Chapter 8

Support Verb Constructions

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8.1 Introduction

This chapter is the reviewed and extended version of Namer (1994b) which aimed at rewriting the part of specifications for the analysis of support verb constructions - hereafter SVC - (also called complex predicates, or light verb constructions, etc.) for monoclausal sentences. We will focus on what we had called “cross-discontinuities”, i.e. the combination of the SVC phenomenon - which can be seen as a “middle-size discontinuity” within long distance constructions, namely control, raising and relativization. The chapter also includes the standard assumptions which have been made wrt predicate argument structure (see chapter 6 (Predicate-Argument-Structure)). The following structure is adopted for this chapter for the description of SVCs:

- The first part (8.2) provides (a) a definition of what we accept to call “support verb” and, consequently, “support verb constructions”, (b) a description of the properties of SVC-constituents, and (c) the illustration of behaviour of SVCs when involved in other discontinuities.

- The second part (8.3) briefly describes several approaches to SVCs. We limit ourselves to the Mel’čuk account and to some hypotheses which have been formulated in the TFS framework. After exposing the motivations of our choice, we present in detail a lexicalist treatment of predicative nouns, and the selected support verb.

- Finally, the third part (8.4) illustrates our proposal by some examplificatory treatments of SVC both in “simple” and in “complex” clauses.

8.2 Linguistic Description

This section must be seen as an attempt to give a practical definition of what a SVC is, and which its components’ properties are. We refer here to the theoretical results presented in the Eurotra Reference Manual (1990) 7.0 and in Daille & Danlos (1992) (EUROTRA MT project), and to the improvements and extensions proposed by P. Samvelian (see Danlos & Samvelian (1992), Jørgensen & Samvelian (1993) and Samvelian (1995)).

8.2.1 Definition

A support verb construction is basically a clause made up by a subject, a verb and a (possibly marked) nominal object, in which the the object bears the meaning, whereas the verbal semantic
contribution is roughly limited to tense and aspect information\(^1\).

(1) John took a walk.
   Gianni fa l’analisi della situazione.
   Hans hat Einfluss auf Marie.
   Jean prend une décision.

The examples above show that (1) the construction may appear in any language, and (2) the verb (\textit{take, make, have}) is not used in its ‘real’ interpretation. Rather, the basic meaning of the first clause is “to walk”, that of the second clause is “to analyse”, that of the third clause is “to influence”, and that of the last clause is “to decide”. This leads to a first remark, namely that a construction made up by such combinations, i.e. “semantically empty verb + direct object as semantic head”, cannot be seen as ordinary construction. In fact the SupV (which can be called either \textit{support verb}, or \textit{light verb}) and the object noun phrase (which PredN head is known as \textit{predicative noun} or \textit{valent noun}) combine into a complex semantic unit, and it is this complex predicate which subcategorizes for grammatical functions, and which semantically selects the arguments. On the other hand, however, this complex predicate cannot be considered a frozen expression (such as \textit{prendre part} or \textit{take place}), for properties specific to SVCs which are exposed below. Finally, despite a number of common properties which ensure all SVCs to be distinguishable from both ordinary predicates and frozen expressions, this class is unfortunately completely heterogeneous, as concerns the nature of PredN involved, PredN behaviour wrt quantification, the variations and aspect of the associated SupV, etc.

In order to give a more formal definition of SVC, we start with defining what a predicative (or valent) noun is.

\textbf{8.2.1.1 Predicative Noun}

A predicative noun is a noun which subcategorizes for (and selects) arguments. Such as verbs, predicative nouns vary in valency, which means that they subcategorize at least for a single PP (which may have the same kind of thematic role that a corresponding verb’s subject can have). Predicative nouns can be divalent or trivalent. Noun arguments are always optional and prepositional. Now the question is : what a noun argument is ? Let us have a look at some traditional definitions and the reasons why we do not consider them sufficient.

- First, if we consider the \textit{possession relation} between a noun and a possessor as a predicate-argument relation, we are forced to conclude that ANY noun is predicative :

  (2) \textit{le centre (de la terre + de la porte).} (the (earth’s + tree’s) center)

  (3) \textit{le nez de Paul.} (Paul’s nose).

\(^1\)We are going to see (section 8.2.1.2) that this definition is sometimes unsufficient. However, we will keep it for this part of the discussion.
(4) la maison de Luc.
   (Luc’s house).

(5) le chef de l’équipe...
   (the head of the team)

We assume that noun relational complements are to be distinguished from noun arguments. A noun can be considered predicative monovalent if it has selective constraints wrt to its argument :

(6) le sommeil de Paul.
   (Paul’s sleep)

which includes consequently all nouns which are derived from monovalent verbs or adjectives :

(7) la vie de Paul.
   (Paul’s life)

(8) la mort de Luc.
   (Luc’s death)

(9) la beauté du diable.
   (the beauty of the devil)

(10) la sincérité de Jean
     (Jean’s sincerity)

- One of the usual definitions of a PredN is that of an abstract noun. We have seen that some abstract nouns don’t satisfy the above definition : centre, bordure, milieu, sommet, creux, bosse ... select a rather unrestricted argument. On the other hand, there is a well-known class of nouns, which are either processive (abstract) or resultative (concrete). Both reading can appear together, e.g. in a sentence such as :

(11) le livre de Sartre est rouge
     (Sartre’s book is red)

*livre* selects its arguments (the agent, or author, and the topic) as two constituents which have specific syntactic properties : the agent is a prepositional phrase introduced by *de*, and the theme is a prepositional phrase introduced by any preposition whose meaning is about. So, as regards the definition, *livre* is predicative. On the other hand, *livre* cannot be labelled as an abstract noun, for abstracts cannot be characterized by a colour. Another example of “concrete” predicative noun is given by *cadeau*. Here again, we have a concrete noun (*le cadeau est volumineux*) and at the same time, a noun which subcategorizes for two arguments which are syntactically and semantically constraint :

(12) le cadeau de Luc à Marie.
     (Luc’s present to Mary)
Another “traditional” definition of a predicative noun, is that of a **deverbal noun** : a predicative noun derives from a verb with which it shares the argumental structure. Once again, there are examples of nouns which do not satisfy this definition, and which however are valent nouns : these are nouns such as *patience, beauté, excursion* ....

