

# The Position of Nonfinite Verbs in a Topological sentence model for Danish

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# Outline

I'm going to suggest that

- nonfinite verbs form a constituent with their possible objects and should be placed together in one slot in the sentence model, and not in two separate slots as suggested by Diderichsen
- nonfinite VPs should be placed in the P slot for predicates introduced in Hansen 1970

# Outline

Then I will

- give a brief introduction to Linearization-based HPSG and
- show a formalization of the suggestion

# Diderichsen's model

Main clause							
	F field	Nexus field			Content field		
$k_s$	F	v	s	a	V	S	A
og	saa	kunde	han	sikkert ikke alligevel	faa sagt	hende besked	i tide
<i>and</i>	<i>then</i>	<i>could</i>	<i>he</i>	<i>probably</i> <i>not</i> <i>anyway</i>	<i>said</i>	<i>her</i>	in time

Diderichsen (1957, p. 186)

# Diderichsen's model

Subordinate clause							
	Conj	Nexus field			Content field		
k <sub>s</sub>	k <sub>u</sub>	s	a	v	V	S	A
og	at	han	sikkert ikke alligevel	kunde	faa sagt	hende besked	i tide
<i>and</i>	<i>that</i>	<i>he</i>	<i>probably not anyway</i>	<i>could</i>	<i>get said</i>	<i>her notice</i>	<i>in time</i>
eller	hvem		der ellers	ville	komme		
<i>or</i>	<i>who</i>		<i>there else</i>	<i>would</i>	<i>come</i>		

Diderichsen (1957, p. 186)

# Predicates

As noted – though not really commented on – by Diderichsen (1957, p. 166) adjectival predicates (placed in the N slot) may be coordinated with adverbs and PPs (placed in the A slot):

- (1) Han var rask, oppe og i god bedring.  
*He was well, up and in good recovery*

# Separate slot(s) for predicates

Based among other things on such observations Hansen (1970) suggests two new slots in the model, P for adjectival predicates and Adv for what he calls valency bound adverbials:

$k_s$	V	S	L	$a_1$	$O_i$	$O_d$	P	Adv	$a_2$
men <i>but</i>	sender <i>send</i>	du <i>you</i>		aldrig <i>never</i>		pengene <i>money-the</i>		tilbage <i>back</i>	mere? <i>any more</i>
	gør <i>make</i>	de <i>they</i>		straks <i>imme- -diately</i>		båden <i>boat-the</i>	klar? <i>ready</i>		

Hansen 1970, p. 72

# Separate slot(s) for predicates

Between P and Adv he places a slot ( $a_3$ ) for manner adverbs:

$k_s$	V	S	L	$a_1$	$O_i$	$O_d$	P	$a_3$	Adv	$a_2$
du <i>you</i>	satte <i>put</i>			ikke <i>not</i>		proppen <i>cork-the</i>		ordentligt <i>properly</i>	i <i>in</i>	
de <i>they</i>	valgte <i>elected</i>			jo <i>as you know</i>		Jensen <i>Jensen</i>		enstem- migt <i>unani- -mously</i>	ind <i>in</i>	denne gang <i>this time</i>

Hansen 1970, p. 80



# Manner adverbials preceding P

Heltoft and Hansen (2005) collapses P and Adv but adds a new MO/BA slot:

...	$V_i$	O	MA	P	MO/ BA	TSA
røverne har <i>robbers-the have</i>	slået <i>hit</i>	Kassim <i>Kassim</i>	brutalt <i>brutally</i>	ihjel <i>to death</i>		
idet han ikke havde <i>as he not had</i>	fået <i>got</i>	nøglerne <i>keys-the</i>		med <i>along</i>		
hun var <i>she had</i>	blevet <i>become</i>		sent <i>late</i>	student <i>student</i>		
de var <i>they had</i>	kommet <i>come</i>		ivrigt <i>eagerly</i>	løbende <i>running</i>		
han har <i>he has</i>	fået <i>got</i>	billedet <i>painting-the</i>	smukt <i>beatifully</i>	hængt op <i>hung up</i>		

Heltoft & Hansen 2005, pp. 164-165

# Nonfinite verbs in $V_i$ or P

Nonfinite verbs are placed either in  $V_i$  or P apparently depending on the presence or absence of preceding object and/or manner adverb:

...	$V_i$	O	MA	P	MO BA	TSA
han var <i>he had</i>	blevet <i>been</i>		smukt <i>beatifully</i>	<b>syet</b> sammen <i>stitched up</i>		af skomageren <i>by shoemaker-the</i>
Ali Baba fik	<b>syet</b>	broderen	smukt	sammen		af skomageren
han har <i>he has</i>	fået <i>got</i>	billedet <i>painting-the</i>	smukt <i>beatifully</i>	<b>hængt</b> op <i>hung up</i>		
han har	fået <b>hængt</b>	billedet	smukt	op		

Heltoft & Hansen 2005, pp. 164-165

# Nonfinite verbs in F

Diderichsen 1957, p. 166:

‘Infinittet med dets bestemmelser udgør et Hypotagme, der samlet kan staa som Fundament: *Sende børnene hjem turde han ikke | Bragt Orden i Tingene havde han unægtelig (gjort)*. Men de enkelte Bestemmelser behandles normalt som selvstændige Led: *Børnene turde han ikke sende hjem.*’

‘The nonfinite (verb) and its complements make out a constituent, which can function as Fundament: *Send the children home dared he not | Made order in things had he undeniably (done)*. But the individual complements are normally treated as independent phrases: *The children dared he not send home.*’

# Nonfinite verbs in F

If the VP is a constituent in F, why should it not be a constituent in the content field?

