

**Thematic Prominence and Animacy Asymmetries:
Evidence from a Cross-Linguistic Production Study**

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Abstract

The article reports the results of a cross-linguistic production study the main goal of which was to identify the impact of animacy and thematic asymmetries on linear order and subject choice. The experimental study was carried out on a sample of heterogeneous languages, namely German, Greek, Turkish, and Chinese, which allows us to draw generalizations about several typological variables. In order to investigate the impact of different configurations of animacy and thematic role properties, argument realization was tested with three classes of experiencer verbs: (a) experiencer-subject verbs, (b) \pm agentive experiencer-object verbs, and (c) non-agentive experiencer-object verbs. The experimental findings show that animate-first effects occur across languages, an expected result under the view that these effects come from asymmetries in the mental representation of the referents which are independent from particular grammatical properties. Experiencer-first effects depend on the (non-)agentivity of particular verb classes in the lexicon, and as such are language-specific. Indeed it turns out that the experiencer-first effects we observe in languages such as Greek and German are not replicated for Turkish and Chinese.

These results mirror the (non-)canonicity of experiencer-objects in the languages investigated.

Keywords

argument realization, psych-verb, experiencer, word order, syntactic function, animacy

1. Introduction¹

The impact of functional and semantic factors such as animacy and thematic role on the form of utterance has been the subject of several research paradigms. Cross-linguistic studies such as Aissen (1999), Bresnan et al. (2001), Comrie (1981), Dahl and Fraurud (1996), Siewierska (1993), and Silverstein (1976) have shown the influence of animacy on the selection of syntactic function or word order to the effect that highly animate entities tend to occur in higher syntactic functions or in an early position in the clause. In the same vein, psycholinguistic studies such as Branigan and Feleki (1999), Feleki (1996), Prat-Sala and Branigan (2000), Prat Sala et al. (2000), among others, have demonstrated the impact of animacy on word order in language production which is instantiated as an animate-first effect. Beyond changes of word order, animate-first effects are also observed in the occurrence of passive clauses, which offer an alternative strategy to affect the linearization of propositional content.

¹ Abbreviations in glosses: A person marker set A, ABL ablative, ACC accusative, ADVZ adverbializer, AOR aorist, ATT attributor, AUX auxiliary, B person marker set B, CAUS causative, CMPL completive, CRS currently relevant state, D deictic, DAT dative, DEF definite, EXP experiential aspect, F feminine, GEN genitive, INCMPL incompletive, INDEF indefinite IPFV imperfective, LOC locative, M masculine, MEDP mediopassive, N neuter, NOM nominative, NPST nonpast, PASS passive, PFV perfective, PL plural, PROC processive, PST past, PTCP participle, SUBJ subjunctive, TRR transitivizer

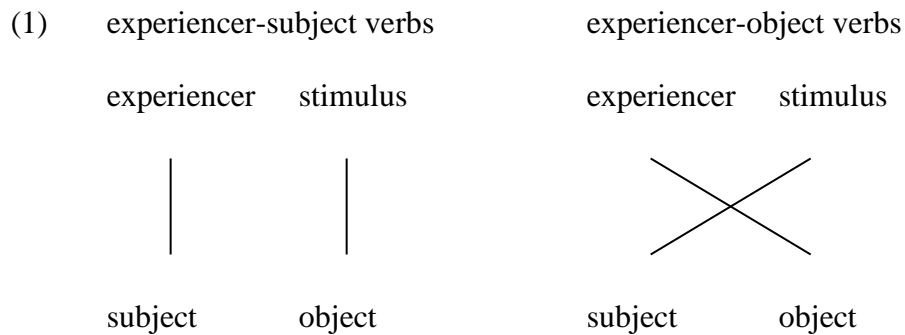
For instance, it has been observed in several languages that a higher animate is realized as the subject of a passivized verb, hence surfacing in an earlier position in the clause (see Bock and Warren, 1985; Bock et al., 1992; Van Nice and Dietrich, 2003; Prat Sala, 1997). The question is whether the effects on the choice of subject are reducible to the animate-first principle or whether they are manifestations of a partly independent animate-high (i.e., higher animate in a higher syntactic function) principle (see Branigan et al. 2008).

Animacy effects (animate-first, animate-high) relate to *inherent properties* of the participants of an event. As an ontological category animacy is deeply enrooted in human cognition and manifests itself in the general principle that humans tend to give priority to animate entities in diverse respects (Dahl, 2008). Given this fundamental significance, animacy is essentially reflected in the grammar of languages, but also in language use and language processing. With respect to language processing animacy has been identified with high conceptual accessibility of referents which is at the basis of animacy effects in language production (Bock and Warren, 1985).

Similar effects come from the *relational properties* of participants, i.e., their involvement in the event in terms of thematic roles. Theories of thematic role hierarchies argue that thematic roles are harmonically mapped on hierarchical structure, such that higher thematic roles are mapped onto higher syntactic functions (see Bresnan, 2001; Dik, 1978; Grimshaw, 1990; Jackendoff, 1987; Van Valin and LaPolla, 1997; Van Valin and Wilkins, 1996; Primus, 1999 among others; see Levin and Rappaport Hovav, 2005 for a discussion of role hierarchies). The thematic role scale has also been suggested to influence argument linearization shown in several theoretical studies (e.g. Grimshaw, 1990; Haider 1993; Uszkoreit, 1986) as well as in psycho- and neurolinguistic research (Bornkessel et al., 2005; Scheepers 1997,

Scheepers et al., 2000, among others). The assumption that the agent is at the top of the thematic role hierarchy implies both a preference for encoding agents in the highest syntactic function, i.e., as the subject, and a preference for having agents surface early in the linearization; for the same reasons discussed with respect to animacy effects, these two observations are not independent from each other.

