

# On the semantics of predication

Frank Van Eynde  
University of Leuven

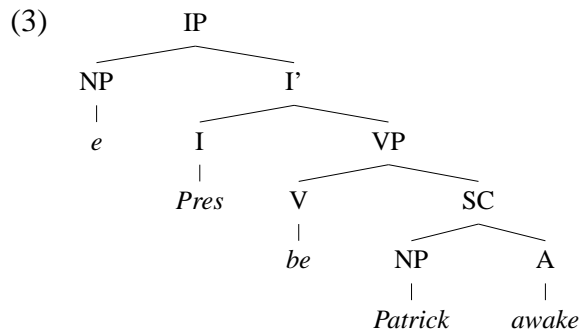
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## Overview

1. The small clause analysis and its variants
2. The monostratal subject raising treatment
3. Problems with the subject raising treatment
4. Syntax
5. Semantic representation
6. The syntax-semantics interface
7. Conclusion

# 1 The small clause analysis and its variants

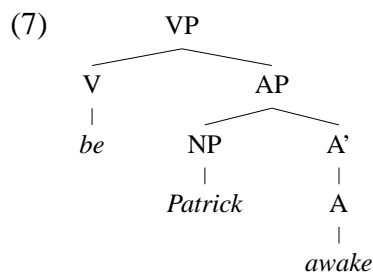
- (1) Patrick is awake.
- (2) We all find her attractive.
  - the predicate and its target from a semantic unit.
  - the projection principle: mappings between levels of linguistic representation (LF-, D- and S-structure) must be homomorphic with respect to argument structure (Chomsky 1981, 38).



BUT the predicate selector can impose syntactic constraints on the predicate: *worden* selects A or N, but not P; *gaan* selects P, but not N.

- (4) dat we op die manier in de war           geraken/\*worden.  
       that we in that way    in the confusion get/\*become  
       ‘that we get confused in that way.’
- (5) dat het licht over twee minuten uit gaat/\*wordt.  
       that the light in two minutes out goes/\*becomes  
       ‘that the light will go off in two minutes.’
- (6) dat hij later piloot wordt/\*gaat.  
       that he later pilot becomes/\*goes  
       ‘that he’ll become a pilot later.’

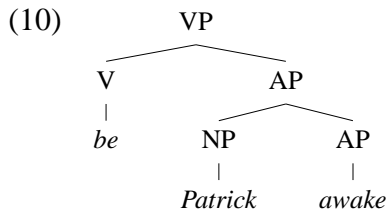
Subjects across categories (Stowell 1983)



BUT the sister of the subject NP can be a maximal projection, as in *Patrick is a fool* and *I am so sleepy*, AND movement is restricted to lexical heads and maximal projections (Chomsky 1986).

- (8) a. Patrick is nog niet helemaal wakker.
- b. Helemaal wakker is Patrick nog niet.
- c. \* Patrick helemaal wakker is nog niet
- (9) a. We vinden dat voorstel niet echt aantrekkelijk.
- b. Echt aantrekkelijk vinden we dat voorstel niet.
- c. \* Dat voorstel echt aantrekkelijk vinden we niet

Subject NP is adjoined to XP (Den Dikken 1992, 23-24), (Hoekstra and Mulder 1990)



BUT this still allows (8c) and (9c)

MOREOVER all variants of the small clause analysis make the wrong predictions about clefting.

- (11) Het is XP dat S/XP
  - a. Het is dat voorstel dat we best aantrekkelijk vinden.
  - b. Het is best aantrekkelijk dat we dat voorstel vinden.
  - c. \* Het is dat voorstel best aantrekkelijk dat we vinden

For more arguments against the assumption that the predicate and its target form a constituent, see (Pollard and Sag 1994, 109-123).

ERGO either it is not true that the predicate and its target form a semantic unit, or the projection principle is too strong.



### 3 Problems for the subject raising treatment

A subject raising analysis is appropriate for some instances of predication but not for all. Data extracted from the treebank of the Spoken Dutch Corpus (1998-2003).

