

# SUPINE NOMINALS AS PARTICIPIAL NOMINALISATIONS<sup>1</sup>

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**Abstract:** In this paper, we discuss the morpho-syntactic properties of nominal supines in Romanian in relation to their past participle morphology. In view of the morphological similarity between the participle and the nominalization (highlighted by the presence of *-t/s* in both the verbal and the nominal environment), we claim that the same syntactic structure is present in both. The question we want to then investigate concerns the type of participle involved in the nominalization. Recent work in this area distinguishes between resultant state and target state participles. We show that only the former feeds supine formation.

**Keywords:** nominal supine, target-state participle, resultant-state participle

## 1. Introduction

In the literature on the Romanian supine, it is standardly assumed that both its nominal and verbal guises are formed on the basis of the past participle stem (*Gramatica Academiei* 1966, Guțu-Romalo et al. 1967, Pană-Dindelegan 1992, 1995, Cornilescu (in preparation), Soare 2002 among others). As we see in (1), both the “verbal” (1c) and the “nominal” (1b) uses of the supine contain the past participle suffix *-t/-s*:

- (1) a. Am *citi -t* cartea.  
have read-PRT book-the  
‘I read the book.’
- b. *Citi -t -ul* cărților este relaxant.  
read-SUP-the books-GEN is relaxing  
‘Reading books is relaxing.’
- c. Ion s -a apucat *de citi-t* cărți SF.  
John REFL-has started of read-SUP books SF  
‘John started reading SF books.’

Taking the participial source of the supine as granted, in the present study we are concerned with a different kind of question. In the recent literature it has been argued that participial constructions can be divided into two classes, namely *target* and *resultant* state participles (see for instance Parsons 1990, Kratzer 2000, Anagnostopoulou 2003, Alexiadou and Anagnostopoulou 2008). Thus the question is which of these two is involved in supine formation:

- (2) a. Die Ausfahrt ist *immer noch* versperrt. *Target-state (TS) participle*  
the driveway is still obstructed
- b. Das Theorem ist (*\*immer noch*) bewiesen. *Resultant-state (RS) participle*  
the theorem is still proven (Kratzer 2001:1-2)

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We first show that the nominal supine displays properties similar to those of the RS participle. Second, we provide an analysis of the supine within the framework of Distributed Morphology (Halle and Marantz 1993, 1994 and subsequent work). We claim that it inherits the whole set of verbal functional projections from the RS participle (i.e. vP, VoiceP, and AspectP) which are then embedded under the DP layer introduced by the definite determiner *-ul*.

The paper is organized as follows: in section 2 we discuss the two types of participles and the syntactic differences between them. On the basis of the morpho-syntactic similarities between the RS participle and the nominal supine, we argue in section 3 that the nominal supine is derived from the RS participle and not from the TS one. Section 4 focuses on the syntactic analysis of the nominal supine; we show that the supine involves the whole set of verbal functional projections: v, VoiceP and AspectP like the RS participle. We present our conclusions in section 5 where we also raise some further issues.

## 2. Two types of participles

The distinction between the target state and the resultant state of an event that culminated is best described in Parsons (1990: 234-235): “If I throw a ball onto the roof, the target state of this event is the ball's being on the roof, a state that may or may not last for a long time”. The resultant state is “the state of my having thrown the ball onto the roof and (...) cannot cease holding at some later time”. So the main difference introduced by Parsons is in terms of the possibility/impossibility of the state to not hold anymore at a later point in time.

More recently, the literature has provided several (morpho-)syntactic tests that clearly distinguish between the two uses of the past participle cross-linguistically: the “immer noch (still)” test (Kratzer 2000, for German), the availability of agent and instrument PPs which indicate the presence of a Voice projection (cf. Alexiadou, Anagnostopoulou and Schäfer 2006), and the possibility to accept result- or agent-oriented adverbs (Anagnostopoulou 2003, Alexiadou and Anagnostopoulou 2008, for Greek). In what follows we see how these criteria fare in relation to the Romanian data.

### 2.1 The “immer noch (still)” test

The standard test for the distinction between the two types of participles presented in (2) is proposed in Kratzer (2000) for German (following Nedjalkov and Jaxontov 1988). Given the fact that a resultant state lasts forever and only the target state can have an end, we expect that only the latter participles can be modified by the adverb “still”.

