Relativsätze: die harten Nüsse

Wolfgang Sternefeld, Universität Tübingen

Frankfurt 6.12.2011

Relative Clauses: The Tough Nuts

Wolfgang Sternefeld, Universität Tübingen

Frankfurt 6.12.2011

Intro and Overview

Empirical Motivation: blue outscopes red

(1) a. the interest in each other [$_{RC}$ that John and Mary showed *t*] (anaphors)
b. The relative of his [$_{RC}$ that everybody likes *t*] lives far away (bound variables)
c. The headway [$_{RC}$ that we made *t*] was satisfactory (idioms)
d. the last book John said that Tolstoy has written *t* (scope reconstruction for *last*)

Generalization: Something inside of the RC has scope over something inside the head of the RC.

Overview

1. head internal analyses, criticism
2. more criticism, against syntactic reconstruction
3. conclusion: if there is reconstruction, it's semantic
4. the worst case: telescoping and scope without c-command
5. syntactic preliminaries: RCs attach to DP rather than NP
6. semantics 1: open propositions as closed formulas
7. semantics 2: continuation semantics and inverse linking
8. homework: the worst case
9. look ahead to next talk: a general system for β-reduction

Two Head Internal Analyses

Analyses (Vergnaud (1974), Kayne (1994), and others):

The so-called “Raising Analysis **RA**”:
The head of the RC is generated inside of the RC, moved to SpecC, and then — moved (raised) to the head position.

The co-called “Matching Analysis **MA**”:
The head of the RC generated inside and outside the RC, the inside one moves to SpecC, and is obligatorily deleted.

Sketch of a RA:

(2) the house which I bought

a. [$_{\text{DP}}$ the e [$_{\text{RC}}$ I bought which house]
b. [$_{\text{DP}}$ the e [$_{\text{RC}}$ which house [$_{\text{RC}}$ I bought t$_i$]]]
c. [$_{\text{DP}}$ the house$_j$ [$_{\text{RC}}$ which t$_j$ [$_{\text{RC}}$ I bought t$_i$]]]

Sketch of a MA:

(3) a. [$_{\text{DP}}$ the house$_i$ [$_{\text{RC}}$ [$_{\text{RC}}$ I bought which house]]
b. [$_{\text{DP}}$ the house [$_{\text{RC}}$ which house [$_{\text{RC}}$ I bought t]]
c. [$_{\text{DP}}$ the house [$_{\text{RC}}$ which house [$_{\text{RC}}$ I bought t]]

Against RA

Wellknown counterarguments against RA

- Case conflict in German:

(4)	des_{GEN}	Mannes_{GEN}	den_{AKK}	(Mann_{AKK})	ich	kenne
	of	the	man	who	I	know

- Conflict of declension class in German:

(5)	*ein	Angestellter,	der	(Angestellte)	beleidigt	wurde
	an	employee	who		insulted	was

- Island violations:

(6)	der Tag_i	$[_{PP}$ an dem	t_i]	er	ankam
	the day	on which		he	arrived

The MA does not encounter these difficulties if it is assumed that
— matching can ignore morphology
— matching can ignore islands for movement.

Against RA

- Lost generalization: Intransitive D's coincide in morph. form:

(7) a. Ich vertraue den Freunden
I trust the friends
b. Ich vertraue denen
I trust them

(8) a. den Freunden$_i$, denen *[Freunden$_i$] ich vertraue
the friends who I trust
b.*den Freunden$_i$, den [Freunden$_i$] ich vertraue
the friends who I trust

- unmotivated transitivity of RPs like *wo, womit, warum, weshalb, wie* etc.

(9) der Ort [$_{RC}$ [wo Ort] ich Dich suche
the place where I you look-for

- Mismatch between transitivity of RP and its meaning:

(10) a. der Mann dessen Mannes Tochter
the man whose man's daughter ≠
b. der Mann dessen Mannes Tochter

Against Reconstruction in General

Further arguments against reconstruction. Recall the case of idioms:

(11) the headway [$_{RC}$ that we made t] was satisfactory

But: Gazdar et al. (1985) p. 238:

(12) a. My goose is cooked, but yours isn't
b. We had expected that excellent care would be taken of the orphants, and it was taken
c. I said close tabs would be kept on Sandy, but they weren't
d. We thought the bottom would fall out of the housing market, but it didn't.

