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## FRIGRAM: a French Interaction Grammar

Guy Perrier

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# FRIGRAM: a French Interaction Grammar

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# Chapter 1

## Generalities

FRIGRAM is written in the framework of the Interaction Grammar (IG) formalism. For a presentation of the formalism, the reader can refer to [GP09].

### 1.1 The principles of the grammar

FRIGRAM includes about 4000 EPTDs (Elementary Polarized Tree Descriptions), which all respect some principles. There are two kinds of principles: the principles verified by each EPTD individually and the principles verified by the models of PTDs (Polarized Tree Descriptions) representing the syntax of sentences.

#### 1.1.1 The principles of individual descriptions

**Definition 1** *A node with a positive or saturated `cat` feature is called a concrete node.*

**Principle 1 (cat-funct)**

- *Any concrete node of an EPTD has `funct` feature.*
- *Any non concrete node of an EPTD has either a `cat` feature or a virtual `funct` feature.*

The consequence is that any node of a model has a `cat` feature and a `funct` feature. Another consequence is that any node of a model has a unique concrete antecedent in the original PTD.

**Principle 2 (strict lexicalisation)** *Any EPTD has exactly one anchor node. This anchor node has a saturated `cat` feature with an atomic feature value.*

**Definition 2** *A spine in an EPTD is a list of nodes  $N_1, N_2 \dots, N_p$  such that:*

- *for any  $i$  such that  $1 < i \leq p$ , node  $N_i$  has a saturated feature `cat` and a feature `funct`  $\leftrightarrow$  `head`; moreover, node  $N_i$  is a daughter of node  $N_{i-1}$ ;*
- *node  $N_1$  is a concrete node and its feature `funct` is different from the value `head`; it is called the maximal projection of all other nodes belonging to the spine;*
- *node  $N_p$  is either an anchor or a trace; in the first case, the spine is called a main spine; in the second case, it is called an empty spine; in both cases, node  $N_p$  is called the lexical head of all nodes belonging to the spine.*

**Principle 3 (spine)** *Any concrete node of an EPTD belongs to exactly one spine.*

A corollary of the strict lexicalisation and spine principles is that every EPTD has exactly one main spine.

A consequence of the spine principle is that all nodes with a positive feature **cat** are the maximal projection of one spine.

**Principle 4 (maximal projection)** *If a maximal projection has a concrete mother node, then it is the maximal projection of an empty spine and the mother node belongs to the main spine.*

The spine definition and the principle are illustrated with three EPTDs used to parse the following sentences.

- (1.1) *Jean arrive plus tôt **qu'** hier.*  
 Jean is coming earlier than yesterday.  
 ' Jean is coming earlier than yesterday.'
- (1.2) ***Qui** dort dine.*  
 Who sleeps has dinner.  
 ' Who sleeps has dinner.'
- (1.3) *Jean rencontre Marie dans l'entreprise de **qui** travaille Pierre.*  
 Jean is meeting Marie in the company of whom works Pierre.  
 ' Jean is meeting Marie in whose company Pierre works'.

Figure 1.1 shows the EPTDs associated with the words in bold in the two first sentences.

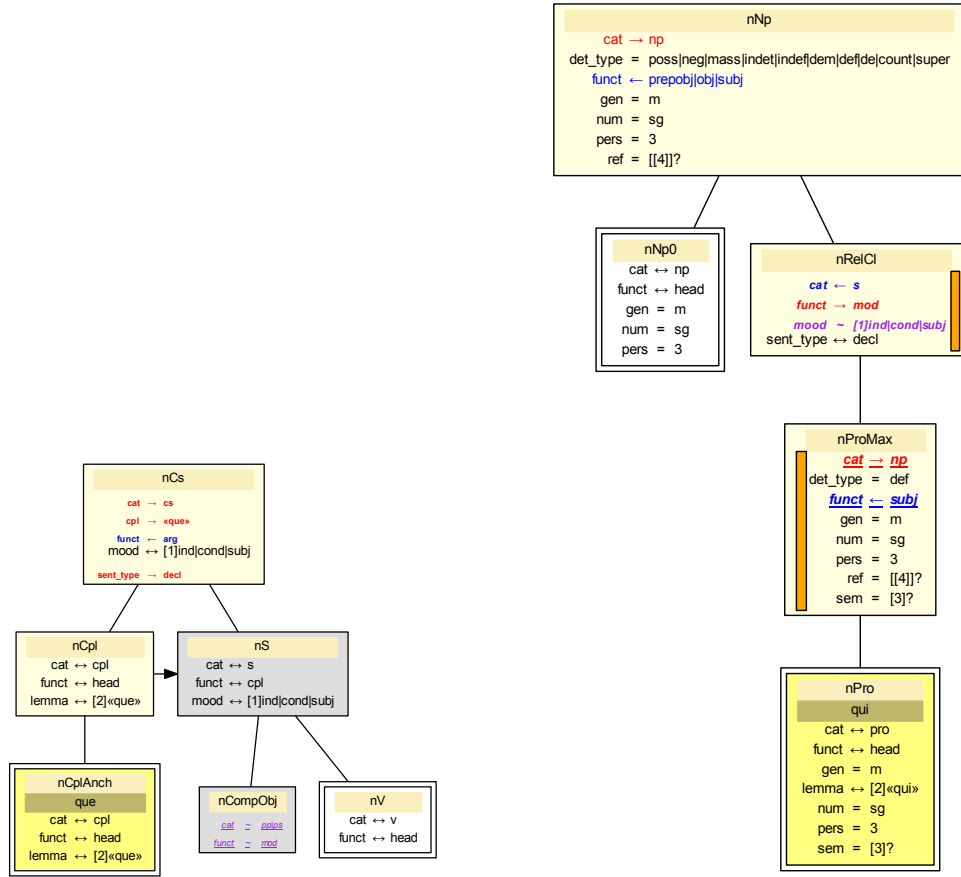


Figure 1.1: EPTDs associated with the complementizer *que* introducing a comparison clause and with the subject relative pronoun *qui* used without antecedent

In the left EPTD, there is a main spine *nCs*, *nCpl*, *nCplAnch* and an empty spine *nS*, *nV*. Node *nCs* is the maximal projection of the main spine and *nCplAnch* its lexical head. In the same EPTD, node *nS* is the maximal projection of the empty spine and *nV* its lexical head.

In the right EPTD, there is a main spine *nProMax*, *nPro* and an empty spine *nNp*, *nNp0*. Node *nProMax* is the maximal projection of the main spine and *nPro* its lexical head. In the same EPTD, node *nNp* is the maximal projection of the empty spine and *nNp0* its lexical head.

The EPTD of figure 1.2 is associated with the relative pronoun *qui* and it includes three spines : the main spine *nProMax*, *Pro*, and two empty spines reduced to a single node, *nCanSubj* and *nTrace*.



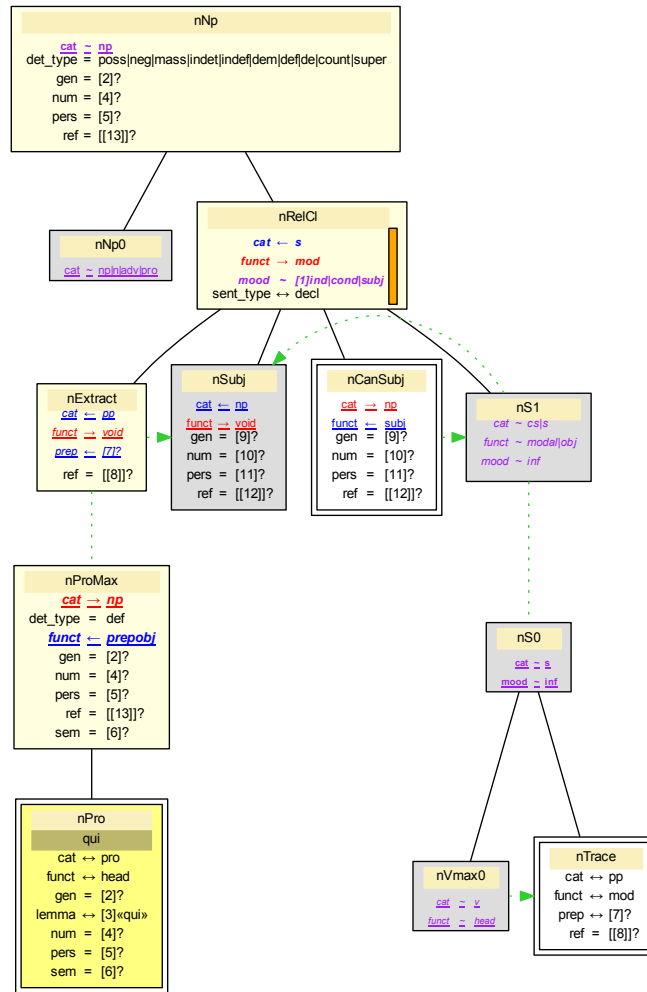


Figure 1.2: EPTD associated with the relative pronoun *qui* used in an extracted indirect complement

### 1.1.2 The principles of models

**Principle 5 (head)** For any node of a model which is not a leaf, there is exactly one daughter node with a feature `funct : head`. This daughter is called the immediate head of its mother.

From this principle, each node of model can be associated with a unique leaf, its lexical head, using a path determined by the successive immediate heads.

**Principle 6 (function unicity)** For any node of a model which is not a leaf and for any `funct` feature different of `mod` and `iobj`, there is at most one daughter node with such a `funct` feature.

Both principles are useful for guiding the parsing with IG.

## 1.2 The organisation of the grammar

### 1.2.1 The interface with the lexicon

FRIGRAM is strictly lexicalized: each EPTD of the grammar has a unique anchor node intended to be linked with a word of the language. For this, it is associated to a feature structure describing a syntactic frame corresponding to words able to anchor it, the description being independent of the grammatical formalism. This feature structure constitutes the EPTD *interface* with the lexicon.

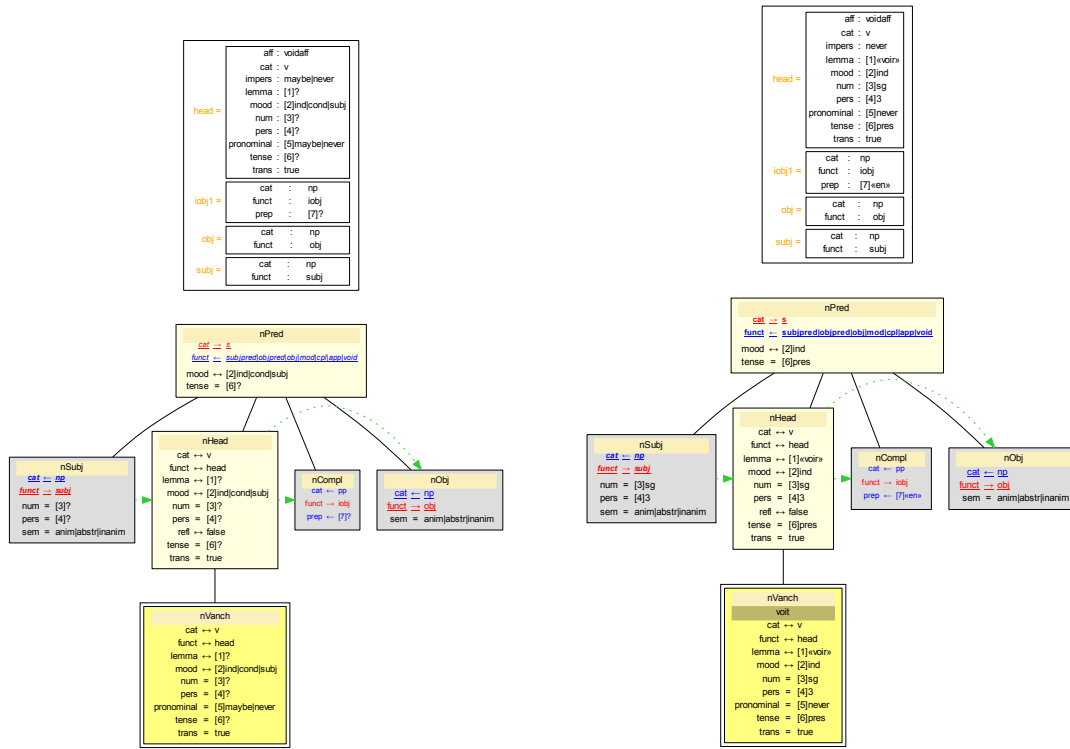


Figure 1.3: From left to right, a non anchored EPTD describing the syntactic behaviour of a transitive verb in the active voice, and the same EPTD after anchoring with the verb *voit*

The set of features used in the interfaces differs from the one used in EPTDs because they do not play the same role: they do not aim at describing syntactic structures but they are used for describing the morpho-syntactic properties of the words of the language in a way independent of the formalism.

On the left part of figure 1.3, an EPTD represents the syntactic behavior of a transitive verb, which also requires an indirect complement, in the active voice and in a mood which is conditional, indicative or subjunctive. It is topped by its interface, which expresses these properties with a two level feature structure.

- At the top level, the features *head*, *iobj1*, *obj* and *subj* respectively indicate the different components of the frame required from verbs anchoring the EPTD. It means that these verbs must have a subject, a direct object and an indirect object.

- The second level gives morpho-syntactic properties of each element of the top level<sup>1</sup>.

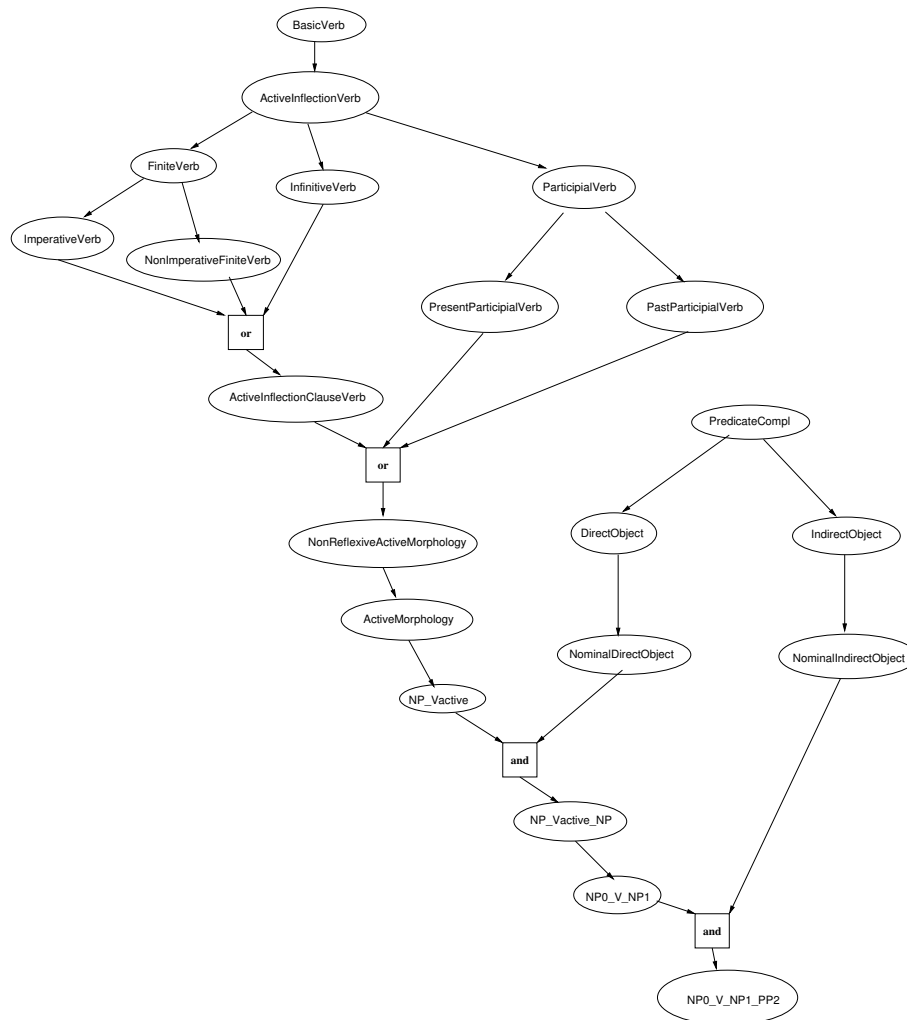


Figure 1.4: Partial view of the hierarchy of classes used for defining the terminal class `NP0_V_NP1_PP2`

The lexicon which is linked to the grammar must have the same form for its entries as for the EPTD interfaces because the EPTD anchoring is performed by feature filtering. For instance, the feature structure on the right part of figure 1.3 represents a possible lexical entry for the verb *voit*. It succeeds to filter the interface on the left and a side effect is to instantiate feature values shared by the EPTD and its interface, the values of the `lemma`, `mood`, `num`, `pers`, `pronominal` and `tense` features. The result is the anchored EPTD on the right part of the figure.

### 1.2.2 The source grammar as a hierarchy of classes

The about 4000 EPTDs of FRIGRAM have not been written one by one but they are automatically generated from a source grammar, which is structured as a hierarchy of classes, built each one from the other ones with three operations: *simple inheritance*, *conjunction* and *disjunction*.

<sup>1</sup>For the explanation of the different feature names, see the first section of the chapter about verbs.

In the following, when there is ambiguity, we call this source grammar  $\text{FRIGRAM}_S$  whereas the object grammar, constituted of the EPTDs, is called  $\text{FRIGRAM}_O$ . The compilation of  $\text{FRIGRAM}_O$  from  $\text{FRIGRAM}_S$  is performed by XMG [DLP05], which is a software dedicated to the design of electronic grammars usable in NLP.

**Definition 3** *A terminal class of the source grammar is a class that is evaluated to produce the corresponding EPTDs of the object grammar.*

Of course, all classes that are not operands of one among the three operations are terminal classes. Figure 1.4 gives a partial view of the hierarchy of classes used for producing the terminal class  $\text{NP0\_V\_NP1\_PP2}$ . This class results from the composition of 40 classes structured in a hierarchy which is partially shown in figure 1.4. Classes related to impersonal and reflexive constructions as well as passive and middle voices are not considered in this view. The evaluation of the  $\text{NP0\_V\_NP1\_PP2}$  class produces 60 EPTDs.

$\text{FRIGRAM}_S$  includes about 400 classes and among them 160 terminal classes defining around 4000 EPTDs. It means that every terminal defines 25 EPTDs on average.

### 1.2.3 The grouping of classes by modules

The 400 classes of  $\text{FRIGRAM}_S$  are grouped by modules. Here is the list of all modules in the alphabetic order:

- ADJECTIVE: classes concerning adjectives,
- ADVERB: classes concerning adverbs,
- COMPLEMENT: classes modelling all kinds of complements required by verbs, nouns or adjectives
- COMPLEMENTIZER: classes concerning complementizers<sup>2</sup>,
- COORDINATION: classes modelling coordination,
- DETERMINER: classes concerning determiners, except interrogative determiners,
- INTERROGATIVE: classes concerning interrogative pronouns, adverbs and determiners,
- NOUN: classes concerning common and proper nouns,
- PREPOSITION: classes concerning prepositions,
- PROCLITIC: classes concerning clitic pronouns,
- PRONOUN: classes concerning lexical pronouns, except interrogative and relative pronouns,
- PUNCTUATION: classes concerning punctuation signs,
- RELATIVE: classes concerning relative pronouns,
- VERB: classes defining the different families of verbs according to their subcategorization frame and specific verbs as presentatives and modal and causative verbs,

---

<sup>2</sup>The prepositions *à* and *de* introducing direct object infinitives are considered as complementizers.

- VERBKERNEL: classes defining the common verbal kernel of all verbs with the morphology and its interaction with the form of the subject, the syntactic function of the verb and its voice,
- VERBIMPERSONALDIATHESES: classes modelling the different diatheses, active, passive and middle, with an impersonal subject,
- VERBPERSONALDIATHESES: classes modelling the different diatheses, active, passive and middle, with a personal subject,
- VERBSUBJECTCONTROL: classes modelling the control of infinitive subjects by arguments of the verb governing the infinitive.

Some classes of one module are defined from classes of another module. We can represent it with a graph where an edge means that some classes of the target module are defined from classes of the source module. Figure 1.5 shows these dependencies for the modules concerning verbs, nouns and adjectives.

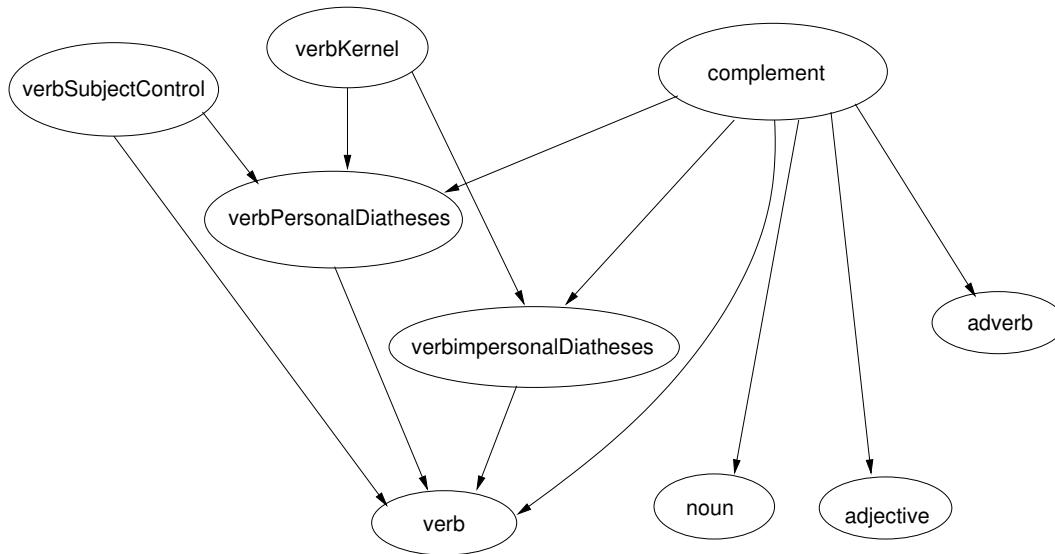


Figure 1.5: The hierarchy of modules grouping the classes of FRIGRAM<sub>S</sub> concerning verbs, nouns, adjectives and adverbs

Figure 1.6 shows these dependencies for the modules modelling extraction from relative, interrogative and cleft clauses.

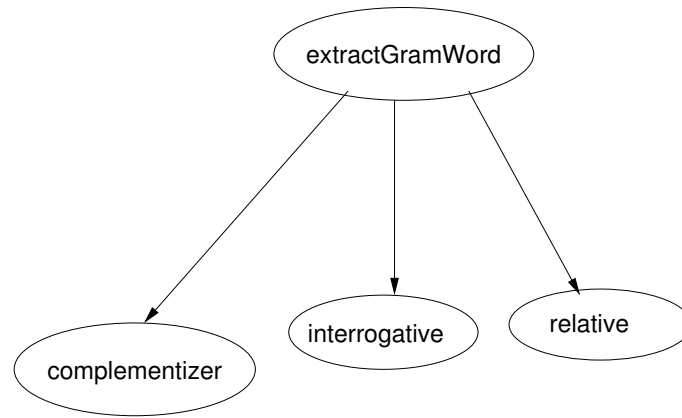


Figure 1.6: The hierarchy of modules grouping the classes of  $\text{FRIGRAM}_S$  concerning extraction

The modules absent from figure 1.5 and figure 1.6 are isolated modules without external dependencies.



## Chapter 2

# Complements

The COMPLEMENT module gathers classes describing complements required by verbs, nouns and adjectives. That is why the following modules depend on the COMPLEMENT module, as figure 1.5 in the previous chapter shows it : VERBPERSONALDIATHESES, VERBIMPERSONALDIATHESES, NOUN and ADJECTIVE. A basic class, PREDCOMPLEMENT, describes the common features of all complement classes. It generates the EPTD of figure 2.1.

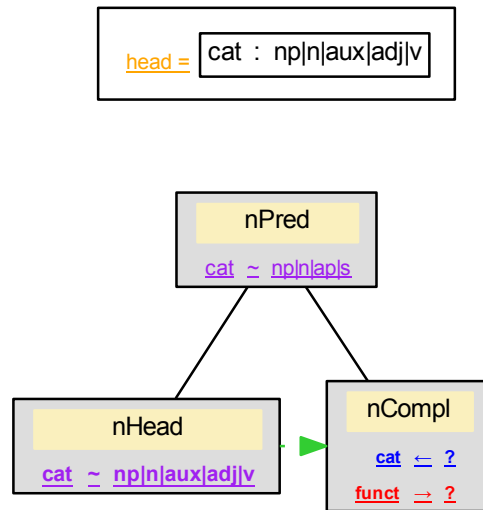


Figure 2.1: The EPTD defined by the PREDCOMPLEMENT class

The `cat` negative feature and the `funct` positive feature express that the complement represented with node *nCompl* is required by its head represented with node *nHead*.

Complement are of three kinds : direct objects, predicate complements and indirect objects.



## 2.1 Direct objects

Only verbs have direct objects. Here are various examples of direct objects.

(2.1) *Jean interroge Marie.*

Jean is asking Marie.

'Jean is asking Marie.'

(2.2) *Ce colis pèse lourd.*

This parcel weights a lot

'This parcel weights a lot'

(2.3) *Jean veut venir.*

Jean wants to come.

'Jean wants to come.'

(2.4) *Jean apprend à travailler.*

Jean learns working.

'Jean learns working.'

(2.5) *Jean veut que Marie vienne.*

Jean wants that Marie comes.

'Jean wants that Marie comes.'

(2.6) *Jean demande quand Marie vient.*

Jean asks when Marie is coming.

'Jean asks when Marie is coming.'

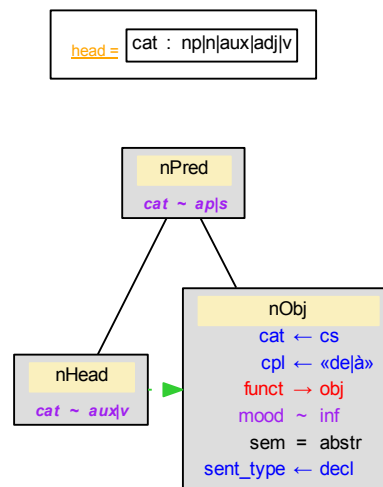


Figure 2.2: PTD defined by the `INDIRECTINFINITIVECLAUSEOBJECT` class

The different forms of direct objects correspond to different classes:

- NOMINALOBJECT for nominal objects (sentence 2.1),
- ADVERBIALOBJECT for adverbial objects (sentence 2.2),
- DIRECTINFINITIVECLAUSEOBJECT for direct object infinitives (sentence 2.3),
- INDIRECTINFINITIVECLAUSEOBJECT for object infinitives introduced with a preposition used as a complementizer (sentence 2.4),
- DECLARATIVEFINITECLAUSEOBJECT for declarative object finite clauses (sentence 2.5),
- and INTERROGATIVECLAUSEOBJECT for interrogative object finite clauses (sentence 2.6).

The DIRECTINFINITIVECLAUSEOBJECT, INDIRECTINFINITIVECLAUSEOBJECT, DECLARATIVEFINITECLAUSEOBJECT classes inherit a common class, DECLARATIVECLAUSEOBJECT, which itself inherits the CLAUSEOBJECT class. The INTERROGATIVECLAUSEOBJECT directly inherits the CLAUSEOBJECT class.

Figure 2.2 shows the PTD defined by the INDIRECTINFINITIVECLAUSEOBJECT class. For this class, the object is an infinitive clause introduced with *à* or *de* considered as complementizers.

Figure 2.3 shows the two PTDs defined by the INTERROGATIVECLAUSEOBJECT class. The left one corresponds to interrogative indirect clauses introduced with the conjunction *si*, whereas the right one corresponds to non complementized interrogative indirect clauses.

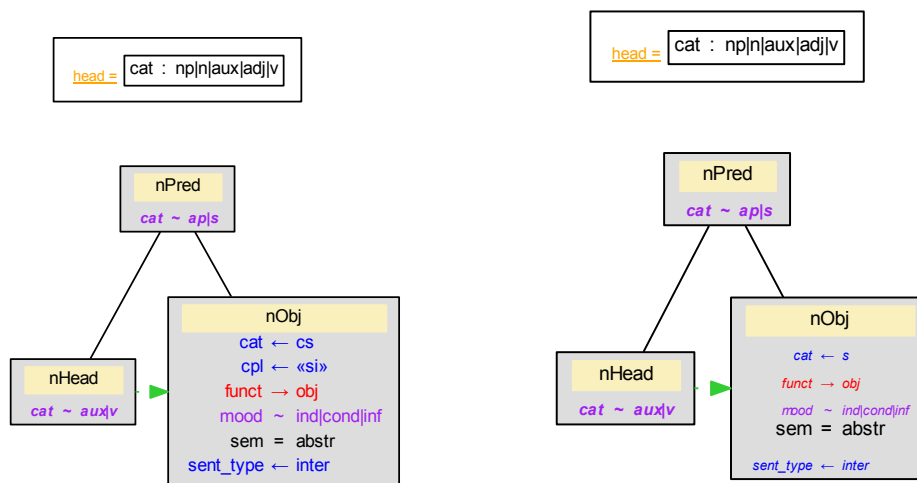


Figure 2.3: The two PTDs defined by the INTERROGATIVECLAUSEOBJECT class

## 2.2 Predicate Complements

Predicate complements are complement that behave as predicates which are about the subject or the direct object of the verb on which they depend. Here are various examples of predicate

complements <sup>1</sup>.

- (2.7) *L'entreprise reste un échec.*  
 The company remains a failure.  
 'The company remains a failure.'
- (2.8) *Jean trouve Marie abandonnée par ses amis.*  
 Jean finds Marie abandoned by her friends.  
 'Jean finds Marie abandoned by her friends.'
- (2.9) *Jean entend Marie chanter.*  
 Jean is hearing Marie singing.  
 'Jean is hearing Marie singing.'
- (2.10) *Le problème est de rentrer tard.*  
 The problem is to come home late.  
 'The problem is to come home late.'
- (2.11) *Marie passe pour une femme intelligente.*  
 Marie looks a woman clever.  
 'Marie looks a clever woman.'
- (2.12) *Marie passe pour jalouse de Pierre.*  
 Marie is seen as jealous of Pierre.  
 'Marie is seen as jealous of Pierre.'
- (2.13) *Marie passe pour être une femme intelligente.*  
 Marie looks to be a woman clever.  
 'Marie is seen as being a clever woman.'

The examples above illustrate different cases of predicate complements. Sentence 2.7 illustrates a predicate complement about the subject *l'entreprise*, whereas sentence 2.8 illustrates a predicate complement about the object *Marie*. A basic class, PREDICATECOMPL, expresses the common features of all cases and it generates the PTD shown on figure 2.4.

---

<sup>1</sup>Another analysis of sentence 2.9 considers *Marie chanter* as a whole infinitive clause and *Marie* as the subject of this clause but it has some difficulty to express the relative independence of *Marie* with respect to *chanter* as in the sentence *Jean entend chanter Marie*.

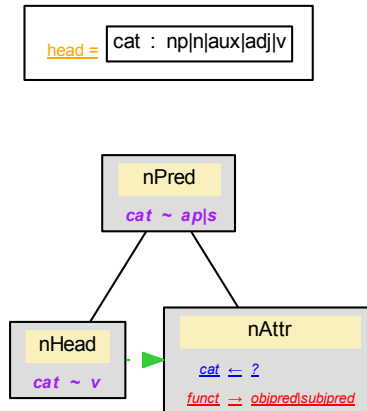


Figure 2.4: The PTD defined by the PREDICATECOMPL class

The different cases are distinguished according to the form of the complements and they give rise to different classes inheriting the PREDICATECOMPL class:

- DIRECTPREDICATECOMPLNOUNPHRASE for predicate complements that are noun phrases (sentence 2.7),
- DIRECTPREDICATECOMPLADJECTIVALPHRASE for predicate complements that are adjectival phrases (sentence 2.8),
- DIRECTPREDICATENONCOMPLEMENTEDCLAUSE for predicate complements that are direct infinitives (sentence 2.9),
- DIRECTPREDICATECOMPLEMENTEDCLAUSE for predicate complements that are clauses introduced with a complementizer (sentence 2.10),
- INDIRECTPREDICATECOMPLNOUNPHRASE for predicate complements that are noun phrases introduced with a preposition (sentence 2.11),
- INDIRECTPREDICATECOMPLADJECTIVALPHRASE for predicate complements that are adjectival phrases introduced with a preposition (sentence 2.12),
- INDIRECTPREDICATEINFINITIVECLAUSE for predicate complements that are infinitives introduced with a preposition (sentence 2.13).

For instance, figure 2.5 shows the PTDs defined by the DIRECTPREDICATECOMPLEMENTEDCLAUSE and INDIRECTPREDICATEINFINITIVECLAUSE classes.

The right PTD includes particular nodes: node *nAttr0* representing the complement infinitive without its preposition and node *nAttrSubj* representing the subject of this infinitive. It will have the subject or the object of the verb as its antecedent according to the argument to which the predicate complement is related.

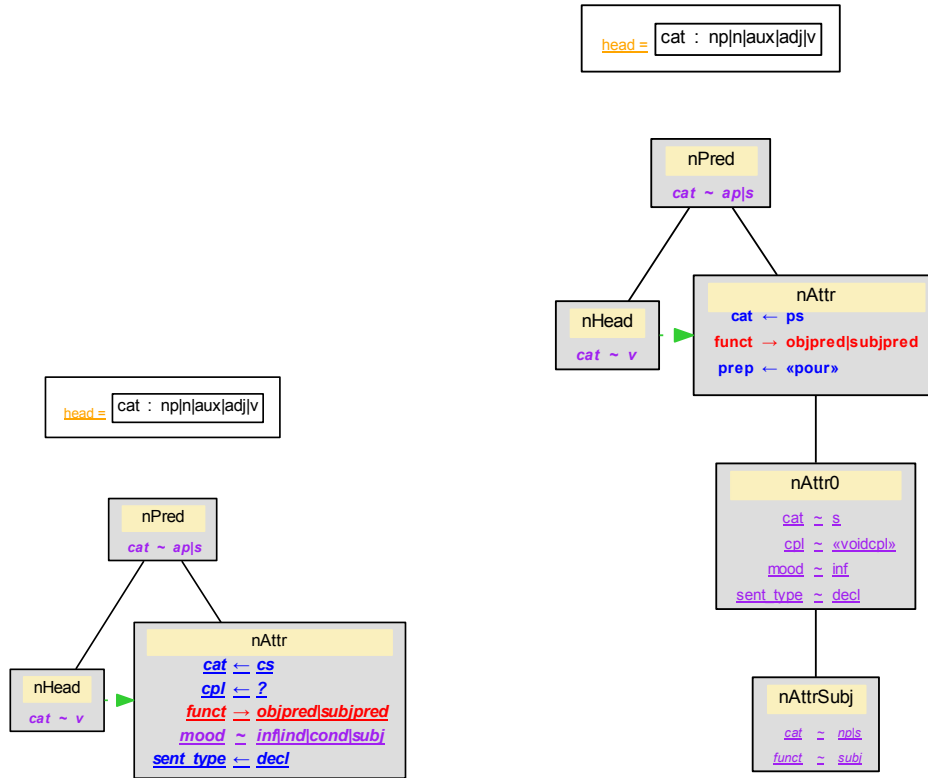


Figure 2.5: The PTDs defined by the `DIRECTPREDICATECOMPLEMENTEDCLAUSE` and `INDIRECTPREDICATEINFINITIVECLAUSE` classes

## 2.3 Indirect objects

Indirect objects are required complements introduced with a preposition, with the exception of some cases studied in the two previous sections. Here are various examples of indirect objects.

(2.14) *Marie est interrogée par Jean.*

Marie is asked by Jean.

' Marie is asked by Jean. '

(2.15) *Jean parle de Marie.*

Jean speaks about Marie.

' Jean speaks about Marie. '

(2.16) *Jean propose une collaboration avec le Japon.*

Jean proposes a collaboration with Japan.

' Jean proposes a collaboration with Japan. '

(2.17) *Jean est attentif au cours.*

Jean is attentive to the class.

'Jean is attentive to the class.'

(2.18) *Jean parvient à dormir.*  
Jean succeeds in sleeping.

'Jean succeeds in sleeping.'

(2.19) *J'emmène les enfants danser.*  
I take the children dancing.

'I take the children dancing.'

(2.20) *Les bénéfices vont diminuant.*  
The profits are going decreasing.

'The profits are going decreasing.'

(2.21) *Il a le souci de bien faire.*  
He has the worry of well doing.

'He is anxious to do well.'

(2.22) *Il a le souci que la lettre arrive à Marie.*  
He has the worry that the letter arrives to Marie.

'He is anxious that the letter arrives to Marie.'

Contrary to direct objects or predicate complements, indirect objects can be complements of verbs, nouns and adjectives, as examples 2.15, 2.16 and 2.17 illustrate it.

A basic class, `INDIRECTOBJECT`, expresses the common features of all cases and it generates the PTD shown on figure 2.6.

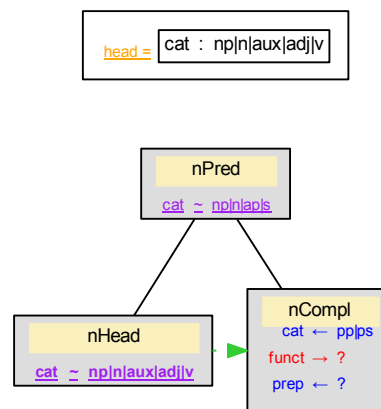


Figure 2.6: The PTD defined by the `INDIRECTOBJECT` class

The different cases are distinguished according to the form of the complements and they give rise to different classes inheriting the `INDIRECTOBJECT` class:

- `AGENTOBJECT` for agent complements (sentence 2.14),

- **NOMINALINDIRECTOBJECT** for other nominal complements (sentences 2.15, 2.16), 2.17)),
- **CLAUSALINDIRECTOBJECT** for indirect clausal complements introduced with a preposition (sentence 2.18); the complements can be infinitives or present participles;
- **INFINITIVEINDIRECTOBJECTWITHOUTPREPOSITION** for indirect infinitive complements introduced without a preposition (sentence 2.19)<sup>2</sup>,
- **PRESENTPARTICIPLEINDIRECTOBJECTWITHOUTPREPOSITION** for present participle complements which are indirect objects without preposition (sentence 2.20),
- **CLAUSALDEOBJECT** for clausal complements introduced with the preposition *de*; the class is the disjunction of two classes, **INFINITIVEINDIRECTOBJECT** and **FINITECLAUSEDEOBJECT**, corresponding to the two cases : the complement clause is an infinitive (sentence 2.21) or the complement clause is finite and the preposition is implicit (sentence 2.22); figure 2.7 shows the two PTDs corresponding to the two cases.

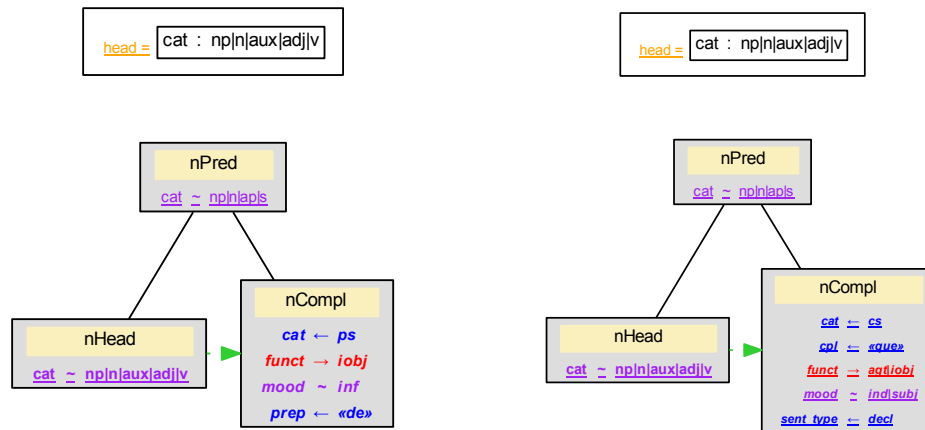


Figure 2.7: The PTDs defined by the **CLAUSEDEOBJECT** class

<sup>2</sup>Even if there is no preposition, the complement is considered as indirect because the complement does not verify the usual tests for recognizing direct objects. A destination preposition is implicit.

# Chapter 3

## Verbs

### 3.1 Interfaces with the lexicon

Verbs are characterized in interfaces with the feature `head.cat = aux|v`, depending on whether the verb is an auxiliary or not. Their morphological features and some syntactic properties are gathered in the `head` feature:

- **aff** : it takes the values **en**, **le**, **y** according to the affix that is associated with the verb (*en vouloir* à); if the verb takes no affix, the value of the feature is **voidaff**;
- **impers**: if the verb always takes an impersonal construction, the value of the feature is **always** (*falloir*); if the verb never takes an impersonal construction, the value of the feature is **never** (*comporter*); if the verb can enter personal as impersonal constructions, the value is **maybe** (*arriver, vendre*); for transitive verbs, the concerned impersonal construction is implicitly a passive construction;
- **mood**: it gives the mood of the verb, which can take the following values: **cond** (conditional), **imp** (imperative), **ind** (indicative), **inf** (infinitive), **pastp** (past participle), **presp** (present participle), **subj** (subjunctive);
- **num**: it gives the number of the verb : **pl** (plural) or **sg** (singular);
- **pers**: it gives the person of the verb: **1**, **2** or **3**;
- **pronominal**: if the verb is essentially pronominal, the value of the feature is **always** (*s'enfuir*); if the verb never enters a pronominal construction, the value of the feature is **never** (*venir*); if the verb enters a pronominal construction by accident, the value is **maybe** (*laver, rencontrer*);
- **tense**: it gives the tense of the verb: **fut** (future), **imperf** (imperfect), **pres** (present), **past**;
- **trans**: it can takes the values **true** or **false** depending on whether the verb is transitive or not.

The subcategorisation frame of a verb is described with features which are put in parallel with the head feature and describe the required syntactic arguments of the verb:

- **caus**: the complement verb of causative auxiliaries



- **iobj1**: first indirect object,
- **iobj2**: second indirect object,
- **iobj3**: third indirect object,
- **modal**: infinitive object of a modal auxiliary,
- **obj**: direct object,
- **objpred**: object predicate complement, a predicate complement that agrees with the object of the verb,
- **subj**: subject,
- **subjpred**: subject predicate complement, a predicate complement that agrees with the subject of the verb,

For each argument feature, the properties of the argument are described with the following features:

- **cat**: the category of the argument, which can take the values **ap** (adjective phrase), **np** (noun phrase), **pp** (prepositional phrase) or **s** (sentence); if the argument is introduced with a complementizer or a preposition, the considered category is that of the argument without the complementizer or the preposition; the presence of these link words is indicated with another feature; for instance, one of the lexical entries for the verb *aller* has a feature **obj1.cat = np** to describe the locative complement of the verb;
- **funct**: the syntactic function of the argument, which can take the values **iobj** (indirect object)<sup>1</sup>, **modal** (object of a modal auxiliary), **obj** (direct object), **objpred** (object predicate complement), **subj** (subject), **subjpred** (subject predicate complement);
- **control**: if the argument is an infinitive, the function of the other argument that is its subject; the feature can take the values **iobj**, **obj**, **subj** or **void**, if there is no control over the infinitive; for instance, one of the lexical entries for the verb *permettre* (*allow*) has the feature **obj.control = iobj** because it takes an infinitive as its direct object and the subject of this infinitive is the indirect object of *permettre*;
- **cpl**: a possible complementizer if the argument is a sentence; if the argument is a sentence that requires no complementizer, it can be indicated with the feature **cpl = voidcpl**;
- **mood**: the possible mood of the argument if it is a sentence;
- **prep**: the possible preposition introducing the argument; if the argument requires no preposition, it is possible to indicate it with the feature value **voidprep**;
- **sem**: the semantic type of the argument, which can take the values **abstr** (abstract), **anim** (animate), **inanim** (inanimate) or **void** if the argument has no semantic content;
- **sent\_type**: the type of the sentence, if the argument is a sentence; this type can be **decl** (declarative), **excl** (exclamatory), **imper** (imperative) or **inter** (interrogative);

The two first features above are always present in the description of an argument; the other ones are optional.