To summarize, predicative nouns form a heterogeneous class. In fact, a predicative noun is a valent noun. It imposes syntactic and semantic constraints on its arguments it subcategorizes for. It subcategorizes for at least one argument, which is usually an agent, an instrument, or an experiencer (cf. Samvelian (1995)). We refer to it here by the term *arg1*. A predicative noun can be:

- concrete (*la thèse*)
- abstract, derived from a verb (*la destruction*)
- abstract, derived from an adjective (*la beauté*)
- abstract, non-derived (*la passion*)

The minimal common knowledge of the hypothesis above seems to show that the only prerequisite for a noun to be predicative, is that it must have a non empty subcat list, and it must bring selectional constraints on its arguments. For nouns which traditionnally are considered monovalent, this definition excludes relational complements.

### 8.2.1.2 Support Verb Construction

Let us limit ourself to the hypothesis that a support - or light - verb is an element with no proper meaning. This definition may be considered as true for entries such as *faire*, whose semantic contribution is purely temporal and aspectual. But it is definitely wrong in the case of other verbs, such as *donner*. Recall that this verb, such as light verbs in general, has a “real” meaning, e.g. when used with a direct object headed by the noun *livre* :

(13) Paul donne un livre à Marie.
    (Paul gives a book to Mary)

Here, *donner* expresses a transfer of an object from a source to a goal. *Donner* can be used as a support verb, too, with a predicative direct object, such as in :

(14) Paul donne un baiser à Marie.
    (Paul gives a kiss to Mary)

where the meaning of the predicate is *to kiss*. However, *donner* also allows the coordination of these two sorts of direct object :

(15) Paul donne un livre et un baiser à Marie.
    (Paul gives a book and a kiss to Mary)
If a support verb is assumed to have no specific semantic properties at all, coordinated structures such as this would be impossible. Therefore, it is reasonable to suppose that a support verb’s semantic content is not necessarily empty, and that the resulting semantics of the support verb construction is actually some kind of semantic combination of the meaning of the predicative noun with that of the verb. This assumption will be taken into account in the second part of the chapter, by assuming an abstract “operator” for the semantic association. Meanwhile, we assume in this part the definition of a support verb as that of a semantically-empty unit.

Let us now try to give a more formal definition of support verb. Let us assume an active declarative monoclausal sentence, whose structure could be labelled as follows:

\[
\text{NP1} \_ \_ V \_ \_ [ \text{SupV} \_ \_ \text{NP2} \_ \_ ( \text{prep}_2) \_ \_ \text{Det} \_ \_ \text{PredN} \_ \_ ( \text{PP}/3 \_ \_ \text{prep}/3 \_ \_ \text{NP}_3 \_ \_ ( \text{PP}/4 \_ \_ \text{prep}/4 \_ \_ \text{NP}_4 \_ \_ ] ] .
\]

NP1 refers to the subject of the SupV, and NP2 is headed by the PredN. A PredN being always a valent noun, it can have an argument structure (represented above by the two optional PPs, PP3 and PP4\(^2\)). The predicative NP (NP2) can be marked by a preposition (indicated here by the optional \text{prep}_2 symbol).

8.2.1.2.1 Derivation of (A)

Actually, (A) is produced on the basis of the noun phrase structure (B):

\[
\text{NP}_2 \_ \_ \text{Det} \_ \_ \text{PredN} \_ \_ ( \text{PP}/1 \_ \_ \text{prep}/1 \_ \_ \text{NP}_1 \_ \_ ( \text{PP}/3 \_ \_ \text{prep}/3 \_ \_ \text{NP}_3 \_ \_ ( \text{PP}/4 \_ \_ \text{prep}/4 \_ \_ \text{NP}_4 \_ \_ ] ] .
\]

The obtention of B from A is the first criterion to determine the link between a predicative NP and the corresponding SVC: a SupV allows for a structure like A, in which the subject (NP1) semantic content is token identical to the unrealized \text{arg1} of the predicative noun. This property is used to distinguish SVCs from frozen expressions, for which e.g. the following equivalences don’t hold:

\text{take into account} : \quad \text{John took the data into account} \\
\neq \quad \text{John’s account of the data}

\text{prendre place} : \quad \text{Jean prend place dans le cortège} \\
\neq \quad \text{La place de Jean dans le cortège}

8.2.1.2.2 Relative Clause Paraphrase

The second criterion says that the arguments of a PredN in an NP such as (B) can be paraphrased by a relative clause. The head of the clause is the SupV.

\(^2\)optionality is indicated by parenthesis
John’s attack against Mary
= the attack that John carried out against Mary

L’agression de Jean contre Marie
= l’agression que Jean a commise contre Marie

Hans’ Angriff gegen Maria
= Der Angriff, den Hans gegen Maria richtete

We could schematize this paraphrases by the following structures equation:

(B) \( NP_2 \{ \text{Det} \text{PredN} \{ \text{PP}_1 \{ \text{prep}, \text{NP}_1 \} \{ \text{PP}_3 \{ \text{prep}, \text{NP}_3 \} \} \} \} \)

= (C) \( NP_2 \{ \text{Det} \text{PredN}_2 \{ \text{WH}_2 \text{NP}_1 \text{SupV} \{ \text{PP}_3 \} \{ \text{PP}_4 \} \} \} \)

The paraphrase property differentiates a SupV from an ordinary verb as exemplified in (16) and (17):

(16) Max criticizes the speculations on the dollar.

(17) Max exige l’expulsion de criminel vers la Suisse.

since these verbs don’t allow paraphrases such as:

Max’s speculations on the dollar
\( \neq \) the speculations that Max criticizes on the dollar

L’expulsion par Max du criminel vers la Suisse
\( \neq \) L’expulsion que Max exige du criminel vers la Suisse

8.2.1.2.3 Unrealized PredN Agent

In an SVC - as described by structure (A) - the agentive position in the PredN structure must be empty:

(18) *Peter carried out John’s attack against Mary.
*Pierre a commis l’agression de Jean contre Marie.
*Pater has Hans’ Angriff gegen Maria gerichtet.

Here again, the constraints on the subjects are not true in ordinary verb construction.

(19) Max criticizes John’s speculations on the dollar.
(20) Ed exige l’expulsion du criminel par la police.