A critical area for the study of the interaction between inherent properties (prominence in the animacy hierarchy) and relational properties (prominence in the thematic hierarchy) is the domain of experiencer verbs. The experiencer role refers to a participant that undergoes an event affecting consciousness, i.e., an event of emotion, cognition, volition, perception, or bodily sensation. Since consciousness is a prerequisite for being an experiencer, the experiencer is by definition animate. The experiencer role differs from the agent role in that it does not have control over the event. Next to the experiencer role transitive experiencer verbs license a stimulus argument. The stimulus is a rather heterogeneous role comprising the cause of an experiential situation or the target of a perceptual experience and can be either animate or inanimate. Experiencer verbs come with two argument structures: there are experiencer-subject verbs and experiencer-object verbs; see (1). Transitive experiencer-subject verbs such as *love*, *hate*, *admire*, etc. select an experiencer subject and a stimulus object. Transitive experiencer-object verbs such as *annoy*, *concern*, *frighten*, etc. select an experiencer object and a stimulus subject.



Experiencer verbs differ from canonical transitive verbs in their argument properties as well as in their semantics.² Experiencer-subject verbs are by definition non-agentive, since the experiencer does not exercise control over the event. Experiencer-object verbs can be either agentive or non-agentive: the verb is agentive if the stimulus has control over the event, and this configuration is only possible with animate stimuli. The experiencer argument of non-agentive experiencer-object verbs shows some properties that relate to prominence in the thematic role hierarchy. There is a rich paradigm of syntactic studies providing evidence that these arguments have several subject-like properties (see Belletti and Rizzi, 1988 as well as further references in Section 2). Experimental studies show that experiencers tend to be realized early in the clause or in a higher syntactic function. For instance, Ferreira (1994) shows that the experiencer in English tends to be realized in a high syntactic function. Other studies (e.g. for German, see Bornkessel, 2002; Haupt et al., 2008; Scheepers 1997, Scheepers et al., 2000) report prominence effects of non-subject

² Canonical transitive verbs are agentive verbs taking an agent subject (external argument) and a patient direct object (internal argument).

experiencers³ related to word order. These effects are reminiscent of the animacy effects and indeed may be in part due to the fact that frequently experiencers outrank stimuli in the animacy hierarchy.

The goal of the present article is to make a typological contribution to the available studies on disentangling the effects of the inherent properties and the effects of the relational properties of participants with reference to experiencer verbs. The question is whether experiencer-first effects are reducible to animate-first effect. This question cannot be answered independently of a particular grammar for at least two reasons. First, the early realization of a lower argument is made possible by a set of syntactic operations (simple constituent fronting, passivization, etc.) that may have different properties (i.e., different triggers) in particular languages. Second, the relational prominence of the experiencer role depends on syntactic-semantic properties of the verb such as agentivity. As a lexical property, agentivity is subject to typological variation. This implies that experiencer-object verbs are expected to vary in displaying experiencer-prominence effects not only within a given language but also cross-linguistically (see further discussion in Section 2). In order to examine the interaction between these typological factors, we carried out a production experiment in four languages representing different language types, namely German, Greek, Turkish, and Chinese.

³ We refer here to so-called *downgraded experiencers* in the sense of Bickel (2004), which include experiencer arguments that are coded by structural means normally used for objects, e.g., dative, accusative case, and adpositional coding.

Section 2 provides a summary of the crucial assumptions about experiencer verbs in the previous literature. The reasoning behind the chosen language sample as well as the typological hypotheses of the present study are introduced in Section 3, while the methodological decisions of the cross-linguistic production experiment are outlined in Section 4. Section 5 presents the results per language and contains a discussion of the language-specific properties of the obtained dataset. The cross-linguistic results are reported in Section 6. Section 7 contains a discussion of the results with focus on the comparison between languages. Section 8 provides the general conclusions of this article.

2. Experiencer verbs and animacy

Since the seminal work of Belletti and Rizzi (1988), experiencer verbs have been dealt with by many scholars studying verbal argument structure (see e.g. Anagnostopoulou, 1999; Arad, 1998a, 1998b; Croft, 1993; Grimshaw, 1990; Härtl, 2001; Landau, 2010; Pesetsky, 1995; Reinhart, 2002). As already introduced in (1), these verbs may have either an experiencer subject or a stimulus subject. Moreover, verbs of both classes may be either transitive (such as *love* with an experiencer subject or *frighten* with a stimulus subject) or intransitive (such as *be ashamed* with an experiencer subject or *appeal to* with a stimulus subject). The present study deals with transitive experiencer verbs, and hence the following discussion focuses on this class of verbs.