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<sup>1</sup>An indirect object is an object introduced with a preposition but in some cases, the preposition may be missing as in the sentence *Il emmène Marie chercher son fils* (*he takes Marie getting her son*), where *chercher son fils* is regarded as an indirect object of *emmène* without preposition.

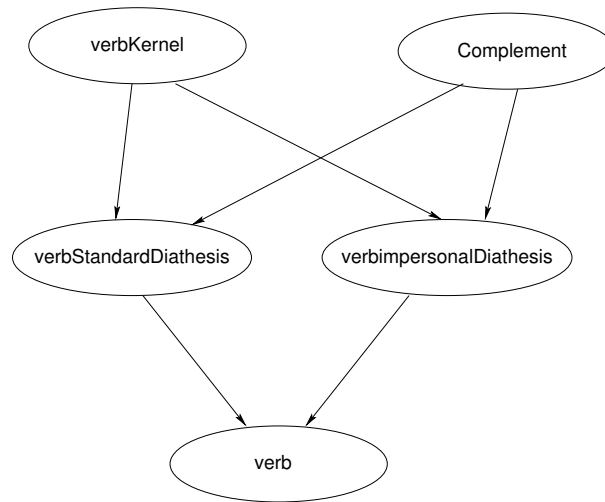


Figure 3.1: The dependencies between the modules of the verb grammar

## 3.2 The verb modules

The verb grammar is the most important part of FRIGRAM. It includes about 3000 EPTDs. Because of its size, it is shared out in several modules, which depend on each other:

- *verbKernel* concerns the common kernel of all verbs, auxiliaries included. It describes the verb without considering its complement, that is the following aspects and their mutual dependencies: the morphology of the verb, its mood, the voice of the clause it governs, the syntactic function of this clause in its environment and finally the shape of the subject. The syntactic function of the clause in its environment can be the whole sentence, the subject or a complement of another verb or a participial phrase attributive of a noun.
- *verbStandardDiatheses* describes the usual verb diatheses: active, passive and middle<sup>2</sup>. The classes of this module are built by conjunctive combination of classes coming from modules *verbKernel* and *Complement*.
- *verbImpersonalDiathesis* describes the impersonal verb diathesis, that is the diathesis in which the subject is impersonal. It uses the same mechanism of combination as the previous module.
- *verb*, which describes the different verb families according to their subcategorization frames. The classes of the module are built by disjunctive combination of classes coming from the two modules related to the verb diatheses.

The dependencies between the modules are represented on the diagram of figure 3.1.

<sup>2</sup>Causative constructions are not considered in the same way as active and passive diatheses. Causative auxiliaries are regarded as full verbs taking specific complements. They contribute to a variant of the active diathesis.

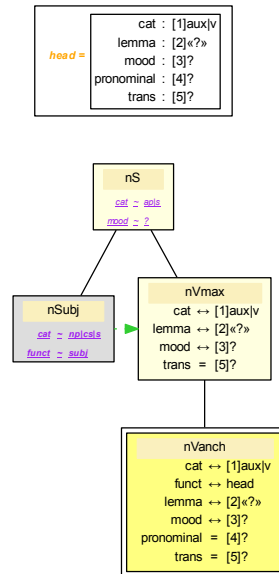


Figure 3.2: EPTD defined by the BASICVERB class .

### 3.3 The verb kernel or the verb without its complements

The BASICVERB class describes the common skeleton to all EPTDs anchored by verbs. It is presented in figure 3.2 with the following nodes:

- *nVanch* represents the bare verb,
- *nVmax* represents the verbal kernel constituted of the bare verb with its possible affixes, clitic pronouns and adverbs; it is the mother node of *nVanch*;
- *nS* represents the clause or the participial phrase that includes the verbal kernel as an immediate sub-constituent;
- *nSubj* represents the subject of the verb and it is a sister node of *nVmax*. *nSubj* precedes *nVmax*, even with subject inversion: in this case, *nSubj* represents a trace of the actual subject, which is put after *nVmax*.

Node *nVmax* share a saturated **mood** feature with *nVanch* but not necessarily with *nS*. It depends on whether *nVanch* determines the inflection of *nS* or not.

#### 3.3.1 Inflectional versus non inflectional verb

The BASICVERB class is divided into two subclasses, ACTIVEINFLECTIONVERB and COMPOUNDVERB, according to the role of *nVanch* in the determination of the inflection of *nS*.

- For ACTIVEINFLECTIONVERB, the anchoring verb determines the mood of *nS*, and as a consequence its syntactic function ; it also determines the shape of *nSubj*.
- For COMPOUNDVERB, the verb is a past participle combined with tense or passive auxiliaries and the inflection of *nS* is determined by one of these auxiliaries, according to its position and mood.

The verb that gives the inflection to *nS* is called the *inflectional verb* and its corresponding *nVmax* node is called the inflectional daughter of *nS*. In this function, it is named *nInfl*. The inflectional node is not always the head of *nS*. This is only the case when the head is a simple verb. If the verb is a past participle composed with auxiliaries, it is not the inflectional verb of *nS* but it is the head.

In the following examples, verbs that are heads of a clause or a participial phrase are in bold with a subscript H, those that are inflectional verbs are in bold with a subscript I.

- (3.1) *Jean **vient**<sub>HI</sub> aujourd'hui.*  
 Jean is coming today  
 'Jean is coming today.'
- (3.2) *Jean veut **venir**<sub>HI</sub> aujourd'hui.*  
 Jean wants to come today  
 'Jean wants to come today.'
- (3.3) *Jean **est**<sub>I</sub> **venu**<sub>H</sub> aujourd'hui.*  
 Jean came today  
 'Jean came today'
- (3.4) *Jean **a**<sub>I</sub> **fait**<sub>H</sub> **venir**<sub>HI</sub> Marie aujourd'hui.*  
 Jean got to come Marie today  
 'Jean got Marie to come today'
- (3.5) *Jean **a**<sub>I</sub> été **invité**<sub>H</sub> par le directeur.*  
 Jean was invited by the director  
 'Jean was invited by the director.'
- (3.6) *Jean **ayant**<sub>I</sub> déjà **rencontré**<sub>H</sub> Marie ne viendra pas à la réunion.*  
 Jean having already met Marie will not come to the meeting  
 'Jean having already met Marie will not come to the meeting.'
- (3.7) *Jean **ayant**<sub>I</sub> déjà **rencontré**<sub>H</sub> Marie , celle-ci ne viendra pas à la réunion.*  
 Jean having already met Marie , this one will not come to the meeting  
 'Jean having already met Marie, this one will not come to the meeting.'
- (3.8) *Jean croit Marie **abandonnée**<sub>HI</sub> par Pierre.*  
 Jean believes Marie abandoned by Pierre  
 'Jean believes Marie to be abandoned by Pierre'

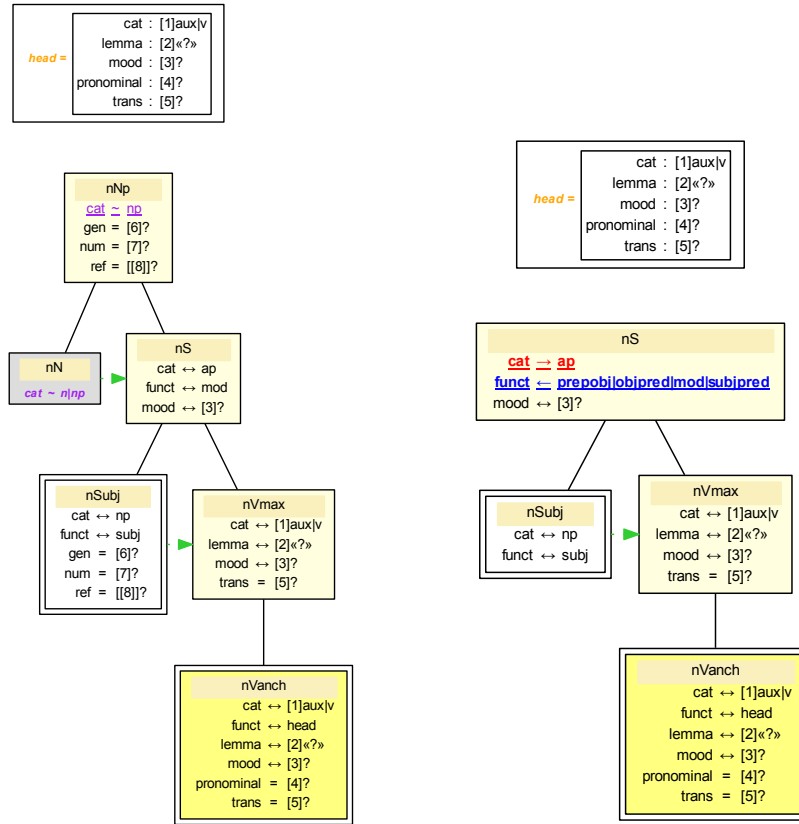


Figure 3.3: EPTDs defined by the PARTICIPIALVERB class for the respective attributive and predicate complement functions

In examples 3.1, 3.3 and 3.5, the *nS* node from the EPTD of the verbs in bold corresponds to the whole sentence.

In example 3.2, it corresponds to the infinitive clause *venir aujourd'hui*.

In example 3.4, the causative auxiliary *fait* is regarded as taking two complements, the infinitive *venir* and the direct object *Marie*. The *nS* node from the EPTDs of *a* and *fait* represents the whole sentence but for *venir*, it reduces to this verb.

In sentences 3.6 and 3.8, *nS* represents the respective participial phrases *ayant déjà rencontré Marie* and *abandonnée par Pierre*.

Sentence 3.7 differs from sentence 3.6 because *nS* represents the phrases *Jean ayant déjà rencontré Marie*, which is regarded as a standard clause.

According to the grammatical category of *nS*, the ACTIVEINFLECTIONVERB class is refined in two kind of subclasses:

- when *nS* represents a participial phrase, it is refined in the unique PARTICIPIALVERB class,
- when *nS* represents a clause, it is refined in the FINITEVERB, INFINITIVEACTIVEINFLEC-

TIONVERB and PARTICIPLEACTIVEINFLECTIONVERB classes, according to its mood. The three classes are gathered in the disjunction ACTIVEINFLECTIONCLAUSEVERB.

### 3.3.2 Verbs contributing to the inflection of participial phrases

The PARTICIPIALVERB class defines the EPTDs anchored by verbs determining the inflection of participial phrases playing the role of adjectival phrases. As figure 3.3 shows it, there are two kinds of EPTDs according to the function of the participial phrase represented with node  $nS$  : attributive or predicate complement.

In both EPTDs, node  $nS$  represents the participial phrase. In examples 3.6 and 3.8, which illustrate them, this participial phrase is respectively instantiated with *ayant déjà rencontré Marie* and *abandonnée par Pierre*. Participial phrases are considered as a complete clauses with an empty node  $nSubj$  being the subject of this clause.

The verb anchoring each EPTD contributes to the inflection of the participial phrase. In examples 3.6 and 3.8, it is respectively instantiated with *ayant* and *abandonnée*. The inflectional property of the verbs is expressed with the **cat** and **mood** features. In example 3.6, the participle *rencontré* is the head of the participial phrase but not the inflectional verb, which *ayant*. As a consequence, the EPTD it anchors is not produced by the PARTICIPIALVERB class.

Nodes  $nS$  and  $nVmax$  share the value of the **mood** feature, which is saturated.

As regards the **cat** feature of node  $nS$ , there is a difference between the EPTDs. The left EPTD corresponds to the attributive function of the participial phrase, as illustrated with example 3.6. The **cat** feature is saturated and there are two specific nodes:  $nN$  representing the noun modified by the participial phrase and  $nNp$  representing the resulting noun phrase. In example 3.6, nodes  $nN$  and  $nNp$  are respectively instantiated with *Jean* and *Jean ayant déjà rencontré Marie*.

The right EPTD corresponds to the predicate function of the participial phrase, as illustrated with example 3.8. The **cat** feature is positive because node  $nS$  can provide a predicate complement to an appropriate constituent that assigns it the function **prepobj|objpred|mod|subjpred**; hence, the polarity of the **funct** feature attached at  $nS$  is negative. In example 3.8, node  $nS$  takes the **objpred** function from the verb *croit*.

The PARTICIPIALVERB class is divided into two subclasses: PRESENTPARTICIPIALVERB and PASTPARTICIPIALVERB. The first class concerns present participles and the second class concerns past participles. This differentiation is necessary because in the second case, the agreement in gender and number must be explicitly described, as example 3.8 shows it. The PASTPARTICIPIALVERB class achieves the agreement between the past participle *abandonnée* an its subject and the EPTD anchored by *croit* achieves the agreement between this subject and the direct object *Marie*.

### 3.3.3 Verbs contributing to the inflection of standard clauses

Apart from participial phrases, the verbs anchoring the ACTIVEINFLECTIONVERB class contribute to the inflection of standard clauses. According to its mood, the ACTIVEINFLECTIONVERB is refined in the following subclasses: FINITEVERB for the finite moods, INFINITIVEVERB for the infinitive mood, PARTICIPLEVERB for the present and past participles.

The classes define the EPTDs presented in figure 3.4. The inflectional property of the verb is expressed with the **mood** feature which is shared by the  $nS$ ,  $nVmax$  and  $nVanchor$  nodes and saturated in the three nodes. It is also expressed with the **cat** and **funct** features, which express that the inflectional verb determines the syntactic function of the clause.

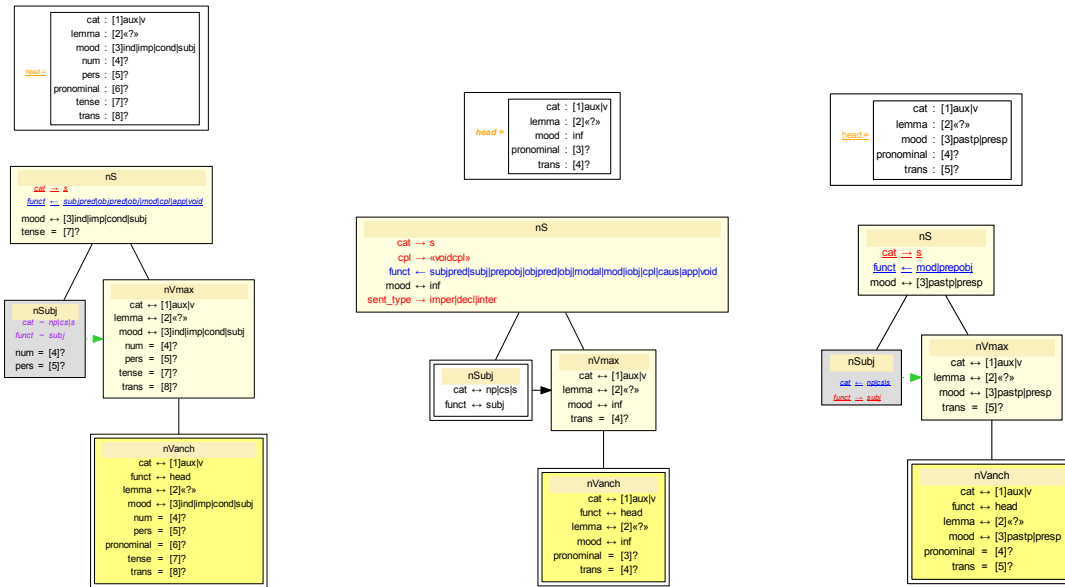


Figure 3.4: EPTDs defined by the FINITEVERB, INFINITIVEVERB and PARTICIPLEVERB classes

Now, every class has its specificities. For the FINITEVERB class, a **tense** feature is added to the *nS*, *nVmax* and *nVanch* nodes with a shared value. It is illustrated with examples 3.1, 3.3, 3.4 and 3.5. This class is divided in two subclasses according to whether the mood is imperative or not : IMPERATIVEVERB and NONIMPERATIVEFINITEVERB. For the first one, the subject is empty and its **cat** and **funct** features are saturated because an imperative verb requires no external subject.

The INFINITIVEVERB class is illustrated with examples 3.2 and 3.4. The first particularity lies in the form the subject which is empty and for which the **cat** and **funct** features are saturated because an infinitive verb requires no external subject. The second particularity lies in the two polarized features **cpl** and **sent\_type**. They allow to deal with infinitive clauses in a uniform way with respect to complemented clauses. Feature **cpl** indicates the complementizer that introduces the concerned clause and feature **sent\_type** indicates the type of the clause: **decl** (declarative), **inter** (interrogative), **imper** (imperative) or **excl** (exclamative). When there is no complementizer, feature **cpl** takes value **voidcpl**.

Finally, the PARTICIPLEVERB is illustrated with example 3.7. The main difference with respect to the previous classes lies in the polarities attached at the *nSubj* node, which express that an external subject is always required. This class is divided in two subclasses according to the mood of the participle: PRESENTPARTICIPLEVERB and PASTPARTICIPLEVERB. For the PASTPARTICIPLEVERB class, the subject *nSubj* agrees with the verb anchored at *nVanch* in number and person. The two features are also raised to *nVmax*

The different classes expressing different forms of clause inflectional verbs are gathered by disjunctive composition in a unique class ACTIVEINFLECTIONCLAUSEVERB, except PASTPARTICIPLEVERB because of its particular behaviour : it excludes combination with a reflexive pronoun.

In fact, ACTIVEINFLECTIONCLAUSEVERB is the disjunction of IMPERATIVEVERB, NONIMPERATIVEFINITEVERB, INFINITIVEVERB and PRESENTPARTICLEVERB.

### 3.3.4 Past participles combined with auxiliaries to build compound verbs

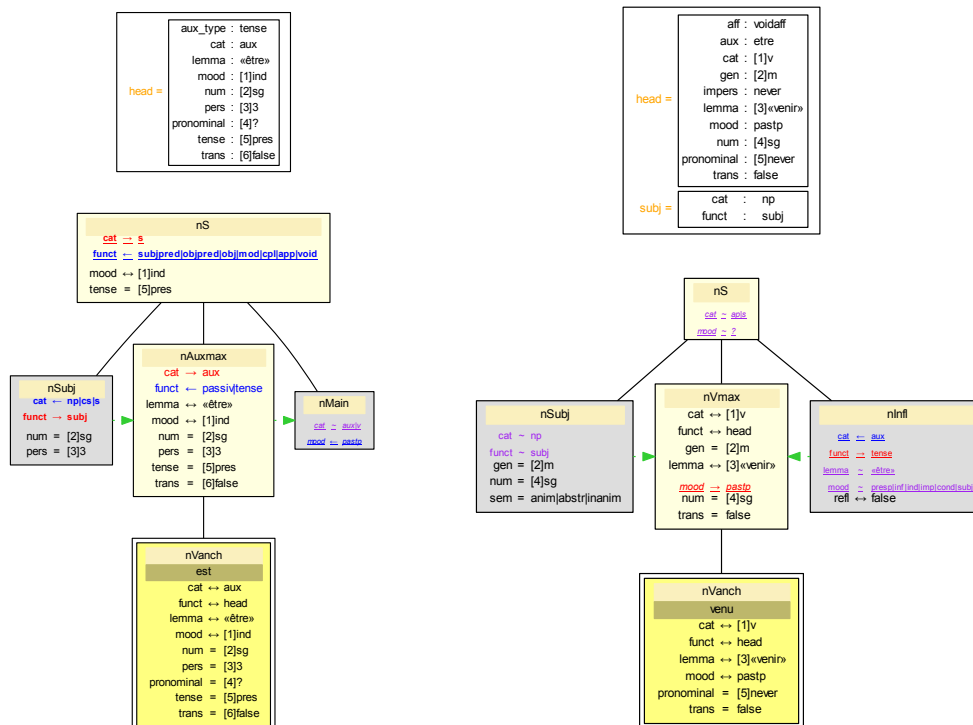


Figure 3.5: EPTDs used for *est* and *venu* in the parsing of *Jean est venu aujourd'hui*.

The interaction between a past participle and an auxiliary is performed by three kinds of features: `funct`, `mood` and `cat`.

Figure 3.5 illustrates this game between the `funct`, `mood` and `cat` features and the polarities of the EPTDs anchored by the past participle *venu* and the auxiliary *est* in the composition of the sentence *Jean est venu aujourd'hui* (*Jean came today*).

As the figure shows it, the auxiliary is a daughter of *nS*, separate from the verbal kernel *nVmax*, because an adjunct of the sentence may be inserted between a verb and its auxiliary, as in the following sentence: *Jean a, cet après-midi, rencontré Marie*. (*Jean, this afternoon, met Marie*)

Node *nAuxmax* carries `cat → aux` and `funct ← passiv|tense` features to express that *est* is an available auxiliary which expects a function of passive or tense auxiliary. It will merge with node *nAux* of the EPTD associated with *venu*, which carries dual features.

At the same time, node *nMain* carries a `mood ← pastp` feature to express that *est* expects a past participle. It will merge with node *nVmax* the EPTD associated with *venu*, which carries a dual feature.

In the same sentence, a verb can have both roles: auxiliary and main verb. This the case for sentence 3.5, in which *été* is a passive auxiliary for *invité* and at the same time, it is a main verb



with *a* as its tense auxiliary.

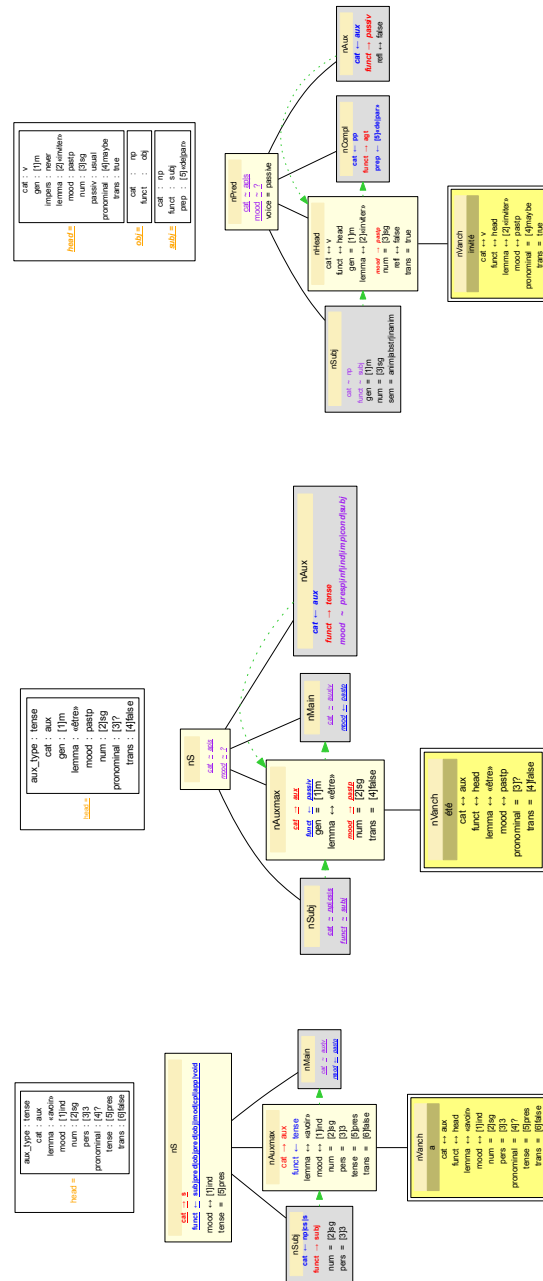


Figure 3.6: EPTDs associated with the verbs *a*, *été* and *invité* to compose the sentence *Jean a été invité par le directeur* (*Jean was invited by the director*).

Figure 3.6 shows the EPTDs used for the three verbs in the composition of the sentence *Jean a été invité par le directeur*<sup>3</sup>.

<sup>3</sup>The example shows why the `cat` feature of `nAuxmax` node is positive for auxiliaries and the `cat` feature of `nVmax` node is saturated for main verbs that are not auxiliaries. If this feature would be positive in all cases and

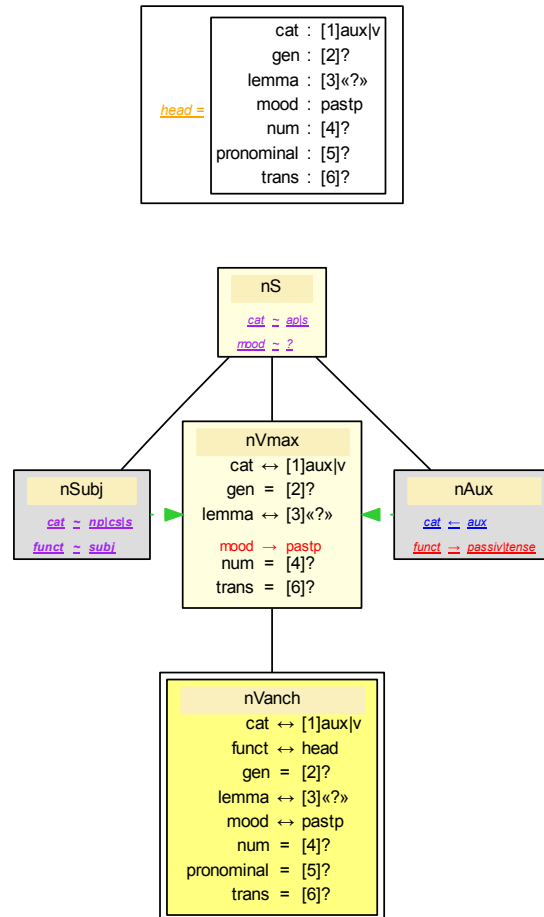


Figure 3.7: The EPTD defined by the COMPOUNDVERB class.

In the grammar, the interaction between auxiliaries and main verbs is expressed within two classes: AUXILIARY and COMPOUNDVERB

### The past participle side

The COMPOUNDVERB class expresses that the anchoring verb is a past participle expecting an auxiliary. It defines the EPTD shown on figure 3.7. Node *nAux* represents the expected auxiliary, hence it carries a negative feature `cat ← aux` and a positive feature `funct → passiv|tense`<sup>4</sup>.

if the `cat` feature would be negative for all *nMain* nodes in the EPTDs of auxiliaries, the parsing of the sentence would fail: the `cat` feature for *été* must neutralize two negative features coming from *a* and *invité*, which is not possible.

<sup>4</sup>We do not consider modal auxiliaries because modal verbs are nearer full verbs from a syntactic point of view.

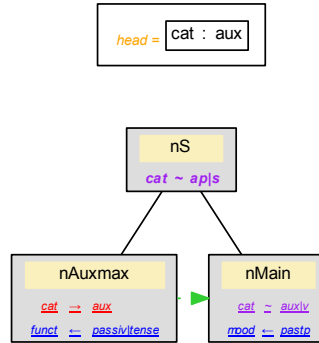


Figure 3.8: The EPTD defined by the AUXILIARY class.

In node *nVmax*, the mood feature is positively polarized with value *pastp* and it will be neutralized by a dual feature coming from an auxiliary.

The COMPOUNDVERB class is divided into two subclasses, according to the different functions of auxiliaries: TENSECOMPOUNDVERB and PASSIVECOMPOUNDVERB.

For the two classes, the verb is a past participle with two agreement features: *gen* (gender) and *num* (number). The PASSIVECOMPOUNDVERB class expresses a systematic agreement between the past participle and the subject. For the TENSECOMPOUNDVERB class, the agreement rule is very complex and depends on the transitivity of the verb. We have partially left this problem aside in the current version of the grammar. The problem is solved in the case on intransitive verbs with *être* as their tense auxiliary. In this case, the past participle agrees with the subject.

The TENSECOMPOUNDVERB has a subclass, REFLEXIVETENSECOMPOUNDVERB, for the past participles used with a tense auxiliary in a reflexive construction. In this case, the auxiliary is always *être*.

### The auxiliary side

The AUXILIARY class defines the common skeleton of the tense and passive auxiliary EPTDs, which is shown in figure 3.8 and offers an exact duality of polarities for its *nAuxmax* and *nMain* nodes with respect to the corresponding nodes *nAux* and *nVmax* of the COMPOUNDVERB class.

Node *Auxmax* represents the verbal kernel anchored with the auxiliary and node *nMain* represents the verbal kernel of the expected main verb that combines with the auxiliary. The AUXILIARY class is then divided into two subclasses: AVOIR and ETRE.

The *Avoir* class inherits the AUXILIARY class and either the ACTIVEINFLECTIONCLAUSEVERB class or the PRESENTPARTICIPIALVERB class and it defines two kinds of EPTDs :

- 4 EPTDs corresponding to the ACTIVEINFLECTIONCLAUSEVERB class when the *avoir* auxiliary contributes to the inflection of a clause, as sentences 3.4, 3.5 and 3.7 illustrate it; figure 3.6 shows one the 4 EPTDs;

- 2 EPTDs corresponding to the PRESENTPARTICIPIALVERB class when the *avoir* auxiliary contributes to the inflection of a present participial phrase, such as in sentence 3.6.

The *Etre* class represents the use of *être* as a tense or passive auxiliary. It inherits the AUXILIARY class and either the ACTIVEINFLECTIONCLAUSEVERB class, the PRESENTPARTICIPIALVERB or the TENSECOMPOUNDVERB. Unlike *avoir*, *être* can be used as a passive auxiliary in past participle. The EPTD corresponding to the case is shown on figure 3.6 and it is used in sentence 3.4.

### 3.3.5 The different voices of full verbs

Full verbs have three voices, active, passive and middle. Causative is not considered as a specific voice and correlatively, causative verbs are not considered as auxiliaries but as full verbs. Causative constructions will be studied with the different diatheses of full verbs.

Voices are related to verb morphology, as the following examples illustrate it.

- (3.9) *Jean a acheté une voiture.*  
 Jean has bought a car  
 'Jean has bought a car.'
- (3.10) *Jean s'est acheté une voiture.*  
 Jean himself has bought a car  
 'Jean has bought himself a car.'
- (3.11) *Jean s'est beaucoup ennuyé à Paris.*  
 Jean was very bored in Paris  
 'Jean was very bored in Paris.'
- (3.12) *Jean a fait venir Marie aujourd'hui.*  
 Jean made come Marie today  
 'Jean made Marie come today'
- (3.13) *Jean ayant déjà rencontré Marie ne viendra pas à la réunion.*  
 Jean having already met Marie do not come to the meeting  
 'Jean having already met Marie do not come to the meeting.'
- (3.14) *Jean connaît la femme invitée par le directeur.*  
 Jean knows the woman invited by the director  
 'Jean knows the woman invited by the director.'
- (3.15) *Jean est invité par le directeur.*  
 Jean is invited by the director  
 'Jean is invited by the director.'
- (3.16) *Jean croit Marie abandonnée<sub>H</sub> par Pierre.*  
 Jean believes Marie abandoned by Pierre  
 'Jean believes Marie to be abandoned by Pierre'
- (3.17) *Ces vins se sont bien vendus.*  
 These wines were well sold  
 'These wines were well sold.'

The five first sentences concern the active voice, sentences 3.14, 3.15 and 3.16 concern the passive voice, and sentence 3.17 the middle voice. The three voices give rise to three classes: ACTIVE-MORPHOLOGY, PASSIVEMORPHOLOGY and MIDDLEMORPHOLOGY.

### Active voice

The ACTIVE-MORPHOLOGY class is the disjunctive composition of two classes: NONREFLEXIVEACTIVE-MORPHOLOGY and REFLEXIVEACTIVE-MORPHOLOGY. The distinction concerns the presence or not of a reflexive pronoun with the verb. It is justified by the polarization of feature `refl` attached at node `nVmax`, which can take one of the following values :

`aff` : the reflexive pronoun is an affix representing no argument of the verb (essentially pronominal verbs, middle voice);

`arg` : the reflexive pronoun represents a direct or an indirect object of the verb;

`false` : there is no reflexive pronoun

Moreover, for compound tenses, the auxiliary is always *être* in presence of a reflexive pronoun; otherwise, it depends on the verb.

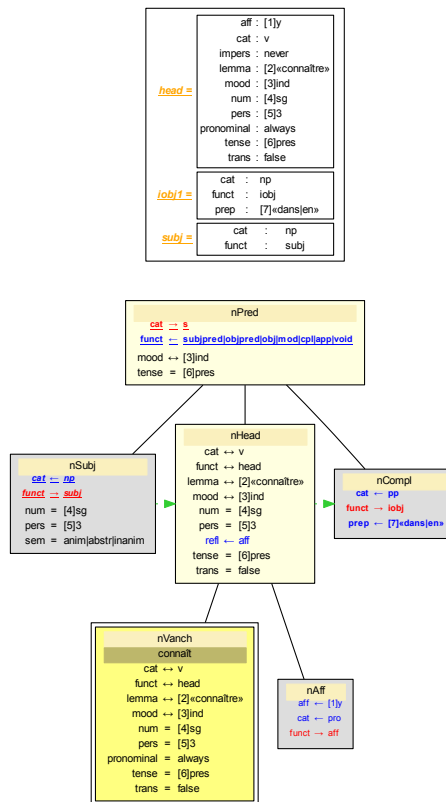


Figure 3.9: The EPTD used for *connait* in the parsing of sentence 3.18.

The NONREFLEXIVEACTIVE MORPHOLOGY class is illustrated with sentences 3.9, 3.12 and 3.13. It is the disjunctive composition of classes that describe the different syntactic functions of the verb:

- ACTIVEINFLECTIONCLAUSEVERB, PRESENTPARTICIPIALVERB, PASTPARTICIPIALVERB and PASTPARTICIPLEVERB for which the verb contributes to the inflection of the clause or the participial phrase,
- NONREFLEXIVEACTIVEPASTCOMPOUNDVERB, when the verb is a past participle composed with a tense auxiliary; in this case, the agreement of the past participle is partially taken into account : if the verb is intransitive and requires the auxiliary *avoir*, the past participle is in singular and masculine; if the verb requires the auxiliary *être*, it agrees in number and gender with the subject, and if the verb is transitive, the agreement is left underspecified; the issue of the agreement with the object put before the verb is not considered here.

The REFLEXIVEACTIVE MORPHOLOGY class concerns a verb in the active voice with a reflexive pronoun. It is illustrated with sentences 3.10 and 3.11. The class is defined from a disjunction of the ACTIVEINFLECTIONCLAUSEVERB, PRESENTPARTICIPIALVERB and REFLEXIVE TENSECOMPOUNDVERB classes.

The need of a reflexive pronoun is represented by a negative feature **refl** attached at node *nInfl*. The value of this feature is *aff* for essentially pronominal verbs and *arg* for non essentially pronominal verbs which can take a reflexive direct or indirect object.

Some verbs are used in the active voice with a clitic pronoun *le*, *en* or *y*, which represents no complement of the verb but affects its meaning, like *connaît* in example 3.18.

- (3.18) *Jean s'y connaît dans les capitales du monde.*  
 Jean knows in the capitals of the world.  
 'Jean knows all about the capitals of the world.'

The EPTD used for *connaît* to parse this example is given by figure 3.9. In this EPTD, the node *nAff* represents the expected clitic *y*.

### Passive voice

The PASSIVEMORPHOLOGY class is the disjunctive composition of the following classes:

- PASTPARTICIPIALVERB for past participles heads of attributive participial phrases, such as in sentence 3.14;
- PASSIVECOMPOUNDVERB for past participles combined with a passive auxiliary, such as in sentence 3.15;
- PASTPARTICIPLEVERB for past participles heads of participial phrases complements of verbs, such as in sentence 3.16.

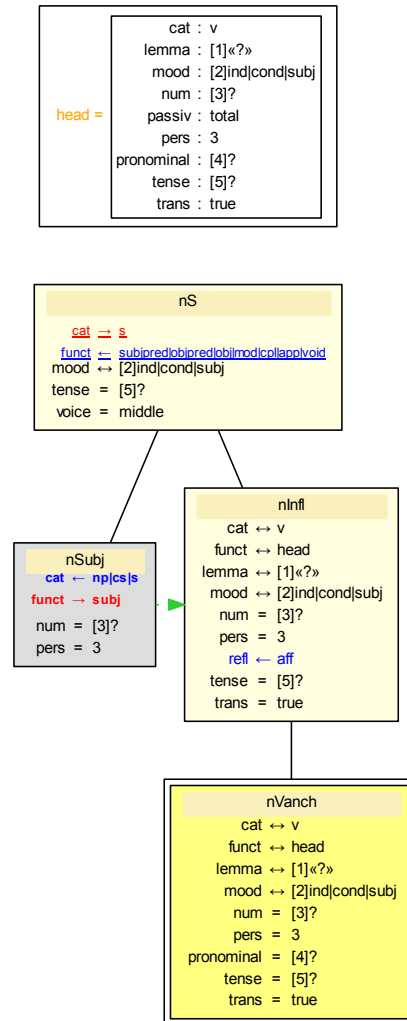


Figure 3.10: An EPTD defined by the MIDDLEMORPHOLOGY class for finite verbs.

### Middle voice

For some transitive verbs, the middle voice represents a construction where the object of the active voice becomes the subject of the middle voice and at the same time the verb takes a reflexive pronoun. The MIDDLEMORPHOLOGY class is the disjunction of classes that model the different cases: ACTIVEINFLECTIONCLAUSEVERB, PRESENTPARTICIPIALVERB and REFLEXIVETENSECOMPOUNDVERB. Sentence 3.17 illustrates the case of the *ActiveInflectionClauseVerb* class, which defines the EPTD given by figure 3.10.

### 3.4 The different verb diatheses

We consider the active, passive and middle diatheses. Used in a personal construction they are gathered in the VERBPERSONALDIATHESES module. Used in an impersonal construction, they are gathered in the VERBIMPERSONALDIATHESES module.

Here are examples illustrating the different diatheses.

- (3.19) *Jean vient aujourd'hui.*  
 Jean is-coming today  
 'Jean is coming today'
- (3.20) *Que Jean ne vienne pas gêne Marie.*  
 that Jean does not come disturbs Marie.  
 'Jean not coming disturbs Marie.'
- (3.21) *Jean est invité par le directeur.*  
 Jean is invited by the director  
 'Jean is invited by the director.'
- (3.22) *Partir est sérieusement envisagé.*  
 To go is seriously envisaged.  
 'To go is seriously envisaged.'
- (3.23) *Ce vin se boit très frais.*  
 That wine is drunk very fresh  
 'That wine must be drunk very fresh'
- (3.24) *Que Jean parte se comprend facilement.*  
 That Jean is leaving is understood easily.  
 'Jean leaving can be understood easily.'
- (3.25) *Il pleut aujourd'hui*  
 it is raining today  
 'it is raining today'
- (3.26) *Il a été vendu beaucoup de voitures*  
 it has been sold a lot of cars  
 'it has been sold a-lot of cars'
- (3.27) *Il se vend beaucoup de voitures*  
 It itself sells a lot of cars  
 'A lot of cars are sold'
- (3.28) *Il a été décidé que Jean parte.*  
 It was decided that Jean go  
 'It was decided that Jean go.'

Examples 3.19 and 3.20 illustrate the personal active diathesis. Examples 3.21 and 3.22 illustrate the personal passive diathesis and examples 3.23 and 3.24 the personal middle diathesis. Examples 3.25 3.26 3.27 and 3.28 illustrate the different impersonal diatheses.



### 3.4.1 The VerbPersonalDiatheses Module

#### The personal active diathesis

The personal active diathesis is described by 30 classes according to the category of the subject and the number and the category of the required complements.

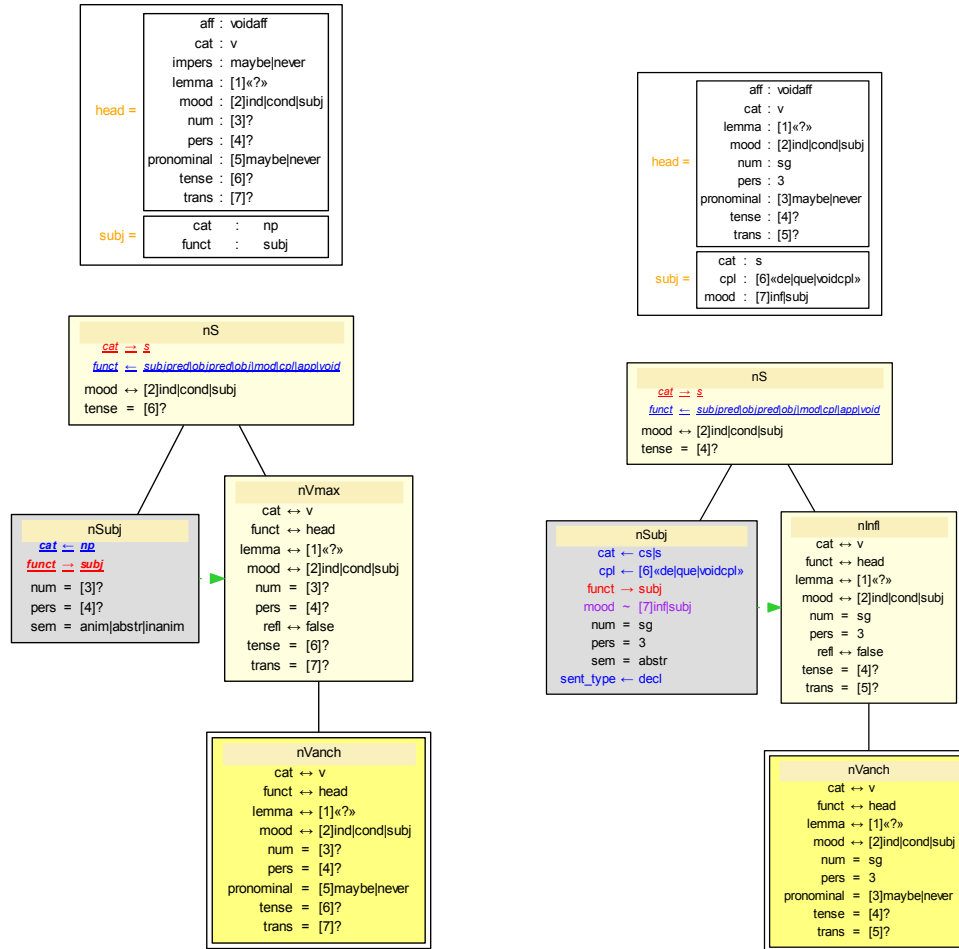


Figure 3.11: EPTDs defined by the NP\_VACTIVE and S\_VACTIVE classes for verbs in a finite mood.

The two following classes are the ground classes of this family:

- NP\_VACTIVE, which represents the active diathesis with a nominal personal subject; it inherits the ACTIVEMORPHOLOGY class;
- S\_VACTIVE, which represents the active diathesis with a nominal personal subject; it inherits the ACTIVEMORPHOLOGY class.

Figure 3.11 represents the EPTDs defined by these classes for the finite moods. The right EPTD

concerns verbs taking a clausal subject. All cases of clausal subject are taken into account in the same EPTD:

- infinitives with the polarized features  $\text{cat} \leftarrow \text{s cpl} \leftarrow \text{voidcpl}$  and  $\text{mood} \sim \text{inf}$ ,
- complementized infinitives with the polarized features  $\text{cat} \leftarrow \text{cs cpl} \leftarrow \text{de}$  and  $\text{mood} \sim \text{inf}$ ,
- complementized finite clauses with the polarized features  $\text{cat} \leftarrow \text{cs cpl} \leftarrow \text{que}$  and  $\text{mood} \sim \text{subj}$ .

In the three cases, the verb provides the subject with a positive feature  $\text{funct} \rightarrow \text{subj}$  whereas the negative feature  $\text{sent\_type} \leftarrow \text{decl}$  expresses that the expected subject must be a declarative clause.