A similar state of affairs is observed for the Romanian participles: a participle describing a temporary state like that of the tires being pumped up can be modified by *încă* “still”, but one describing a permanent result like that of a theorem having been proven cannot:

- |     |    |   |               |
|-----|----|---|---------------|
| (3) | a. | Cauciucurile sînt încă umflate.<br>The tires are still pumped up.   | TS participle |
|     | b. | Teorema este (*încă) demonstrată.<br>The theorem is (*still) proven | RS participle |

In what follows we use *încă*-modification to distinguish between the two participles in our attempt to identify several other morpho-syntactic properties that distinguish them from each other. In doing so, we apply the tests Anagnostopoulou (2003), Alexiadou and



## 2.5 The internal structure of TS/RS participles

In this section, we offer a syntactic analysis of TS/RS participles within the framework of Distributed Morphology (DM, see Halle and Marantz 1993, 1994) approach.

The basic assumptions of this approach can be summarized as follows:

1. Word formation makes reference to roots as atomic lexical elements in combination with functional elements
2. Words have a complex syntactic structure

In particular, it is generally assumed that languages have atomic, non-decomposable elements, which are called roots. Roots are non-decomposable. Roots combine with features, the functional vocabulary, and build larger elements. On this view, words are not primitives. The primitives of word formation are the roots and the functional vocabulary. Importantly, roots are category neutral. They are then categorized by combining with category defining functional heads.

In this analysis the root contains a core minimal meaning. But everything else in terms of meaning must come from the structure. In other words, if something is interpreted as event, a functional layer introducing this event implication should be present, namely *v*.

In our analysis we use the following building blocks of words and criteria used to provide empirical evidence for their presence in structure and hence the complexity of words. Our building blocks are *v*, VoiceP, AspectP, *n* and *D*. *v* is a verbalizer which brings about event implications and its presence in the structure can be detected via modification. Voice is the layer that introduces the external arguments and its presence in the structure is diagnosed by licensing of PPs. Aspect is so called outer Aspect, diagnosed by the presence of participial morphology and adverbial modification; outer Aspect receives a  $\pm$ perfective interpretation. *n* is a nominalizer, which brings about individual/entity interpretation. Finally, *D* is the layer that introduces reference/definiteness.

Concerning the internal structure of TS and RS participles, Alexiadou and Anagnostopoulou (2008) argued for Greek that both TS and RS project a *v* head, since they both contain event implications<sup>2</sup> (see Parsons 1990, Kratzer 2000: the two participles occur as the result of an event having culminated). As evidence for this, note that both TS and RS participles include in their structure a verbal suffix like *-iz* which is taken as the overt reflex of a *v* head, a head that verbalizes roots and introduces eventuality (see Alexiadou 2001, forthcoming):

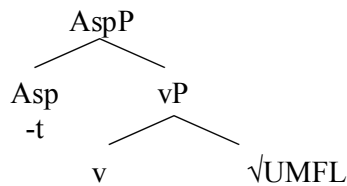
(7)	Root	Verb	TS/RS Participle
	COLON	- colon- <b>iz</b> -a - (to) colonize	- colon <b>izat</b>
	FAVOR	- favor - <b>iz</b> -a - (to) treat with favor	- favor <b>izat</b>
	COMPUTER	- computer - <b>iz</b> -a - (to) equip with/control by computers	- computer <b>izat</b>

In the light of the tests presented in section 2 we claim that a Voice head is presented only in the structure of RS participles (see 5- 6 above), since only these ones can license instrumental PPs.

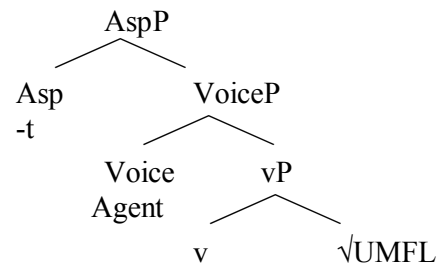
Both participles project Aspect (the stativizer in Kratzer 2000), as they both contain the participial suffix *-t/s* which carries the aspectual features. The difference between the two types of participles is that Aspect attaches to the *v*P in the case of the TS participle but to the VoiceP in the case of the RS participle (see also Anagnostopoulou 2003, cf. Embick 2004):

<sup>2</sup> In Romanian, we have morphological ambiguity between the three forms, but we do not go into this discussion, since it would take us too far from our purposes.

