Subjects, Agents, Experiencers, and Animates in Competition: Modern Greek Argument Order

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Abstract

This article presents the results of a recall experiment on Modern Greek experiential verbs. The influence of the factors subjecthood, thematic role (agent, experiencer), and animacy on word order and their interaction is investigated with three different types of experiencer verbs, namely experiencer subject (ES) verbs, labile [±agentive] experiencer object verbs, and non-agentive experiencer object (EO) verbs. The experimental results show that while a tendency to preserve the preferred SVO order is visible with all examined verb classes, this effect is weakened by an experiencer-first preference for EO verbs. Furthermore, for EO verbs the crucial factor for the argument order preferences is the property [±agentive] of the stimulus while animacy does not exhibit an independent effect in our findings. These results support the separation of the three types of experiential verbs, which is suggested in psych-verb theories on the basis of their different syntactic behavior.

1 Preliminaries[1]

It has been observed that two types of semantic factors have an influence on the linerization of verbal arguments. On the one hand, *inherent* properties of participants, in particular animacy, have been shown to affect word order preferences. On the other hand, *relational* properties of participants, i.e. those properties that identify their thematic relation to the predicate core, such as agentivity and experiential involvement, have been investigated regarding their contribution to argument linearization. The present study aims at investigating the interplay of these factors regarding their impact on word order preferences.

Experiencer verbs provide an ideal case for the study of the interaction of the mentioned factors since they appear in two inverse argument construction types, i.e. as experiencer subject verbs and as experiencer object verbs. These are associated with different degrees of agentivity of the stimulus and allow for variation on the factor animacy since the stimulus role is not restricted to a particular animacy value.

Next to semantic factors syntactic functions, in particular subjecthood, have been demonstrated to influence argument linearization. It is argued that subject

and object occupy fixed positions in the canonical sentence structure which determines argument linearization independently of relational and inherent participant properties. Taking into account the different hypotheses related to word order determination, our study investigates the interaction of subjecthood, animacy, and thematic role on argument order in language production. A recall experiment was designed to test the predictions associated with the mentioned factors.

The article is organized as follows. The subsequent subsections outline the cross-linguistic properties of experiencer verbs (section 1.1) and the state of the art concerning the factors investigated in our study (section 1.2). Section 2 describes the method used in the production experiment and section 3 presents the experimental results discussing four types of effects in the obtained data, namely subject-first effects, experiencer-first effects, animate-first effects, and agentive-first effects. Finally, section 4 summarizes the results of the study und draws conclusions concerning the interaction of the investigated factors on the basis of the differences between the produced orders per experiential construction type.

1.1   On the peculiarity of experiencer verbs

Experiencer verbs show some special properties in comparison with canonical transitive verbs. This holds with respect to the verb semantics as well as with respect to the participant properties of the arguments (see among others Croft 1993, Dowty 1991, Härtl 2001, Klein & Kutscher 2002, Landau (to appear), Pesetzky 1995, Reinhart 2002, Verhoeven 2007). Experiencer verbs are mainly stative and do not show a clear control incline between the subject and the object. Furthermore, while the prototypical participant properties of agent ([+animate], [+agentive]) and patient ([-animate], [-agentive]) are maximally contrastive, this does not apply to the pair experiencer and stimulus: the experiencer is necessarily [+animate] and [-agentive], the stimulus is prototypically [-animate] and [-agentive].

These special semantic properties are reflected at the structural level in peculiar linking patterns and syntactic properties of object experiencers. For instance, experiencer verbs show two orientations. There are experiencer-oriented verbs, i.e. verbs which take the experiencer as subject (henceforth ES verbs), and stimulus-oriented verbs, i.e. verbs which take the stimulus as subject and the experiencer as object (henceforth EO verbs). Stimulus-oriented verbs may be further distinguished as to whether the experiencer object is coded like a direct object in a language, e.g. being marked in the accusative case, or like an indirect object, e.g. appearing in the dative case.

The special properties of experiencer verbs in contrast to canonical transitive verbs are the subject of recent volumes on non-canonical marking of subjects and objects, e.g. Aikhenvald, Dixon & Onishi (eds.) 2001, and Bhaskararao & Subbarao (eds.) 2004. With respect to EO verbs, special 'psych' properties have

been identified, e.g. that experiencer objects exhibit backward binding of ana-phoric pronouns belonging to the putative subject argument (cf. Pesetzky 1987, 1995, Belletti & Rizzi 1988). Experiencer objects have been shown to constitute an extraction barrier (cf. Belletti & Rizzi 1988) and to display scope interaction with the stimulus causer subject (e.g. Kim & Larson 1989, Kuno & Takami 1993). Furthermore, EO verbs are often restricted in passivization, and for a number of languages in which subjects precede objects, it has been argued that the experiencer object tends to occur in an earlier position than the stimulus subject. Accounts on EO verbs differ as to the weight and the status they attrib-ute to the different features in constituting unique properties of EO verbs (see e.g. Landau (to appear) for a discussion of these and further psych properties and a proposal concerning their status as core vs. non-core psych properties).

In accordance with the abovementioned cross-linguistic observations, Mod-ern Greek distinguishes between experiencer-oriented, i.e. ES verbs (1a) and stimulus-oriented, i.e. EO verbs (1b) (cf. Anagnostopoulou 1999, Kordoni 1999).

(1)   a.   O   zoɣráfos   θavmázi   ton
           DEF:NOM.SG.M[2] painter:NOM.SG.M admire:3.SG DEF:ACC.SG.M
           musikó.
           musician:ACC.SG.M
           'The painter admires the musician.'

      b.   O   musikós   enðiaféri   ton
           DEF:NOM.SG.M   musician:NOM.PL.M interest:3.SG DEF:ACC.SG.M
           zoɣráfo.
           painter:ACC.SG.M
           'The musician interests the painter.'