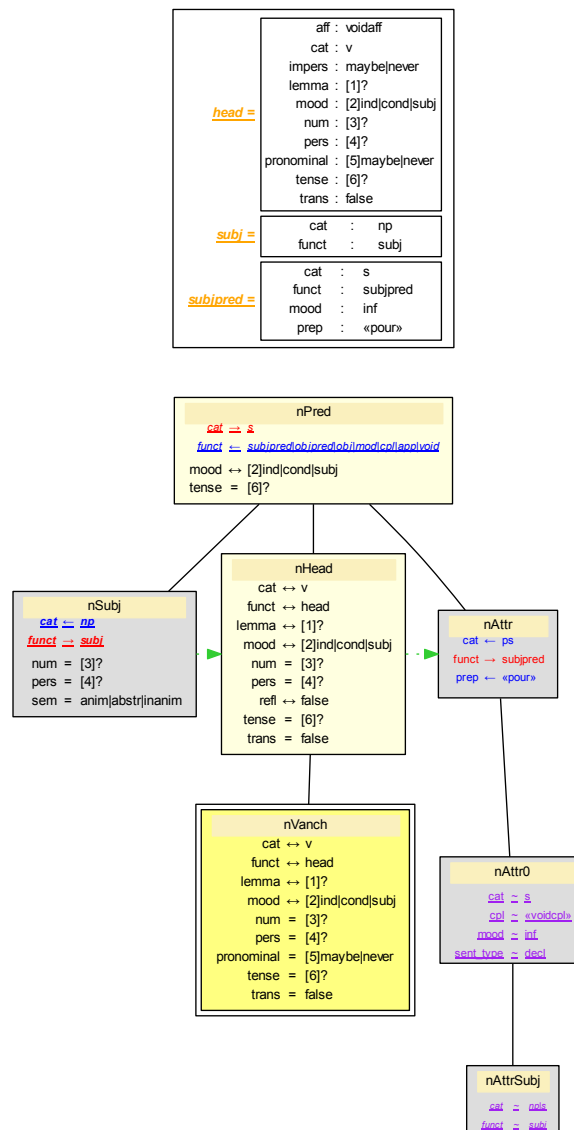


Figure 3.12: EPTD defined by the NP\_VACTIVE\_PSSUBJPRED class for verbs in finite moods

The two ground classes NP\_VACTIVE and S\_VACTIVE are combined with complement classes taken from the COMPLEMENT module to build the active diatheses of verbs with complements. We will not give an exhaustive presentation of all combinations. We merely describe the example of the NP\_VACTIVE\_PSSUBJPRED class, resulting from the conjunction of two classes: N\_VACTIVE and INDIRECTPREDICATEINFINITIVECLAUSE.

The following example illustrates the use of this EPTD anchored by the verb *passer*.

- (3.29) *Marie passe pour être une femme intelligente.*  
 Marie looks being a woman clever  
 'Marie looks being a clever woman'

### The verbImpersonalDiathesis module

The VERBIMPERSONALDIATHESIS module includes 24 classes. It concerns the active, passive and middle diatheses of verbs used with an impersonal subject. In most cases, verbs are finite but it may occur that they are infinitive if they are complement of modal verbs, such as in sentence *il peut pleuvoir aujourd'hui*.

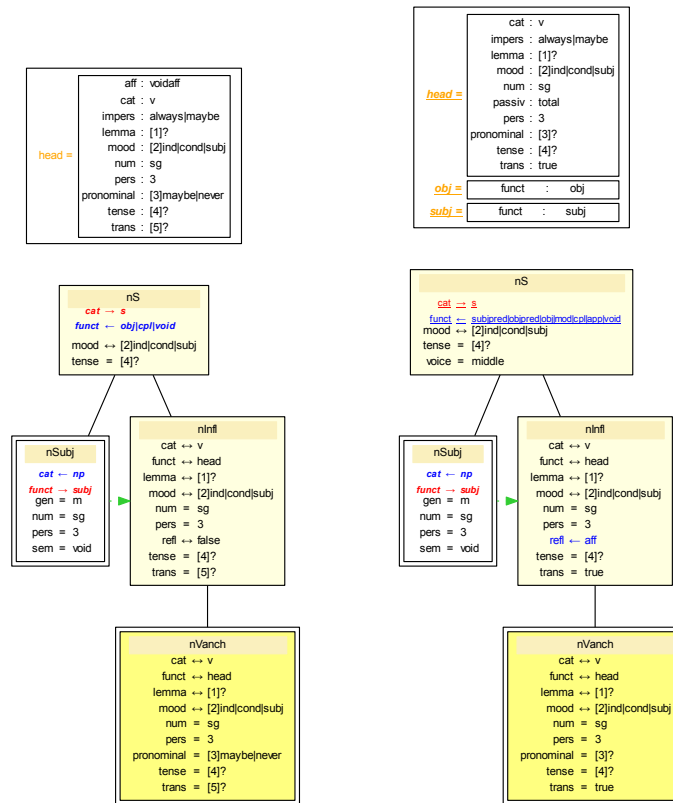


Figure 3.13: EPTD defined by the IL\_VACTIVE and IL\_VMIDDLE classes for verbs in finite moods

Three ground classes correspond to the three voices: IL\_VACTIVE, IL\_VMIDDLE and IL\_VPASSIVE. Figure 3.30 shows the EPTDs defined by the two first classes for the finite moods. They inherit

theACTIVE MORPHOLOGY and MIDDLE MORPHOLOGY classes. Figure 3.31 shows the EPTD defined by the IL\_VPASSIVE class for verbs in the past participle mood. It inherits the PASSIVEMORPHOLOGY class.

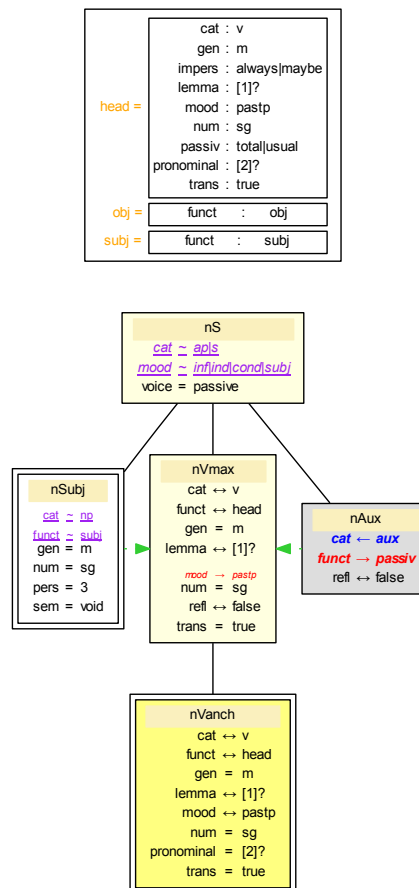


Figure 3.14: EPTD defined by the IL\_VPASSIVE class for verbs in past participle

In the three classes, the *nSubj* node represents the phonologically empty trace of the impersonal subject *il*, which comes from its status of clitic.

The difference between the IL\_VACTIVE class and the other ones is that the verb can be used in an impersonal construction without any argument, whereas the IL\_VPASSIVE and IL\_VMIDDLE classes require an argument for the verb, which is the subject in the canonical construction of the verb. This argument is called the *logical subject* of the verb.

Here are examples illustrating the three basic classes.

- (3.30) *Il pleut aujourd'hui.*  
 it is raining today  
 'it is raining today'

- (3.31) *Il arrive deux personnes aujourd'hui.*  
 it is arriving two persons today.

'Two persons are arriving today.'

(3.32) *Il a été vendu beaucoup de voitures.*  
 it has been sold a lot of cars  
 'it has been sold a lot of cars'

(3.33) *Il se vend beaucoup de voitures*  
 It sells a lot of cars  
 'A lot of cars are sold'

(3.34) *Il a été décidé que Jean parte.*  
 It was decided that Jean go  
 'It was decided that Jean go.'

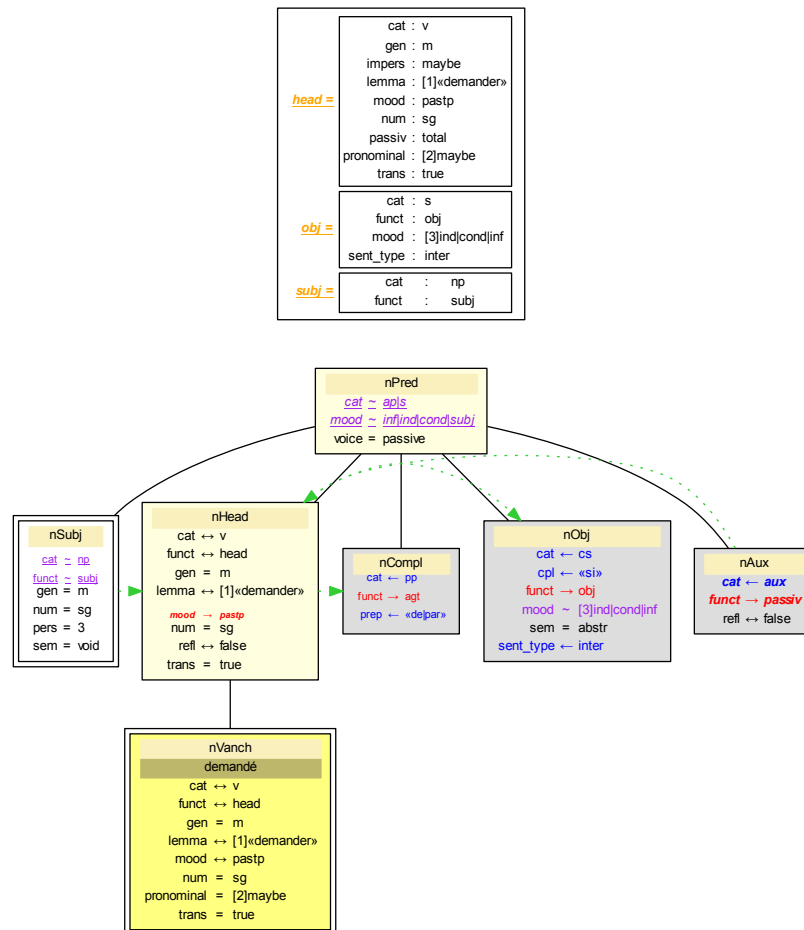


Figure 3.15: EPTD associated with *demandé* in the parsing of *Il a été demandé par Jean si Marie venait.*

In sentences 3.31, 3.32, 3.33 and 3.34, the logical subject is respectively *deux personnes*, *beaucoup de voitures*, *beaucoup de voitures* and *que Jean parte*. So the EPTDs defined by IL\_VPASSIVE

and IL\_VMIDDLE classes cannot be used alone. They must be combined with EPTD coming from the COMPLEMENT module and giving the different forms of the logical subject.

More generally, complex classes are created by combining the three ground classes with classes coming from the COMPLEMENT module. These classes represent the verbs with their complements in an impersonal construction. For instance, the IL\_VPASSIVE\_SINTER\_AGTNP class represents the impersonal passive diathesis with an interrogative clause as the logical subject and an agent complement. It results from the conjunction of two classes: IL\_VPASSIVE\_SINTER and AGENT. The IL\_VPASSIVE\_SINTER class itself results from the conjunction of the IL\_VPASSIVE and INTERROGATIVECLAUSEOBJECT classes.

In the parsing of the following example 3.35, the verb *demandé* is used with an EPTD generated by the Il\_Vpassive\_Sinter\_agtNP class. Figure 3.4.1 shows this EPTD.

- (3.35) *Il a été demandé par Jean si Marie venait.*  
 it has been asked by Jean if Marie was coming.  
 'It has been asked by Jean if Marie was coming.'

### 3.5 The VERB module of verb families

The VERB module gathers all terminal classes of the verb grammar, except for tense auxiliaries. It includes the different families of standard verbs but also the modal and causative auxiliaries.

#### 3.5.1 The families of standard verbs

For standard verbs, a terminal class represents all diatheses corresponding to a subcategorization frame defining a family. For instance, the NO\_V\_S1 class corresponds to transitive verbs with a nominal subject and a clausal direct object. It is the disjunction of the following classes representing different diatheses: NP\_VACTIVE\_SINF, NP\_VACTIVE\_CSINF, NP\_VACTIVE\_QUELSFIN, NP\_VACTIVE\_SINTER, S\_VPASSIVE, S\_VPASSIVE\_AGTNP, S\_VMIDDLE, IL\_VPASSIVE\_QUESFIN, IL\_VPASSIVE\_SINTER, IL\_VPASSIVE\_DESINF, IL\_VMIDDLE\_QUESFIN, IL\_VPASSIVE\_DESINF\_AGTNP, IL\_VPASSIVE\_QUESFIN\_AGTNP, IL\_VPASSIVE\_SINTER\_AGTNP. Here are examples illustrating all these different classes taken in the same order.

- (3.36) *L'ingénieur souhaite diriger l'entreprise.*  
 the engineer hopes to drive the company  
 'The engineer hopes to drive the company.'
- (3.37) *L'ingénieur propose de diriger l'entreprise.*  
 the engineer proposes to drive the company  
 'The engineer proposes to drive the company.'
- (3.38) *L'ingénieur propose que Marie dirige l'entreprise.*  
 the engineer proposes that Marie drive the company  
 'The engineer proposes that Marie drive the company.'
- (3.39) *Jean demande quand l'ingénieur vient.*  
 Jean asks when the engineer is coming  
 'Jean asks when the engineer is coming.'

- (3.40) *Que Marie dirige l'entreprise est fortement souhaité.*  
 that Marie drives the-company is strongly hoped  
 'That Marie drives the company is strongly hoped.'
- (3.41) *Que Marie dirige l'entreprise est fortement souhaité par Jean.*  
 that Marie drives the company is strongly hoped by Jean  
 'That Marie drives the company is strongly hoped by Jean.'
- (3.42) *Que Marie aille diriger l'entreprise se dit en ce moment.*  
 that Marie is going to drive the company is said in that moment  
 'That Marie is going to drive the company is said in that moment.'
- (3.43) *Il est souhaité que Marie dirige l'entreprise.*  
 it is hoped that Marie drive the company  
 'It is hoped that Marie drive the company.'
- (3.44) *Il a été demandé pourquoi Jean partait.*  
 it was asked why Jean was leaving  
 'It was asked why Jean was leaving.'
- (3.45) *Il est envisagé de vendre l'entreprise.*  
 it is envisaged to sell the company  
 'It is envisaged to sell the company.'
- (3.46) *Il se dit que l'entreprise sera vendue.*  
 it is said that the company will be sold  
 'It is said that the company will be sold.'
- (3.47) *Il est envisagé par Jean de vendre l'entreprise.*  
 it is envisaged by Jean to sell the company  
 'It is envisaged by Jean to sell the company.'
- (3.48) *Il est souhaité par Jean que Marie dirige l'entreprise.*  
 it is hoped by Jean that Marie drive the company  
 'It is hoped by Jean that Marie drive the company'
- (3.49) *Il a été demandé par le directeur pourquoi Jean partait.*  
 it was asked by the director why Jean was leaving  
 'It was asked by the director why Jean was leaving.'

When a family represents verbs with two or three complements, the corresponding class is created by inheritance of a class corresponding to verbs with one complement and by conjunction of classes corresponding to additional complements. For instance, the NP0\_V\_NP1\_PP2\_PP3 class results from the conjunction of the NP0\_V\_NP1\_PP2 and the NOMINALINDIRECTOBJECT classes. The NP0\_V\_NP1\_PP2 class itself results from the conjunction of the NP0\_V\_NP1 and the NOMINALINDIRECTOBJECT classes.

In the following example 3.50, the verb *transporter* is associated with an EPTD generated by the NP0\_V\_NP1\_PP2\_PP3 class. Figure 3.16 shows this EPTD.

- (3.50) *Marie fait transporter un colis de Paris à Marseille.*  
 Marie makes carry a parcel from Paris to Marseille  
 'Marie makes a parcel carry from Paris to Marseille.'

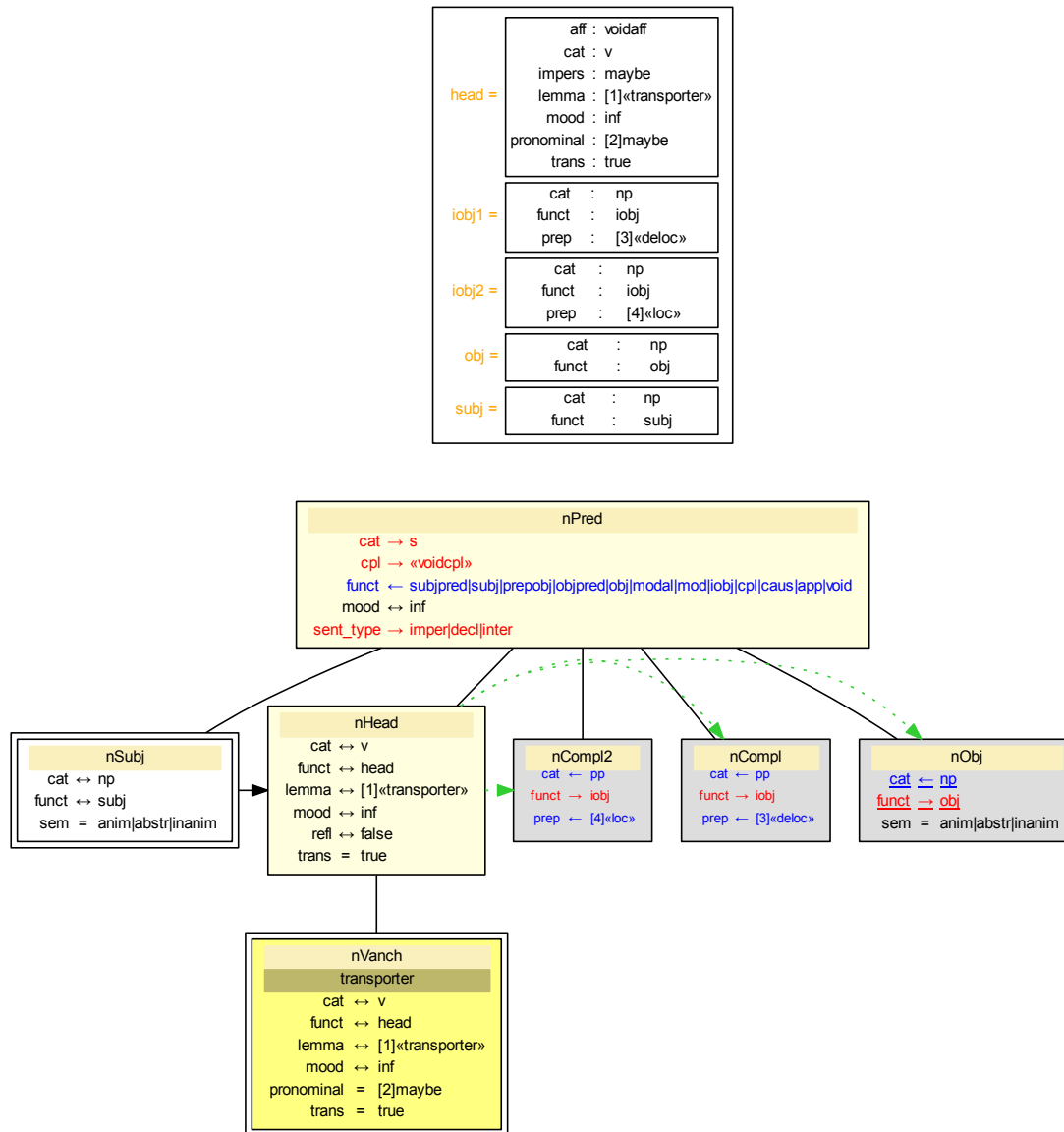


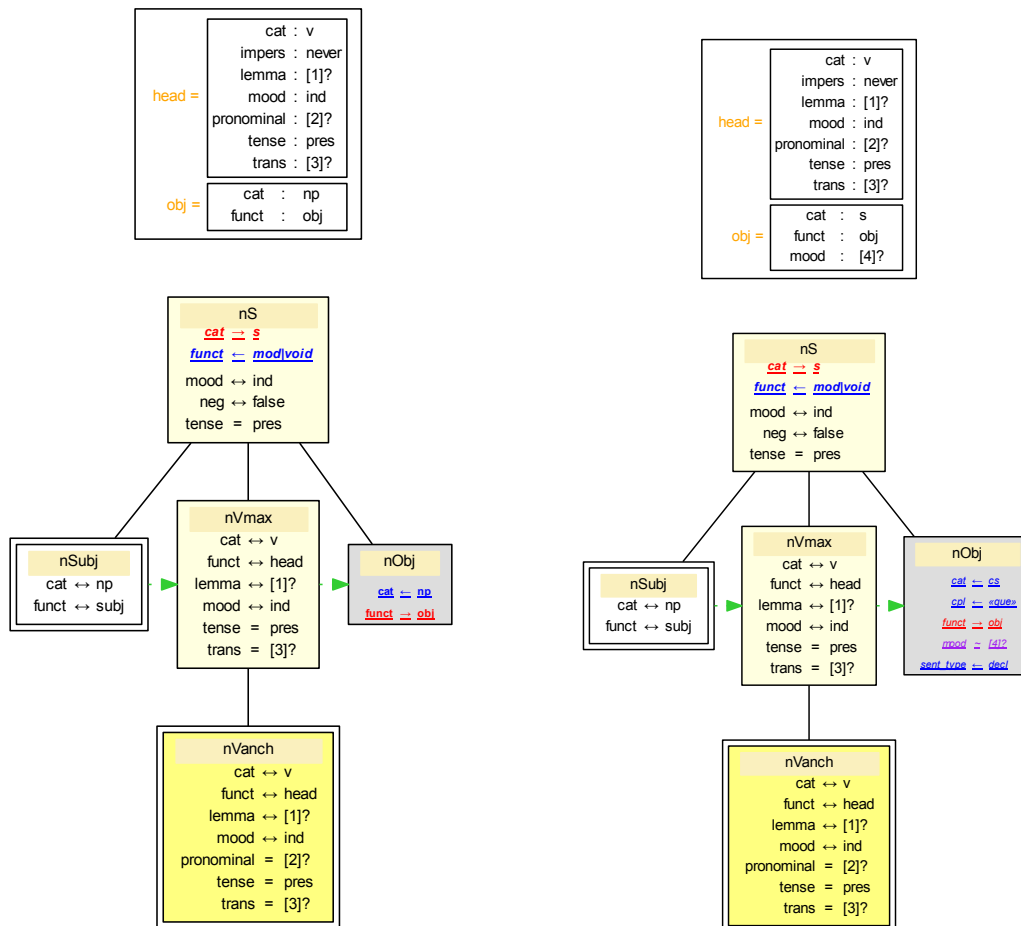
Figure 3.16: EPTD associated with *transporter* used in the parsing of sentence *Marie fait transporter un colis de Paris à Marseille*

### 3.5.2 Presentatives

Presentatives, like *voici* and *voilà*, are usually considered as adverbs. In FRIGRAM, they are considered as special verbs and their EPTDs are defined by the `VPRESENT_C1` and `VPRESENT_C1_C2OBJPRED` classes. The first class concerns presentatives with a direct object, which may be nominal or clausal. The second class add an object predicate complement. Here are examples illustrating these different cases.



- (3.51) *Le livre que voici est facile à lire.*  
 The book that you see here is easy to read.  
 'The following book is easy to read.'
- (3.52) *Voici que Jean vient.*  
 Here that Jean is coming.  
 'Jean is coming.'
- (3.53) *La voilà tranquille.*  
 Her there quiet.  
 'She is quiet now.'
- (3.54) *Le voici qui arrive.*  
 Him here who is coming.  
 'He is coming now.'

Figure 3.17: EPTDs defined by the `VPRESENT_C1` class

The two first sentences illustrate the VPRESNT\_C1 class and the two last ones the VPRESNT\_C1\_C2OBJPRED class. Figure 3.17 shows the two EPTDs defined by the VPRESNT\_C1 class. The difference between the two EPTDs lies in the nature of the object: nominal or clausal.

### 3.5.3 Modal verbs

Modal verbs are dealt with in a particular way because they are transparent with respect to their subject, which is constrained by their object infinitive. The following examples illustrate this property.

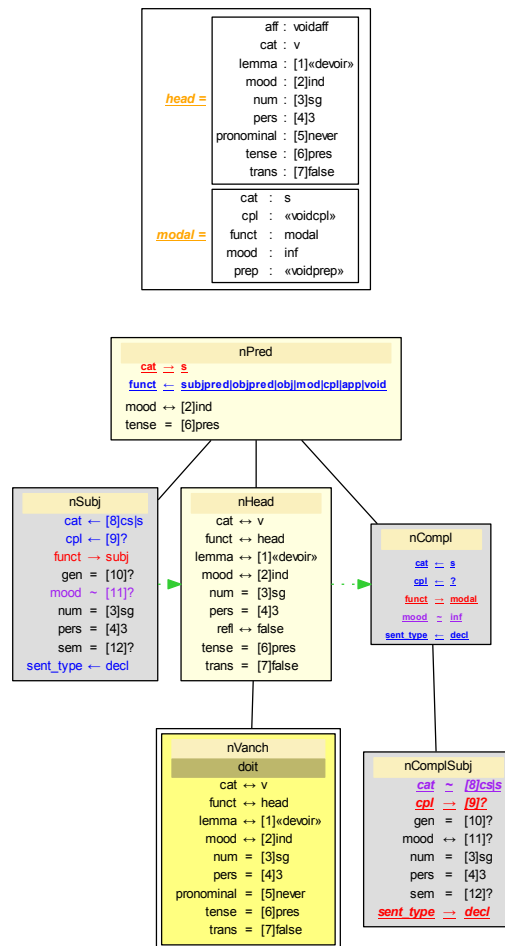


Figure 3.18: EPTD associated with *doit* used in the parsing of sentence *travailler la nuit doit être difficile*

(3.55) *Il commence à pleuvoir.*

It is beginning to be raining

'It is beginning to be raining.'

(3.56) *Jean **peut** venir.*

Jean may come

'Jean may come.'

(3.57) *Travailler la nuit **doit** être difficile.*

To work at night shall be difficult

'To work at night shall be difficult'

A specific class `VMODAL_C1INF` defines the EPTDs of modal verbs from the conjunction of two classes: `ACTIVE MORPHOLOGY` and `PRED COMPLEMENT`. Then there is an alternative related to the form of the infinitive object depending on whether it is introduced by a complementizer or not. A second alternative is related to the form of the subject: nominal or clausal.

Figure 3.18 shows an instantiation of the `VMODAL_C1INF` for the verb *doit* used in sentence 3.57. The identification of node *nSubj*, the subject of the modal verb, with node *nComplSubj*, the subject of the infinitive, is realized with coreferences for four features.

### 3.5.4 Causative verbs

In a causative construction, a causative auxiliary (*faire* or *laisser* in French) combines with an infinitive in the active voice. Here are examples illustrating this construction. For every sentence, the causative auxiliary and the complement infinitive are in bold.

(3.58) *Jean a **fait** venir Marie aujourd'hui.*

Jean got to come Marie today

'Jean got Marie to come today'

(3.59) *Manger beaucoup **fait** dormir.*

To-eat a-lot causes sleeping

'To eat a lot causes sleeping'

(3.60) *Que Marie mange beaucoup la **fait** dormir.*

That Marie eats a-lot her makes sleeping

'That Marie eats a lot makes her sleeping'

(3.61) *Jean s'est **fait** contrôler.*

Jean himself has made control

'Jean has made control himself'

(3.62) *Jean **fait** balayer la cour par Marie*

Jean asks to sweep the yard by Marie

'Jean asks Marie to sweep the yard'

(3.63) *Jean **fait** balayer la cour à Marie*

Jean asks to sweep the yard to Marie

'Jean asks Marie to sweep the yard'

In FRIGRAM, causative auxiliaries are considered as special full verbs and the associated ground class is `CAUSATIVE VERB`. This class inherits the `ACTIVE MORPHOLOGY` class and it adds particular features to node *nSubj* according to the form of the subject: nominal or clausal.

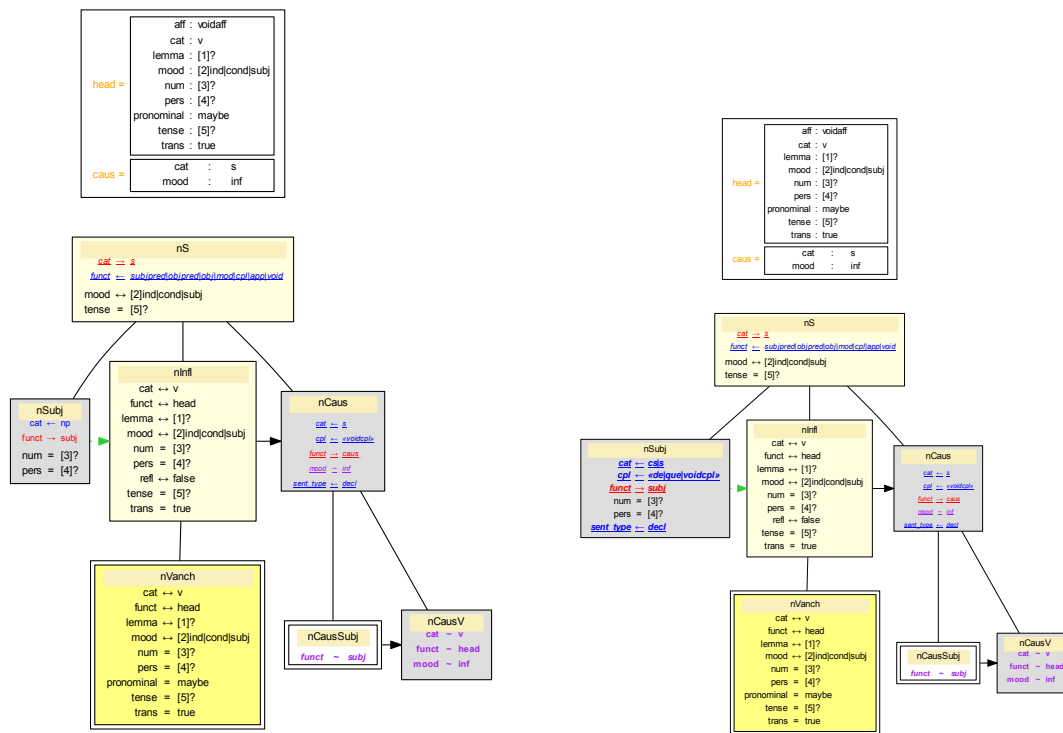


Figure 3.19: EPTDs defined by the CAUSATIVEVERB class

Figure The EPTD used for the infinitive is defined in class *CausativeMorphology*. Figure 3.19 shows the two EPTDs defined by this class for verbs in the conditional, indicative or subjunctive mood. The left EPTD corresponds to a nominal subject and the right one to a clausal subject. The causative construction entails specific complements:

- The patient that is caused to perform the action expressed by the infinitive is the object of the causative verb if the verb is intransitive. Sentences 3.58 and 3.60 illustrate this construction and the CAUSATIVEVERBWITHOBJ, inheriting the CAUSATIVEVERB class, represents causative auxiliaries used in this construction.
- The patient that is caused to perform the action expressed by the infinitive is an indirect complement of the causative auxiliary with a dative or agent function if the infinitive is transitive. Sentences 3.62 and 3.63 illustrate this construction and the CAUSATIVEVERBWITHAOBJ and CAUSATIVEVERBWITHAGT classes, inheriting the CAUSATIVEVERB class, represent causative verbs used in the same construction.

If the complements of the caused verb are clitics, they can rise to the causative verb in some conditions, which is developed in subsection 6.2.3 of chapter 6.



# Chapter 4

## Nouns

The NOUN module gathers all classes anchored with common and proper nouns.

### 4.1 Interfaces with the lexicon

Nouns are characterized in interfaces with the feature `head.cat = n`. Their morphological features and some syntactic properties are gathered in the `head` feature:

- `funct`: it gives the possible functions of the noun, which are `app`, `cp1`, `mod`, `obj`, `objpred`, `preobj`, `subj`, `subjpred`;
- `gen`: it indicates the gender of the noun with the values `f` and `m`;
- `noun_type`: it gives a subcategorization of nouns according to semantic properties; it respectively takes the values `abstr`, `anim`, `count`, `mass`, `propnoun` if the noun is abstract, animate, inanimate and countable, inanimate and a mass noun or a proper noun;
- `num`: it gives the number of the noun : `pl` (plural) or `sg` (singular);
- `sent_type` : when the noun is the head of a nominal sentence, it gives the type of the sentence, `excl` (exclamative) or `imper` (imperative).

The properties of special classes of nouns are described with features which are put in parallel with the head feature and describe the required syntactic arguments or the governor of the noun:

- `gov`: the governor of the noun when it behaves as a modifier,
- `iobj1`: first required complement,
- `iobj2`: second required complement,
- `verb` : the support verb that has the noun as its direct object.

### 4.2 Common and proper nouns

Two basic classes `COMMONNOUN` and `PROPERNOUN` define the skeleton of all classes related to common and proper nouns. They produce the PTDs of figure 4.1.

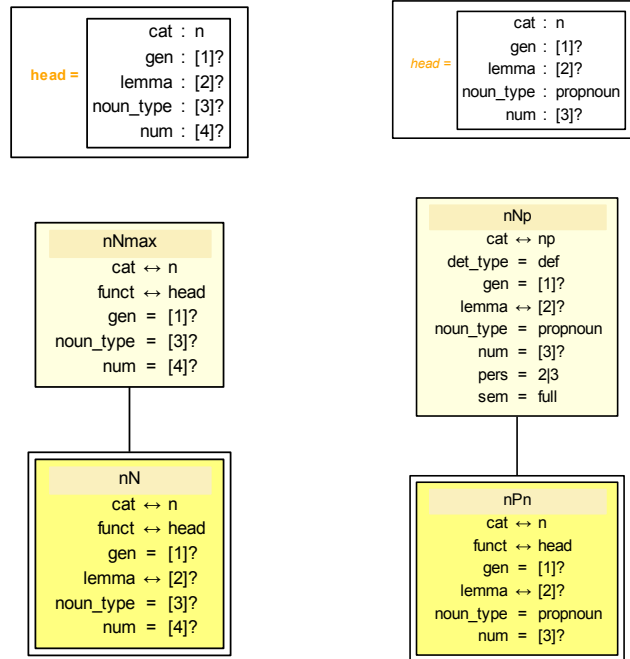


Figure 4.1: The PTD defined by the COMMONNOUN and PROPERNOUN classes

All features of the PTDs are neutral or saturated because the syntactic functions of nouns are various and they will be defined by specialized classes inheriting one of the two basic classes and adding polarized features. The two PTDs differ not in the `cat` feature but also because node `nNmax` is always the head of its mother node, which is not the case for `nNp`. Moreover the feature `det_type = def` expresses that a proper noun is definite noun phrase.

Proper nouns have two possible functions illustrated with the following examples.

- (4.1) *Marie est interrogée par Jean.*  
 Marie is asked by Jean.  
 ' Marie is asked by Jean. '
- (4.2) *Mon ami Jean Martin est ingénieur.*  
 My friend Jean Martin is engineer.  
 ' My friend Jean Martin is engineer. '

The two functions are expressed with two classes inheriting the PROPERNOUN class:

- the NPROPER class expressing the usual function of noun phrases illustrated with sentence 4.1,
- the NPROPER\_NP1GOV class expressing proper nouns that are modifiers of noun phrases, which is illustrated with sentence 4.2.

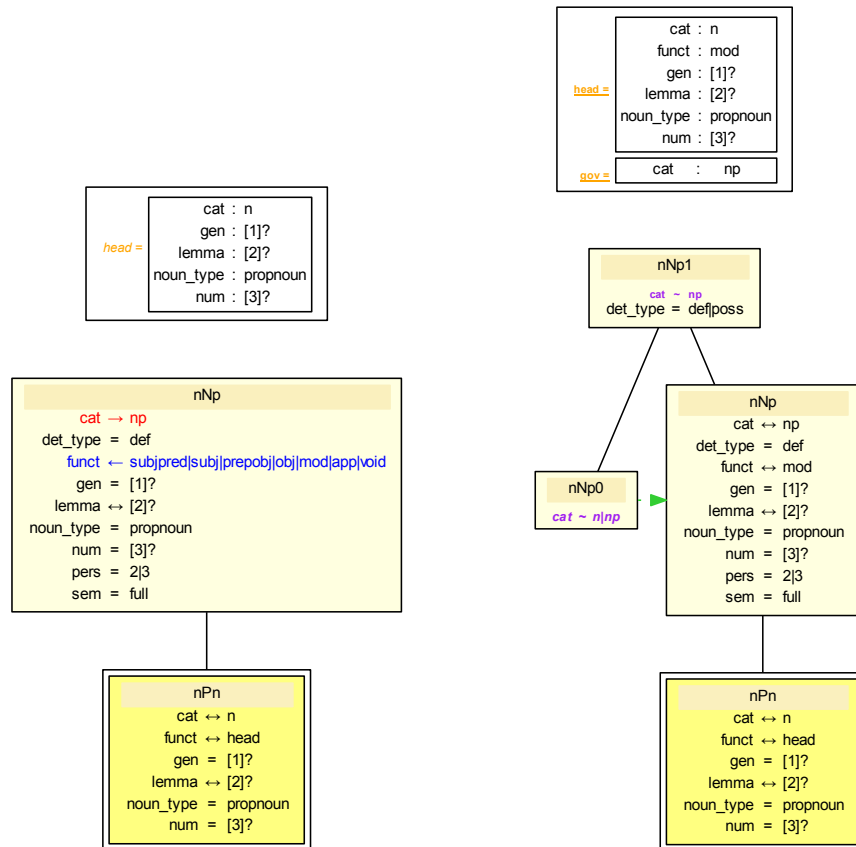


Figure 4.2: The EPTDs defined by the NPROPER and NPROPER\_NP1GOV classes

Figure 4.2 shows the two EPTDs defined by these classes

### 4.3 The syntactic functions of common nouns

The following examples illustrate various syntactic functions of common nouns (the concerned common nouns are in bold).

(4.3) *La **file** est grande.*

The girl is tall.

' The girl is tall. '

(4.4) *La réunion a **lieu** demain.*

The meeting takes place tomorrow.

' The meeting takes place tomorrow. '

(4.5) *Jean est **ingénieur***

Jean is engineer.

' Jean is engineer. '



- (4.6) *Jean travaille toute la nuit.*  
 Jean works all the night.  
 'Jean works all the night.'
- (4.7) **Domage** *que Jean ne soit pas venu !*  
 Pity that Jean did not come !  
 'It is a pity that Jean did not come !'
- (4.8) *Jean a lu un roman fleuve.*  
 Jean has read a novel-fleuve.  
 'Jean has read a novel-fleuve.'

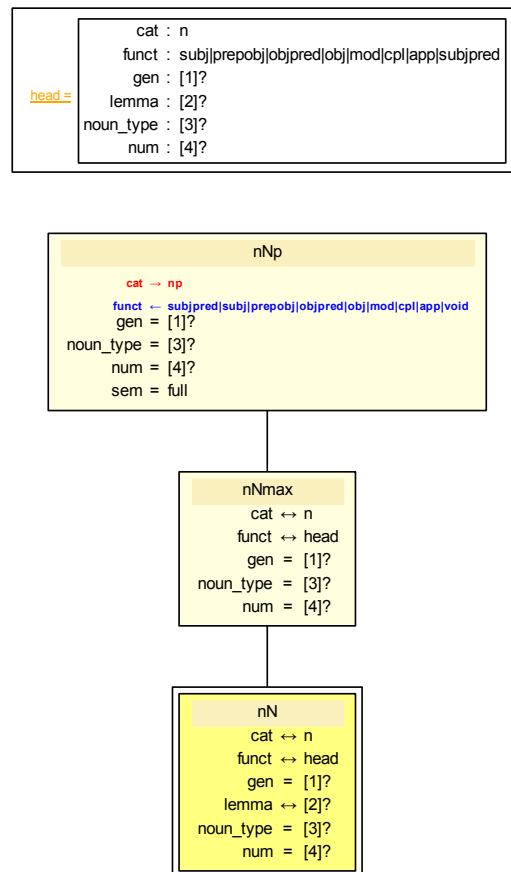


Figure 4.3: The PTD defined by the NOUNPHRASEHEAD class

Common nouns can be heads of noun phrases, as sentences 4.3 and 4.4 show it, which is expressed with the NOUNPHRASEHEAD class. This class defines the PTD of figure 4.3. In this PTD, the positive feature `cat → np` and the negative feature `funct` express the fact that a common noun can be the head of any noun phrase, which will receive various functions in a sentence.

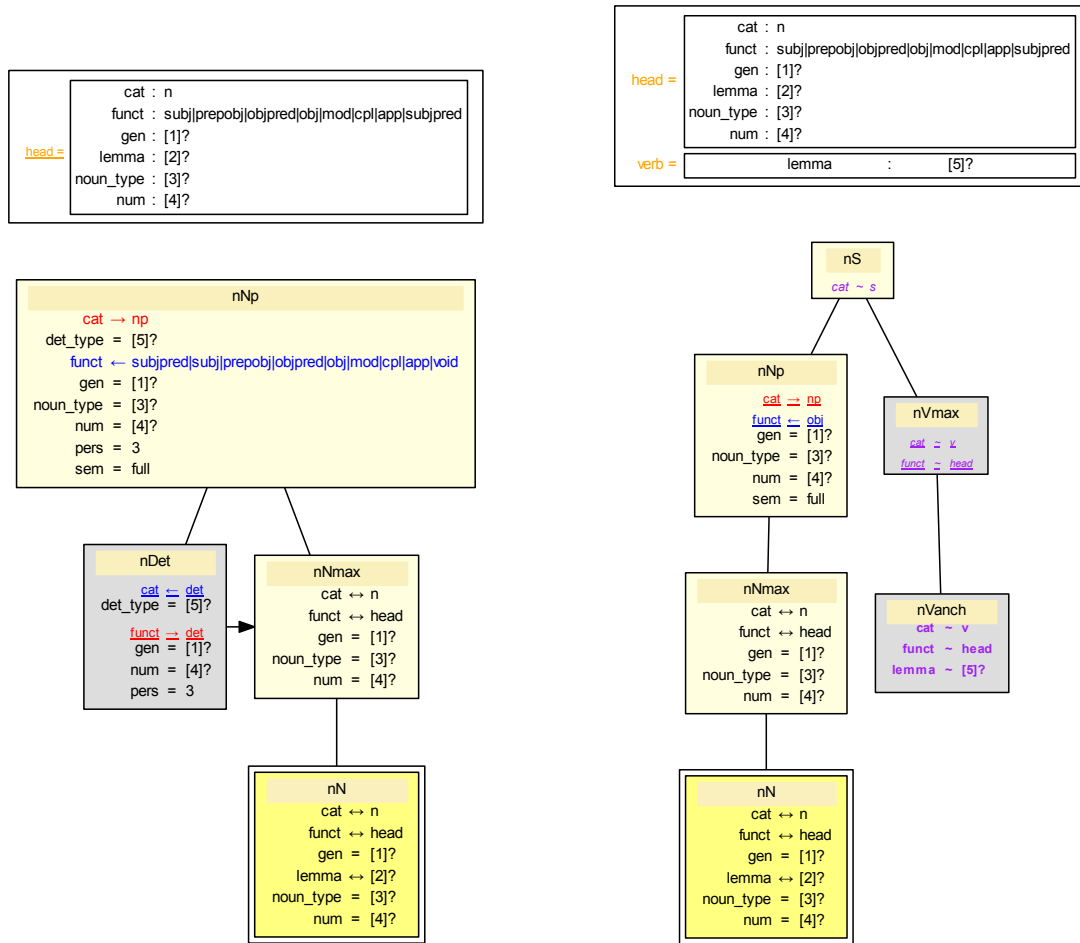


Figure 4.4: The EPTDs defined by the DETCOMMONNOUN and OBJECTIDIOMCOMMONNOUN classes

The NOUNPHRASEHEAD class is specialized in two subclasses:

- DETCOMMONNOUN that expects a determiner to build a noun phrase, as sentence 4.3 shows it,
- OBJECTIDIOMCOMMONNOUN that combine with a support verb to build an idiomatic expression, as sentence 4.4 shows it.

