked for **something** very intensely that will (likely) help me with my thesis.

(6) Pat looked for **a secretary** very intensely that would proofread her manuscript.

Generalized Modification

HPSG analysis: Generalized Modification

“**A relative clause can be realized in a syntactic position which allows access to a suitable antecedent of the relative pronoun.**”

- Nouns introduce ANCHORS
  (pair of index + local top handle: $<i, \text{hn}>$)
- Anchors percolate up the tree
- Index + handle identification

(7) $\text{YP} \text{XP} \left[\text{ANCHORS } \mathbf{S} = \{<i, \text{hm}>, \ldots \} \right] \text{RP} \left[<i, \text{hn}>\right]$
Problems with Kiss' Generalized Modification

- Does not capture the phenomenon of determiners with obligatory RCs (derjenige/diejenige/dasjenige)
- Does not account for RCs with elliptical NPs
- Does not account for the scope effects

Revised steps

- Determiner (rather than the noun) introduces the anchor
  - obligatorily for determiners like derjenige/diejenige/dasjenige
  - optionally for "normal" determiners like the/a, der/ein
- Anchors optionally cancelled when "picked up" by a RC
- At root node, all anchors must have been used
- Noun-ellipsis-schema for elliptical NPs
- Framework of L(exical) R(esource) S(emantics) to account for scope effects
A New Theory of Relative Clause Attachment

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L(exical) R(esource) S(emantics) (Richter&Sailer 2004)

CONTENT: aspects relevant for local semantic phenomena (e.g. linking, selection)

(8) Appropriateness conditions of the sort content:

\[
\text{content: } \left[ \text{INDEX \ extended-index } \right]
\]

(9) Appropriateness conditions of the sort extended-index:

\[
\text{extended-index: } \left[ \text{VAR \ term } \right]
\]

MAIN: main semantic predicate contributed by a word

(10) Sketch of the lexical entry of book:

\[
\text{word \ PHON} \langle \text{book} \rangle
\]

\[
\text{SS|LOC|CONT} \left[ \text{INDEX \ PHI \ VAR \ PERS \ NUM \ GEN \ neut} \right]
\]

\[
\text{MAIN \ book'}
\]
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The syntactic part

The anchor

(11) ANCHORS as nonlocal feature:

\[
\begin{array}{c}
\text{SYNSEM|NONLOC} \\
\text{INHERITED} \\
\text{TO-BIND}
\end{array}
\begin{array}{c}
\text{SLASH set(local)} \\
\text{ANC(HORS) set(local)} \\
\text{SLASH set(local)} \\
\text{ANC(HORS) set(local)}
\end{array}
\]

How the anchor is introduced

The determiner as functor which selects the NP (Van Eynde 1998, 2006)

(13) \textit{hd-functor-phr} \Rightarrow

\[
\begin{array}{c}
\text{DAUGHTERS} \left\langle \text{SYNSEM|LOC|CAT|HEAD|SELECT 1, 2} \right\rangle \\
\text{HEAD-DTR 2 SYNSEM 1 synsem}
\end{array}
\]

The determiner introduces the anchor.

(14) Lexical entry of determiner with obligatory RC

\[
\begin{array}{c}
\text{PHON (diejenige)} \\
\text{LOC|CAT|HEAD} [\text{determiner}] \\
\text{SELECT|LOC|CONT 1]}
\end{array}
\begin{array}{c}
\text{SS} \\
\text{NONLOC|INH|ANCHORS} \left\{ \text{index-local} \right\}
\end{array}
\end{array}
\]
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The syntactic part

(15) Lexical entry of “normal” determiner (with optional RC)

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(16) The Nonlocal Feature Principle
(Pollard & Sag 1994, Kiss 2005, Crysmann (to appear))

In a headed phrase, for each nonlocal feature \( F = \text{SLASH}, \text{QUE}, \text{REL}, \text{or ANCHORS}, \) the value of \( \text{SYNSEM}|\text{NONLOCAL}|\text{INHERITED}|F \) is the set difference of the union of the values on all the daughters and the value of \( \text{SYNSEM}|\text{NONLOCAL}|\text{TO-BIND}|F \) on the HEAD-DAUGHTER.