(2) \*Sende turde han ikke børnene hjem.  
*Send dared he not children-the home*

(3) \*Sende hjem turde han ikke børnene.  
*Send home dared he not children-the*

# Nonfinite VPs in extraposition

In Hansen (1970) the nonfinite VP is treated as a constituent placed in extraposition. There are a lot of empty slots!

ks-F	V	S-L-a1- Oi-Od-P- Adv-a2	ex					
Hansen <i>Hansen</i>	må <i>must</i>		ks- ku-S- a1	V	Oi-Od- P-Adv- a2	ex		
				have <i>have</i>		ks-ku- S-a1	V	Oi-Od-P- Adv-a2
							spist <i>eaten</i>	en bøf <i>a steak</i>

The model in Hansen 1970, from Jørgensen 2006, p. 13

# Adverbials following nonfinite VPs

It is possible to have adverbials modifying the finite verb placed after the nonfinite VP:

(4) Jeg så solen gå ned oppe fra taget.  
*I saw sun-the go down up from roof-the*  
'I saw the sun set from up the roof'

(5) Han lod Peter gå af de her nævnte grunde.  
*He let Peter go for the here mentioned reasons*

This should not be possible if the nonfinite VP is in extraposition.

# Nonfinite VPs in the content field

This suggests that the VP is not in extraposition but placed in a slot preceding the final slot for free adverbs.

There are two obvious candidates for the position of the nonfinite VP:  $V_i$  or P, or perhaps sometimes one, sometimes the other as assumed in Heltoft & Hansen 2005?

# Nonfinite VPs in P

Two arguments in favour of P:

- unitary stress
- the object position



# No unitary stress

Verbs not combining with co-predicates are stressed:

(6) a. De 'smed bøgerne.  
*They threw books-the*

b. Hunden 'løb.  
*Dog-the ran*

c. De 'blev.  
*They remained*

d. Han 'har en bil.  
*He has a car*

# Unitary stress

Verbs combining with co-predicates are not stressed:

- (7) a. Bilen <sub>o</sub>var gammel.  
*Car-the was old*
- b. De <sub>o</sub>smed bøgerne ud.  
*They threw books-the out*
- c. Hunden <sub>o</sub>løb hjem.  
*Dog-the ran home*
- d. De <sub>o</sub>blev siddende.  
*They remained sitting*
- e. Han <sub>o</sub>har sovet hele eftermiddagen.  
*He has slept all afternoon-the*
- f. Ole <sub>o</sub>fik repareret bilen.  
*Ole got repaired car-the*

# Nonfinite VPs as co-predicates

According to this criterion nonfinite VPs are co-predicates.

It is therefore simpler – though of course not necessary – to assume that nonfinite VPs as other co-predicates are placed in P.

# Objects preceding the nonfinite VP

If it is possible for an object to precede the nonfinite VP it is a good argument for nonfinite VPs in P.

- (8) Pia hørte ikke Peter gå.  
*Pia heard not Peter leave*

The question is whether *Peter* functions as an object or forms some kind of constituent with *gå*

# One constituent in F

*Fundamentfeltsprøven* (The Fundament Field Test) cannot show that *Peter gå* is a constituent. *Peter* and *gå* may be fronted separately, but not together:

- (9) a. Peter hørte Pia ikke gå.  
*Peter heard Pia not leave*
- b. Gå hørte Pia ham ikke.  
*Leave heard Pia him not*
- c. \*Peter gå hørte Pia ikke.  
*Peter leave heard Pia not*

# The slot for pronominal objects

The putative object may appear in the I slot for unstressed pronominal objects preceding a medial adverb:

(10) Pia hørte ham ikke gå.  
*Pia heard him not leave*

Note that this sentence can only mean that Pia didn't hear him leave, not that he didn't leave.

# Passivization

The clause may be passivized:

- (11) Han blev hørt gå.  
*He was heard leaving*

Assuming that passivization promotes the object of the active clause to subject in the passive clause, an assumption shared by e.g. traditional Danish grammar and HPSG, this is again an indication that *Peter* functions as object in (8).

# Summing up

Nonfinite verbs form constituents with their objects (and adverbials) (occurrence in F), the VP should therefore be placed in one slot, not divided between more slots, also when it occurs in the content field.

Nonfinite VPs in several respects behave like other co-predicates, and I have suggested that they like other co-predicates occur in the P slot.



# Formalization

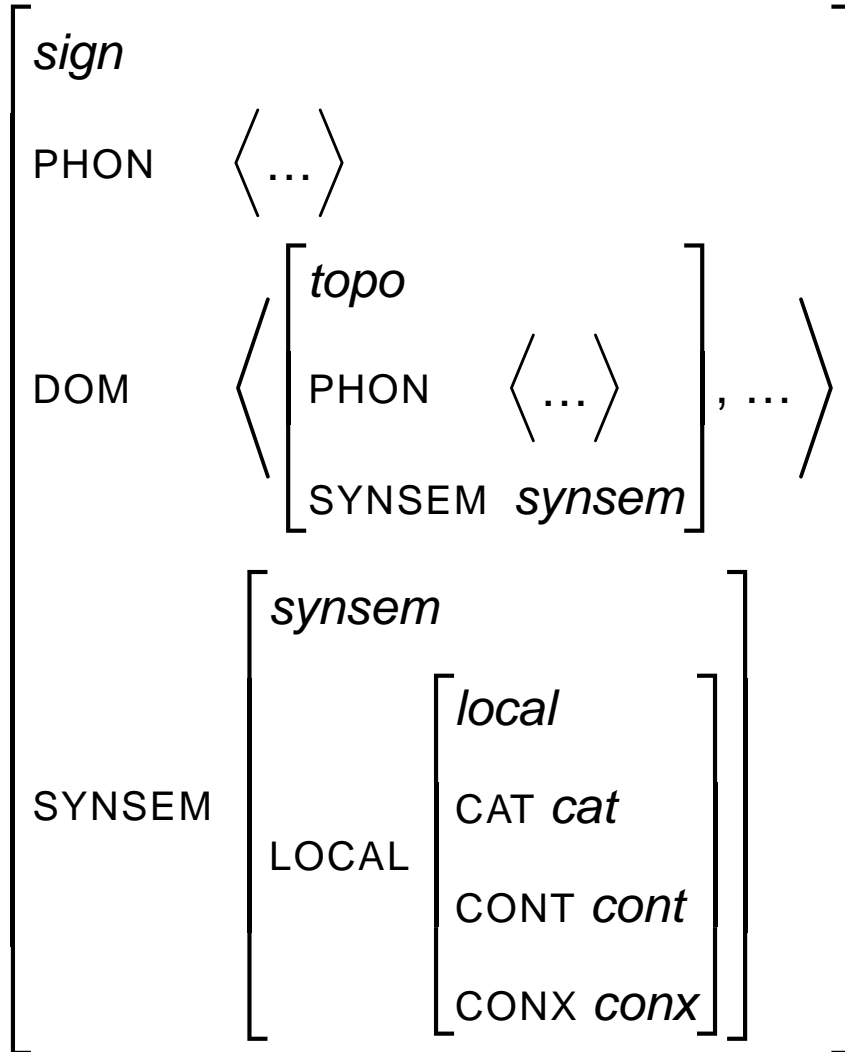
Linearization-based HPSG, Reape (1993, 1994), Kathol (1995, 2000)