Ordinary pronouns can pick up idiomatic meaning in an environment of obligatary idiomatic interpretation at the position of the pronoun. But if ordinary pronouns can do so, relative pronouns also can. Thus, idioms provide no argument for syntactic reconstruction.

Against Reconstruction in General

No Condition C effects in German (Salzmann (2006) p. 101):

(269) a. das [Bild von Peter], das er t am besten findet
the picture of Peter which he the best finds
'the picture of Peter$_i$ that he$_i$ likes best'

b. die [Nachforschungen über Peter], die er mir lieber t
the investigations about Peter which he me prefer
verschwiegen hätte
conceal had
'the investigations about Peter$_i$ that he$_i$ would have rather concealed from me'

c. der [Wesenszug von Peter], auf den er am meisten t
the trait of Peter on which he the most
stolz ist
proud is
'the trait of Peter$_i$ he$_i$ is most proud of'

Against Reconstruction in General

No Condition C effects in English for low reading: (Heycock (2011))

(13) That is the only picture of Kahlo that they say she was ever willing to look at —

No Condition C effects in English for idiom reconstruction: (Heycock op. cit.)

(14) This represents the only headway on Lucy's problem that she thinks they have made — so far

Against Reconstruction in General

If reconstruction is blocked, blocking is not syntactically conditioned:

Negation (Bhatt (2002)):

(15) This is the first book that John denied/didn't say that Antonia wrote $\neq$
This is the book that John denied/didn't say that Antonia wrote first

(16) This is the first book that few people said that Antonia wrote $\neq$
This is the book that few people said that Antonia wrote first

Adverbs: (Heycock op. cit.)

(17) This is the first book that people have occasionally thought that Antonia wrote $\neq$
This is the book that people have occasionally thought that Antonia wrote first

Against Reconstruction in General

Various predicates (factives, implicatives, deontic operators etc.)

(18) That is the only book that I know she likes $\neq$
That is the book that I know is the only one she likes

(19) That are the only people that he managed to insult $\neq$
That are the only people such that he managed to insult only them

Conclusion: almost anything can intervene. The (im)possibility of reconstruction is not triggered by syntactic conditions. Therefore **reconstruction cannot be syntactic.**

Against Reconstruction in General

No Condition C trapping effects in German (Salzmann op. cit. p. 109):

(20) die [Nachforschungen von Peter über ihre$_j$ Vergangenheit],
the investigations of Peter about her past
die er jeder Geliebten$_j$ — verheimlichte
which he every.DAT mistress concealed
lit.: 'the investigations by Peter$_i$ about her$_j$ past that he$_i$ concealed from every mistress$_j$'

(20) seems to raise an additional problem: if there is no syntactic reconstruction, how can we get *ihre*$_j$ into the scope of *jeder Geliebten*$_j$?

(20) die [Nachforschungen von Peter über ihre$_j$ Vergangenheit],
the investigations of Peter about her past
die er jeder Geliebten$_j$ — verheimlichte
which he every.DAT mistress concealed

Beyond Reconstruction

The worst case scenario:

(21) The picture of his$_i$ mother that every soldier$_i$ kept t wrapped in a sock was not much use to him$_i$

(21) is taken from Safir (1999) p. 613, who attributes it to Bianchi and Åfarli. None of these authors, however, mentioned the following crucial problems:

- *every soldier* must have scope over the entire subject phrase
- *every soldier* must be able to bind *him* in the matrix clause

In any case **syntactic reconstruction is insufficient** to handle these examples.

Proposed solution (the only one I know of): QR out of RC as proposed by Hulsey and Sauerland (2006). Caveat: QR should be clause-bound.