EO verbs such as *enðiaféri* in (1b) are characterized by the fact that they are not agentive. I.e., the subject does not have control over the performance of the event denoted by the verb. Interestingly, a number of Modern Greek EO verbs are systematically ambiguous between an agentive and a non-agentive (causa-tive) reading, called labile EO verbs in the following. The stimulus is interpreted as an agent or as a theme/cause, respectively (Anagnostopoulou 1999, Kordoni 1999, Verhoeven 2008b).[3] The reading of the verb *enoxlí* in (2a) can be agentive, while in (2b), it can only be interpreted as non-agentive/causative. The crucial issue relates to the inherent properties of the stimulus subject: The subject in

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[2] The following abbreviations are used in the glosses of the examples: ACC accusative, AOR ao-rist, DEF definite, F feminine, M masculine, N neuter, NOM nominative, PL plural, SG singular.

[3] See also Klein & Kutscher 2002 for the agentive/non-agentive distinction with respect to German EO verbs and Landau (to appear) for a systematic treatment of this distinction in his syntac-tic account of experiencers.

(2a) is animate, hence it enables both readings of the labile verb; the subject in (2b) is inanimate such that an agentive reading is excluded.

(2) a. O   θόδoros   (to)   enoxlí
         DEF:NOM.SG.M Thodoros:NOM.SG.M 3.SG:ACC.N bother:3.SG
         to   korítsi.
         DEF:ACC.SG.N girl:ACC.SG.N
         'Thodoros bothers the girl.'

     b. O   θórivos   (to)   enoxlí
         DEF:NOM.SG.M noice:NOM.SG.M   3.SG:ACC.N bother:3.SG
         to   korítsi.
         DEF:ACC.SG.N girl:ACC.SG.N
         'The noice bothers the girl.'

The crucial point for our purposes is the effect of the thematic properties of the arguments on word order. For non-agentive experiencer verbs, as well as for labile verbs in their non-agentive reading, it has been argued that both possible orders of the arguments, namely $S_{STIM} \prec O_{EXP}$ and $O_{EXP} \prec S_{STIM}$, are considered as equally neutral (see Anagnostopoulou 1999: 69, 73).

(3) a. Ton   Pétro   ton   enðiaférun
         DEF:ACC.SG.M Peter:ACC.SG.M   3.SG:ACC.M interest:3.PL
         ta   maθimatiká.
         DEF:NOM.PL.N mathematics:NOM.PL.N
         'Mathematics interests Peter.'

     b. Ta   maθimatiká   ton   enðiaférun
         DEF:NOM.PL.N mathematics:NOM.PL.N 3.SG:ACC.M interest:3.PL
         ton   Pétro.
         DEF:ACC.SG.M Peter:ACC.SG.M
         'Mathematics interests Peter.' (Anagnostopoulou 1999: 73)

Both orders in (3), $S_{STIM} \prec O_{EXP}$ and $O_{EXP} \prec S_{STIM}$, are grammatical, given that generally both the SO and OS orders are possible in Modern Greek. Hence, the intuition of 'neutrality' and the difference of the verbs at issue to canonical transitive verbs is not an obvious statement. Taken for granted that single meta-linguistic intuitions do not constitute reliable evidence, we carried out an experimental study based on a repeated-observations design with a sample of native speakers, which is reported in the main part of this article, sections 2 and 3.

1.2 Previous studies

The influence of animacy as a functional correlate of grammatical structure is shown in influential work such as Silverstein (1976), Comrie (1981), Keenan & Comrie (1977), Kuno & Kaburaki (1977), Lehmann (1991), Dahl & Fraurud (1996), Aissen (1999), etc. The impact of animacy on word order in language

production is instantiated as an animate-first effect, which has been shown for several languages such as Greek (Feleki 1996, Branigan & Feleki 1999), Catalan (Prat-Sala et al. 2000), Spanish (Prat-Sata & Branigan 2000), German (Kempen & Harbusch 2004a, Van Nice & Dietrich 2003), Japanese (Branigan et al. 2008, Tanaka et al. 2005) among others.

Theories of thematic role hierarchies (see Bresnan 2001, Dik 1978, Grimshaw 1990, Jackendoff 1987, Van Valin & LaPolla 1997, Primus 1999 among others) agree that the agent outranks the experiencer, and the latter outranks the stimulus. The resulting scale is illustrated in (4). It represents those roles listed on the thematic relations continuum in Van Valin & LaPolla (1998:127) which are necessary for our purposes.

(4)   Agent > Causer > Experiencer > Stimulus > Patient

Thematic role hierarchies are often used to claim a harmonic alignment with the hierarchical structure of the clause, such that positions higher on the scale in (4) are matched on higher syntactic functions. But they have also been suggested to influence linearization of arguments due to prominence differences (see Bornkessel et al. 2005, Grimshaw 1990, Haider 1993, Scheepers et al. 2000, Uszkoreit 1986). Testing this hypothesis with German ES and EO verbs in language comprehension experiments, Scheepers et al. 2000 found – next to a dominant subject before object linearization – a modulating influence of the role hierarchy: preposing of experiencer objects was more acceptable than preposing of stimulus objects and postposing of non-agentive (i.e. inanimate) stimuli subjects was judged as better than postposing of potentially agentive (i.e. animate) stimulus subjects.[4] Thus, agent-first and experiencer-first had a modulating influence on word order in these findings.

