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LEXICAL SEMANTICS AND LINKING IN HPSG: THE CASE OF PSYCH VERB CONSTRUCTIONS

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CONTENTS

1. INTRODUCTION

The challenge that the Psych Verb Constructions have always posed for syntactic theories lies on the split syntactic realization of the "*experiencer*" argument, which with verbs like *love* in (1) below is syntactically

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realized as the subject of the sentence, whereas with verbs like the ones in (2)-(4) it occupies the object position of the sentence:

(1) John loves Mary.

(2) John frightens Mary.

(3) The storm frightened Mary.

(4) John amused the cat.

In their attempt to account for the syntactic properties of this kind of constructions, linking theories developed in different frameworks have most of the times sacrificed their success, and consistency, by resorting to idiosyncratic assumptions concerning the syntactic realization of the experiencer semantic argument. 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 for the Psych Verb Constructions (hence PVCs), since it counter-intuitively stipulates that the Experiencer-Subject Psych Verb Constructions (hence ESPVCs) are no different than the normal causative verbs of any natural language. Moreover, Grimshaw's account is unable to provide a clearcut distinction between the so-called **agentive** and **causative** readings which characterize the Experiencer-Object Psych Verb Constructions (hence EOPVCs).

Dowty (1991) is also obliged to admit that his linking theory, which argues for a direct mapping from events in the world and their participants to surface grammatical relations via proto-role entailments, cannot account unproblematically for the Psych Verb Constructions either:

> ...what sets this class of predicates off from all other natural-language verbs is that i. the predicate entails that the Experiencer has some perception of the Stimulus-thus the Experiencer is entailed to be sentient/perceiving, though the Stilulus is not- and ii. the Stimulus causes some emotional reaction of cognitive judgement in the Experiencer. The first of these is a P-Agent entailment for the Experiencer, while the second is a P-Agent entailment for the Stimulus. Moreover, these predicates have no OTHER entailments for either argument that are relevant to argument selection, which leaves a situation in which each argument has a **weak** but **apparently equal** claim to subjecthood. (Dowty (1991, pp. 579–580))

The contribution of this paper is to propose a linking theory able to express, without resorting to complicated analyses and idiosyncratic assumptions, a consistent and parsimonious semantic account of the Modern Greek PVCs of the following form:

(5) I Maria latrevi tin musiki.
the Maria(nom) adore.3S the music(acc)
"Mary adores the music".

(6) I Maria eknevrizi ton Gianni.
the Maria(nom) annoy.3S the Giani(acc)
"Mary annoys John".

(7) I Maria ton eknevrizi ton Giani.
the Maria(nom) cl.(acc) annoy.3S the Giani(acc)
"Mary annoys John".

(8) O thorivos ton eknevrizi ton Giani.
the noise(nom) cl.(acc) annoy.3S the Giani(acc)
"The noise annoys John".

(5) represents an ESPVC in MG, while (6)-(8) represent EOPVCs in the same language.

The linking theory we are proposing here is sensitive to the syntactic encoding of the semantic properties of agentivity and causation, and it is developed in HPSG, where the semantics is couched within a situation theoretic framework, according to which verbs are lexically specified for a CONTENT feature with a RELN attribute and a list valued ROLES attribute. We will mainly concentrate on providing a clearcut semantic and syntactic distinction between the Agentive and the Causative EOPVCs in MG, and on formulating a linking theory able to account formally for this distinction, as well as for the semantic and syntactic similarities between the Agentive Experiencer-Object, and the ESPVCs in MG. To this purpose, we are relying heavily on cliticization phenomena (i.e., **clitic-doubling** phenomena) in MG, as well as on a revised version of Wechsler's (1995) Notion Rule.

2. Psych Verb Constructions in Modern Greek

2.1. ESPVCs. ESPVCs in MG includes transitive psychological predicates,[1]

[1]ESPVCs in MG feature also intransitive predicates like *tromazo* (be-scared), or *endiaferome* (be-interested), which feature an experiencer-subject in agreement with the verb and a theme as an object of a prepositional phrase:

whose characteristic is that they syntactically realize the experiencer semantic argument in their subject position, as has also been mentioned in 1.

Thus, this class of PVCs includes verbs like *latrevo* (adore), *miso* (hate), or *fovame* (fear), which feature an experiencer-subject, and a theme-object:

(9) O Giannis latrevi to podosfero.
the John(nom) adore.3S the football(acc)
"John adores football".

(10) O Giannis misi tin Maria.
the John(nom) hate.3S the Maria(acc)
"John hates Mary".

(11) O Giannis fovate ta liontaria.
the John(nom) fear.3S the lions(acc)
"John fears the lions".

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. This as such would have been unproblematic, if it had not had the consequence that at the end the ESPVCs 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, as we saw in 1, 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 for the ESPVCs, since it counter-intuitively stipulates that the Experiencer-Subject predicates are no different than the normal causative verbs of any natural language:

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(1) I Maria tromazi me tous keravnous.
the Maria(nom) be-scared.3S with the lightnings(acc)
"Mary is scared of the lightnings".

(2) O Giannis endiaferete gia tin Maria.
the John(nom) be-interested.3S for the Maria(acc
"John is interested in Mary".

We are not dealing with these predicates here, since they fall beyond the scope of this paper.

> ...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))

Grimshaw's account for the ESPVCs has one more consequence: it leads her to the conclusion that the experiencer semantic argument in such constructions, supposedly being the most prominent one on both the thematic and the aspectual hierarchies, qualifies as an EXTERNAL ARGUMENT.[2] In Grimshaw's framework, 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. And although this might be true for this kind of constructions in English, which is Grimshaw's case study:

(12) John envied the car parked next to his.

(13) The car parked next to his was envied by John.

this claim does not hold for the ESPVCs in MG:

(14) I gonis tu agapun ton Giani.
the parents(nom) his love.3PL the Giani(acc)
"His parents love John".

(15) *O Gianis agapiete apo tus gonis tu.
the Gianis(nom) be-loved.PASS.3S by the parents(acc) his
"John is loved by his parents."

(16) I Maria zilepse to spiti ton gitonon.
the Maria(nom) envy.PST.3S the house(acc) the neighbours(gen)
"Mary envied the neighbours' house."

(17) *To spiti ton gitonon zileftike apo tin Maria.
the house(nom) the neighbours(gen) be-envied.PASS.PST.3S by the Maria(acc)

[2]Grimshaw 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 it is claimed by Grimshaw's account that 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.

"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 corresponding Accusative Experiencer predicates. More specifically, she argues that:

> ...As to experiencer verbs 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. (Tsimpli (1989, p. 289))

This analysis is based on two facts:

1. that these forms take the ending *-ome*, which is the typical ending of the passive verb constructions in Modern Greek, and
2. that most of these forms admit an *apo*-PP as an optional dependent

We do not consider[3] these forms to be passive forms for the following reasons:

1. The paradigm of the Experiencer-Subject Intransitive PVCs in MG is not morphologically consistent, since there are predicates belonging to these specific constructions ending both in *-o*, which is the typical ending of active verbs in MG, and in *-ome*. Moreover, MG verbs ending in *-ome* are not necessarily PASSIVE; they might be middle verbs (e.g., *diavazete (efkola)* (reads easily) (Condoravdi (1989))), have a reflexive or a reciprocal meaning (e.g., *htenizome* (to comb myself), or *voithiomaste (metaksi mas)* (we help each other) (Theophanopoulou-Kontou (1985))), or they might even be deponent verbs (e.g., *erhome* (to come)).
2. The suppressed argument of the passive forms in MG is encoded **only** by an *apo*-PP dependent. The situation is different, though, with the ESPVCs in MG. The "suppressed argument", in the hypothetical case that one would consider these constructions to be indeed passives, can be expressed with a variety of PPs: *gia*-PP ("for"-PP),

[3] Along with Markantonatou (1995), and Campos (1987).

me-PP ("with"-PP), *apo*-PP ("from"-PP). In addition, as Markantonatou (1995) mentions, different prepositions are associated with different meanings and interpretations. *stenahorieme gia ton Giani* (I feel sorry for John), for example, implies that *Gianis* is the target/recipient of the psychological state, while *stenahorieme me ton Giani* (I am upset with John) implies that *Gianis* is the cause of the psychological state. Furthermore, some of these psych verbs do not accept an *apo*-PP dependent. Such predicates are: *endiaferome* (be-interested), and *stenohorieme* (be upset).