Especially experiencer-object verbs have been the focus of several semanto-syntactic studies (see Belletti and Rizzi, 1988; Landau, 2010; Pesetsky, 1995; Reinhart, 2002 among others). The crucial property is that these verbs (or a subset thereof) differ from prototypical transitive verbs with respect to the agentivity of their

subject argument, i.e. the stimulus. In particular, some of these verbs are non-agentive while other verbs are not specified for agentivity (henceforth, \pm agentive); that is, they alternate between an agentive and a non-agentive reading (see Arad, 1998a, 1998b; Klein and Kutscher, 2002; and Landau, 2010 for evidence from a diverse set of languages). Interestingly for the purposes of this article, agentivity interacts with animacy: only animates can exercise control over the event, and hence an agentive reading requires an animate stimulus. The interaction between animacy and agentivity is illustrated by the German examples in (2). The \pm agentive verb *stören* ‘disturb’ allows for an agentive reading iff used with an animate stimulus, as in (2a). The effect of verb semantics is illustrated by the contrast between (2a) and (2c): even with an animate stimulus, the non-agentive verb *interessieren* ‘interest’ does not allow for an agentive reading, as shown by the non-acceptability of the agent-oriented adverb *absichtlich* ‘intentionally’. The examples (2b) and (2d) illustrate that inanimate stimuli do not allow for agentive readings and that this holds independently of the semantics of the verb.

- (2) a. *Maria störte Peter (absichtlich).*
‘Maria disturbed Peter.’
- b. *Marias Fragen störten Peter (*absichtlich).*
‘Maria’s questions disturbed Peter (*intentionally).’
- c. *Maria interessierte Peter (*absichtlich).*
‘Maria interested Peter (*intentionally).’
- d. *Marias Fragen interessierten Peter (*absichtlich).*
‘Maria’s questions interested Peter (*intentionally).’

The distinction between \pm agentive and non-agentive experiencer-object verbs depends on the individual verb; i.e., it is lexically encoded. Crucially, a class of non-agentive (experiencer) verbs is not necessarily part of the verb inventory of any language. For instance, it has been shown that in Chinese any experiential verb is compatible with the adverb *gùyì-de* ‘intention-ADVR (intentionally)’ provided it is combined with an animate stimulus. This also holds for verbs such as *xīyǐn* ‘fascinate’, *mízhù* ‘attract’, *gǎndòng* ‘move, touch’, which are the translational equivalents of non-agentive verbs in other languages. Furthermore, the use of this adverb is not possible with inanimate stimuli, which shows that this adverb renders a valid test in this language, too (see Verhoeven, 2010a, 2010b). In a language such as Chinese, experiencer-object verbs always allow for an agentive reading apart from cases in which an agentive interpretation is excluded for pragmatic reasons, e.g., if the instigator of the event is a kind of entity that cannot exert control over the event. In such a language, experiencer-object verbs do not differ from canonical transitive verbs. In sum, the possibility of an agentive reading of experiencer-object verbs depends (a) on the semantics of the verb and (b) on the animacy of the stimulus, whereby the property (a) is language specific.

The peculiarity in the semantics of experiencer verbs comes along with a series of language-specific phenomena indicating that the experiencer-object has some non-canonical properties that reflect its prominence in the syntactic structure. There are diverse non-canonical properties discussed in the literature, often called psych properties, since they characterize experiential verbs, often also named psych(ological) verbs. To these characteristics belong restrictions in passivization (Belletti and Rizzi, 1988; Grimshaw, 1990), nominalization (Bayer, 2004; Pesetsky, 1995), reflexivization (Belletti and Rizzi, 1988), binding properties (see Belletti and

Rizzi, 1988; Pesetsky, 1987, 1995; Postal, 1971), island properties that do not fit in with the experiencer's status as complement (see Belletti and Rizzi, 1988), peculiarities in clitic doubling (Anagnostopoulou, 1999), and so on (for these criteria and additional ones, see Bayer, 2004; Belletti and Rizzi, 1988; Haspelmath, 2001; Klein and Kutscher, 2002; Landau, 2010; Pesetsky, 1995; Reinhart, 2002 among others). The crucial point for these non-canonical properties is that they only apply to non-agentive readings of experiencer-object verbs, but not to the agentive variants (see Arad, 1998a, 1998b; Landau, 2010). Since agentivity also depends on animacy (as shown in (2)), the interaction with animacy is consistently observed in these phenomena.⁴

This also holds true for the linearization of the experiencer and stimulus which has been the subject of various theoretical and empirical studies. However, in contrast to animate-first and agent-first effects (see Section 1), experiencer-first effects are still debated. There are experimental and corpus studies that report evidence for word order variation or a preference for an early realization of the experiencer for languages such as German, Dutch, and Modern Greek (see, e.g., Bader and Häussler, 2010; Bornkessel, 2002; Bornkessel-Schlesewsky and Schlesewsky, 2009; Hoberg, 1981; Kempen and Harbusch, 2004b; Lamers, 2007; Lamers and de Hoop, *forthc.*; Primus, 1994; Verhoeven, 2009b). On the basis of a single-item rating study with German experiencer-object verbs (outbalancing the factors definiteness and animacy), Haupt et al. (2008) found no overall word order preference for the arguments in transitive experiencer-object sentences. Evidence for an early realization of the experiencer

⁴ In the interest of space, examples illustrating this point with passivization and clitic doubling are discussed further down when presenting the language-specific data.

through passivization has been reported for English in production and comprehension studies (see Cupples, 2002; Ferreira, 1994; Piñango, 2000).