Further evidence for word order variation and/or a preference to front the experiencer object has been discussed for languages such as German or Dutch based on corpus data as well as psycho- and neuro-linguistic experiments (see Bornkessel 2002, Haupt et al. 2008, Hoberg 1981, Kempen & Harbusch 2004b, Lamers 2007, Primus 1994).[5] Haupt et al. (2008:84) show on the basis of a single-item rating study (outbalancing the factors definiteness and animacy) an advantage for 'dative $O_{EXP} \prec$ nominative S_{STIM}' and no overall word order preference for the arguments in accusative EO constructions, where both orderings ($S_{STIM} \prec O_{EXP}$ and $O_{EXP} \prec S_{STIM}$) received nearly the same preference ratings.

Argument order variation with EO verbs has been explained by the interaction of competing principles, such as subject-first (or nominative-argument-first) and experiencer-first, see Primus (1994), (2004). At the same time, the interplay of the same factors explains the strictness of '$S_{EXP} \prec O_{STIM}$' order with ES verbs.

[4] Note that in Scheepers et al. (2000) the factor (in)agentivity was not separated from the factor (in)animacy, which is however done in the present study to observe possible effects of both factors.

[5] Note that the issue of word order variation with respect to subject and object in German and its dependency on the factor agentivity is already discussed in Lenerz (1977).

In thematic role theories assuming proto-roles (Dowty 1991, Primus 1999), specific roles are characterized by proto-agent and/or proto-patient properties. The experiencer by its sentience displays one proto-agent property. But also the stimulus may have a proto-agent property, if it is causative or agentive, as outlined in section 1.1. Depending on the relative number of proto-agent and/or proto-patient features, the experiencer may be matched on the subject or on the object function.[6] Moreover, in this view the hierarchy proto-agent > proto-patient determines basic argument order to the effect that the experiencer-first effect is a manifestation of the (proto-)agent-first effect (see Primus 1994, 2004).

Experiencer-first effects are still debated. However, effects linked to a different behavior of EO verbs in contrast to ES verbs and agentive verbs have been demonstrated in several experimental studies (e.g. Cupples 2002, Ferreira 1994, Piñango 1999). For instance, Ferreira (1994) showed for English that EO verbs were significantly more often produced in a passive construction – thus assigning the experiencer the subject function – than ES verbs and agentive verbs. The results in Cupples (2002) correspond to Ferreira's findings with respect to on-line comprehension in reading tasks, i.e. passive constructions with EO verbs resulted in fewer errors and shorter reading times than passive constructions with ES verbs while active EO verbs took a longer reading time than active ES and agentive verbs.

As concerns the role of subjecthood, subject-first effects have been demonstrated by means of a variety of different experimental methods (see data from language comprehension in Frazier 1987, Schlesewsky et al. 2000, Schriefers et al. 1995, Scheepers et al. 2000 for German ES and EO verbs; see also corpus data in Kempen & Harbusch 2004b). However, subject-first effects have been mainly investigated in European languages, that generally display a distinguished subject function and a canonical S ≺ O word order. Thus, we do not assume that the subject-first effect is a universal principle. Rather, within the frame of the present investigation on Modern Greek, a subject-first preference is seen as a tendency to preserve the canonical word order.

2 Method

A recall task was designed following the design of previous studies for the impact of animacy on grammatical function assignment and word order (see Bock & Warren 1985; Feleki 1996 and Branigan & Feleki 1999 for Greek). The speaker was presented a block of six sentences on a computer screen, and was instructed to memorize the scenes that are described in the sentences, in order to

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[6] This is similar to the marcrorole approach in Van Valin & LaPolla (1997), where more specific thematic relations are matched on the macroroles actor and undergoer.

be able to recall them afterwards. The instruction pointed out that it was important to remember the scene and not the exact expression. Each sentence was preceded by a prompt, which encoded a typical location where the situation referred to could take place. The target sentence followed the prompt, as exemplified in (5).

(5) Galerí: O   zoɣráfos θavmázi to   portréto.
     Gallery: The   painter admires the   portrait
     'The painter admires the portrait.'

When the speaker was ready, the slide with the target sentences was withdrawn and the speaker only saw the prompt location words. At this point, the speaker was asked to recall the sentences. This experimental procedure is based on the assumption that speakers recall the target scenes from memory. Their production is expected to display deviations from the perceived material due to memory limitations. Deviations are expected to be systematic when markedness asymmetries are at issue. Hence, the systematic preference to replace the presented pattern with an alternative pattern is assumed to be evidence for a markedness asymmetry between the two competing patterns.

The sentences to be recalled consisted of a main clause containing an experiencer argument, a stimulus argument and one of the experiential verbs introduced below. Each verb occurred with an animate and an inanimate stimulus. Furthermore, each 'verb-experiencer-stimulus' constellation was presented in two orders, SVO and OVS. Only verb medial orders were tested since they are most natural in representing a 'topic – comment' structure, which is the most frequent information structure in discourse and may be accommodated even if presented out-of-the-blue. Moreover, SVO is the most frequent order in Modern Greek (see Lascaratou 1994) and it is contextually unrestricted. We assume that the dominant reading of this order when presented out of the blue will be a $(S)_{TOP}(VO)_{COMMENT}$ information structure. The counterpart of this order involving a fronted object is an OVS clause with clitic doubling which necessarily implies a $(O)_{TOP}(VS)_{COMMENT}$ information structure. This order is contextually restricted with canonical transitive verbs (it requires a context that licenses object topicalization), but is expected to be contextually unrestricted for non-agentive EO verbs according to the accounts reported above (see also Verhoeven 2008a, 2009a for evidence from a corpus study).

In our experiment, eight ES verbs (6) and sixteen EO verbs were tested. The first half of the EO verbs, given in (7), are labile verbs (see section 1.1), i.e. they are ambiguous between an agentive and a non-agentive reading, and the second half of the EO verbs, given in (8), are non-agentive, i.e. they display only a non-agentive reading, independently of the animacy of the stimulus.

