
Valence Alternations in Modern Greek: an MRS analysis

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7.1 Introduction

The aim of this paper is to provide a semantic account of valence alternations in Modern Greek of the following general form:¹

$$(1) \quad \text{NP}_k \text{ V NP}_i [\text{P NP}_j] \rightarrow \text{NP}_k \text{ V NP}_j [\text{P NP}_i]$$

In other words, the valence alternations in Modern Greek we focus on in this paper are the ones involving direct internal arguments (i.e., objects) and indirect prepositional complements.

Such alternation patterns in Modern Greek characterize mainly the behaviour of verbal predicates which participate in the so-called Locative Alternation phenomena.

The rest of the paper is structured as follows. In the next section (Section (7.2)) we will give a thorough overview of the behaviour of the relevant classes of verbs in Modern Greek: the so-called *spray/load* verbs, *removal* verbs, and the *impingement* verbs. In Section (7.3) we will present briefly previous analyses of valence alternations and we will show why such analyses fail to account for the Modern Greek data that we are interested in. Finally, in the last section (Section (7.4)) we will give a brief overview of Minimal Recursion Semantics (MRS; Copestake et al. (1999)), which the analysis of valence alternations in Modern Greek that we are presenting in the same section is based on.

¹The indices in (1) denote referential identity.

7.2 Locative Alternation in Modern Greek: Overview

7.2.1 The verbs of the *spray/load* class

Let us take a look at the following sentences in Modern Greek:

- (2) O georgos fortose to ahiro sto karo.
the farmer.N load.PAST.3S the hay.A onto-the wagon
“The farmer loaded the hay on the wagon”.
- (3) O georgos fortose to karo me ahiro.
the farmer.N load.PAST.3S the wagon.A with hay
“The farmer loaded the wagon with hay”.
- (4) I diadilotes psekasan tin mpogia sto agalma.
the demonstrators.N.PL spray.PAST.3PL the paint.A onto-the
statue
“The demonstrators sprayed the paint onto the statue”.
- (5) I diadilotes psekasan to agalma me mpogia.
the demonstrators.N.PL spray.PAST.3PL the statue.A with paint
“The demonstrators sprayed the statue with paint”.

(2)-(5) are examples of Modern Greek predicates which participate in the so-called Locative Alternation phenomena (see Dowty (1991), Rappaport and Levin (1988), Levin and Rappaport Hovav (1991)). Alternations in Modern Greek with the locative verbs *fortono* (load) and *psekazo* (spray) are of the general form presented in (1) in Section (7.1).

The main features of these verbs in Modern Greek (English and some other languages) is that they are morphologically identical and that they always involve at least two arguments: one denoting a *location* and one denoting the *locatum* (*karo* (wagon)/*agalma* (statue) and *ahiro* (hay)/*mpogia* (paint), respectively, in (2)-(5) above).

(Levin, 1993, pg. 50) describes this class of predicates as follows:

[Locative alternation] is found with certain verbs that relate to putting substances on surfaces or things in containers, or to removing substances from surfaces or things from containers.

Much of the discussion in the literature has dealt with the so-called holistic interpretation of the English locative verbs *spray* and *load*.

Concerning Modern Greek locative verbs, in (2) all the available hay has been loaded onto the wagon no matter whether the wagon is full or not. In (3) the wagon is completely loaded. Likewise in (4) all the paint has been sprayed on the statue which is not necessarily covered. In (5) all the statue is

covered. The aspect of all the sentences in (2)-(5) above, though, depends on the properties of the object rather than the properties of the oblique.

Not all locative verbs in Modern Greek, though, alternate.

The verbs *gemizo* (fill) and *skepazo* (cover), for instance, admit a *me*-PP (with-PP) complement only (see also Levin (1993) for the corresponding English verbs):

- (6) O Petros gemise tin dexameni (me nero).
the Peter.N fill.PAST.3S the tank.A (with water)
“Peter filled the tank (with water)”.
- (7) *O Petros gemise (to) nero (stin dexameni).
the Peter.N fill.PAST.3S (the) water.A (into-the tank).
“*Peter filled water (into the tank)”.
- (8) O Petros skepase to perivoli (me ena adiavroho).
the Peter.N cover.PAST.3S the garden.A (with a tarpaulin)
“Peter covered the garden (with a tarpaulin)”.
- (9) *O Petros skepase ena adiavroho (sto perivoli).
the Peter.N cover.PAST.3S a tarpaulin.A (over-the garden)
“*Peter covered a tarpaulin (over the garden)”.