Thus, since there is no account claiming that passivization changes the lexical semantics of predicates, one would not expect passivization to delete a causative component from the meaning of a predicate, as Markantonatou (1995, p. 290) also points out.

Having shown that both a-structure accounts like Grimshaw's (1990) and accounts like the one proposed by Tsimpli (1989) which specifically predict that the MG ESPVCs are the passive forms of the corresponding Accusative Experiencer predicates are stipulative in their nature, we will try to account for the syntactic properties of these constructions on a purely semantic basis.

2.2. **The semantics of Nominative Experiencers in Modern Greek and the Notion Rule.** Let us consider the following PVCs in MG, which include a Nominative Experiencer syntactically realized in the subject position of the sentence. Under each sentence there is a relevant to the sentence semantic entailment, as well as an irrelevant one:

(18) O Gianis zilevi tin Maria.
the Gianis(nom) envy.3S the Mary(acc)
"John envies Mary".
$\models$John has a notion of Mary.
$\not\models$Mary has a notion of John.

(19) O Gianis fovate tin Maria.
the Gianis(nom) fear.3S the Mary(acc)
"John fears Peter".
$\models$John has a notion of Mary.
$\not\models$Mary has a notion of John.

In other words, the MG ESPVCs in (18) and (19) above convey the meaning that "in order for *Gianis* to *envy*, or *fear* some individual *x*, he must have a notion of *x*, since that notion is the content of his envy, or his fear, respectively".[4] Although, of course, one could go that far as to claim that "x (in our examples (18)-(19) above the individual denoted by *tin Maria*) does not have any notion of *Gianis*", as Wechsler (1995) does, we will just claim here that for us the semantic argument which is realized in the object position of the ESPVCs in MG, or in the object position of a prepositional phrase in the case of the MG Intransitive ESPVCs, like the following:

(20) I Maria tromazi me tus keravnus.
the Maria(nom) be-scared.3S with the lightnings(acc)
"Mary is scared of the lightnings".

(21) O Giannis endiaferete gia tin Maria.
the John(nom) be-interested.3S for the Maria(acc)
"John is interested in Mary".

is simply **semantically neutral**, or **semantically underspecified**. Having said that, though, we would like to add here a few more observations concerning this specific argument, i.e., the "experienced" (EXPD) semantic argument of the constructions in question. These observations come from the literature on the PVCs in general, and they are proving

[4] Wechsler (1995) has first used the notion of *notion* to account for English Experiencer-Subject Psych Verb Constructions of the following form:

(1) John wants the cat.
$\models$John has a notion of the cat.
$\not\models$The cat has a notion of John.

(2) John likes Mary.
$\models$John has a notion of Mary.
$\not\models$Mary has a notion of John.

(3) John is expecting Fred.
$\models$John has a notion of Fred.
$\not\models$Fred has a notion of John.

More specifically, he argues that "in order to *want*, *like*, or *expect* some individual x, John must have a notion of x, since that notion plays a role in the structure of John's mental state of wanting, liking, or expecting: it is the "object" (content) of his wanting, etc. But it is not necessary that x has a notion of John: for all we know the cat in (1) could be unconscious. **The generalization suggested by this entailment pattern is just that each sentence entails that the individual denoted by its *subject* NP has a notion of the individual denoted by its *object* NP, while the converse entailment does not go through**". (Wechsler (1995, pp. 35–36)) that our claim that "the "experienced" (EXPD) semantic argument of the MG ESPVCs is basically a **semantically neutral**, or a **semantically underspecified** argument" is to the right direction.

Dowty's (1991) linking theory, which argues 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 constructions in question does not bear any Proto-Agent or Proto-Patient Properties, i.e., it is a **semantically neutral** argument.

Zaenen's (1993) account for 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. Thus, for Zaenen's account the EXPD argument of the ESPVCs bears the intrinsic classification (IC) feature [-r].

Coming back to Modern Greek, Markantonatou (1995) has proposed that the EXPD semantic role of the constructions in question can be intrinsically classified either as [-o] or as [+r].

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. But I would like to note that again these stipulations match exactly with the stipulations which Zaenen (1993) has made to treat Dutch psychological predicates. First, Zaenen assumes that semantic arguments which are not related to any entailments at all are intrinsically classified [-o]. The EXPD semantic arguments of psychological predicates do not seem to be related to any Proto-Agent or Proto-Patient entailments. In addition, Zaenen assumes that intrinsically case marked arguments in languages which encode SUBJ and OBJ through case marking and agreement (MG is such a language) are always [+r]. The EXPD semantic argument of non-causative transitive MG psychological predicates can be assumed to be linked to an intrinsically case marked argument. The surfacing accusative NP does not behave as a NORMAL OBJ because MG non-causative psychological predicates do not passivize. Also, this accusative NP is not related to passive adjectives. However, the accusative NP maps a thematic argument which is one of the prerequisites of intrinsic case marking (Belletti and Rizzi (1988)). A second prerequisite, according to Belletti and Rizzi, is that the verb does not have an external argument. I have already assumed that EXTERNAL arguments correspond to θ[-o] a-srtucture arguments of LMT and that MG non-causative psychological predicates do not have such arguments. This disjunctive stipulation about the IC features of the EXPD argument helps to preserve monotonicity in the

linking component which is an essential assumption of LMT". (Markantonatou (1995, pp 295–296))
We believe that Markantonatou's account for the EXPD semantic role of the ESPVCs is basically inaccurate. This is due, we believe, to the author's misinterpretation of Zaenen's (1993) account of the Dutch psychological predicates. But let us be more specific.
Markantonatou's first stipulation, as we have seen above, is that the EXPD semantic role can be classified as [-o] in the case of non-causative intransitive MG psychological predicates. Markantonatou claims that her assumption follows the lines of Zaenen's claims for the Dutch Psych Verb Constructions. This is the first misinterpretation of hers concerning Zaenen's account. What Zaenen exactly advocates is the following:

> ...I can only stipulate that when the **sole** participant of a verb has neither agent nor patient properties it is marked -o. (Zaenen (1993, p 150))

That shows that with this stipulation Zaenen intends to specifically account for the intrinsic classification (IC) of the SUBJ argument of intransitive verbs like the verbs *staan* (stand), and *bloeden* (bleed) in Dutch, and definitely not for the EXPD argument of the Dutch ESPVCs, for which she clearly predicts that it bears the [-r] intrinsic classification (IC) feature, as we have already mentioned above.
Secondly, Markantonatou assumes that the EXPD semantic argument of non-causative transitive MG psychological predicates is linked to an intrinsically case marked argument, which as such should bear the intrinsic classification (IC) feature [+r]. This assumption of hers is based on the following typological principle advocated by Zaenen:

> 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 +r. (Zaenen (1993, p 152))

To support her assumption, Markantonatou also claims the following:

1. The surfacing accusative NP of non-causative transitive MG psychological predicates is not related to passive adjectives. BUT
   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 with which the surfacing accusative NP combines, which has to denote a **result state**, as Bresnan (1996) has clearly shown.
2. The MG non-causative psychological predicates

(a) do not passivize; and
(b) lack an EXTERNAL = θ [-o] a-structure argument
It is true that the ESPVCs in Modern Greek do not passivize, as has been also mentioned in 2.1 above. But this has nothing to do neither with the intrinsic classification (IC) feature(s) of the EXPD argument of the constructions in question, nor with the assumption that their argument structure lacks an EXTERNAL = θ [-o] argument. Rather, it has to do with the semantics of their base verb, and consequently with the semantics of the construction itself.