(6) ES verbs
     aɣapáo 'love', *apolamváno* 'enjoy', *ektimáo* 'appraise', *gustáro* 'like', *ipotimáo* 'devaluate', *latrévo* 'adore', *misó* 'hate', *θavmázo* 'admire'

(7)   EO verbs: labile
       prokaló 'provoke', *enoxló* 'bother', *kseɣeláo* 'fiddle', *enθaríno* 'encourage', *ðiaskeðázo* 'amuse', *tromázo* 'frighten', *pirázo* 'jest, bother', *paraplanáo* 'mislead'

(8)   EO verbs: non-agentive
       provlimatízo 'puzzle', *apoɣoitévo* 'disappoint' *ɣoitévo* 'captivate, charm', *siginó* 'touch', *stenoxoró* 'sadden', *eknevrízo* 'annoy', (*apasxoló* 'concern', *eksorɣízo*, 'enrage')

The two last verbs in the list of non-agentive verbs in (8), namely *apasxoló* 'concern' and *eksorɣízo*, 'enrage', were originally included in this set of items. However, next to its experiential meaning, the verb *apasxoló* 'concern' has a non-experiential meaning, hence it is not clear which meaning is activated by each performance in the experiment, especially when two animates are involved. The verb *eksorɣízo* 'enrage' was originally classified as non-agentive, but a later experiment on the interpretation of experiencer verbs in Greek (reported in Verhoeven 2009b) has shown that many Greek native speakers could interpret this verb as agentive in a suitable frame. For these reasons, these two verbs are sorted out and are not considered in the results reported in the present article.

In sum, the experiment contains three factors:

(a) *verb type*: ES verbs, labile EO verbs, and non-agentive EO verbs;
(b) *animacy of the stimulus*: animate vs. inanimate;
(c) *word order*: S ≺ O vs. O ≺ S.

Full permutation of these factors gives 3 (verb type) × 2 (animacy of the stimulus) × 2 (word order) = 12 experimental conditions. 32 consultants participated in the experiment, all native speakers of Greek and residents of Athens (21 men, 11 women; age range: 20-35, average: 26.4). Each consultant was presented 48 sentences, i.e., 4 tokens per experimental condition. The task was presented to the consultants in a Powerpoint presentation. The sentences were presented in blocks of six items per slide, which were pseudo-randomized, such that each slide contained six different conditions implemented with six different verbs. The performance of the consultants was recorded through head microphones on a digital audio recorder.

3   Results

3.1   Decoding

Each consultant was presented 48 sentences which resulted in a dataset of 32×48=1536 sentences. As explained in section 2, two items were excluded, i.e.

96 trials, hence the data set that is considered in the following sections contains 1440 experimentally produced utterances.

In a large part of the obtained reactions (293 trials, 20.4%), the consultant did not remember the perceived sentence. In further 294 cases the consultant gave a different verb, either semantically related to the perceived one, or completely different (cf. e.g. (9)). Such tokens had to be excluded from the data set since they do not provide evidence for the verbs under consideration.

(9)   Perceived: EO verb, labile; SVO
       i   parástasi   ðiaskéðase   to   θeatí.
       the   performance:NOM.SG.F amused:AOR.3.SG   the   viewer:ACC.SG.M
       'The performance amused the viewer.'

       Produced:
       tin   parástasi   apolamváni   o   θeatís.
       the   performance:ACC.SG.F enjoy:3.SG   the viewer:NOM.SG.M
       'The performance, the viewer enjoys it.'

In 16 further cases, the consultant selected a type of argument which was not in line with the intended experimental condition, e.g., an indefinite expression (cf. (10)), or a referential expression with different animacy properties (cf. (11)).

(10)   Perceived: EO verb, labile; SVO
       o   ekpeðeftís   prokalí   ton   oriváti.
       the   trainer:NOM.SG.M   provoke:3.SG the   mountaineer:ACC.SG.M
       'The trainer provokes the mountaineer.'

       Produced:
       kápjos   prokalí   ton   oriváti.
       somebody:NOM.SG.M   provoke:3.SG the   mountaineer:ACC.SG.M
       'Somebody provokes the mountaineer.'

(11)   Perceived: ES verb; OVS
       ton   psálti   ton   apólafse
       the   church.singer:ACC.SG.M   the   enjoy:AOR.3.SG
       o   pistós.
       the   believer:NOM.SG.M
       'The church singer, the believer enjoyed him.'

       Produced:
       o   pistós   apolamváni   tus   ímnus.
       the   church.singer:NOM.SG.M   enjoy:3.SG   the   hymn:ACC.PL.M
       'The believer enjoys the hymns.'

Table 1 summarizes these categories in the results. All measurements reported in the next sections relate to the valid data set of 837 sentences, which corresponds to 58.1% of the obtained data.

Table 1. Valid tokens in the obtained data set

				n	$\%$
total				1440	100.0
	the consultant does not remember the stimulus			293	20.4
		different verb		294	20.4
			critically different argument	16	1.1
			valid sentences	837	58.1

3.2 Subject-first effects

A subject-first tendency in a language in which subjects canonically precede non-subjects is equivalent to the tendency to preserve the canonical word order (see section 1.2). Greek is a language with flexible word order, it is however clear that subjects precede objects in the basic order, which is independent of the SVO vs. VSO debate in the syntactic literature. Thus, we assume that a subject-first preference applies in Greek, which motivates the prediction that subject-initial input sentences will be faithfully recalled in the perceived order, while at least a proportion of object-initial sentences will be recalled in the reverse order.

In order to examine the presence of subject-first effects in the data set, we compare experiencer-subject sentences with two animate arguments, i.e. animate experiencer and animate stimulus. Hence, an impact of animacy is excluded in this part of the data set. Examples (12) and (13) illustrate subject-initial and object-initial sentences, as they were presented in the experiment.

