Linking Experiencer-Subject Psych Verb Constructions in Modern Greek

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1 Introduction

Modern Greek (hence MG) distinguishes three classes of Psych Verb Constructions (hence PVCs):

1. The Experiencer-Subject Psych Verb Constructions (hence ESPVCs). This class of PVCs includes verbs like *miso* (hate), *agapo* (love), or *latrevo* (adore), which feature a nominative *experiencer* in agreement with the verb, and an accusative *theme*:

   (1) O Gianis misi to sholio.
   the Gianis.N hate.3S the school.A
   "John hates school."

   (2) O Gianis agapa tin Maria.
   the Gianis.N love.3S the Maria.A
   "John loves Mary."

   (3) O Gianis latrevi tin musiki.
   the Gianis.N adore.3S the music.A
   "John adores music."

2. The Experiencer-Object Psych Verb Constructions (hence EOPVCs), which feature a nominative *theme* in agreement with the verb, and an accusative *experiencer*:

   (4) I Maria eksorgizi ton Giani.
   the Maria.N enrage.3S the Giani.A
   "Mary enrages John."

   (5) I kategides to fovisan to pedi.
   the thunderstorms.N,PL cl.A frighten.PAST.3PL the child.A
   "The thunderstorm frightened the child."

3. The last class of PVCs in MG includes the verbs *aresi* (likes) and *ftei* (bothers/matters), which feature a nominative *theme* in agreement with the verb, and an *experiencer*, either in morphological genitive or as the complement of a prepositional phrase:[1]

[1] This class of PVCs in MG is parallel to the so-called *piacere* class of Italian:

(6) To sholio aresi ston Giani.
the school.N like.3S to-the Giani.A
"John likes school."

(7) To sholio tu aresi tu Giani.
the school.N cl.G like.3S the Giani.G
"John likes school."

This paper focuses on the semantic properties and the syntactic behaviour of MG ESPVCs. Apart from the predicates mentioned above, MG ESPVCs include also predicates like *fovame* (fear), which feature an experiencer-subject in agreement with the verb and either an accusative theme (ex. (8)), or a theme as the object of a prepositional phrase (ex. (9)). We should underline here that examples (8) and (9) below convey the same meaning. That is, they do NOT differ semantically.

(8) I Maria fovate tis kategides.
the Maria.N fear.3S the storms.A
"Mary is afraid of the storms."

(9) I Maria fovate me tis kategides.
the Maria.N fear.3S with the storms
"Mary is afraid of the storms."

The challenge that these constructions pose lies on the split syntactic realization of the "experienced" (hence EXPD[2]) semantic role[3], which in constructions like (8) is syntactically realized as the object of the sentence, while in constructions like (9) it is syntactically realized as the object of a prepositional phrase.

Our aim is to propose a unified linking account of the MG ESPVCs. This unified account

1. is based on the assumption that the individual denoted by the *object* NP (or PP) of the MG ESPVCs is entailed to be semantically underspecified, and

2. makes use of Wechsler's (1995) Notion Rule, of Davis and Koenig's (2000) linking theory, as well as of Markantonatou and Sadler's (1996) proposal for the linking of indirect arguments.

(1) A Gianni piace questo.
to Gianni pleases this
"This pleases John."

(2) Questo piace a Gianni.
this pleases to Gianni
"This pleases John."

for which Belletti and Rizzi (1988) have argued that the *experiencer* argument bears a *lexical* dative case marker.

[2]We adopt here Markantonatou's (1995) terminology.

[3]I.e., the theme.

2 ESPVCs in Modern Greek

2.1 Overview

As shown in Section (1), MG ESPVCs include verbal predicates whose common characteristic is that they feature a nominative *experiencer* in agreement with the verb.

Both the literature on MG PVCs and the literature on PVCs in other languages have paid more attention to the Experiencer-Object rather than the Experiencer-Subject predicates, which we are interested in here. This as such would have been unproblematic, if it had not had the consequence that the Experiencer-Subject PVCs have either been left unaccounted for, or the accounts provided for them by the different Lexical Semantics and Linking theories are to a great extent stipulative.

In the generative tradition, for instance, Grimshaw's (1990) linking theory, which on the one hand relies heavily on thematic roles, but on the other hand suggests that argument selection is determined by a causal aspectual structure on a separate "tier" from the thematic structure, fails to provide a consistent and parsimonious account of the Experiencer-Subject PVCs, since it stipulates counter-intuitively that the Experiencer-Subject predicates are no different than the normal causative verbs of any natural language:

> ...The case of psychological state verbs like *fear* is considerably more delicate. The desired result will follow if their Experiencer qualifies as the aspectually most prominent argument...However, it must be admitted that in this case there is no independent evidence that the aspectual analysis will give this result, so for the present purposes we must simply stipulate it. (Grimshaw (1990, pp. 17-18))

With this Grimshaw acknowledges that the interaction between her thematic and aspectual hierarchies proves to be problematic in the case of the ESPVCs. That is, prominence must be stipulated in the case of the ESPVCs.