To conclude our discussion about the semantic properties of the "experienced" (EXPD) argument of the MG ESPVCs, we would like to underline that this argument is basically **semantically neutral**, as both Dowty (1991) and Zaenen (Zaenen 1993) have correctly pointed out in their accounts of similar constructions in English and Dutch, respectively.

2.3. **Summary.** As far as the syntax of the ESPVCs is concerned, we have shown that these constructions:

1. do not passivize,
2. are not the passive forms of the corresponding Accusative Experiencer predicates, and
3. syntactically realize the EXPD semantic role either in the sentence's OBJ position, or in the OBJ position of a prepositional phrase in the case of Intransitive ESPVCs

Coming to the semantics of the constructions in question, we have shown that:

1. the individual denoted by the subject NP in these constructions is entailed to have a notion of the individual denoted by the constructions' object NP, and
2. the individual denoted by the object NP or by the object of the prepositional phrase NP is entailed to bear neither Proto-Agent nor Proto-Patient Properties, i.e., it is a **semantically neutral**, or a **semantically underspecified** argument

2.4. EOPVCs in Modern Greek.

2.4.1. *Accusative* EOPVC*s in Modern Greek.* This class of PVCs includes transitive verbs like *exsorgizo* (enrage), or *fovizo* (frighten), which feature a nominative theme in agreement with the verb and an accusative experiencer:

(22) I Maria eksorgizi ton Giani.
the Maria(nom) enrage.3S the Giani(acc)
"Mary enrages John".

(23) I Maria ton eksorgizi ton Giani.
the Maria(nom) cl.(acc) enrage.3S the Giani(acc)
"Mary enrages John."

2.4.2. *Teasing apart Agentive from Causative* EOPVC*s.*

The semantics and the syntax of the MG *Accusative* EOPVC*s.* It has been shown in the literature that the Accusative EOPVCs can alternate between the so-called *agentive* and *psychological* readings. More specifically, the *agentive* alternant may come up when the nominative argument in these constructions is *animate*, in which case it can be interpreted as an *agent*.[5] But although this alternation is a pragmatic matter for languages such as English, for instance, we provide evidence here that in the case of MG Accusative EOPVCs the *agentive/causative* alternation[6] is actually also a matter of syntax. Consider, for instance, the following examples:

(24) O Gianis tin stenohori tin Maria.
the Gianis(nom) cl.(acc) upset.3S the Maria(acc)
"John upsets Mary".

(25) O Gianis stenohori tin Maria.
the Gianis(nom) upset.3S the Maria(acc)
"John upsets Mary".

In example (24) above, the doubling of the accusative experiencer object is **obligatory**, because the sentence is uttered in order to convey the *causative reading*;[7] i.e., the only valid interpretation of the sentence is that "there is something about John that upsets Mary".
On the other hand, when the sentence is uttered in order to convey the *agentive reading*, as is the case in example (25) above, the accusative experiencer **cannot be doubled**. In cases like this, the nominative *animate* argument of the construction is interpreted as **deliberately and**

[5]Grimshaw (1990) also claims that the *frighten* class verbs can take both agentive and non-agentive (i.e., psychological) interpretations; in the former, the subject of the *frighten* class verb corresponds to an agent; that is, it is the highest role on both the thematic and the aspectual hierarchies, since Grimshaw considers verbs of the *frighten* class to be causative, and therefore it also qualifies as an EXTERNAL ARGUMENT (i.e., an argument which is most prominent on both hierarchies).
[6]As we prefer to call it for reasons which will become clear later in our analysis.
[7]In the literature this reading is mentioned as *psychological reading*.

volitionally causing the accusative experiencer object to experience an emotion of some sort. For instance, in (25) above, *o Gianis* can only be interpreted as somebody who upsets *tin Maria* deliberately and volitionally. The interpretation "there is something about John that upsets/bothers Mary" is excluded, and this is because the nominative argument of the sentence is *animate*, and the accusative experiencer is *not doubled*.[8]
Thus, a first conclusion we can safely draw is that the *agentive/causative* alternation which characterizes the Accusative EOPVCs is both a matter of semantics and a matter of syntax in MG. More specifically, we want to underline the following:

1. The *agentive/causative* alternation of the Accusative EOPVCs in MG is a syntactically distinguishable one via the absence or the presence, respectively, of the clitic in the sentence, and
2. The two alternants, i.e., the agentive and the causative one, do not only differ syntactically, but they also convey different semantic interpretations.

Other Clitic Doubled Constructions in MG. The fact that clitics function basically as causative morphemes in MG, helping this way in distinguishing at-first-sight homophonous verbs, is also enforced by the semantic properties, as well as the syntactic behaviour of MG verbs like the following: *petheno* (die), *orimazo* (ripen, become mature), *puntiazo* (get cold), *melaniazo* (bruise), *lahaniazo* (pant), *mudiazo* (numb), *adinatizo* (become thinner/weaker), *arosteno* (become sick), *vuliazo* (sink), *mikreno* (shrink), *lepteno* (become thinner), *imerono* (tame), and so forth.
The case of the above mentioned verbs in MG is really worth taking a closer look at. The reason is that all of the verbs at hand belong originally to the so called *patient oriented constructions* (cf., Theophanopoulou-Kontou (1997)). With the term **patient oriented**, we refer to the way in which

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[8] A comment due here is that doubling may be permitted in (25) above and the agentive reading may be preserved. However, this doubling is sensitive to context (cf., Heim's (1982) Prominence Condition and its use in MG by Anagnostopoulou (1994), as (1) indicates:

(1) Egrapsa mia bibliokrisia jia ena kenurgio biblio pano sto clitic doubling.
I-wrote a book-review for a new book on the clitic doubling
*Epitides ton enohlisa ton suggrafea
on-purpose cl.(acc) I-bothered the writer(acc)
"I wrote a review on a new book on clitic doubling. I bothered/contacted the writer on purpose."

the **orientation** of the action denoted by the verb is defined; namely from the patient's, and not from the cause(r)'s, point of view. In other words, the cause(r) in this kind of constructions - not being at the "heart of the semantic information" meant to be conveyed by the verbal head - is either left syntactically unexpressed, or it is expressed in the syntax with an oblique argument, like it is shown in the following:

(26) O Gianis orimase me ta vasana.
the Gianis(nom) become-mature.PST.3S with the difficulties
"John grew wiser through the difficulties of life."

(27) O Gianis lahaniase me tin anifora.
the Gianis(nom) pant.PST.3S with the uphill-road
"John panted as he walked uphill."

(28) I prosfiges puntiasan to vradi apo to krio stis
the refugees(nom) get-cold.PST.3PL the night by the cold in-the
skines.
tents
"The refugees got cold in the tents during the night."

In examples (26)-(28) above, where the action denoted by the verb is **patient oriented**, the cause(r) is expressed as the object of the prepositional phrase (*me/apo* PP) in a syntactically oblique position.
The most interesting aspect, though, of the above mentioned **patient oriented** verbs is that they can be also used as **purely causative** verbs. In other words, MG exhibits at-first-sight homophonous transitive verbs, which denote an action with two participants, namely a cause(r), which is syntactically realized in the subject position of the sentence, and a causee, which is syntactically realized in the sentence's object position, like it is obvious from the following[9]:

(29) Ta vasana ton orimasan proora ton
the difficulties(nom) cl.(acc) make-mature.PST.3PL prematurely the
Giani.
Giani(acc)
"The difficulties of life made John wiser prematurely."