(12) ES verb; SVO
    o   zoɣráfos   θavmázi   to   ɣlípti
    the   painter:NOM.SG.M admires:3.SG the sculptor:ACC.SG.M
    'The painter admires the sculptor.'

(13) ES verb; OVS
    to   ɣlípti   to   θavmázi   o   zoɣráfos
    the   sculptor:ACC.SG.M him admires:3.SG the painter:NOM.SG.M
    'The sculptor, the painter admires him.'

The predictions based on the subject-first hypothesis were borne out in the obtained data. Table 2 shows a clear subject-first effect for ES verbs: while 100.0% of the S ≺ O input sentences were reproduced in the same order, 45.4% of the O ≺ S input sentences were changed to S ≺ O in the memorized sentences.

Table 2. ES verbs; animate stimulus

perceived order:	$S_{AN} \prec O_{AN}$		$O_{AN} \prec S_{AN}$	
produced order:	*n*	%	*n*	%
total	128		128	
valid	79	100.0	88	100.0
SO	79	100.0	40	45.4
OS	0	0.0	48	54.5

3.3   Experiencer-first effects

The next question is whether the EO verbs also show a subject-first effect – or rather an experiencer-first effect. An experiencer-first effect would be in line with a linearization that is harmonic with the thematic role hierarchy in (4) for those EO verbs that have a non-agentive reading, i.e. the non-agentive EO verbs (see (8)) and the non-agentive readings of the labile EO verbs (see (7)), as long as the stimulus is not interpreted as a causer. Moreover, as outlined in section 1.2, an experiencer-first effect follows from the proto-agent > proto-patient linearization (Primus 2004).

In the case of EO verbs, the subject-first effect and the experiencer-first effect are in conflict. A subject-first effect resulting from the tendency to preserve the preferred word order yields the order '$S_{STIM} \prec$ non-S_{EXP}'[7] with an active verb (V_{ACT}), cf. (14). An experiencer-first effect means that the EO of an active verb occupies the initial position in the clause, which results in the order 'non-$S_{EXP} \prec S_{STIM}$', cf. (15). Both preferences are reconciled if the experiencer is coded as the subject of the passivized verb in sentence-initial position in the form '$S_{EXP} \prec$ non-S_{STIM}', with a passive verb (V_{PASS}), cf. (16).

(14)   EO verb, active voice; SVO
o   ðiaríktis   provlimátise   ton   astinomikó.
the burglar:NOM.SG.M puzzle:AOR.3.SG the   policeman:ACC.SG.M
'The burglar puzzled the policeman.'

(15)   EO verb, active voice; OVS
ton astinomikó   ton provlimátise   o   ðiaríktis.
the   policeman:ACC.SG.M him puzzle:AOR.3.SG the burglar:NOM.SG.M
'The policeman, the burglar puzzled him.'

(16)   EO verb, passive voice; SVnon-S
o   astinomikós   provlimatístike   apó
the   policeman:NOM.SG.M puzzle:AOR.PASS.3.SG   by

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[7] The abbreviation 'non-S' instead of 'O' refers to objects of active verbs and prepositional agents of passive verbs, see example (15).

> ton   ðiaríkti.
> the   burglar:ACC.SG.M
> 'The policeman was puzzled by the burglar.'

To exclude animacy as a possible intervening factor, we examine again those sentences that are symmetric as regards the animacy of the participants, i.e. we only look at the sentences with animate stimuli. Table 3 presents the results for the symmetric EO verbs.

Table 3. EO verbs; animate stimulus

perceived order:	$S_{STIM} \prec$ non-S_{EXP}		non-$S_{EXP} \prec S_{STIM}$	
produced order:	*n*	%	*n*	%
total	224		224	
valid	115	100.0	128	100.0
$S_{STIM} \prec$ non-S_{EXP} (V_{ACT})	105	91.3	48	37.5
non-$S_{EXP} \prec S_{STIM}$ (V_{ACT})	8	7.0	65	50.8
$S_{EXP} \prec$ non-S_{STIM} (V_{PASS})	2	1.7	15	11.7
non-$S_{STIM} \prec S_{EXP}$ (V_{PASS})	0	0.0	0	0.0

The results for this group of EO verbs differ from those of the ES verbs. The subject-first effect (i.e. the preservation of the basic word order) is weaker with EO verbs. This applies to the $S \prec O$ input sentences (where we get 91.3% of preserved word order in the memorized sentences vs. 100% in the respective condition with ES verbs, cf. Table 2) as well as to the $O \prec S$ input sentences (were we get 37.5% of change to the basic word order in the memorized sentences vs. 45.4% in the respective condition with ES verbs, cf. Table 2). We conclude from these results that the experiencer-first effect reduces the impact of the preference for the canonical word order (subject-first effect). Furthermore, in contrast to the symmetric ES verbs, the symmetric EO verbs were given in their passive form in 1.7% of the $S \prec O$ input sentences and in 11.7% of the $O \prec S$ input sentences. The occurrence of passivization in case of $S \prec O$ input suggests that the passive form of EO verbs is dominant in discourse and as such highly accessible in the lexical memory; hence it is spontaneously selected by some speakers, although it was not available in the presented sentences. The larger proportion of passive sentences in the case of $O \prec S$ input points to the reconciliation of the subject-first effect and the experiencer-first effect: we assume that the speaker recalls the experiencer $\prec$ stimulus order from memory and selects a passive verb in order to avoid a less preferred order. Note that, up to this point, we ignore the differences in agentivity of the EO verbs and their stimuli. We will come back to this distinction in section 3.5.

3.4   Animate-first effects

As mentioned in section 1.2, animate-first effects in language production are already established through diverse experimental studies for a number of languages among them also Modern Greek (see Branigan & Feleki 1999, Branigan et al. 2008, Feleki 1996). Animate-first effects are tested in asymmetric constellations as regards the animacy of the participants involved.