Grimshaw's account of the ESPVCs has one more consequence: it leads her to the conclusion that the *experiencer* argument of these constructions, supposedly being the most prominent one on both the thematic and the aspectual hierarchies, qualifies as an EXTERNAL ARGUMENT.[4] According to her, the fact that the Experiencer-Subject predicates have an EXTERNAL ARGUMENT in their a-structure has the consequence that they can be related to passive sentences, since EXTERNAL ARGUMENT status does predict the availability of PASSIVIZATION in her theory. And although this might be true for this kind of construction in English, which is Grimshaw's case study:

(10) John admired the car parked next to his.

(11) The car parked next to his was admired by John.

[4]Grimshaw (1990) defines the notion of EXTERNAL ARGUMENT as the argument that is most prominent on both hierarchies, i.e., the thematic and the aspectual. If the two dimensions do not pick out the same argument as the most prominent, then, in Grimshaw's account, the predicate lacks an external argument. Thus, according to this, ESPVCs do have an external argument in their a-structure, since the *experiencer* is the most prominent argument on the thematic hierarchy, and it is stipulated to be the most prominent argument on the aspectual hierarchy, as well.

this claim does not hold for the MG ESPVCs:

(12) I gonis tu agapun ton Giani.
the parents.N,PL his love.3PL the Giani.A
"His parents love John."

(13) *O Gianis agapiete apo tus gonis tu.
the Gianis.N love.PASS.3S by the parents his
"John is loved by his parents."

(14) I Maria zilepse to spiti ton gitonon.
the Maria.N envy.PAST.3S the house.A the neighbours.G,PL
"Mary envied the neighbours' house."

(15) *To spiti ton gitonon zileftike apo tin Maria.
the house.N the neighbours.G,PL envy.PASS.PAST.3S by the Maria
"The neighbours' house was envied by Mary."

As far as the literature on MG PVCs is concerned, Tsimpli (1989, p. 246) has argued that some of the Experiencer-Subject predicates can be considered to be the passive forms of the Experiencer-Object predicates that we have seen in (4) and (5) in Section (1):

> ...As to experiencer verbs[5] I argue that they contain a single theta-role in their argument structure, which can be assumed to be either external or internal. *Passives of experiencer verbs are passives of causativised forms of the experiencer verbs.* The forms that enter passivization in the syntax are forms that have already undergone a process of causativization in the lexicon which has introduced an additional external argument to the original argument structure of the experiencer verbs which consists of only the experiencer argument[6] (Tsimpli (1989, p. 289)).

Tsimpli's (1989) analysis of the MG ESPVCs is based on two assumptions:

[5]That is, both the ESPVCs, and the EOPVCs (Experiencer-Object Psych Verb Constructions).

[6]To draw a connection to Grimshaw's (1990) account of the ESPVCs that we have just outlined above, under Tsimpli's (1989) analysis those ESPVCs in MG which she takes to be passives of EOPVCs do not have an EXTERNAL ARGUMENT in their a-structure; thus, they cannot be predicted (on some accounts) to undergo passivization. This conclusion is compatible with what we have shown in examples (12)-(15).

The only case which might constitute a counter-example is the case of the "passive" form of the verb *agapo* (love) (*agapieme* (be loved)) (the examples are from Markantonatou (1995, p. 290)):

(1) To tragudi afto agapithike apo tus anthropus tis epohis tu.
the song.N this love.PASS.PAST.3S by the people the time its
"This song was popular among the people of its time."

(2) O Gianis agapithike *(apo tin adelfi tu).
the Gianis.N love.PASS.PAST.3S by the sister his
"John was loved by his sister."

But for this case we will agree with Markantonatou (1995, p. 290) that the meaning of the verb *agapieme* (be loved) in (1) is more something like "to be popular".

1. that the forms ending in -*ome*[7] are passives, and
2. that most of these forms admit an *apo*-PP as an optional dependent.

These assumptions, though, are not unproblematic:

1. Although it is true that for most of the MG ESPVCs ending in -*ome* one could find an active EOPVC counterpart, there are at least three ESPVCs - i.e., *vari-eme* (be bored), *onirev-ome* (dream of), and *her-ome* (enjoy/be happy) - which do not have any active EOPVC counterpart. One possible explanation for this that Tsimpli (1989) does not seem to have taken into consideration is that in MG verbs ending in -*ome* are not necessarily PASSIVE; they can be deponent verbs (e.g., *erhome* (to come)), or middle verbs (e.g., *diavazete (efkola)* (reads easily), cf., Condoravdi (1989)), or have a reflexive (e.g., *htenizome* (to comb myself)) or reciprocal meaning (e.g., *voithiomaste* (we help each other), cf., Theophanopoulou-Kontou (1985)).
2. It is quite unclear to us whether Tsimpli (1989) has in mind the same CAUSATIVIZATION process in order to provide the verbs from which both the active, as well as the passive-in-form ESPVCs are derived.
3. It is also unclear to us what Tsimpli's (1989) analysis would be in the case of ESPVCs like *agapo* (love), *epithimo* (desire/want), *zilevo* (envy), *thavmazo* (admire), *thelo* (want), *latrevo* (adore), *miso* (hate), *nostalgo* (long for), *simpono* (sympathise with) which are neither passive-in-form, nor do they have an EOPVC counterpart.
4. Finally, Tsimpli's second assumption that most of the MG ESPVCs ending in -*ome* admit an *apo*-PP as an optional dependent is false, since the "suppressed" argument (such an argument should exist, if the MG ESPVCs were indeed passive forms) can be expressed with a variety of PPs: *gia*-PP ("for"-PP), *me*-PP ("with"-PP), and *apo*-PP ("from"-PP).[8] In addition, different prepositions are associated with different interpretations.[9] Furthermore, some of the MG ESPVCs ending in -*ome* do not accept at all an *apo*-PP dependent. Such predicates are: *endiaferome* (be interested), and *stenahorieme* (be upset).