(30) *Ta vasana orimasan proora ton Giani.
the difficulties(nom) make-mature.PST.3PL prematurely the Giani(acc)

[9]The examples (29)-(42) started taking shape in my mind and were finally incorporated into this work due to a comment on a talk related to the Modern Greek **patient oriented constructions** made by Gianis Veloudis during the 20th Annual Meeting of the Department of Linguistics, Faculty of Philosophy, Aristotle University of Thessaloniki, 23-25 April 1999.

"The difficulties of life made John wiser prematurely."

(31) To treximo ton lahaniase ton Giani.
the running(nom) cl.(acc) pant.PST.3S the Giani(acc)

"Running made John pant."

(32) *To treximo lahaniase ton Giani.
the running(nom) pant.PST.3S the Giani(acc)

"Running made John pant."

(33) I Maria ton lahaniase ton Giani me to grigoro
the Maria(nom) cl.(acc) pant.PST.3S the Giani(acc) with the quick
perpatima tis.
pace hers

"Mary made John pant with her fast pace."

(34) *I Maria lahaniase ton Giani me to grigoro perpatima
the Maria(nom) pant.PST.3S the Giani(acc) with the quick pace
tis.
hers

"Mary made John pant with her fast pace."

(35) To grigoro perpatima tis Marias ton lahaniase ton
the quick pace(nom) the Maria(gen) cl.(acc) pant.PST.3S the
Giani.
Giani(acc)

"Mary's fast pace made John pant."

(36) *To grigoro perpatima tis Marias lahaniase ton Giani.
the quick pace(nom) the Maria(gen) pant.PST.3S the Giani(acc)

"Mary's fast pace made John pant."

(37) To krio tus puntiase tus prosfiges to vradi stis
the cold(nom) cl.(acc) freeze.PST.3S the refugees(acc) the night in-the
skines.
tents

"The cold froze the refugees in the tents during the night."

(38) *To krio puntiase tus prosfiges to vradi stis skines.
the cold(nom) freeze.PST.3S the refugees(acc) the night in-the tents

"The cold froze the refugees in the tents during the night."

(39) I Maria ton pethane ton Giani me tin fliaria tis.
the Maria(nom) cl.(acc) die.PST.3S the Giani(acc) with the talking hers

"Mary bored John to death with her continuous talking."

(40) *I Maria pethane ton Giani me tin fliaria tis.
the Maria(nom) die.PST.3S the Giani(acc) with the talking hers

"Mary bored John to death with her continuous talking."

(41) I Maria ton puntiase ton Giani anigontas to
the Maria(nom) cl.(acc) freeze.PST.3S the Giani(acc) opening the
parathiro stin plati tu.
window on-the back his

"Mary caused John to get a cold by opening the window behind his back."

(42) *I Maria puntiase ton Giani anigontas to parathiro
the Maria(nom) freeze.PST.3S the Giani(acc) opening the window
stin plati tu.
on-the back his

"Mary caused John to get a cold by opening the window behind his back."

At first sight the transitive verbs in (29)-(42) are homophonous with the patient oriented verbs in (26)-(28). But let us take a closer look at the examples in (29)-(42) above.

Looking at pairs of sentences, like, for instance, the ones in (29)-(30), or the ones in (39)-(40), it is obvious that the sentences in which the causee object argument is not doubled with a pronominal affix in a *proclitic* to the verb position, i.e., the sentences in (30), and (40), are ungrammatical, in contrast to the sentences in (29), and (39), in which the verb is accompanied by a doubled pronominal affix in a *proclitic* position, and which constitute absolutely felicitous sentences in MG.

This observation leads to the natural conclusion that "in order to causativize the MG **patient oriented** class of verbs, the presence of a causative morphology is needed. This causative morphology is represented by the doubled pronominal affix in the language at hand, which distinguishes the **patient oriented** verbs from their homophonous in base causative counterparts."

Thus, we want to generalize our conclusion about causativization in MG by saying that "causative verbs in MG are accompanied by a distinct causative morphology, namely the presence of a doubled pronominal affix appearing in a *proclitic* to the verb position. This distinct causative morphology distinguishes consequently the MG causative verbs from their homophonous in base agentive or other counterparts."

2.4.3. *The semantics of* EOPVC*s revisited.* Let us consider again the sentences in (24) and (25) that we have seen in 2.4.2 above, and which we repeat here for convenience:

(43) O Gianis tin stenohori tin Maria.
the Gianis(nom) cl.(acc) upset.3S the Maria(acc)
"John upsets Mary".

(44) O Gianis stenohori tin Maria.
the Gianis(nom) upset.3S the Maria(acc)
"John upsets Mary".

Let us start with the sentence in (44), i.e., with the semantic properties of the participants of the **agentive** alternant. We have argued above that the nominative *animate* argument, i.e., *o Gianis*, of the sentence in (44), which represents an Agentive EOPVC in MG, is interpreted as **deliberately** and **volitionally** causing the accusative experiencer, i.e., *tin Maria*, to experience the emotion of upset. That means basically that:

1. Firstly, *o Gianis* has a notion of *Maria*. Otherwise, he would not have been able to **deliberately** and **volitionally** upset her.
2. And secondly, *Maria* has also a notion of *Gianis*, who represents at the same time both the cause and the content of her upset, since we believe that "exotic scenarios" like, for instance, the following:

   (45) O Gianis stenohori tin Maria stelnontas tis
   the Gianis(nom) upset.3S the Maria(acc) sending her
   anonima kai anepithimita erotika grammata kathe mera.
   anonymous and undesirable love letters every day
   John upsets Mary sending to her every day anomynous and undesirable love letters. $\not\models$ Mary does not know that John exists, or Mary does not know who is the one sending her the letters, or Mary does not know that is John who sends her the letters.

   are neither plausible, nor desirable to describe the situation conveyed by the Agentive EOPVC in (44).

More specifically, in the case of the MG Agentive EOPVCs, like the one in the sentence (44) above, we claim that "in order to *upset* some individual y (in our example (44) above the individual denoted by *tin Maria*) **deliberately** and **volitionally**, Gianis must have a notion of y, since that notion plays a role in the structure of Gianis's mental state of volition and intention to cause y to experience the feeling of upset: y is the "object" (target) of his intentions. At the same time, it is necessary that y has also a notion of Gianis, i.e., the individual who represents both the cause and the content of y's feeling of upset: otherwise, i.e., in case it is claimed that y should not have any notion of the individual x responsible for y's feelings, one is unnecessarily forced either to find refuge in the not always so clearcut[10] philosophical distinction between the *cause* and the *content* of a mental state, or to be able to invent "exotic scenarios", like the one we have provided in (45) above. The generalization suggested by the entailment pattern we propose here is that sentences like the one in (44) entail that the individual denoted by their *subject* NP has a notion of the individual denoted by their *object* NP, and the converse entailment is also true".

Of course, we have to point out here that the pattern describing the semantic entailments of the participants in the MG Agentive EOPVCs we have proposed above presupposes also that the individual denoted by the subject NP of the constructions in question has a notion of the individual denoted by the object NP of these constructions prior to the notion that the individual denoted by the object NP forms for the individual denoted by the subject NP. In other words, and as far as the MG Agentive EOPVCs are concerned, we advocate that "in order for an individual x to *upset* some individual y **deliberately** and **volitionally**, x must have a prior notion of y to the notion that y acquires for x, i.e., the cause and the content of y's mental state, during the induction of the mental state".