Basic idea:

Linearization (topology) should be a separate level of the linguistic description, independent of the hierarchical structure

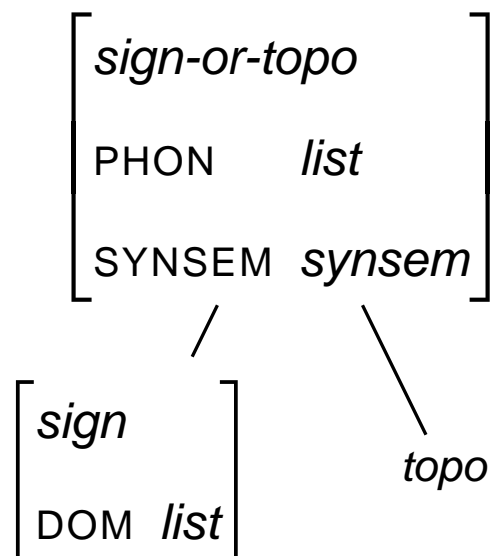
# The sign

The DOM list reflects linear order:



# *Topo* elements

*Topo* elements are like signs except that they do not have a DOM list:



# The order of *topo* elements

The order of elements on the DOM list of any sign is restricted by this constraint:

$$sign \longrightarrow \left[ \text{DOM} \left\langle F \prec v \prec s \prec l^* \prec a1^* \prec V \prec O^* \prec a3 \prec P \prec a2^* \right\rangle \right]$$

These *topo* elements correspond to the slots in the sentence model, but the constraint should be understood as ordering only those *topo* elements that are present. There is no demand for all *topo* elements to be present.

# The composition of the DOM list

There are two ways in which the DOM list of the mother may be constructed from the DOM lists of the daughters:

- the two lists may be *shuffled*, or
- the elements on one of the lists may be *compacted* to one *topo* element which is then inserted on the other list with the *shuffle* relation.

# Shuffle

$$\langle a, b \rangle \circ \langle c, d \rangle \Rightarrow$$

$$\langle a, b, c, d \rangle,$$

$$\langle a, c, b, d \rangle,$$

$$\langle a, c, d, b \rangle,$$

$$\langle c, a, b, d \rangle,$$

$$\langle c, a, d, b \rangle,$$

$$\langle c, d, a, b \rangle$$

# Compaction

A sign may be compacted to a *topo* element:

$$\text{compaction} \left( \begin{array}{l} \left[ \begin{array}{l} \text{sign} \\ \text{PHON } \boxed{1} \left( \boxed{2} \oplus \boxed{3} \oplus \dots \oplus \boxed{n} \right) \\ \text{DOM } \left\langle \left[ \begin{array}{l} \text{topo} \\ \text{PHON } \boxed{2} \end{array} \right], \left[ \begin{array}{l} \text{topo} \\ \text{PHON } \boxed{3} \end{array} \right], \dots, \left[ \begin{array}{l} \text{topo} \\ \text{PHON } \boxed{n} \end{array} \right] \right\rangle \\ \text{SS } \boxed{4} \end{array} \right], \left[ \begin{array}{l} \text{topo} \\ \text{PHON } \boxed{1} \\ \text{SS } \boxed{4} \end{array} \right] \end{array} \right)$$

# ID schemata

The composition of various types of phrases is licensed by a limited number of ID schemata.

I will present three of them here:

*Head-comps-phrase*

*Head-copred-phrase*

*Head-subj-phrase*



# *Headed-phrase*

This constraint expresses what is common to all headed phrases:

*headed-phr*  $\longrightarrow$

$$\left[ \begin{array}{l} \text{DOM } \boxed{1} \circ \langle \boxed{4} \rangle (\circ \langle \boxed{5} \rangle) \\ \text{HEAD-DTR} \mid \text{DOM } \boxed{1} \\ \text{NON-HEAD-DTRS } \langle \boxed{2}, (\boxed{3}) \rangle \end{array} \right]$$

$\wedge$

$$\text{compaction}(\boxed{2}, \boxed{4})$$

$\wedge$

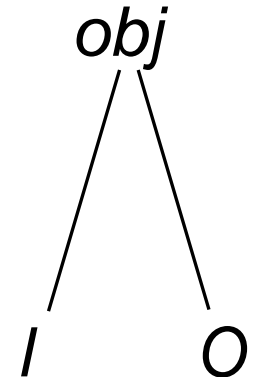
$$\left( \text{compaction}(\boxed{3}, \boxed{5}) \right)$$

# *Head-comps-phrase*

The combination of a verb and its object(s) is licensed as a *head-comps-phrase*:

*head-comps-phr*  $\longrightarrow$

$$\left[ \begin{array}{l} \text{SS} \mid \text{LOC} \mid \text{CAT} \left[ \begin{array}{l} \text{SUBJ} \quad \boxed{1} \\ \text{COMPS} \quad \langle \rangle \end{array} \right] \\ \text{HEAD-DTR} \mid \text{SS} \mid \text{LOC} \mid \text{CAT} \left[ \begin{array}{l} \text{SUBJ} \quad \boxed{1} \\ \text{COMPS} \quad \langle \boxed{2}, (\boxed{3}) \rangle \end{array} \right] \\ \text{NON-HEAD-DTRS} \quad \langle \boxed{4} [\text{SS} \quad \boxed{2}], (\boxed{5} [\text{SS} \quad \boxed{3}]) \rangle \end{array} \right]$$



$$\wedge \text{compaction}(\boxed{4}, [\text{obj}]) \quad (\wedge \text{compaction}(\boxed{5}, [\text{obj}]) \quad )$$