(8) a. TS Participle



b. RS Participle



Note that the forms in (7) contain -a-. This is thematic vowel associated with all Romance verbal formations. It has been argued by e.g. Ippolito (1999) for Italian and Oltra-Massuet (1999) for Catalan that thematic vowels in Romance languages attach to functional heads, such as v, presumably post-syntactically, i.e. in the morphological component. In (8) *iz-* is the realization of the verbalizer v to which the thematic vowel attaches.

### 3. Resultant state participles and the nominal supine

In view of the morphological similarity between the participle and the nominalization (highlighted by the presence of *-t/s* in both the verbal and the nominal environment), we claim, following Ippolito's (1999) insights, that the same syntactic structure is present in both. The question is then which of the two participles serves as the functional basis for building a supine nominal. The supine nominal introduces a DP layer, so the concern now is which of the two participial structures in (8) gets nominalised. As we will see in this section, the nominal supine exemplified in (1b) fully shares the properties of RS participles. On the basis of this similarity, we consequently argue that the nominal supine is a nominalization of the functional structure in (8b) and not of that in (8a).

#### 3.1 Eventuality in the supine

To begin with, there is a consensus in the literature starting with Grimshaw (1990) that the projection of argument structure (in particular, the theme) in derived nominal indicates the presence of event structure. In DM terms, an event interpretation is realized in vP. The supine can project its theme (cf. (1b) and (9)) and it also allows eventive modifiers like “frequently” as well as manner adverbs (result- or agent-oriented):

- (9) *umflatul cauciucurilor frecvent/prost /atent*  
 pump-up-SUP-the tires-GEN frequently/badly /carefully  
 ‘the frequent/bad/careful pumping up of the tires’

This means that the supine nominal inherits the vP level from the participle, no matter which of the two structures in (8) is embeds.

#### 3.2 Voice specification

The availability of agent and instrumental PPs illustrated in (10) with the supine indicates a first similarity to the RS and not to the TS participle. This means that the supine nominal projects Voice:

- (10) umflatul cauciucurilor *de către tata (cu pompa)*  
 pump-up-Sup-the tires-Gen by father (with the pump)  
 ‘the pumping up of the tires (with the pump) by the father’

The behaviour of the nominal supine with respect to the theme-agent co-referentiality test in Kratzer (1994, 2000) indicates that the presence of Voice is actually obligatory in the nominal supine (Iordăchioaia 2008). According to Kratzer, the passive construction in (11a) excludes the coreferentiality between the Agent and the Theme (i.e. the child having combed itself), because this would trigger a Principle C effect. The R-expression *das Kind* would be c-commanded by the coindexed external argument introduced by the Voice projection. By contrast, the adjectival participle in (11b) does not have a Voice projection to host the external argument, so coreference between the Theme and the Agent does not trigger Principle C effects:

- (11) a. Das Kind *wurde* gekämmt.            Th ≠ Ag; #Th = Ag  
           the child was combed  
       b. Das Kind *war* gekämmt.            Th ≠ Ag; Th = Ag  
           the child was combed  
           ‘The child was combed.’

As the data in (12) indicate, the supine nominal patterns with the passive construction in (11a) which suggests that it contains a Voice projection:

- (12) anunțatul oaspeților  
 announce-Sup-the guests-Gen  
 a. #Agent = Theme: “the guests announced themselves”  
 b. Agent ≠ Theme: “the guests were announced by somebody else”

Alexiadou, Anagnostopoulou and Schäfer (2006) argue that internally-caused roots do not project Voice, since they do not license agent PPs, they simply have a *v* head which only licenses causer PPs:

- (13) Lemnul a putrezit *de la umezeală/\*de către umezeală*.  
 wood-the has rotten from humidity/\*by humidity

As a further piece of evidence in favour of the presence of Voice, note that the supine nominal is incompatible with internally-caused roots, precisely because they cannot project Voice:

- (14) \*ruginitul fierului / \*putrezitul lemnului  
 rust-Sup-the iron-Gen / rot-Sup-the wood-Gen

In conclusion, the supine embeds the RS participle structure in (8b).