More specifically, in the case of the sentence (44), for example, it is only natural to assume that in order for *Gianis* to be able to *upset tin Maria* **deliberately** and **volitionally**, *Gianis* must know (or know of) *Maria*. It is not prohibited to assume that *Maria* can also be aware of the existence of *Gianis*. But this specific notion of *Maria*'s is irrelevant to the linguistic report of the causation of the mental state of upset caused by *Gianis*. What is relevant is the notion that *Maria* acquires for *Gianis* as the cause and the content of her feeling of upset during the induction of the mental state itself.

Before showing how we are able to capture these generalizations concerning the MG Agentive EOPVCs formally, we would also like to take a look at the semantic properties of the participants of the Causative EOPVCs in MG.

We have argued in the previous, and as far as examples like the one in (43) are concerned, that the accusative experiencer object is clitic doubled, when the sentence is uttered in order to convey the meaning that "there is something about an individual x that causes an individual y to experience

[10] We want to underline here that most of the times it happens that in actual situations the cause and the content roles of a mental state are one and the same entity, and that in the majority of the cases it is more than reasonable to infer from a linguistic report of the causation of a mental state that the entity serving as the cause serves as the content as well.

an emotion of some sort". One should note here that this is the **only** valid interpretation of the MG EOPVCs containing a clitic doubled accusative experiencer argument.

In other words, it is only natural to assume and advocate that the semantic argument realized in the subject position of the sentence in (43) above bears exactly the same semantic entailments as the semantic argument realized in the subject position of the following sentence, which also represents a Causative EOPVC in MG:

(46) I kategides tin fovizoun tin Maria.
the storms(nom) cl.(acc) frighten.3PL the Maria(acc)
"The storms frighten Mary".

That is, both *Gianis* in (43) above, and *kategides* in (46) are semantically entailed:

1. not to have any notion of the semantic argument experiencing the mental state caused by them, and
2. not to participate in the mental state itself in any other way apart from causing it.

More specifically, in the case of the MG Causative EOPVCs, like the ones in the sentences (43), and (46) above, we claim that "the semantic argument x (animate or inanimate) realised in the subject position of these constructions (in our examples (43), and (46) above the semantic arguments denoted by *Gianis*, and *kategides*, respectively) does not have any notion of the individual y experiencing the mental state of upset, or fear (in both our examples the individual denoted by *tin Maria*). This is because x is not entailed to have any volition, or intention to cause y to experience the feelings of upset, or fear: in other words, y is not the "target" of x's intentions, since x acts only as the **cause** (natural or other) initiating the mental state that y experiences. Of course, we have to point out here that y, on the contrary, has a notion of the cause initiating the mental state that it experiences: in the case of the examples (43), and (46) above, *Maria* does have a notion of *Gianis*, and *kategides* being the cause of her mental state of upset, or fear, respectively. Thus, the generalization suggested by the entailment pattern we propose here for sentences like the ones in (43), and (46) above is that the Causative EOPVCs in MG entail that the semantic argument realized in their *subject* position (animate or inanimate) does not have any notion of the individual denoted by their *object* NP; it acts only as the cause (natural, or other) initiating the mental state experienced by the individual denoted by their *object* NP. At the same time, though, the converse entailment does go through, i.e., the individual denoted by their *object* NP does have a notion of the cause of its mental state".

2.4.4. *Summary.* To summarize, as far as the syntax of the MG EOPVCs is concerned, we have shown that:

1. The MG Agentive EOPVCs do not allow their accusative experiencer to be clitic doubled, while
2. the converse is true for the MG Causative EOPVCs.

Coming to the semantics of the constructions in questions, following the notion of *notion* as used in Wechsler (1995) we have advocated that:

1. in the Agentive EOPVCs both participants in the event denoted by the verb are entailed to have a *notion* of each other, while
2. in the Causative EOPVCs:
   - the semantic argument realized in the *subject* position (animate or inanimate) does not have any notion either of the semantic argument (individual) denoted by the *object* NP, or of the affected state that this experiences; it acts only as the cause (natural, or other) initiating the mental state experienced by the individual denoted by the *object* NP;
   - at the same time, though, the converse entailment does go through, i.e., the individual denoted by the *object* NP does have a notion of the cause of its mental state.

3. The Analysis: The Notion Rule (revised) and the EOPVCs in MG

3.1. **The Agentive EOPVCs.** To capture formally the generalizations about the Agentive EOPVCs we are stating a constraint on lexical signs using a slightly different version of Wechsler's (1995) *CONCEIVES* relation.

Thus, we are defining our *CONCEIVES* relation as "a relation holding between an agent A, an individual x, at times t_0, and t, just in case A has a notion of x at time t_0 prior to the time t that x acquires a notion of A".[11] Using, as Wechsler (1995) does, the framework of situation semantics (Barwise and Perry (1983) , Devlin (1991)), we designate the situation *type* S, for those situations which involve x conceiving of y prior to y conceiving of x, as in the following:

[11]In order to express formally that "in order for an individual x to *upset* some individual y **deliberately** and **volitionally**, x must have a prior notion of y to the notion that y acquires for x, i.e., the cause and the content of y's mental state, during the induction of the mental state".

(47) S= [s| $s \models \ll CONCEIVE, x, y, t_0, t \gg$],
where $t_0 < t$

In the notation above, the left-hand slot, the one immediately to the right of the relation name, which is now filled by the parameter *x*, is meant to be filled by the Agent, and the slot to its right, the one which is now filled by the parameter *y*, is meant to be filled by the entity which the Agent has a notion of before it acquiring a notion of the Agent, as it is shown in the following:

(48) a.$\ll CONCEIVE, x, y, t_0, t \gg$
b.$\ll CONCEIVE, agent : x, entity.agent.has.a.notion.of : y, time : t_0 \gg$
c.$\ll CONCEIVE, entity.agent.has.a.notion.of : y, agent : x, time : t \gg$
where $t_0 < t$

Thus, our constraint works "by forbidding any lexical entry whose content includes a relation and a role list such that the relation involves the filler of the lower slot *CONCEIVE*-ing of the filler of the higher slot before the filler of the higher slot *CONCEIVES* of the filler of the lower slot":

(49) **The Notion Rule** (revised version)

$$* \begin{bmatrix} \text{RELN} & R \\ \text{ROLES} & \left\langle \ldots\text{r} \quad \ldots\text{r}' \ldots \right\rangle \end{bmatrix}, \text{ where}$$

[s| $s \models \ll R, r' : x, r : y, t \gg$] $\Rightarrow \{_{x,y,t,t0}\ \}$ [s| $s \models \ll CONCEIVE, y, x, t_0 \gg$], and $t_0 < t$

In other words, the *CONCEIVE* relation holds between *y* and *x* at times t_0 and *t*, where $t_0 < t$, if *y* has a notion of *x* at a time t_0 prior to the time *t* at which *x* acquires a notion of *y*.

For example, for a verb like the agentive *stenohoro* (upset/bother) in (44), there is a relation, i.e., the **stenohoro** (upset/bother) relation, for which the following entailment holds:

(50) $\forall\ x,y\ \Box$ [*upset*(UPSETTER:*x*, UPSETTEE:*y*) $\rightarrow$ *CONCEIVE(x,y)*]

That means that for *x* to upset *y* deliberately and volitionally, *x* must conceive of *y* at a time t_0 defined as preceding the time *t*, at which *y* also acquires a notion of *x*, i.e., a notion of the cause and the content of its feelings of upset, and which occurs during the induction of the mental state itself.