8.2.1.2.4 Double Analysis

The fourth main property of an SVC is the so-called “double analysis” or “multiple extraction” property. In an SVC whose structure is (A), in which the PredN argument structure is not empty, there are several extraction possibilities for NP2 (headed by PredN), which means that NP2 can be analysed in several ways.
**Divalent PredN:** Let us consider first an SVC with a divalent PredN:

(21) Max carried out an attack against Mary

A first extraction, which is realized by means of the clefting operation, shows that *an attack against Mary* can be analysed as a single constituent:

(22) It is **an attack** **against Mary** that Max carried out

However, the head of NP2 alone can also be extracted:

(23) It is **an attack** that Max carried out **against Mary**

Similarly, the extraction may concern only the PredN second argument:

(24) It is **against Mary** that Max carried out **an attack**

**Trivalent PredN:** Now, let us examine the example of another SVC (25) containing the trivalent PredN *expulsion*:

(25) La police a procédé à l’expulsion du criminel vers la Suisse.

Various extractions are allowed:

(26) C’est **à l’expulsion du criminel vers la Suisse** que la police a procédé.
(27) C’est **vers la Suisse** que la police a procédé **à l’expulsion du criminel**.
(28) C’est **de ce criminel** que la police a procédé **à l’expulsion vers la Suisse**.

Other aren’t:

(29) */C’est **à l’expulsion que la police a procédé de ce criminel vers la Suisse**.*
(30) */C’est **du criminel vers la Suisse que la police a procédé à l’expulsion**.*
(31) */C’est **à l’expulsion du criminel que la police a procédé vers la Suisse**.*
(32) */C’est **à l’expulsion vers la Suisse que la police a procédé du criminel**.*

**Passivization:** Building clefted sentences from SVCs is not the only way to show the “double analysis” property. It also can be shown by means of the passive transformation of (A), provided that the SupV is transitive. Let us examine the results obtained from (21):

(33) An attack against Mary has been carried out by Max.
(34) An attack has been carried out by Max against Mary.
(35) */An attack by Max against Mary has been carried out.*

**Permutation:** Finally, the double attachment possibility for the arguments of a predicative noun can sometimes be observed in a monoclausal non-clefted active SVC, in which the noun argument is moved out of the NP domain:
(36) Max a commis une agression monstrueuse contre Marie.
Max a commis contre Marie une agression monstrueuse.

SVC vs other Constructions: The property of double analysis is generally used to distinguish SupV from ordinary verbs:

(37) Max condamne l’expulsion du criminel vers la Suisse.
C’est l’expulsion du criminel vers la Suisse que Max condamne.
* C’est vers la Suisse que Max condamne l’expulsion du criminel.

(38) Max is describing an attack against Mary.
It is an attack against Mary that Max is describing.
* It is against Mary that Max is describing an attack.

and from frozen expressions:

(39) Max prend part à ce cortège. C’est à ce cortège que Max prend part.
* C’est part à ce cortège que Max prend.

Extraction Constraints: We have just seen that the argument extraction paradigms depend on the predicative noun which selects these arguments. So, examples (22) to (24) show that agression puts no restriction on args extraction, and the opposition between examples (26) to (28), end examples (29) to (31) show that expulsion activates a different kind of extraction paradigm. The same paradigm is observed with another 3-valent noun, which is characterized by a frame of type “ASSOC”:

(40) Max fait l’échange de A avec B.
Max does the exchange of A with B.

(41) C’est l’échange de A avec B que Max fait.

(42) * C’est l’échange de A que Max fait avec B.

(43) * C’est l’échange avec B que Max fait de A.

(44) * C’est l’échange que Max fait de A avec B.

(45) C’est de A que Max fait l’échange avec B.

(46) C’est avec B que Max fait l’échange de A.

(47) * C’est de A avec B que Max fait l’échange.

So at a first glance, we could make the hypothesis that a predicative noun PredN which governs an NP looking like:

det PredN NPa NPb

allows for the extraction of at least the following sequences:

(48) det PredN , provided that “det” is indefinite (It is an attack that A committed against B vs *C’est l’échange que Max fait de A avec B,
When the noun arguments are prepositional, (especially for directional locatives) they can sometimes be extracted as a whole, above all when the composed meaning can be understood as “path unit”:

(49) C’est de Douvres à Calais que Max a fait ce voyage.

At our knowledge, there are no other cases such as (49). Of course a systematic investigation of the 3-valent predicative nouns should be done. Nevertheless we will make the assumption that extraction conditions are syntactic (and not lexically set), and correspond to the description given in (48).

To conclude, the characteristics of a support verb are summarized below:

(c1) A support verb builds a clause (called SVC) from a predicative NP: the notion of support verb construction derives from that of predicative noun.

(c2) An NP headed by a predicative noun can be paraphrased by an SVC embedded in a relative clause. In other words, the SupV associated to a PredN is unique (exception: possible stylistic and aspectual variants).

(c3) In an SVC, the deep subject of the verb is coreferent with the arg1 of the PredN. Therefore, the arg1 of the PredN must be left unrealized.

(c4) In a clefted sentence which is obtained from an SVC, the extracted object element is either the whole NP headed by the PredN, or the head, or one of the PredN arguments.

Given these properties, and bearing in mind the definition we gave of a predicative noun, we are able to distinguish SupV from frozen expressions, and from a large part of ordinary verbs. However, some verbs which cannot be considered SupV satisfy these 4 criteria:

(50) Max écrit un livre sur les fourmis.
    (Max writes a book about ants)

(c1) le livre de Max sur les fourmis.
    (Max’s book about ants)

(c2) le livre que Max écrit sur les fourmis.
    (the book Max wrote about ants)

(c3) »Max écrit le livre de Luc sur les fourmis.
    (Max writes Luc’s book about ants)
(c4) C’est un livre sur les fourmis que Max écrit.
(It is a book about ants that Max writes)
C’est un livre que Max écrit sur les fourmis.
(It is a book Max writes about ants)
C’est sur les fourmis que Max écrit un livre.
(It is about ants that Max writes a book)

Therefore we have to add a last criterion to distinguish SupVs from ordinary verbs: a support verb must subcategorize for an obligatory object. So:

(51) Max fait un résumé.
(Max makes a summary)

is an SVC, because the 4 criteria are met, and in addition *Max fait is ungrammatical. On the other hand:

(52) Max écrit un résumé.
(Max writes a summary)

is not an SVC, though the 4 criteria are met. In fact, écrire can be used in an absolute way (Max écrit) without changing the meaning of the sentence in a signifiant way.