The conclusion falling out from the discussion above is that pure a-structure accounts like Grimshaw's (1990), as well as analyses like the one proposed by Tsimpli (1989) which specifically predict that the MG ESPVCs ending in -*ome* are the passive forms of the corresponding EOPVCs cannot account for the syntactic behaviour of the MG ESPVCs. Thus, we will try to account for the syntactic properties of these constructions on a semantic basis.

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[7] Which is the typical ending of the passive verb constructions in MG.

[8] Passive forms in MG take only an *apo*-PP dependent; no other PP is licensed to encode the suppressed argument. Clearly, the situation is different with the MG ESPVCs ending in -*ome*. This is one more argument against Tsimpli's (1989) claim that MG ESPVCs ending in -*ome* are the passive forms of the corresponding EOPVCs.

[9] Cf., also Markantonatou (1995).

2.2 The semantics of the MG ESPVCs

The semantic account of the MG ESPVCs that we propose here is based on Wechsler's (1995) Notion Rule.

Consider the following ESPVCs in MG:

(16) O Gianis agapa tin Maria.
the Gianis.N love.3S the Maria.A
"John loves Mary."

(17) O Gianis.N fovate tin Maria.
the Gianis.N fear.3S the Maria.A
"John fears Mary."

Following Wechsler (1995), we use the notion of *notion* in order to account for the ESPVCs in (16)-(17):

(18) O Gianis agapa tin Maria.
the Gianis.N love.3S the Maria.A
"John loves Mary."
$\models$John has a notion of Mary.[10]

(19) O Gianis.N fovate tin Maria.
the Gianis.N fear.3S the Maria.A
"John fears Mary."
$\models$John has a notion of Mary.

In other words, the MG ESPVCs in (16) and (17) convey the meaning that "in order for *Gianis* to *love* or *fear* some individual x, he must have a notion of x, since that notion is the content of his love, or his fear, respectively". We also suggest that in the case of the MG ESPVCs the semantic argument denoted by the object NP (or PP; cf., examples (8)-(9) in Section (1)) is entailed to be **semantically underspecified**.[11]

To avoid confusion at this point we need to clarify that by **semantically underspecified** we mean the following: the verb's meaning in the MG ESPVCs (cf., (16) and (17)) does not specify constraints over the semantic argument denoted by the object NP (or PP) to a great extent and therefore is relatively unspecific about the nature of this argument. In other words, the semantic underspecification of the argument of the MG ESPVCs denoted by their object NP or PP has to do with the constraints that the meaning of the verb of these constructions specifies over this argument.

For all we know in (18) and (19) the participant in the events described by the verbs which is denoted by *tin Maria* can be either cognitive, or non-cognitive. But this is something that is not clear from the constructions themselves without any additional contextual information.

The idea of semantic underspecification in relation to the "experienced" (EXPD) semantic argument of the ESPVCs is not new in the literature. Dowty's (1991) linking theory, which argues

[10]$\models$ means "**entails**".

[11]Note that Wechsler (1995) appears to rule out by the Notion Rule the possibility of a lexical entry in which B conceives of A.

for a direct mapping from events in the world and their participants to surface grammatical relations via proto-role entailments, predicts that the EXPD argument of the ESPVCs does not bear any Proto-Agent or Proto-Patient Properties, i.e., it is entailed to be a semantically underspecified argument. Zaenen's (1993) account of the Dutch PVCs makes a similar prediction in a slightly different way, i.e., by determining the intrinsic classification of the EXPD argument rather than its surface grammatical role only. For Zaenen's account the EXPD argument of the ESPVCs bears the intrinsic classification (IC) feature [-o]. [-o] in Zaenen's theory are all semantic arguments which are not related to any entailments at all. And according to her the EXPD argument of the ESPVCs is such a semantically underspecified argument.

Our assumption that the EXPD argument of the MG ESPVCs is semantically underspecified is not only (pre)-theoretically justified; it is also going to help us formulate a unified linking account of the MG ESPVCs (cf., ex. (1)-(3) and (8)-(9) in Section (1)).

2.3 Previous attempts at unified linking accounts of the MG ESPVCs

A unified linking account of constructions like the ones in (1)-(3) and (8)-(9) has also been the aim of previous approaches to MG ESPVCs.