If we substitute the upsettee and the upsetter roles for r, and r′, respectively, the Notion Rule indicates that the lexical entry in (51) below is an ill-formed lexical entry:

(51) $* \begin{bmatrix} \text{RELN} & \textit{upset} \\ \text{ROLES} & \left\langle \text{UPSETTEE}, \ \text{UPSETTER} \right\rangle \end{bmatrix}$

while the lexical entry in (52) is a well-formed lexical entry:

(52) $\begin{bmatrix} \text{RELN} & \textit{upset} \\ \text{ROLES} & \left\langle \text{UPSETTER}, \ \text{UPSETTEE} \right\rangle \end{bmatrix}$

To account for the order of the Psych Verb Constructions' direct arguments on the argument roles (ARG-ST) list, we rely on Wechsler's (1995) Isomorphy Condition:

(53) **Isomorphy Condition**

$$* \begin{bmatrix} \text{SUBCAT} & \left\langle \ldots\text{X:2} \quad \ldots\text{Y:1}\ldots \right\rangle \\ \text{ROLES} & \left\langle \ldots\text{R:1} \quad \ldots\text{R':2}\ldots \right\rangle \end{bmatrix}$$

which imposes the restriction that the order of the direct arguments on the argument roles (ARG-S) list should be reflected by the order of the associated NPs in the SUBCAT list. This way, the unrestricted roles in (52) link up to complements without crossing lines:

(54) $\begin{bmatrix} \text{SUBCAT} & \left\langle \text{NP:x}, \ \text{NP:y} \right\rangle \\ \text{ROLES} & \left\langle \text{upsetter:x}, \ \text{upsettee:y} \right\rangle \end{bmatrix}$

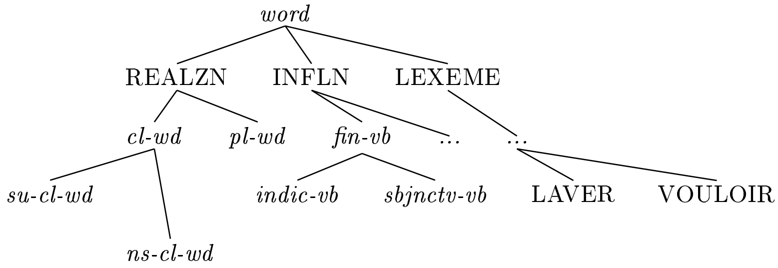
And by the application of the Subcategorization Principle, the rightmost NP (NP:y) is first added to the verb, to form a VP, followed by the subject NP:x.

3.2. **The Causative EOPVCs.** To capture formally the generalizations about the Causative EOPVCs we first propose along with Kolliakou (1999) that MG V clitics are pronominal affixes, a la Miller (1992a, 1992b), Miller and Sag (1997), and Monachesi (1996).

More specifically, the analysis of French clitics put forward by Miller and Sag (1997) draws on the idea that clitics are lexically generated, and therefore cannot be accounted for by means of syntactic rules. The heart of their analysis of the French pronominal affixes focusses on making sure that some elements in the ARG-ST list do not surface in the syntax. This is mainly achieved by an inflectional process which reduces the verbal subcategorization structure while adding a pronominal affix to the verb. In other words, Miller and Sag's proposal makes use of monotonic inheritance, allowing elements of the type *aff* to be inserted in the ARG-ST list of verbs, and setting constraints on certain types in the hierarchy. These

constraints aim at stopping members of the type *aff* in the ARG-ST list from surfacing syntactically. Linking of ARG-ST and syntax takes place by unifying lexical types with semantic and phonological information with "linking" or "semantic" types in the lexical hierarchy.
Moreover, Miller and Sag (1997, p. 581) assume that "each inflected word[12] must belong simultaneously to three compatible types: (1) a (CLITIC-)REALIZATION (REALZN) type - either *plain-word (pl-wd)* or *cliticized-word (cl-wd)*; *cl-wd* is further divided into the two subtypes *su(bject)-cl-wd* and *n(on)s(ubject)-cl-wd*; (2) an INFLECTIONAL (INFLN) type, (e.g., *3sg-pres-indic-vb, 2sg-imper-vb*, etc.) that specifies an inflectional form for a given lexeme; and (3) a LEXEME type that specifies the morphological stem, part of speech, argument structure, and meaning common to a family of inflected forms. The hierarchically organised verbal *lexeme* types correspond to what are normally regarded as lexical entries. The hierarchy of words is thus as partially described in terms of the three partitions indicated in the following[13]:

(55)



By means of the above presented hierarchy for *word*, which is a subtype of *sign*, object pronominal affixes are lexically generated with the help of constraints associated with certain types in the hierarchy; such constraints in combination with specific types aim at making sure that affixes which appear in the ARG-ST list of their verbal host would be absent from their host's SUBJ and COMPS lists, as is shown in the following four types:

1. The type *pl-wd* which is subject to the following constraints:

(56)
$$\begin{bmatrix} \textit{pl-wd} \\ \text{SYNSEM} \begin{bmatrix} \text{LOC} \mid \text{CAT} \begin{bmatrix} \text{VALENCE} \begin{bmatrix} \text{SUBJ} \left\langle \boxed{2} \right\rangle \\ \text{COMPS} \boxed{3} \end{bmatrix} \\ \text{ARG-ST} \left\langle \boxed{2} \right\rangle \oplus \boxed{3} \end{bmatrix} \end{bmatrix} \end{bmatrix}$$

[12]And according to them, "cliticization" is a kind of extended inflection (cf., Miller and Sag (1997, p. 581, footnote 12)).
[13]Miller and Sag (1997, p. 581, ex. (13)).

According to Miller and Sag (1997, pp. 586-587), "(56) guarantees that *pl-wds* have an argument structure list corresponding to the simple concatenation of the values of the valence features SUBJ and COMPS; the SUBJ list must furthermore contain exactly one element."

2. The type *cl-wd* which is subject to the following constraints:

$$(57)\quad \begin{bmatrix} \textit{cl-wd} \\ \text{SYNSEM} \begin{bmatrix} \text{LOC} \mid \text{CAT} \begin{bmatrix} \text{HEAD } \textit{verb} \\ \text{VALENCE} \begin{bmatrix} \text{SUBJ } \boxed{2} \\ \text{COMPS } \boxed{3}\text{list}\big(\textit{non-aff}\big) \end{bmatrix} \\ \text{ARG-ST } \big(\boxed{2} \oplus \boxed{3}\big) \bigcirc \text{ nelist}\big(\textit{aff}\big) \end{bmatrix} \end{bmatrix} \end{bmatrix}$$

According to Miller and Sag (1997, pp. 587-588), "(57) requires that all the members of the COMPS list be of type *non-aff*, i.e., these complements must either be *gaps* or else *canons* (overt complements). (57) also guarantees that SUBJ and COMPS lists add up to be the ARG-ST list, except that one or more ARG-ST elements of type *aff* must be absent from the SUBJ or COMPS list, i.e., "shuffled in" to constitute the ARG-ST list...Whereas the COMPS list of a *pl-wd* is unrestricted, all members of the COMPS list of a *cl-wd* must be *non-aff* and hence must correspond to overt complements or gaps, rather than pronominal affixes of that verb's ARG-ST list."