# *Head-copred-phrase*

The combination of a verb and its co-predicate is licensed as a *head-copred-phrase*:

*head-copred-phr*  $\longrightarrow$

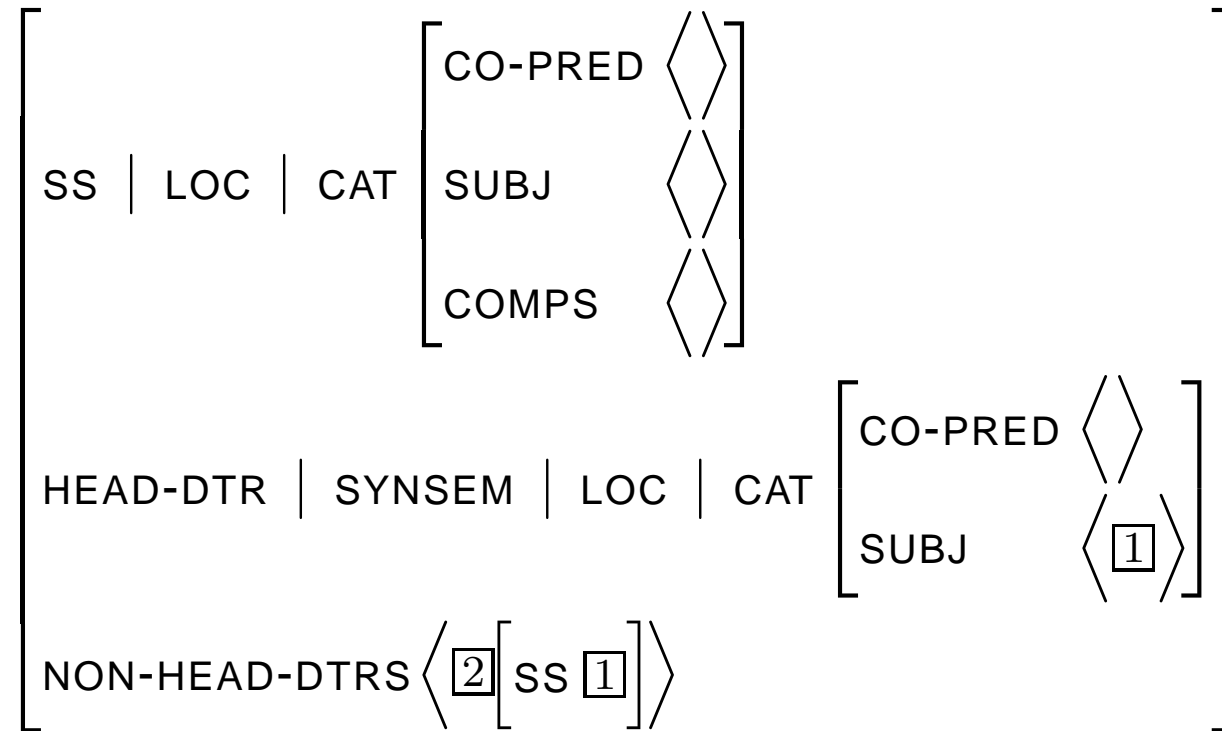
$$\left[ \begin{array}{l} \text{SS} \mid \text{LOC} \mid \text{CAT} \left[ \begin{array}{l} \text{CO-PRED} \langle \rangle \\ \text{ARG-ST} \boxed{1} \end{array} \right] \\ \\ \text{HEAD-DTR} \mid \text{SYNSEM} \mid \text{LOC} \mid \text{CAT} \left[ \begin{array}{l} \text{CO-PRED} \langle \boxed{2} \rangle \\ \text{ARG-ST} \boxed{1} \left( \text{list} \oplus \langle \boxed{3} \rangle \right) \end{array} \right] \\ \\ \text{NON-HEAD-DTRS} \left\langle \boxed{4} \left[ \text{SS} \boxed{2} \mid \text{LOC} \mid \text{CAT} \left[ \begin{array}{l} \text{SUBJ} \langle \boxed{3} \rangle \\ \text{COMPS} \langle \rangle \end{array} \right] \right] \right\rangle \end{array} \right]$$

$$\wedge \text{compaction}(\boxed{4}, [P])$$

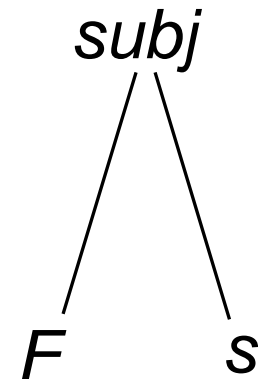
# *Head-subj-phrase*

The combination of a verb/VP and its subject is licensed as a *head-subj-phrase*:

*head-subj-phr*  $\longrightarrow$



$\wedge \text{compaction}(\boxed{2}, [\text{subj}])$



# No empty slots

In this model there are no empty slots

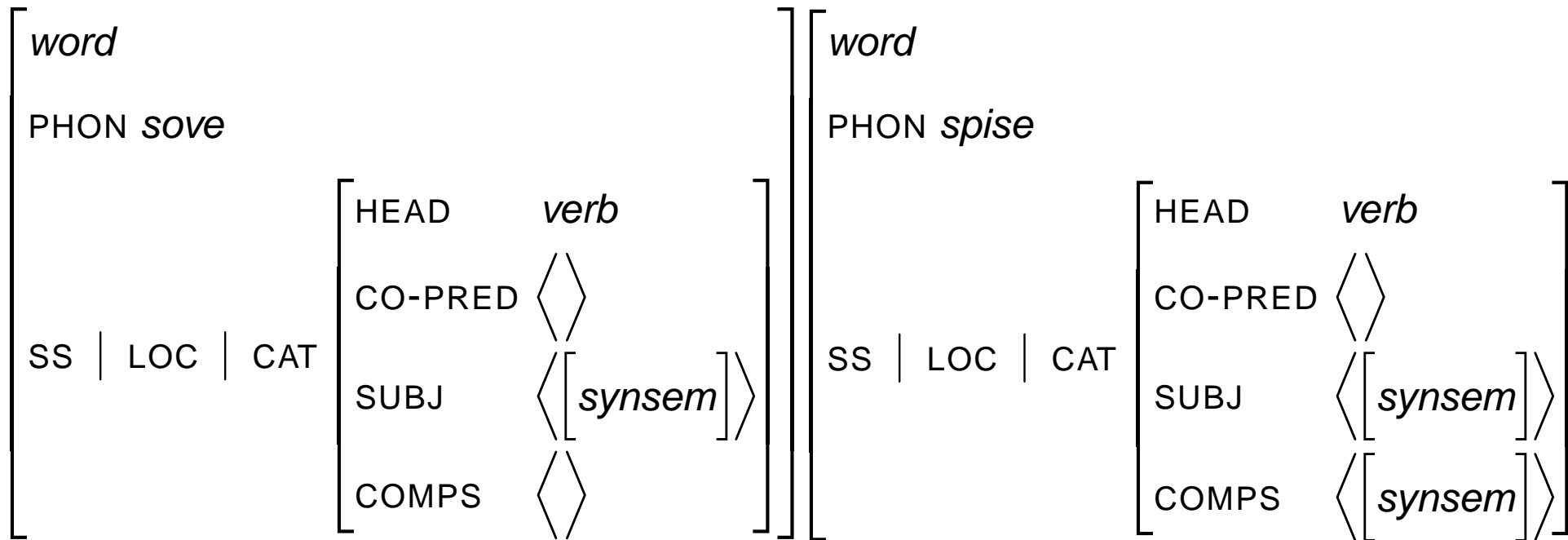
A *topo* element (a slot) is only present in case it is instantiated

For a slot to be instantiated it must be licensed by one of the ID schemata

The ID schemata ensure that arguments are realized only once, elements are cancelled off from the valence lists once they are realized

# Lexical entries

Part of the lexical entries for *sove* 'sleep', and *spise*, 'eat':



# Main and subordinate clauses

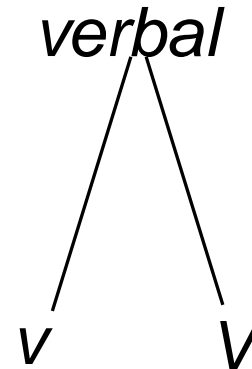
There is only one order of *topo* elements, only one schema.

The difference in word order between main and subordinate clauses is modelled by assigning nonfinite verbs the *topo* value *V*, while finite verbs are assigned the *topo* value *verbal* subsuming the values *v* and *V*

# Finite and nonfinite verbs

$$\left[ \begin{array}{c} \text{word} \\ \dots \\ \left[ \begin{array}{c} \text{verb} \\ \text{VFORM } \textit{nonfinite} \end{array} \right] \end{array} \right] \longrightarrow \left[ \text{DOM} \left\langle \left[ V \right] \right\rangle \right]$$

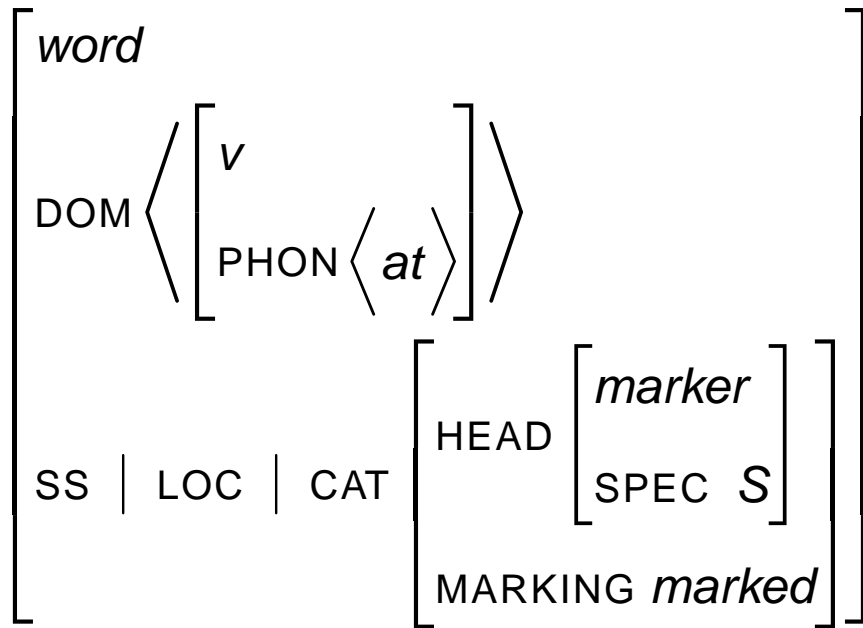
$$\left[ \begin{array}{c} \text{word} \\ \dots \\ \left[ \begin{array}{c} \text{verb} \\ \text{VFORM } \textit{finite} \end{array} \right] \end{array} \right] \longrightarrow \left[ \text{DOM} \left\langle \left[ \textit{verbal} \right] \right\rangle \right]$$