PREDC	Adj	N	P	Adv	V	Clause	Conj	other	total
lexical	2189	596	68	333	178	–	–	35	3399
phrasal	1656	2661	698	46	217	217	215	64	5774
total	3845	3257	766	379	395	217	215	99	9173
%	41.92	35.51	8.35	4.13	4.31	2.36	2.34	1.08	100

#### 3.1 Subjects of verbal predicates

V = present participle (22)

- (15) dat de kinderen weer druk doende zijn.  
 that the children again busily doing are  
 ‘that the children are making a big fuss again.’

V = past participle (263)

- (16) dat haar collega’s niet overtuigd leken.  
 that her colleagues not convinced seemed  
 ‘that her colleagues did not seem convinced.’

V = (om) te infinitive (57)

- (17) dat die straat ’s nachts te mijden is.  
 that that street at night to avoid is  
 ‘that that street is to be avoided at night.’
- (18) dat Vera in die jurk gewoon om te stelen is.  
 that Vera in that dress simply for to steal is  
 ‘that Vera is simply adorable in that dress.’

V = bare infinitive (53)

- (19) dat zo’n uitstap altijd weer hard werken is.  
 that such-an excursion always again hard work is  
 ‘that such an excursion is always hard labour.’
- (20) dat het zoals gewoonlijk zwoegen en zweten wordt.  
 that it as usual labour and sweat becomes  
 ‘that it will be hard labour as usual.’
- (21) Partir, c’est toujours un peu mourir.  
 leave, it’s always a bit die  
 ‘Leaving is always a bit like dying.’

### 3.2 Subjects of nominal predicates

Singular Predicative Noun Lexical Rule (Ginzburg and Sag 2000, 194)

$$(22) \left[ \begin{array}{l} \textit{lexeme} \\ \text{ARG-ST } \langle \boxed{1} \rangle \oplus \boxed{A} \\ \text{SS | LOC | CAT | HEAD } \textit{noun} \end{array} \right] \Rightarrow \left[ \begin{array}{l} \textit{word} \\ \text{ARG-ST } \langle \boxed{2}, \boxed{1} \rangle \oplus \boxed{A} \\ \text{SS | LOC | CAT } \left[ \begin{array}{l} \text{HEAD } \left[ \begin{array}{l} \text{AGR | NUM } \textit{sing} \\ \text{PRED } + \end{array} \right] \\ \text{SPR } \langle \boxed{1} \rangle \\ \text{SUBJ } \langle \boxed{2} \rangle \end{array} \right] \end{array} \right]$$

N = common noun

What is the ‘subject’ of a common noun?

*mijn keuze* ‘my choice’ vs. *ik kies* ‘I choose’

- (23) dat dit hotel mijn eerste keuze was.  
that this hotel my first choice was  
‘that this hotel was my first choice.’

N = proper noun (88 lexical)

- (24) dat hij net als zijn grootvader Ludovicus heet.  
that he just like his grandfather Ludovicus is-called  
‘that he is called Ludovicus just like his grandfather.’

“this lexical rule fails (on semantic grounds) to account for predicative proper nouns, as in *Cicero is Tully*.” (Pollard and Sag 1994, 360)

N = pronoun (189 lexical and 205 phrasal)

- (25) dat het volgens mij toch niets wordt.  
that it according-to me yet nothing becomes  
‘that it is not going to lead to anything according to me.’
- (26) dat zo’n Ferrari echt iets voor hem is.  
that such-a Ferrari really something for him is  
‘that such a Ferrari is really something for him.’