3. The two subtypes of *cl-type* which are subject to the following further constraints:

$$(58)\quad \begin{bmatrix} \textit{su-cl-wd} \\ \text{SYNSEM} \begin{bmatrix} \text{LOC} \mid \text{CAT} \begin{bmatrix} \text{VALENCE} \begin{bmatrix} \text{SUBJ } \langle\rangle \end{bmatrix} \\ \text{ARG-ST } \Big\langle \big[\textit{aff,nom}\big], \ldots \Big\rangle \end{bmatrix} \end{bmatrix} \end{bmatrix}$$

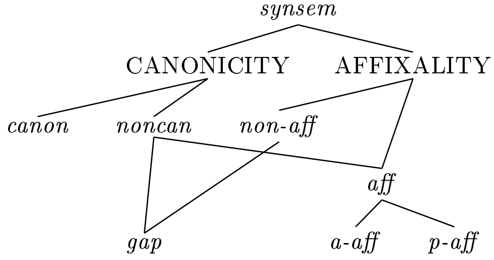
$$(59)\quad \begin{bmatrix} \textit{ns-cl-wd} \\ \text{SYNSEM} \begin{bmatrix} \text{LOC} \mid \text{CAT} \begin{bmatrix} \text{VALENCE} \begin{bmatrix} \text{SUBJ } \Big\langle \boxed{1} \Big\rangle \\ \text{ARG-ST } \Big\langle \boxed{1}, \ldots \Big\rangle \end{bmatrix} \end{bmatrix} \end{bmatrix} \end{bmatrix}$$

According to Miller and Sag (1997, p. 588), "these constraints guarantee that a *su-cl-wd* must have an empty SUBJ list and a first argument that is a nominative NP[*aff*], allowing for the possibility that other arguments are also of type *aff*. The first argument of a *ns-cl-wd*, by contrast, must also appear on the SUBJ list. If this argument is an *aff*, it will be impotent; it may be a *canon* element that combines with a subject syntactically; alternatively it is a *gap*

> and corresponds to an instance of subject extraction. In addition, there must be an *aff* elsewhere in its ARG-ST list because the ARG-ST list of all *cl-wds* must include at least one *aff* element that is not on any valence list."

Now since the elements in the ARG-ST list are of type *synsem*, the synsem hierarchy that Miller and Sag (1997, p. 586) propose is extended in order to accommodate affixal elements in the following way:

(60)



In (60) above, *canon(ical-synsem)*, according to Miller and Sag (1997, p. 586), "is the type associated with all signs; *noncan(onical-synsem)* corresponds to an ARG-ST position that is not realized as a local syntactic dependent of the head. The latter subtype is in turn divided into the subtype *aff(ixal-synsem)* and *gap(-synsem)*. It is the presence of elements of type *aff* on a verb's ARG-ST list that triggers the morphological realization of the corresponding pronominal affixes. The type *non-aff* provides a cross-cutting classification, subsuming all types of *synsem* other than *aff*."

Following Miller and Sag's definition of the type *cl-wd* as is presented in (57) above, along with their definition of the *cl-wd*'s subtype *ns-cl-wd* as is presented in (59), we maintain that a verb in MG whose full NP dependent is duplicated by a pronominal affix belongs to a type which is subject to the following constraints:

$$(61)\quad \begin{bmatrix} \textit{ns-cldou-wd} \\ \text{SS}\,|\,\text{LOC} \begin{bmatrix} \text{CAT} \begin{bmatrix} \text{HEAD} \begin{bmatrix} \textit{verb}\big(\text{CL-WD}\big) \\ \text{VFORM } \textit{indic} \end{bmatrix} \\ \text{VAL} \begin{bmatrix} \text{SUBJ } \langle \boxed{1} \rangle \\ \text{COMPS } \langle \boxed{3}\text{NP}_{\text{acc,j}} \rangle \end{bmatrix} \\ \text{ARG-ST } \langle \big(\boxed{1} \oplus \boxed{3}\big) \bigcirc\ \boxed{2}[\text{p-aff}]_{\text{acc,j}} \rangle \end{bmatrix} \\ \text{CONT} \begin{bmatrix} \textit{cause-rel} \\ \text{CAUSER } \boxed{1} \\ \text{CAUSEE } \boxed{3} \end{bmatrix} \end{bmatrix} \end{bmatrix}$$

(61) above, being actually a subtype of both the *cl-wd* type as presented in (57) and the *ns-cl-wd* type as presented in (59), is subject to all the constraints that these two types obey.

That is, (61) requires that verbs belonging to the type *ns-cldou-wd* have an "*affix*-free" COMPS list, i.e., all their complements must be *canons* (i.e., overt complements). (61) also forces the SUBJ and COMPS lists of the verbs belonging to its type to add up in order to comprise the ARG-ST list. This ARG-ST list contains though also one element of type *aff*, which is coindexed with the full complement NP, since it is the element which is "duplicating" the full complement NP, serving only as a redundant expression of the person, number, and gender class features of this full NP (cf., Bresnan and Mchombo (1986)).

In addition, (61), when applying to MG, also guarantees that the pronominal affix is going to be realized in a *proclitic* to its verbal host position, since this verbal host is in the *indic(ative)* form. If the value of the VFORM feature of the HEAD is *non-per(iphrastic)-imper(ative)*, then the pronominal affix is going to be realized in an *enclitic* to its verbal host position.

Finally, it should be underlined that the semantics associated with the type *ns-cldou-wd* (i.e., the value of the CONTENT) indicates that the verbs falling under this specific type are basically causative verbs.

4. Conclusion

4.1. **The coverage of the Notion Rule.** To recapitulate, let us take a closer look at the coverage possibilities of the Notion Rule we have proposed in (49) above has as far as the MG PVCs are concerned.

Thus, we have already shown that this revised version of the Notion Rule is able to account unproblematically, and without having to resort to counter-intuitive assumptions and "exotic scenarios", for the semantic generalizations related to the MG Agentive EOPVCs, for which we have convincingly argue in the previous section that they entail that the individual denoted by their *subject* NP has a notion of the individual denoted by their *object* NP, and the converse entailment is also true.

The Notion Rule in (49) can also account for the ESPVCs in MG, for which we have convincingly argued in Section (2.2) that they entail that the entity denoted by their *subject* NP has a notion of the entity denoted by their *object* NP, while the entity denoted by their *object* NP is entailed to be **semantically neutral**, or **semantically underspecified**; thus, these constructions do not constitute ontologically an obstacle for the Notion Rule.

As far as the MG Causative EOPVCs are concerned, for which we have convincingly shown in the previous section that the semantic argument realized in their *subject* position (animate or inanimate) does not have any notion of the individual denoted by their *object* NP, since it serves only as the cause (natural, or other) initiating the mental state experienced by the individual denoted by their *object* NP, while the converse entailment does actually go through, i.e., the individual denoted by their *object* NP does have a notion of the cause of its mental state, the Notion Rule is obviously not going to be the main rule accounting for their semantic properties. That is, these constructions cannot trigger the Notion Rule as the main rule capturing the semantic entailments related to them, since only one of the participants in the event denoted by them is entailed to be **cognitive**. Thus, we are going to treat these constructions as normal **causative relations** denoting an event in which one of the participants represents the **cause** (natural or other), while the other participant is entailed to be the **cognitive individual** experiencing the mental state initiated by the causer participant.

4.2. **Linking.** To account for the linking patterns related to the MG PVCs, we follow Davis (1996), and Davis and Koenig (1999), who propose an analysis on linking patterns in HPSG "that does away with intermediary mechanisms such as thematic or actor/undergoer hierarchies."
Instead, linking in their accounts is being taken care of by constraints on word classes, defined by both syntactic and semantic criteria, which encode generalizations between semantic roles and syntactic arguments.
More specifically, Davis and Koenig (1999) use a hierarchy of semantic relations which allows them to model semantic relatedness among words. To provide 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. They further hypothesize that, for each of the characteristic entailments associated with a semantic role attribute, there is always a most general semantic relation requiring that entailment to hold of the participant denoted by its value. Table (1)[14] gives the attribute names, the semantic relation that licenses each attribute, and the (disjunctive) set of characteristic entailments defining each attribute. Inspired by Dowty (1991) and Wechsler (1995), it constitutes their hypothesis regarding the

[14]Proposed by Davis and Koenig (1999).

set of participant properties that affect the linking of semantic arguments onto syntactic functions.