Moreover, the relevance of the factor animacy in the linearization of experiencer and stimulus has been shown in various studies. The rate of an early realization of the object-experiencer, either through object preposing or through passivization, increases in asymmetric animacy constellations, i.e. when the stimulus is inanimate (s. Ferreira, 1994; Lamers and de Schepper, 2010; Scheepers et al., 2000; Verhoeven, 2009b). However, in most studies, the factors (in)animacy and (in)agentivity are not systematically separated, so that the contribution of each of them to the resulting pattern cannot be identified. In Verhoeven (2009b), a recall study on the linearization of Greek experiencer verbs, both \pm agentive and non-agentive experiencer-object verbs were tested with animate and inanimate stimulus arguments. In this experiment, it turned out that the crucial factor for argument linearization was the relational property of \pm agentive of the stimulus while animacy did not exhibit an independent effect.

3. Cross-linguistic issues

A central question in the analysis of experiencer-object verbs is whether experiencer-first effects relate to the particular thematic properties of the arguments at issue or whether they are reducible to their inherent properties (in particular their status as animates). Syntactic and experimental studies on experiencer objects in languages such as English, German, Dutch, or Greek show that the experiencer-first effect is also observed in configurations without animacy asymmetries (see Ferreira, 1994; Scheepers et al., 2000; Lamers and de Schepper, 2010; Verhoeven, 2009b). These

findings indicate that the observations on word order relate to the thematic relation of these arguments to the verb.

The thematic relatedness of experiencer-first effects motivates the expectation of typological differences, since experiencer-object verbs do not universally form a verb class with exceptional syntactic properties. In some languages, these verbs display syntactic properties that differ from those of canonical transitive verbs, whereas other languages subsume experiencer-object verbs under the class of canonical transitive verbs, i.e. in these latter languages experiencer-object verbs fail to show specific non-object-like syntactic behavior (see Section 2 with reference to Chinese). This typological difference is in line with the fact that the locus of the thematic properties of experiencers is the lexical entry of the verb, namely its thematic grid; given that the lexicon is a language-specific entity, we do not expect the lexical entries of equivalent concepts to have identical properties across languages.

In order to examine the relevance of this typological distinction we investigated two languages that possess a particular class of non-agentive experiencer-object verbs, i.e., German and Greek, and two languages in which experiencer-object verbs do not differ from canonical transitive verbs in their grammatical behavior, i.e., Turkish and Chinese, see (3). German and Greek unequivocally belong to the languages in which transitive experiencer-objects display non-canonical properties, as introduced in Section 2. For both languages there is a rich literature discussing diverse psych properties of non-agentive transitive experiencer-object verbs, among them word order variation and restrictions in the formation of a (dynamic) passive construction. In contrast, Turkish and Chinese do not possess a class of strictly non-agentive transitive experiencer-objects verbs. Experiencer-objects of transitive verbs behave like canonical objects in both their agentive and their non-agentive reading in these

languages. Furthermore, in both languages, passivization with transitive experiencer-object verbs does not differ from passivization with regular transitive verbs. Finally, argument order in these languages does not display any particular properties with experiencer-object verbs. Previous empirical studies report that object fronting in these languages occurs under the same contextual conditions for canonical transitive verbs and experiencer-object verbs (see Verhoeven, 2008, 2010a for Turkish and Chinese). A more comprehensive account of the psych properties is given for each language in Section 5.

(3) Typological factor I

Exceptional-experiencer languages: German, Greek

Non-exceptional-experiencer languages: Turkish, Chinese

Experiencer-first is not only an effect on the linear order but also on the choice of clause structure. The fact that experiencer-first is independent from animate-first implies that the choice of a thematic grid has an influence on incremental speech production. If the choice of a clause structure has an impact on the phenomena at issue, then an array of typological options arise that may interact with the possibility of experiencer-first constructions. Early occurrence of the experiencer argument can be realized through two classes of operations: (a) the choice of a non-canonical word order and (b) the choice of a construction in which the experiencer argument surfaces as subject (of a passive verb).

Languages differ with respect to the factors that may license non-canonical word orders. In some languages, word order is very flexible and may be influenced by a number of factors including animacy, definiteness, weight, and possibly further

asymmetries between the constituents at issue. This type of word order flexibility is reported for languages having scrambling, e.g., for many V-final languages such as German, Turkish, Japanese, Hindi, etc. (Haider and Rosengren, 2003; Kornfilt, 2003; Saito, 1989; Mahajan, 1990). Scrambling means that the non-canonical word order targets positions within the thematic layer of the clause, as can be seen by an array of syntactic properties of these orders with respect to scopal phenomena and the possibilities of movement (see Fanselow, 2001). Beyond scrambling, non-canonical word orders can be the result of movement to clause peripheral positions associated with particular information-structural features (e.g., topic or focus positions), as is reported for Italian, Hungarian, Greek, etc. (Rizzi, 1997; É. Kiss, 1998; Tsimpli, 1995). In general, the factors that induce movement to left-peripheral positions are a subset of the factors that induce scrambling. The relevant issue for our purposes is whether experiencer-first effects are sensitive to this structural distinction. For this purpose, we investigate two languages with scrambling (Turkish and German) and two languages without scrambling (Greek and Chinese), see (4).