On the other hand, the verb *hino* (pour), for instance, appears only with a locative prepositional complement:

- (10) O Petros ehise nero sto mbol.
the Peter.N pour.PAST.3S water.A into-the bowl
“Peter poured water into the bowl”.
- (11) *O Petros ehise to mbol me nero.
the Peter.N pour.PAST.3S the bowl.A with water
“*Peter poured the bowl with water”.

7.2.2 Removal Predicates

The *removal* predicates in Modern Greek also take *locatum* and *location* arguments and they are distinguished in the following groups:

1. Predicates which imply a change of state of the *location* argument (for instance, the verb *adiazo* (empty)) when it is realized as the direct object of the verb. These predicates appear as tri-valent with alternative argument structures (see examples (12) and (13) below):

- (12) O Petros adiase tin dexameni (apo to nero).
the Peter.N empty.PAST.3S the tank.A (of the water)
“Peter emptied the tank (of water)”.

- (13) O Petros adiase to nero apo tin dexameni.
 the Peter.N empty.PAST.3S the water.A from the tank
 “Peter emptied the water from the tank”.

2. Predicates which denote a contact with the *location* (see also Levin and Rappaport Hovav (1991) for the corresponding predicates in English). These predicates may also specify the manner or the instrument related to this action of moving (*skupizo* (wipe)).

They do not allow an inchoative interpretation (example (14)). This is an indication that they do not imply a change of state of the *location* argument. For instance, wiping the oil from a pan does not imply a definite change of the state of the pan. That means that the pan is not an *oil-less pan*.

Some of these predicates do not admit an *apo*-PP (of/from-PP) complement when their *location* argument is realized as the direct object. For instance, the verb *skupizo*. *skupizo* (wipe) does not admit an *apo*-PP (of/from-PP) complement when its *location* argument is realized as the direct object (example (15)). In this case *skupizo* does not entail the existence of a *locatum* argument. For instance, the act of wiping a pan does not necessarily result in wiping something off it.

- (14) *To tigani skupistike apo to ladi.
 the pan.N wipe.PAST.INCH.3S of the oil
 “*The pan wiped of oil”.

- (15) *O Petros skupise to tigani apo to ladi.
 the Peter.N wipe.PAST.3S the pan.A from the oil
 “*Peter wiped the pan of the oil”.

- (16) O Petros skupise to tigani.
 the Peter.N wipe.PAST.3S the pan.A
 “Peter wiped the pan”.

- (17) O Petros skupise to ladi apo to tigani.
 the Peter.N wipe.PAST.3S the oil.A from the pan
 “Peter wiped the oil from the pan”.

katharizo (trim) is different than *skupizo* (wipe), though, in the sense that “trimming an object” necessarily means “trimming something off this object”:

- (18) O Petros katharise to thamno apo ta xera kladia.
 the Peter.N trim.PAST.3S the bush.A of the dry branches
 “Peter trimmed the bush of the dry branches”.

3. Predicates which denote only some action of contact in relation to the *location*, but do not specify the manner or the instrument used in this action.

In Modern Greek these predicates do not allow an inchoative interpretation (see example (19) below), but they take an obligatory *apo*-PP (from-PP) (see example (21) below):

(19) *I tsada vgalhike apo ta psonia.
the bag.N remove.PAST.INCH.3S of the shopping
“*The bag removed of the shopping”.

(20) *I Maria evgale tin tsada apo ta psonia.
the Maria.N remove.PAST.3S the bag.A of the shopping
“*Maria removed the bag of the shopping”.

(21) I Maria evgale ta psonia apo tin
the Maria.N remove.PAST.3S the shopping.A.PL from the
tsada.
bag
“Maria removed the shopping from the bag”.

(22) *I Maria evgale ta psonia.
the Maria.N remove.PAST.3S the shopping.A.PL
“*Maria removed the shopping”.

4. The verb *therapevo* (cure) also belongs to the so-called *removal* predicates in Modern Greek:

(23) To pedi therapeftike apo tin pnevmonia.
the child.N cure.PAST.INCH.3S of the pneumonia
“The child cured of pneumonia”.

(24) O yiatros therapefse to pedi apo tin pnevmonia.
the doctor.N cure.PAST.3S the child.A of the pneumonia
“The doctor cured the child of pneumonia”.