### 3.3 Incompatibility with i(ndividual)-level predicates

Another piece of evidence that supports the similarity between the RS participles and the supine is the incompatibility with i(ndividual)-level predicates. According to Kratzer (2001), the only verbs that lack an R-state are the i-level predicates described in Kratzer (1995): e.g. *know*, *own*:

- (15) Poeziile lui sînt (încă) cunoscute (printre adolescenți).  
 poems-the his are still known among teenagers  
 a. His poems are still (well-)known among teenagers (nowadays). *TS participle*  
 b. \*His poems have been known by teenagers. *RS participle*

These verbs lack a (Davidsonian) event argument that could culminate so that the R-state is available (Kratzer 2000), so this is why a corresponding RS participle is excluded.

For the supine, Iordăchioaia and Soare (2008) argued that it disallows individual-level predicates, due to the fact that they cannot be understood as bounded and then pluralized over by the pluractional operator in the supine:

- (16) \*Cunoscutul limbilor străine/ \*descinsul omului din maimuță  
 know-Sup-the languages foreign-Gen/ descend-Sup-the man-Gen from monkey  
 ‘the knowledge of foreign languages/the descent of the man from the monkey’

In the literature, boundedness is related to the limitation of an event in space and/or time (Jackendoff 1991) and in Kratzer’s (1995) terms, spatial and time location is related to the presence of the event argument. Thus the lack of the event argument in i-level predicates correlates with their impossibility of becoming bounded. We conclude that the incompatibility between the supine and i-level predicates, and the one between resultant-state participles and i-level predicates has the origins in the one and the same source, namely the lack of the event argument.

### 3.4 Negation

The analysis of RS and TS participles in Kratzer (2001) accounts for the different interpretations that the negative prefix *-un* has: contradictory negation with the former and contrary negation (if *-un*-prefixation is at all possible) with the latter.

Horn (1989, Ch. 5) distinguishes between contrary and contradictory negation as linguistic ways of expressing contrary oppositions (e.g. black – white, bad – good, healthy – unhealthy) and contradictory oppositions (e.g. black – nonblack, male – female, expired – unexpired). Importantly, the negation of a contrary negation does not entail the affirmative (17a). By contrast, the negation of a contradictory negation does entail the affirmative (17b).

- (17) a. John is not *unhealthy*.  $\neq$  John is *healthy*.  
 b. The food is not *unexpired*.  $\Rightarrow$  The food is *expired*.

With respect to negation, TS participles seem to resemble pure adjectives and can only be interpreted as contrary negation. In (18b) we have an example of a TS participle *aerisit* ‘aired’ whose negation *neaerisit* ‘unaired’ is a contrary negation. The modification by *încă* ‘still’ and the ungrammaticality of the agent PP in (18c) indicate that we are dealing with a TS participle. The negation of a contrary negation as not yielding an affirmation in (18d) indicates that the TS participle is indeed a case of contrary negation:

- (18) a. sănătos – nesănătos; gol - \*negol (adjectives)  
 healthy – unhealthy; empty - \*unempty  
 b. aerisit – neaerisit(=îmbîcsită) (TS participles)  
 aired – unaired(=stinky)

- c. Camera este încă *aerisită* (\*de către tata). (TS/\*RS participle)  
 room-the is still aired (by father)  
 ‘The room is still aired.’
- d. Camera nu este *neaerisită*. ≠> Camera este *aerisită*.  
 Room-the not is unaired room-the is aired  
 ‘The room is not unaired. ≠> The room is aired.’

By contrast, negated RS participles are only interpreted as contradictory negation:

- (19) a. golit – negolit; examinat – neexaminat  
 emptied – unemptied; examined – unexamined
- b. Cutia poștală nu este (\*încă) *negolită*. => Cutia poștală este (\*încă) *golită*.  
 mailbox-the not is still unemptied mailbox-the is still emptied  
 ‘The mailbox is not unemptied. => The mailbox is emptied (has been emptied).’