### 3.3 The semantics of the copula

- (27) a. John is a teacher  $\Rightarrow$  *teacher'*(j)  
 b. Every child is awake  $\Rightarrow$   $\forall x$  [*child'*(x)  $\rightarrow$  *awake'*(x)]

$$(28) \left[ \begin{array}{l} \text{ARG-ST} \left\langle \text{NP}, [\text{LOC} | \text{CONTENT} \boxed{1}] \right\rangle \\ \text{SYNSEM} | \text{LOC} | \text{CONTENT} \boxed{1} \end{array} \right]$$

Arguments pro

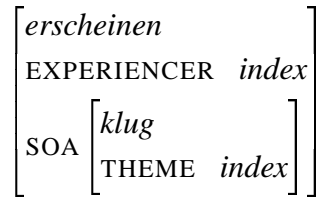
- the copula does not add anything to the meaning of the clause, see (29)
  - there are languages which routinely omit the copula (Russian, Hungarian)
  - the copula is omitted in absolute constructions, see (30)
- (29) dat die oplossing ons geschikt lijkt (te zijn).  
 that that solution us appropriate seems (to be)  
 ‘that that solution seems appropriate to us.’
- (30) His army in retreat, the general had no choice but to surrender.

Arguments contra

- the copula is part of a paradigm of copular verbs with which it is in semantic contrast: *he is ill* vs. *he seems ill* vs. *he stays ill*
  - the copula can be conjoined with other copular verbs, as in (31)
  - the copula can be combined with an experiencer, as in (32)
  - the copula carries tense
  - omissibility does not entail semantic vacuity: the existence of languages without articles does not entail that the articles are semantically vacuous in the languages which have them
- (31) Hij is en blijft onze beste doelman.  
 he is and remains our best goalie  
 ‘He is and remains our best goalie.’
- (32) Die oplossing is/lijkt me te vergezocht.  
 that solution is/seems me too far-fetched  
 ‘That solution is/seems too far-fetched to/for me.’

### 3.4 The semantics of the other predicate selectors

(33) klug erscheint (Mueller 2002, 105)



BUT most of the predicates are phrasal (63%)

- (34) a. He is by far the biggest fool that I have ever met.  
b. He is more (of) a journalist than a scientist.

### 3.5 Summing up

- subject raising is empirically inadequate for bare infinitives, predicative proper nouns and predicative pronouns
- it is not clear what the subject of a common noun is
- the copula had better not be treated as semantically vacuous
- phrasal predicates are a problem for the Pred(Theme) analysis

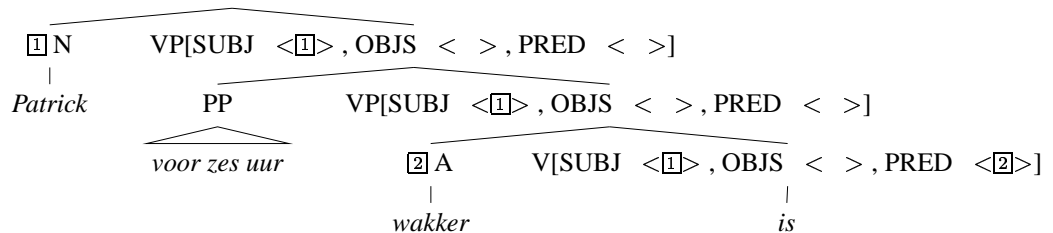
## 4 Syntax

$$(35) \text{ word} \Rightarrow \left[ \begin{array}{l} \text{ARG-ST} \quad \boxed{A} \oplus \boxed{B} \oplus \boxed{C} \\ \text{SYNSEM} \mid \text{LOC} \mid \text{CAT} \quad \left[ \begin{array}{l} \text{SUBJ} \quad \boxed{A} \\ \text{OBJS} \quad \boxed{B} \\ \text{PRED} \quad \boxed{C} \end{array} \right] \end{array} \right]$$

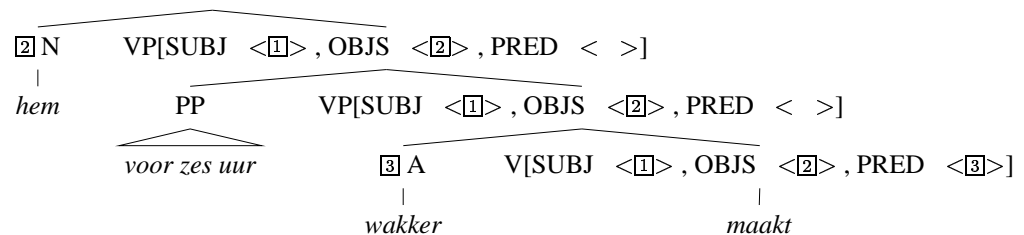
- objects, but not predicates, are required to have a specific case, verb form or pform by their selector
- objects, but not predicates, can be extraposed
- objects, but not predicates, can precede the VP adjuncts in the Mittelfeld
- objects, but not predicates, can be stranded if their selector is fronted