(25) *O yiatros therapefse tin pnevmonia apo to pedi.
the doctor.N cure.PAST.3S the pneumonia.A from the child
“*The doctor cured pneumonia from the child”.

7.2.3 Impingement Predicates

A typical impingement verb in Modern Greek is *htipo* (hit).

According to Dowty (1991), the verb *hit* (in English) does not imply any change of state for any of its arguments which may surface syntactically as direct object. The same semantic entailments also hold for the Modern Greek verb *htipo*.

htipo is an asymmetric predicate in that when the *location* argument is realized as the direct object of the predicate the *locatum* argument is optional, but when the *locatum* argument is realized as the direct object all arguments are obligatory.

- (26) O Petros htipise ton frahti.
the Peter.N hit.PAST.3S the fence.A
“Peter hit the fence”.
- (27) O Petros htipise ton frahti me to xilo.
the Peter.N hit.PAST.3S the fence.A with the stick
“Peter hit the fence with the stick”.
- (28) O Petros htipise to xilo sto frahti.
the Peter.N hit.PAST.3S the stick.A onto-the fence
“Peter hit the stick against the fence”.
- (29) *O Petros htipise to xilo.
the Peter.N hit.PAST.3S the stick.A
“*Peter hit the stick”.

Another impingement verb in Modern Greek is the trivalent verb *spazo* (break), which alternates between a *me* (with) and a *sto* (onto) prepositional complement. Each alternant indicates that the argument which surfaces as the direct object of the verb is entailed to undergo a change of state.

The relationship between the trivalent *spazo* and its bivalent counterpart in Modern Greek is a very interesting one to observe. The bivalent *spazo* (break) does not require that its direct object be either a *location* or a *locatum*:

- (30) O Gianis espase to podi tu.
the Gianis.N break.PAST.3S the leg.A his
“John broke his leg”.

In other words, on its own *spazo* (break) is not an impingement verb, but a change-of-state predicate (see Gawron (1986) on the English verb *break*).

Moreover, in the trivalent case both oblique arguments are optional and neither is entailed by the verb. This strongly suggests that *spazo* is simply a change-of-state verb, even in its trivalent use:

- (31) O Petros espase ton frahti (me to xilo).
the Peter.N break.PAST.3S the fence.A (with the stick)
“Peter broke the fence (with the stick)”.
- (32) O Petros espase to xilo (ston frahti).
the Peter.N break.PAST.3S the stick.A (onto-the fence)
“Peter broke the stick (against the fence)”.

For verbs in the *htipo* (hit) and the *spazo* (break) subclasses in Modern Greek, the *me* (with) alternant (see examples (27) and (31) above) entails that one of the arguments is understood as the instrument (“means”) which is used by the causer in order to perform the action denoted by the verb. The *sto* (onto) alternant (see examples (28) and (32) above), on the other hand, entails that one of the arguments (i.e., the *locatum*) undergoes directed motion.

Finally, as we have also pointed out in the case of the verbs of the *spray/load* class in Modern Greek (see Section (7.2.1) above), not all verbs of the impingement class in Modern Greek alternate:²

- (33) I Maria edire to agori me to xilo.
 the Maria.N swat.PAST.3S the boy.A with the stick
 “Maria swatted the boy with the stick”.
- (34) *I Maria edire to xilo sto agori.
 the Maria.N swat.PAST.3S the stick.A at/against-the boy
 “*Maria swatted the stick at/against the boy”.

7.3 Previous analyses of Locative Alternation

7.3.1 Pinker (1989)

Pinker (1989) assumes that the two alternants of the (English) locative verbs *spray* and *load* must have different semantic contents, since according to his analysis the semantic content of lexical entries determines (for the most part) subcategorization:

- (35) Peter sprayed the paint onto the statue.
 CAUSE (PETER, GO (PAINT, TO (STATUE)))
- (36) Peter sprayed the statue with paint.
 ACT-ON (PETER, STATUE, BY (CAUSE (PETER, GO (PAINT, TO (STATUE))))))

The problem with such analyses of valence alternations, – i.e., analyses which presuppose that the semantics of the verbs determine their subcategorization, – is that there is no independent semantic motivation for the new metalanguage predicate/keyword BY (see (36) and cf. also Koenig and Davis (2000) for more on this specific point).