Coming back to the supine, we want to see whether it behaves like RS participles, as we would expect from our hypothesis. Given that *–un* expresses contradictory negation with RS and contrary negation with TS, semantic anomalies should occur if one asserts both the affirmation and the negation of an RS participle, but not if one of the two participles (i.e. affirmative and negative) is a TS or an adjective (see also Horn 1989, §2.4.2).

We saw that *golită* ‘emptied’ can only be an RS participle. This explains the anomaly it triggers in combination with the denial of the event in (20a). The adjective by contrast is fine. By comparison to (20a), the participle in (20b) must be a TS participle.

- (20) a. Cutia poștală este goală/#golită, deși nu a golit-o nimeni.  
 mailbox-the is empty/#emptied, although not has emptied-it nobody  
 ‘The mailbox is empty although nobody has emptied it.’
- b. Camera este *aerisită*<sub>TS/\*RS</sub>, deși nu a aerisit-o nimeni.  
 room-the is aired although not has aired-it nobody  
 ‘(The air in) the room is fresh, although nobody has aired it.’

As illustrated in (21), the negated supine must contribute contradictory negation, since the continuation of the sentence with an affirmative event triggers semantic anomaly. In conclusion, the negated supine nominal is interpreted as contradictory negation like the negated RS participle. This confirms our proposal that the supine inherits the functional structure of the RS participle:

- (21) Neumflatul cauciucurilor înainte de drum, (#deși tata le-a umflat ...)  
 un-pump-up-Sup-the tires-Gen before of way (although father them-has pumped-up ...)  
 ‘Not pumping up the tires before leaving (#although the father has pumped them up) ...’

#### 4. The internal structure of the supine nominal

From the above discussion, we conclude that the supine is derived on the basis of the RS participle, so it embeds its whole functional structure plus the DP realization of the definite article, as suggested in (22):

- (22) [- ul [Asp [ Voice [v + Root] ] ]<sub>RS-Part</sub> ]<sub>Sup</sub>

Similarly to the Romanian supine, Spanish nominals derived from participles allow agent PPs like the RS participle in (6b), so most likely they are also built on the basis of RS participles and are nominalised via the definite article *le/la* hosted by D.

- (23) El recitado de poemas *de Juan* atrae muchos espectadores.  
the reciting of poems of Juan attracts many spectators  
'John's reciting poems attracts many spectators.'

This fact opens a path to understanding the way the structure of participles can be inherited by the corresponding nominalisations across Romance languages. The Romanian supine for instance is more complex than a simple participial nominalisation, given that it also has so-called 'verbal' uses which have little in common with the participial stem (see Manoliu-Manea 1983, Soare 2002). Italian *-ata* nominalisations (also derived from the past participle, cf. Ippolito 1999) developed a special aspectual value.

Coming back to the Romanian nominal supine, two questions still remain concerning its functional structure: what are the nominal projections in the supine, D, *n* or both? Which projection hosts the pluractional operator (cf. Iordăchioaia and Soare 2008) in the supine nominal?

#### 4.1 Does the supine have an n head?

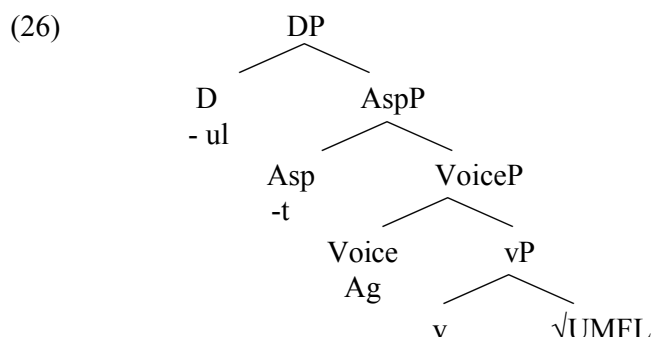
Within the framework of assumptions we are operating, the presence of an n head would signal a nominal internal structure; thus if n were present, we would expect the supine to show a number of nominal properties, e.g. to be compatible with adjectival modification. However, we note that the supine shows a restrictive behaviour with respect to adjectival modification. The masculine-neuter form of an adjective modifying the supine is homonymous with the corresponding adverb, but the impossibility to prepose the modifier in (24b) indicates that it must be an adverb and not an adjective in (24a), as in Romanian preposing of adjectives usually applies. The homonymous adjective can be preposed when modifying an infinitival nominal in (25b).<sup>3</sup>