(4) Typological factor II

Scrambling languages: German, Turkish

Non-scrambling languages: Greek, Chinese

A critical issue at the intersection between factor I and factor II is the assumption that for a subset of experiencer-object verbs the non-nominative experiencer is hierarchically higher than the nominative stimulus. This analysis applies to exceptional-experiencer languages (German and Greek) and implies that the experiencer-first effect is not the result of a syntactic operation but the basic

configuration in these cases. For instance, it has been argued for German dative psych verbs that they show a basic dative-before-nominative order which is licensed by hierarchical requirements within the verb's lexical entry (e.g. Lenerz, 1977; Fanselow, 2001, 2003; Haider and Rosengren, 2003; Haider, 2010; Primus, 1996). However for accusative psych verbs, the properties are not uncontroversial. Some authors consider them as canonical transitive verbs with a higher nominative argument – although, at least for some accusative psych verbs a treatment on a par with dative psych verbs has been proposed (Lenerz, 1977; Haider and Rosengren, 2003; Bayer, 2004). Note however that empirical studies on word order show that the experiencer-first effect is substantially stronger with dative verbs than with accusative verbs (e.g. Haupt et al., 2008; Bader and Häussler, 2010). The crucial issue for our considerations is that the possibility that experiencer-first with non-nominative experiencers is the basic configuration is orthogonal to the scrambling distinction and only applies to the exceptional-experiencer languages.

All languages in our sample have non-active constructions, which can be selected such that the experiencer argument will be realized as the subject. These include regular eventive passives, stative passives as well as middle voice and anticausative forms. These possibilities do not have the same extension; the common denominator is that they are accompanied by a change in the linear order, such that the undergoer precedes the actor. The relation between choice of voice and linearization has been examined in several cross-linguistic studies on information structure (Givón, 1994; Mathesius, 1975:156ff.; Skopeteas and Fanselow, 2009), animacy (Prat Sala, 1997) or salience (Tomlin, 1995) of the referents of the clause. Without assuming that the constructions are identical across languages (see an overview of the cross-linguistic properties of passivization in Abraham and Leisiö, eds., 2006), the relevant issue for

our purposes is that these constructions provide a structural option to deviate from the default linearization. The language-specific differences with respect to the properties of voice formation are discussed in the language-specific subsections of Section 5.

The study presented in the following examines the choices of speakers during speech production. In this type of data, speakers select between different descriptions of one and the same situation although the alternative expressions do not necessarily have identical extension. The critical issue is that at least for some situations speakers have the choice between ‘X *annoys* Y’ or ‘Y *is annoyed by* X’ and similarly the choice between ‘X *worries* Y’, ‘Y *worries about* X’, and ‘Y *is worried about* X’ although the alternative expressions may have different extensions and although they are not alternative derivations from the same basic structure. On this background, the relevance of speech production data is that they reveal correlations between the choice of certain constructions and particular factors of interest (such as animacy). However, factors (partly) explaining the choice of a construction do not straightforwardly correspond to features inducing syntactic operations.

The choice of a non-active construction reflects the thematic properties of the experiencer vis-à-vis the stimulus. Assuming that the thematic hierarchy *agent* > *experiencer* > *non-agentive stimulus* influences the choice of subject (based on Grimshaw 1990), the choice of an experiencer subject is more likely if the experiencer competes with a lower role (non-agentive stimulus) than if the experiencer competes with a higher role (agentive stimulus) for the subject function. Since all languages in our sample offer the possibility to choose an experiencer subject in a non-active construction, we expect that between-language differences in the choice of non-active constructions should be accounted for by the typological factor I. In languages in which the experiencer-object verbs are canonical transitive verbs (Turkish/Chinese),

non-active constructions are expected to be less frequent than in languages in which experiencer-object verbs have exceptional properties (German/Greek).

The examined languages are outlined in Table 1. Beyond the properties that were used for the choice of languages, our sample languages display further differences, in particular in the morphology (e.g., case or properties of the verb derivation). The properties that have an impact on the production data of our study will be discussed in the respective language specific chapters (see Section 5).

Table 1. Properties of the object languages

WO properties		
non-agentive EO	scrambling	non-scrambling
yes	German	Greek
no	Turkish	Chinese

4. Method

In order to observe the impact of typological variation on experiencer-first effects, we carried out a cross-linguistic study on controlled language production which intends to contribute to the experimental research already existing in this area. Our study follows the method developed in Ferreira (1994) for the investigation of passive voice with different verb classes in English. The same method with a similar design is used in other studies related to research on passivization and argument linearization in language production such as Lamers and de Schepper (2010), Lamers and de Hoop (forthc.).

4.1 Procedure

In our experiment the participants were presented with word triples on a computer screen, each consisting of an initial verb stem followed by two nouns, e.g. *interessier...* ‘concern’ – *Zuschauer* ‘spectator’ – *Aufführung* ‘performance’ (see illustrative examples for the individual languages in Section 5; specifically, German in example (9), Greek in example (14), Turkish in example (19), and Chinese in example (23)).⁵ After seeing the triple on the computer screen (there was no time limit in the presentation of the slides), the participants proceeded to an empty screen. At this time point, the participants were asked to produce a sentence using the previously presented words; that is, they had to retrieve the presented words from working memory. The participants were instructed not to add more content words, but they were allowed to insert grammatical words such as articles or auxiliary words.