Markantonatou (1995) focused for this purpose on the EXPD semantic argument of the MG ESPVCs and proposed that this argument can be either semantically underspecified, or syntactically restricted. In the former case it bears the intrinsic classification (IC) feature [-o], in Markantonatou's Lexical Mapping Theory (LMT) framework, while in the latter it bears the intrinsic classification (IC) feature [+r]:[12]

Intransitive ESPVCS

predicate	<EXPR	EXPD>	
	-r	-o	Intrinsic Classification (IC)
	SUBJ	OBL	Mapping Principles

(20) O Gianis endiaferete gia sena.
the Gianis.N be-interested.3S for you
"John is interested in you."

Transitive ESPVC*s.*

predicate	<EXPR	EXPD>	
	-r	+r	Intrinsic Classification (IC)
	SUBJ	OBJ_θ	Mapping Principles

(21) O Gianis agapa tin Maria.
the Gianis.N love.3S the Maria.A
"John loves Mary."

She admits, though, that this specific Intrinsic Classification (IC) of the EXPD semantic argument of the MG ESPVCs is stipulative: "...that the EXPD semantic role can be classified as either [-o] or as [+r] is a stipulation" (Markantonatou (1995, pp. 295)).

[12] The examples are from Markantonatou (1995, p. 296).

That is, the assumption that the EXPD semantic argument of the "transitive"[13] MG ESPVCs is syntactically restricted is indeed questionable. This assumption is based on the typological principle that "in languages in which SUBJ and (OBJ?) is encoded through case-marking and agreement (and not via word order) lexically case marked participants are always syntactically restricted" (i.e., intrinsically classified as [+r]) (Zaenen (1993, p. 152)).

To show, though, that, however stipulative, such an assumption does indeed hold for the EXPD semantic argument of the MG ESPVCs, Markantonatou (1995) claims

1. that the surfacing accusative NP of the "transitive" MG ESPVCs is not related to passive adjectives.

   This claim, though, is at odds with Bresnan (1996), who has shown that the ability of nominals to be related to passive adjectives has nothing to do with their intrinsic classification (IC) features. Rather, it has to do with the semantics of the base verb the surfacing accusative NP combines with, which has to denote a **result state** (cf., Bresnan (1996)).

2. that the MG ESPVCs

   (a) do not passivize; and

   (b) lack an EXTERNAL $= \hat{\theta}$ [-o] a-structure argument.

   It is true that the MG ESPVCs do not passivize. But this has nothing to do either with the syntactic restrictedness of their EXPD semantic argument, or with the assumption that their argument structure lacks an EXTERNAL $= \hat{\theta}$ [-o] argument. Rather, it has to do with the semantics of their base verb, and consequently with the semantics of the construction itself.

Closing we want to underline that Markantonatou's (1995) analysis is the first attempt at a unified account of the MG ESPVCs (cf., (8) and (9) in Section (1)), based on the semantic and syntactic properties of the EXPD argument of these constructions. The unified linking account we propose in Section (3.3) for the MG ESPVCs tries to overcome the problematic aspects of this analysis.

2.4 Summary

As far as the syntax of the MG ESPVCs is concerned, we have concluded that these constructions:

1. do not passivize,

2. are not the passive forms of the corresponding EOPVCs, and

3. realize syntactically the EXPD semantic role either as the object of the sentence, or as the complement of a prepositional phrase.

Coming to the semantics of the MG ESPVCs, we have concluded that:

[13] To follow Markantonatou's (1995) terminology.

1. the individual denoted by their subject NP is entailed to have a notion of the entity denoted by their object NP (or PP) (cf., Wechsler's (1995) notion of *notion* and his **Notion Rule**; Section (2.2)), and

2. the entity denoted by their object NP or by the complement of the prepositional phrase is entailed to bear neither Proto-Agent nor Proto-Patient properties, i.e., it is entailed to be a semantically underspecified argument (cf., Section (2.2)).

3 Analysis

As mentioned above, the unified semantic and linking account of the MG ESPVCs we present below is based on the assumption that constructions like the ones in (1)-(3) and (8)-(9) in Section (1) entail that the individual denoted by their *subject* NP is entailed to have a notion of the entity denoted by their *object* NP (or PP), and that the entity denoted by their *object* NP (or PP) is entailed to be semantically underspecified.

As mentioned in Section (1), the linking account we propose for the MG ESPVCs (cf., examples (1)-(3) and (8)-(9)) is based on Wechsler's (1995) Notion Rule, Davis and Koenig's (2000) linking theory, as well as of Markantonatou and Sadler's (1996) proposal for the linking of indirect arguments.

3.1 Linking ESPVCs in MG

In what follows we apply Davis and Koenig's (2000) linking theory in order to capture formally in HPSG the linking patterns related to the ESPVCs in MG. Davis and Koenig's (2000) linking theory builds on Wechsler's (1995) Notion Rule as far as the analysis of PVCs is concerned.

In order to capture formally generalizations related to the semantics of given predicators Davis and Koenig (2000) use a hierarchy of semantic relations which allows them to model semantic relatedness among words, and in order to provide for semantic grounding for postulating the particular semantic relation types and the semantic attributes within them, they associate each semantic role attribute with a set of *characteristic entailments*, at least one of which holds of any participant denoted by the value of that attribute.