Now that the main criteria to recognize predicative nouns, SupVs and SVCs have been presented, let us see the other properties which characterize SVCs.

8.2.2 Other Properties

In this section, we are going to list briefly a series of secondary linguistic aspects of SVCs.

8.2.2.1 Stylistic and Aspectual Variants

A stylistic or aspectual variant can substitute for the support verb:

(53) John has influence over Mary.

⇒

(54) John gains influence over Mary.
Jean prend de l’influence sur Marie.
Hans gewinnt Einflußauf Marie.

In general a SupV’s aspectual/stylistic variants satisfy criteria (3) and (4) above, but not (2).

In an SVC we can at least distinguish the following aspectual variants for a SupV:

- neuter, which is generally the “base” support verb, such as have in *John has influence over Mary.*
• inchoative, such as *gain wrt *have in: *John gains hope of getting a job.,
• durative, such as *keep wrt *have in: *John keeps hope of getting a job.,
• terminative, such as *loose wrt *have, in: *John *lost hope of getting a job.
• iterative, such as *multiply wrt *carry out in: *John multiplies his attacks against Mary.

It is obvious that the examples show an opposition between the neuter variant as a non-marked
item and all the others which are marked to focus on a specific phase of a process. A process
begins at a point of time, remains during a period of time and ends at a point of time. To focus on
the beginning of a process we can use the inchoative variant, to focus on the end of a process, the
terminative variant can be used. The durative variant focuses on the fact that the process is still
developing while the iterative variant focuses on the repetition of the same process. The neuter
variant is used when the process is referred to as a whole without focusing on a specific phase or
modality of its development.

The difference between markedness and no-markedness of variants of explain why only the neuter
variant of support verbs can be used for a paraphrase of NP headed by a PredN. Such an NP does
not include any information about a focus on a special phase of the process and therefore only the
neuter variant allows a correct paraphrase.

In addition to aspectual variants there also exist stylistic variants. Those variants do not focus on
a specific phase of a process:

(55) Max (a + caresse + nourrit) l’espoir de revoir Marie

8.2.2.2 Determination of the PredN

8.2.2.2.1 Articles

The selection of an article for a predicative noun in an SVC is not free but it is rarely completely
fixed. There are complex constraints on the use of articles depending on different properties of
the predicative noun and the support verb.

So, the use of a specific article can vary for the same predicative noun depending on the variation
of the argument-structure, which is not specific to SVCs, and neither to predicative nouns, but is a
general NP specification issue. On the other hand, the use of a specific article sometimes depends
on the support verb variant. In the German examples below, the terminative variant selects a
definite article for the predicative noun:

(56) Max hat (0 + *eine + *die) Hoffnung auf eine Stelle.
(Max has hope for a job).
(57) Max verliert (*0 + *eine + die) die Hoffnung auf eine Stelle.
(Max loses the hope for a job).
(58) Max hat Mut.
(Max has courage).
(59) Max verliert den Mut.
(Max loses the courage)
Possessives

For most predicative nouns, a possessive can introduce a PredN in an active SVC only if it is coreferent with the subject: a sentence like

(60) *John carried out my attack against Mary

is as deviant as:

(61) *John carried out Peter’s attack against Mary

A possessive coreferent to the subject is possible only with some PredN:

(62) I made my decision about Mary.
   *I gave Mary my kiss

This use of a possessive coreferent to the subject is anaphoric: it can occur in a context like

(63) I have to make a decision about Mary. I will make my decision next week.

where the possessive can alternate with a demonstrative without clear change of meaning.

The possibility for a PredN in an SVC to be introduced by a possessive coreferent to the subject may depend on the variant of the SVC:

(64) *J’ai mon courage. [neuter]
   J’ai perdu mon courage. [terminative]

In this case, the use of a possessive coreferent to the subject looks lexical, although it can be considered as anaphoric because of the following paraphrase:

   J’ai perdu mon courage
   = J’ai perdu le courage que j’avais

8.2.2.3 Argument Realization

A last linguistic property shall be mentioned. It has to do with the various ways the arguments of a predicative noun can be realized in the surface structure. Three behaviours can be distinguished. We take therefore three examples of nouns (interruption, description, mépris), which illustrate each one of these three behaviours. Each of the mentioned nouns subcategorize for two arguments: the agent (or the cause) and the topic (or theme). Let us see how these arguments are represented:

Interruption

*Interruption* gives rise to the following paradigm:

(65) l’interruption du match par la pluie.
   (The interruption of the match by the rain)
(66) l’interruption du match.

(67) *l’interruption de la pluie. (where de la pluie represents the cause of the interruption)
(68) *son interruption du match.

This means that the cause cannot appear as a genitive (see the forbidden co-occurrence of the possessive son and the object introduced by de). It can appear only as a “by-object”. Therefore, we will say that interruption has only a passive reading.

Mépris

Mépris has a rather opposite behaviour:

(69) le mépris de Paul pour l’argent.
    (Paul’s contempt for money)
(70) le mépris de Paul.
(71) son mépris pour l’argent.
(72) son mépris de l’argent.
(73) le mépris de l’argent.
(74) *le mépris de l’argent par Paul.

Here, the préposition de can be used to introduce either the agent, or the object. Genitive construction is thus allowed. On the other hand, the realization of the agent by means of a “by-object” leads to an ungrammatical sentence. Therefore, we say that mépris has only an active reading.

Description

The predicative noun description can realize its arguments both like mépris and interruption:

(75) la description du suspect par Luc.
    (the description of the suspect by Luc)
(76) la description du suspect. (= object)
(77) la description de Luc. (= agent)
(78) la description de Luc du suspect.
(79) sa description du suspect.

We say in this case that description is a passivizable predicative noun: the agent is represented either as a genitive, or as a “by-object”.