Figure 4.4 shows the two EPTDs defined by these classes. In the left EPTD, a node *nDet* represents the expected determiner and its ability to interact with a real determiner is expressed with the negative feature *cat*  $\leftarrow$  *det* and the positive feature *funct*  $\rightarrow$  *det*.

In the right EPTD, node *nNp* represents the maximal projection of the anchored common noun. Its positive feature *cat*  $\rightarrow$  *np* and its negative feature *funct*  $\leftarrow$  *obj* express the fact that the common noun will be the object of the verb *nVmax* in the sentence *nS*.

A common noun can be used as a predicate complement, as sentence 4.5 shows it. A particular class `PREDICATIVECOMMONNOUN`, inheriting the `COMMONNOUN` class, defines a corresponding EPTD shown in figure 4.5.

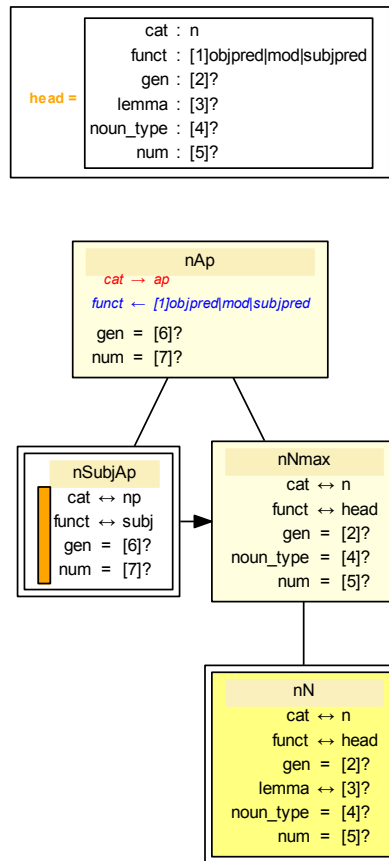


Figure 4.5: The EPTD defined by the `PREDICATIVECOMMONNOUN` class

A common noun playing the role of a predicate complement behave as an adjective, hence the maximal projection of the anchored common noun is represented with a node *nAp* with the positive feature `cat → ap`. Like for any adjectival phrase, an empty node *nSubjAp* represents the subject of the adjectival phrase.

Some commons nouns can be used as temporal complements without a preposition, as sentence 4.6 shows it. The `TEMPORALNOUN` class expresses this use defining the EPTD of figure 4.6.

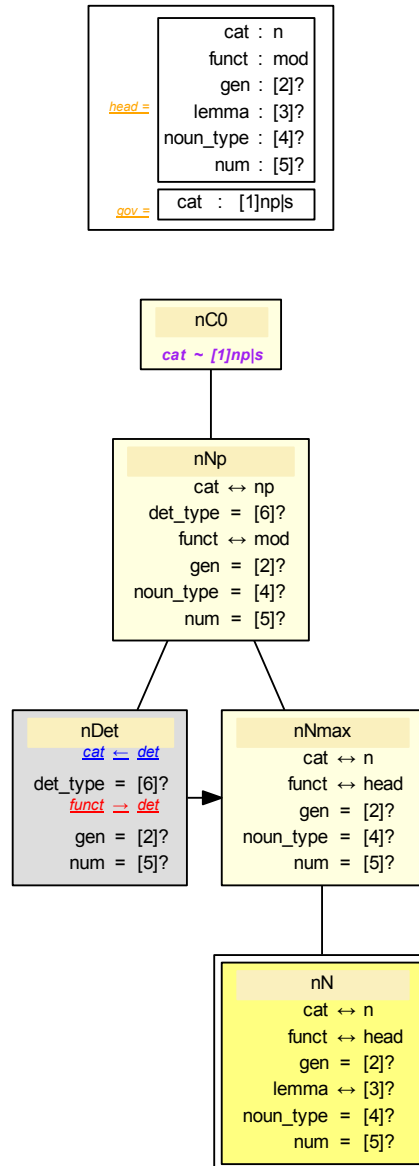


Figure 4.6: The EPTD defined by the TEMPORALNOUN class

This EPTD expresses that the anchored common noun is the head of a noun phrase represented with node  $nNp$  and acting as a circumstantial complement in a sentence or a noun phrase represented with node  $nCO$ .

Other particular common nouns can be heads of sentences, as example 4.7 shows it. The SENTENCEHEADNOUN class expresses this use defining the EPTDs of figure 4.7.

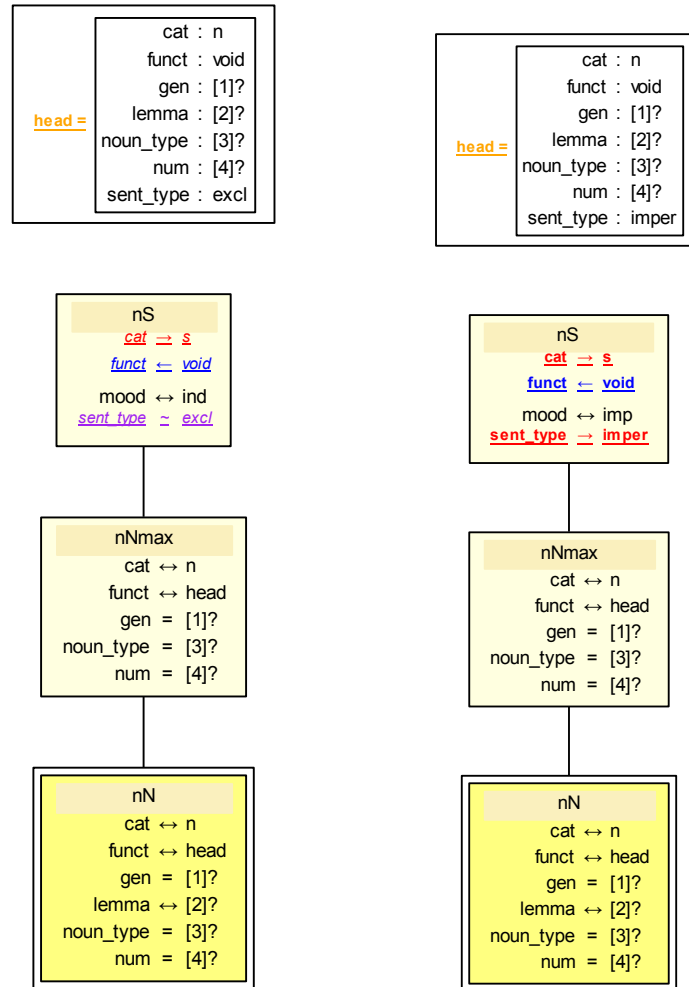


Figure 4.7: The EPTDs defined by the SENTENCEHEADNOUN class

The only difference between the two EPTDs lies in the fact that the left EPTD is used in an exclamative sentence, whereas the right EPTD is used in an imperative sentence, which is expressed with the `mood` and `sent_type` features.

Some common nouns are used in an attributive function like adjectives, as sentence 4.8 illustrates it. It is modeled with the NATTR class and shown in figure 4.8.

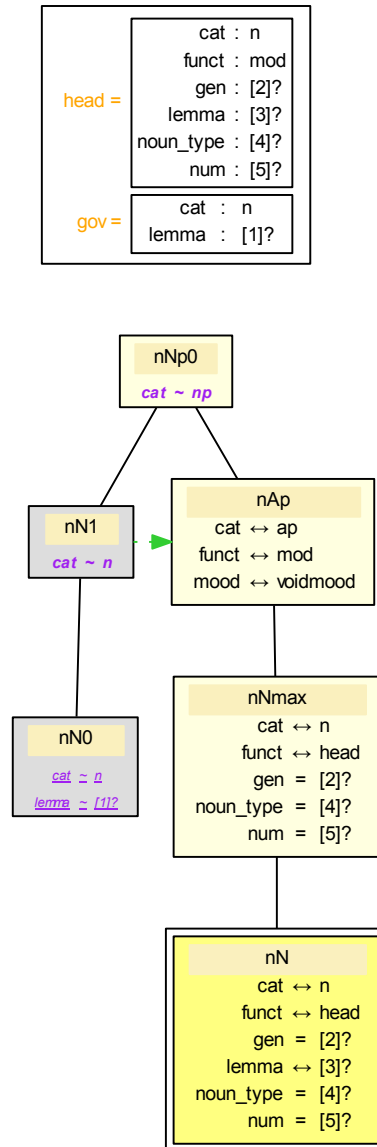


Figure 4.8: The EPTDs defined by the NATTR class

#### 4.4 Nouns with required complements

Some common nouns required various kinds of complements as the following examples illustrate it. In the examples, the concerned nouns are in bold.

- (4.9) *Jean a pris **contact** avec l'entreprise.*  
 Jean has made **contact** with the company.  
 ' Jean has made contact with the company. '

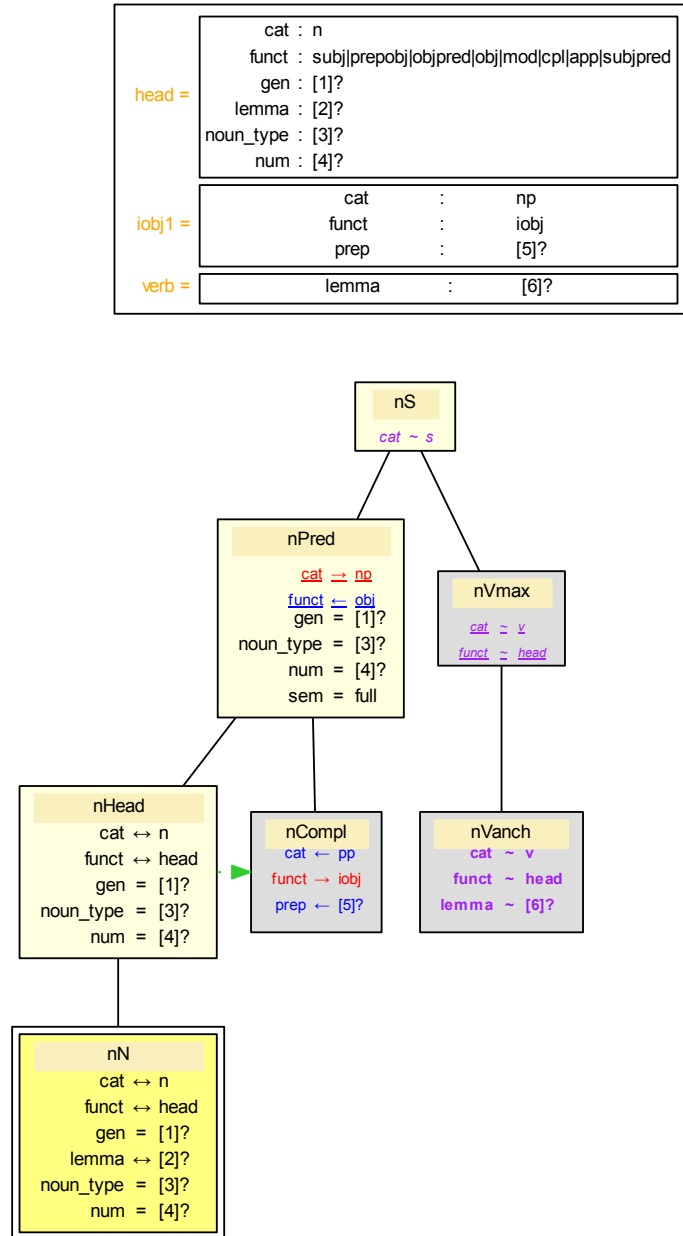


Figure 4.9: An EPTD defined by the N\_PP1 class

- (4.10) *J'ai l'accord pour que Jean vienne.*  
 I have the agreement for that Jean comes.  
 ' I have the agreement for Jean coming.'
- (4.11) *La crainte de venir est grande.*  
 The fear of coming is great.

'The fear of coming is great.'

- (4.12) **Domage** *que Jean vienne seulement demain !*  
 Pity that Jean come only tomorrow !

'It is a pity that Jean come only tomorrow !'

- (4.13) **L'invitation** *de l'entreprise à l'ingénieur est arrivée.*  
 The invitation of the company to the engineer has come.

'The invitation of the company to the engineer has come.'

- (4.14) **La crainte** *de Jean de venir est grande.*  
 The fear of Jean of coming is great.

'The Jean's fear of coming is great.'

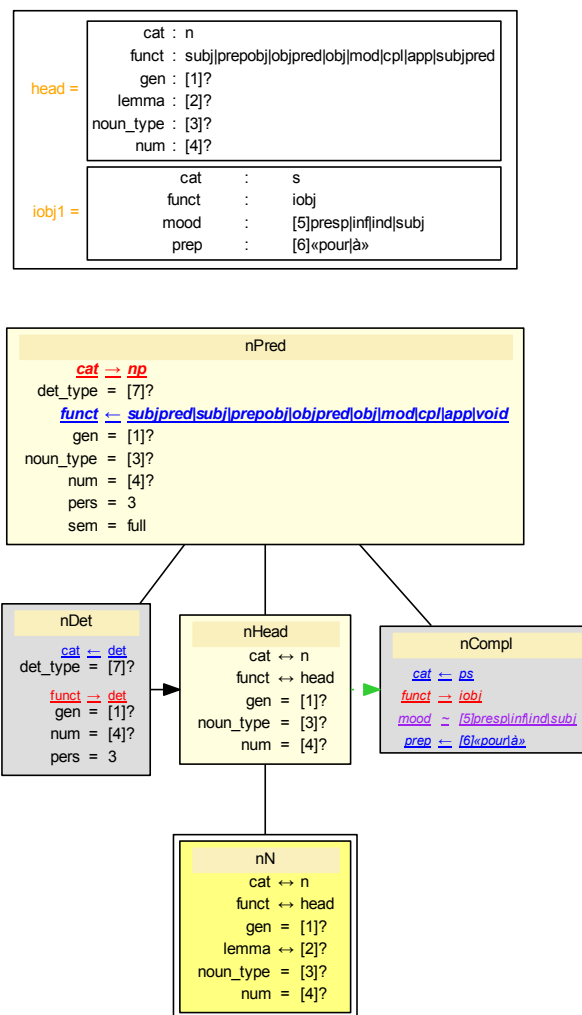


Figure 4.10: An EPTD defined by the N\_PS1 class



As the examples above show it, all kinds of complements of a common noun can combine with all syntactic functions of this nouns; we assume an exception: when the common noun is an attribute of another common noun. Hence, as a preliminary of the definition of the related classes, a class N is the disjunction of the DETCOMMONNOUN, PREDICATIVECOMMONNOUN, OBJECTIDIOMCOMMONNOUN, TEMPORALNOUN and SENTENCEHEADNOUN classes. The N class defines 7 EPTDs because the TEMPORALNOUN and SENTENCEHEADNOUN classes each one correspond to two EPTDs.

Then, a class N\_PP1 models the syntactic construction of any common noun requiring a nominal complement. It defines 14 EPTDs because for every syntactic function of a common noun, there a two possible nominal complements : a common noun or a complete noun phrase. Figure 4.9 shows the EPTD corresponding to example 4.9.

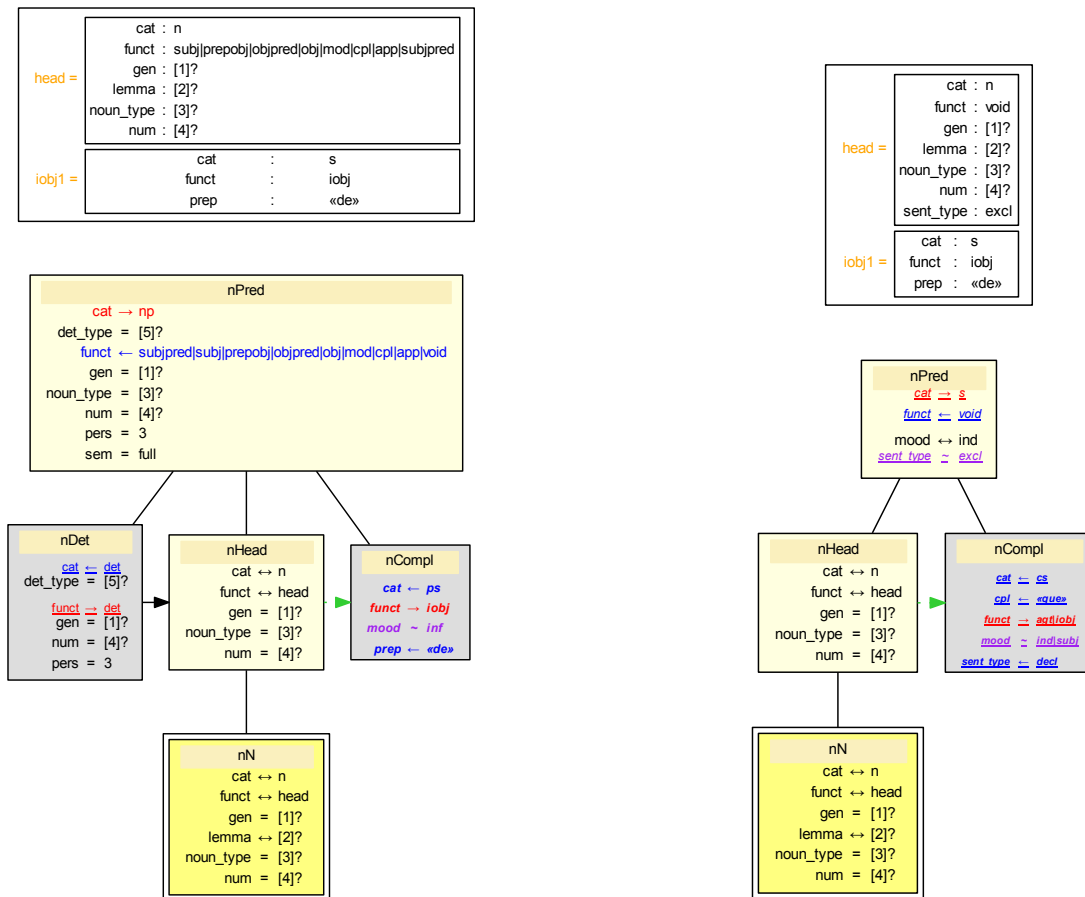


Figure 4.11: Two EPTDs defined by the NDES1 class

Another class N\_PS1 models the syntactic construction of any common noun requiring a clausal complement, except if the complement is introduced with preposition *de*, which is a particular case. It defines 7 EPTDs corresponding to the 7 EPTDs for the different syntactic functions of common nouns without complements. Figure 4.10 shows the EPTD corresponding

to example 4.10.

Common nouns requiring clausal complements introduced with preposition *de* are defined with a specific class N\_DES1 because for the complement there is a systematic alternation between an infinitive introduced with *de* and a finite clause introduced with *que*. Examples 4.11 and 4.12 express this alternation and figure 4.11 show the EPTDs used to parse the examples.

Like a verb, a common noun can require several complements, which is expressed by the N\_PP1\_PP2, N\_PP1\_PS2 and N\_PP1\_DES2 classes and illustrated with the examples 4.13 and 4.14.

Figure 4.12 presents the EPTD used to parse sentence 4.14 and defined by the N\_PP1\_DES2 class.

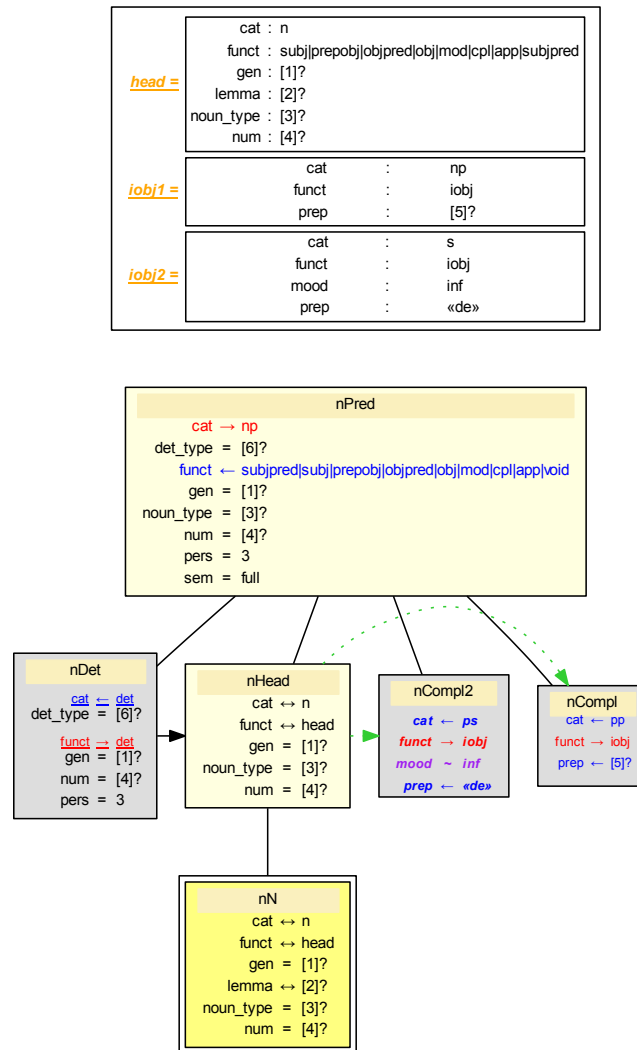


Figure 4.12: An EPTD defined by the N\_PP1\_DES2 class



## Chapter 5

# Determiners

The characteristic feature of determiners is that they are required by common nouns to build noun phrases.

### 5.1 Interfaces with the lexicon

Determiners are characterized in interfaces with the feature `head.cat = det`. Their morphological features and some syntactic properties are gathered in the `head` feature:

- **det\_type**: it gives the type of the determiner, **count** (countable), **de** (the unique determiner *de*), **def** (definite), **dem** (demonstrative), **indef** (indefinite), **part** (partitive), **neg** (negative), **poss** (possessive), **super** (superlative); we have more kinds of determiners than the grammarians have defined because we have split the class of indefinites into 5 sub-classes: **count** and **part**, which select countable and mass nouns, **de** for the unique determiner *de*, which has a specific behavior<sup>1</sup>, **neg** for negative determiners and **indef** for standard indefinites;
- **gen**: it indicates the gender of the deteminer with the values **f** and **m**;
- **num**: it gives the number of the deteminer, **pl** (plural) or **sg** (singular).

### 5.2 Standard determiners

The basic class `DETERMINER`, which is shared by all determiners, is very general: the node representing the maximal projection of the determiner tells only that it is able to take the function `det`. Figure 5.1 shows the PTD defined by the class.

The `DET_N1` class defines the PTDs of standard determiners: definite, indefinite (in the large sense) and demonstrative determiners. With respect to the `DETERMINER` class, it adds a positive feature `cat → det` and a negative feature `funct ← funct` to express the one-to-one possible interaction with a word requiring a determiner.

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<sup>1</sup>Since in the XMG language, it is not possible to express that an indefinite determiner is different from *de*, we use this trick to express the difference.

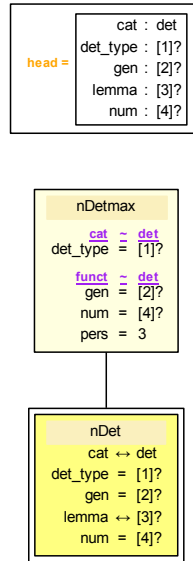


Figure 5.1: PTD defined by the DETERMINER class

There is a particular class DETPOSS\_N1 for possessive determiners, because their interface must specify the number and the gender of the possessor.

The PTDs defined by the DET\_N1 and DETPOSS\_N1 classes are shown on figure 5.2.

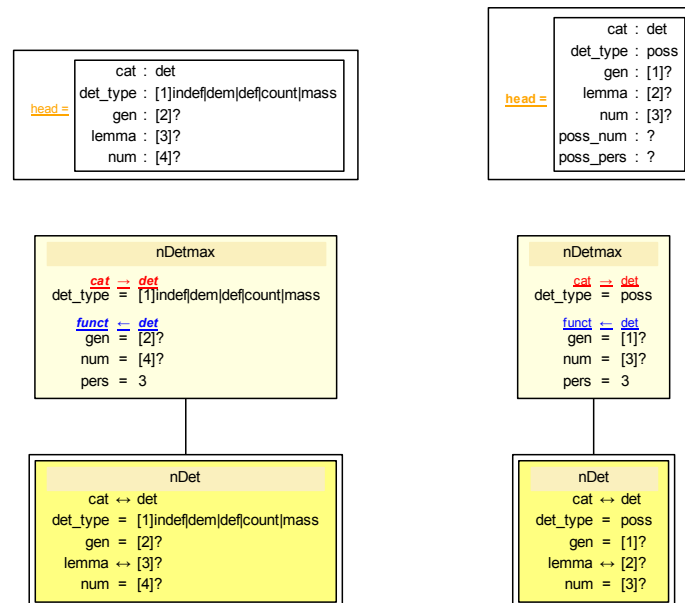


Figure 5.2: PTDs defined by the DET\_N1 and DETPOSS\_N1 classes

## 5.3 Related Determiners

There are specific determiners that interact with other words in their environment. All share the RELATEDDETERMINER class, which defines the PTD shown in figure 5.3.

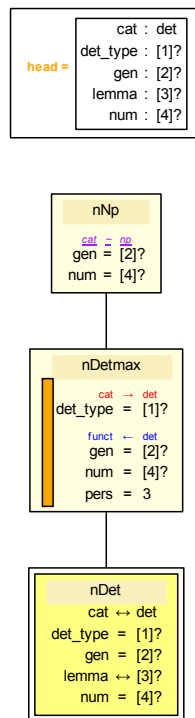


Figure 5.3: PTD defined by the RELATEDDETERMINER class

There are two kinds of determiners having this property: negative determiners and the indefinite determiner *de*.

### 5.3.1 Negative determiners

Negative determiners, like *aucun*, are paired with the clitic *ne* put before the verb head of the clause receiving the noun phrase introduced by the determiner, but the position of the noun phrase is relatively free inside the clause, as the following examples show it.

(5.1) *Marie ne connaît la femme d' aucun ingénieur.*

Marie does not know the wife of any engineer.

Marie knows no wife of any engineer.

(5.2) *Marie ne pense connaître la femme d' aucun ingénieur.*

Marie does not think to know the wife of any engineer.

Marie think to knows the wife of no engineer.

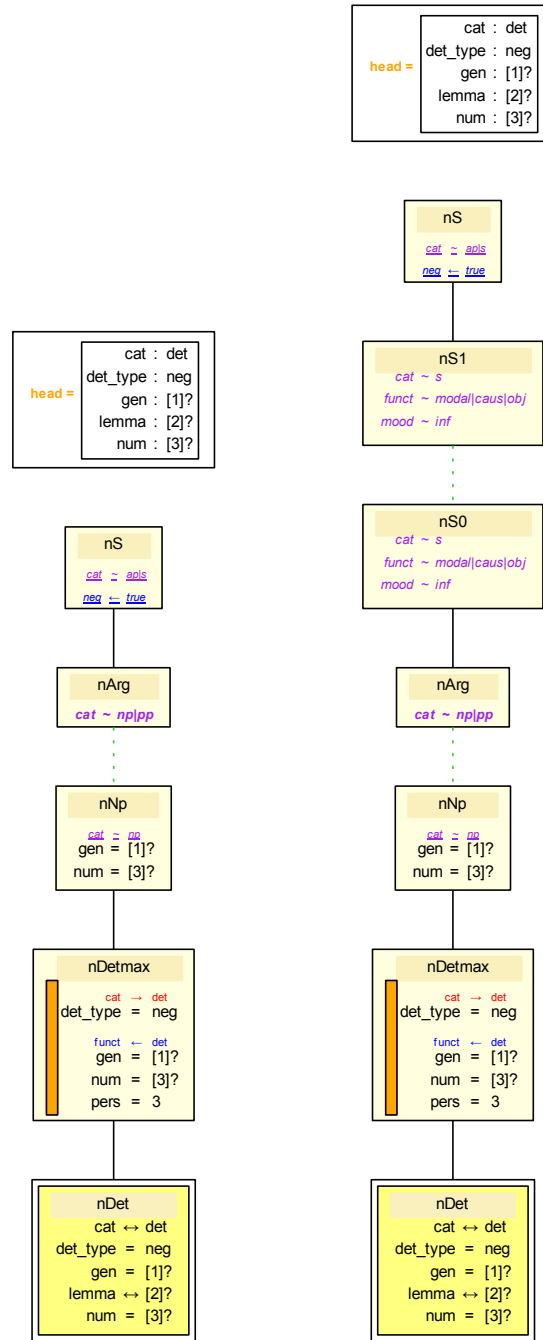


Figure 5.4: EPTDs defined by the DETNEG\_N1 class

The DETNEG class defines the EPTDs associated with any negative determiner, which is shown in figure 5.4. There are two EPTDs because there are two cases:

- the particle *ne* is in the same clause as the negative determiner, which is illustrated with sentence 5.1;

- the particle *ne* is in a clause embedding the clause including the negative determiner, which is illustrated with sentence 5.2.

In both cases, node *nNp* represents the noun phrase determined by the negative determiner anchored at node *nDet*. In both examples, the noun phrase is *aucun ingénieur*. It can be embedded more or less deeply in a prepositional or noun phrase, which is represented by an underspecified dominance relation from node *nArg* over node *nNp*. Node *nArg* corresponds to the noun phrase *la femme d'aucun ingénieur*.

In both cases, node *nS* represents the clause aimed at receive the particle *ne*, which is expressed with the negative feature `neg ← true`. The dual feature `neg → true` will be provided by the particle *ne*.

The difference between the two cases lies in the relation between node *nArg* and node *nS*. In the left EPTD, node *nArg* is a direct daughter of *nS*. The right EPTD expresses the possibility for node *nArg* to be embedded in a pileup of infinitives depending on the head verb of the main clause *nS* with a modal, causative or object relation. The most external infinitive is represented with node *nS1* and the most internal infinitive is represented with node *nS0*. Between them, there is an underspecified dominance relation. In sentence 5.2, there is only one infinitive, *connaître la femme d'aucun ingénieur*, for which node *nS1* is merged with node *nS0*.

### 5.3.2 The indefinite determiner *de*

The indefinite determiner *de* is paired with a negation or with an adjective preceding the noun that it introduces. The examples below illustrate these cases.

(5.3) *Jean connaît de grandes entreprises.*

Jean knows big companies.

Jean knows big companies.

(5.4) *Jean ne connaît pas d'entreprise.*

Jean does not know company.

Jean knows no company.

(5.5) *Jean ne pense pas connaître d'entreprise.*

Jean does not think to know company.

Jean does not think to know any company.

According to the two cases, there are two respective classes : `DETDEADJ_N1` and `DET-DENEG_N1`. Figure 5.5 shows the EPTD defined by the `DETDEADJ_N1` class which is used to parse sentence 5.5 below.



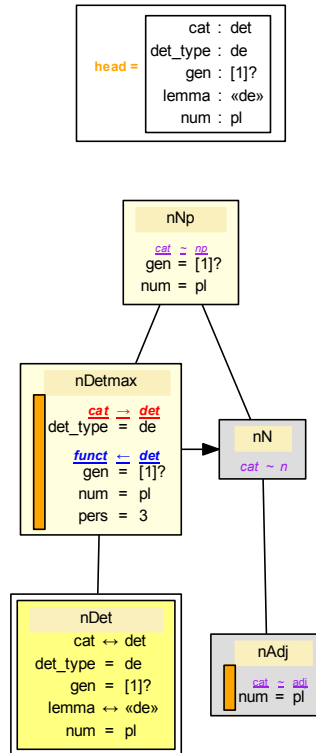


Figure 5.5: EPTD defined by the DETDEADJ\_N1 class

On the figure, node *nAdj* represents an adjective that must modify the common noun *nN* to build the noun phrase *nNp* with the determiner *nDetmax*.

The DETDENEG\_N1 class defines two EPTDs similar to those shown on figure 5.4. It includes the same two cases illustrated with examples 5.4 and 5.5.

## 5.4 Superlatives

Superlatives in French are generally expressed with *le plus* and *le moins*, as the following examples show it.

(5.6) *La moins grande chambre me convient mieux.*

The least great room me suits better.

The least great room suits me better.

(5.7) *La chambre la moins difficile à chauffer me convient mieux.*

The room the least difficult to heat me suits better.

The room which is the least difficult to heat suits me better.

(5.8) *La moins difficile à chauffer me convient mieux.*

The least difficult to heat me suits better.

That one which is the least difficult to heat suits me better.

Superlatives can be represented in two ways:

- A definite determiner is immediately followed with adverb *plus* or *moins* modifying an adjective.
- A compound determiner *le plus* or *le moins* replaces both the simple determiner and the adverb. In the following, we call it the *superlative determiner*.

The first option can lead to a misunderstanding of superlatives because, for instance, it makes no difference in the interpretation of sentence 5.6 and of the sentence *La chambre moins grande me convient mieux*. Hence, we have chosen the second option.

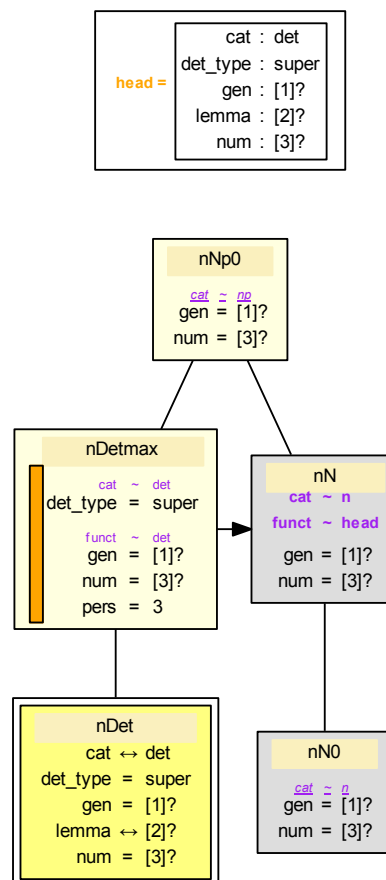


Figure 5.6: EPTD defined by the SUPERLATIVE class

Now, three cases have to be considered according to the position of the superlative determiner with respect to the common noun it applies. A class gives the general skeleton of all syntactic constructions expressing superlatives: the SUPERLATIVE class presented on figure 5.6. Node *nNp0* represents the noun phrase determined by the superlative determiner anchored at node *nDet*. This noun phrase is *la moins grande chambre* in sentence 5.6 and *la moins difficile à chauffer* in sentences 5.7 and 5.8.

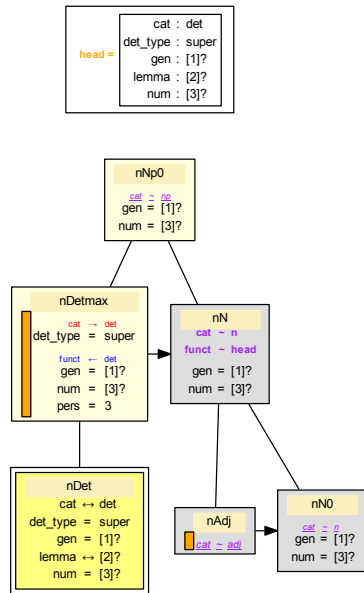


Figure 5.7: EPTD defined by the to the PRESUPERLATIVE class

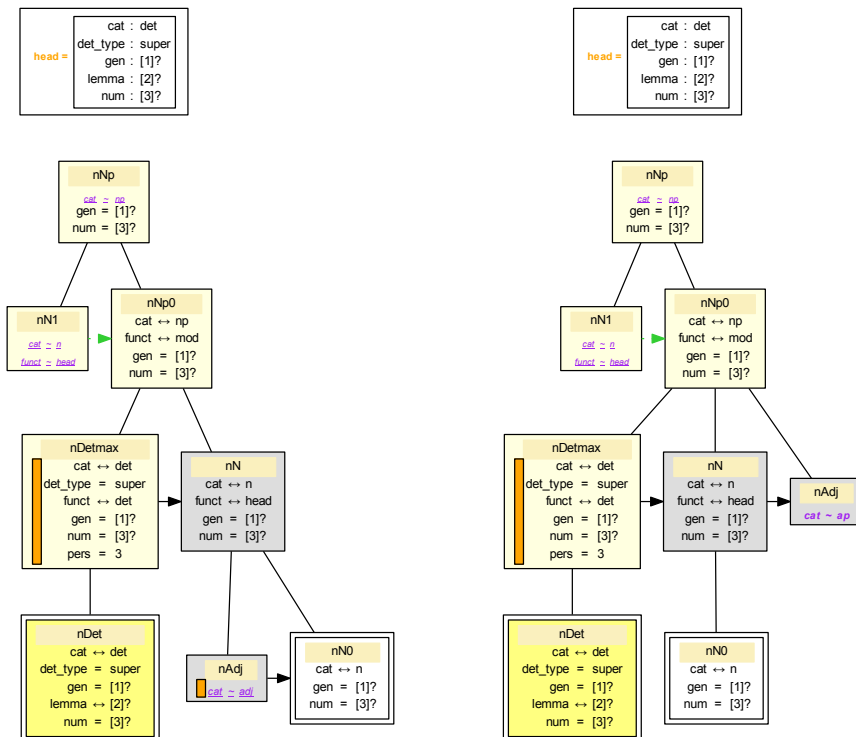


Figure 5.8: EPTDs defined by the to the POSTSUPERLATIVE class

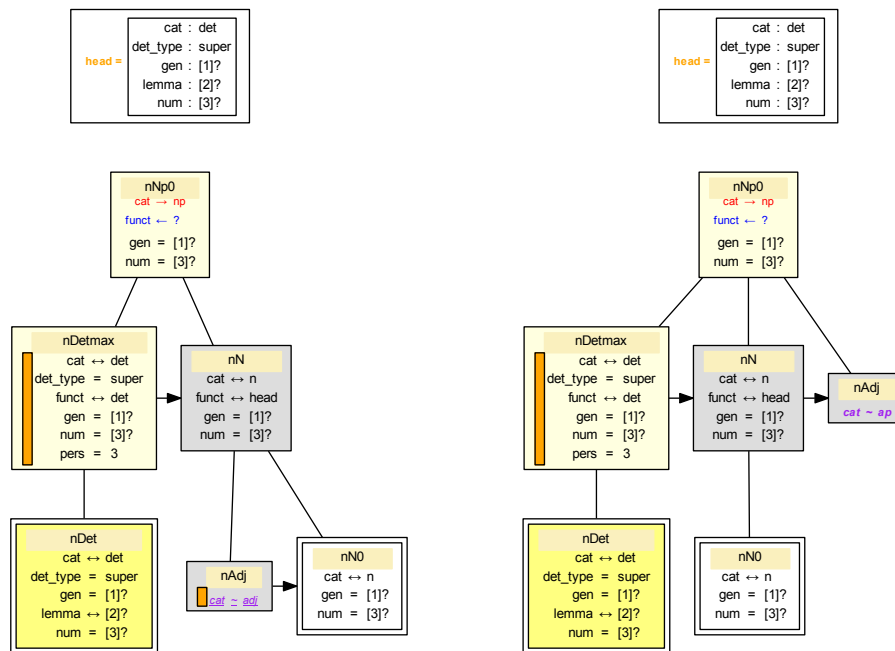


Figure 5.9: EPTD defined by the to the EMPTYSUPERLATIVE class

Then, three classes express the three cases:

- the PRESUPERLATIVE class, for which the superlative determiner precedes the modified noun, like in sentence 5.6, It defines the EPTD shown on figure 5.7.
- the POSTSUPERLATIVE class, for which the superlative determiner follows the modified noun, like in sentence 5.7, It defines the two EPTDs shown on figure 5.8. The left EPTD corresponds to adjectives preceding the common noun they modify and the right EPTD to adjectives following the common noun they modify. The idea in both cases is to represent the adjective modified with the superlative as a noun phrase (node *nNp0*) with a missing head represented with an empty node *nN0*.
- the EMPTYSUPERLATIVE class, for which the modified noun is elided, like in sentence 5.8. It defines the two EPTDs shown on figure 5.9, corresponding to the two positions of the adjective with respect to the common noun it modifies. In both cases, the elided noun is represented with an empty node *nN0*.

The three classes are grouped in their disjunction, the DETSUPER\_ADJ1 class. In all cases, the superlative may be accompanied with a complement introduced by the preposition *de*, *d'entre* or *parmi* giving precisions about the set of individuals from which that one expressed with the superlative is extracted. It is expressed with the DETSUPER\_ADJ1\_PREPNP2 class, which inherits the DETSUPER\_ADJ1 class. Figure 5.10 shows one of the 5 EPTDs defined by the class. This corresponds to the case that the superlative determiner is put after the common noun and the adjective is put before the common noun. Such EPTD is used to parse the following sentence.

- (5.9) *Il était l'élève le plus intelligent d'entre nous.*  
 He was the student the most clever among us.  
 He was the most clever student among us.

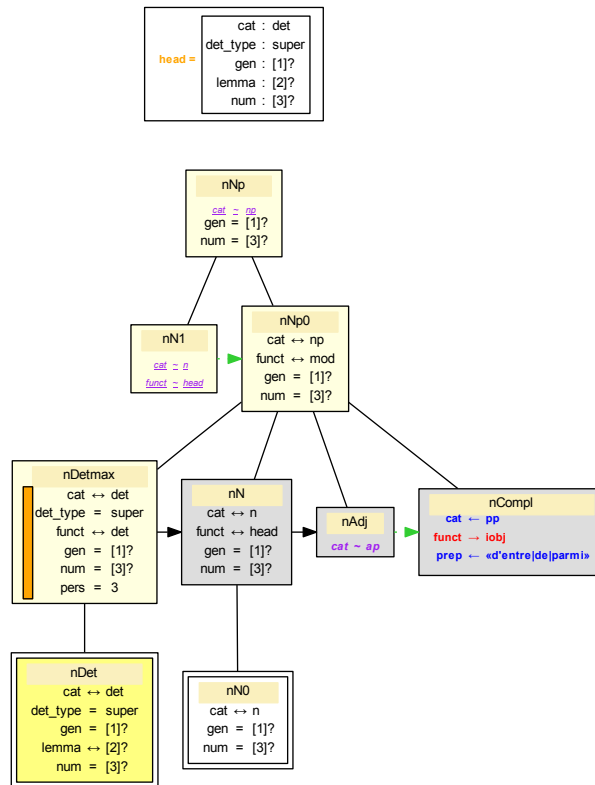


Figure 5.10: One of the EPTDs defined by the DETSUPER\_ADJ1\_PREPNP2 class

# Chapter 6

## Pronouns

The classes related to pronouns are distributed between two modules : PROCLITIC for clitic pronouns and PRONOUN for lexical pronouns.

### 6.1 Interfaces with the lexicon

Pronouns are characterized in the interface with the feature `head.cat = pro`. They are ranged in different classes according to the value of the `head.pro_type` feature:

- `clit` : clitic pronouns (*il, le, lui...*),
- `def`: definite (personal) pronouns that are separated (*lui, lui-même...*),
- `dem`: demonstrative pronouns (*ceci, ça...*),
- `indef`: indefinite pronouns (*chacun, tout...*),
- `inter`: interrogative pronouns (*lequel, que, quel...*),
- `neg`: negative pronouns (*aucun, rien, personne...*),
- `poss`: possessive pronouns (*le sien...*),
- `rel`: relative pronouns (*dont, lequel, que...*).