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(17) NP

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(18) diejenige (Frau) die dort steht
the+that woman who there stands
‘the very woman who is standing there’

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Constraint on *noun-ellipsis-functor* (adopted from Branco & Costa 2006)

(19) \[ \text{noun-ellipsis-functor} \Rightarrow \]

\[
\begin{array}{c}
\text{SS|LOC|CAT} \\
\text{DTRS} \\
\end{array}
\begin{array}{c}
\text{HEAD 1 noun} \\
\text{select \ LOC\|\ CAT} \\
\text{head 2} \\
\end{array}
\]

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How the anchor is “picked up” by the RC

(21) \[
\begin{array}{c}
\text{NP} \\
\text{LOC\|\ CAT} \\
\text{select \ LOC\|\ CAT} \\
\text{nonloc\|\ inh\|\ anc} \\
\text{loosen} \\
\end{array}
\begin{array}{c}
\text{head 1 noun} \\
\text{head 2} \\
\text{nonloc\|\ inh\|\ anc} \\
\text{cont 3} \\
\end{array}
\]

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(22) Generalized Modification (revised, preliminary)

(20) \[
\text{noun-ellipsis-functor} \Rightarrow
\end{array}
\begin{array}{c}
\text{SS} \\
\text{LOC\|\ CAT} \\
\text{select \ LOC\|\ CAT} \\
\text{nonloc\|\ inh\|\ anc} \\
\text{cont 3} \\
\end{array}
\begin{array}{c}
\text{head 1 noun} \\
\text{head 2} \\
\text{nonloc\|\ inh\|\ anc} \\
\text{cont 3} \\
\end{array}
\]

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The syntactic part

Anchors only optionally bound in order to allow for multiple RCs:

(23) A paper just came out which you might be interested in which talks about extraposition. (Keller 1995:2)

Constraint on clause

(24) \[\text{clause } \langle \text{SS} | \text{STATUS complete} \rangle \Rightarrow \langle \text{SS} | \text{NONLOC} | \text{INH} | \text{ANCHORS} \{ \} \rangle\]

(see Richter 1997)

To ensure that obligatory anchors (derjenige/diejenige/dasjenige) are picked up by RC

Right Roof Constraint


b. * [Talking to a student is interesting] who is intelligent.

LRS (Richter&Sailer 2004)

(26) Appropriateness conditions:

a. \[\text{sign:} \begin{bmatrix} \text{PHON} & \text{phonology} \\ \text{SYNSEM} & \text{synsem} \\ \text{LO(GICAL)-F(ORM)} & \text{IrS} \end{bmatrix}\]

b. \[\text{Irs:} \begin{bmatrix} \text{EX(TERINAL)-CONT(ENT)} & m(eaningful) e(xpression) \\ \text{IN(TERINAL)-CONT(ENT)} & m(eaningful) e(xpression) \\ \text{PARTS} & \text{list(me)} \end{bmatrix}\]

LF: aspects relevant for nonlocal semantics

EXCONT: overall logical form of a phrase

INCONT: scopally lowest element contributed by a word

PARTS: collection of meaning contributions of the words
Lexical entries

(27) Pat:

\[
\begin{array}{c}
\text{word} \\
\text{PHON} \langle \text{Pat} \rangle \\
\text{content} \\
\text{SS|LOC|CONT} \\
\text{INDEX} \\
\text{PER} \\
\text{3rd} \\
\text{num} \\
\text{sg} \\
\text{VAR} \\
\text{p} \\
\text{PHI} \\
\text{me} \\
\text{EXCONT} \\
\text{INCONT} \\
\text{PARTS} \\
\end{array}
\]

(28) hire:

\[
\begin{array}{c}
\text{word} \\
\text{PHON} \langle \text{hire} \rangle \\
\text{HEAD} \\
\text{CAT} \\
\text{VERB} \\
\text{SUBCAT} \\
\text{NP} \left[ \text{INDEX VAR} x, \text{NP} \left[ \text{INDEX VAR} y \right] \right] \\
\text{content} \\
\text{SS|LOC} \\
\text{CONT} \\
\text{INDEX} \\
\text{VAR} \\
\text{e} \\
\text{MAIN} \\
\text{me} \\
\text{OUT} \\
\text{HIRE} \\
\text{e} \\
\text{x} \\
\text{e} \\
\text{y} \\
\text{y} \\
\text{e} \\
\end{array}
\]

(29) a:

\[
\begin{array}{c}
\text{word} \\
\text{PHON} \langle a \rangle \\
\text{content} \\
\text{SS|LOC|CONT} \\
\text{INDEX} \\
\text{VAR} \\
\text{y} \\
\text{me} \\
\text{EXCONT} \\
\text{INCONT} \\
\text{PARTS} \\
\end{array}
\]

(30) secretary:

\[
\begin{array}{c}
\text{word} \\
\text{PHON} \langle \text{secretary} \rangle \\
\text{content} \\
\text{SS|LOC|CONT} \\
\text{INDEX} \\
\text{VAR} \\
\text{y} \\
\text{PER} \\
\text{3rd} \\
\text{num} \\
\text{sg} \\
\text{main} \\
\text{s} \\
\text{me} \\
\text{EXCONT} \\
\text{INCONT} \\
\text{PARTS} \\
\end{array}
\]
Basic principles

(31) The EXCONT PRINCIPLE:
   a. In every utterance, every subexpression of the EXCONT value of the utterance is an element of its PARTS list, and every element of the utterance’s PARTS list is a subexpression of the EXCONT value.
   b. ...