To describe, thus, the linking patterns of the MG ESPVCs we first adopt Davis and Koenig's (2000) Table (1).[14] Interesting for our purpose are the semantic role attributes ACTOR and SOA and the *characteristic entailments* related to them.

We also assume the hierarchy of semantic relations in Figure (1), which should be viewed as only comprising the semantic subnetwork of the whole multiple inheritance network of lexical constraints that Davis and Koenig (2000) propose (see Figure (2)).

Thus, following Davis and Koenig's (2000) approach to linking along with Table (1) of semantic roles and characteristic semantic entailments and the semantic relations hierarchy in Figure (1), the linking patterns related to the MG ESPVCs can formally be captured by the semantic relation in (22), first introduced in Davis and Koenig (2000) for the English ESPVCs.

[14]Partial table. The whole table in Davis and Koenig (2000).

Relation	*Licenses semantic role attribute(s)*	*Characteristic entailments*
act-rel	ACTOR	Causally affects or influences other participant(s) or event(s); Volitionally involved in event; Has a notion or perception of other participant(s) in event; Possesses an entity.
soa-rel	SOA	Resulting state of affairs; Perceived or conceived of by another participant; A circumstance aspectually or temporally delimited by the relation

Table 1: Semantic roles and characteristic semantic entailments

(22) $\begin{bmatrix} \textit{notion-rel} & \\ \text{ACT} & \boxed{1} \\ \text{SOA} & \boxed{2} \end{bmatrix}$

Davis and Koenig's (2000) *notion-rel* in (22), which is semantically grounded in Wechsler's (1995) Notion Rule, captures properly the semantic generalizations related to the MG ESPVCs (cf., Section (2.2) above).

That is, Davis and Koenig's (2000) *notion-rel* in (22), which in the partial hierarchy of the semantic relations in Figure (1) is a subtype of *act-s-a-rel*, indicates that for the MG ESPVCs, as for the English ESPVCs, the top-level ACTOR corresponds to the participant who holds the mental representation in the event denoted by the predicator, by virtue of the definition of semantic attributes in Table (1). According to Davis and Koenig (2000), the top-level ACTOR is mapped onto the first argument of the ARG-ST list, being ultimately realized as the SUBJ of constructions like the English and the MG ESPVCs.

Moreover, the SOA semantic role attribute of the *notion-rel* in (22), which signifies the second participant in the event denoted via the relation by the predicator, is in full compatibility from the point of view of its *characteristic entailments* with the analysis related to this specific participant that we presented in Section (2.2). That is, in the case of the MG ESPVCs - as well as the English ESPVCs (cf., Davis and Koenig (2000)) - the SOA corresponds to the entity perceived or conceived of by another participant (i.e., the **cognitive** ACTOR). This same entity is entailed to be semantically underspecified for the reasons explained in Section (2.2). According to Davis and Koenig (2000), the SOA semantic role attribute is mapped onto the second argument of the ARG-ST list, being ultimately realized in the COMPS of constructions like the English and the MG ESPVCs.

For exemplification look at the MG verb *latrevi* (adores):

(23) I Maria latrevi ton Giani.
the Maria.N adore.3S the Giani.A
"Mary adores John."

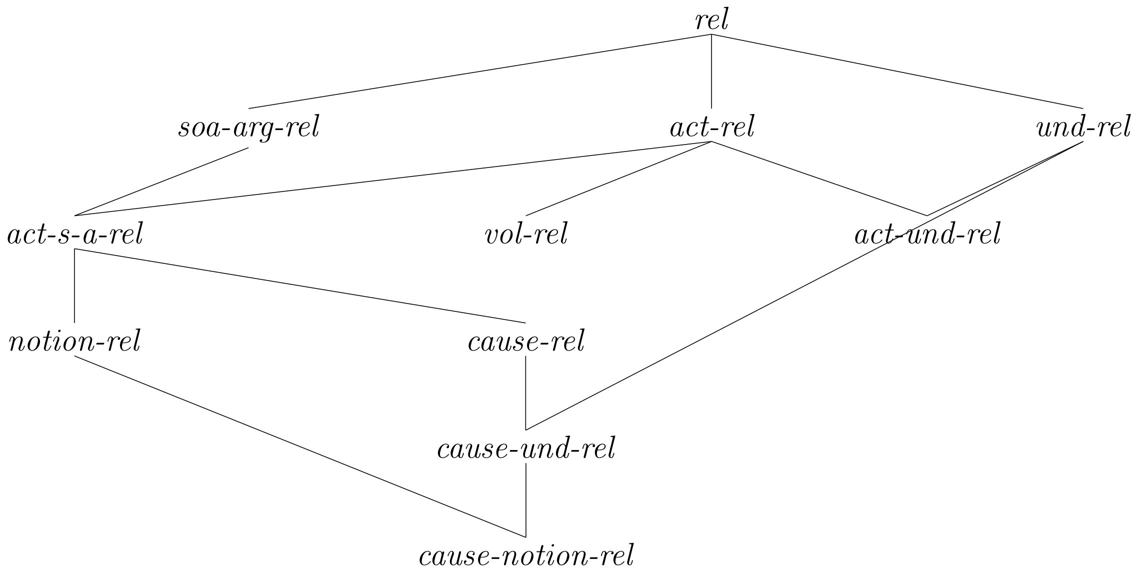

Figure 1: A partial hierarchy of semantic relations

latrevi in (23) denotes a state, which necessarily includes a **cognitive** ACTOR, as well as a second participant, associated with the semantic role attribute of SOA (cf., Table (1)), which in the case of the (MG) ESPVCs (cf., (23)) is entailed to be semantically underspecified.