Other features are used to describe pronouns:

- `aff`: when the pronoun is an affix, except a reflexive affix, it gives the value of this affix, `en`, `le` or `y`;
- `det_type`: it gives the type of the determination corresponding to the pronoun; its values are the same as for the equivalent feature for determiners (see section 5.1);
- `funct`: some clitic pronouns have a syntactic function marked with this feature; the possible functions are `iobj`, `mod`, `obj`, `objpred`, `subj`, `subjpred`;
- `gen`: it indicates the gender of the pronoun with the values `f` and `m`;
- `num`: it gives the number of the pronoun, `pl` (plural) or `sg` (singular);
- `pers`: it gives the person of the pronoun, `1`, `2` or `3`;

- **sem**: this feature indicates if a subject clitic pronoun has a semantic counterpart with the values **full** and **empty**.

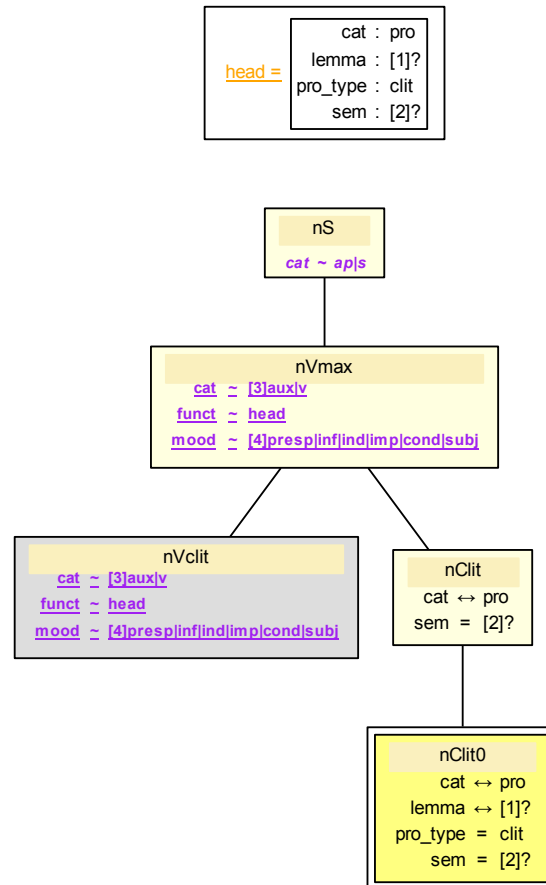


Figure 6.1: PTD defined by the CLITIC class

## 6.2 Clitic pronouns

### 6.2.1 Affix versus argument clitics

A clitic pronoun is placed side by side near a verb to modify it. The general skeleton of all its EPTDs is defined by the CLITIC class and shown on figure 6.1. A clitic pronoun anchored at node *nClit0* has its maximal projection represented by node *nClit*. The modified verb is represented by node *nVclit* and its maximal projection by node *nVmax*. This one is an immediate sub-constituent of node *nS* representing a clause or an adjectival phrase.

A clitic pronoun can represent a verb or noun argument. It can also be an affix without any argument function. The following examples illustrate these different functions.

- (6.1) *Jean la voit.*  
 Jean her sees.

Jean sees her.

(6.2) *Jean en connaît la couleur.*

Jean of it knows the color.

Jean knows the decision of him.

(6.3) *Finis-en avec ce travail.*

Finish with this work.

Put an end to this work.

(6.4) *Les ordinateurs se vendent bien.*

The computers themselves sell well.

The computers sell well.

In sentence 6.1, clitic *la* represents the object of the verb *voit*. In sentence 6.2, clitic *en* represents the complement of the noun *couleur*. Sentences 6.3 and 6.4 illustrate the two cases of non argument clitics. The first one concerns the clitics *en*, *y*, *le*, which are used to modify the semantics of the verb to which they are linked.

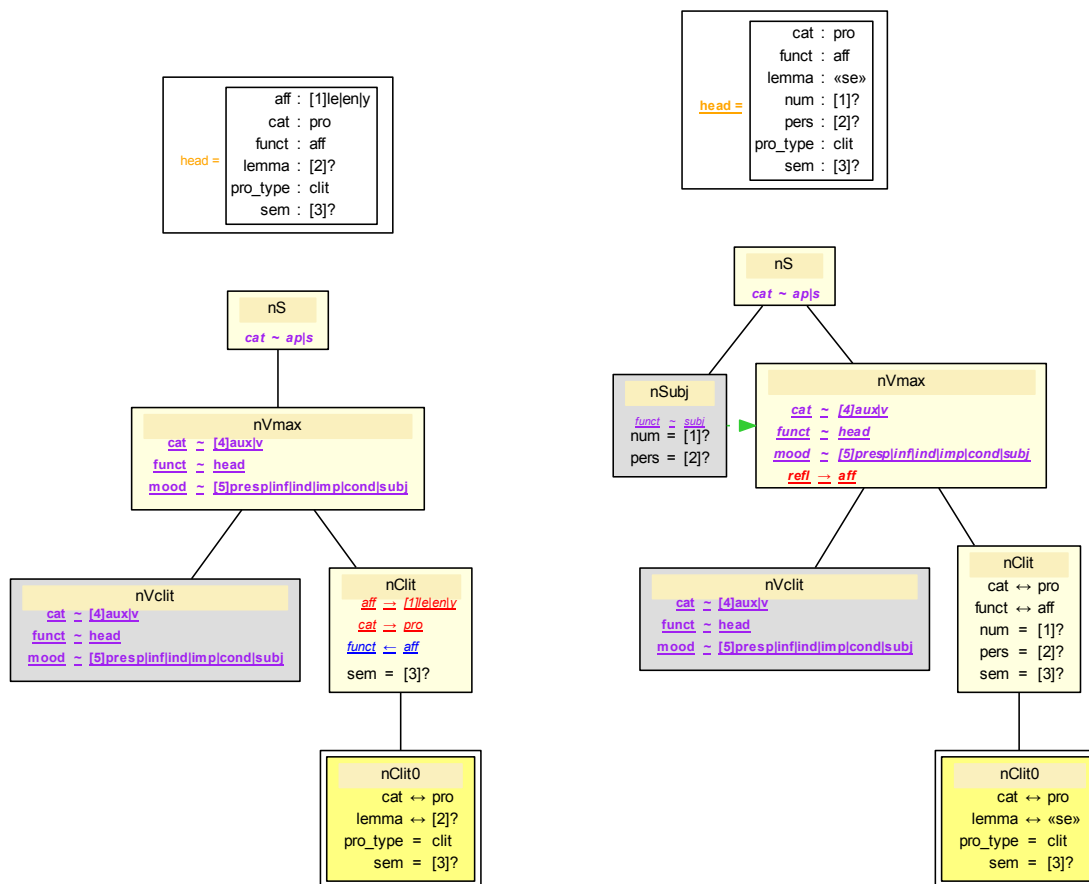


Figure 6.2: PTDs defined by the AFFIXCLITIC and EMPTYREFLEXIVECLITIC classes



The corresponding PTD is defined with the `AFFIXCLITIC` class and shown on the left of figure 6.2. Node  $nClit$  representing the maximal projection of the clitic carries three polarized features  $\text{aft} \rightarrow \text{le|en|y}$ ,  $\text{cat} \rightarrow \text{pro}$  and  $\text{funct} \leftarrow \text{aff}$ , which will be neutralized by features brought by the EPTD associated with an appropriate verb.

The second case concerns the reflexive clitic *se* which is used to build pronominal verbs or to express the middle voice of some transitive verbs. Sentence 6.4 illustrates middle voice. The `EMPTYREFLEXIVECLITIC` class defines these two uses of the *se* clitic. It generates the PTD presented on the right of figure 6.2. They are two differences with respect to the PTD defined by the `AFFIXCLITIC` class. First, the PTD carries only one polarized feature, the feature  $\text{refl} \rightarrow \text{aff}$ , which is attached at the maximal projection of the verb, represented with node  $nVmax$ . This feature will be neutralized by a dual feature brought by an EPTD associated with the middle voice of a verb or with the active voice of a pronominal verb. Second, there is an agreement in person ( $\text{pers}$ ) and number ( $\text{num}$ ) between the clitic pronoun represented with node  $nClit$  and the subject of the verb represented with node  $nSubj$ .

The use of a clitic pronoun as an argument is defined by the `FULLCONSTITUENTCLITIC` class and figure 6.3 shows the PTD defined by this class. The argument is represented with node  $nConst$ , which is empty or full. This node co-refers to node  $nClit$ , representing the clitic pronoun. There is no structural relation between  $nConst$  and the main description, because the relation is variable according to the function of the clitic.

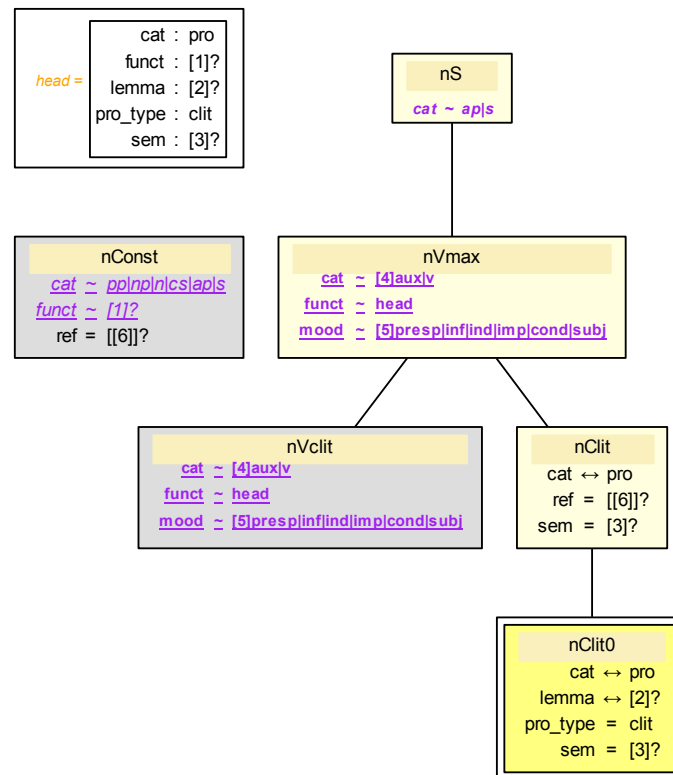


Figure 6.3: PTD defined by the `FULLCONSTITUENTCLITIC` class

### 6.2.2 Subject clitic pronouns

A first possible function of clitics is subject. Here are examples with different uses of subject clitics.

(6.5) **Il** *pleut*.

It rains.

It rains.

(6.6) *Vient-il* *aujourd'hui* ?

Comes he today ?

Does he come today ?

(6.7) *Jean vient-il* *aujourd'hui* ?

Jean comes he today ?

Does Jean come today ?

(6.8) *Est-ce* *le fils de Jean* ?

Is it the son of Jean ?

Is it Jean's son ?

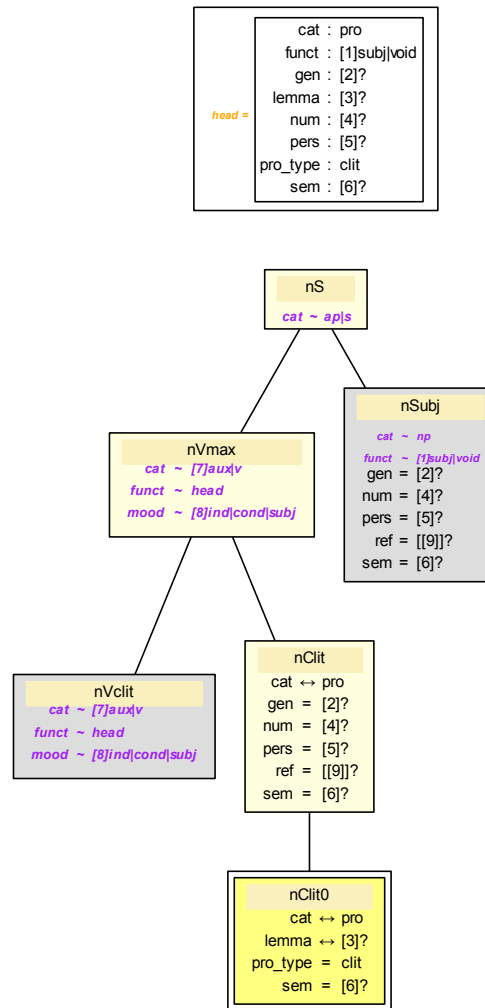


Figure 6.4: PTD defined by the SUBJECTCLITIC class

The behavior of subject clitics is very particular, which is expressed with a specific class, the SUBJECTCLITIC class. This class inherits the FULLCONSTITUENTCLITIC class and defines the PTD shown on figure 6.4. Node *nSubj*, which is a renaming of the *nConst* node from the FULLCONSTITUENTCLITIC class, represents the subject noun phrase in a canonical position. Features *cat* and *funct* attached at this node are virtual because they can be saturated in two ways:

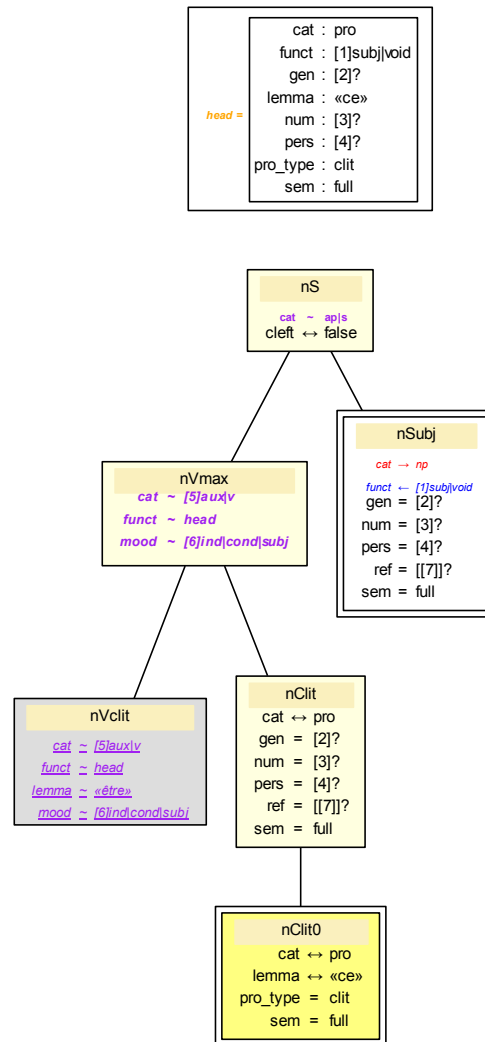


Figure 6.5: PTD defined by the CESUBJECTCLITIC class

- The subject clitic plays the role of an actual subject, which is expressed with the polarized features `cat → np` and `funct ← subj` for node `nSubj`. The ACTUALSUBJECTCLITIC class implements this case, adding the two polarized features. Then, it is specialized in two subclasses PROCLIT-SUBJ-DECL and PROCLIT-SUBJ-INTER according to the position of the clitic with respect to the verb. Put before the verb as in sentence 6.5, it expresses that the corresponding sentence is declarative. Put after the verb as in sentence 6.6, it expresses that the sentence is interrogative.
- The subject clitic put after the verb is a repetition of the actual subject, which is a noun phrase put before the verb, as sentence 6.7 illustrates it. The PROCLIT-SUBJ-REPEAT implements this case. It adds no polarized feature; it only constrains node `nSubj` to be a full constituent. The ACTUALSUBJECTCLITIC class is the disjunction of two classes: STANDARDSUBJECTCLITIC and CESUBJECTCLITIC. Both inherit the SUBJECTCLITIC

class. The first one corresponds to the clitics *il* and *on*, which is illustrated with sentences 6.5 and 6.6, and the second one corresponds to the clitic *ce*, which is illustrated with sentence 6.8.

With respect to the SUBJECTCLITIC class, STANDARDSUBJECTCLITIC makes node *nSubj* empty. Then, it assigns value **full** to feature **sem** for personal pronouns (example 6.6) or feature **empty** for impersonal pronouns (example 6.6). In the first case, a feature **det\_type** is added to node *nSubj*.

The CESUBJECTCLITIC class defines three PTDs but two of them are used in cleft clauses and their description is postponed to the section ?? of chapter *extraction*. The remaining PTD is illustrated with example 6.8 and shown in figure 6.5. The main difference with the STANDARDSUBJECTCLITIC class is that the clitized verb is very constrained: the only possible verb is *être*, even if it also accepts modal auxiliaries.

### 6.2.3 Verb complement clitic pronouns

Clitic pronoun can be verb complements in various circumstances. The sentences below give different examples of complement clitics.

(6.9) *Jean la voit.*

Jean her sees.

Jean sees her.

(6.10) *Jean y fait venir Marie.*

Jean there makes come Marie.

Jean makes Marie come there.

(6.11) *Jean se fait emmener par Marie.*

Jean himself makes take by Marie.

Jean makes himself take by Marie.

(6.12) *Jean fait se rencontrer les ingénieurs.*

Jean makes meet the engineers.

Jean makes the engineers meet.

(6.13) *Les ingénieurs se parlent.*

The engineers themselves tell

The engineers tell themselves.

(6.14) *Jean y rencontre Marie.*

Jean there meets Marie.

Jean meets Marie there.

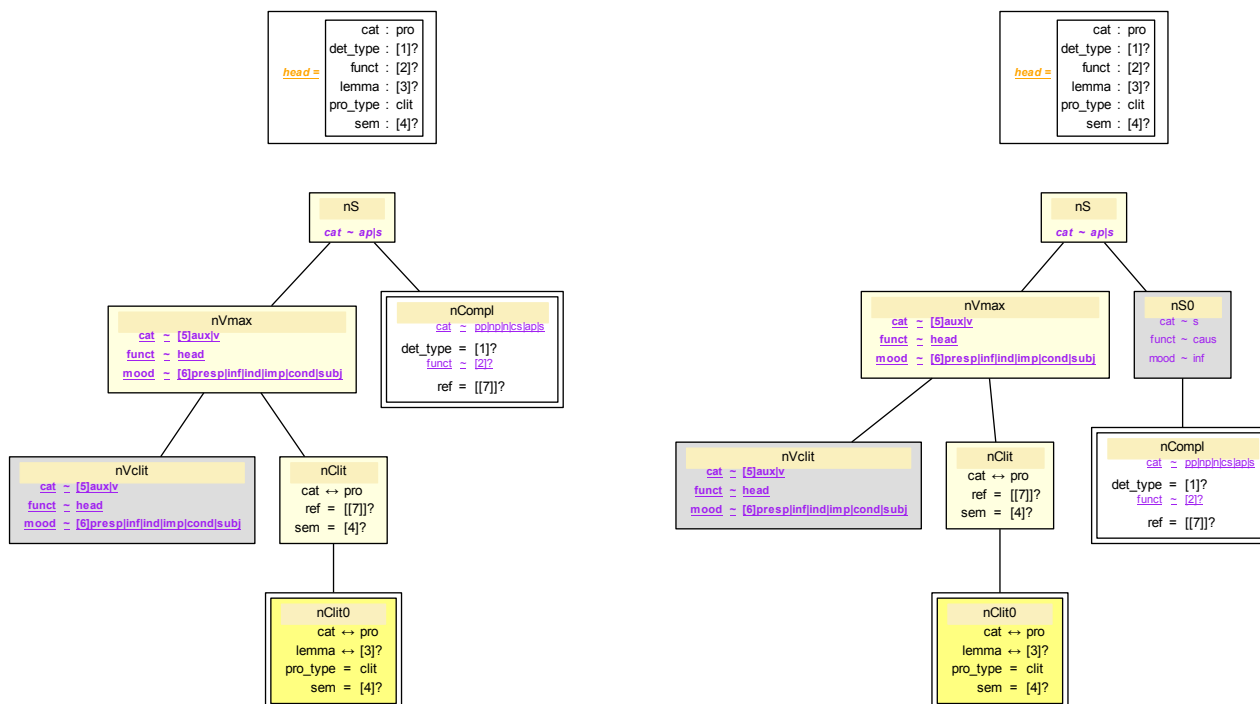


Figure 6.6: PTDs defined by the VERBCOMPLEMENTCLITIC class

The PTDs expressing the fact that a clitic pronoun is a verb complement are defined by the VERBCOMPLEMENTCLITIC class, which has the syntactic function of the complement as a parameter. This class inherits the FULLCONSTITUENTCLITIC class, renaming node *nConst* as *nCompl*. It generates two PTDs shown on figure 6.6. The left PTD corresponds to a clitic that is a complement of the verb to which it is adjoined and the right PTD corresponds to a clitic that has risen from its governing verb to a causative auxiliary. For this one, node *nS0* represents the infinitive object of the causative auxiliary.

Among complement clitics, one can distinguish complement clitics which are required by the verb from adjunct clitics. The first case is expressed with the REQUIREDVERBCOMPLEMENTCLITIC0 class. All examples above refer to this case, except the last one. This class inherits the VERBCOMPLEMENTCLITIC class and adds two polarized features, **cat** and **funct**, which are respectively positive and negative. In this way, the anchoring clitics behave as obligatory complements.

The REQUIREDVERBCOMPLEMENTCLITIC0 class is specialized in two subclasses according to the fact that the complement is direct or indirect: the DIRECTVERBCOMPLEMENTCLITIC class illustrated with sentences 6.9, 6.11 and 6.12, and the INDIRECTVERBCOMPLEMENTCLITIC class illustrated with sentences 6.10 and 6.13. The first class fixes the category of *nCompl* as **np** and add agreement features shared by *nCompl*, *nClit* and the interface. The second class fixes the category of *nCompl* as **pp** but for agreement features, it distinguishes two cases: some clitics, *lui* and *se*, carry agreement features, and other ones, *en* and *y*, are deprived of any agreement feature. Figure 6.7 shows two PTDs defined by the INDIRECTVERBCOMPLEMENTCLITIC class corresponding to the two cases.

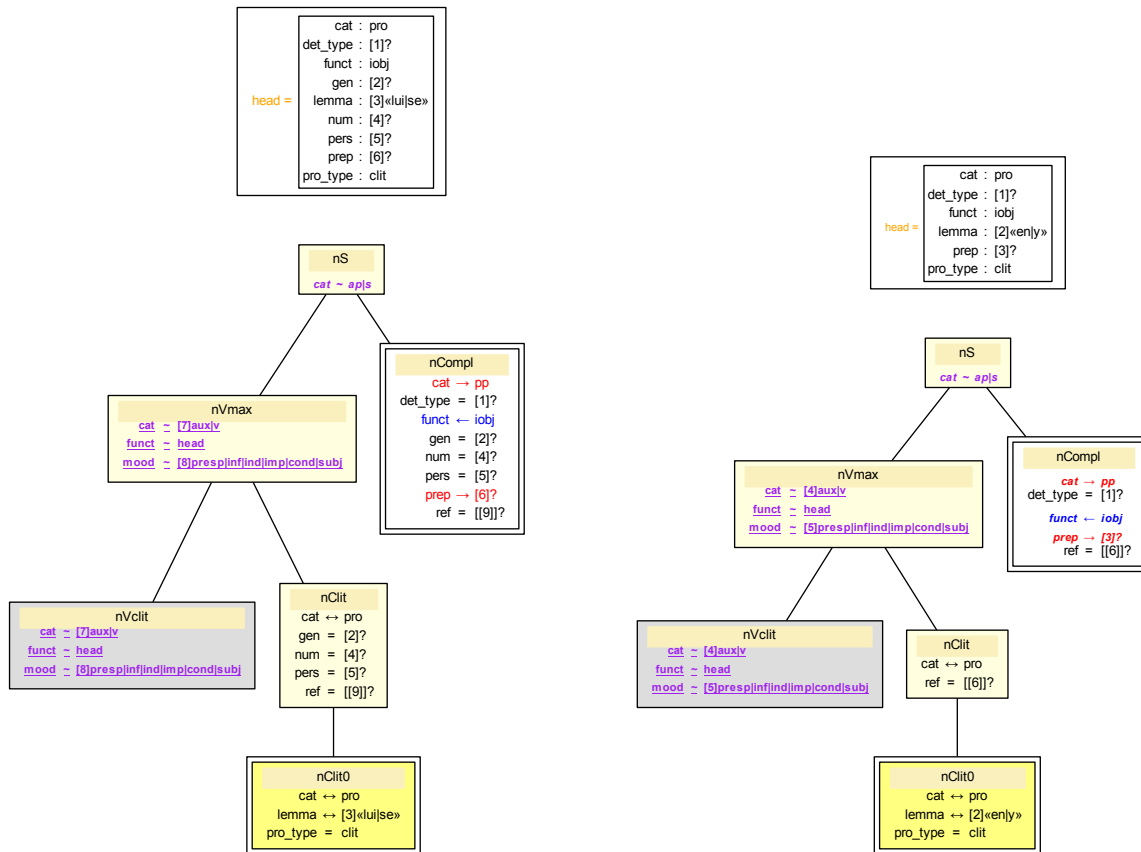


Figure 6.7: PTDs defined by the `INDIRECTVERBCOMPLEMENTCLITIC` class

Then, the `DIRECTVERBCOMPLEMENTCLITIC` and `INDIRECTVERBCOMPLEMENTCLITIC` classes are gathered in their disjunction `REQUIREDVERBCOMPLEMENTCLITIC`, which is itself specialized in two subclasses, according to the reflexive feature or not of the clitic pronoun: the `NON-REFLEXIVEREQUIREDVERBCOMPLEMENTCLITIC` class illustrated with sentences 6.9 and 6.10 and the `REFLEXIVEREQUIREDVERBCOMPLEMENTCLITIC` class illustrated with sentences 6.11, 6.12 and 6.13. We must distinguish these two cases because of three reasons:

- the interaction between a reflexive clitic and the reflexive form of a verb is performed through a polarized feature `ref1` → `arg` attached at the maximal projection of the cliticized verb;
- non reflexive clitics necessarily rise in presence of causative auxiliaries but reflexive auxiliaries can rise or not, depending on they co-refer to the subject of the causative auxiliary or the infinitive;
- for reflexive clitics, there is agreement with the co-referring subject.

Figure 6.8 shows the EPTDs defined by the two classes for clitics that are direct objects without rising.

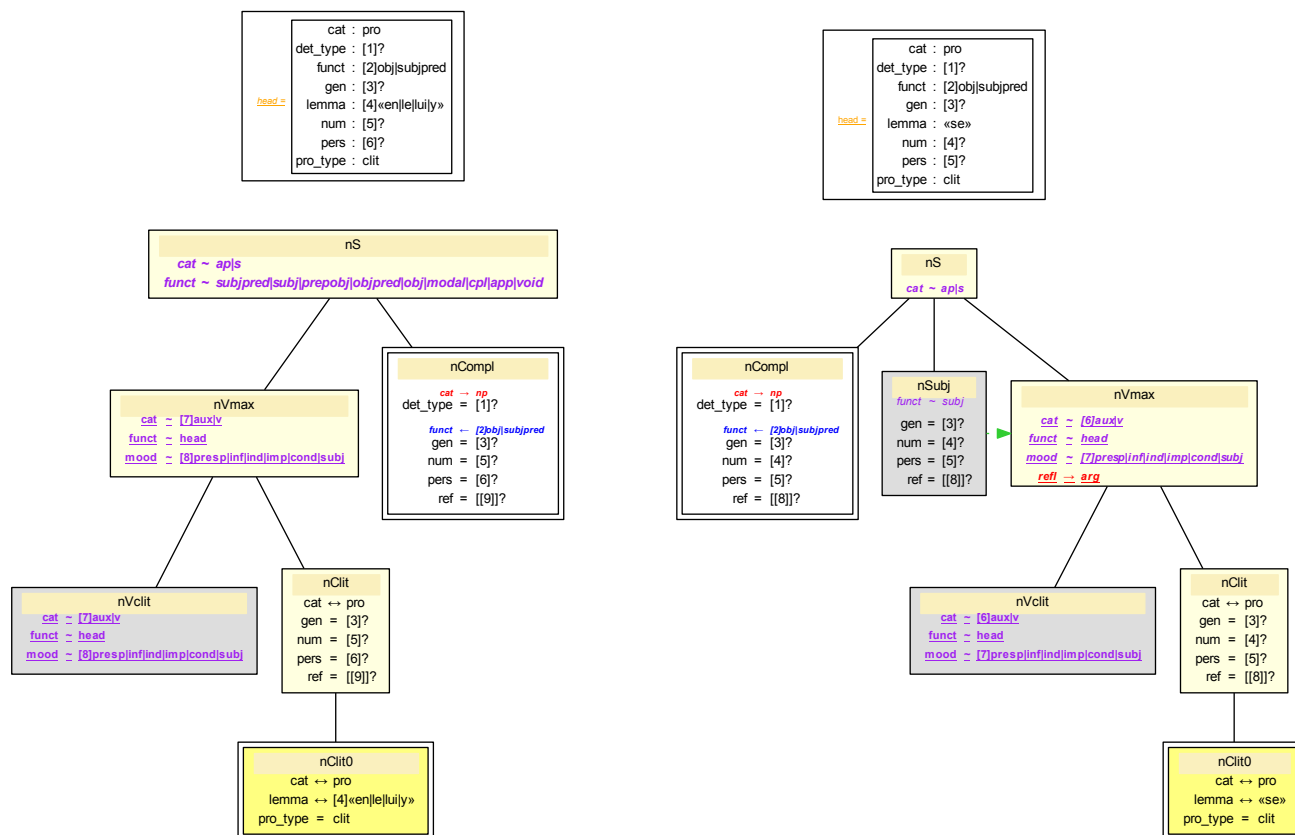


Figure 6.8: PTDs defined by the NONREFLEXIVEREQUIREDVERBCOMPLEMENTCLITIC and e REFLEXIVEREQUIREDVERBCOMPLEMENTCLITIC classes

The figure shows the three differences mentioned above. In particular, in the left PTD, there is a constraint on the syntactic function of the main sentence, expressed in the feature `funct` of node `nS`. This feature cannot take the value `caus`, which means that the sentence with the cliticized verb cannot be the object of a causative auxiliary, because in this case, the clitic must rise to the causative auxiliary.

The only adjunct clitic is the locative clitic *y* illustrated with sentence 6.14. The ADJUNCT-CLITIC class defines its use with two PTDs presented on figure ???. In both PTDs, node `nCompl` represents the trace of the locative complement in the form of an empty node, which has all its features saturated because it does not have to interact with other nodes. The two PTDs correspond to the non-rising and rising cases.

#### 6.2.4 Noun complement clitic pronouns

The *en* clitic pronoun can play the role of a noun complement as the following examples show it.

(6.15) *Jean en connaît la couleur.*

Jean of it knows the color.

Jean knows the decision of him.



(6.16) *Jean en connaît le résumé de la décision.*  
 Jean of him knows the abstract of the decision.  
 Jean knows the abstract of the decision of him.

(6.17) *Jean en fait publier les conclusions.*  
 Jean of it makes publish the conclusions.  
 Jean has the conclusions published.

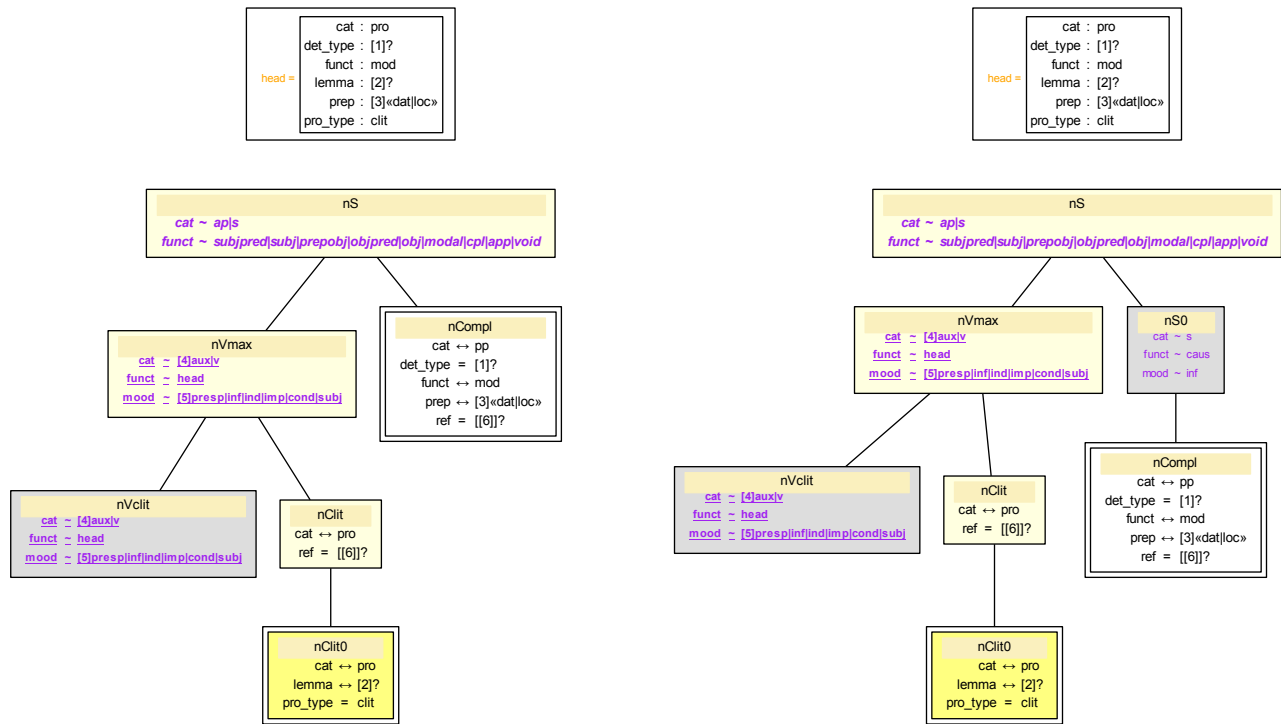


Figure 6.9: The PTDs defined by the ADJUNCTCLITIC class

The basic class is NOUNCOMPLEMENTCLITIC. It generates two PTDs shown on figure 6.10 according to the presence or not of a causative auxiliary, which entails clitic rising as in sentence 6.17. The trace of the noun complement is represented with the empty node *nCompl*. Its mother constituent is a noun phrase represented with node *nObj*. This noun phrase is more or less deeply embedded in another noun phrase which has a function of object or predicate and is represented with node *nObj*. Hence, an underspecified dominance relation between node *nObj* and node *nObj0*.

In sentences 6.15 and 6.17, nodes *nObj* and *nObj0* are merged and they respectively represent the phrases *la couleur* and *les conclusions*. In sentence 6.16, node *nObj*, which represents *le résumé de la décision*, strictly dominates node *nObj0*, which represents *la décision*.

The NOUNCOMPLEMENTCLITIC class is specialized in two classes, the OBLIGATORYNOUNCOMPLEMENTCLITIC class, when the clitic is a required complement as in sentences 6.16 and 6.17, and the OPTIONALNOUNCOMPLEMENTCLITIC class, when the clitic is an adjunct as in sentence 6.15. They only differ in the polarities attached at node *nCompl*: in the former, there

are the polarized features  $\text{cat} \rightarrow \text{pp}$ ,  $\text{prep} \rightarrow \text{de}$  and  $\text{funct} \leftarrow \text{iobj}$ ; in the latter, there are the saturated features  $\text{cat} \leftrightarrow \text{pp}$ ,  $\text{prep} \leftrightarrow \text{de}$  and  $\text{funct} \leftrightarrow \text{mod}$ .

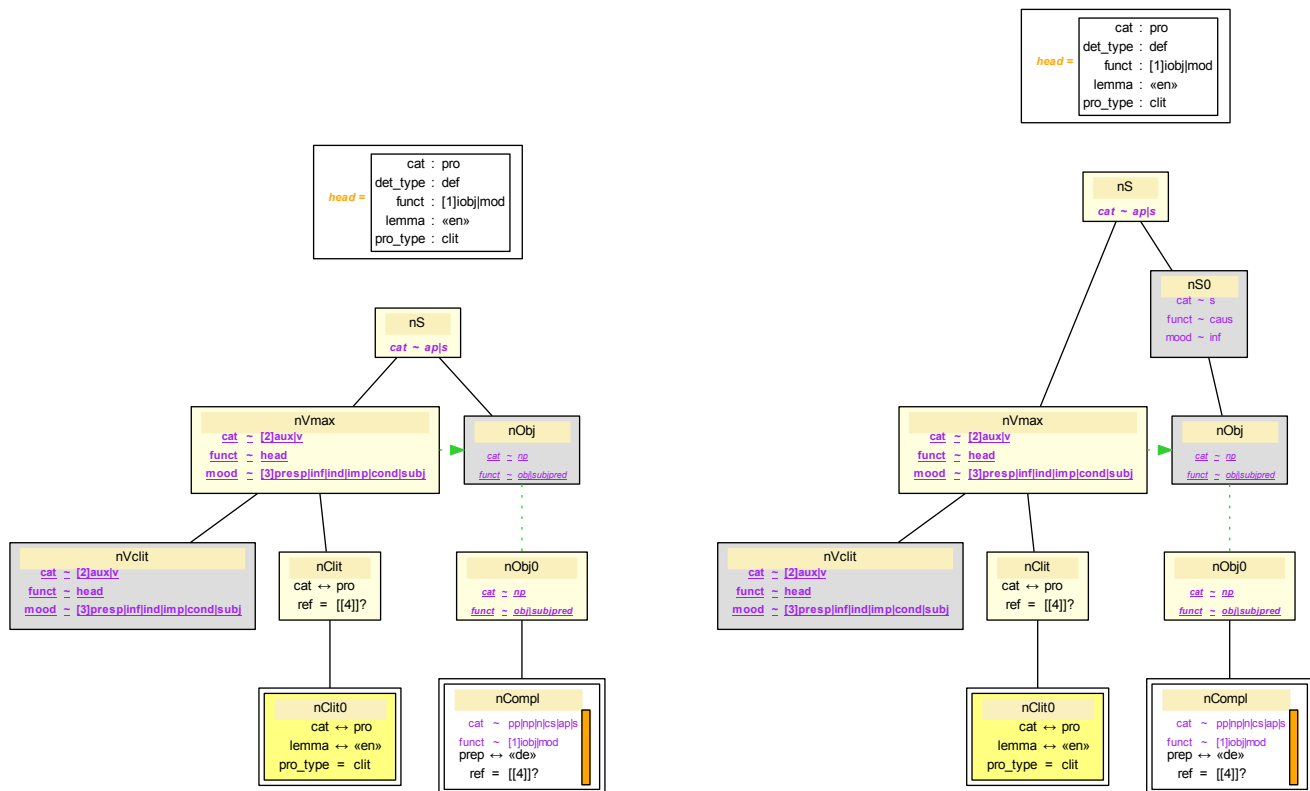


Figure 6.10: PTDs defined by the NOUNCOMPLEMENTCLITIC class

### 6.2.5 Position of clitic pronouns according to the type of the context clause

According to the type of the context clause (declarative, interrogative, imperative, negative), the clitic pronouns are put before or after the verb. Here are examples illustrating this phenomenon.

(6.18) *Jean y pense.*  
Jean it thinks.  
Jean thinks it.

(6.19) *Penses-y !*  
Think it !  
Think it !

(6.20) *N'y pense pas !*  
it think not !  
Do not think it !

(6.21) *Donne les lui !*  
Give them him !

Give him them !

The starting common class is the `COMPLCLITIC` class, which is a disjunction of the `NONREFLEXIVEREQUIREDVERBCOMPLEMENTCLITIC`, `REFLEXIVEREQUIREDVERBCOMPLEMENTCLITIC`, `ADJUNCTCLITIC`, `OBLIGATORYNOUNCOMPLCLITIC`, `OPTIONALNOUNCOMPLCLITIC`, `AFFIXCLITIC` and `EMPTYREFLEXIVECLITIC` classes. Then, the `COMPLCLITIC` class is specialized in three sub-classes:

- the `PROCLIT-COMPL-DECL-INTER` class for interrogative and declarative clauses, with the clitic pronoun before the verb, as in example 6.18,
- the `PROCLIT-COMPL-IMPER-POS` class for imperative positive clauses, with the clitic pronoun after the verb, as in example 6.19
- the `PROCLIT-COMPL-IMPER-NEG` class for imperative negative clauses, with the clitic pronoun before the verb, as in example 6.20.

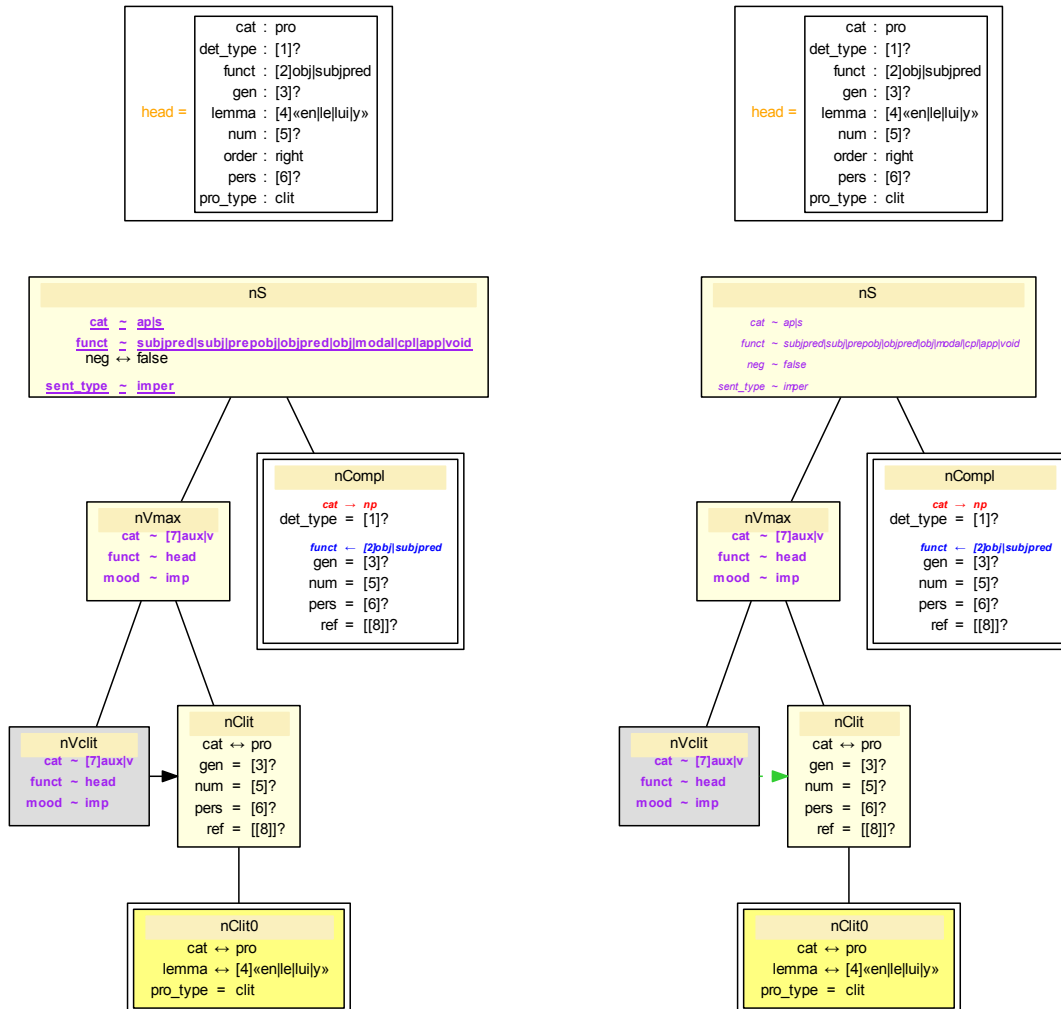


Figure 6.11: EPTDs defined by the `PROCLIT-COMPL-IMPER-POS` class

A difficulty arises in the second case when two clitics are present, as in sentence 6.21. Hence, the PROCLIT-COMPL-IMPER-POS class is more complicated. It distinguishes the PTD attached at the first clitic from the EPTD attached at the second clitic. Figure 6.11 shows an example for each case. Each clitic must verify the absence of a negation. The first one, represented with the left EPTD, add a saturated feature  $\text{neg} \leftrightarrow \text{false}$  to node  $nS$  representing the sentence headed by the cliticized verb. The second one, represented with the right EPTD, bring a virtual feature  $\text{neg} \sim \text{false}$ , which will be saturated by the feature brought by the EPTD of the first clitic.