8.3 Background Discussion

In this section we give an outline of different approaches to SVCs. We set aside LADL-work, which has been done in descriptive, transformation-based linguistics, and aimed at producing a systematic description of the French language by recording not only the lexical forms, but also the basic syntactic structures in which the form can occur. Their results have largely contributed to a coherent definition of SVCs (see Namer (1994b)). We are going to examine two other approaches: First the Clas & Mel’čuk (1984) (totally semantic) theory, and then the HPSG-based approach, which exposes some problems from a semantic point of view (see Namer (1994b)).
8.3.1  **RESTRICTED LEXICAL CO-OCCURRENCE (CRL)**

This approach, developed in Clas & Mel’čuk (1984), is purely semantic. It is inspired from the notion of *collocation*, introduced among others by R. Firth (1951) and referred to by Hausmann (1985) to indicate the co-occurrence constraints existing between two lexical units: both are not associated in a completely free way, but one of them determines the occurrence of the other one. The definition of Clas & Mel’čuk (1984) is slightly different from that of Hausmann (1985), as it is rather a reformulation of the non-compositionality criterion:

“Lexical co-occurrence refers to the ability of lexemes to combine into phrases to express a given meaning. Restricted lexical co-occurrence refers to the fact if a lexeme A whose meaning is 'A', and a lexeme B whose meaning is 'B' cannot combine to express the compound meaning 'A + B', though there are no syntactic constraints preventing this.

In Clas & Mel’čuk (1984), CRLs are described in terms of lexical functions. A lexical function takes a lexeme as argument (word which is associated to a meaning) and maps it onto one or several lexemes which reflect the meaning indicated by the lexical function. An example is that of **Supp**, which takes a predicative noun as argument, and returns the support verb as value:

\[
\text{Supp(}décision) = \text{prendre [ une décision].}
\]

The limits of such an approach are evident. Though the information recorded under each lexical entry is very rich, it does not correspond to any syntactic criteria, but rather reflect semantic intuitions and thus the work in Clas & Mel’čuk (1984) is hardly reusable in any NLP-directed formalism.

8.3.2  **HPSG**

HPSG in itself (Pollard & Sag (1994)) does not foresee at all a noun to be predicative. Trying to extend the theory - and especially the semantic principle - one sees very quickly that it is not suitable for other predications than the verbal one. There is semantic type incompatibility, together with problems with quantifier scope (what is the scope of quantification if the noun is predicative? This situation cannot be handled by the Scope Principle).

Now, let us examine the approach which is proposed in Erbach & Krenn (1994), which aims, among others, at proposing an HPSG solution to SVCs. First, one can notice that semantics is set aside. The content is mentioned, but the authors simply assume that nouns are psoas, and thus ignore the noun specifiers’ problem.

The approach, from a syntactic point of view, follows the same philosophy as ours, which consists in making use of the “argument inheritance” concept (see other sections).

The problem lies ‘in the direction’ the selection is made. When a semantic unit is compound, one has to decide which component selects the other one. Logically, the direction should correspond to the minimal cost. Now, in Erbach & Krenn (1994), the authors chose the verb as selectional head, which means that a support verb lists all the predicative nouns which it can combine with. The (German) example below depicts the lexical entry of *haben*, such as in *Angst/Vertrauen haben*: 

\[
\text{haben(}décision) = \text{Angst [ Vertrauen [ }décision].}
\]
The ‘...’ are put for all the possible disjunctive NP lemmas possibly associated with the support verb. The reader can easily imagine how long the disjunctive chain should be with verbs such as faire (make) or prendre (make). Moreover, in any non purely theoretical study, one sees that the solution is totally inefficient as disjunctions - generalized disjunctions - are very expensive from a computational point of view.

8.3.3 Our Solution

Our solution, originally proposed by Jørgensen & Samvelian (1993), and then by Namer & Schmidt (1993), is also based on the argument inheritance principle, which is the condition for the predicative noun constituents to allow for multiple extractions. However, opposite to section 8.3.2, we do not consider the verb as selecting the predicative nouns, for the reasons exposed above, but exactly the other way round. Our model, described below, has the following properties:

- It is easily adaptable to the mainstream recommendations given in 2 (Formal Assumptions) and chapter 6 (Predicate-Argument-Structure),
- It is compatible with the extraction, double analysis properties mentioned in section 8.2,
- It is easily extensible in that the semantics of the SVC could be seen as some kind of combination of the semantics of the noun and the semantics of the verb (provided that this “kind of combination” is known),
- It requires no further kind of knowledge for the processing of cross-discontinuities.
- It is not in contradiction with the possibility of alternation.

Its description includes the following parts:

- Representation of a valent noun, including the semantic structure proposed in chapter 6 (Predicate-Argument-Structure), and thus integratable into the corresponding type system. An additional feature characterizes the predicative noun/support verb relation.
- Representation of a support verb
- Representation of the extraction/multiple attachements
8.3.3.1 Predicative Nouns

8.3.3.1.1 Semantic Content

The semantic content of a predicative noun, be it deadjectival, deverbal or non derivational, has a dynamic reading. From that the formal representation proposed in chapter 6 (Predicate-Argument-Structure), and illustrated by the example *administration* follows:

\[
\text{(81)}\quad \begin{array}{c}
\text{INDEX} \\
\text{PERS} \\
\text{3RD} \\
\text{NUM} \\
\text{SING} \\
\text{REL} \\
\text{ARG-EVENT} \\
\text{ARG1} \\
\text{ARG2} \\
\text{SEM_ADJ} \\
\end{array}
\]

Monovalent “relational” abstract nouns, denoting a property, a part-of, etc. get the semantic structure exemplified by *size*:

\[
\text{(82)}\quad \begin{array}{c}
\text{INDEX} \\
\text{PERS} \\
\text{3RD} \\
\text{NUM} \\
\text{SING} \\
\text{REL} \\
\text{SIZE} \\
\text{ARG1} \\
\text{ARG2} \\
\text{SEM_ADJ} \\
\end{array}
\]

Together with this structure, the predicative noun, which we assume selecting the lemma of the support verb(s) it combines with, must encode the following general syntactic information:

- the characterization of the support verbs, and their aspect,
- the constraints on the extractability of its arguments in a SVC.

8.3.3.1.2 Light Verbs Alternative Selection

The value of the light verb which can be associated with the predicative noun can be considered as an intrinsic property of the noun. However, there is not only one, but there are several variants of the light verb which combine with a given noun. The first idea is to propose a disjunction of values, with the corresponding aspect or stylistic characteristics. As this solution would be compiled out into as many lexical entries as there are verb variants, this is not very desirable.
An alternative consists in applying the solution proposed by Rieder, P. & A. (1995a) to handle the alternance in the syntactic realizations of arguments of a predicate.