The entailments holding of the two participants of the psychological states in MG are associated only with the semantic role attributes mentioned above. Thus, these are the only appropriate attributes for *latrevo-rel*, according to Davis and Koenig's (2000) Attribute-to-Entailment Condition:

(24) ATTRIBUTE-TO-ENTAILMENT CONDITION
If a semantic role attribute (ACTOR, UNDERGOER, and so forth) is present in a semantic relation *r* included in the lexical semantic structure of a predicator, then its value denotes a participant in the situation denoted by *r* that is entailed to bear one of the attribute's characteristic entailments (as they are listed in Table (1)).

Therefore, the lexical semantic relation of *latrevo* is a subtype of *notion-rel*, which is a subtype of *act-s-a-rel* (cf., Figure (1)). Because of Davis and Koenig's (2000) Semantic Subtype Linking Condition,[15] this means that *latrevo* must obey the *act-vb* constraint (also introduced by Davis and Koenig (2000), along with the *und-vb* constraint; cf., Figure (3)), which holds of all verbs with semantics of supertype *act-rel*. This constraint requires the actor to be mapped onto the first element of the ARG-ST list.

[15] The Semantic Subtype Linking Condition

If *s* is a type in the semantic relations hierarchy and there exists a type in the word class hierarchy with NUCLEUS value of type *s*, then there exists a type *s-p* in the word class hierarchy with NUCLEUS value of type *s* such that every type in the word class hierarchy with NUCLEUS a subtype of *s* is a subtype of *s-p*.

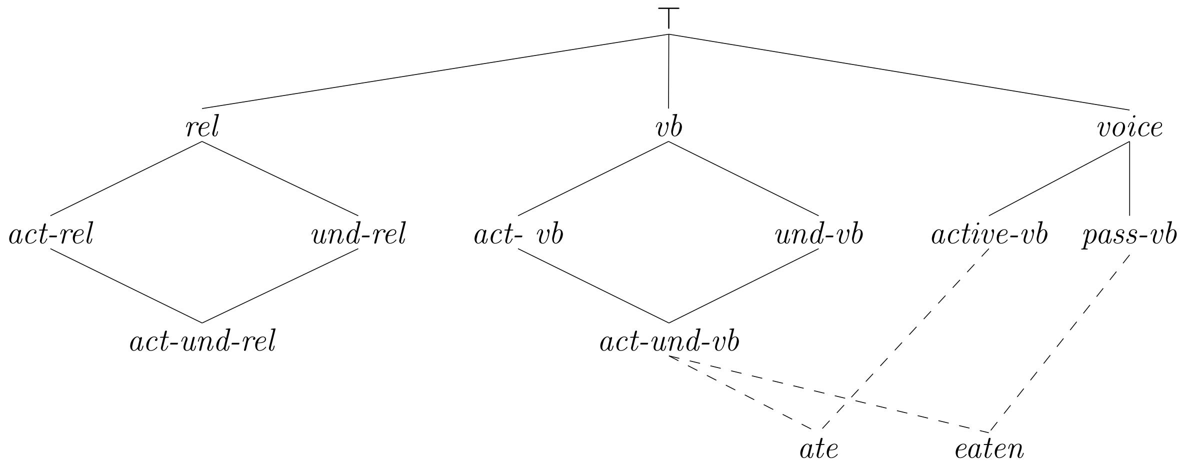

Figure 2: An illustration of multiple inheritance of lexical constraints

$$\begin{bmatrix} \textit{act-vb} & \\ \text{CONTENT} & \begin{bmatrix}\textit{act-rel} & \\ \text{ACTOR} & \boxed{1}\end{bmatrix} \\ \text{ARG-ST} & \langle \text{NP:}\boxed{1}, \ldots \rangle \end{bmatrix} \quad \begin{bmatrix} \textit{und-vb} & \\ \text{CONTENT} & \begin{bmatrix}\textit{und-rel} & \\ \text{UND} & \boxed{1}\end{bmatrix} \\ \text{ARG-ST} & \langle \ldots, \text{NP:}\boxed{1} \left(, \text{XP} \ldots\right) \rangle \end{bmatrix}$$

Figure 3: The *act-vb* and *und-vb* linking classes

Finally, because *latrevo* is morphologically a subtype of *active-vb*,[16] it inherits, as Davis and Koenig (2000) explain, the general constraint on active verbs that the first element of their ARG-ST list is mapped onto the subject function and the rest of their ARG-ST list is mapped onto complements.

$$\begin{bmatrix} \textit{active-vb} & \\ \text{CAT} & \begin{bmatrix} \text{ARG-ST} & \langle \boxed{1} \rangle \oplus \boxed{2} \\ \text{VAL} & \begin{bmatrix} \text{SUBJ} & \langle \boxed{1} \rangle \\ \text{COMPS} & \boxed{2} \end{bmatrix} \end{bmatrix} \end{bmatrix}$$

Figure 4: The *active-vb* verb class

3.2 Summary

In Section (3.1) above we showed that Davis and Koenig's (2000) linking account of the English ESPVCs in combination with the semantic analysis presented in Section (2.2) can be applied in MG in order to provide a linking account of the ESPVCs, whose non-cognitive participant is syntactically realized as an object *NP*.