When a verb is equipped with several clitics, their order is ignored by our grammar. Thus, it parses the wrong sentence *\*je lui le donne* in the same way as the acceptable sentence *je le lui donne*.

### 6.3 Standard lexical pronouns

The common skeleton for the EPTDs of lexical pronouns (by opposition to clitic pronouns) is defined by the PRONOUN class and shown on the left of figure 6.12. The ARGUMENTPRONOUN class is a refinement of the PRONOUN class for separated pronouns playing the role of an argument. Figure 6.12 shows the corresponding PTD on the right. The only difference with respect to the PRONOUN PTD lies in the addition of polarized features  $\text{cat} \rightarrow \text{np}$  and  $\text{funct} \leftarrow \text{app|cp1|obj|prepobj|subj|subjpred|void}$ .

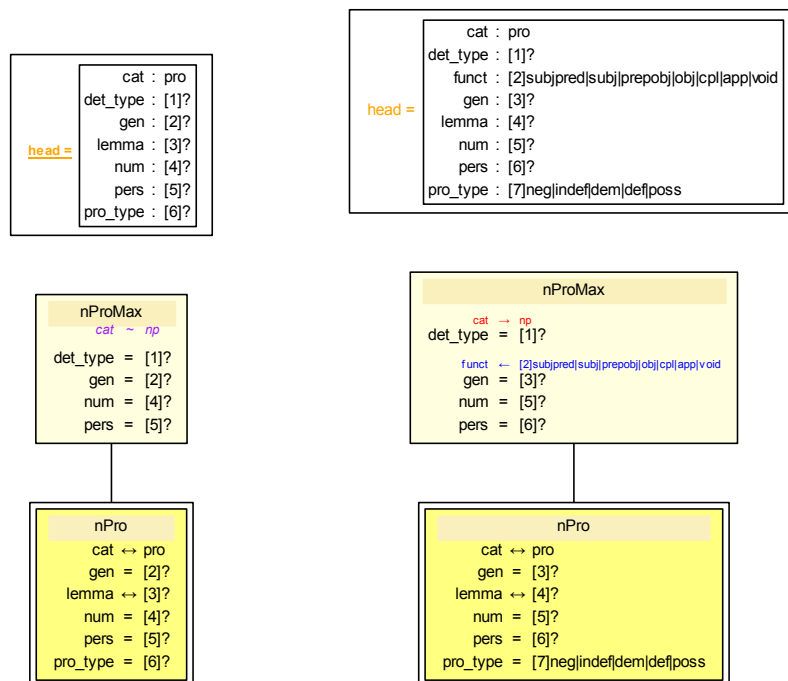


Figure 6.12: PTDs defined by the PRONOUN and ARGUMENTPRONOUN classes

Then, this class is specialized in seven terminal sub-classes:

- the PROPERs class dedicated to separated personal pronouns which are not reflexive,

- the PROREFL class dedicated to separated personal pronouns which are reflexive,
- the PRODEM class dedicated to demonstrative pronouns,
- the PROPOSS class dedicated to possessive pronouns,
- the PROINDEF class dedicated to indefinite pronouns,
- the PROMOD\_S1 class dedicated to indefinite pronouns used as sentence modifiers,
- the PRONEG class dedicated to negative pronouns.

The following examples illustrate the use of non reflexive personal pronouns.

(6.22) *Jean travaille pour lui.*

Jean works for himself.

Jean works for himself.

(6.23) *Jean ne connaît que lui.*

Jean knows only him.

Jean knows only him.

(6.24) *Lui et moi venons demain.*

He and me are coming tomorrow.

He and me are coming tomorrow.

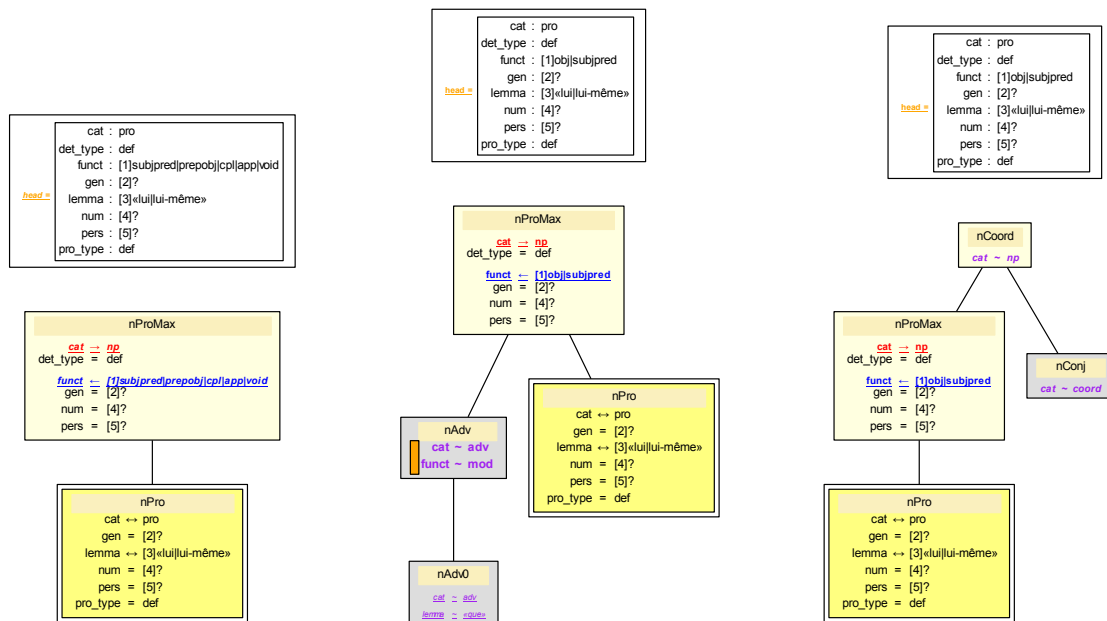


Figure 6.13: EPTDs defined by the PROPERS class

The PROPERS class takes the three cases illustrated with the three sentences above into account. Inheriting the ARGUMENTPRONOUN class, it defines three EPTDs presented on figure 6.13.

The first EPTD, illustrated with sentence 6.22, corresponds to the use of personal pronouns as noun phrases but with restricted functions. For instance, they cannot be used as direct objects of verbs.

The second EPTD, illustrated with sentence 6.23, corresponds to the use of personal pronouns as direct objects or predicate complements but modified with the adverb *que*.

The third EPTD, illustrated with sentence 6.24, corresponds to the use of personal pronouns as conjuncts in coordination of noun phrases.

Reflexive personal pronouns have similar constraints illustrated with the following examples.

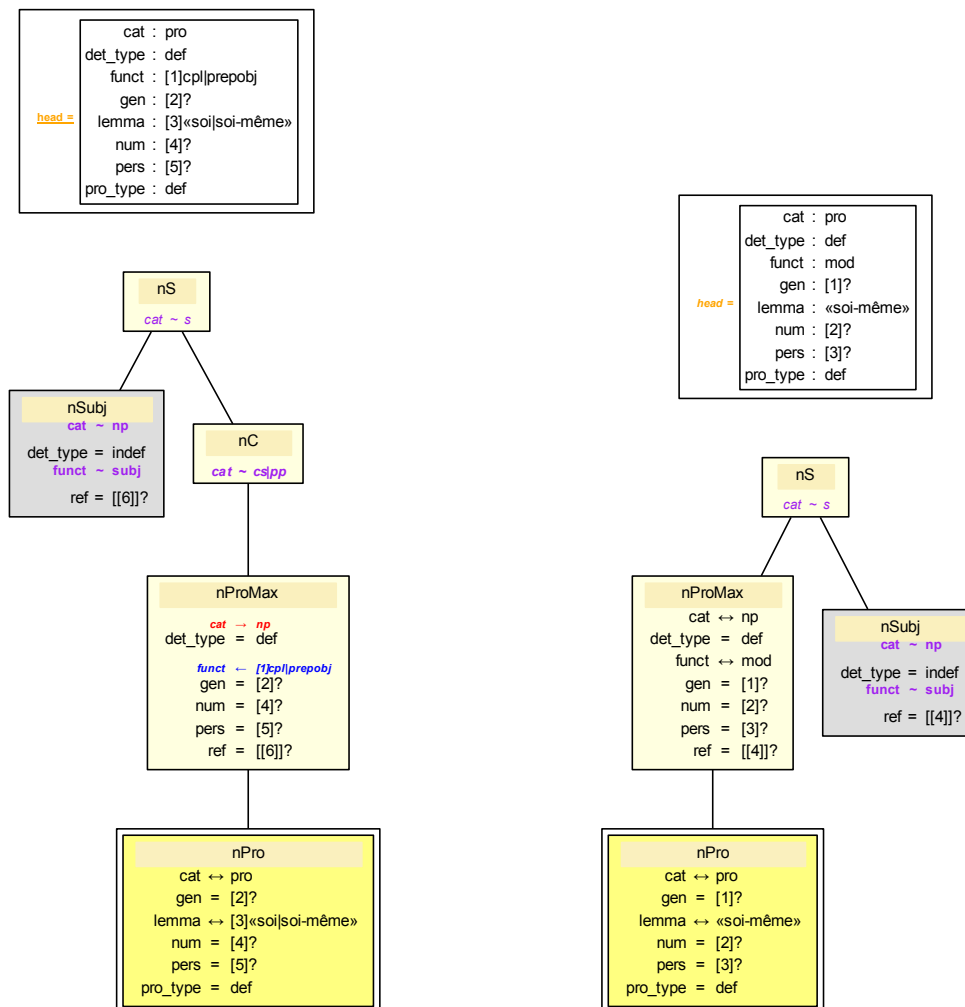


Figure 6.14: Two of the four EPTDs defined by the PROREFL class

- (6.25) *On travaille pour soi.*  
 One works for himself.  
 One works for himself.

(6.26) *On est toujours soi-même.*

One is always himself.

One is always himself.

(6.27) *On ne connaît bien que soi.*

One knows well only himself

One well knows only himself.

(6.28) *On peut le faire soi-même.*

One can it do himself

One can do it himself.

The PROREFL class is not exactly a specialization of the ARGUMENTPRONOUN class because the reflexive pronoun *soi-même* is not always used as an argument but sometimes it plays the role of a modifier as in sentence 6.28. Therefore, the PROREFL class directly inherits the PRONOUN class and it generates four EPTDs. Two of them are shown on figure 6.14. For both of them, node *nSubj* represents the subject of the clause which is the antecedent of the reflexive pronoun.

From the left to the right, they respectively correspond to sentences 6.25 and 6.28. In the right one, node *nProMax* has all its features saturated because the pronoun is a modifier of the sentence and not a required argument.

The PRODEM, PROPOSS and PROINDEF classes are just copies of the ARGUMENTPRONOUN class with addition of specific feature to the interface.

The PRONEG class concerns negative pronouns, as the following sentences illustrate it.

(6.29) *Jean ne peut arriver à voir personne.*

Jean can succeed to see nobody.

Jean cannot succeed in seeing somebody.

(6.30) *Jean ne travaille avec l'appui de personne.*

Jean works with the support of nobody.

Jean works with the support of nobody.

(6.31) **Nul** *ne le connaît.*

Nobody him knows.

Nobody knows him.

These examples show that the position of a negative pronoun with respect to the correlated particle *ne* is flexible, which is expressed in the PRONEG class related to negative pronouns. This class generates two EPTDs, shown on figure 6.15. Nodes *nS1* on the left EPTD and *nS* on the right EPTD represent the clause which is the scope of the negation : it has the verb carrying the particle *ne* as its head. There are two EPTDs because of the following alternative:

- The negative pronoun is in the same clause, which is expressed by the left EPTD and illustrated by sentences 6.30 and 6.31. It is more or deeply embedded in a noun or prepositional phrase, which is an immediate sub-constituent of the clause and represented with node *nArg*. Hence, there is an underspecified dominance relation from node *nArg* to node *nProMax*, which represents the maximal projection of the pronoun. For sentence 6.30, node *nArg* represents the phrase *avec l'appui de personne* and it strictly dominates node *nProMax*, which represents *personne*. For sentence 6.31, node *nArg* and node *nProMax* are merged to represent *nul*.

- The negative pronoun is in an infinitive, which is more or less deeply embedded in the scope clause. It is expressed by the right EPTD and illustrated by sentence 6.29. Node *nS1* represents the infinitive that is an immediate sub-constituent of the scope clause. For sentence 6.29, it corresponds to *arriver à voir personne*. Thus, there is an underspecified dominance relation from node *nS1* to node *nS0*, which represents the phrase *voir personne* in our example. Then, we have another dominance relation from node *nArg* to node *nProMax*, as in the other EPTD, but in example 6.29, the two nodes merge to represent *personne*.

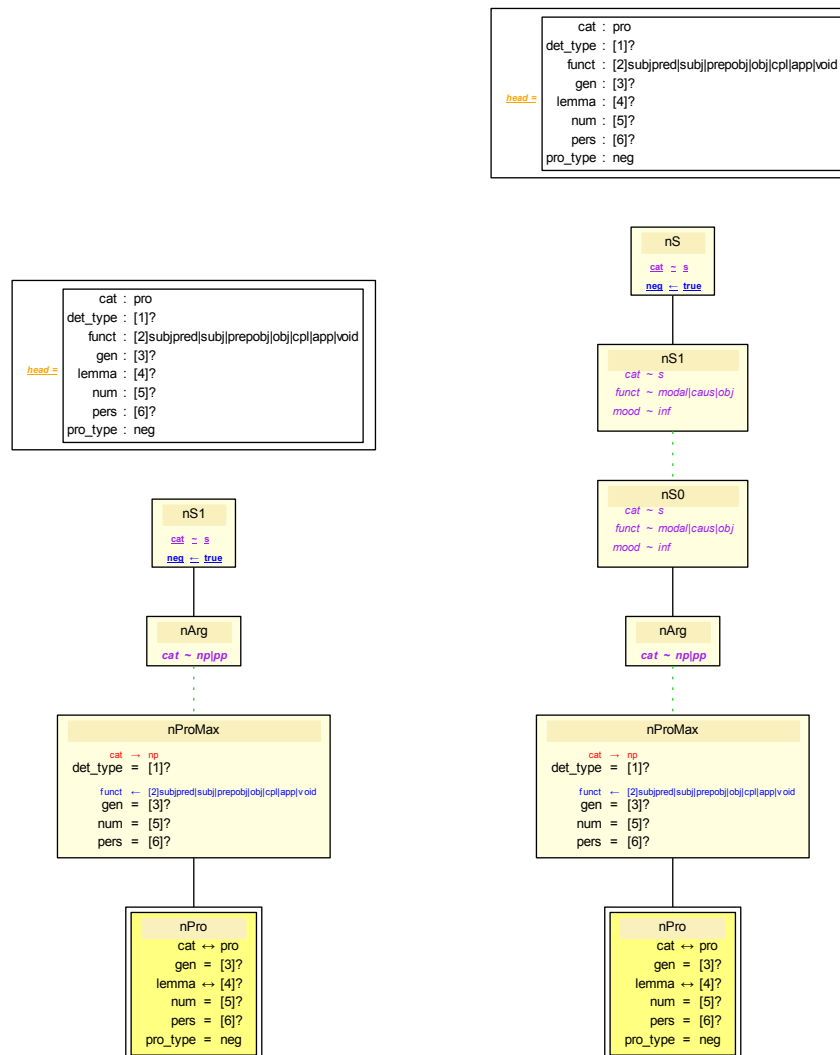


Figure 6.15: EPTDs defined by the PRONEG class

Another kind of indefinite pronouns have a specific behavior. They act as modifiers of sentences corefering with the subject of these sentences. Here are examples with such pronouns.

- (6.32) *Il fait tout lui-même.*  
He makes all himself.



He makes all himself.

(6.33) *Les étudiants s'apprécient les uns les autres.*

The students appreciate themselves each other.

The students appreciate themselves each other.

Some quantifier pronouns, like *tous* or *chacun*, have the same behaviour but in a more flexible way, because they may corefer with complements of the verb. They will be studied in the next section. The class defining the EPTD for indefinite pronouns acting as sentence modifiers, is `PROMOD_S1`. This EPTD is shown on figure 6.16.

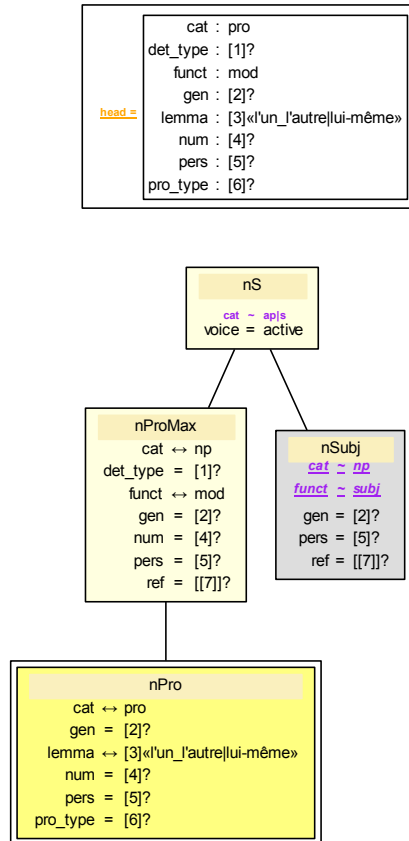


Figure 6.16: EPTD defined by the `PROMOD` class

Feature `ref` expresses that nodes *nProMax*, representing the maximal projection of the pronoun, and *nSubj*, representing the subject of the sentence or the adjectival phrase, co-refer to the same entity.

## 6.4 Quantifier pronouns

Quantifier pronouns, like *tous*, *tout*, *chacun*, *rien*, have a specific syntax, which requires specific classes. First, *tous*, *tout* and *rien* can behave as clitic pronouns, as the following examples show

it.

(6.34) *Jean n'a rien compris.*  
 Jean has nothing understood.  
 Jean has understood nothing.

(6.35) *Jean ne comprend rien.*  
 Jean understands nothing.  
 Jean understands nothing.

(6.36) *Jean a tout pu faire réaliser par son frère.*  
 Jean has all can made achieve by his brother.  
 Jean could have made all to be achieved by his brother.

(6.37) *Jean n'a pu rien faire réaliser par son frère.*  
 Jean has could nothing made achieve by his brother.  
 Jean could have made nothing to be achieved by his brother.

(6.38) *Jean a toutes pu les faire examiner par le médecin.*  
 Jean has all could them make examine by the doctor .  
 Jean could have made all of them to be examined by the doctor.

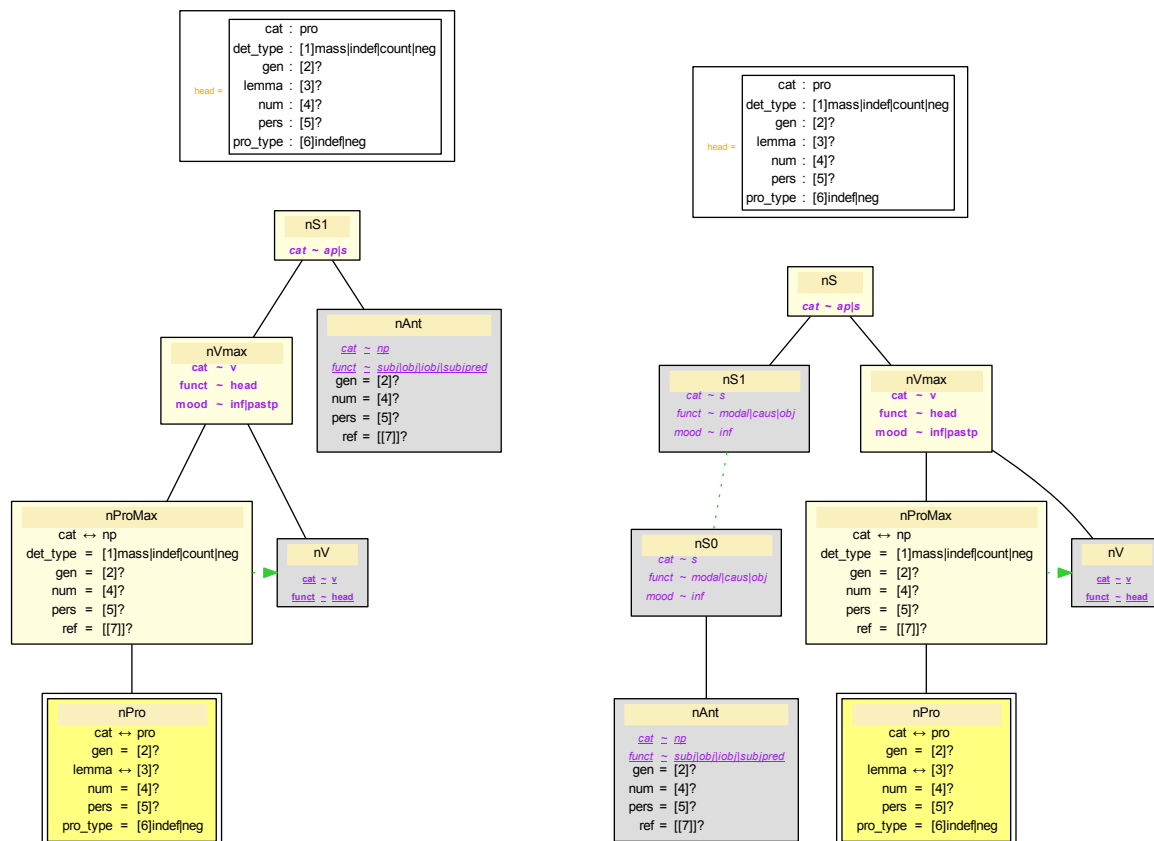


Figure 6.17: Two examples of PTDs defined by the CLITICQUANTIFIEDPRONOUN class

If sentence 6.35 does not justify the treatment of *rien* as a clitic, the position of the pronoun before the past participle in other sentences speaks in favor of this treatment.

The CLITICQUANTIFIEDPRONOUN class models this behavior and generates four PTDs because of the possible combination of two alternatives:

- if the mood of the verb is **pastp** (past participle) or **inf** (infinitive), the pronoun precedes the verb (all examples except 6.35); if not, the pronoun is put after the verb (sentence 6.35);
- in presence of a causative or modal auxiliary, the pronoun can rise to the auxiliary (sentences 6.36, 6.37 and 6.38).

Figure 6.17 shows the cases corresponding to the position of the pronoun before the verb. In both PTDs, the maximal projection of the pronoun, represented with node *nProMax*, adjoins a verb *nV* as a clitic to build node *nVmax* with him. Node *nProMax* co-refers to a node *Ant* with the help of a feature **ref**. The two nodes also share their agreement features and *nAnt* can have different functions given by feature **funct**.

The PTDs differ in the position of *Ant*.

- The left PTD represents the configuration without rising of the pronoun, illustrated with sentence 6.34. Node *nAnt* represents an argument of the verb that is cliticized with the pronoun.
- The right PTD represents the configuration with the rising of the pronoun to a causative or modal auxiliary and it is illustrated with sentences 6.36, 6.37 and 6.38. Here, node *nArg* is included in an infinitive represented with node *nS0*. This infinitive can be embedded more or less deeply in the clause, the head verb of which is cliticized with the pronoun. This is expressed with an underspecified dominance relation from node *nS1* over node *nS0*. Node *nS1* represents the infinitive which is an immediate sub-constituent of the main clause. For instance, in sentence 6.38, node *nS1* corresponds to *les faire examiner par le médecin* and node *nS0* to *examiner par le médecin*.

Then, the CLITICQUANTIFIEDPRONOUN class is divided in two more specific classes:

- The DIRECTCOMPLEMENTQUANTIFIEDPRONOUN class when the pronoun plays the role of an actual object for the verb, which is illustrated with sentences 6.34, 6.35, 6.36 and 6.37. In this case, node *nAnt* on figure 6.17 represents the empty trace of the complement in its canonical position and it carries the polarized features **cat** → **np** and **funct** ← **obj|subpred**.
- The PROQUANT-MOD\_V1 class, when the pronoun plays the role of a verb modifier, which is illustrated with sentence 6.38. It only applies to the pronoun *tous* and *chacun*. In this case, the pronoun co-refers with the subject or the object of the verb. In sentence 6.38, it co-refers with the object.

The DIRECTCOMPLEMENTQUANTIFIEDPRONOUN class itself is specialized in two sub-classes PROTOUT\_V1 and PRORIEN\_V1. The first one is dedicated to the *tout* pronoun and it is just a copy of the DIRECTCOMPLEMENTQUANTIFIEDPRONOUN class.

The second one is dedicated to the *rien* pronoun. It is more complicated because it must express the link with the *ne* particle under the form of the feature **neg** ← **true**, which is attached to the clause that is the scope of the negation.

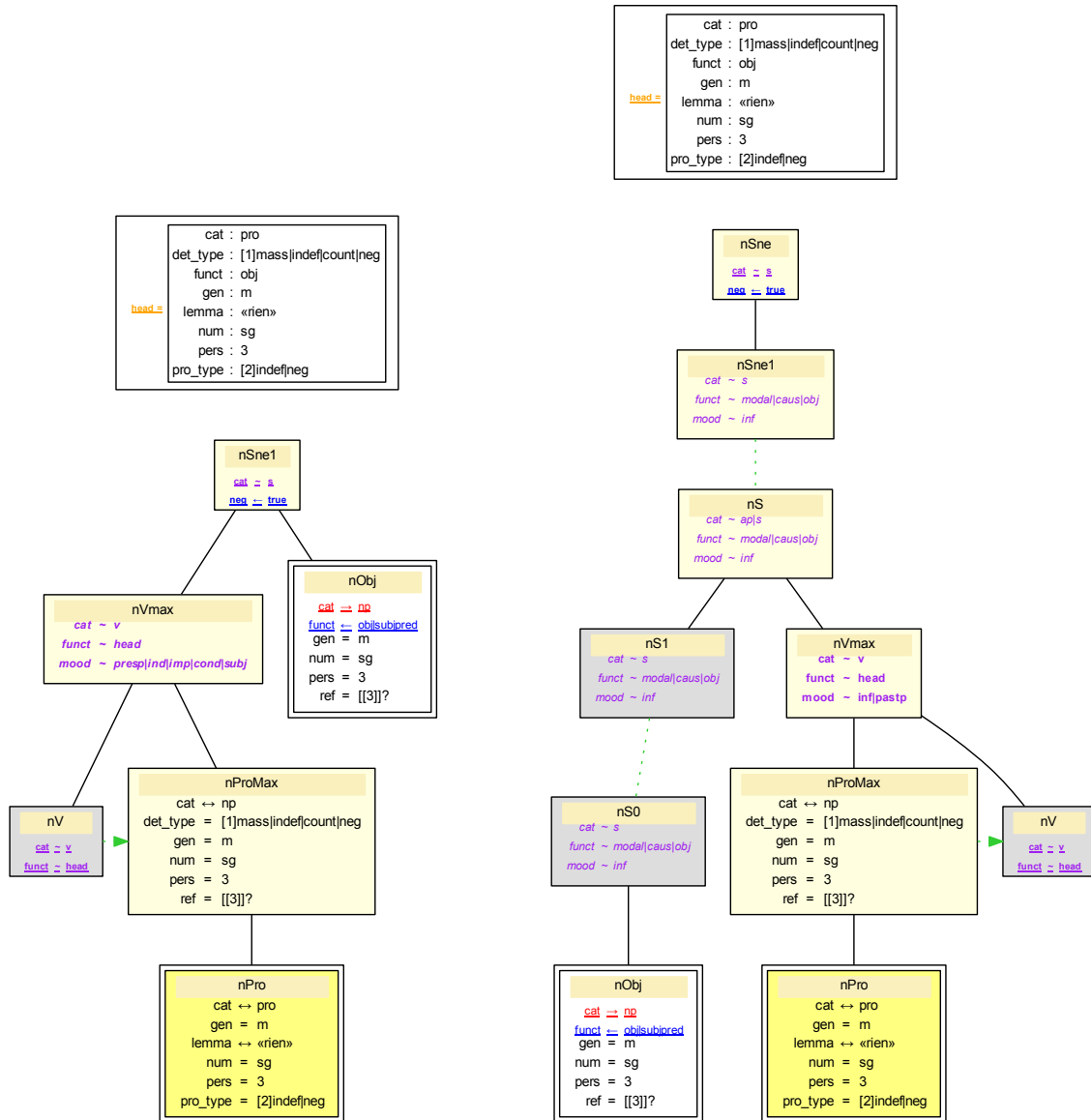


Figure 6.18: Two examples of EPTDs defined by the PRORIEN\_V1 class

So three levels can be distinguished, from the most to the less external: the scope of the negation, the scope of the cliticized verb and the scope of the verb that has the pronoun as its argument. The three levels can be distinct and all cases still combine with the two possibilities for the position of the pronoun with respect to the verb it cliticizes. Hence, the class generates eight EPTDs. Figure 6.18 shows two of these EPTDs illustrated with sentences 6.34 and 6.37. On the right EPTD, nodes *nSne*, *nSne1*, *nS*, *nS1* *nS0* represent the following levels illustrated with the following phrases in example 6.38:

- *nSne* for the scope of the negation: *Jean n' a pu rien faire réaliser par son frère,*

- *nSne1* for the infinitive that is an immediate sub-constituent: *rien faire réaliser par son frère*,
- *nS* for the scope of the verb cliticized with quantifier pronoun: *rien faire réaliser par son frère*,
- *nS1* for the infinitive that is an immediate sub-constituent: *réaliser par son frère*,
- *nS0* the scope of the verb that has the quantifier pronoun as a complement: *réaliser par son frère*.

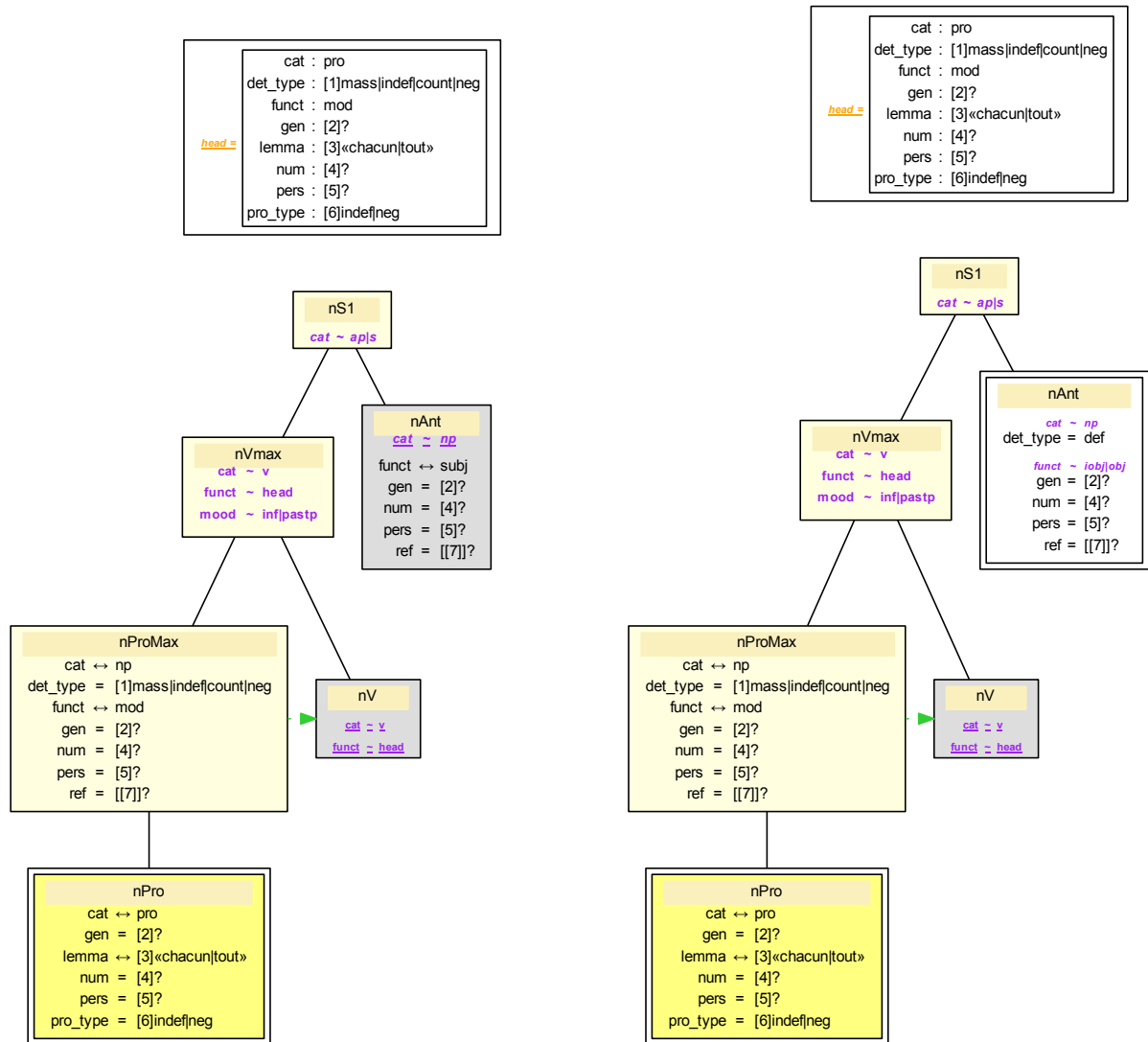


Figure 6.19: EPTDs defined by the PROQUANT-MOD\_S1 class

The pronouns *chacun* and *tout* behaves as sentences modifiers in a similar way as pronouns attached at class PROMOD\_S1. Nevertheless, their use is more flexible because they can co-refer

with complements but only if these complements are clitic or relative pronouns. So, sentence 6.42 is grammatical because *tous* co-refers with *leur* but sentence 6.43 is ungrammatical because *tous* co-refers with *aux enfants*. When the co-referring expression is a subject, there is no such restriction, as example 6.39 shows it.

(6.39) *Les enfants ont chacun mangé une pomme.*

The children have each one eaten an apple.

The children have each one eaten an apple.

(6.40) *Ils ont mangé chacun une pomme.*

They have eaten each one an apple.

They have each one eaten an apple.

(6.41) *Ils ont mangé une pomme chacun.*

They have eaten an apple each one.

They have each one eaten an apple.

(6.42) *Jean leur a tous donné une pomme.*

Jean them has all given an apple.

Jean has given an apple to all of them.

(6.43) \**Jean a tous donné une pomme aux enfants.*

Jean has all given an apple to the children.

Jean has given an apple to all of the children.

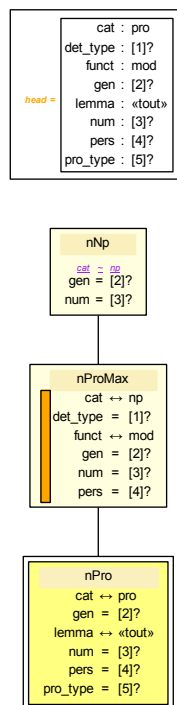


Figure 6.20: EPTDs defined by the PROSURDET\_NP1 class

The PROQUANT-MOD\_S1 class models this behavior, defining eight EPTDs. Figure 6.19 shows the simplest cases:

- the left EPTD corresponds to the case that the co-referring expression is a subject and it is illustrated with sentences 6.39, 6.40 and 6.41;
- the right EPTD corresponds to the case that the co-referring expression is a complement and it is illustrated with sentence 6.42; as we can see, node *nAnt* representing the trace of this expression is empty.

Finally, the pronoun *tout* with all its inflected forms behave as a sur-determiner, as the following example illustrates it.

- (6.44) *L'ingénieur accepte toutes les propositions.*  
 The engineer accepts all the proposals.  
 The engineer accepts all proposals.

This particular behavior is modeled with the PROSURDET\_NP1 class, which defines the EPTD of figure 6.20.

## 6.5 Pronouns requiring complements

Some demonstrative and indefinite pronouns require prepositional or clausal complements.

### 6.5.1 Demonstrative and indefinite pronouns with prepositional complements

Demonstrative pronouns, like *celui*, and indefinite pronouns, like *aucun*, *quelqu'un* *quelques-uns* require a partitive nominal complement introduced with a partitive preposition *de*, *d'entre* or *parmi* as the following sentences illustrate it.

- (6.45) **Celui** *de Paris* vient *aujourd'hui*.  
 That from Paris is coming today.  
 That from Paris is coming today.
- (6.46) *Je préfère celui de laine.*  
 I prefer that with wool  
 I prefer that with wool.
- (6.47) **Quelques-uns** *d'entre mes amis* seront présents.  
 Someones among my friends will be present.  
 Someones among my friends will be present.
- (6.48) **Aucun** *de mes amis* ne sera présent.  
 Nobody of my friends will be present.  
 Nobody of my friends will be present.
- (6.49) *Je veux quelque chose de facile.*  
 I want something of easy.  
 I want something easy.

- (6.50) **Personne** *de sensé ne peut croire cela.*  
 Nobody of sensible can believe that.  
 No sensible person can believe that.

When the complement is nominal as in the four first examples, the behavior of the pronouns is modelled with the PRO\_PP1 class. When it is adjectival as in the two examples, it is modelled with PRO\_PS1 class.

The PRO\_PP1 class generates eight EPTDs, two for demonstrative pronouns, two for positive indefinite pronouns and four for negative indefinite pronouns. The EPTDs for demonstrative pronouns are shown on figure 6.21. The only difference between these EPTDs lies in feature `det_type` of node *PrepObj*, the complement introduced with *de*: when the complement is a complete noun phrase as in sentence 6.45, it has the value `count|def|dem|indef|neg|poss|super`; when the complement is a common noun as in sentence 6.46, it has the value `voiddet`. The value of the `iobj1.cat` in the interface is consistent with the value of `det_type`.

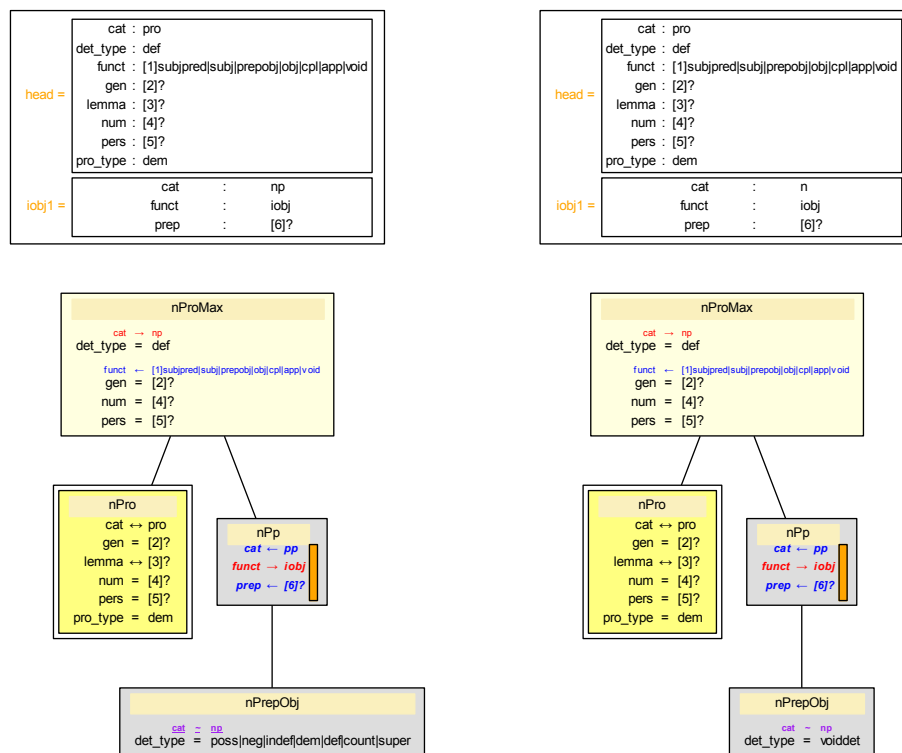


Figure 6.21: EPTDs defined by the PRO\_PP1 class for demonstrative pronouns

The PRO\_PS1 concerns indefinite pronouns taking an adjectival complement as in sentences 6.49 and 6.50. It generates three EPTDs, one for positive indefinite pronouns and two for negative indefinite pronouns. Figure 6.22 shows the EPTD associated with positive indefinite pronouns as example 6.49 illustrates it.



### 6.5.2 Demonstrative pronouns with clausal complements

The demonstrative pronouns *ce* and *celui* with all its inflected forms have a very specific behavior illustrated with the following sentences.

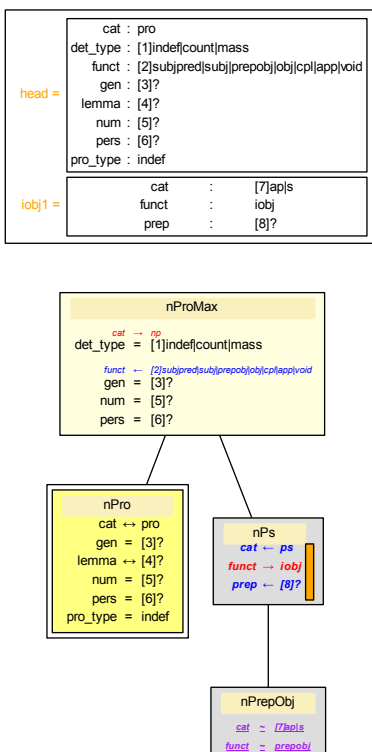


Figure 6.22: EPTD defined by the PRO\_PS1 class for positive indefinite pronouns

- (6.51) *Jean connaît celui qui vient.*  
 Jean knows that one who is coming.  
 Jean knows that one who is coming.
- (6.52) *Marie croit à ce que dit Jean.*  
 Marie believes in that what says Jean.  
 Marie believes in what Jean says.
- (6.53) *Marie sait ce pour quoi Jean vient.*  
 Marie knows that for which Jean comes.  
 Marie knows that for which Jean comes.
- (6.54) *Jean s'attend à ce que Marie vienne aujourd'hui.*  
 Jean expects that that Marie come today.  
 Jean expects that Marie comes today.
- (6.55) *Cà ne m'arrange pas de vous recevoir.*  
 That does not arrange me to you receive.

That does not arrange me to receive you.

(6.56) *Je trouve cela dommage que Jean ne vienne pas.*

I find that a pity that Jean does not come.

I find that is a pity that Jean does not come.

As the three first sentences show it, they can require a relative clause, which is modeled with the `PRODEM_S1REL` class, which generates the EPTD shown on the left of figure 6.23. Node *nS* represents the relative clause that is expected. Node *nProMax* represents the maximal projection of the demonstrative pronoun with the relative clause as a modifier and it behaves as any noun phrase.

Moreover, *ce* can be used with a clause introduced with the complementizer *que*, as sentence 6.54 illustrates it. This is represented with the `PROCE_CS1FIN` class. The class generates the EPTD shown on the right of figure 6.23. Contrary to the previous case, the maximal projection *nProMax* cannot be used as any noun phrase but it must be the object of prepositional phrase represented with node *nPp*.