7.3.2 An HPSG Analysis

Markantonatou and Sadler (1996) use underspecified verb entries in order to provide an HPSG analysis for verb alternations in English which affect specifically the choice of direct and indirect internal arguments.

²See Dowty (1991) for similar exceptions among the verbs of the impingement class in English.

In their analysis no lexical rules are implicated in relating the two different semantics they assume for the English locative verbs, which correspond to different syntactic argument structures. Instead, for their analysis they rely on the application of the rules of their linking component, the simultaneous satisfaction of different constraints and on type inference.

As an example of how their analysis works, let us take a closer look at their proposal for the English verb *load*, which, as the Modern Greek verb *fortono* (load) in examples (2) and (3) in Section (7.2.1) above, has two alternative forms, each with an optional oblique which is existentially quantified when not syntactically realized:

(37) John loaded the hay on the wagon.

(38) John loaded the wagon on the hay.

The following is the semantic representation that Markantonatou and Sadler (1996) assume for the (active) English verb *load*:

(39)

REL	<i>load</i>	
ARG1	$\boxed{1}$ [OTHER { <i>location</i> }] <small>argtype</small>	
ARG2	$\left[\begin{array}{l} \text{LINK } causer_ntc \\ \text{OTHER } \{ \} \end{array} \right]$ <small>argtype</small>	
ARG3	$\boxed{2}$ [OTHER { <i>locatum</i> }] <small>argtype</small>	
SEM.CON.S.	$\left[\begin{array}{l} \text{REL } \perp \\ \text{ARG1 } \boxed{1} \\ \text{ARG2 } \boxed{2} \end{array} \right]$ <small>contact</small>	

specc

They presuppose that

“...the [English] verb *load* has **only one** argument for which properties relevant to linking are expressed. This argument is the argument which will eventually surface as the subject. Otherwise, *load* requires a location and a locatum argument, but it does not define any entailments over these arguments which would enforce any particular linking” (Markantonatou and Sadler, 1996, pg. 52).

According to Markantonatou and Sadler (1996), it is this lack of further specifications which permits the location-object locatum-object alternation, and which reflects the fact that the two alternants of the verb *load* in English are somehow symmetric with respect to the optionality of oblique arguments. As far as existential quantification is concerned, they assume that arguments

which appear in the lexical entry of *load* as first level or embedded (second level) semantic arguments are existentially quantified.

load, according to them, also has a value specified for the attribute SEM.CONNS, which indicates that there is an entailment of contact between the ARG1 and the ARG3 of the predicate *load* (the location and the locatum). Markantonatou and Sadler (1996) underline that “the fact that this is the most general type of contact will in turn ensure that the predicate can surface with both *with-PP* and *on, in, etc-PP*”.

As far as linking of the arguments of the verb *load* is concerned, Markantonatou and Sadler (1996) assume that by means of the semantic representation that they propose in (39) two options are possible: “[Either] ARG2 is linked to subject as it has no other choice, and since it is a top level argument which is not also the argument of an embedded predicate, it must be linked. [Or] ARG1 and ARG3 are not specified for any LINK values and therefore they can each link either to the object of the verb or to the object of a predicate that maps an embedded relation.... [Finally] similar argumentation can be developed if one assumes that instead of linking the ARGs first, the system links SEM.CONNS first” (Markantonatou and Sadler, 1996, pg. 52-53).

Finally, the fragment of the hierarchy of *semcons* in Figure (1) below shows how the alternation characterizing the locative verbs like *load* in English is accounted for in the theory proposed by Markantonatou and Sadler (1996), which we have presented briefly above.

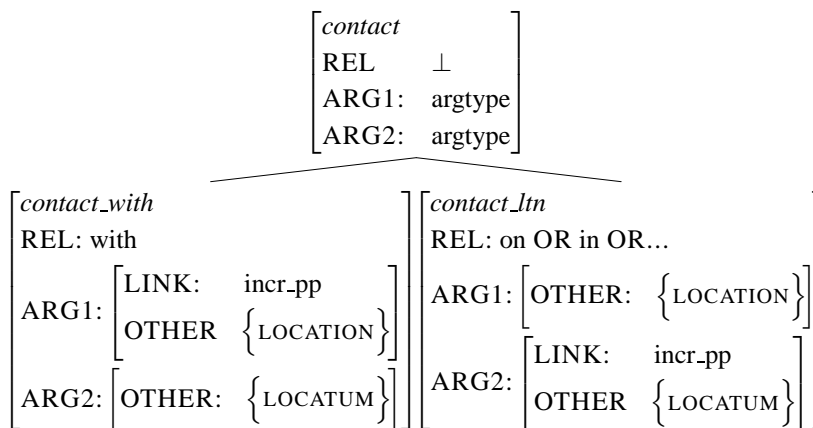


FIGURE 1 The hierarchy of *semcons* that Markantonatou and Sadler (1996) propose for English locative verbs like *load*