4.2 Conditions and predictions

The experimental design contained two factors, VERB GROUP and ANIMACY, as outlined in (5). This design is identical with Experiment 4 in Ferreira (1994: 725-727), which allows for direct comparison with the reported facts in English (see Section 7). The factor ANIMACY comprises two levels (animate and inanimate) referring to the semantic properties of the stimulus. Given that the experiencer is necessarily animate, this manipulation results in a symmetric (two animate arguments) and an asymmetric (animate experiencer and inanimate stimulus) configuration. The factor VERB GROUP

⁵ The presented forms varied between the languages depending on the individual morphological prerequisites. Details about the procedure and material of the experiment in each language are reported in Section 5.

compares experiencer-object verbs with experiencer-subject verbs. In languages that distinguish between two classes of experiencer-object verbs, non-agentive and \pm agentive, i.e., German and Greek (see Section 3), we examined both subclasses of experiencer-object verbs. In the other languages, i.e., in Turkish and Chinese we only examined a single class of experiencer-object verbs (which are necessarily \pm agentive). Hence, full crossing of the two factors resulted in 2 (VERB GROUP) \times 2 (ANIMACY) = 4 conditions in the Turkish and Chinese experiments, and in 3 (VERB GROUP) \times 2 (ANIMACY) = 6 conditions in the German and Greek experiments.

- (5) a. VERB GROUP:
experiencer-subject verbs;
 \pm agentive experiencer-object verbs;
non-agentive experiencer-object verbs (only in German and Greek).
- b. ANIMACY:
animate stimulus;
inanimate stimulus.

The aim of this manipulation is to observe the effects of thematic prominence and animacy on the choice of construction in speech production. We assume that the default configuration is an expression with an active verb and the preferred word order, which involves the subject preceding the object in all of the sample languages. This configuration occurs with the least contextual restrictions, which is reflected in its frequency in speech production (see, e.g., Scheepers et al., 2000; Bader and Häussler, 2010 for German, Lascaratou, 1989 for Greek). The question is in which conditions the speaker will deviate from this default configuration and produce an

utterance with an earlier lower argument, either through a non-canonical word order or through a non-active construction. Effects of thematic prominence of experiencers are expected to be found in the experiencer-object verbs since these involve a thematically prominent lower argument. The estimation of these effects will be based on a comparison with the experiencer-subject verbs which serve as a control condition. Effects of animacy asymmetries are expected to occur in the condition of experiencer-object verbs with inanimate stimuli, in which the lower argument (experiencer) outranks the higher argument (stimulus) in the animacy hierarchy.

As explained in Section 3 with respect to typological factor I in (3), there is evidence for the thematic prominence of experiencer-objects in German and Greek. In Turkish and Chinese experiencer-objects have been shown to behave like canonical objects. If speech production is sensitive to this typological difference, then VERB GROUP is expected to interact with the typological factor I ‘exceptional-experiencer languages’ (German/Greek vs. Turkish/Chinese), such that the effect of VERB GROUP is larger in languages of the former type than in languages of the latter type (see cross-linguistic prediction in (6a)). The possibility that some accusative experiencers precede stimuli in the basic order (see discussion in Section 3) applies to exactly these languages and leads to the same prediction. The effect of ANIMACY is not expected to interact with this typological factor.

A possible strategy in order to deviate from the default linearization is a non-canonical word order involving a lower argument in an earlier position in the clause. To the extent that the speakers are going to select a non-canonical word order, we expect an influence of the typological factor II in (4): non-canonical word order induced by asymmetries in animacy or in thematic prominence is expected to occur more often in scrambling languages such as German and Turkish than in non-

scrambling languages such as Greek and Chinese (see cross-linguistic prediction in (6b)). Beyond that, all languages can use a strategy rendering an experiencer-subject construction through the choice of passive voice or another diathetic operation (see Section 5 for the structures that are available in the individual languages). This possibility is not affected by the availability of scrambling. In the case of diathetic alternations, the frequencies in the choice of non-active constructions are only expected to be influenced by the status of EO verbs available in a language (see typological factor I), as specified above in Section 3.

(6) Cross-linguistic predictions

a. Typological factor I ‘exceptional-experiencer languages’

Experiencer-first effects (with object-experiencers) are expected to be larger in exceptional-experiencer languages (i.e. German/Greek) than in non-exceptional-experiencer languages (i.e. Turkish/Chinese).

b. Typological factor II ‘scrambling languages’

The amount of non-canonical orders (independently of trigger) is expected to be higher in scrambling languages (i.e. German/Turkish) than in non-scrambling languages (i.e. Greek/Chinese).