The approach makes use of a feature, called COHEAD, which, for each argument, instantiates a set of features reflecting the possible/forbidden syntactic realizations of this argument. Besides, each lexical entry indicates in the same feature COHEAD its maximal projection (the other slots remaining unspecified, in order to allow structure unification) which is structure-shared with its HEAD feature. So, the syntactic structure of an N is schematically as in (83):

\[
\begin{array}{c}
\text{HEAD} \\
\text{COHEAD} \\
\end{array} \begin{array}{c}
\text{N,HEAD} \\
\end{array}
\]

The COMPS list structure of verbs which e.g. respectively (a) can subcatergorize for an NP and (b) exclusively subcategorize for a VP are:

(a) \[
\begin{array}{c}
\text{COHEAD} \\
\text{N,HEAD} \\
\end{array} \begin{array}{c}
\text{[...]} \\
\end{array}
\]

(b) \[
\begin{array}{c}
\text{COHEAD} \\
\text{N,HEAD} \\
\end{array} \begin{array}{c}
\text{NO} \\
\end{array}
\]

In (a), the COHEAD value of the verb COMPS list unifies with that of the noun projection COHEAD given in (83), whereas the unification fails in (b), because there the N,HEAD value is no.

We adopt this approach to represent the syntactic realization of the support verb:

- In the lexical entry of the verb, the head feature LIGHTV encodes the lemma of the verb and its aspect, if it is a support verb (whose overall structure wrt full verbs is explained below). If it is a full verb the value is no. Another head feature, COLIGHTV is instantiated with a structure whose elements are the possible aspectual/stylistic variants of the light verb:

\[
\begin{array}{c}
\text{COLIGHTV} \\
\end{array} \begin{array}{c}
\text{NEUTER} \\
\text{INCHO} \\
\text{DUR} \\
\text{TERM} \\
\text{ITER} \\
\end{array} \begin{array}{c}
\text{<ATOM>} \\
\text{<ATOM>} \\
\text{<ATOM>} \\
\text{<ATOM>} \\
\text{<ATOM>} \\
\end{array}
\]

For instance, the COLIGHTV value is a disjunction for prendre, which is either a NEUTER support verb (prendre une décision/ take a decision) or an INCHO one (prendre espoir/ gain hope). (85) is a simplified representation of the HEAD value of the support verb prendre, in which distributed disjunction (which allows for an elegant co-variation of the LIGHTV\text{ASPECT} and COLIGHTV values) is represented by “$1$”:

\[
\begin{array}{c}
\text{LIGHTV} \\
\text{COLIGHTV} \\
\end{array} \begin{array}{c}
\text{VAL} \\
\text{ASPECT} \\
\end{array} \begin{array}{c}
\text{PRENDRE} \\
\text{$1$: (NEUTER \lor INCHO)} \\
\text{$1$: \left[\text{NEUTER} \lor \text{INCHO} \right]} \\
\end{array}
\]
On the predicative noun, the head feature COLIGHTV encodes the complete paradigm of the possible SVC associated to the noun. So, show (1) the (simplified) head structure of decision, and (2) that of espoir, wrt to the support verb construction:

(1) \[
\begin{bmatrix}
\text{NEUTER} & \text{PRENDRE} \\
\text{INCHO} & \text{NO} \\
\text{DUR} & \text{NO} \\
\text{TERM} & \text{NO} \\
\text{ITER} & \text{NO}
\end{bmatrix}
\]

(2) \[
\begin{bmatrix}
\text{NEUTER} & \text{AVOIR} \\
\text{INCHO} & \text{PRENDRE} \\
\text{DUR} & \text{GARDER} \\
\text{TERM} & \text{PERDRE} \\
\text{ITER} & \text{NO}
\end{bmatrix}
\]

The unification process between the predicative noun and the support verb (which ensures the resulting structure to be a SVC) is the same as with the COHEAD feature described above.

8.3.3.1.3 Summary

The general structure of a valent noun, which can be part of an SVC, is the following:

(86) \[
\begin{bmatrix}
\text{HEAD} & \text{COLIGHTV} & [\ldots] \\
\text{SUBJ} & \langle [\ldots] \\
\text{COMPLS} & \langle [\ldots] \\
\text{INDEX} & \text{EVE} \\
\text{CONT} & \text{RESTIND} & \text{RESTR} & \text{PAS} & \text{ARG-EVE} & \text{eve} \\
\text{ARG1} & \text{ARG2} & \text{ARG3} & \text{ARG4} & \text{ARG5} & \text{ARG6} & \text{ARG7} & \text{ARG8}
\end{bmatrix}
\]

8.3.3.2 Light Verb Structure

If we assume the hypothesis under which the support verb does not carry any informative content, but only marks tense and aspect, then two representations, taken from traditional approaches on argument inheritance can be examined:

- The verb as the copula,
- The verb as a tense auxiliary, under the Jörgensen & Samvelian (1993) and Abeillé & Godard (1994b) hypotheses.

The first hypothesis implies the predicative noun to have combined with all its complement, so the light verb is divalent, subcategorizing a predicative NP with an unsaturated subject list, and a subject, whose content is token-identical to that of the PredN’s unrealized subject. The drawback of this solution is that it assumes a minimal structure for the predicative noun (no complements are described) which makes argument extraction impossible.
Let us examine the second solution. It consists in considering the subcategorized for PredN as completely unsaturated for its SUBJ and COMPLS lists. So, the verb inherites from it its whole complementation, including the subject.

In other words, a light verb has a parametric COMPLS list. Its syntactic structure is the following:

$$\begin{array}{l}
\text{HEAD} & \left[ \text{LIGHTV} | \text{VAL} \right. \\
\text{COLIGHTV} & \left[ \text{ASPECT} \right. \\
\text{SUBJ} & \left. \right] \\
\text{COMPLS} & \left[ \text{NP:} \right. \\
\text{COMPS} & \left. \right] \\
\text{CONT} & \left. \right] \\
\text{RESTR} & \left. \right] \\
\text{PAS} & \left. \right] \\
\end{array}$$

From a semantic point of view, the light verb inherits from the PredN its content, to which it associates its own semantic properties.

$$\begin{array}{l}
\text{CAT} & \left[ \text{HEAD} | \text{LIGHTV} \right. \\
\text{COMPS} & \left[ \text{VAL} | \text{*LEMMA*} \right. \\
\text{RESTR} & \left. \right] \\
\text{REL} & \left. \right] \\
\text{ARG-EVENT} & \left. \right] \\
\text{ARG1} & \left. \right] \\
\end{array}$$