7.4 Locative Alternation in Modern Greek: The Analysis

The account we suggest here for locative alternation in Modern Greek (see examples in Section (7.2) above) does not follow the analysis of locative alternation that Markantonatou and Sadler (1996) have proposed and whose main points we have briefly presented in the previous section. The reason is that underspecification (of verbal entries and/or of their complements) may be a possible approach to valence alternations, once it has been made sure that overgeneration is excluded (see, for instance, the disjunctive values of the REL feature of the *contact_ltn* type in Figure (1) of section (7.3.2) above).

Instead, we follow the proposal of Koenig and Davis (2000) for valence alternations, including locative alternation in English. Specifically, observing that in order to state linking regularities one often needs to resort to otherwise unmotivated predicates or an *ad hoc* feature geometry, the main hypothesis of Koenig and Davis (2000) is that the semantic content of verbs should be considered to consist of a list of elementary predications, one member of which is chosen as the key for determining the verb's linking properties. Arguments within other elementary predications may be realized as objects of prepositions, but not as direct arguments of the verb. According to them, the *lexical list hypothesis*, – as they call the linking theory that they propose, – allows for a motivated analysis of the linking properties of apparent semantic doublets (i.e., what we have called “valence alternants”), as well as for a more restrictive and constrained theory of linking altogether. Their analysis is based on a minimal recursion approach to lexical semantic representation and is formalized using the Minimal Recursion Semantics (MRS) framework of Copestake et al. (1999).

In brief, Minimal Recursion Semantics (MRS; Copestake et al. (1999)) is a framework for computational semantics, in which the meaning of expressions is represented as a flat bag of Elementary Predications (or EPs) encoded as values of a LISZT attribute. The denotation of this bag is equivalent to the logical conjunction of its members. Scope relations between EPs are represented as explicit relations among EPs. Such scope relations can also be underspecified. The assumption of current MRS is that each lexical item contributes a single EP, which is referred to as the *KEY EP*.

According to Koenig and Davis (2000), for situation-denoting EPs, which are also most interesting for our purposes here, the following generalizations hold:

1. EPs do not encode recursively embedded state-of-affairs (SOAs).
2. EPs can have one, two, or three arguments.
3. If an EP has three arguments, then one of them is a state-of-affairs, and another is an undergoer co-indexed with an argument of the embedded state-of-affairs.

Finally, as far as direct arguments are concerned, in Koenig and Davis (2000) these are predicted to link off the value of the KEY attribute.

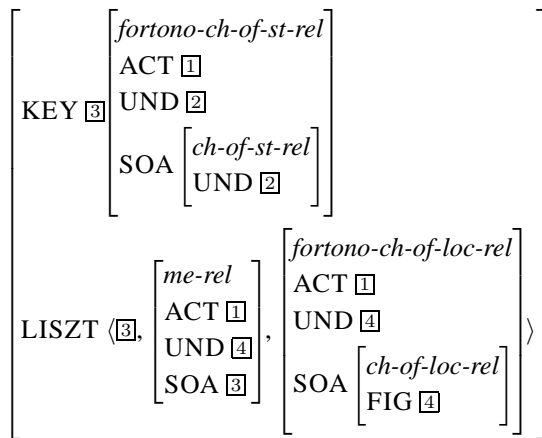
7.4.1 The verbs of the *spray/load* class

Thus, following the *lexical list hypothesis* of Koenig and Davis (2000), i.e., assuming along with Koenig and Davis (2000) that some lexical items include more than one EPs in their semantic content, but lexically they select only one of these EPs as their KEY, we propose that the semantic properties of the arguments of the verb *fortono* (load) in example (3) of Section (7.2.1) above, repeated in (40) below for convenience:

- (40) O georgos fortose to karo me ahiro.
 the farmer.N load.PAST.3S the wagon.A with hay
 “The farmer loaded the wagon with hay”.

are captured by the following semantic type:

- (41) CONTENT value of *fortono_me* (*load_with*)



(41) above captures that the *me* (with) alternant of the Modern Greek locative verb *fortono* (load; examples (3) and (40) above) denotes situations that must be both changes of state and changes of location.