$$(36) \left[ \begin{array}{l} \textit{hd-pred-phr} \\ \text{SYNSEM} \mid \text{LOC} \mid \text{CAT} \mid \text{PRED} \langle \rangle \\ \text{HD-DTR} \mid \text{SYNSEM} \mid \text{LOC} \mid \text{CAT} \mid \text{PRED} \langle \boxed{1} \rangle \\ \text{NON-HD-DTR} \mid \text{SYNSEM} \quad \boxed{1} \textit{synsem} \end{array} \right]$$

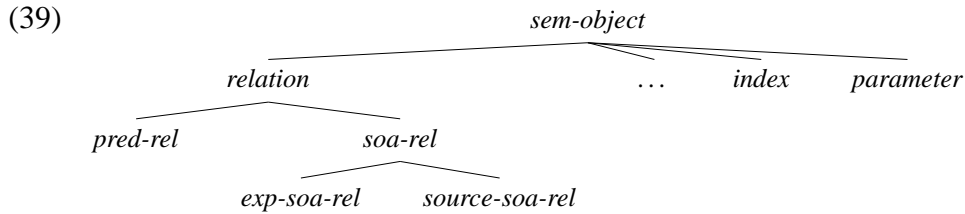
$$(37) \text{ S}[\text{SUBJ} \langle \rangle, \text{OBJS} \langle \rangle, \text{PRED} \langle \rangle]$$



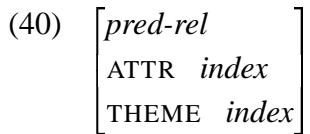
$$(38) \text{ VP}[\text{SUBJ} \langle \boxed{1} \rangle, \text{OBJS} \langle \rangle, \text{PRED} \langle \rangle]$$



## 5 Semantic representation

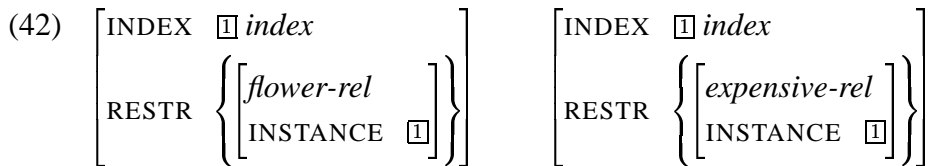
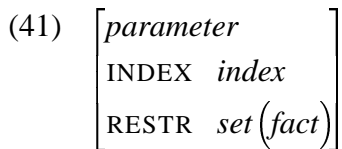


### 5.1 The predication

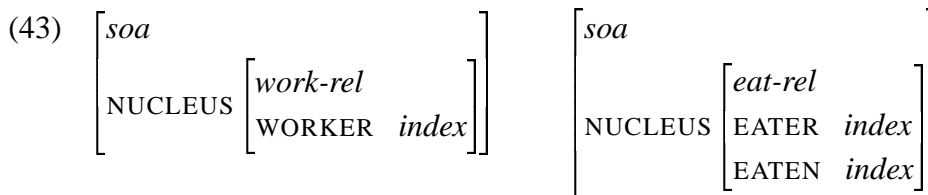


#### 5.1.1 The attribute

Since the predicate can belong to any part of speech, we need a uniform notation for the representation of the predicative adjectives, nouns, verbs, prepositions and adverbs.



Comparable to the lambda-expressions  $\lambda x \textit{flower}'(x)$  and  $\lambda x \textit{expensive}'(x)$ .



Comparable to the lambda-expressions  $\lambda x \textit{work}'(x)$  and  $\lambda x \lambda y \textit{eat}'(x,y)$ .