[16]This constraint has also been introduced by Davis and Koenig (2000). See Figure (4) (Figure (11) of Davis and Koenig (2000)).

In the following we extend this analysis to the MG ESPVCs, which feature an experiencer-subject in agreement with the verb and a theme (i.e., the EXPD semantic argument) as the object of a prepositional phrase (cf., example (9) in Section (1)).

3.3 Linking Indirect Arguments in MG ESPVCs

As mentioned in Section (1), MG ESPVCs include also predicates like *fovame* (fear), which feature an experiencer-subject in agreement with the verb and either an accusative theme, or a theme as the object of a prepositional phrase. We repeat here examples (8) and (9) of Section (1) for convenience:

(25) I Maria fovate tis kategides.
the Maria.N fear.3S the storms.A
"Mary is afraid of the storms."

(26) I Maria fovate me tis kategides.
the Maria.N fear.3S with the storms
"Mary is afraid of the storms."

The verb *fovame*, though, can also be found in MG ESPVCs which feature only an experiencer-subject in agreement with the verb:

(27) I Maria fovate.
the Maria.N fear.3S
"Mary is scared."

Examples (25)-(27), thus, show that a possible way of treating the MG ESPVCs is as predicates whose valency can be extended, as is shown in Figure 5 below.

$$\begin{bmatrix} \textit{exp\_subj\_verbs} & \\ \text{ACT} & \textit{perceiver} \end{bmatrix}$$

$$\begin{bmatrix} \textit{exp\_subj\_non\_ext} & \\ \text{ACT} & \textit{perceiver} \\ \text{SOA} & \textit{empty\_rel} \end{bmatrix} \begin{bmatrix} \textit{exp\_subj\_ext1} & \\ \text{ACT} & \textit{perceiver} \\ \text{SOA} & \textit{index/psoa} \end{bmatrix} \begin{bmatrix} \textit{exp\_subj\_ext2} & \\ \text{ACT} & \textit{perceiver} \\ \text{SOA} & \textit{direction\_of\_perception} \end{bmatrix}$$

Figure 5: The fragment of the type system for the verb *fovame*

The idea of treating the MG ESPVCs, like the verb *fovame* in (8)-(9) in Section (1) and in (25)-(27) above, as predicates whose valency can be extended comes from Markantonatou and Sadler (1996), who treat predicates such as *talk* as monovalent predicates whose valency is extended (cf., Markantonatou and Sadler (1996, p. 60)):

(28) John talked.

(29) John talked about Mary.

(30) John talked to Peter.

(31) John talked to Peter about Mary.

The values of the SOA semantic argument in the case of the valency extended Experiencer-Subject verbs belonging to the type *exp_subj_ext2* in Figure 5, like the verb *fovame* in (9) in Section (1) and in (26) above, will be as in Figure 6 below.

$$\begin{bmatrix} \textit{direction\_of\_perception} \\ \textsc{act}\ \textit{perceiver} \end{bmatrix}$$

$$\begin{bmatrix} \textit{direction\_of\_perception\_me} \\ \textsc{act}\ \textit{perceiver} \\ \textsc{soa}\ \textit{source\_of\_perception} \end{bmatrix} \begin{bmatrix} \textit{direction\_of\_perception\_gia} \\ \textsc{act}\ \textit{perceiver} \\ \textsc{soa}\ \textit{target\_of\_perception} \end{bmatrix}$$

Figure 6: The hierarchy of SOAs for the verb *fovame*

To become more specific, let us go back to Figure 5. Figure 5 describes all the three subclasses of the MG ESPVCs as subtypes of the type *exp_subj_verbs*, which includes a **cognitive** ACTOR. Thus in Figure 5

1. the "transitive" ESPVCs (cf., examples (1)-(3) in Section (1) and example (25) above) are subtyped under the type *exp_subj_ext1*. Like its supertype *exp_subj_verbs*, this type also includes a **cognitive** ACTOR, as well as a second participant, associated with the semantic role attribute of SOA, which in the case of the MG "transitive" ESPVCs corresponds to the entity perceived or conceived of by the **cognitive** ACTOR (cf., Section (3.1)), and may surface syntactically as the accusative object NP of the verbal predicate, for the reasons we have explained in Section (3.1);