The *sto* (onto) alternant of the Modern Greek locative verb *fortono* (load; example (2) of Section (7.2.1) above, repeated in (42) below for convenience) denotes a single change of location:

- (42) O georgos fortose to ahiro sto karo.
 the farmer.N load.PAST.3S the hay.A onto-the wagon
 “The farmer loaded the hay on the wagon”.

Koenig and Davis (2000) have proposed that the semantics of the *onto* alternant of the English locative verb *load* includes only the second member of the LISZT in (41) above.

This will also capture the CONTENT value of the *sto* (onto) alternant of the Modern Greek locative verb *fortono* (load) in examples (2) and (42) above:

(43) CONTENT value of *fortono_sto* (*load_onto*)

$$\left[\begin{array}{l} \text{KEY } \boxed{5} \\ \text{LISZT } \langle \boxed{5} \rangle \end{array} \left[\begin{array}{l} \text{fortono-}ch\text{-of-loc-rel} \\ \text{ACT } \boxed{1} \\ \text{UND } \boxed{4} \\ \text{SOA } \left[\begin{array}{l} ch\text{-of-loc-rel} \\ \text{FIG } \boxed{4} \end{array} \right] \end{array} \right] \right]$$

The analysis presented above holds also for both alternants of the Modern Greek locative verb *psekazo* (spray) (see examples (4) and (5) of Section (7.2.1) above, repeated in (44) and (45) below for convenience), as shown in (46) and (47) below:

(44) I diadilotes psekasan tin mpogia sto
the demonstrators.N.PL spray.PAST.3PL the paint.A onto-the
agalma.
statue

“The demonstrators sprayed the paint onto the statue”.

(45) I diadilotes psekasan to agalma me mpogia.
the demonstrators.N.PL spray.PAST.3PL the statue.A with paint

“The demonstrators sprayed the statue with paint”.

(46) CONTENT value of *psekazo_me* (*spray_with*)

$$\left[\begin{array}{l} \text{KEY } \boxed{6} \left[\begin{array}{l} \textit{psekazo-ch-of-st-rel} \\ \text{ACT } \boxed{1} \\ \text{UND } \boxed{2} \\ \text{SOA } \left[\begin{array}{l} \textit{ch-of-st-rel} \\ \text{UND } \boxed{2} \end{array} \right] \end{array} \right] \\ \\ \text{LISZT } \langle \boxed{6}, \left[\begin{array}{l} \textit{me-rel} \\ \text{ACT } \boxed{1} \\ \text{UND } \boxed{4} \\ \text{SOA } \boxed{6} \end{array} \right], \left[\begin{array}{l} \textit{psekazo-ch-of-loc-rel} \\ \text{ACT } \boxed{1} \\ \text{UND } \boxed{4} \\ \text{SOA } \left[\begin{array}{l} \textit{ch-of-loc-rel} \\ \text{FIG } \boxed{4} \end{array} \right] \end{array} \right] \rangle \end{array} \right]$$

(47) CONTENT value of *psekazo_sto* (*spray_onto*)

$$\left[\begin{array}{l} \text{KEY } \boxed{7} \left[\begin{array}{l} \textit{psekazo-ch-of-loc-rel} \\ \text{ACT } \boxed{1} \\ \text{UND } \boxed{4} \\ \text{SOA } \left[\begin{array}{l} \textit{ch-of-loc-rel} \\ \text{FIG } \boxed{4} \end{array} \right] \end{array} \right] \\ \\ \text{LISZT } \langle \boxed{7} \rangle \end{array} \right]$$

7.4.2 Removal Predicates

In the spirit of the MRS-based analysis for the Modern Greek verbs of the *spray/load* class that we have presented above, we propose that the semantic properties of the arguments of one of the most representative verbs of the *removal predicates* class in Modern Greek, the verb *skupizo* (wipe) in example (16) of Section (7.2.2) above, repeated in (48) below for convenience:

(48) O Petros skupise to tigani.
 the Peter.N wipe.PAST.3S the pan.A
 “Peter wiped the pan”.

are captured by the following semantic type:

(49) CONTENT value of *skupizo* (wipe; examples (16) and (48))

$$\left[\begin{array}{l} \text{KEY } \boxed{3} \left[\begin{array}{l} \text{skupizo-rel} \\ \text{ACT } \boxed{1} \left(o \text{ Petros} \right) \\ \text{UND } \boxed{2} \left(to \text{ tigani} \right) \end{array} \right] \\ \text{LISZT } \langle \boxed{3} \rangle \end{array} \right]$$

(49) above captures that the Modern Greek removal predicate *skupizo* (wipe) does not allow for a PP (*apo*-PP (of/from-PP)) complement when its *location* argument is realized as the direct object (see examples (15) and (16) in Section (7.2.2) above and example (48) in this section). As has been also pointed out in Section (7.2.2), in this case *skupizo* does *not* entail the existence of a *locatum* argument.

The Modern Greek removal predicate *skupizo* (wipe) does admit a PP (*apo*-PP (of/from-PP)) complement, though, when a *locatum* argument is realized as its direct object (see example (17) in Section (7.2.2) above, repeated in (50) below for convenience):

(50) O Petros skupise to ladi apo to tigani.
the Peter.N wipe.PAST.3S the oil.A from the pan
“Peter wiped the oil from the pan”.

In this case we propose that the semantic properties of the arguments of the verb *skupizo* (wipe) are captured by the following semantic type:

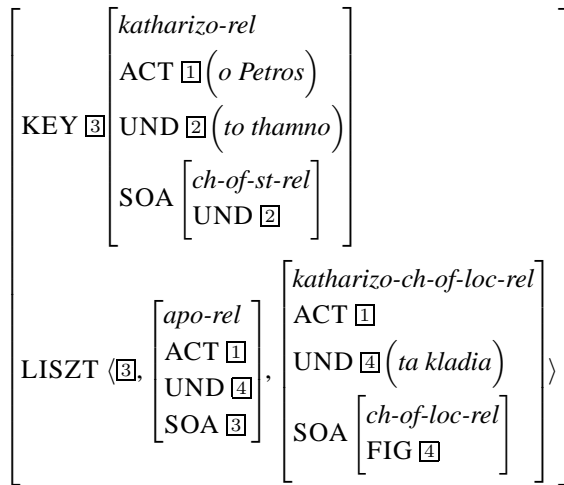
(51) CONTENT value of *skupizo_apo* (wipe_from; examples (17) and (50))

$$\left[\begin{array}{l} \text{KEY } \boxed{5} \left[\begin{array}{l} \text{skupizo-ch-of-loc-rel} \\ \text{ACT } \boxed{1} \left(o \text{ Petros} \right) \\ \text{UND } \boxed{4} \left(to \text{ ladi} \right) \\ \text{SOA } \left[\begin{array}{l} \text{ch-of-loc-rel} \\ \text{FIG } \boxed{4} \end{array} \right] \end{array} \right] \\ \text{LISZT } \langle \boxed{5} \rangle \end{array} \right]$$

Finally, we propose one last semantic type (see (53) below) in order to capture the semantic properties of the arguments of the Modern Greek removal predicate *katharizo* (trim; see example (18) in Section (7.2.2) above, repeated in (52) below for convenience):

- (52) O Petros katharise to thamno apo ta xera kladia.
 the Peter.N trim.PAST.3S the bush.A of the dry branches
 “Peter trimmed the bush of the dry branches”.

- (53) CONTENT value of *katharizo_apo* (trim_of; examples (18) and (52))



(53) above captures that in Modern Greek trimming necessarily results in trimming something off something else; in the case of example (52) above trimming the bush results in trimming the dry branches off the bush. And this is what the semantic type in (53) captures.

7.4.3 Impingement Predicates

As shown in Section (7.2.3) above, a typical impingement verb in Modern Greek is *htipo* (hit) (see examples (26)-(29) in Section (7.2.3), repeated below for convenience):

- (54) O Petros htipise ton frahti.
 the Peter.N hit.PAST.3S the fence.A
 “Peter hit the fence”.
- (55) O Petros htipise ton frahti me to xilo.
 the Peter.N hit.PAST.3S the fence.A with the stick
 “Peter hit the fence with the stick”.
- (56) O Petros htipise to xilo sto frahti.
 the Peter.N hit.PAST.3S the stick.A onto-the fence
 “Peter hit the stick against the fence”.