(44) dat zo'n uitstap altijd weer hard werken is.  
that such-an excursion always again hard work is  
'that such an excursion is always hard labour.'

(45) dat het zoals gewoonlijk zwoegen en zweten wordt.  
that it as usual labour and sweat becomes  
'that it will be hard labour as usual.'

(46) dat strips lezen al jaren zijn favoriete tijdverdrijf is.  
 that comic-strips read already years his favorite pastime is  
 ‘that reading comic strips has been his favorite pastime for years now.’

(47) dat ze hard werken slecht voor de gezondheid vindt.  
 that she hard work bad for the health finds  
 ‘that she finds working hard bad for her health.’

(48) 
$$\left[ \begin{array}{l} \text{INDEX } \boxed{1} \text{ index} \\ \text{RESTR } \left\{ \begin{array}{l} \left[ \begin{array}{l} \textit{work-rel} \\ \text{INSTANCE } \boxed{1} \\ \text{WORKER } \textit{index} \end{array} \right] \end{array} \right\} \end{array} \right] \quad \left[ \begin{array}{l} \text{INDEX } \boxed{1} \text{ index} \\ \text{RESTR } \left\{ \begin{array}{l} \left[ \begin{array}{l} \textit{eat-rel} \\ \text{INSTANCE } \boxed{1} \\ \text{EATER } \textit{index} \\ \text{EATEN } \textit{index} \end{array} \right] \end{array} \right\} \end{array} \right]$$

Comparable to the Davidsonian event variable, but more general.

(49) Eerlijk zijn is niet altijd gemakkelijk.  
 honest be is not always easy  
 ‘It is not always easy to be honest.’

(50) Alles goed vinden lijkt me niet verstandig.  
 everything good find seems me not clever  
 ‘It does not seem clever to me to find everything good.’

### 5.1.2 The theme

(51) dat het al donker is.  
 that it already dark is  
 ‘that it is already dark.’

(52) dat we het tegenwoordig erg druk hebben.  
 that we it these-days very busy have  
 ‘that we are very busy these days.’

(53) dat geld niet gelukkig maakt.  
 that money not happy makes  
 ‘that money does not make (one) happy.’

In German the target can also be omitted when it is the subject of a finite verb.

(54) Mir ist kalt.  
 to-me is cold  
 ‘I am cold.’

### 5.1.3 The indices

(55)  $\forall x [child'(x) \rightarrow awake'(x)]$

(56) 
$$\left[ \begin{array}{l} index \\ PERSON \quad person \\ NUMBER \quad number \\ GENDER \quad gender \end{array} \right]$$

(57) dat we toen nog student waren.  
that we then still student were  
'that we were still students at the time.'

(58) dat Olivia toen het mooiste meisje van de klas was.  
that Olivia then the prettiest girl of the class was  
'that Olivia was the prettiest girl of the class at the time.'

### 5.2 Predicate selectors

(59) 
$$\left[ \begin{array}{l} soa-rel \\ SOA \quad pred-rel \end{array} \right] \quad \left[ \begin{array}{l} exp-soa-rel \\ EXPERIENCER \quad index \end{array} \right] \quad \left[ \begin{array}{l} source-soa-rel \\ SOURCE \quad index \end{array} \right]$$

(60) dat we die oplossing wel geschikt vinden.  
that we that solution appropriate find  
'that we find that solution appropriate.'

(61) dat de kip haar eieren warm houdt.  
that the chicken her eggs warm holds  
'that the chicken keeps her eggs warm.'

The EXPERIENCER role and the SOURCE role can be left implicit.

(62) 
$$\left[ \begin{array}{l} rel \\ INSTANCE \quad index \end{array} \right]$$

The semantic representations of the predicate selectors are maximally specific subtypes of *soa-rel*.