2. the ESPVCs which are subtyped under the type *exp_subj_ext2* (cf., examples (9) in Section (1) and (26) above). These include a **cognitive** ACTOR, as well as a second participant, associated with the semantic role attribute of SOA, which in this case also corresponds to the entity perceived or conceived of by the **cognitive** ACTOR and takes as a value the characteristic entailment of the *direction_of_perception*; this being in turn underspecified can be instantiated either as a *direction_of_perception_me* subtype, or as a *direction_of_perception_gia* subtype, as is shown in Figure 6. The verbal predicates belonging to the *exp_subj_ext2* type are morphologically subtypes of *active-vb* (cf., Davis and Koenig (2000) and Section (3.1)), and thus they also inherit the general constraint on active verbs that the first element of their ARG-ST list is mapped onto the subject function, and the rest of their ARG-ST list is mapped onto complements; in other words, that means that the prepositional phrases in examples (9) and (26) are mapped onto the COMPS list of the predicates at hand;

3. finally, the ESPVCs which are subtyped under the type *exp_subj_non_ext* (cf., example (27)). These, as is shown in Figure 5, include only a **cognitive** ACTOR, since the value of the semantic role attribute of SOA is the *empty_rel*. The verbal predicates belonging to the *exp_subj_non_ext* type are morphologically subtypes of the *middle-vb* verb class, whose definition is similar to the one of the *active-vb* verb class (proposed by Davis and Koenig (2000) and repeated for convenience next to the definition of the *middle-vb* verb

class in Figure (7) below), the only difference between the two verb classes being that the COMPS list of the *middle-vb* verb class is empty. In other words, that means that the verbal predicates which belong to the *exp_subj_non_ext* type and which are morphologically subtypes of *middle-vb* (cf., Figure (7) below) inherit the general constraint on middle verbs that the lone element of their ARG-ST list is mapped onto the subject function.

$$\begin{bmatrix} \textit{active-vb} & \\ \text{CAT} & \begin{bmatrix} \text{ARG-ST} & \langle \boxed{1} \rangle \oplus \boxed{2} \\ \text{VAL} & \begin{bmatrix} \text{SUBJ} & \langle \boxed{1} \rangle \\ \text{COMPS} & \boxed{2} \end{bmatrix} \end{bmatrix} \end{bmatrix} \quad \begin{bmatrix} \textit{middle-vb} & \\ \text{CAT} & \begin{bmatrix} \text{ARG-ST} & \langle \boxed{1} \rangle \\ \text{VAL} & \begin{bmatrix} \text{SUBJ} & \langle \boxed{1} \rangle \\ \text{COMPS} & \langle\ \rangle \end{bmatrix} \end{bmatrix} \end{bmatrix}$$

Figure 7: The *active-vb* and the *middle-vb* verb classes

4 Conclusion

In conclusion, we need to underline that the analysis we proposed in Section (3.3) above for the linking of the indirect arguments in the MG ESPVCs does not change the linking account of the MG ESPVCs presented in Section (3.1). Rather, it extends it in a natural way.

That means that in order to capture the semantic generalizations and the syntactic behaviour of all the three subtypes of the *exp_subj_verbs* in MG, the *notion-rel* (cf., Davis and Koenig (2000)) in (22) in Section (3.1) is relevant. This *notion-rel* indicates that for the *exp_subj_verbs* in MG the top level ACTOR corresponds to the participant that holds the mental representation (*perceiver*) in the situation denoted by the predicator, and that is mapped onto the first element of the ARG-ST list, being ultimately realized as the SUBJ of the MG ESPVCs. It also indicates that the SOA semantic role attribute, which signifies the second participant in the situation denoted by the predicator, is semantically underspecified and corresponds to the entity perceived or conceived of by the cognitive ACTOR in the case of the verbal predicates belonging to the *exp_subj_ext1* and *exp_subj_ext2* types. Because the SOA semantic role attribute is semantically underspecified, and only in the case of the verbal predicates belonging to the *exp_subj_ext1* and *exp_subj_ext2* types where its value is not the *empty_rel*, it may take either the *index/psoa*, or the *direction_of_perception* values. In both cases, the SOA is mapped onto the second argument of the ARG-ST list, being ultimately realized in the COMPS list of the constructions at hand; in the former case as an accusative object NP; in the latter as a complement PP, due to the values that the SOA may take in the case of the *exp_subj_ext2* verbs in MG (cf., Figure 6).

As an overall conclusive remark, we need to point out that linking for us, as for Davis and Koenig (2000), is based on fully defined *semantic relations*, like the ones shown in Figure (1) in Section (3.1). These *semantic relations*, one of which is the relevant to our work *notion-rel* (cf., Davis and Koenig (2000) and Section (3.1)) whose semantic backbone lies on Wechsler's (1995) **Notion Rule**, license specific *semantic role attributes* which bear specific *characteristic entailments*, which in collaboration with other lexical constraints are responsible for the mapping between semantic roles and syntactic arguments (cf., Davis and Koenig (2000), Figures (3) and (4), and the hierarchy of lexical constraints in Figure (2) in Section (3.1)). In relation to that, underspefication for us works on the level of the *characteristic entailments* related to specific *semantic role attributes* of given *semantic relations*, while Markantonatou and Sadler (1996), for instance, prefer to have fully underspecified verbal entries; i.e., for them it is sufficient to (i) indicate just the **number** of the arguments that a verbal predicate supports, (ii) identify the argument(s) of the given verbal predicate for which properties straightforwardly related to linking are expressed, and (iii) proceed from there with the linking of the remaining, underspecified for any linking properties, arguments.

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