- (57) *O Petros htipise to xilo.
 the Peter.N hit.PAST.3S the stick.A
 “*Peter hit the stick”.

In order to capture the semantic properties of the arguments of the most representative verb of the *impingement predicates* class in Modern Greek, the verb *htipo* (hit) in examples (54)-(57) above, we propose the semantic types in (58) and (59), which are in the spirit of the MRS-based analysis that we have presented in the previous for the verbs of the *spray/load* class and for the *removal predicates* in Modern Greek.

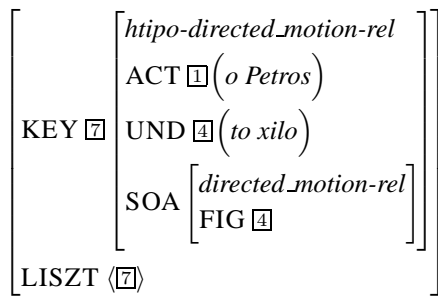
(58) and (59) capture that the Modern Greek impingement verb *htipo* (hit) is an assymmetric predicate in that when the *location* argument is realized as the direct object of the predicate the *locatum* argument is optional (see SOA (5) in (58)), but when the *locatum* argument is realized as the direct object all arguments are obligatory (see (59)).

(58) and (59) also capture that the *me* (with) alternant of the Modern Greek impingement verb *htipo* (hit) (see example (55) above) entails that one of the verbal arguments is understood as the instrument which is used by the actor in order to perform the action denoted by the verb. The *sto* (onto) alternant (see example (56) above) entails that one of the verbal arguments (the *locatum*) undergoes directed motion.

- (58) CONTENT value of *htipo*(*_me*) (hit(*_with*); examples (26), (27)), (54), and (55))

$$\left[\begin{array}{l} \text{KEY } \boxed{5} \left[\begin{array}{l} \textit{htipo-rel} \\ \text{ACT } \boxed{1} \left(\textit{o Petros} \right) \\ \text{UND } \boxed{3} \left(\textit{ton frahti} \right) \end{array} \right] \\ \text{LISZT } \boxed{5}, \left[\begin{array}{l} \textit{me-rel} \\ \text{ACT } \boxed{1} \\ \text{UND } \boxed{4} \left(\textit{to xilo} \right) \\ \text{SOA } \boxed{6} \left[\begin{array}{l} \textit{htipobytouching-rel} \\ \text{ACT } \boxed{4} \\ \text{UND } \boxed{3} \\ \text{SOA } \boxed{5} \end{array} \right] \end{array} \right], \left[\begin{array}{l} \textit{htipo-dir_motion-rel} \\ \text{ACT } \boxed{1} \\ \text{UND } \boxed{4} \\ \text{SOA } \left[\begin{array}{l} \textit{dir_motion-rel} \\ \text{FIG } \boxed{4} \end{array} \right] \end{array} \right] \end{array} \right]$$

(59) CONTENT value of *htipo_sto* (hit_against; examples (28) and (56))



7.5 Conclusions

The MRS-based account proposed by Koenig and Davis (2000) for locative alternation in English enables us to capture the semantic differences of the Modern Greek locative constructions we have presented in Section (7.2) without resorting to underspecified verb entries (cf., Markantonatou and Sadler (1996) and Section (7.3.2)) or semantically unmotivated keywords (cf., Pinker (1989) and Section (7.3.1)).

The MRS-based semantic analysis we have presented in Section (7.4) can account, as we have shown in the same section, for a wide range of Modern Greek verbs which participate in valence alternations affecting both their direct and their indirect arguments: the verbs of the *spray/load* class, the so-called *removal predicates*, and the *impingement predicates* in Modern Greek (see Sections (7.2.1), (7.2.2), and (7.2.3), respectively).

As a final general comment, we need to underline here that the analysis we have presented in Section (7.4) above is in the spirit of the analysis that Koenig and Davis (2000) proposed in that the semantic content we assume for monomorphemic words in our account consists of a list of Minimal Recursion Semantics (MRS; Copestake et al. (1999)) Elementary Predications (EPs), like Koenig and Davis (2000) have proposed. Because of this, we do not need to introduce semantically unmotivated predicates in order to account for the linking in the case of Modern Greek valence alternations. So linking (also in the case of Modern Greek valence alternations) is simpler, exactly like Koenig and Davis (2000) have envisaged it: each EP can have very few structures and linking of direct arguments only depends on the EP selected as the KEY.

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