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.
und-rel	UNDERGOER	Causally affected or influenced by another participant; Undergoes a change of state; Is an incremental theme; Possessed by entity.
soa-rel	SOA	Resulting state of affairs; Perceived or conceived of by another participant; A circumstance aspectually or temporally delimited by the relation
fig-grnd-rel	FIG GRND	Entity located with respect to another participant; Moves with respect to another participant; Contains or constitutes another participant; Entity with respect to which another entity is located; Trajectory along which another participant moves; Is contained by or part of another participant.
property-rel	P-BEARER	Entity bearing property.

TABLE 1. Semantic roles and characteristic semantic entailments

As they explain, "these constraints should be viewed as being outside the metalanguage used to describe the semantics encoded in the lexical entries. They constitute constraints on appropriate models for the interpretation of the feature structures representing lexically encoded semantic information. As such, their satisfaction cannot be checked by looking at the metalanguage used in the descriptions. It can only be checked by considering whether the model interpreting the metalanguage structures fit the intuitions regarding properties of event participants."
In order to capture formally the model-theoretic relation between semantic attributes and their characteristic entailments, they introduce the following constraint on semantic attributes:

(62) 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)).

According to Davis and Koenig (1999), "the Attribute-to-Entailment condition does not establish a one-to-one correlation between attributes and characteristic entailments. It merely says that if a certain attribute is present in a semantic relation, at least one of its characteristic entailments holds of the role played by the participant denoted by the attribute's value. The reverse implication does not hold; the condition does not require any attribute to be present in a semantic relation."
Finally, Davis and Koenig (1999) note that "although it is difficult to provide a unifying characterization for each set of entailments, the ACTOR entailments relate to initiating an event and affecting other participants, while the UNDERGOER entailments typify "affected" participants. The entailments characteristic of the ACTOR attribute might then reduce to a general entailment roughly paraphrasable as: "has control over the unfolding of the situation" and similar reductions might be possible for other semantic attributes mentioned in the table. But the semantic underpinnings of linking are the entailments themselves, borne by the participants (the denotata of the attributes' values). The names of the attributes are simply convenient reifications of these classes of entailments for the purposes of linking. Table (1), therefore, embodies two hypotheses and two hypotheses only:

1. Characteristic entailments constitute sets of properties of event participants on which linking constraints depend (see Davis (1996) for a more detailed discussion).
2. Semantic role attributes are needed to simplify the interface between semantic arguments and syntactic dependents."

Finally, linking in Davis and Koenig's (1999) account "consists of a classification of words constraining the relations that can exist between (the type of) semantic content of verbs and (the type of) their subcategorization structure. Crucially, the linking contraints that map from semantic attributes to the subject and object reference both the semantic attributes and the list of syntactic dependents or ARG-ST list. Not all verbs in a semantic class have the same subcategorization possibilities, however. 'Eat', for example, differs from 'devour' in that its undergoer need not be mapped to any syntactic argument. 'Eat' and 'devour' thus only share some of their linking properties."

Davis and Koenig's (1999) proposal is that "a hierarchical organization of lexical knowledge constitutes the optimal architecture in which to specify these partial linking similarities among verbs, say the class of verbs with a semantics that is a subtype of *act-rel*. By itself, though, this claim is too weak. If different word classes could vary more or less arbitrarily in the mappings they specify betweeen proto-role attributes and subcategorization requirements, then linking would be free. In fact, the linking properties of a verb are highly constrained by the semantic relation it denotes; verbs denoting *act-rel* events, for instance, map their actor onto subject position in the active form."
To reflect such constraints, Davis and Koenig (1999) restrict the kinds of word classes that exist in the lexicon via a universal condition on the relation between (linking-related) word classes and semantic relations:

(63) 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.

The effects of this homomorphism constraint are represented informally in the parallelism of the hierarchies of Figure 1.

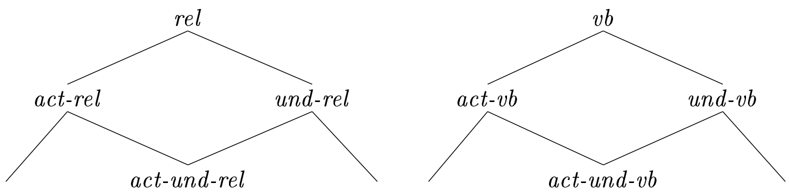


FIGURE 1. Homomorphism between semantic relation types and linking types

In other words, according to Davis and Koenig (1999) "the relationship between the two hierarchies of semantic relations and word class types can be expressed in a principle that imposes a homomorphism under subtypes from semantic relations to word classes. The principle in (63) has the effect of ensuring that any lexical item's location in the lexical hierarchy is such that it inherits all linking constraints applicable to it, given its semantics."
Thus, following Davis and Koenig's (1999) approach to linking, the linking patterns related to the ESPVCS, as well as the Agentive and the Causative

EOPVCs in MG that we have extensively described in the previous are formally captured in the following relations:

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

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

In other words, the *notion-rel* in (64), which is semantically grounded in the Notion Rule in (49), captures properly the semantic generalizations related both to the ESPVCs, the way these have been described in 2.2 and 2.3, as well as the semantic generalizations related to the Agentive EOPVCs, the way these have been described in 2.4.2, 2.4.3, and 2.4.4.
That is, according to the *notion-rel* in (64), which is semantically grounded in the Notion Rule in (49), for the ESPVCs and the Agentive EOPVCs in MG the object of emotion is non-causal, and the top-level ACTOR corresponds to the participant who holds a mental representation, by virtue of the definition of semantic attributes in Table (1). Consequently and as far as the ESPVCs and the Agentive EOPVCs in MG are concerned, the top-level ACTOR is mapped onto the first argument of the ARG-ST list, being ultimately realized in the SUBJ position of the constructions in question.
On the other hand, the linking patterns of the Causative EOPVCs in MG, the way these have described in (2.4.3), are properly captured in (65), which briefly states that:

1. the cause(r) (animate or inanimate) is realized as the subject,
2. the "affected" by the cause(r) individual occupies the object position of the sentence, and
3. this "affected" individual does have a **notion** of the cause(r) initiating its mental state, but the converse entailment does not go through.

Taking the *cause-notion-rel* in (65) into account, we maintain that the Causative EOPVCs in MG belong to the type *ns-cldou-wd* we have seen in (61) in Section 3.2, which we repeat here in its elaborated version:

(66)
$$\begin{bmatrix} \textit{ns-cldou-wd} \\ \text{SS}\,|\,\text{LOC} \begin{bmatrix} \text{CAT} \begin{bmatrix} \text{HEAD} \begin{bmatrix} \textit{verb}\big(\text{CL-WD}\big) \\ \text{VFORM } \textit{indic} \end{bmatrix} \\ \text{VAL} \begin{bmatrix} \text{SUBJ } \langle \boxed{1} \rangle \\ \text{COMPS } \langle \boxed{3}\text{NP}_{\text{acc,j}} \rangle \end{bmatrix} \\ \text{ARG-ST } \langle \big(\boxed{1} \oplus \boxed{3}\big) \bigcirc \boxed{2}[\text{p-aff}]_{\text{acc,j}} \rangle \end{bmatrix} \\ \text{CONT} \begin{bmatrix} \textit{cause-notion-rel} \\ \text{ACT } \boxed{1} \\ \text{UND } \boxed{3} \\ \text{SOA} \begin{bmatrix} \textit{notion-rel} & \\ \text{ACT} & \boxed{3} \\ \text{SOA} & \boxed{1} \end{bmatrix} \end{bmatrix} \end{bmatrix} \end{bmatrix}$$

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