Figure (88) suggests that the predicative relation of the support verb provides the aspectual feature the verb gives to the sentence. This information, of course, could be represented as index value (tag 0), so that two alternative representations could be proposed for the support verb:

1. The same architecture as above is kept, except that (a) the aspect (1) goes into the CONT|RESTIND|PAS|INDEX value, and (b) the CONT|RESTIND|PAS|REL attribute receives the actual semantic contribution of the verb, if any (see section8.2, example (15)) (but how could it be formulated?), and otherwise, an arbitrary null value,

2. The architecture in (88) is replaced by the (simpler) following one, where the PAS feature is made up only of the predicative noun content:

$$\begin{array}{l}
\text{INDEX} & \left[ \text{eve} | \text{ASPECT} \right. \\
\text{RESTR} & \left. \right] \\
\text{PAS} & \left. \right] \\
\end{array}$$
The drawback of the second solution is that it does not enable the formulation of the semantic contribution of the verb in the SVC meaning.

In the following, we will keep the hypothesis illustrated by figure (88).

8.3.3.3 Frame Alternations

8.3.3.3.1 Optionality, Permutations

Predicative noun complements are all optional. This optionality is transferred to the verb. As far as the verb COMPLS list permutation is concerned, things are not so clear. In fact, the answer does not depend on the predicative noun, but it is rather a (language-specific) matter which has to do with complement reordering constraints, in general. So, roughly, we observe in French that the NP[mark] < NP reordering is possible (among others) when the NP is undefined or modified by an adjunct:

(90) Max a présenté Luc à Marie.
\[\Rightarrow\]
*Max a présenté à Marie Luc.
Max a présenté à Marie un beau garçon.

The same occurs with a support verb: when it combines with an undefined predicative noun, the permutation of the complements is straightforward:

(91) Max a commis une agression contre Marie.
Max a commis contre Marie une agression (e + ignoble).

On the other hand, complement permutation is sometimes forbidden:

(92) Max a pris la décision d’épouser Clara.
* Max a pris d’épouser Clara la décision.

8.3.3.3.2 Passivization

Passivization and Unbounded Dependencies are two cases in which “double analysis” can be observed. As for passivization, only two projections of the predicative noun can behave as passive subject:

(1) The totally unsaturated predicative NP
(2) The NP whose COMPS list is saturated and whose subject is unrealized.

Case (1) is the “ordinary” transitive verb passivization rule.
Case (2) describes the fact that, whereas the input includes a list of 2 constituents, the unsaturated PredNP and its COMPS list, the output is the passive construction in which the PredNP becomes the subject AND becomes completely saturated in its complement position. The lexical rule which builds such a representation applies only to support verb constructions, as shown by the non-null LIGHTV value.

8.3.3.3.3 Unbounded Dependencies

Let us now turn to the UDC, for which we adopt the general “lean” strategy depicted in 4 (Phrase Structure). Our problem is to constrain constituent extraction, according to the observations which are made in section (8.2).

Recall that we assume the following extractions to be licit:

<table>
<thead>
<tr>
<th>DET</th>
<th>PredN</th>
<th>NPA</th>
<th>NPb</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>det-undef PredN</td>
<td>det-undef PredN</td>
<td>det-undef PredN</td>
</tr>
<tr>
<td>2</td>
<td>det PredN NPa</td>
<td>det PredN NPa</td>
<td>det PredN NPa</td>
</tr>
<tr>
<td>3</td>
<td>NPa</td>
<td>NPa</td>
<td>NPa</td>
</tr>
<tr>
<td>4</td>
<td>NPa</td>
<td>NPa</td>
<td>NPa</td>
</tr>
</tbody>
</table>

Here again, cases (1), (3) and (4) are accounted for in complement extraction lexical rules as they are described in Pollard & Sag (1994), chapter 9 and mentioned in 4, (Phrase Structure).

In addition, we have to define a rule which handles case (2), i.e. which performs the same “frame transformation” as the lexical rule (94) does for passivization:
8.4 Examples

In this last section we give 3 examples to illustrate various aspects of support verb constructions. The examples start with lexical entries. The phrase structure rules are inspired by HPSG.

First we are going to examine an active monoclausal sentence (97). Then, a passive monoclausal sentence where the “fully saturated” predicative NP is in the passive subject position (98). Finally, we give an example of a relative clause whose relative pronoun refers to the fully saturated predicative noun (99):

(97) L’Opposition réitère ses critiques au gouvernement.
(The opposition repeats their criticism to the government.)

(98) La décision de voter la motion de censure a été prise par la majorité des députés.
(The decision of introducing a vote of censure has been taken by the majority of the representatives.)

(99) [les bombardements contre Sarajevo] que les Serbes ont effectués […]
The bombing of Sarajevo which the Serbs carried out […]

8.4.1 Example (1)

In (97), the support verb (réitérer) is the iterative aspectual variant of the verb faire which combines with critiques to produce the neutral SVC faire une/des critiques. The use of the possessive ses must be understood in the restrictive meaning mentioned in section (8.2), example (63).

8.4.1.1 Lexical Entries

The predicative noun critique selects a subject and a complement, which are respectively the author and the target of the criticism.
Assuming the HPSG standard for the phrase structure rules, we have:

- First, the ID2 schema applied, which successively combines together the verb and the predicative noun, and then the resulting structure to the nominal phrase object *au gouvernement*:
The resulting VP then combines with the subject *L’Opposition*. The content value of the sentence is given in detail in figure (103):

8.4.2 Example (2)

In this second example, we show how the approach chosen is compatible with passivization. In (98), the passive transformation implies the extraction of the PredNP + its complement. So, it is the lexical rule (94) that is activated (see section (8.3), subsection 8.3.3.3.2).