Beyond Reconstruction

Conclusion so far:

- We need a head external syntax for (21) and all other examples
- Scope and binding effects, if there are any, cannot be handled by syntactic reconstruction
- It seems that reconstruction effects do not arise from giving A low scope over B (by some mechanism) but by giving B wide scope over A (by some other mechanism)
- Thesis: we can account for (21) (the worst case) by developing a mechanism that does just this: give B inside of a RC wide scope with respect to its head in a novel *in situ* analysis of scope and binding.
- In particular, we will develop a mechanism for binding (and scope) that does not require surface c-command between binder and bindee.

The syntax semantics interface

Standard assumption for relative clause attachment:

(22) $[_{DP}$ the $[_{NP}$ $[_{NP}$ man $][_{RC}$ who lives in NY $]]]$

We will depart from this tradition in assuming the following structures:

(23) a. $[_{DP}$ $[_{DP}$ the man $][_{RC}$ who lives in NY $]]$
b. $[_{DP}$ $[_{DP}$ the man $][_{PP}$ from Boston $]]$

Motivation: Various relations between D(P) and RC (to the exclusion of NP), e.g.:

- Hydras: $[_{DP}$ the man and the woman $][_{RC}$ who hate each other $]$
- (24) derjenige (Mann) *($[_{RC}$ der kam])
  that-one (man) who came

The syntax semantics interface

- no phonological reduction of D in the presence of a RC (cf. Prinzhorn (2005))

(25) *Alle Kinder ham'n Arm, der dreckert war, gehobn
all children have-the arm that dirty was risen

- Wide scope RC over NP (Richard Larson):

(26) die meisten angeblichen Diebe, die sich auf
the most alleged thieves who themselves on
freistehende Landhäuser spezialisiert haben
free-standing cottages specialized have
most alleged thieves who specialized on
vacant/straggling cottages

The syntax semantics interface

But now, given the structure [$_{\text{DP}}$ DP RC], either
— DP may have scope over RC, or
— RC may have scope over DP. The same for PPs in cases of inversed linking:

(27) the rose in every vase = [$_{\text{DP}}$ DP PP]

— PP scope over DP: inversed linking reading
— DP scope over PP: implausible linear reading

We derive these readings by adopting Barker's framework of continuations. A continuation is basically a placeholder for material that will be stuffed in at a later time. Every predicate may come with a continuation. Representing cont. as $*$ and depending on whether or not the restriction R or the scope S of a quantifier Q comes along with a continuation, we derive the 4 possibilities in (28):

The syntax semantics interface

(28) Q(R,S), Q($*$R,S), Q(R,$*$S), Q($*$R,$*$S)

E.g., let Q = the, R = man and PP = from Boston, then one possiblity is

(29) the man from Boston = $\lambda *$.the($*$man, S)(from Boston) = the(man $\cap$ from Boston, S)

More precisely, we assume a shift from properties in (28) and (29) to open propositions (a point to be discussed below). (30) sketches a derivation of the linear reading, (31) one of the inversed reading:

(30) the rose in every vase

a. every vase = $\forall x(\mathbf{vase}(x) \rightarrow P(x))$

b. in = $\mathbf{in}(y, x)$

c. in every vase = $\forall x(\mathbf{vase}(x) \rightarrow \mathbf{in}(y, x))$

d. the rose = $\lambda * \mathrm{THE}_y(*\mathbf{rose}(y), S(y))$

e. the rose in every vase = $\mathrm{THE}_y(\mathbf{rose}(y) \wedge \forall x(\mathbf{vase}(x) \rightarrow \mathbf{in}(y, x)), S(y))$

The syntax semantics interface

Now for the more plausible inversed linking reading:

(31) a. every vase = $\forall x(\mathbf{vase}(x) \to P(x))$

b. in = $*\mathbf{in}(y, x)$

c. in every vase = $\lambda * \forall x(\mathbf{vase}(x) \to *\mathbf{in}(y, x))$

d. the rose = $\mathrm{THE}_y(\mathbf{rose}(y), S(y))$

e. the rose in every vase = $\forall x(\mathbf{vase}(x) \to \mathrm{THE}_y(\mathbf{rose}(y) \wedge \mathbf{in}(y, x)), S(y))$

Note that when performing the step from (b) to (c) the free variable x in (b) must end up bound in the scope of the binder $\forall x$ in (c), and likewise when deriving (e) from (c) and (d) the variable y free in (c) ends up bound in the scope of the binder THE_y. We therefore need a theory where semantic composition via lambda abstraction is fully compatible with unrestrained beta-reduction.