# Complementizers

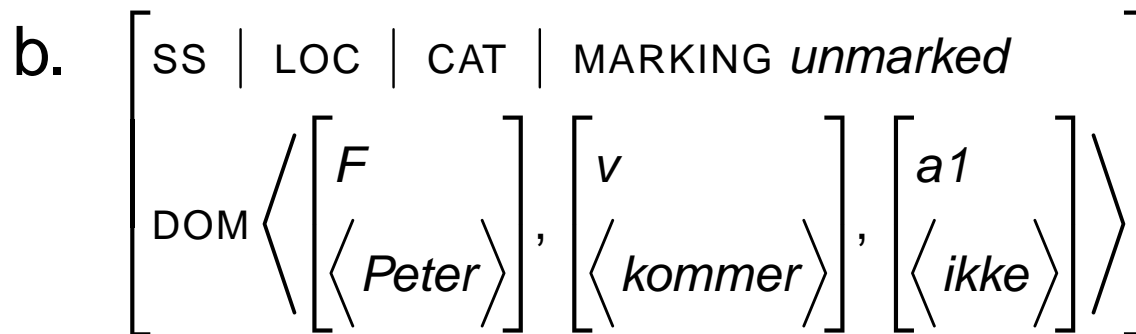
Complementizers are assigned the *topo* value *v*. Part of the lexical entry for *at*, ‘that’:



# Main clause

Together with a constraint saying that the *v* slot must always be instantiated this gives the right word order. Either the finite verb instantiates *v* resulting in main clause word order:

- (12) a. Peter kommer ikke.  
*Peter comes not*



# Subordinate clause

Or the complementizer instantiates  $v$  and the finite verb must instantiate  $V$  resulting in subordinate clause word order:

(13) a. (Ole sagde) at Peter ikke kommer.  
*Ole said that Peter not comes*

b. 
$$\left[ \begin{array}{c|c|c|c} \text{SS} & \text{LOC} & \text{CAT} & \text{MARKING } \textit{marked} \\ \hline \text{DOM} & \left\langle \begin{array}{c} v \\ \left\langle at \right\rangle \end{array} \right\rangle, & \left\langle \begin{array}{c} s \\ \left\langle Peter \right\rangle \end{array} \right\rangle, & \left\langle \begin{array}{c} a1 \\ \left\langle ikke \right\rangle \end{array} \right\rangle, & \left\langle \begin{array}{c} v \\ \left\langle kommer \right\rangle \end{array} \right\rangle \end{array} \right]$$

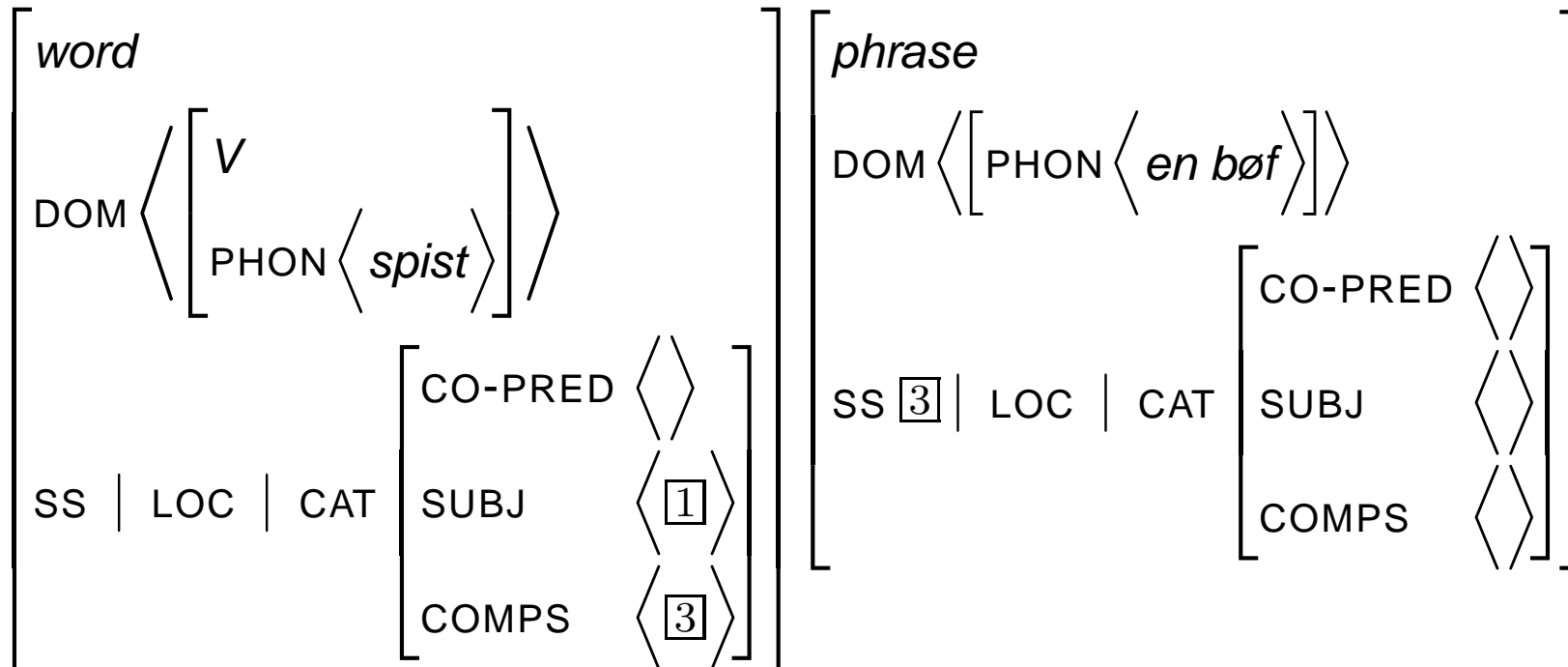
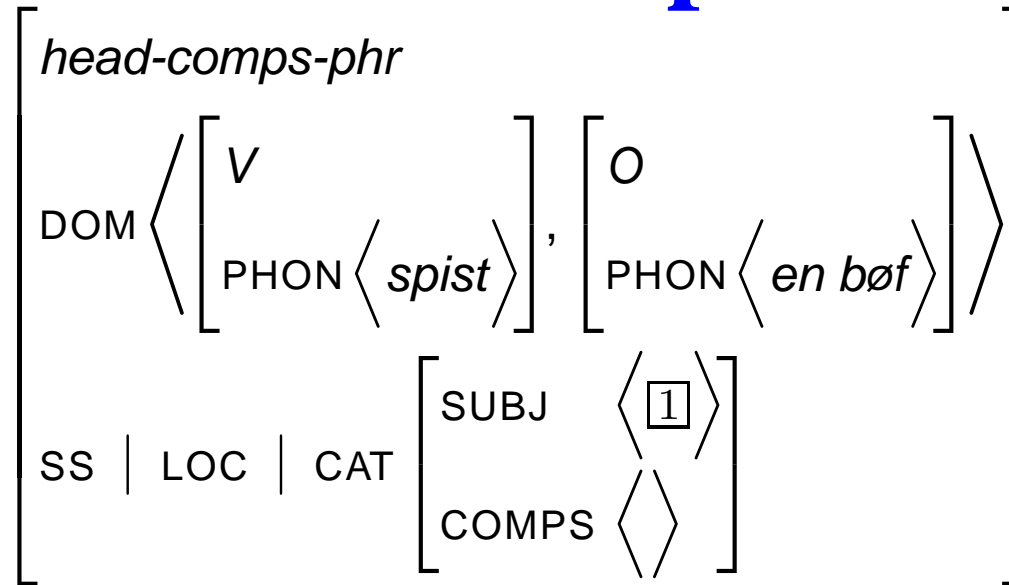
So there is no movement!