First, we focus on EO sentences with an inanimate stimulus subject. As introduced in section 1.1, EO verbs with an inanimate stimulus are necessarily non-agentive. In sentences with an inanimate stimulus subject, the animate-first and the experiencer-first preferences are convergent (given that the experiencer is obligatorily animate). Thus, we expect that the subject-first effect (in active sentences(!)) is even weaker with EO verbs/inanimate stimulus than with EO verbs/animate stimuli. This will result in more changes of word order in the condition of $S \prec O$ input sentences, illustrated in (17). It will equally result in a higher percentage of sentences preserving the experiencer in the initial position, either as a preposed object (i.e. non-$S_{EXP.AN} \prec S_{STIM.IN}$ (V_{ACT}), cf. (18)) or as a subject in a passive sentence (i.e. $S_{EXP.AN} \prec$ non-$S_{STIM.IN}$ (V_{PASS}), cf. (19)).

(17)   EO verb, active voice; SVO
      i   ipóθesi   provlimátise   ton   astinomikó.
      the   issue:NOM.SG.F   puzzle:AOR.3.SG   the   policeman:ACC.SG.M
      'The issue puzzled the policeman.'

(18)   EO verb, active voice; OVS
      ton   astinomikó   ton provlimátise   i   ipóθesi.
      the   policeman:ACC.SG.M   him puzzle:AOR.3.SG the issue:NOM.SG.F
      'The policeman, the issue puzzled him.'

(19)   EO verb, passive voice; SVnon-S
      o astinomikós   provlimatístike   me tin ipóθesi.
      the policeman:NOM.SG.M puzzle:AOR.PASS.3.SG with the   issue:ACC.SG.F
      'The policeman was puzzled by the issue.'

The results of the EO verbs with inanimate stimuli are in line with our expectations (see Table 4). There is evidence for an effect of animacy both with $S \prec O$ input order as well as with $O \prec S$ input order. 14.0% of the $S \prec O$ input sentences with inanimate subject stimuli were changed to animate-first (= experiencer-first) – in contrast to 8.7% in the respective condition with EO verbs/animate stimulus and 0.0% with ES verbs/animate stimulus. At this point note the high percentage of passives in this group: 7.4% passives vs. 6.6% EO-first. Again, as mentioned above, the high percentage of passive reconciles the animate-first and the subject-first constraints.

As concerns the $O \prec S$ input sentences, 78.6% were reproduced in the input order – in contrast to 62.5% in the respective condition with EO verbs/animate stimulus and 54.5% with ES verbs/animate stimulus. In 59.3% of the sentences,

the experiencer object remained in the preposed position while in 19.3% of the sentences, a passive clause was formed assigning the subject function to the experiencer.

Table 4. EO verbs; inanimate stimulus

perceived order:	$S_{STIM.IN} \prec$ non-$S_{EXP.AN}$		non-$S_{EXP.AN} \prec$ $S_{STIM.IN}$	
produced order:	n	%	n	%
total	224		224	
valid	121	100.0	135	100.0
$S_{STIM.IN} \prec$ non-$S_{EXP.AN}$ (V_{ACT})	104	86.0	29	21.4
non-$S_{EXP.AN} \prec S_{STIM.IN}$ (V_{ACT})	8	6.6	80	59.3
$S_{EXP.AN} \prec$ non-$S_{STIM.IN}$ (V_{PASS})	9	7.4	26	19.3
non-$S_{STIM.IN} \prec S_{EXP.AN}$ (V_{PASS})	0	0.0	0	0.0

Animacy of the stimulus was also manipulated for ES verbs. Here, a possible animate-first effect is convergent with the subject-first effect (see section 3.2). Thus, we expect not only faithfull reproduction of the S ≺ O input sentences but also a higher percentage of change of the O ≺ S input into S ≺ O in comparison to the ES verbs/animate stimulus (see Talbe 2). Table 5 shows that the first expectation is indeed fulfilled: 100.0% of the S ≺ O input sentences were reproduced in the same order. However, the results of the O ≺ S input sentences are not in line with our hypothesis: only 34.4% of the sentences are changed to the S ≺ O order – in contrast to 45.4% with the ES verbs/animate stimulus. This result is unexpected and cannot be accounted for under the assumptions of the present article and provided that an animate-first preference can be identified for Modern Greek. Further investigation is needed in order to test whether this result is a random effect of the experimental approach or results from a real though "unexpected" preference in Modern Greek syntax.

Table 5. ES verbs; inanimate stimulus

perceived order:	$S_{AN} \prec O_{INAN}$		$O_{INAN} \prec S_{AN}$	
produced order:	n	%	n	%
total	128		128	
valid	75	100.0	96	100.0
SO	75	100.0	33	34.4
OS	0	0.0	63	65.6

3.5   Agent-first effects

The last factor to be examined in our experiment is the semantic notion of agentivity and its influence on word order. The agentivity of the stimulus is understood here as its control for the accomplishment of the verbal event. Agentivity

is tested by evaluating the possibility of the stimulus' volitional or intentional involvement in the situation described. Volitional involvement (~ control) in a situation is generally seen as a prerequisite for agenthood (e.g. Dowty 1991, Van Valin & Wilkins 1996, Van Valin & LaPolla 1997, Primus 1999).

In section 1.1, we saw that experiencer object verbs may be distinguished as to whether the stimulus is agentive or non-agentive, just being the theme or the cause of the experience without active influence and volitional action. Furthermore, we noted that scholars of Greek (e.g., Anagnostopoulou 1999: 69, 73) consider both orders $S_{STIM} \prec O_{EXP}$ and $O_{EXP} \prec S_{STIM}$ as equally neutral with non-agentive EO verbs.