The syntax semantics interface

We thus need a theory where the following equivalence holds:

(32) $\lambda p \forall x(P(x) \rightarrow p)(Q(x)) = \forall x(P(x) \rightarrow Q(x))$

But β-reduction of this sort is strictly forbidden in formal semantics: we cannot, by any means, interpret a free variable (the blue x) as if it were in the scope of a binder.

The syntax semantics interface

We thus need a theory where the following equivalence holds:

(32) $\lambda p \forall x(P(x) \rightarrow p)(Q(x)) = \forall x(P(x) \rightarrow Q(x))$

But β-reduction of this sort is strictly forbidden in formal semantics: we cannot, by any means, interpret a free variable (the blue x) as if it were in the scope of a binder.

Formulas and Value Assignments

CONCLUSION:
Logical theory notwithstanding, we as linguists need such a new framework, one that allows for unrestrained β-reduction, in particular for accounting for data like:

(33) a. Sich selber hasst niemand
him self hates nobody
'nobody hates himself'

b. Seinen$_i$ Bruder hasst niemand$_i$
his brother hates noone
'noone$_i$ hates his$_i$ brother'

A first step towards analysis data like these *in situ*, i.e. without syntactic reconstruction, has been taken in Sternefeld (1998, 2001); a full-fledged system of unconstrained β-reduction has been developed in Klein and Sternefeld (2011*b*). To account for the RC-data it suffices to look at the first steps of the more general framwork.

Logic

Basic assumptions:

1. a proposition does not denote a truth value but the set of value assignments for variables that satisfy the proposition
2. a proposition containing free variables is represented (interpreted or translated) as one without free variables, e.g.:

$$\mathbf{hate}(x_7, x_9) \rightsquigarrow \lambda g.\mathbf{hate}(g(7), g(9))$$

   with: a. n the type of the intergers 7 and 9, called identifiers (pointers, discourse markers etc.)
   b. g a variable of type $\langle n, e\rangle$, called assignment function
   c. $\langle\langle n, e\rangle, t\rangle$ the type of all (type shifted) propositions.
3. all expressions of type α are now type shifted to $\langle\langle n, e\rangle, \alpha\rangle$

Consequences:

- "open" propositions can be β-reduced (i.e. lambda converted) without restrictions
- semantic reconstruction is β-reduction

Logic

Quantification over "‘variables” becomes compositional. For example,

(34) $(\forall x_7)(\mathbf{hate}(x_7, x_9))$

in traditional notation now translates type shifted as:

(35) $\forall_{\langle n,\langle\langle n,e\rangle,t\rangle,\langle\langle n,e\rangle,t\rangle\rangle}(7)(\lambda g.\mathbf{hate}(g(7), g(9)))$

(36) a. Definition of (lifted) universal quantification:
$\forall_{\langle n,\langle\langle n,e\rangle,t\rangle,\langle\langle n,e\rangle,t\rangle\rangle} := \lambda i_{\langle n\rangle}\lambda p_{\langle\langle n,e\rangle,t\rangle}\lambda g_{\langle n,e\rangle}(\forall x_{\langle e\rangle})(p(g[i/x]))$
b. Definition of modified assignment:
$g[i/x] := (\iota f_{\langle n,e\rangle})(f(i) = x \wedge \forall n(n \neq i \rightarrow f(n) = g(n)))$