German and Greek involve a further distinction between two subclasses of experiencer-object verbs. These verb classes introduce the role of agentivity, which is crucial in order to understand to what extent animacy influences the thematic possibilities of the argument: inanimate stimuli only allow for non-agentive readings, while animate stimuli can be either agentive or not – depending on context and on verb semantics. Hence, the comparison with the effects of agentivity is expected to

allow for conclusions with respect to the role of animacy in grammar. If the animacy effects with experiencer-object verbs relate to the fact that an agentive reading is excluded, then we expect that inanimate stimuli (across VERB GROUPS) and non-agentive verbs (across ANIMACY levels) will display a higher amount of experiencer-first constructions and will contrast with the animate stimuli of \pm agentive verbs. The predicted data pattern is expected to result in an interaction effect (between VERB GROUP and ANIMACY).

4.3 Material

As introduced in Section 4.1, the target elements contained a verb and two nouns. Sixteen verbs per VERB GROUP (i.e., 16 experiencer-subject verbs; 16 \pm agentive experiencer-object verbs; 16 non-agentive experiencer-object verbs in German and Greek) were used in the experiment. A complete list of the verbs is provided in Appendix B for each language separately.

The selection of the lexical material was based on a larger inventory of sixty experiential concepts that were translated by native speakers in each language. It is not possible to include the same concepts across languages in the experiment, since the lexicalization of the experiential concepts involves several aspects of variation that are crucial for the assumptions of the present empirical study. For instance, some concepts are not encoded through verbs of the same class across languages. Hence, the concept ‘hate’ which is used as an instance of the transitive experiencer-subject verbs in German, Greek, and Chinese, cannot be used as an instance of the same class in Turkish, since it is lexicalized through an intransitive verb taking the stimulus as an ablative-marked oblique object in this language, namely *nefret et-* ‘hate’.

Furthermore, since the experiment deals with verb classes, concepts that are encoded through periphrastic constructions cannot be used for this purpose, as for instance periphrastic causative experiencer-object constructions in Chinese, e.g. *shǐ (gǎndào) jīngkǒng* (make feel frightened) ‘frighten’. After excluding inappropriate items, we presented the eligible verbs of each class to the native speakers, asking them to determine those sixteen verbs that according to their intuition are more ‘basic’ or ‘common’ in everyday communication. The distinction between non-agentive and \pm agentive experiencer-object verbs in German and Greek was based on two standard control tests, testing their compatibility with (a) control adverbs (e.g., *intentionally, on purpose*) in sentences with two animate arguments and (b) subordination under control verbs (e.g., *attempt, conclude*) in the same environment (see Appendix C for the results of these pretests; see also a previous cross-linguistic study on the agentivity in experiencer-objects verbs reported in Verhoeven 2010a).

Each target element is a triple containing a verb and two nouns. One of the two nouns was animate, while the other one was either animate or inanimate (depending on the experimental condition). The nouns were semantically connected and possible subjects and/or objects of the respective verbs, e.g. reader – author / message; pupil – teacher / grade, and so on. 16 noun groups involving two animates and an inanimate were established and each noun group (once with the two animate nouns, once with one animate and one inanimate noun) was combined with one verb of each VERB GROUP. In this way, 2 (VERB GROUP) \times 2 (ANIMACY) \times 16 (items) = 64 triples were constructed for Turkish and Chinese; 3 (VERB GROUP) \times 2 (ANIMACY) \times 16 (items) = 96 triples were constructed for German and Greek.

The target elements contained the verb in the first position in all languages. The nouns⁶ were presented in both orders, in order to counterbalance the effects of the order of presentation. Hence, each target element had two versions, which gave rise to $64 \text{ (triples)} \times 2 \text{ (orders)} = 128$ elements for Turkish and Chinese, and $96 \text{ (triples)} \times 2 \text{ (orders)} = 192$ elements for German and Greek. These elements were distributed over 4 experimental sessions, resulting in $(128/4=)$ 32 (Turkish and Chinese) and $(192/4=)$ 48 (German and Greek) elements each, such that each participant saw each verb once and 8 repetitions per condition with different lexicalizations. The target elements were mixed with filler elements in a target-to-filler ratio of 1:3 (i.e., 96 fillers for Turkish and Chinese, and 144 fillers for German and Greek) and were pseudo-randomized. Each experimental session began with a training phase containing 5 elements; after the training phase, the subjects were presented with the experimental elements (targets and fillers). The task was presented in a Powerpoint presentation. The performance of the subjects was recorded through head microphones on a digital audio recorder.

4.4 Data analysis

The produced sentences were classified as valid or non-valid for testing our hypotheses (see Section 4.5). Valid sentences were decoded for ‘diathesis’ and ‘order’. The category ‘diathesis’ refers to alternative realizations of the verb as active, passive, and some further language-specific categories that are introduced and exemplified in the corresponding sections (see Section 5). The category ‘order’ refers

⁶ In German and Greek the nouns were presented in a form unspecified for nominative or accusative case, whereas in Turkish the nominative form, being the unmarked form, was chosen. For more details on the presented case forms see the language-specific subsection in Section 5.

to the order of the major constituents and contains the possible permutations of a subject (S), a verb (V), and a non-subject (X). The language-specific constructions are discussed in Section 5; the counts of valid sentences are given for each language separately in Appendix A.

In the quantitative report of the data, we calculate the proportions of utterances in which the lower argument is realized earlier in the utterance than the higher argument. The ‘lower argument’ is the most embedded argument in the basic (active) configuration, i.e., the stimulus of experiencer-subject verbs and the experiencer of experiencer-object verbs (the term ‘lower argument’ refers to the argument structure of the basic active configuration). Earlier realization of the lower argument can be achieved through a non-canonical word order. Furthermore, earlier realization of the same argument can be achieved through a non-active voice, in which the lower argument surfaces as the subject.