# An example

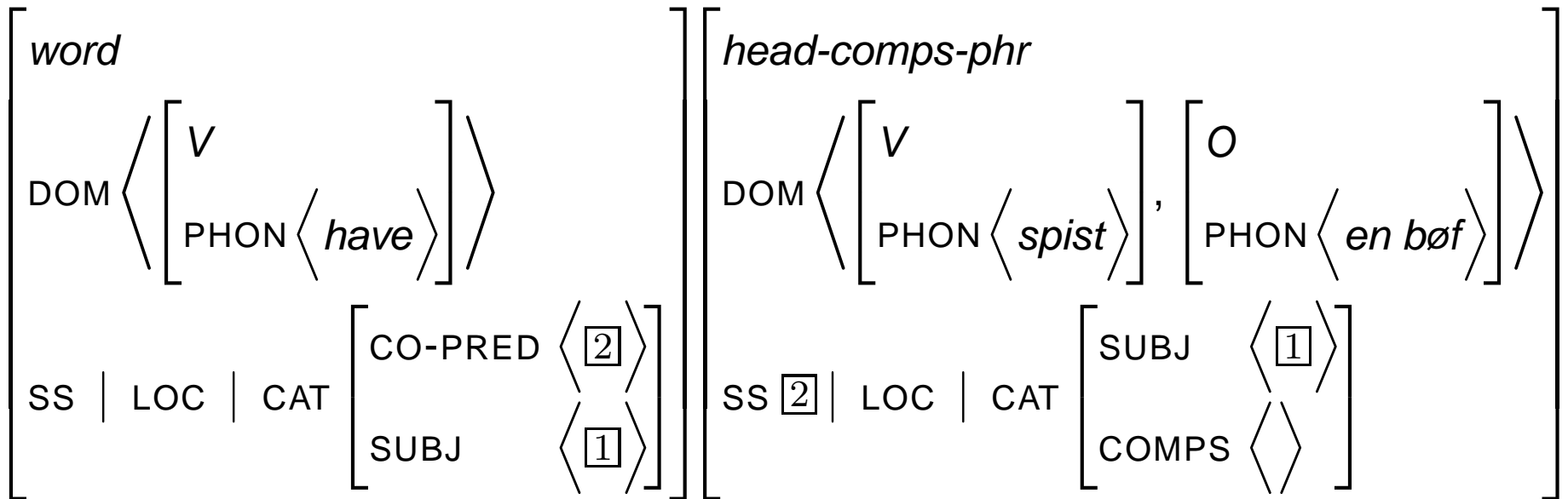
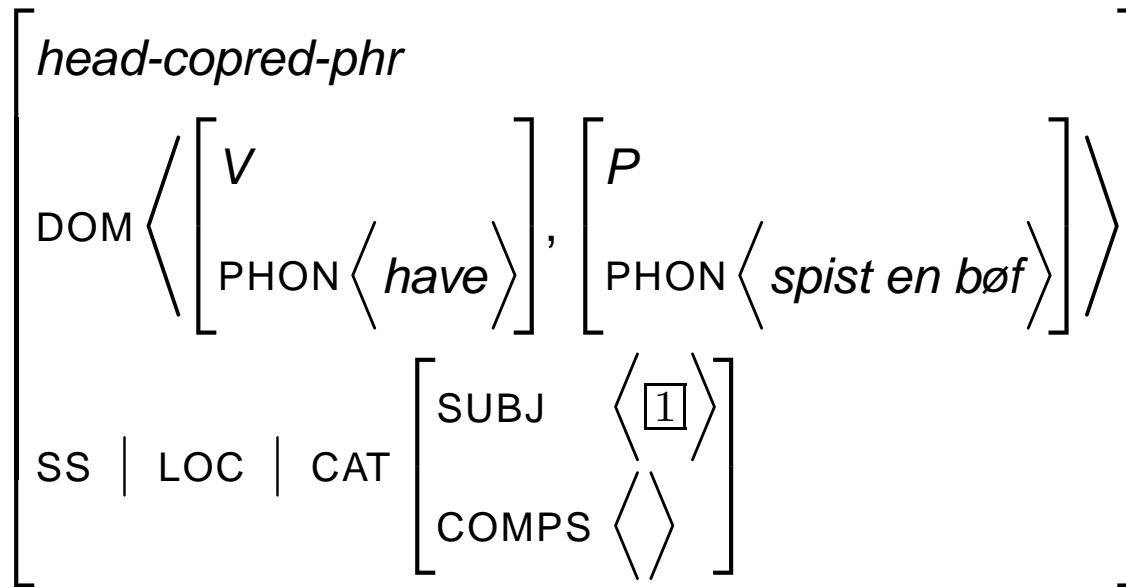
We will now return to the example in Jørgensen (2006) and see some of the machinery at work.