Logic

(37) $(\forall x_7)(\mathbf{hate}(x_7, x_9)) \rightsquigarrow$

a. $\forall(7)(\lambda g.\mathbf{hate}(g(7), g(9))) =$

b. $\lambda i_n \lambda p_{\langle\langle n,e\rangle,t\rangle} \lambda g_{\langle n,e\rangle}(\forall x)(p(g[i/x]))(7)(\lambda g.\mathbf{hate}(g(7), g(9))) =$

c. $\lambda p_{\langle\langle n,e\rangle,t\rangle} \lambda g_{\langle n,e\rangle}(\forall x)(p(g[7/x]))(\lambda g.\mathbf{hate}(g(7), g(9))) =$

d. $\lambda g_{\langle n,e\rangle}(\forall x)(\lambda g.\mathbf{hate}(g(7), g(9))(g[7/x])) =$

e. $\lambda g_{\langle n,e\rangle}(\forall x)(\mathbf{hate}(g[7/x](7), g[7/x](9))) =$

f. $\lambda g_{\langle n,e\rangle}(\forall x)(\mathbf{hate}(x, g[7/x](9))) =$

g. $\lambda g_{\langle n,e\rangle}(\forall x)(\mathbf{hate}(x, g(9)))$

Note that in the above derivation, the step from (c.) to (d.) involves β-reduction into the scope of a quantifier. This is possible because the argument does not contain a free variable. It's as if (38) now becomes true. . .

(38) $\lambda p(\forall x)(\ldots\ p \ldots)(R(\ldots x \ldots)) = (\forall x)(\ldots\ R(\ldots x \ldots) \ldots)$

Logic

To simplify exposition, I will use ordinary notation (as in (38)) whenever possible; it's obvious how to translate these into type shifted formulas. E.g.,

(39) Conjunction translates as:
$(p \wedge q) \rightsquigarrow \lambda g(p(g) \wedge q(g))$

(40) Restricted universal quantification translates as:
$\lambda p \lambda q(\forall x_i)(p \to q) \rightsquigarrow$
$\lambda p_{\langle\langle e,n\rangle,t\rangle} \lambda q_{\langle\langle e,n\rangle,t\rangle} \lambda g_{\langle n,e\rangle} \forall(i)(\lambda g'(p(g') \to q(g'))(g[i/x])) =$
$\lambda p \lambda q \lambda g(\forall x)(p(g[i/x]) \to q(g[i/x]))$

Example:

(41) $\lambda p \lambda q(\forall x_i)(p \to q)(R(x_i, x_j)) \equiv$
$\lambda p \lambda q \lambda g(\forall x)(p(g[i/x]) \to q(g[i/x]))(\lambda g.R(g(i), g(j))) =$
$\lambda q \lambda g(\forall x)(\lambda g.R(g(i), g(j))(g[i/x]) \to q(g[i/x])) =$
$\lambda q \lambda g(\forall x)(R(g[i/x](i), g[i/x](j)) \to q(g[i/x])) =$
$\lambda q \lambda g(\forall x)(R(x, g(j)) \to q(g[i/x])) \equiv$
$\lambda q(\forall x_i)(R(x_i, x_j) \to q)$

Restricted Quantifiers and Continuations

Each open proposition p that enters the computation may come along with its continuation. A continuation is a variable $*_{\langle\langle\langle n,e\rangle,t\rangle,\langle\langle n,e\rangle,t\rangle\rangle}$, an open proposition with a continuation is an expression $\lambda * . * p$. Semantic composition can always kill or plug a continuation by “lowering”, i.e., by applying $\lambda * \ldots$ to the identity function $\lambda p.p$. We will insert continuations only if necessary to derive the desired reading.

Example: Linear and inverse readings of *an apple in every basket*.

Restricted Quantifiers and Continuations

(42) a. an apple = $\mathcal{Q} = \lambda * \lambda p \exists x (*\textbf{apple}(x) \wedge p)$
b. every basket = $\lambda p \forall y (\textbf{basket}(y) \rightarrow p)$
c. in = $\lambda * . * \textbf{in}(x, y)$
d. in + every basket = $\lambda *$ .every basket(in($*$)) (projects continuation of every basket)
e. in every basket = $\mathcal{R} = \lambda * \forall y (\textbf{basket}(y) \rightarrow * \textbf{in}(x, y))$

(43) an apple + in every basket = $\mathcal{Q} + \mathcal{R}$
a. Rule for linear composition: $\mathcal{Q}(\lambda q (q \wedge \mathcal{R}(\lambda r.r)))$ (red: kills continuation of $\mathcal{R}$'s scope)
b. Rule for inverse composition: $\lambda s \mathcal{R}(\lambda q \mathcal{Q}(\lambda r.r)(q \wedge s))$ (blue: kills cont. of $\mathcal{Q}$'s restriction; red: projects $\mathcal{Q}$'s scope to that of entire DP)