- (24) a. cititul (*constant*) al ziarelor (*constant*)  
read-Sup-the constantly newspapers-Gen constantly  
'constantly reading newspapers'  
b. \*constantul citit al ziarelor  
constant-the read-Sup newspapers-Gen
- (25) a. citirea *constantă* a ziarelor  
read-Inf-the constant newspapers-Gen  
b. *constantă* citire a ziarelor  
constant read-Inf-the newspapers  
'the constant reading of newspapers'

<sup>3</sup> Among the few adjectives that can modify the supine seem to be the relational/argumental ones (see also Fradin and Kerleroux 2003). Since such adjectives have been argued to be actually DPs (Fabregas 2007, Alexiadou and Stavrou forthcoming, Marchis 2008), it is not at all clear that they modify an n head. Rather they function as arguments of the participle.

Moreover, it has been argued in Iordăchioaia and Soare (2008) that the supine lacks a Classifier projection which is obligatory for nouns with an *n* head according to Picallo (2006): nominal categories (i.e. carrying an *n* head) must check their nominal class information (e.g. gender, declension) under Classifier. If the supine does not have a Classifier, this would normally exclude the presence of *n*.

An argument that seems to support the presence of an *n* head comes from the fact that the supine assigns genitive case to its argument (A. Cornilescu p.c.). Genitive case assignment indicates a nominal internal structure, in contrast to the accusative case associated with verbal structures without *n*. In Cornilescu (1995), genitive case in nominalisations is assigned in the complement position of the nominal. Alexiadou, Iordăchioaia and Soare (forthcoming) have argued that the presence of genitive case in Romanian supines is associated with the D layer (see Abney 1987). In particular the authors claimed the only way in which D is licensed is via insertion of the definite article. This has the following consequence: because it is inserted in D, the affixed article in the supine creates a nominal environment, albeit a defective one, hence the case that appears is genitive, namely the case found in nominal environments.



Note, however, that the presence of an *n* projection (and possibly that of more nominal structure between *n* and D) over the AspP would not come in conflict with our present claim that the functional structure of the supine nominal is based on that of the RS participle.

#### 4.2 The pluractionality of the supine nominal

Iordăchioaia and Soare (2008) argue for the presence of a pluractional operator (PO, see Lasersohn 1995, van Geenhoven 2004, Laca 2006) in the structure of the supine. POs are known to operate on the aspectual value of events, in particular, to turn a bounded event into a plurality of events. For instance, the Spanish construction *andar* + gerund acts as a PO which explains the ungrammaticality of a singular theme with the one-time event *matar* ‘kill’ in (27). This property is known in the literature as ‘the lack of multiplicity effects with indefinites’:

- (27) a. ??El zorro anduvo matando *una gallina*.  
 the fox walk-PresPf killing a hen  
 ‘The fox has been killing a hen.’  
 b. El zorro anduvo matando *las gallinas*.  
 the fox walk-PresPf killing the hens  
 ‘The fox has been killing the hens.’

In (27a) the incompatibility with the singular indefinite *una gallina* has to do with the fact that the PO suggests more events of killing one and the same hen, so the indefinite cannot be ‘multiplied’. The grammaticality of the plural theme *las gallinas* indicates the possibility of

the PO to induce 'distributive effects with plurals': the sentence is understood as a plurality of events of killing one or several hens.

The constructions in (28) show that the same effect appears with the Romanian supine:

- (28) a. \*ucisul       jurnalistului/ unui jurnalist de către mafia politică  
 kill-Sup-the journalist-the-Gen/ a-Gen journalist by mafia political  
 b.   ucisul       jurnaliștilor de către mafia politică  
 kill-Sup-the journalists-the-Gen by mafia political  
 'the killing of journalists by the political mafia.'

Importantly, the presence of the PO within the supine can also explain the semantic effect of habituality that it usually has, as argued in Soare (2006).