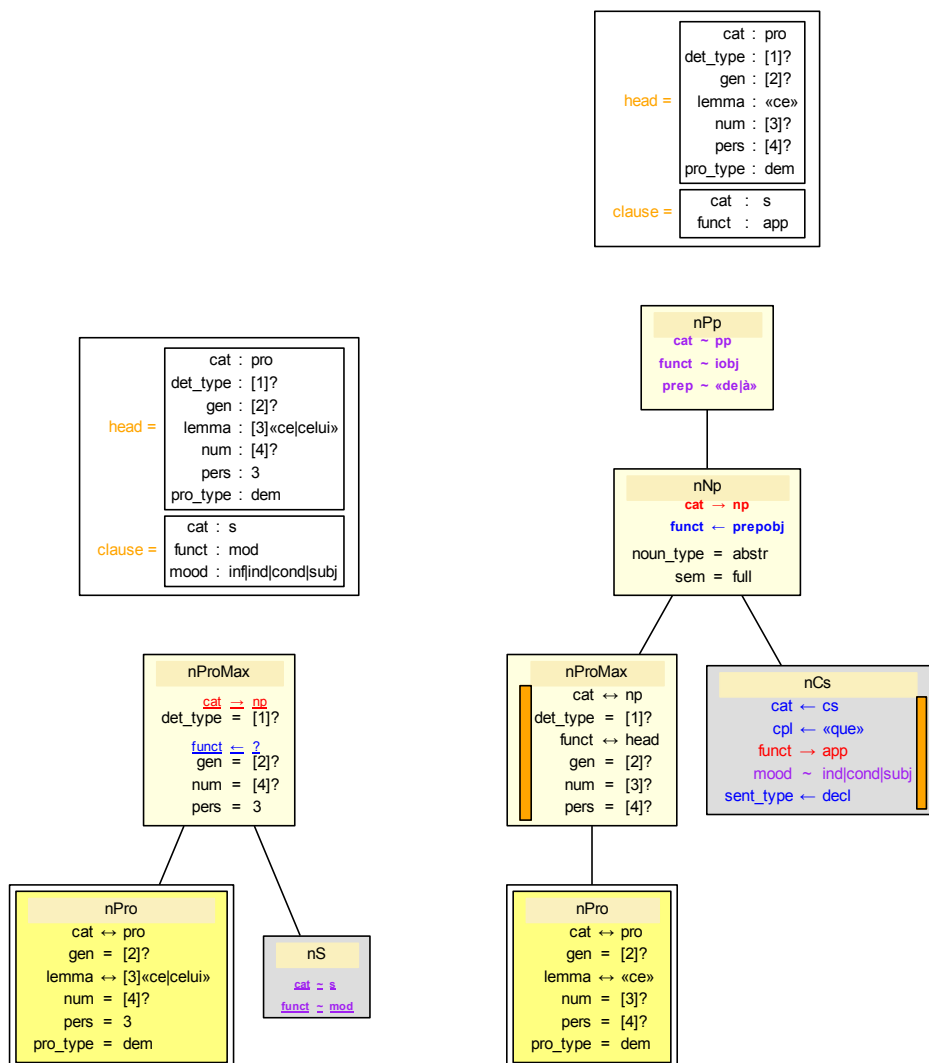


Figure 6.23: The EPTDs defined by the PRODEM\_S1REL and PROCE\_CS1FIN classes

Examples 6.55 and 6.56 illustrate a particular property of some demonstrative pronouns : they can be the subject or the object of a verb to represent a finite or infinitive clause dislocated after the head verb. The PRODEM\_CS1APP class models this phenomenon and it defines the EPTD given by figure 6.24.

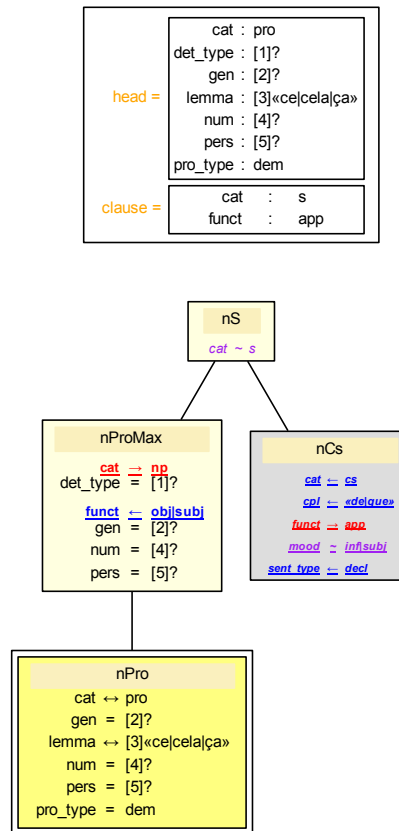


Figure 6.24: The EPTD defined by the PRODEM\_CS1APP class



# Chapter 7

## Adjectives

The classes anchored with adjectives are gathered in the ADJECTIVE module.

### 7.1 Interfaces with the lexicon

Adjectives are characterized in the interface with the feature `head.cat = adj`. Their properties are described with the following sub-features of the `head` feature :

- **funct**: it describes the possible syntactic functions among `mod`, `obj`, `objpred`, `prepobj`, `subjpred`;
- **gen**: it indicates the gender of the adjective with the values `f` and `m`;
- **num**: it gives the number of the adjective, `pl` (plural) or `sg` (singular);
- **order**: when the adjective is attributive, it gives its position with respect to the noun it modifies : `left` or `right`.

Some adjectives require complements, which expressed with features `iobj1`, `iobj2`, according to the number of these complements. The complements are described with the following sub-features of `iobj1`, `iobj2`:

- **cat**: it indicates the category of the complement: `n` (common noun), `np` (noun phrase) or `s` (sentence);
- **control**: when an adjective takes an infinitive as complement, it indicates the function of argument of the infinitive that is controlled by the subject of the adjective: `obj` (for instance *facile*) or `subj` (for instance *lent*);
- **mood**: when the complement is a clause, it gives the mood of the clause , `inf` (infinitive) or `subj` (subjunctive).
- **prep**: it gives the preposition introducing the complement.

### 7.2 The attributive and predicate functions of adjectives

Adjectives mainly occur in two syntactic constructions: attributive (example 7.8) and predicate (example 7.2).

(7.1) *Marie est une femme heureuse.*  
 Marie is a woman happy  
 'Marie is a happy woman'

(7.2) *Marie est heureuse de vivre.*  
 Marie is happy to live  
 'Marie is happy to live'

### 7.2.1 Predicate adjectives as complement versus head of clauses

In the predicate construction, an adjective is composed with a verb, which can be interpreted in two manners: the adjective is the head of a clause and the verb (most times the copula) is considered as an auxiliary; or the adjective is a complement of the verb with an attributive function (with respect to the subject or the object of the verb). The first interpretation is justified by some redistributions in the sentence governed by the adjective like in the following examples.

(7.3) *Que Marie dorme est heureuse.*  
 that Marie sleeps is happy  
 'it is happy that Marie sleeps'

(7.4) *Il est heureux que Marie dorme.*  
 it is happy that Marie sleeps  
 'it is happy that Marie sleeps'

At the opposite, possible extractions, as the following examples illustrate it, lead us to consider adjectives composed with a verb as a complement of this verb.

(7.5) *Marie apparaît heureuse de vivre.*  
 Marie looks happy to live.  
 'Marie looks happy to live.'

(7.6) *Comment Marie apparaît-elle ?*  
 how Mary does-she-look ?  
 'how does Mary look ?'

(7.7) *Heureuse de vivre, Marie l'est.*  
 Happy to live, Marie is.  
 'Mary is happy to live.'

We have chosen to consider predicate adjectives as complements of the verb to which they refer and in this case, they build an adjectival phrase with their own complements. So in example 7.5, *heureuse de vivre* is taken as an adjectival phrase complement of the verb *apparaît*.

### 7.2.2 Left attributive adjectives versus right attributive adjectives

In the attributive construction, adjectives modify common nouns but they do not have the same syntactic properties when they are before the noun they modify (left adjectives) as after the noun (right adjectives).

(7.8) *Marie est une femme heureuse de vivre.*  
 Marie is a woman happy to live  
 'Marie is a woman happy to live.'

(7.9) *Marie attend un heureux évènement.*

Marie is waiting for an happy event.

'Marie is waiting for an happy event.'

(7.10) \**Marie est une heureuse de vivre femme.*

Marie is a happy to live woman

'Marie is a woman happy to live.'

The two first examples show that the same adjective has not the same meaning when it is in left position and when it is in right position but this remark is relevant to semantics, which goes beyond our purpose. From a syntactic point of view, example 7.10 illustrates the fact that attributive adjectives with complements are always right adjectives. Hence, we represent the syntax of left adjectives differently from right adjectives.

As we will see later, left adjectives combine with the common nouns they modify to build a constituent with the type common noun. Right adjectives build adjectival phrases with their complements and these adjectival phrases combine with the common noun they modify and possibly a determiner to build a noun phrase.

### 7.2.3 Modeling left attributive adjectives

After this preliminary linguistic discussion, let us enter the modeling of adjectives with IG.

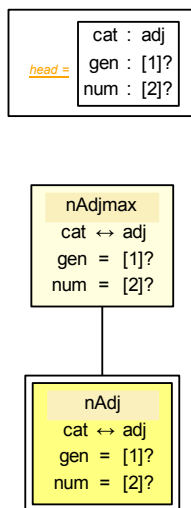


Figure 7.1: PTD defined by the ADJECTIVE class

A basic class ADJECTIVE expresses the common syntactic properties of all adjectives. It defines the PTD given by figure 7.1. In this PTD, the anchor node *nAdj* represents the bare adjective. Its mother node *nAdjmax* represents the adjectival kernel constituted of the adjective with its possible modifiers.

The LEFTATTRIBUTIVE class is dedicated to left attributive constructions is *Attributive*. It inherits the ADJECTIVE class and it defines one PTD shown on the left of figure 7.2. Node *nN*



represents the noun modified by the adjective and the mother node *nNmax* represents the noun with its left modifiers.

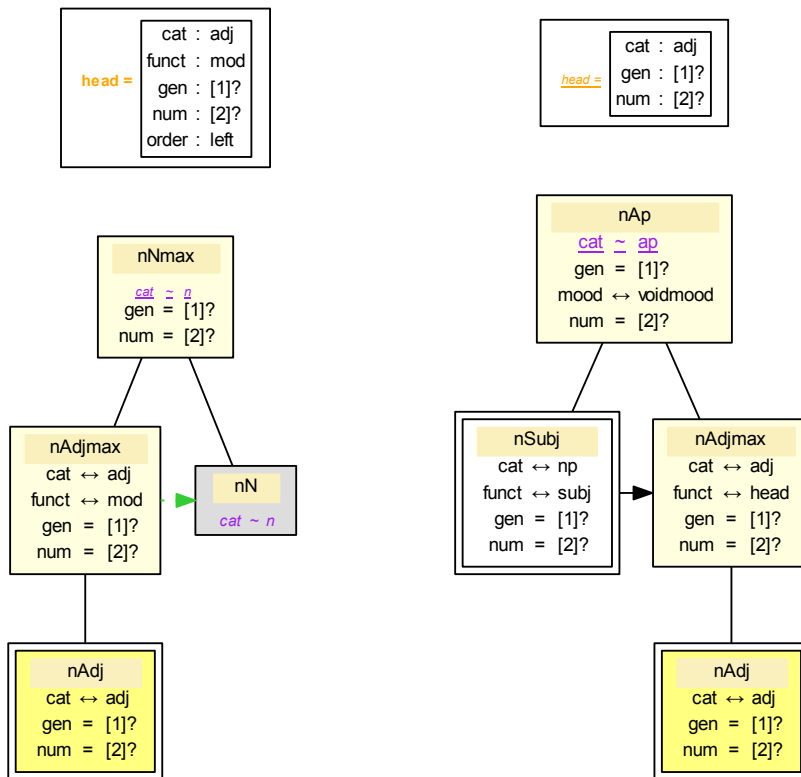


Figure 7.2: PTD defined by the LEFTATTRIBUTIVE and ADJECTIVALPHRASE0 classes

### 7.2.4 Modeling right attributive and predicate adjectives

A common class ADJECTIVALPHRASE0 represents the construction of adjectives as heads of adjectival phrases; which concerns both right attributive and predicate adjectives. This class inherits the ADJECTIVE class and it defines the PTD shown on the right of figure 7.2.

In this PTD, node *nAp* represents the adjectival phrase, which has the adjective as its head, which is expressed with the saturated feature *funct* ↔ *head*. Like a sentence, an adjectival phrase has a subject represented with node *nSubj*. This node is empty and it agrees in number and gender with the adjective, which is expressed with value sharing between *gen* and *num* features.

The ADJECTIVALPHRASE0 is specialized in two classes: RIGHTATTRIBUTIVE for right attributive adjectives and PREDICATEADJECTIVE for predicate adjectives. The first one defines two EPTDs corresponding to two different uses of common nouns : heads of noun phrases or predicate complements. The following examples illustrate the two cases.

- (7.11) *Jean est un ingénieur intelligent.*  
 Jean is a engineer clever.  
 'Jean is a clever engineer'

(7.12) *Jean est sapeur-pompier volontaire.*  
 Jean is firefighter volunteer.  
 'Jean is a volunteer firefighter.'

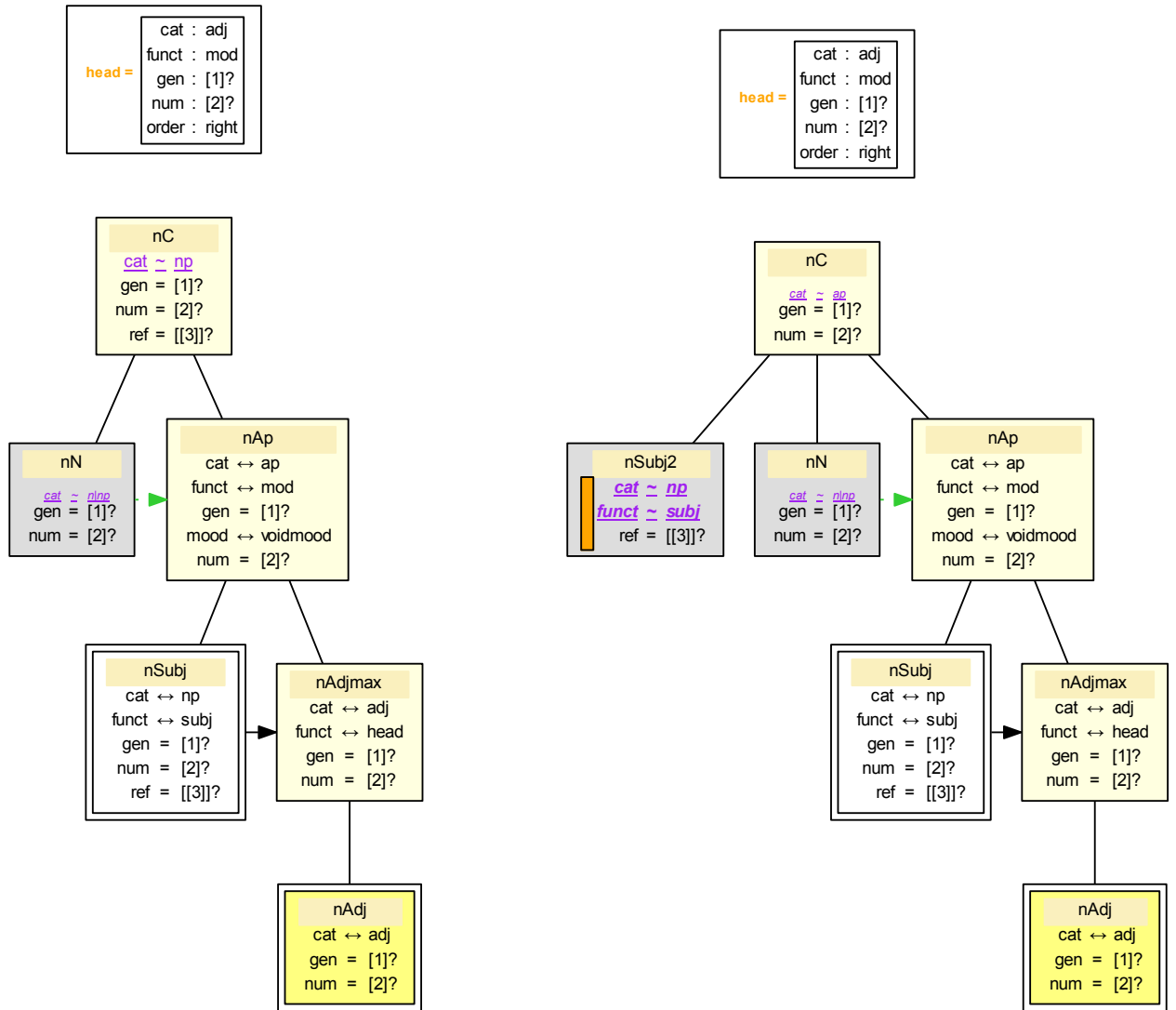


Figure 7.3: PTDs defined by the RIGHTATTRIBUTIVE class

The two EPTDs defined by the RIGHTATTRIBUTIVE class are shown on figure 7.3. Both have a node *nN* representing the common noun modified by the adjective. This node is combined with the adjectival phrase node *nAp* to build its maximal projection *nC*. Then, the EPTDs differ in the function of *nC*:

- in the left EPTD, *nC* represents a noun phrase, the noun phrase *un ingénieur intelligent* in example 7.11;

- in the right EPTD,  $nC$  represents an adjectival phrase, the adjectival phrase *sapeur-pompier volontaire* in example 7.12; as all adjectival phrases, it has a subject represented with node  $nSubj2$  and this subject co-refers with the subject  $nSubj$  of the adjectival phrase having the adjective as its head, *volontaire* in our example.

The PREDICATEADJECTIVE class models the use of adjectives as predicate complements. It inherits the ADJECTIVALPHRASE0 class. The only enrichment with respect to the PTD presented on the right of figure 7.2 is the addition to node  $nAp$  of the polarized features  $cat \rightarrow ap$  and  $funct \leftarrow cpl|mod|obj|objpred|prepobj|subjpred|void$ . The value of  $funct$  represents the different possible functions of the adjectival phrase.

The RIGHTATTRIBUTIVE and PREDICATEADJECTIVE classes are gathered in a disjunction ADJECTIVALPHRASE because they concern all adjectives that are able to receive complements, contrary to the LEFTATTRIBUTIVE class.

### 7.3 Transfer to other categories

Some adjectives in some contexts behave as adverbs or sentences, as the following examples show it.

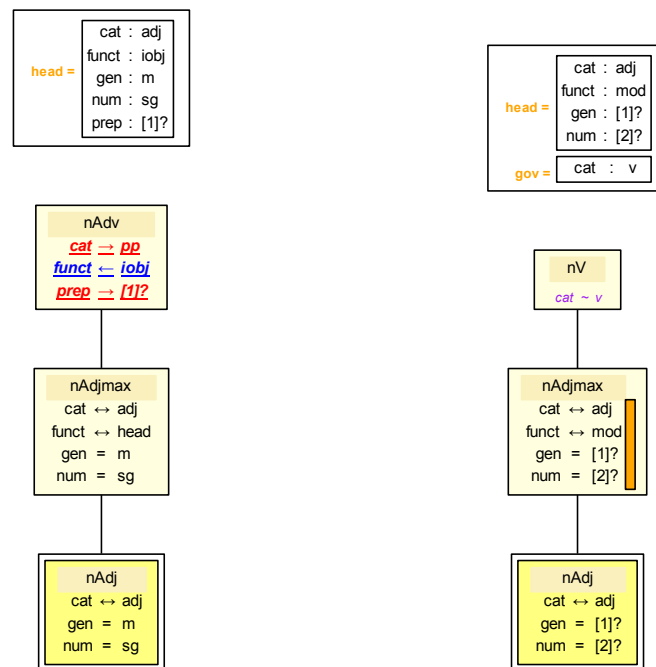


Figure 7.4: EPTDs defined by the ADJADV class

- (7.13) *Jean parle fort.*  
 Jean speaks loud.  
 'Jean speaks loud.'

(7.14) *Jean est monté **haut** sur la montagne.*  
 Jean has climbed high on the mountain.  
 'Jean has climbed high on the mountain.'

(7.15) *Mince !*  
 Damn !  
 'Damn !'

In examples 7.13 and 7.14, the adjectives behave as adverbs but in the first example, the adverb is considered as a complement required by the verb, whereas in the second example, it is a modifier of the verb. Hence, the ADJADV class defines two EPTDs shown on figure 7.4. The left EPTD corresponds to the use of the adjective as a required complement. As a consequence, its maximal projection *nAdv* carries three polarized features  $cat \rightarrow pp$ ,  $funct \leftarrow iobj$  and  $prep \rightarrow ?$ . In this way, the complement is considered in a uniform way as an indirect object prepositional phrase, like in the sentence *Jean parle d'une voix forte*.

The right EPTD represents a modifier of a verb. Node *nV* represents the verb after modification by the adjective and the adjective is the rightmost daughter of this node.

Example 7.15 illustrates that some adjectives can be used as the head of exclamative sentences without verb. This phenomenon is modeled with the ADJSENT class and this class generates the EPTD of figure 7.5.

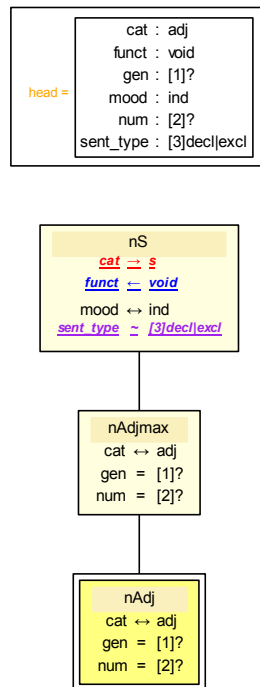


Figure 7.5: EPTD defined by the ADJSENT class

## 7.4 Adjectives requiring complements

Like verbs, adjectives are sorted according to their valence. Here are examples illustrating the various valences of adjectives.

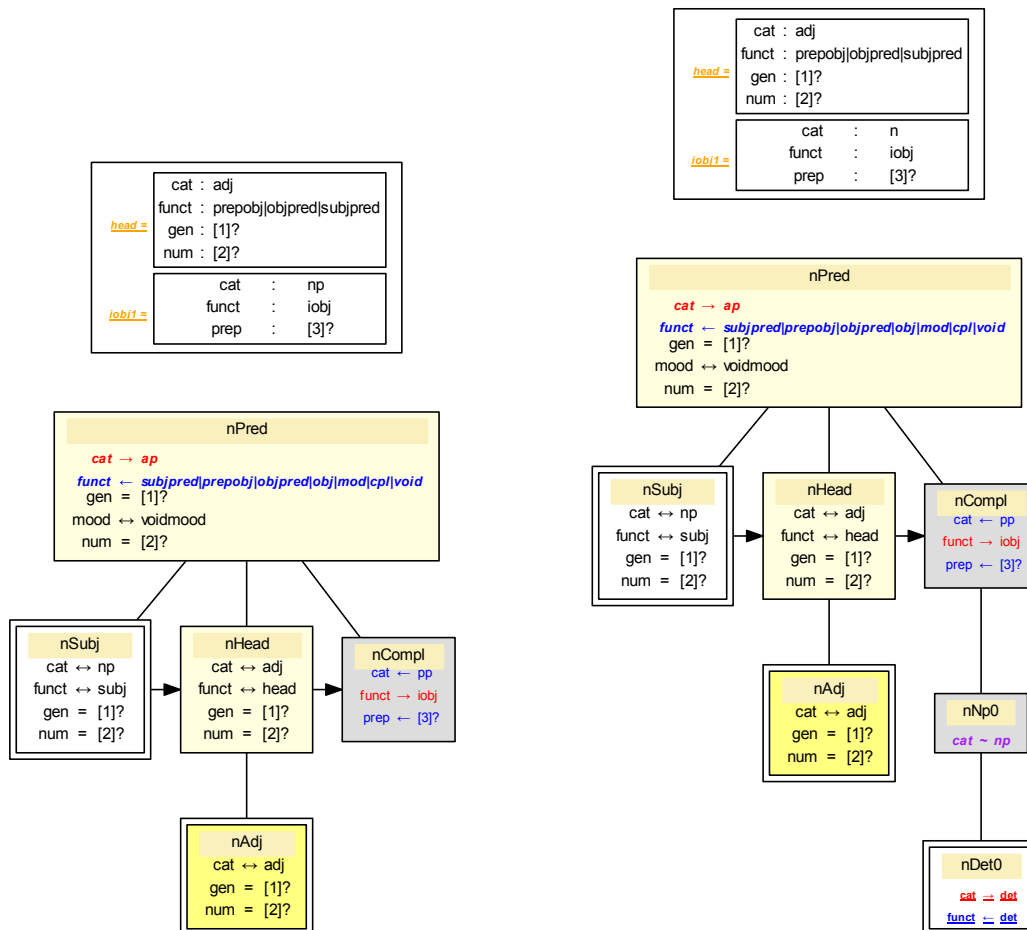


Figure 7.6: EPTDs defined by the ADJ\_PP1 class

- (7.16) *Jean est intelligent.*  
 Jean is clever.  
 'Jean is clever.'
- (7.17) *Jean est doué pour la cuisine.*  
 Jean is gifted in cooking.  
 'Jean is gifted in cooking.'
- (7.18) *Cette situation est difficile à comprendre.*  
 That situation is difficult to understand.  
 'That situation is difficult to understand.'

(7.19) *Jean est lent à comprendre.*  
 Jean is slow-witted in understanding.  
 'Jean is slow-witted in understanding.'

(7.20) *Jean est jaloux que Marie travaille.*  
 Jean is jealous that Marie works.  
 'Jean is jealous that Marie works.'

(7.21) *Jean est tel que je l'ai toujours connu.*  
 Jean is such as I him always knew.  
 'Jean is such as I always knew him.'

(7.22) *La chaleur est telle que cela devient insupportable.*  
 The heat is such that it becomes unbearable.  
 'The heat is such that it becomes unbearable.'

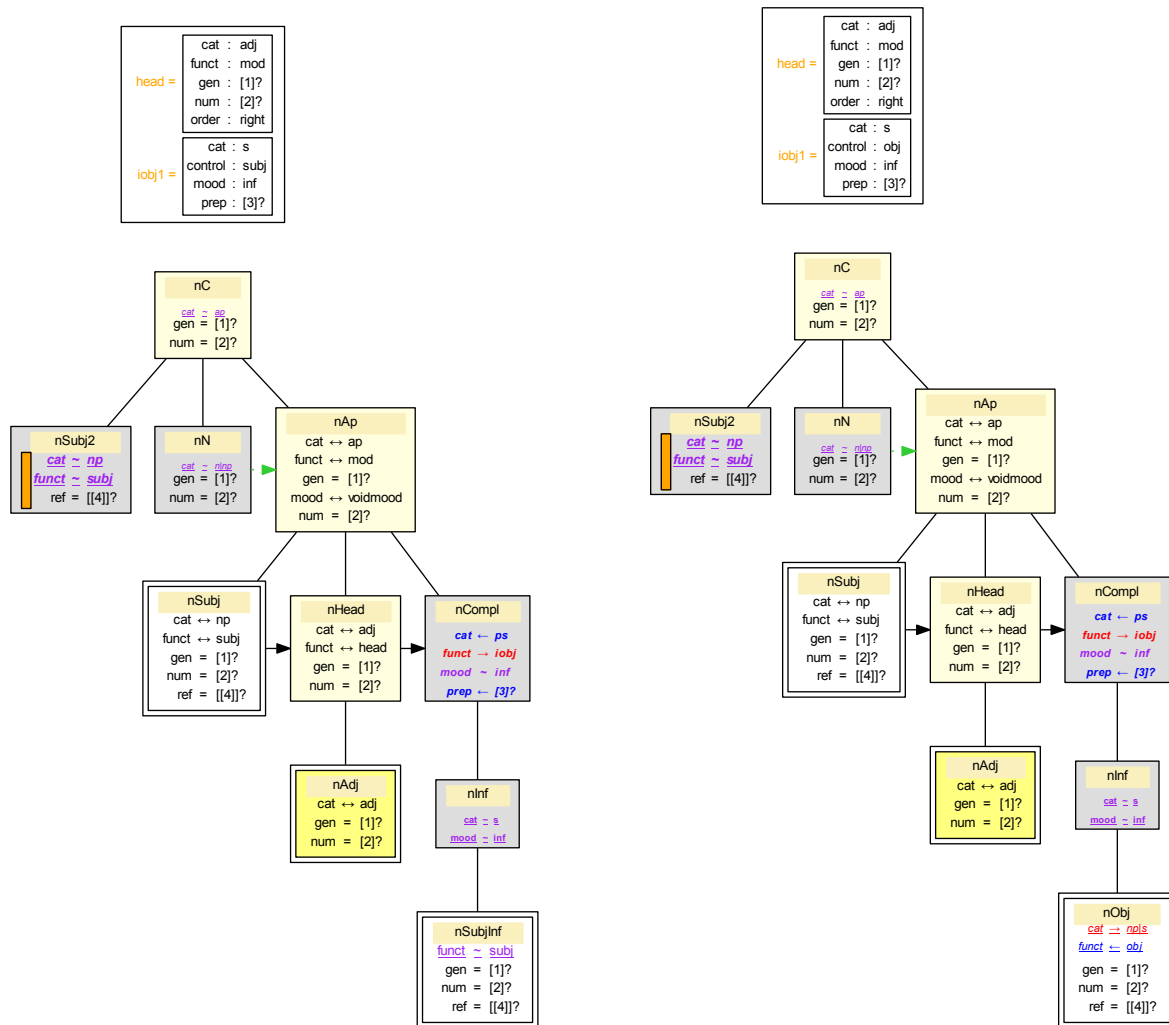


Figure 7.7: EPTDs defined by the ADJ\_PS1 class

Adjectives requiring no complement, as in example 7.16, anchor the EPTDs of the ADJ class, which is the disjunction of the ADJECTIVALPHRASE and LEFTATTRIBUTIVE classes.

The ADJ\_PP1 class concerns adjectives with a nominal complement, as example 7.17 illustrates it. It inherits the ADJECTIVALPHRASE and NOMINALINDIRECTOBJECT classes and it generates 6 EPTDs according to the different functions of the adjective. Figure 7.6 shows the two EPTDs related to the use of adjectives as required complements.

The left EPTD corresponds to adjectives that accepts a noun phrase as a complement, whereas the right EPTD corresponds to adjectives accepting a common noun as a complement. It provides the common noun with an empty determiner represented with node *nDet0*.

The ADJ\_PS1INF class concerns adjectives with an infinitive complement, as examples 7.18 and 7.19 illustrate it. It inherits the ADJECTIVALPHRASE and CLAUSALINDIRECTOBJECT classes and it generates 6 EPTDs according to the different functions of the adjective. Figure 7.7 shows the two EPTDs related to the use of adjectives as required complements.

In the interface, the `iobj1.control` feature indicates the function of the argument of the infinitive controlled by the subject of the adjective. The left EPTDs concerns adjectives for which the control of the subject of the adjective is over the subject of the infinitive, as in example 7.19. In the EPTD, the subject of the infinitive is represented with node *nSubjInf*, which co-refers with node *nSubj* representing the subject of the adjective.

The right EPTD concerns adjectives for which the control of the subject of the adjective is over the object of the infinitive, as in example 7.18. Here, the subject of the adjective *nSubj* co-refers with the object *nObj* of the infinitive.

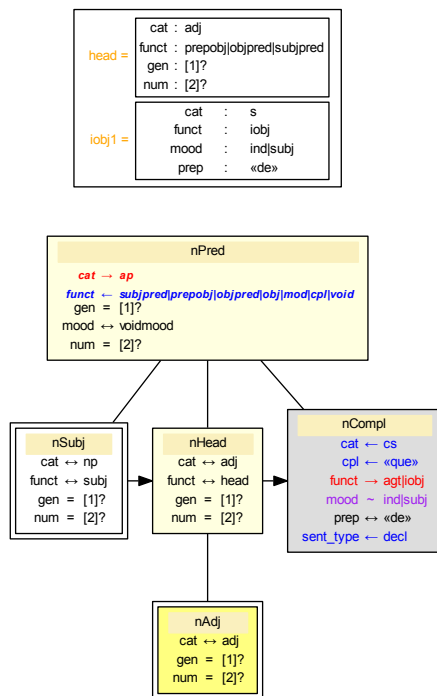


Figure 7.8: EPTD defined by the ADJ\_QUES1 class

The ADJ\_QUES1 class concerns adjectives with a finite clausal complement, as example 7.20 illustrates it. It inherits the ADJECTIVALPHRASE and FINITECLAUSEDEOBJECT classes and it generates 3 EPTDs according to the different functions of the adjective. Figure 7.8 shows the EPTD related to the use of adjectives as required complements.

The adjective *tel*, when it takes a complement introduced with the conjunction *que*, is not associated with the ADJ\_QUES1 class, because it has a particular behavior, illustrated with examples 7.21 and 7.22. In the first example, the object predicate complement of *connu* is missing and implicit; it is in relation of comparison with the adjective *tel*. In the second example, the clause *que cela devient insupportable* is in relation of consequence with the adjective *tel*.

The ADJTEL\_QUES1 class models both cases, as figure 7.9 shows it.

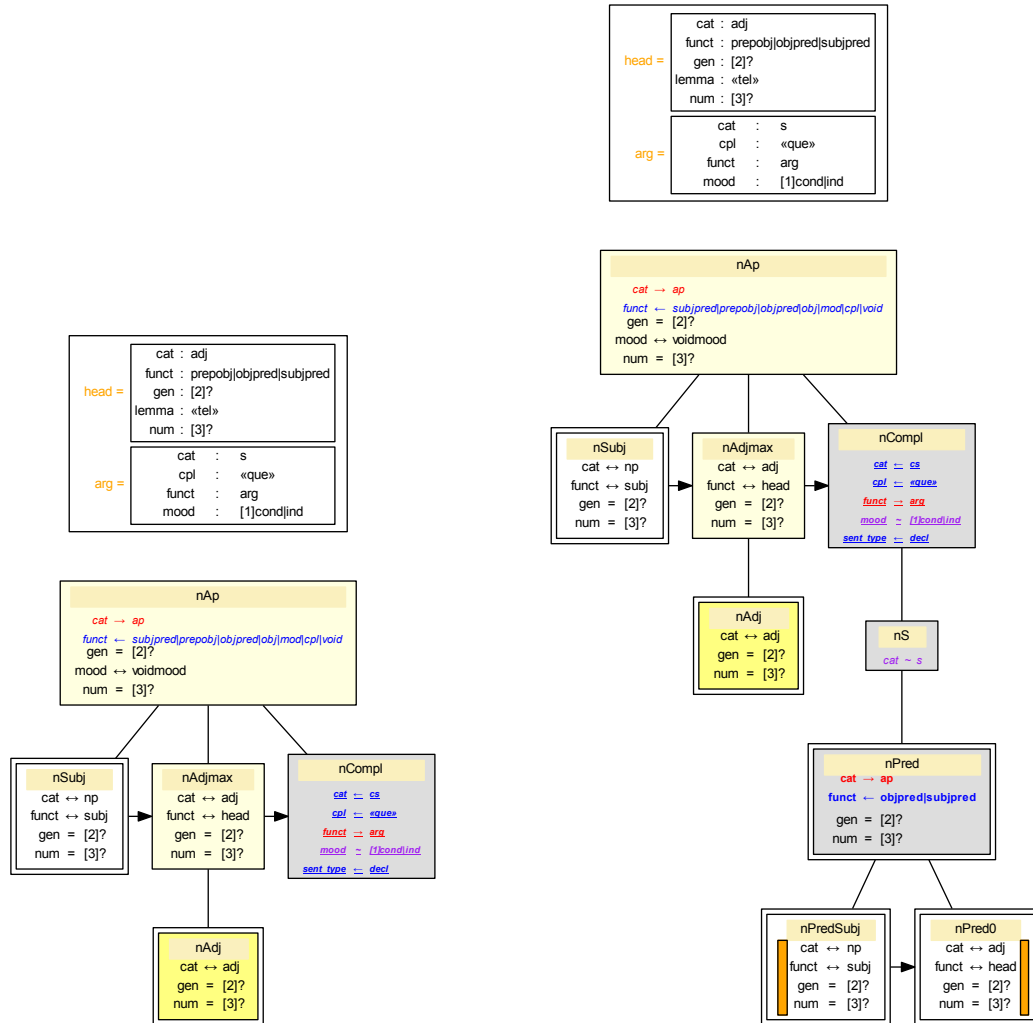


Figure 7.9: EPTD defined by the ADJTEL\_QUES1 class

The class defines 6 EPTDs for the different functions of the adjective *tel* but the figure shows only those for *tel* acting as an argument. The left EPTD corresponds to example ???. Node *nCompl* represents the clause complement of the adjective. A positive feature *funct -> arg*



expresses that the adjective will provide the clause with the function **arg**.

The right EPTD corresponds to example 7.22. It is more complicated because in the complement clause represented with node *nCompl*, there is an adjective which is elided. It is represented by the empty node *nPred0*. As all adjectives, it has an empty subject represented with node *nPredSubj*. Together they build the node *nPred*, which is labeled with the negative feature **funct**  $\leftarrow$  **objpred|subjpred**: it indicates that it can receive the function of predicate complement. In example 7.22, it is an object predicate complement of the verb *connu*.

# Chapter 8

## Adverbs

Adverbs constitute a residual class which is not strictly delimited. In a first approach, they are invariable words used to modify various types of constituents : sentences, noun phrases, prepositional phrases, verbs, adjectives . . . and even adverbs.

The classes anchored with adverbs are gathered in the `ADVERB` module.

### 8.1 Interfaces with the lexicon

Adverbs are characterized in the interface with the feature `head.cat = adv`. Their properties are described with the following sub-features of the `head` feature :

- `adv_type`: it indicates the type of the adverb, `adj` (adverb used as an adjective), `inter` (interrogative), `neg` (the particle *ne*), `negcompl` (negative adverb used in conjunction with the particle *ne*), `stand` (standard);
- `funct`: it describes the possible syntactic functions among `cpl`, `iobj`, `mod`, `obj`, `objpred`, `prepobj`, `subj`, `subjpred`;
- `prep`: when the adverb has the same function as a prepositional complement (locative complement for instance), it indicates an implicit preposition;
- `order`: it concerns the position of the adverb when it acts as a modifier in the modified constituent; it can take the values `left`, `right` or `neutr` if it respectively is before the head, after the head or in any position;
- `sent_type`: when an adverb is the head of a sentence, it gives the type of the sentence, `decl` (declarative), `excl` (exclamatory), `imper` (imperative) or `inter` (interrogative).

When an adverb is used as a modifier, a feature `gov.cat` gives the category of the constituent that is modified: `adj` (adjective), `ap` (adjectival phrase), `adv` (adverb), `cs` (complemented sentence), `np` (noun phrase), `pp` (prepositional phrase), `ps` (clause introduced by a preposition), `s` (sentence), `v` (verb), `vp` (verb phrase).

Some adverbs take a clausal complement introduced with the preposition *de* and the properties of this complement are described with the following sub-features of a feature `iobj1`:

- `cat`: it indicates the category of the complement, `s` usually;
- `cpl`: it indicates the complementizer introducing the complement clause, `que` or `voidcpl` (non complementizer);

- **funct**: it indicates the function of the complement, **iobj** usually;
- **mood**: it indicates the mood of the complement clause, **ind** (indicative), **inf** (infinitive) or **subj** (subjunctive);
- **prep** : it indicates the preposition introducing the complement, **de** usually.

For adverbs that are correlated with conjunctions or prepositions (*plus...que, trop...pour, ...*), the interfaces include a special feature **arg** to describe the properties of the clause introduced by these conjunctions or prepositions. This feature uses the same sub-features as feature **iobj1**.

Since interrogative adverbs have a very specific behavior, which make them closer to other interrogative words, they are not described in this chapter but in chapter ??.

## 8.2 The different functions of adverbs

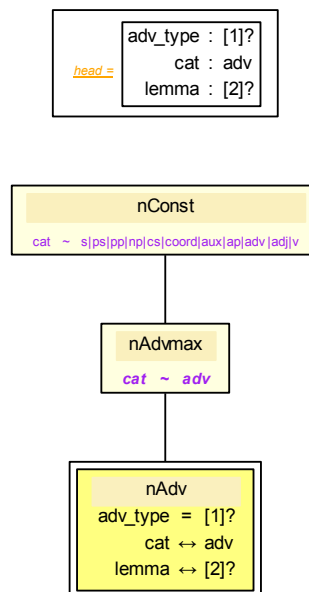


Figure 8.1: The PTD defined by the ADVERB class

A basic class ADVERB defines the common skeleton of all EPTDs anchored by adverbs and shown on figure 8.1. Node *nAdvmax* represents the kernel headed by the adverb anchored at node *nAdv*. The mother node *nConst* of *nAdvmax* must appear in the PTD because its category depends on the adverb.

### 8.2.1 Adverbs as indirect objects of verbs

Some adverbs can play the role of indirect objects of verbs as the following examples illustrate it.

- (8.1) *Jean va là-bas plutôt qu'ailleurs.*  
 Jean goes there rather than elsewhere.  
 Jean goes there rather than elsewhere.
- (8.2) *Jean va mieux que son frère.*  
 Jean seems better than his brother.  
 Jean seems to feel better than his brother.

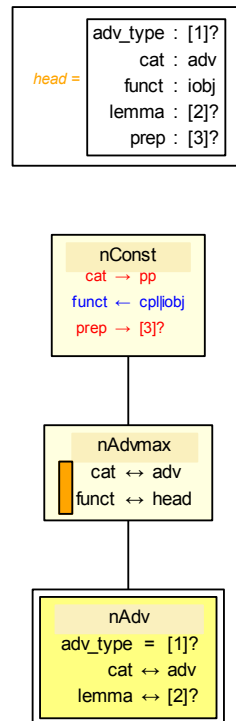


Figure 8.2: The EPTD defined by the `INDIRECTOBJECTADVERB` class

The `INDIRECTOBJECTADVERB` class defines one EPTD for the adverbs used as indirect object. It inherits the `ADVERB` class and it adds polarized features to node `nConst`, which is the maximal projection of the adverb. This node represents a prepositional phrase because in this case the adverb is considered to play same role as a complement prepositional phrase. Hence, it carries a positive feature `prep → ?`, which will take the value `loc` in example 8.1 and `voidprep` in example 8.2. The function that is expected by `nConst` is usually `iobj` but sometimes it may take the function `cp1` when the adverb depends on the conjunction in a comparison as *ailleurs* in example 8.1.

### 8.2.2 Adverbs as noun phrases

Some quantitative adverbs can behave as noun phrases.

- (8.3) *Jean mange beaucoup.*  
 Jean eats very much.  
 Jean eats very much .
- (8.4) *Jean mange moins que Marie.*  
 Jean eats less than Marie.  
 Jean eats less than Marie.
- (8.5) *Jean vient de loin.*  
 Jean comes from afar.  
 Jean comes from afar.
- (8.6) *Jean connaît plus d'histoires que Marie.*  
 Jean knows more stories than Marie.  
 Jean knows more stories than Marie.

The NOUNPHRASEADVERB class expresses the behavior of these adverbs. It inherits the ADVERB class and adds polarized features as INDIRECTOBJECTADVERB. Here, the polarized features are  $cat \rightarrow np$  and  $funct \leftarrow cpl|obj|objpred|prepobj|subj$ .

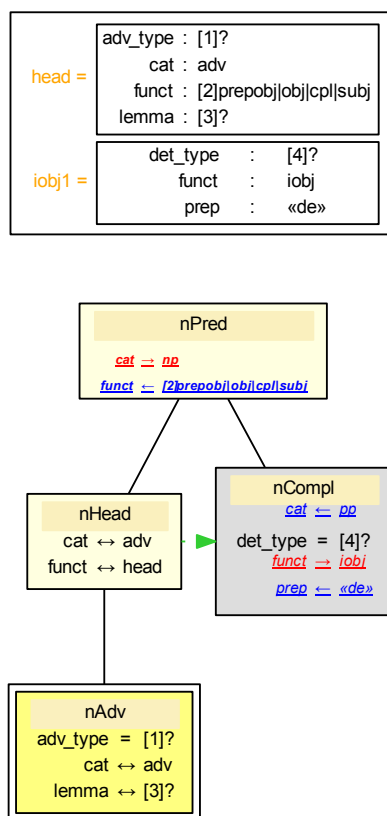


Figure 8.3: The EPTD defined by the NOUNPHRASEADVERBWITHCOMPLEMENT class

In all examples above, the function of the adverb is `obj` except example 8.5 where the adverb *loin* has the function `prepobj`.