- (14) Hansen må have spist en bøf.  
*Hansen must have eaten a steak*

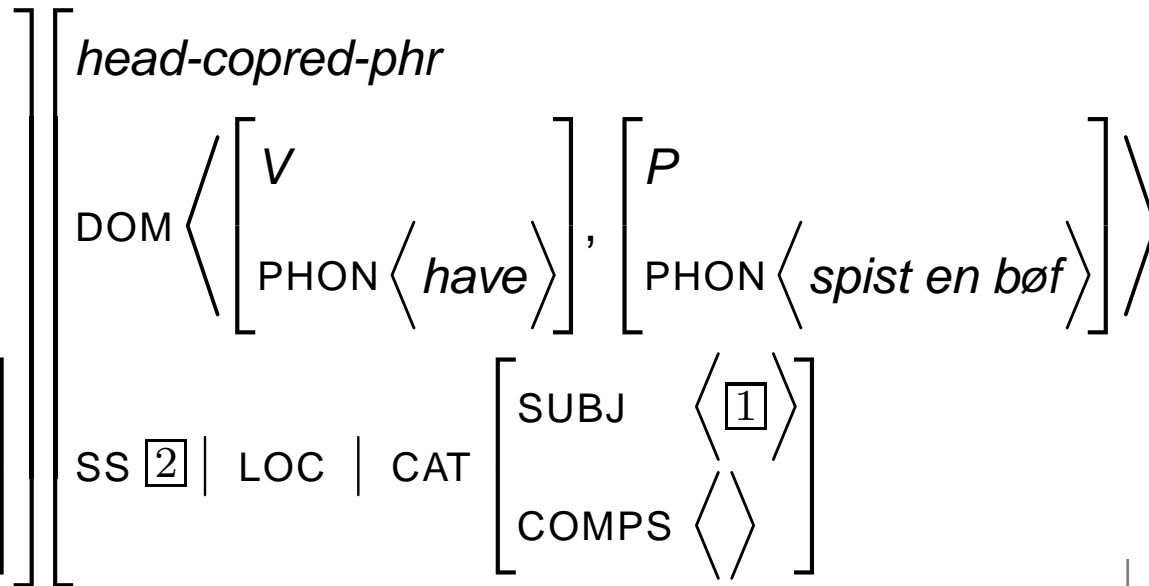
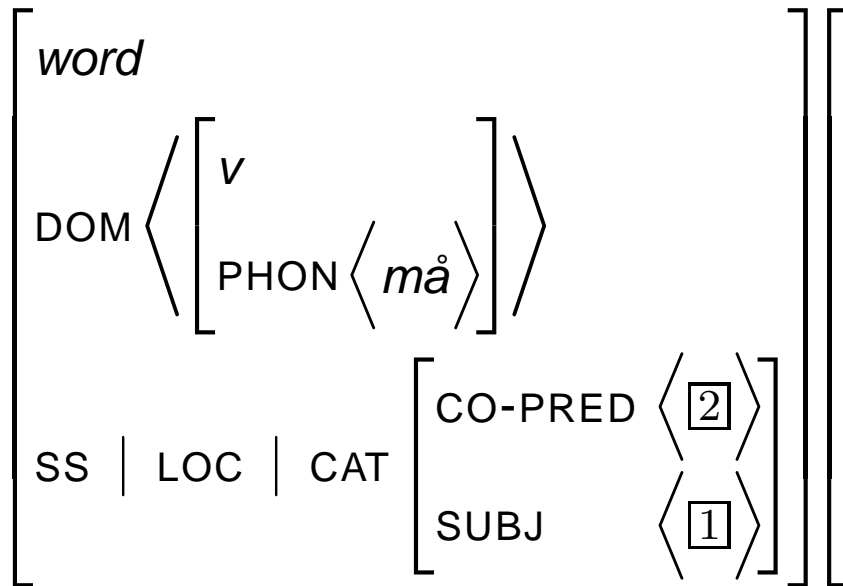
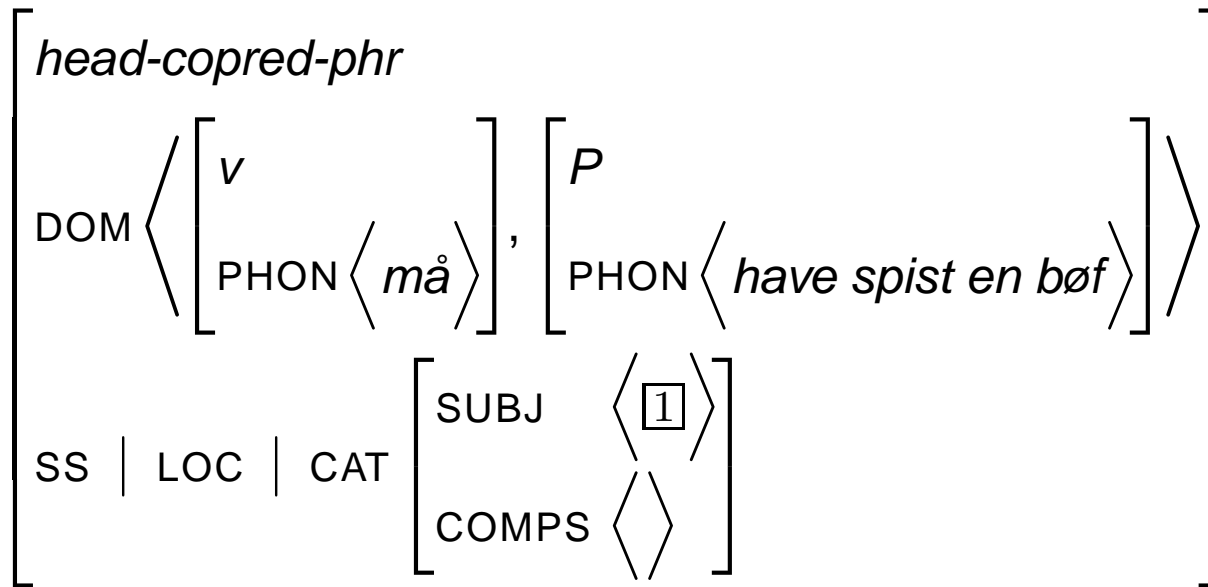
# An example



# An example



# An example



# An example