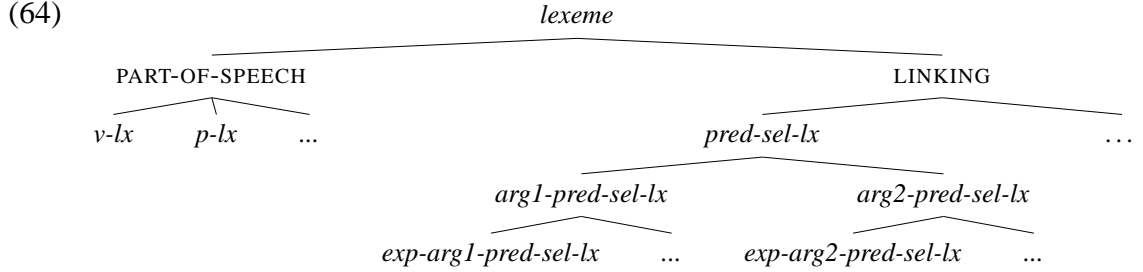
(63) Oil be expensive

$$\left[ \begin{array}{l} INDEX \quad \boxed{1} \quad index \\ \left. \begin{array}{l} RESTR \quad \left\{ \begin{array}{l} \left[ \begin{array}{l} oil-rel \\ INSTANCE \quad \boxed{3} \end{array} \right], \left[ \begin{array}{l} be-rel \\ INSTANCE \quad \boxed{1} \\ EXPERIENCER \quad \boxed{4} \\ SOA \quad \left[ \begin{array}{l} pred-rel \\ ATTR \quad \boxed{2} \quad index \\ THEME \quad \boxed{3} \quad index \end{array} \right] \end{array} \right\} \end{array} \right\} \end{array} \right]$$

SEMANTIC INHERITANCE PRINCIPLE and SEMANTIC COMPOSITIONALITY PRINCIPLE (Sag, Wasow and Bender 2003)

## 6 The syntax-semantics interface

A lexeme hierarchy, in the style of (Ginzburg and Sag 2000, 20).



(65)  $pred\text{-}sel\text{-}lx \Rightarrow \left[ \begin{array}{l} \text{ARG-ST } nelist \oplus \langle X_1 X_2 \rangle \\ \text{SYNSEM | LOC } \left[ \begin{array}{l} \text{CAT | PRED } \langle X_1 \rangle \\ \text{CONT | RESTR } \left\{ \left[ \begin{array}{l} \text{soa-rel} \\ \text{SOA } \left[ \begin{array}{l} \text{pred-rel} \\ \text{ATTR } X_2 \text{ ref} \end{array} \right] \end{array} \right\} \right] \end{array} \right]$

(66)  $arg1\text{-}pred\text{-}sel\text{-}lx \Rightarrow \left[ \begin{array}{l} \text{ARG-ST } \langle X_1 \rangle \oplus nelist \\ \text{SYNSEM | LOC | CONT | RESTR } \left\{ \left[ \text{SOA | THEME } X_1 \text{ index} \right] \right\} \end{array} \right]$

(67)  $arg2\text{-}pred\text{-}sel\text{-}lx \Rightarrow \left[ \begin{array}{l} \text{ARG-ST } nelist \oplus \langle X_1 \rangle \oplus nelist \\ \text{SYNSEM | LOC | CONT | RESTR } \left\{ \left[ \text{SOA | THEME } X_1 \text{ index} \right] \right\} \end{array} \right]$

(68)  $exp\text{-}arg2\text{-}pred\text{-}sel\text{-}lx \Rightarrow \left[ \begin{array}{l} \text{ARG-ST } \langle X_1 \rangle \oplus nelist \\ \text{SYNSEM | LOC | CONT | RESTR } \left\{ \left[ \begin{array}{l} \text{exp-soa-rel} \\ \text{EXPERIENCER } X_1 \text{ index} \end{array} \right] \right\} \end{array} \right]$

(69)  $source\text{-}arg2\text{-}pred\text{-}sel\text{-}lx \Rightarrow \left[ \begin{array}{l} \text{ARG-ST } \langle X_1 \rangle \oplus nelist \\ \text{SYNSEM | LOC | CONT | RESTR } \left\{ \left[ \begin{array}{l} \text{source-soa-rel} \\ \text{SOURCE } X_1 \text{ index} \end{array} \right] \right\} \end{array} \right]$