For quantitative adverbs that they have a partitive complement introduced with *de*, like in example 8.6, the `NOUNPHRASEADVERB` class is specialized in the `NOUNPHRASEADVERBWITHCOMPLEMENT` class. It defines the EPTD presented on figure 8.3. The partitive complement is represented with node *nCompl*. This node has a feature `det_type`, which share its value with the feature `iobj1.det_type` of the interface because the determiner of the complement depends on the adverb. For instance, for *trop* the value is `voiddet`, whereas for *plus* it is `indef|voiddet`.

### 8.2.3 Adverbs as sentence heads

Some adverbs, like *alors*, *bien*, *oui*, *tant pis* . . . , behave as sentence heads. The `ADVSENT` class models this phenomenon and it defines three EPTDs according to the type of the sentence.

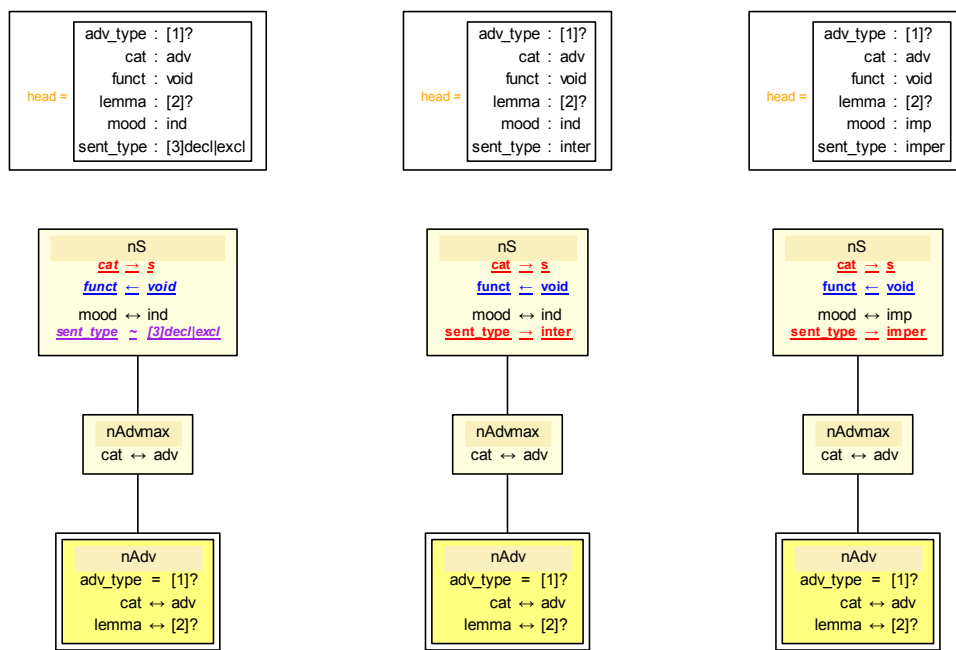


Figure 8.4: The EPTDs defined by the `ADVSENT` class

Figure 8.4 shows the three EPTDs. From the left to the right, they correspond to declarative or exclamatory sentences, interrogative sentences or imperative sentences. The difference between them lies in the value of the feature `sent_type` which is carried by the node *nS* representing the sentence. This value is shared by the feature `head.sent_type` of the interface.

The last and most usual function of adverbs is modifier, which is addressed in the next section.

The `INDIRECTOBJECTADVERB`, `NOUNPHRASEADVERB`, `NOUNPHRASEADVERBWITHCOMPLEMENT` classes are used as intermediate classes for negative, comparative and other adverbs but they are also used as terminal classes for standard adverbs. In this case, they are gathered in a disjunction `ADVARG`.

### 8.3 Adverbs as modifiers

Most often, adverbs are not complements required by verbs but they modify different kinds of words or phrases. The MODIFIERADVERB class defines the common skeleton of all EPTDs expressing this function, which is shown on figure 8.5.

It inherits the ADVERB class and renames node *nConst* as *nModif* because this node represents the constituent modified by the adverb. The value of its feature *cat* gives the categories of constituents possibly modified by adverbs.

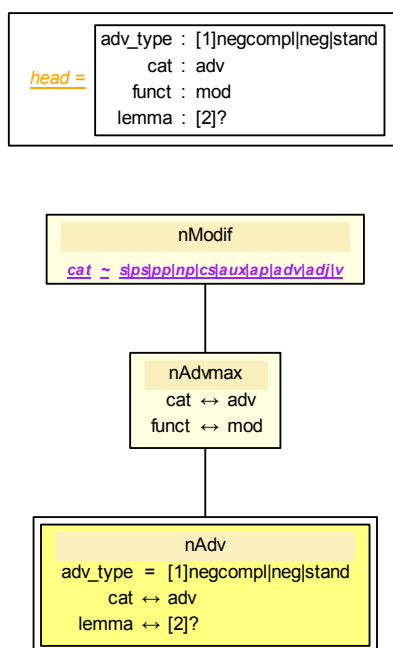


Figure 8.5: The EPTD defined by the MODIFIERADVERB class

Then, according to the grammatical category modified by the adverbs, the MODIFIERADVERB class is specialized in various classes.

#### 8.3.1 Adverbs as sentence modifiers

A criterion for detecting sentence modifiers, is that they can be put at the beginning of a sentence, but their position may be relatively free, as the following examples show it.

(8.7) *Jean voit Marie* **aujourd'hui**.

Jean sees Marie today.

Jean sees Marie today.

(8.8) **Aujourd'hui**, *Jean voit Marie*.

Today, Jean sees Marie.

Today, Jean sees Marie.

- (8.9) *Marie indisponible aujourd’hui viendra demain.*  
 Marie unavailable today will come tomorrow.  
 Marie today unlivable will come tomorrow
- (8.10) *Marie aujourd’hui indisponible viendra demain.*  
 Marie today unavailable will come tomorrow.  
 Marie today unavailable will come tomorrow
- (8.11) **Jamais** *Jean ne voit Marie.*  
 Never Jean sees Marie.  
 Jean never sees Marie.
- (8.12) \**Jean ne voit Marie jamais .*  
 Jean sees Marie never.  
 Jean never sees Marie.

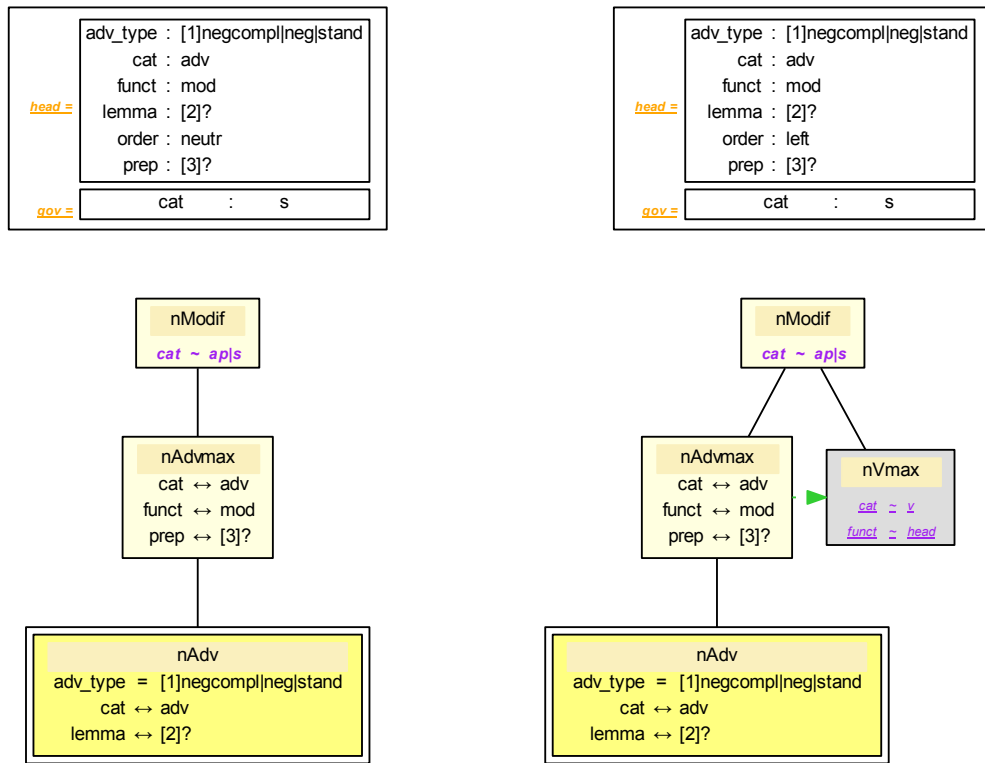


Figure 8.6: The EPTDs defined by the SENTENCEMODIFIERADVERB class

Some adverbs modifiers of sentences, like *aujourd’hui*, have a totally free position in the sentence, but other ones, like *jamais*, must be put before the verb<sup>1</sup>.

<sup>1</sup>As verb modifier, *jamais* can be put in the verb kernel as in the sentence *Jean ne voit jamais Marie*.



Hence, we have two corresponding EPTDs defined by the SENTENCEMODIFIERADVERB class and presented on figure 8.7. The left EPTD corresponds to the case that the position of the adverb is free in the sentence, which is indicated in the interface with the feature `order = neutr`. The right EPTD corresponds to the case of the adverb that must precede the verb, which is indicated in the interface with the feature `order = left`.

### 8.3.2 Adverbs as verb phrase modifiers

Since our grammar ignores verb phrases, we cannot represent adverbs modifying verb phrases explicitly. We represent them as sentence modifiers too but constraining the adverb to occur after the verb it depends, except if the verb is an infinitive or a past participle.

- (8.13) *Jean démonte son ordinateur complètement.*  
 Jean dismantles his computer completely.  
 Jean dismantles his computer completely.
- (8.14) *Jean a complètement démonté son ordinateur.*  
 Jean has completely dismantled his computer.  
 Jean has completely dismantled his computer.
- (8.15) *Jean a démonté complètement son ordinateur.*  
 Jean has dismantled completely his computer.  
 Jean has completely dismantled his computer.
- (8.16) \***Complètement** *Jean a démonté son ordinateur.*  
 Completely Jean has dismantled his computer.  
 Jean has completely dismantled his computer.

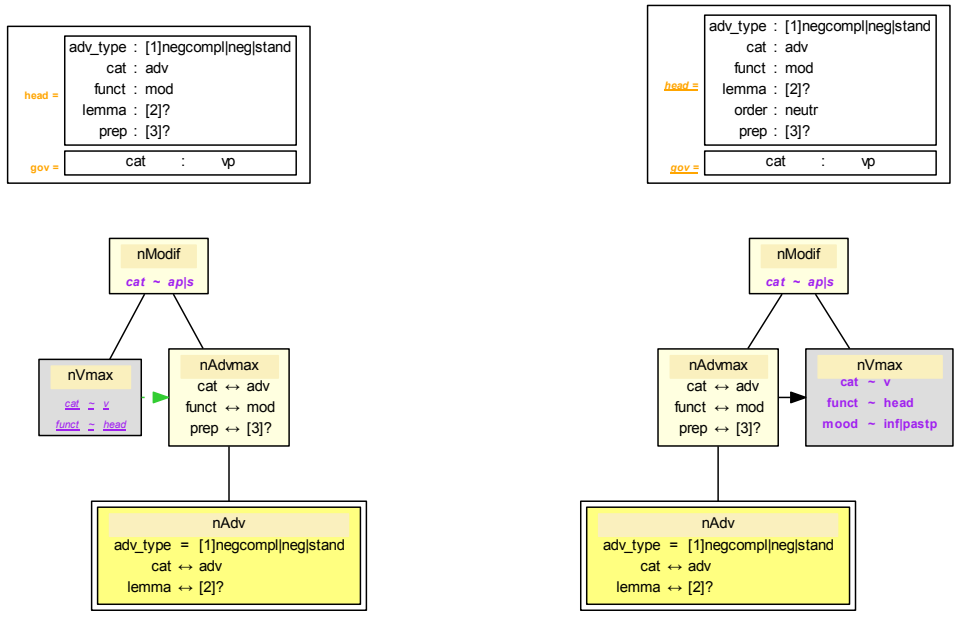


Figure 8.7: The EPTDs defined by the VERBPHRASEMODIFIERADVERB class

The VERBPHRASEMODIFIERADVERB class defines 2 EPTDs. The general case, illustrated with sentences 8.13 and 8.14, corresponds to the left EPTD and the particular case for infinitives and past participles, illustrated with sentence 8.15, corresponds to the right EPTD.

### 8.3.3 Adverbs as modifiers of other categories

For other categories of phrases and words, there are other classes taking their specifics into account (the category of the modified phrase or word, the position of the adverb ...):

- the COMPLEMENTEDCLAUSEMODIFIERADVERB class for adverbs modifying complemented clauses : they are always put at the beginning of the complemented clause;
- the PREPOSITIONALPHRASEMODIFIERADVERB class for adverbs modifying prepositional phrases; they are always put at the beginning of the prepositional phrase;
- the VERBMODIFIERADVERB class for adverbs modifying verbs; generally, their position with respect to the modified verb depends on the mood of the verb but for particular adverbs, they are always put immediately after the verb;
- the ADJECTIVEADVERBMODIFIERADVERB class for adverbs modifying adjectives, adjective phrases or adverbs; they are always put at the beginning of the modified constituent;
- the NOUNPHRASEMODIFIERADVERB class for adverbs modifying noun phrases; they are put either at the beginning of the modified noun phrase, or at the end.

All classes of this section concern the following types of adverbs : **stand** and **negcompl**. For the first one, the classes are gathered in a disjunction ADVMODIF\_C1, which is a terminal class but for the second one, the classes must be enriched as the next section will describe it.

## 8.4 Negation adverbs

In French, negation is most often expressed with the particle *ne* paired with a satellite word, which can be an adverb, a pronoun or a determiner : *pas, personne, aucun* ... The following examples illustrate the case of adverbs as satellites of the particle *ne*.

(8.17) *Jean ne mange que des pommes.*

Jean eats only apples.

Jean eats only apples.

(8.18) *Jean ne pense pouvoir travailler que dans sa chambre.*

Jean thinks to be able to work only in his room.

Jean thinks to be able to work only in his room.

(8.19) *Jean ne mange pas que des pommes.*

Jean does not eat only apples.

Jean does not eat only apples.

This pairing is expressed in FRIGRAM with a polarized feature **neg**, which is attached at the clause constituting the scope of the negation.

The *ne* particle provides the positive feature **neg** → **true** to neutralize the dual negative feature **neg** ← **true** given by the satellite negative word.

Hence, the `ADVNE_V1` class defines the EPTD presented on figure 8.8 for the the *ne* particle, taken as an adverb. Node *nS* represents the sentence that is the scope of the negation. It carries the positive feature `neg`  $\rightarrow$  `true`. The particle *ne* appears as a clitic put before the verb represented by the node *nV*. The maximal projection of the clitic represented by the node *nAdvmax* cannot receive any modifiers, which is indicated by the fact that the node is closed (double rectangle on the figure).

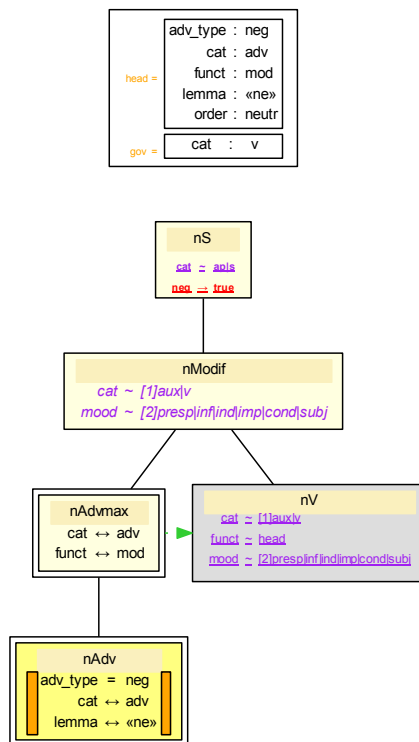


Figure 8.8: The EPTD defined by the `ADVNE_V1` class

The satellite word paired with the *ne* particle can be a pronoun or a determiner but here, we only consider adverbs as *pas*, *point*, *plus*, *guère* or *que*. A satellite adverb follows the syntax of any adverb described in the previous section: it can be an argument or a modifier.

A difficulty comes from the fact that one particle *ne* can be paired with several satellites, as example 8.19 shows it. In this sentence, there are two satellite adverbs : *pas* and *que*. Now, in the IG formalism, one positive feature `neg`  $\rightarrow$  `true` must be saturated by exactly one negative feature `neg`  $\leftarrow$  `true`.

Our solution is to distinguish between a main satellite word and a secondary satellite word. The main satellite word brings the negative feature `neg`  $\leftarrow$  `true` and the secondary satellite word brings a virtual feature `neg`  $\sim$  `true`.

Hence, there are two basic classes for satellite adverbs:

- `OBLIGATORYADVERBNEGATIONSATELLITE` for main satellite adverbs: it is built as a disjunction of all classes presented in the previous section, according to the category of the

modified constituent or word. Moreover, it adds the negative feature  $\text{neg} \leftarrow \text{true}$  to the node  $nS$  representing the scope of the negation;

- **OPTIONALADVERBNEGATIONSATELLITE** for secondary satellite adverbs: it is built as the disjunction of the **VERBMODIFIERADVERB** and the **ADJECTIVEADVERBMODIFIERADVERB** classes; this means that only adverbs modifying verbs, adjectives or adverbs can be secondary satellites. Moreover, it adds the virtual feature  $\text{neg} \sim \text{true}$  to the node  $nS$  representing the scope of the negation; this means that it requires the presence of a main satellite word.

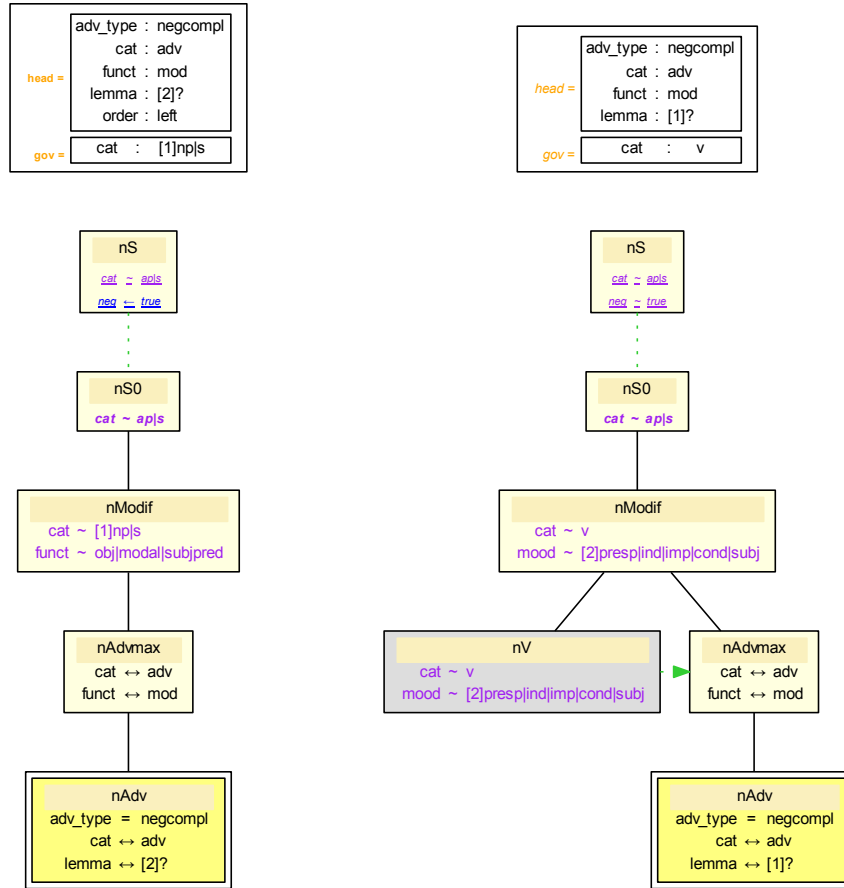


Figure 8.9: EPTDs defined by the **OBLIGATORYADVERBNEGATIONSATELLITE** and **OPTIONALADVERBNEGATIONSATELLITE** classes used in example 8.19

As a consequence, in sentence 8.19, the adverb *que*, which is a modifier of a noun phrase, is a main satellite adverb anchoring an EPTD coming from the **OBLIGATORYADVERBNEGATIONSATELLITE** class and the adverb *pas* is a secondary satellite adverb anchoring an EPTD coming from the **OPTIONALADVERBNEGATIONSATELLITE** class. On figure 8.9, the left PTD comes from the **OBLIGATORYADVERBNEGATIONSATELLITE** class for modeling the behavior of *que*. The right PTD comes from the **OPTIONALADVERBNEGATIONSATELLITE** class for modeling the

behavior of *pas*.

The two classes `OBLIGATORYADVERBNEGATIONSATELLITE` and `OPTIONALADVERBNEGATIONSATELLITE` are gathered in the disjunction `ADVERBNEGATIONSATELLITE`.

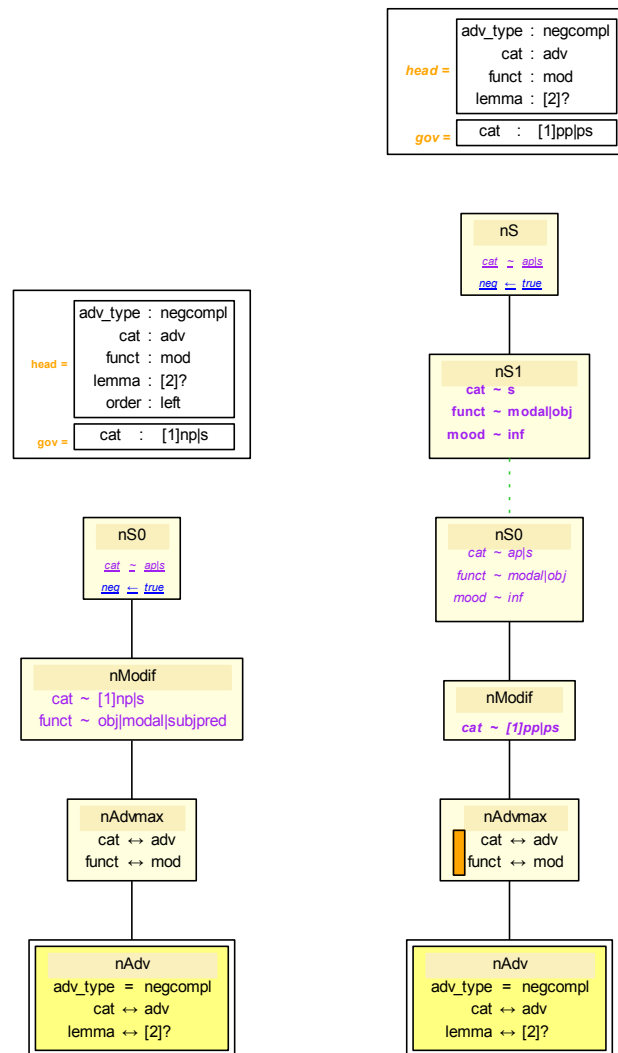


Figure 8.10: EPTDs defined by the `ADVERBNEGATIONDIRECTSATELLITE` and `ADVERBNEGATIONINDIRECTSATELLITE` classes respectively used in example 8.17 and 8.17

In both PTDs of figure 8.9, the node `nS` representing the scope of the negation dominates a node `nS0` representing the sentence including the satellite adverb. The possibility of dissociating `nS0` from `nS` comes from the observation that a satellite adverb may be embedded more or less deeply in an object infinitive clause, like in sentence 8.18. Thus we have to distinguish two cases :

- the satellite adverb is in the same clause as the *ne* particle, which is expressed with the `ADVERBNEGATIONDIRECTSATELLITE` class; sentences 8.17 and 8.19 illustrate this case;
- the satellite adverb is embedded more or less deeply in an object infinitive clause inside

the clause containing the *ne* particle, which is expressed with the ADVERBNEGATIONINDIRECTSATELLITE class; sentence 8.18 illustrates this case.

Figure 8.10 presents an example of PTD defined by each class. The left one is associated with the *que* adverb to parse sentence 8.17 and it is defined by the ADVERBNEGATIONDIRECTSATELLITE class. Node *nModif* represents the noun phrase *que des pommes*, which is an immediate sub-constituent of the sentence *Jean ne mange que des pommes*, the scope of the negation, represented with node *nS0*.

The right one is associated with the *que* adverb to parse sentence 8.18 and it is defined by the ADVERBNEGATIONINDIRECTSATELLITE class. Node *nS* represents the scope of the negation, the whole sentence. Node *nS1* represents the infinitive which an immediate sub-constituent, the clause *pouvoir travailler que dans sa chambre*. Node *nS0* represents the infinitive *travailler que dans sa chambre* and node *nModif* represents the modified prepositional phrase *que dans sa chambre*. The domination of node *nS1* over node *nS0* is underspecified, because any number of infinitives can be embedded between them.

The ADVERBNEGATIONDIRECTSATELLITE and ADVERBNEGATIONINDIRECTSATELLITE classes are gathered in their disjunction, ADVNEGCOMPL\_C1.

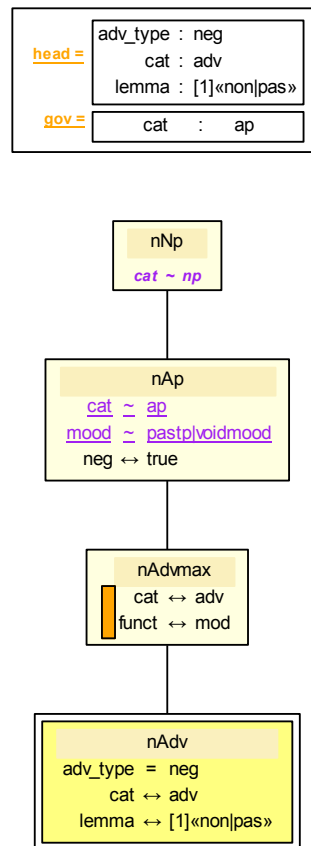


Figure 8.11: The EPTD defined by the ADVNON\_AP1 class

The adverbs *non* and *pas* can be used alone when they modify an attributive adjective, like in the following sentences.

(8.20) *On lui donne un travail pas facile.*

One him gives a work not easy.

One gives him a not easy work.

(8.21) *Cela demande un travail non négligeable.*

It requires a work non insignificant .

It requires a non insignificant work.

This specific use is defined by the ADVNON\_AP1 class, which produces the EPTD of figure 8.11.

## 8.5 Adverbs used as adjectives

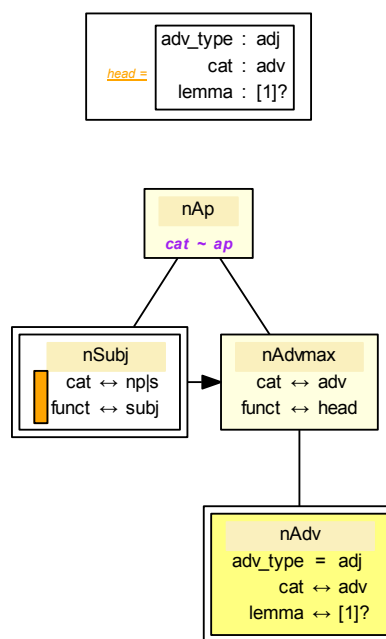


Figure 8.12: The PTD defined by the ADJECTIVEADVERB class

Some adverbs can be used as adjectives as the following examples illustrate it.

(8.22) *Jean est bien.*

Jean is okay.

Jean is okay.

(8.23) *Jean la trouve mieux que son frère.*

Jean her finds better than her brother.

Jean finds her better than her brother.

(8.24) *Jean est un type bien.*  
 Jean is a guy good.  
 Jean is a good guy.

(8.25) *J'ai vu Jean en train de réparer sa voiture.*  
 I saw Jean being repairing his car.  
 I saw Jean repairing his car.

The ADJECTIVEADVERB class defines the skeleton of all EPTDs anchored by adverbs behaving as adjectives. It is shown on figure 8.12. Node *nAp* represents an adjectival phrase having the adverb as its head. As any adjectival phrase, it has empty subject represented with node *nSubj*. Then, the class is specialized in two sub-classes, according to the function of the adverb:

- the PREDICATEADVERB class defines the EPTD for the adverbs used as predicate adjectives, as it is illustrated with sentences 8.13, 8.23 and 8.25; this EPTD is shown on the left part of figure 8.13;
- the ATTRIBUTIVEADVERB class defines the EPTD for the adverbs used as attributive adjectives, as it is illustrated with sentence 8.24; this EPTD is shown on the right part of figure 8.13;

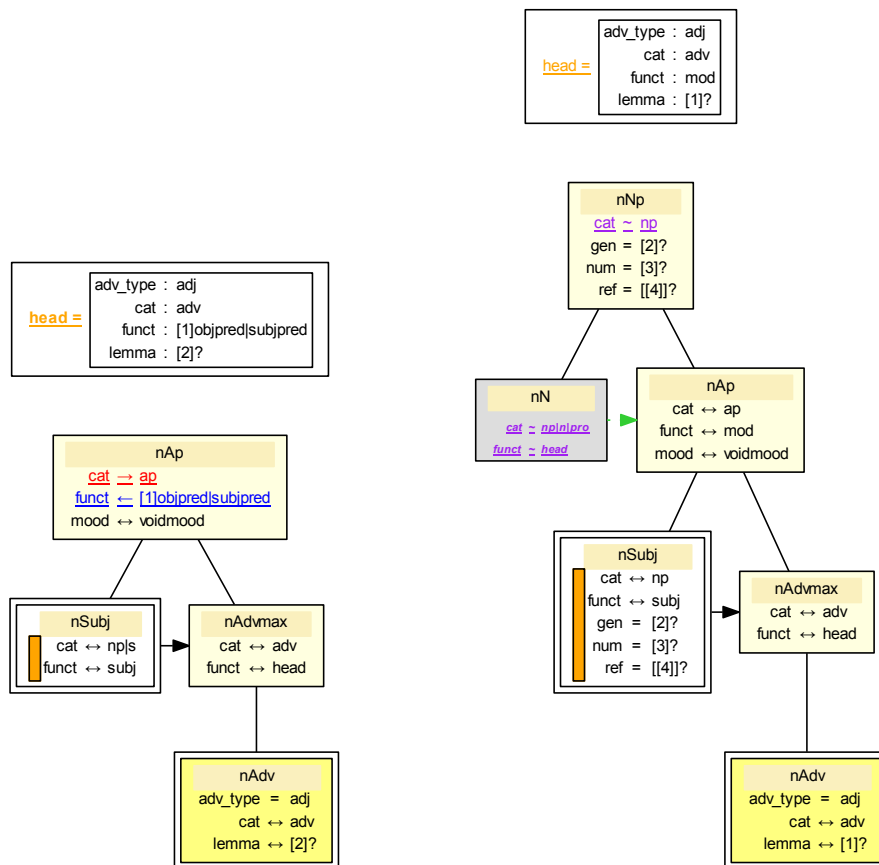


Figure 8.13: The EPTDs defined by the PREDICATEADVERB and ATTRIBUTIVEADVERB classes



The PREDICATEADVERB and ATTRIBUTIVEADVERB classes are gathered in the disjunction ADVADJ, which is a terminal class.

As example 8.25 shows it, adverbs with the function of adjectives can take infinitive complements. The ADVADJ\_DES1INF class models this case and it defines two EPTDs. Figure 8.14 shows the EPTD corresponding to the predicate function of the adverb, illustrated by our example.

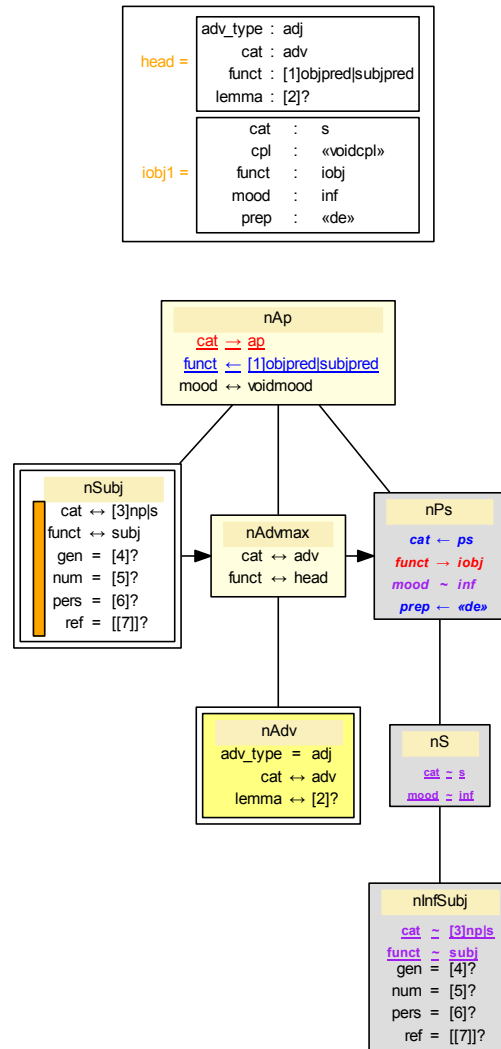


Figure 8.14: The EPTD defined by the ADVADJ\_DES1INF class for the predicate function of the adverb

## 8.6 Adverbs correlated with complement clauses

Some adverbs governs a complement clause in comparative or consecutive constructions, as the following examples show it.

- (8.26) *Jean connaît les parents de trop d'élèves pour ne pas venir.*  
 Jean knows the parents of too many students to not come.  
 Jean knows the parents of too many persons to not come.
- (8.27) *Jean a tellement travaillé qu'il peut se reposer.*  
 Jean has so much worked that he may have a rest.  
 Jean has so much worked that he may have a rest.
- (8.28) *Le paysage est plus ensoleillé maintenant qu'il ne l'est en hiver.*  
 The landscape is more sunny now than it is in winter.  
 The landscape is more sunny now than it is in winter.
- (8.29) *Le paysage est plus ensoleillé maintenant qu'en hiver.*  
 The landscape is more sunny now than in winter.  
 The landscape is more sunny now than in winter.

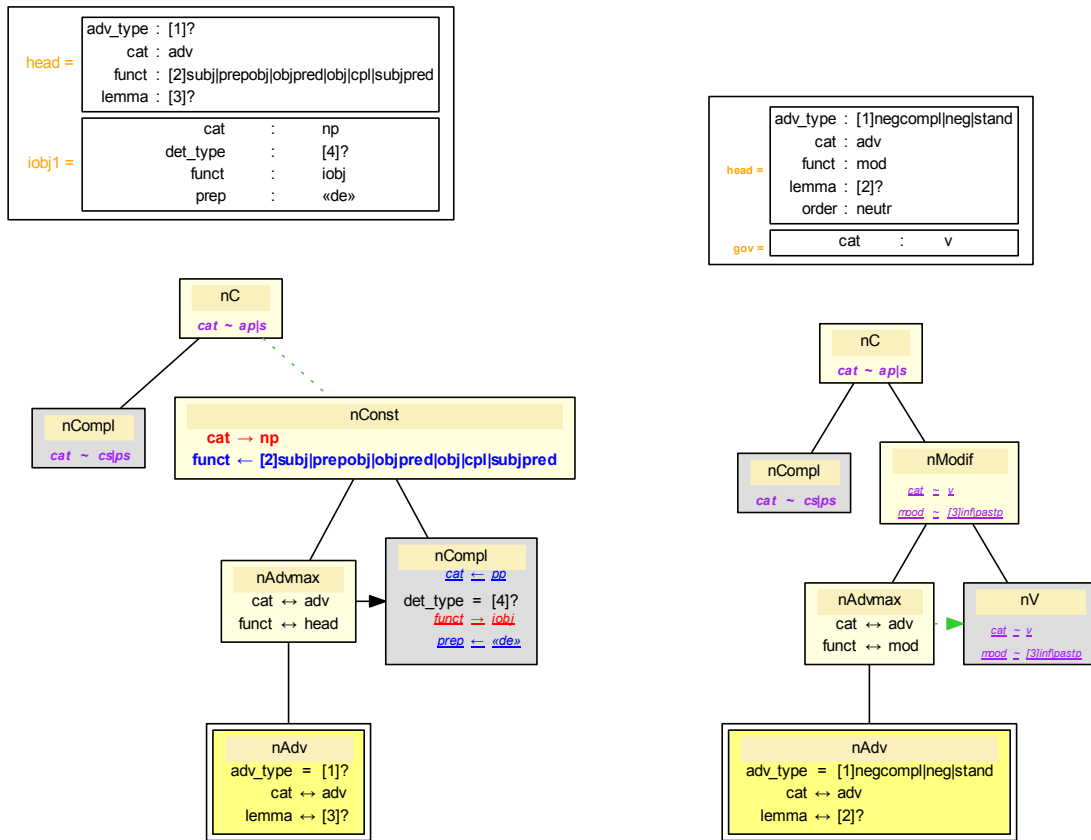


Figure 8.15: PTDs defined by the ADVERBWITHCOMPLEMENTCLAUSE class used in examples 8.26 and 8.27

The ADVERBWITHCOMPLEMENTCLAUSE class defines the common skeleton for all EPTDs. It generates 16 PTDs corresponding to all possible functions of adverbs. Figure 8.15 shows the

PTDs corresponding to examples 8.26 and 8.27. In the left PTD, node *nConst* represents the noun phrase made up of the adverb with its complement, *trop d'élèves* in our example. Node *nC* represents the sentence or the adjectival phrase that is the scope of the construction; in our example, it is the whole sentence. The clause that is correlated with the adverb, *pour ne pas venir* in our example, is represented by node *nCompl* which is a daughter of *nC*. There is an underspecified dominance relation from *nC* to *nConst* because the adverb may be embedded more or less deeply in the clause at which the complement clause is attached.

In the right EPTD of figure 8.15 illustrating sentence 8.27, there is no such underspecified dominance relation because the adverb modifies a verb which is the head of the clause constituting the scope of the construction.

It is the same for the EPTD of figure 8.16 illustrating sentences 8.28 and 8.29. The scope of the construction is the adjectival phrase that is modified by the adverb.

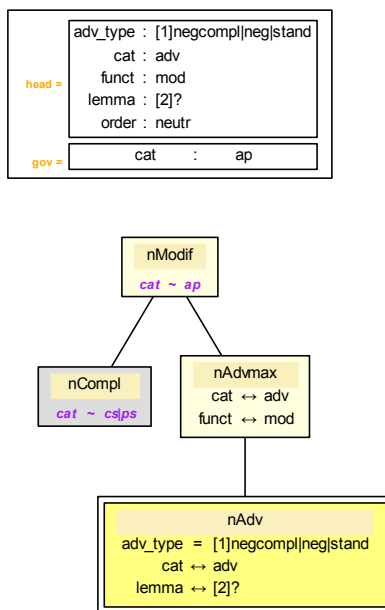


Figure 8.16: PTD defined by the `ADVERBWITHCOMPLEMENTCLAUSE` class used in examples 8.28 and 8.29

The `ADVERBWITHCOMPLEMENTCLAUSE` class is specialized in two sub-classes according to the type of the complement clause that is correlated with the adverb: `ADV_C1_POURS2` if it is infinitive and `ADV_C1_QUEST2` if it is a finite clause.

The `ADV_C1_POURS2` class is illustrated with example 8.26. It defines 13 EPTDs and figure 8.17 on its left part shows the EPTD used in the example. Node *nCompl* carries the polarized features  $\text{cat} \leftarrow \text{ps}$ ,  $\text{prep} \leftarrow \text{pour}$  and  $\text{funct} \rightarrow \text{arg}$  to express that a clause introduced with the preposition *pour* is expected to receive the syntactic function *arg*. In the example, it will be satisfied by *pour ne pas venir*.

The `ADV_C1_QUEST2` class defines 14 EPTDs and figure 8.17 on its right part shows the EPTD used in examples 8.28 and 8.29. Node *nCompl* represents the correlated clause. In sentence 8.28 the clause is complete: it is *qu'il ne l'est en hiver* but in sentence 8.29, it includes

an ellipsis; it reduces to the prepositional phrase *en hiver*.

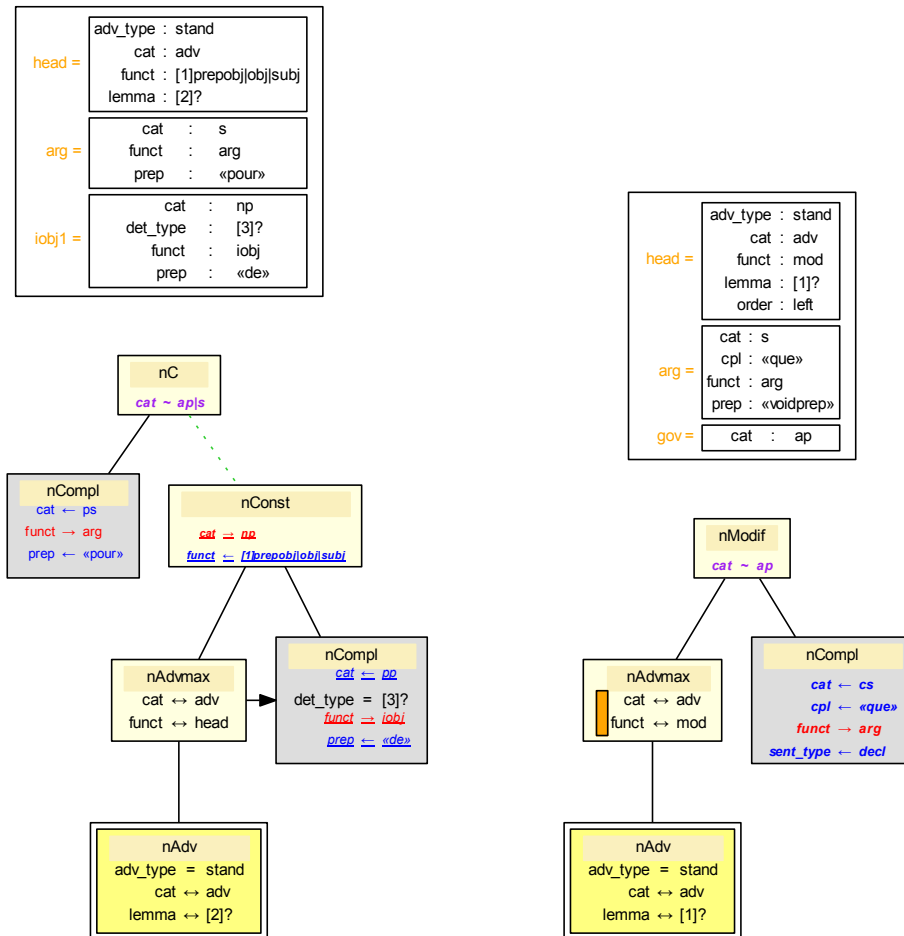


Figure 8.17: EPTDs defined by the ADV\_C1\_POURS2 and ADV\_C1\_QUES2 classes



# Bibliography

- [DLP05] D. Duchier, J. Le Roux, and Y. Parmentier. XMG : Un compilateur de méta-grammaires extensible. In *TALN 2005, Dourdan, France, 2005*.
- [GP09] B. Guillaume and G. Perrier. Interaction Grammars. *Research on Language and Computation*, 7:171–208, 2009.