Restricted Quantifiers and Continuations

Linear composition: $\mathcal{Q}(\lambda q(q \wedge \mathcal{R}(\lambda r.r)))$

(44) $\lambda * \lambda p \exists x(*\textbf{apple}(x) \wedge p)(\lambda q(q \wedge \lambda * \forall y(\textbf{basket}(y) \rightarrow *\textbf{in}(x, y))(\lambda r.r)))$

$=$

$\lambda * \lambda p \exists x(*\textbf{apple}(x) \wedge p)(\lambda q(q \wedge \forall y(\textbf{basket}(y) \rightarrow \textbf{in}(x, y))))$

$=$

$\lambda p \exists x([\lambda q(q \wedge \forall y(\textbf{basket}(y) \rightarrow \textbf{in}(x, y)))]\textbf{apple}(x) \wedge p)$

$=$

$\lambda p \exists x((\textbf{apple}(x) \wedge \forall y(\textbf{basket}(y) \rightarrow \textbf{in}(x, y))) \wedge p)$

Restricted Quantifiers and Continuations

Reversed composition: $\lambda s \mathcal{R}(\lambda q \mathcal{Q}(\lambda r.r)(q \wedge s))$

(45) $\lambda s[\lambda * \forall y(\mathbf{basket}(y) \rightarrow$
$*\mathbf{in}(x,y))](\lambda q[\lambda * \lambda p \exists x(*\mathbf{apple}(x) \wedge p)](\lambda r.r)(q \wedge s))$
$=$
$\lambda s[\lambda * \forall y(\mathbf{basket}(y) \rightarrow$
$*\mathbf{in}(x,y))](\lambda q[\lambda p \exists x(\mathbf{apple}(x) \wedge p)](q \wedge s))$
$=$
$\lambda s[\lambda * \forall y(\mathbf{basket}(y) \rightarrow *\mathbf{in}(x,y))](\lambda q[\exists x(\mathbf{apple}(x) \wedge q \wedge s)])$
$=$
$\lambda s[\forall y(\mathbf{basket}(y) \rightarrow \lambda q[\exists x(\mathbf{apple}(x) \wedge q \wedge s)]\mathbf{in}(x,y))]$
$=$
$\lambda s \forall y(\mathbf{basket}(y) \rightarrow \exists x(\mathbf{apple}(x) \wedge \mathbf{in}(x,y) \wedge s))$

Restricted Quantifiers and Continuations

The worst case

Homework:

(21) The picture of his$_i$ mother that every$_i$ soldier kept t wrapped in a sock was not much use to him$_i$

(46) the$_y$ picture of his$_x$ mother = $\mathcal{Q}$ =
$\lambda p(\exists y)(\forall u)((\mathbf{picture}(u,(\iota v)(\mathbf{mother}(v,x))) \leftrightarrow y = u) \wedge p)$

(47) $\lambda q \mathcal{Q}(q \wedge s)$ (simplified because continuation already removed)
=
$\lambda q(\exists y)(\forall u)((\mathbf{picture}(u,(\iota v)(\mathbf{mother}(v,x))) \leftrightarrow y = u) \wedge q \wedge s)$

(48) that$_y$ every soldier$_x$ kept wrapped in a sock

a. $\lambda * . * (\mathbf{kept\text{-}wrapped\text{-}in}(x,y,z))$ + a sock =

b. $\lambda * (\exists z)(\mathbf{sock}(z) \wedge *(\mathbf{kept\text{-}wrapped\text{-}in}(x,y,z)))$ + every soldier$_x$ =

c. $\lambda * (\forall x)(\mathbf{soldier}(x) \rightarrow$
$(\exists z)(\mathbf{sock}(z) \wedge *(\mathbf{kept\text{-}wrapped\text{-}in}(x,y,z))))$