(70)  $v\text{-}lx \Rightarrow \left[ \begin{array}{l} \text{SYNSEM | LOC | CAT } \left[ \begin{array}{l} \text{HEAD } verb \\ \text{SUBJ } nelist \end{array} \right] \end{array} \right]$

Multiple inheritance from  $v\text{-}lx$  and  $exp\text{-}arg2\text{-}pred\text{-}sel\text{-}lx$  yields a type which subsumes the verbs in:

- (71) dat ze hem niet bekwaam vinden  
 that they him not competent find  
 ‘that they do not consider him competent.’

- (72) dat ze het altijd druk heeft.  
 that she it always busy has  
 ‘that she’s always busy.’

Multiple inheritance from *v-lx* and *source-arg2-pred-sel-lx* yields a type which subsumes the verbs in:

- (73) dat hij ons belachelijk maakt.  
 that he us ridiculous makes  
 ‘that he makes us look like a fool.’
- (74) dat je dat schilderij volgens mij scheef hebt gehangen.  
 that you that painting according-to me askew have hung  
 ‘that you have hung that painting askew according to me.’

$$(75) \text{ exp-arg1-pred-sel-lx} \Rightarrow \left[ \begin{array}{l} \text{ARG-ST } \textit{nelist} \oplus \langle X_{\underline{1}} \rangle \oplus \textit{nelist} \\ \text{SYNSEM} | \text{LOC} | \text{CONT} | \text{RESTR} \left\{ \left[ \begin{array}{l} \textit{exp-soa-rel} \\ \text{EXPERIENCER } \underline{1} \textit{index} \end{array} \right] \right\} \end{array} \right]$$

$$(76) \text{ source-arg1-pred-sel-lx} \Rightarrow \left[ \begin{array}{l} \text{ARG-ST } \textit{nelist} \oplus \langle \text{PP}[\textit{van}]_{\underline{1}} \rangle \oplus \textit{nelist} \\ \text{SYNSEM} | \text{LOC} | \text{CONT} | \text{RESTR} \left\{ \left[ \begin{array}{l} \textit{source-soa-rel} \\ \text{SOURCE } \underline{1} \textit{index} \end{array} \right] \right\} \end{array} \right]$$

Multiple inheritance from *v-lx* and *exp-arg1-pred-sel-lx* yields a type which subsumes the verbs in:

- (77) Het is me een raadsel.  
 it is to-me a puzzle  
 ‘It is a puzzle to me.’
- (78) dat hij ons niet bekwaam lijkt.  
 that he us not competent seems  
 ‘that he does not seem competent to us.’

Multiple inheritance from *v-lx* and *source-arg1-pred-sel-lx* yields a type which subsumes the verbs in:

- (79) dat je van hard werken toch niet rijk wordt.  
 that you of hard work yet not rich gets  
 ‘that you don’t get rich by working hard.’
- (80) dat hij van de dokter nu nog niet naar huis mag.  
 that he from the doctor now still not to house may  
 ‘that the doctor does not permit him to go home yet.’

The use of the prepositions *met* ‘with’ and *zonder* ‘without’ in the absolute construction is subsumed by a type which inherits from *p-lx* and *arg1-pred-sel-lx*.

$$(81) \quad p-lx \Rightarrow \left[ \text{SYNSEM} \mid \text{LOC} \mid \text{CAT} \left[ \begin{array}{l} \text{HEAD } \textit{prep} \\ \text{SUBJ } \langle \rangle \end{array} \right] \right]$$

- (82) Ik kan niet slapen met het licht aan.  
 I can not sleep with the light on  
 ‘I can’t sleep with the light on.’

## 7 Conclusion

- syntactically, the predicate forms a unit with its selector, not with its target
- semantically, the predicate forms a unit with its target
- the syntax-semantics interface takes the form of a multidimensional hierarchy of lexical types

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