Semantics Principle, I

(32) In each headed-phrase,
   a. the EXCONT value of the head and the mother are identical,
   b. the INCONT value of the head and the mother are identical,
   c. the PARTS value contains all and only the elements of the PARTS values of the daughters.

Semantics Principle, II

(33) In each headed-phrase, the following conditions hold:
   a. If the non-head is a quantifier, then its INCONT value is of the form $Qx[\alpha \circ \beta]$, the INCONT value of the head is a component of $\alpha$, and the INCONT value of the non-head daughter is identical with the EXCONT value of the head daughter,
   b. If the non-head is a quantified NP with an EXCONT value of the form $Qx[\alpha \circ \beta]$, then the INCONT value of the head is a component of $\beta$.

Every man

(34) $\forall x \ [\alpha \rightarrow \beta]$
(37) In a head-adjunct-phrase, the EXCONT value of the non-head is a component of the EXCONT value of the head, and
   a. if the non-head is an intersective modifier, then its EXCONT value is of the form $\alpha \land \beta$ and the INCONT value of the head is a component of $\beta$.  
   b. ... 

(38) $\text{book'}(x)$

Semantics Principle, III

An example

(39) Pat hired a secretary.
(40) Pat seeks a secretary.
The scope problem: RC marks scope

Williams' Generalization:
When an adjunct $\beta$ is extraposed from a "source DP" $\alpha$, the scope of $\alpha$ is at least as high as the attachment site of $\beta$ (the extraposition site).


(41) a. I looked for something very intensely that will (likely) help me with my thesis.
   b. *I looked for anything very intensely that will/would help me with my thesis.

(42) Pat looked for a secretary very intensely that would proofread her manuscript.

∃ > look for * look for > ∃

Example: Extraposed RC

(45) Pat seeks a secretary very intensely that would proofread the manuscripts.
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The semantic part

NP1

\[
\begin{align*}
&D \quad \text{ANC} \quad \text{EXCONT} \quad \text{INCONT} \\
&\text{PHON} \quad \langle a \rangle \\
&\text{ANC} \quad \langle 5 \rangle \\
&\text{INCONT} \quad \langle 5 \rangle \\
&\Rightarrow \exists y ([\ldots \text{secretary}'(y)\ldots]) \\
&\exists \alpha \\
&\Rightarrow \exists y ([\ldots \text{secretary}'(y)\ldots] \land \beta)
\end{align*}
\]

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The semantic part

VP1

\[
\begin{align*}
&\text{PHON} \quad \langle \text{seeks} \rangle \\
&\text{MAIN} \quad \text{1d} \quad \text{seek}' \quad \langle @, e, P, \ldots, \ldots \rangle \\
&\text{INCONT} \quad \langle P(\emptyset, y) \rangle \\
&\text{PARTS} \quad \langle 1 \rangle \quad \text{seek}'(\emptyset, e, \ldots, \ldots, \ldots, \ldots) \\
&\Rightarrow \exists y ([\ldots \text{secretary}'(y)\ldots] \land \beta)
\end{align*}
\]

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The semantic part

VP3

\[
\begin{align*}
&\Rightarrow \exists y ([\ldots \text{secretary}'(y)\ldots] \\
&\text{VP3} \quad \text{3a} \quad \text{δ} \quad \Rightarrow \exists y ([\ldots \text{secretary}'(y)\ldots])
\end{align*}
\]

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The semantic part

\[ \text{VP}_3 \]

\[ 3a \triangleleft \delta \]

\[ \Rightarrow [\text{pm}'(\gamma) \wedge (\ldots \text{secretary}' \ldots)] \]

\[ 1d \triangleleft \beta \]

\[ \Rightarrow \exists y[(\ldots \text{secretary}'(\gamma) \ldots) \wedge (\ldots \text{seek}' \ldots)] \]

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The semantic part

\[ \text{VP}_3 \]

\[ 3a \triangleleft \delta \]

\[ \Rightarrow [\text{pm}'(\gamma) \wedge (\ldots \text{secretary}' \ldots)] \]

\[ 1d \triangleleft \beta \]

\[ \Rightarrow \exists y[(\ldots \text{secretary}'(\gamma) \ldots) \wedge (\ldots \text{seek}' \ldots)] \]

(46) * I saw [a [who was wearing a hat]] man yesterday.

- Ruled out by the constraint that the MAIN of the head daughter must be in the scope of the quantifier.
- The MAIN of a determiner cannot be in its own scope.

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## Conclusion

- Generalized Modification, revised
- Obligatory RCs (*derjenige/diejenige/dasjenige*)
- Scope facts: RC marks scope

## References

### References I


### References II


### References III