The worst case

(49) The$_y$ picture of his$_x$ mother that$_y$ every$_x$ soldier kept t$_y$ wrapped in a sock

a. $\lambda s \lambda * (\forall x)(\mathbf{soldier}(x) \rightarrow$
$(\exists z)(\mathbf{sock}(z) \wedge *(\mathbf{kept\text{-}wrapped\text{-}in}(x, y, z))))$
$(\lambda q (\exists y)(\forall u)((\mathbf{picture}(u, (\iota v)(\mathbf{mother}(v, x))) \leftrightarrow y = u) \wedge q \wedge s))$
$=$

b. $\lambda s (\forall x)(\mathbf{soldier}(x) \rightarrow$
$(\exists z)(\mathbf{sock}(z) \wedge \lambda q (\exists y)(\forall u)((\mathbf{picture}(u, (\iota v)(\mathbf{mother}(v, x))) \leftrightarrow$
$y = u) \wedge q \wedge s)(\mathbf{kept\text{-}wrapped\text{-}in}(x, y, z)))) =$

c. $\lambda s (\forall x)(\mathbf{soldier}(x) \rightarrow$
$(\exists z)(\mathbf{sock}(z) \wedge (\exists y)(\forall u)((\mathbf{picture}(u, (\iota v)(\mathbf{mother}(v, x))) \leftrightarrow$
$y = u) \wedge \mathbf{kept\text{-}wrapped\text{-}in}(x, y, z) \wedge s)))$

d. + was not much use to him = $\mathbf{wnmut}(y, x)$ =
$(\forall x)(\mathbf{soldier}(x) \rightarrow$
$(\exists z)(\mathbf{sock}(z) \wedge (\exists y)(\forall u)((\mathbf{picture}(u, (\iota v)(\mathbf{mother}(v, x))) \leftrightarrow$
$y = u) \wedge \mathbf{kept\text{-}wrapped\text{-}in}(x, y, z) \wedge \mathbf{wnmut}(y, x))))$

Bhatt, Rajesh (2002): 'The Raising Analysis of Relative Clauses: Evidence from Adjectival Modification', *Natural Language Semantics* **40**, 43–90.

Gazdar, Gerald, Ewan Klein, Geoffrey Pullum and Ivan Sag (1985): *Generalized Phrase Structure Grammar*. Blackwell, Oxford.

Heycock, Caroline (2011): Relative Reconstructions. Presented at the ZAS Reconstruction Workshop July 2011.

Hulsey, Sarah and Uli Sauerland (2006): 'Sorting out Relative Clauses', *Natural Language Semantics* **14**, 111–137.

Kayne, Richard (1994): *The Antisymmetry of Syntax*. The MIT Press, Cambridge, Mass.

Klein, Udo and Wolfgang Sternefeld (2011*a*): Same Same but Different — an Alphabetically Innocent Compositional Predicate Logic. submitted.

Klein, Udo and Wolfgang Sternefeld (2011*b*): Unrestrained Beta Reduction. in preparation.

Prinzhorn, Martin (2005): DP-Struktur und Stellungsbeschränkungen im Deutschen. Vortrag, Universität Tübingen.

Safir, Ken (1999): 'Vehicle Change and Reconstruction in $\overline{\text{A}}$-Chains', *Linguistic Inquiry* **30**, 587–620.

Salzmann, Martin (2006): 'Resumptive Prolepsis: A Study in Indirect A'-Dependencies', *LOT Dissertation Series* **136**.

Sternefeld, Wolfgang (1998): Connectivity Effects in Pseudo Cleft Sentences. *In:* A. Alexiadou et al., ed., *ZAS Papers in Linguistics*. Zentrum für Allgemeine Sprachwissenschaft, Sprachtypologie und Universalienforschung, Berlin, pp. 146–162.

Sternefeld, Wolfgang (2001): Semantic vs. Syntactic Reconstruction. *In:* C. Rohrer, A. Roßdeutscher and H. Kamp, eds, *Linguistic Form and its Computation*. CSLI Publications, Stanford, CA, pp. 145–182.

Vergnaud, Jean R. (1974): French Relative Clauses. PhD thesis, MIT, Cambridge, Mass.