The stimulus-oriented verbs of our experiment (see (7) and (8) above) included verbs allowing for an agentive reading provided that the stimulus is animate (called labile), see (7), and verbs that are always interpreted as non-agentive, even with an animate stimulus, see (8) and discussion in section 1.1. Independent evidence for identifying the EO verbs as labile (with a possible agentive reading) or as non-agentive comes from a further experiment measuring the possibility to accommodate the agentive reading of a given EO verb with an appropriate contextual trigger (reported in Verhoeven 2009b).

The last question is whether an agent-first effect may be identified in the contrast between agentive and non-agentive EO verbs. We examine (again) those EO verbs with animate stimuli subjects, distinguishing this time between those stimuli that are potentially agentive and those that are non-agentive. We now expect a difference in the memorizing of the order of stimulus and experiencer dependent on the agentivity of the EO verb: The $S \prec O$ order should be preserved more often with agentive stimuli than with non-agentive stimuli. On the contrary, the $O \prec S$ order should be repeated more often with non-agentive stimuli than with agentive stimuli.

Table 6. Labile and non-agentive stimulus-oriented verbs, animate stimulus

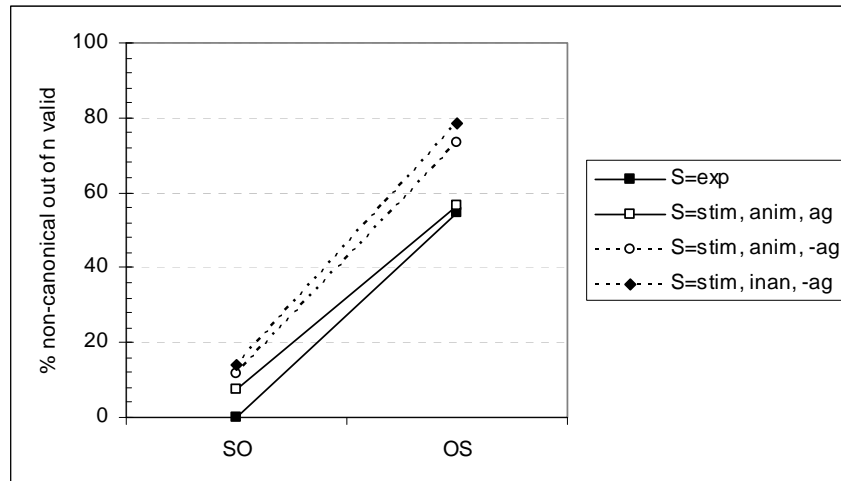|	labile verbs			
perceived order:	SO		OS	
produced order:	*n*	%	*n*	%
total	128		128	
valid	81	100.0	83	100.0
$S_{STIM} \prec$ non-S_{EXP} (V_{ACT})	75	92.6	36	43.4
non-$S_{EXP} \prec S_{STIM}$ (V_{ACT})	6	7.4	43	51.8
$S_{EXP} \prec$ non-S_{STIM} (V_{PASS})	0	0.0	4	4.8
non-$S_{STIM} \prec S_{EXP}$ (V_{PASS})	0	0.0	0	0.0
	non-agentive verbs			
total	96		96	
valid	34	100.0	45	100.0
$S_{STIM} \prec$ non-S_{EXP} (V_{ACT})	30	88.2	12	26.7
non-$S_{EXP} \prec S_{STIM}$ (V_{ACT})	2	5.9	22	48.9
$S_{EXP} \prec$ non-S_{STIM} (V_{PASS})	2	5.9	11	24.4
non-$S_{STIM} \prec S_{EXP}$ (V_{PASS})	0	0.0	0	0.0

Table 6 shows that the EO verbs indeed show different results depending on the agentivity of the verbs. There is evidence for an effect of agentivity both with $S \prec O$ input order as well as with $O \prec S$ input order. The $S \prec O$ order has been preserved with potentially agentive stimuli to a higher percentage (92.6%) than with non-agentive stimuli (88.2%). The experiencer before stimulus order has been preserved with non-agentive EO verbs more often (73.3%) than with agentive EO verbs (56.6%), either in the construction with the preposed experiencer object or in a passive clause with an experiencer subject. This means that the results of the labile EO verbs are more similar to the results of the ES verbs with respect to the subject-first effect.

4 Summary and conclusion

Figure 1 illustrates the results of our experiment based on Table 2, Table 4, and Table 6. This figure shows the proportions of 'non-canonical' clauses, including OS clauses and passive clauses in the data set. The comparison of the means of the four construction types examined (S=exp; S=stim, anim, ag; S=stim, anim, -ag; S=stim, inan, -ag) shows that the results are exactly analogous in both experimental manipulations, i.e. in the SO and the OS input sentences. The crucial point for our hypothesis is the question whether the different construction types have a significant impact. A repeated measures analysis of variance carried out on the entire data set revealed a significant main effect for 'construction type', $F_{1,31} = 24.2$, $p < .001$, a significant main effect for 'order' (SO; OS), $F_{1,31} = 170.8$, $p < .001$, and a marginally significant interaction between both factors, $F_{1,31} = 4.1$, $p < .054$.

Figure 1: Reproduced orders in all construction types

A subject-first effect (interpreted here as a tendency to preserve or reestablish the preferred word order SVO) is visible with all groups of experiencer verbs. It accounts for the difference in the preservation of the input order in the recalled sentences: with all construction types, preservation of SO is generally higher than preservation of the OS input. However, the size of the deviation from the input order is crucially different depending on the construction type. This difference is accounted for by means of other factors, namely an experiencer-first preference, an animate-first preference and an 'agentive-stimulus-first' preference (see sections 3.3 to 3.5). In order to assess the impact of these factors, a statistical analysis (*T*-test) measuring the significance of the reported differences in memorizing the order of the verbal arguments per construction type was carried out. The results are shown in Table 7.