### 4.3 The information under Aspect

The last issue that we want to address here is the information that the Aspect projection carries. In functional terms, we propose that the PO of the supine acts under Aspect, just like the stativizer for RS participles (Kratzer 2000) is taken by Alexiadou and Anagnostopoulou (2008) to be hosted by Asp; this value is carried by the suffix *-t/s*. But how does the semantics of the two aspectual operators come together?

We put forward the hypothesis that the supine combines the properties of the stativizer usually associated with the RS participle with those of the PO, so under its Aspect head, we have an RS stativizer like in Kratzer, but this stativizer involves a set of at least two events. In the Appendix we propose a semantic analysis for the way the properties of the stativizer (associated with the RS participle) combine with those of the PO (contributed by the supine). This approach crucially relies on the suggestion in de Swart (1998) that various aspectual operators may interact at the same time in setting the aspectual value of an event.<sup>4</sup>

## 5. Conclusion

According to Ross (1972) the distinction between verbs – adjectives – nouns is a matter of degree rather than of kinds. In this paper we provided evidence that the supine and the resultant participle are gradually distinct from the verb from which they are derived. Thus we propose the following hierarchy:

**The supine > the (resultant-state) participle > the verb**

Thus, the system we present is flexible enough permitting various layers of the structure to get spelt-out as e.g. nominals or verbal or participial. For instance, both participles contain aspect, but TS ones embed a vP, while RS ones can embed a VoiceP. Due to the morphological similarity between RS participles and the supine, we claimed that they involve the same syntactic structure.

## Appendix

### The semantic information under Aspect in the structure of the supine nominal

What we get at the level of the Aspect:

- i.   Stem+object: λe. [prove(the theorem)(e)]

<sup>4</sup> If we did not want to allow this particular interaction of aspectual operators, we would need to claim that two distinct Aspectual projections are present in the structure, for which, however, we have no independent evidence.

**The RS- stativizer** (Kratzer 2001:12):

$$\lambda P \lambda t. \exists e [P(e) \ \& \ \tau(e) \leq t]$$

Output: the RS property is true for any time after the culmination time  $\tau(e)$  of the event:

$$\lambda t. \exists e [\text{prove}(\text{the theorem})(e) \ \& \ \tau(e) \leq t]$$

**The PO operator** (Lasersohn 1995, Laca 2006 – slightly modified): is true of a set  $X$  of at least 2 events  $e$  and  $e'$  if  $e$  and  $e'$  have the same property  $P$  and their culmination times  $\tau(e)$  and  $\tau(e')$  are different and if there is a time  $t$  between their culmination points, such that there is no event  $e''$  sharing the same property  $P$  and culminating at time  $t$ :

$$\lambda P \lambda X. |X| \geq 2 \ \& \ \forall e, e' \in X [P(e) \ \& \ P(e') \ \& \ \tau(e) \neq \tau(e') \ \& \ \exists t (\text{between}(t, \tau(e), \tau(e'))) \ \& \ \neg \exists e'' [P(e'') \ \& \ t = \tau(e'')]]$$

**The Supine: PO&RS-stativizer**: it maps a property of events into a property of times (RS-stativizer) at the same time mapping this property for a plurality of events:

$$\lambda P \lambda t'. \exists X |X| \geq 2 \ \& \ \forall e, e' \in X [P(e) \ \& \ P(e') \ \& \ \tau(e) \neq \tau(e') \ \& \ \tau(e) \leq t' \ \& \ \tau(e') \leq t' \ \& \ \exists t (\text{between}(t, \tau(e), \tau(e'))) \ \& \ \neg \exists e'' [P(e'') \ \& \ t = \tau(e'')]]$$

If we apply this to the property in (i) above, we obtain a property that is true of any time after the culmination of two different events of proving the theorem:

$$\lambda t'. \exists X |X| \geq 2 \ \& \ \forall e, e' \in X [\text{prove}(\text{the theorem})(e) \ \& \ \text{prove}(\text{the theorem})(e') \ \& \ \tau(e) \neq \tau(e') \ \& \ \tau(e) \leq t' \ \& \ \tau(e') \leq t' \ \& \ \exists t (\text{between}(t, \tau(e), \tau(e'))) \ \& \ \neg \exists e'' [\text{prove}(\text{the theorem})(e'') \ \& \ t = \tau(e'')]]$$

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