8.4.2.1 Lexical Entries

The lexical entry of the neutral verb *prendre* has been partially given in the previous section (section 8.3.3.1.2, (85)). Here is its complete description, including its frame and its content:
The dative noun *décision* subcategorizes for an NP subject and a VP complement:

(105)  

```
(105)  

<table>
<thead>
<tr>
<th>HEAD</th>
<th>COLIGHTV</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>SUBJ</th>
<th>COMPS</th>
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<tbody>
<tr>
<td></td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>INDEX</th>
<th>eve</th>
</tr>
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</table>

<table>
<thead>
<tr>
<th>CONT</th>
<th>RESTIND</th>
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<tbody>
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</table>

<table>
<thead>
<tr>
<th>RESTR</th>
<th>PAS</th>
</tr>
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<td></td>
<td></td>
</tr>
</tbody>
</table>
```

The dative noun *décision* subcategorizes for an NP subject and a VP complement:

8.4.2.2 Phrase Structure Rules

First, the verb undergoes the lexical rule (94) whose output is the new lexical item:
8.3.3.3.3). This is an example of cross-discontinuity: there is an interaction between the support verb construction (effectuer des bombardements) and the relative construction. As the extracted constituent is the predicative NP with a fully saturated COMPS list, this means that the lexical rule for the complement extraction applying to the light verb is the one which is given in figure (96) (see section 8.3, subsection 8.3.3.3.3).
8.4.3.1 Lexical Entries

*bombardement* is a divalent predicative noun, with an agent subject (introduced by *de*, and a goal object, introduced by a variable direction preposition (*sur, contre, ...*):

(108)  

```
<table>
<thead>
<tr>
<th>CAT</th>
<th>SUBJ</th>
<th>COMPS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>⟨NP[DE]:מ⟩</td>
</tr>
<tr>
<td></td>
<td></td>
<td>⟨PP[CLASS DIR]:מ⟩</td>
</tr>
<tr>
<td></td>
<td></td>
<td>[REL BOMBARDEMENT]</td>
</tr>
<tr>
<td></td>
<td></td>
<td>[ARG-EVE מ]</td>
</tr>
<tr>
<td></td>
<td></td>
<td>[ARG1 נ]</td>
</tr>
<tr>
<td></td>
<td></td>
<td>[ARG-DIR נ]</td>
</tr>
</tbody>
</table>
```

*bombardement*

The verb *effectuer* is basically represented as follows:

(109)  

```
<table>
<thead>
<tr>
<th>CAT</th>
<th>SUBJ</th>
<th>COMPS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>⟨NP:מ⟩</td>
</tr>
<tr>
<td></td>
<td></td>
<td>⟨NP[PRED]⟩</td>
</tr>
<tr>
<td></td>
<td></td>
<td>[DET + HEAD [COLIGHTV מ] SUBJ [NP:מ]</td>
</tr>
<tr>
<td></td>
<td></td>
<td>[INDEX מ eve]</td>
</tr>
<tr>
<td></td>
<td></td>
<td>[REL נ]</td>
</tr>
<tr>
<td></td>
<td></td>
<td>[ARG-EVENT נ]</td>
</tr>
<tr>
<td></td>
<td></td>
<td>[ARG1 נ]</td>
</tr>
</tbody>
</table>
```

*effectuer*
8.4.3.2 Phrase Structure Rules

The verb in (109) undergoes the application of the complement extraction rule (96) which moves the PredNP plus its complement to the non-local position. The rule output is thus:

\[
(110) \quad \text{effectuer (+ Comps extraction)}
\]

This output combines with the subject to produce a sentence which is well-formed from the subcategorization point of view. As the NONLOC lists are not empty, we apply the FILLER-HEAD rule, as it is depicted in chapter 4 (Phrase Structure, 4.4.2). We just focus on the UDC issue, leaving the relativization problem aside (i.e. the relationship between the relative pronoun and the referred to noun phrase) which is not specific to SVCs. For a discussion about the possible formalization of relativization, see the proposals e.g. in 4 (Phrase Structure) and Heyd et al. (1995).

The content of the result is:
8.5 Conclusion

This chapter has shown how support verb constructions can be recognized and how they can be handled by a TFS-based formalism.

We have shown that the approach we have chosen to depict SVCs is compatible with the main properties of this construction, but also with the basic, syntactic, structural and semantic assumptions provided respectively by chapter 2 (Formal Assumptions), chapter 4 (Phrase Structure) and chapter 6 (Predicate-Argument-Structure).

We have proposed a structure for SVC which is the maximal projection of the verb, but its semantic content is that of the predicative noun. Actually, the semantic specifications presented here have taken the idea of totally meaningless verbs (e.g. faire) as a basis. We have shown that this is suitable for light verbs, provided that a compositional semantics is assumed.

However, some problems, which were addressed in (see Namer (1994b)) still remain unsolved. Recall in fact what the conclusion in Namer (1994b) was describing, in terms of tasks to be done:

1. combine the noun modifiers with the verbal adjuncts, in the generated complex verbal unit.
2. insert tense and aspect (according to the relevant legislation).
3. represent the SupV as being likely to have a proper semantic content (e.g. in Max donne un livre et un baiser à Eva), and thus, represent the content of the head of a SVC as the combination of the SubV semantic information and the PredN semantic information
4. consider the light verb which is selected by the PredN not as a single possibility, but as the disjunction of several (possibly structured) variants (stylistic or aspectual).

Points 2, 3 and 4 are solved. Point 1 remains a very complex issue. Observe, for instance the two following examples:

(112) Chirac prend des décisions condamnables à propos du nucléaire.
(Chirac takes objectionable decisions concerning nuclear policy.)

(113) Chirac prend des décisions à propos du nucléaire qui indignent l’opinion mondiale.
(Chirac takes decisions concerning nuclear policy which disgust international opinion.)
We are going to see that, whereas (112) can perfectly be accounted for in our approach, thanks to the current decisions concerning semantics providing a parallel structuring for nouns and predicates, example (113) raises a new discontinuity for which we can only propose provisional ways of resolution.

First, example (112) can be processed within our approach, as we assume the predicative noun phrase to be totally unsaturated from the subcategorization point of view when it is involved in a support verb construction. Nevertheless, nothing is said about its behaviour wrt adjuncts: actually any adjunct placed directly after the predicative noun combines with it before the resulting N’ combines with its specifier. As nouns and verbs have compatible semantic content, such a noun adjunct becomes a verb adjunct without problem. As far as example (112) is concerned the following semantic content can be predicted:

Now, let us turn to the second example. Here, the PredN modifying relative clause is not part of the same sequence as the predicative noun, as the noun complement (à propos du nucléaire) is interleaved with them. This is common in free order languages such as French. The only way to handle the relative clause is thus as a verb modifier. But this may be the source of overgeneration if the required constraints (which still have to be defined) are not set.