As concerns the S ≺ O input, the size of deviation from input order significantly differs between the ES verb group and each of the EO verb groups. Changes from the O ≺ S input order significantly differ between the ES verb group and the stimulus-oriented verb groups with a non-agentive reading, i.e. the non-agentive verbs with an animate stimulus ($p < .0007$) and the labile and non-agentive verbs with an inanimate stimulus ($p < .0001$). Furthermore, there is a significant difference between the labile stimulus-oriented verbs with an animate stimulus and the non-agentive verbs with an animate stimulus ($p < .01$) as well as between the labile stimulus-oriented verbs with an animate stimulus and the stimulus-oriented verb groups with inanimate stimuli ($p < .005$).

Table 7. *T*-tests on the means' differences[8]

SO order				
S_{EXP}	>	S_{STIM}, anim, ag	$t_{31} = 2.77$	$p < .009$
S_{EXP}	>	S_{STIM}, anim, –ag	$t_{31} = 3.33$	$p < .002$
S_{EXP}	>	S_{STIM}, inan, –ag	$t_{31} = 3.93$	$p < .0004$
S_{STIM}, anim, ag	>	S_{STIM}, anim, –ag		*
S_{STIM}, anim, ag	>	S_{STIM}, inan, –ag		*
S_{STIM}, anim, –ag	>	S_{STIM}, inan, –ag		*
OS order				
S_{EXP}	>	S_{STIM}, anim, ag		*
S_{EXP}	>	S_{STIM}, anim, –ag	$t_{31} = 3.73$	$p < .0007$
S_{EXP}	>	S_{STIM}, inan, –ag	$t_{31} = 4.36$	$p < .0001$
S_{STIM}, anim, ag	>	S_{STIM}, anim, –ag	$t_{31} = 2.47$	$p < .01$
S_{STIM}, anim, ag	>	S_{STIM}, inan, –ag	$t_{31} = 2.99$	$p < .005$
S_{STIM}, anim, –ag	>	S_{STIM}, inan, –ag		*

Assuming that the significant difference among the observed means is evidence for an asymmetry between the corresponding verb groups with respect to their word order preferences, we deduce the hierarchies in (20) from the statistical results in Table 7, whereby '*x* > *y*' means that *x* is significantly higher than *y*, '*x* | *y*' means that *x* does not significantly differ from *y*.

(20)   a.   SO input order:
            S_{EXP} > (S_{STIM}, anim, ag | S_{STIM}, anim, –ag | S_{STIM}, inan, –ag)
       b.   OS input order
            (S_{EXP} | S_{STIM}, anim, ag) > (S_{STIM}, anim, –ag | S_{STIM}, inan, –ag)

The union of the differences in (20a-b) is given in (21):

(21) S_{EXP} > S_{STIM}, anim, ag > (S_{STIM}, anim, –ag | S_{STIM}, inan, –ag)

The difference in the production of word order between the ES verbs and the (three groups of) EO verbs can be ascribed to an experiencer-first preference (see section 3.3) which is in conflict with the subject-first preference for EO verbs. Experiencer-first supports OS order with EO verbs and renders SO order with EO verbs suboptimal. In contrast, with ES verbs, subject-first and experiencer-first both support SO order and render the OS order suboptimal.

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[8] For the performance of the *t*-test, the obtained proportions per speaker have been transformed through the square root-arcsin transformation in order to meet the normality requirements of parametric tests.

With respect to the differences between the groups of EO verbs, the results in Table 7 reveal that the crucial factor for the production of word order is the property [±agentive] of the stimulus. For EO verbs with agentive stimuli, the agent-first preference (see section 3.5) is in conflict with the experiencer-first preference, but convergent with the subject-first preference, i.e. it supports the SO order and renders the OS order suboptimal. Hence, we assume that the agent-first preference induces the difference between the agentive and the non-agentive verbs in our data set.

Finally, note that our experiment did not show a significant difference depending on the animacy of the stimulus of non-agentive EO verbs. Thus, based on the results of this experiment, animate-first effects as discussed in section 3.4, may be seen as an epiphenomenon of the non-agentivity of the stimulus.

The results of our experiment indicate that *relational* properties of the arguments (experiencers, agentive participants) influence word order in language production. The animacy status as an *inherent* property of participants did not have a significant effect on word order choice but merely appeared as an epiphenomenon of the [±agentive] distinction. Thus, these results contrast with accounts that identify animacy as influencing word order in language production in other experiments (e.g. Feleki 1996 and Branigan & Feleki 1999 for Greek). However, these studies tested agentive verbs[9] and did not investigate the interaction of animacy with role properties of participants.

On the other hand, the results of our study are consistent with the results of the comprehension study on German ES and EO verbs in Scheepers et al. (2000). As reported in section 1.2, these authors also observed a dominant subject-first effect with both types of psych verbs, and additionally, a reliable modulating influence of the thematic role hierarchy on argument order acceptability. Note however, that in Scheepers et al., the factor (in)agentivity was not separated from the factor (in)animacy, such that an independent observation of these parameters was not possible. The outcome of the present experiment shows that investigating the interaction of several word order factors sheds new light on the relative impact of each factor.

Finally, our experimental results support the separation of the three types of experiential verbs which is suggested in psych-verb theories on the basis of their different syntactic behavior. Our results are in line with syntactic analyses that identify a non-canonical behavior of EOs only with non-agentive (= psychological) readings of EO verbs but not with agentive readings of these verbs. This distinction has implications for animacy, since inanimate stimuli are excluded in agentive readings.

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[9] The items tested comprised verbs such as *traváo* 'drag', *akoluθó* 'follow', *anaféro* 'mention', etc. the subjects and objects of which may be both animate or inanimate.

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