The influence of the factors of interest (ANIMACY, VERB GROUP) on the probability of early realization of the lower argument (as a dependent variable) was calculated with generalized mixed effects models for binomial data (carried out with the *glmer* function of the *R*-package *lme4*; Bates et al., 2012). In all datasets, we examine a model containing the fixed factors VERB GROUP, ANIMACY as well as their interaction, the by-SUBJECT and by-ITEM random intercepts, the by-SUBJECT random slopes with both fixed effects, and the by-ITEM random slope with ANIMACY (since ITEMS are nested within VERB GROUP). The maximal random-effects structure was kept constant across compared models (see Barr et al., 2013). The fixed-effects were reduced with a backwards selection procedure. In all datasets, we started with a model including the factors VERB GROUP and ANIMACY and their interaction. The factors of the maximal model were reduced with model comparison, examining the significance

of the difference between the log-likelihood of the compared models (Quené & Van den Bergh 2008). The significance of an interaction effect for the model is calculated by the comparison between a model containing both factors and their interaction and a model containing only the factors (without their interaction). The significance of a main effect (provided that there is no significant interaction) is calculated through the comparison between a model containing both factors (without their interaction) and a model in which the factor of interest is removed. For the final model, we report the fixed effects and the AIC value of the final model (in comparison with the AIC value of the full model with both fixed effects and their interaction), as well as the χ^2 values (and the associated p -level) of the non-reducible factors.

Binary factors were coded as treatment contrasts whereby the baseline of ANIMACY was animate and the baseline for VERB GROUP was ES (for Turkish and Chinese). The contrasts of factors with three levels (i.e., the factor VERB GROUP in German and Greek) were coded as successive differences (function *contr.sdif* in *R*-package MASS) and are ordered as follows: ES[1] < EO±ag[2] < EO/-ag[3]. The contrast coefficients correspond to the differences between the first two levels (EO±ag and ES) and between the last two levels (EO/-ag and EO±ag).

4.5 Valid data set

The collected sentences were decoded as ‘valid’ if they fulfilled the following conditions: (a) they contained exactly the target content words; (b) they were declarative sentences containing a verb with an experiencer and a stimulus; and (c) the sentence was grammatical. These conditions are met in example (7). Utterances which did not meet the aforementioned criteria are coded as non-valid for the hypotheses at

issue. The counts of valid tokens are given for each language separately in the following sections.

(7) German

perceived: *interessier... Zuschauer Komiker*

‘concern’ ‘spectator’ ‘comedian’

produced: *Der Komiker interessiert den Zuschauer.*

‘The comedian concerns/interests the spectator.’ (EO/–ag, anim)

5. Results in the sample languages

In the current section we report the experimental implementation and results for each language of our sample. In order to present the language-specific background for the evaluation of the hypotheses and the experimental results, the main structural properties related to the grammar of experiencer verbs are summarized for each language. Furthermore, two classes of morphosyntactic phenomena are of particular relevance for the effects on linearization investigated in our experiment and will be addressed per language in the following sections: (a) voice alternations of the verb that correlate with different linearizations of the same propositional content, and (b) derivational alternatives of the verb that affect the thematic properties of the arguments and, consequently, the linearization.

5.1 German

5.1.1 Structural properties

For German the properties of EO verbs have been discussed in diverse studies including corpus studies (see Bader and Häussler, 2010; Hoberg, 1981) and psycho- and neurolinguistic studies (Bornkessel, 2002; Bornkessel et al., 2003; Härtl, 2001; Haupt et al., 2008; Scheepers et al., 2000). German has two subclasses of transitive experiencer-object verbs. One subclass contains items equivalent to English *concern*, *fascinate*, *interest* which are non-agentive independently of the animacy of their stimulus argument. This distinction was already exemplified in (2) by the fact that a combination of these verbs with the agent-oriented adverb *absichtlich* ‘intentionally’ results in a violation of the semantic well-formedness, even if the stimulus argument is animate. A further subclass contains verbs equivalent to English *scare*, *frighten*, *amuse* which may take an agentive reading when combined with an animate stimulus; the combination of these verbs with the adverb *absichtlich* is fully acceptable (see (2)). Experiencer-objects in German bear properties that distinguish them from objects of canonical transitive verbs including peculiarities in nominalization, reflexivization, extraction, binding among others (see Bayer, 2004; Fanselow, 2000; Grewendorf, 1989; Haspelmath, 2001; Klein and Kutscher, 2002; Wunderlich 1997). As far as word order preferences are concerned, Haupt et al. (2008:84) confirming earlier observations by Lenerz (1977), Hoberg (1981), and Primus (2004), show for the arguments in accusative experiencer-object constructions that both orderings ($S_{\text{STIM}} \prec O_{\text{EXP}}$ and $O_{\text{EXP}} \prec S_{\text{STIM}}$) are equally acceptable.

In German, regular passives are prototypically dynamic and agentive (see Zifonun, 1992), a property that interacts with the agentivity of experiencer-object verbs, as

shown in example (8a-b). The formation of a regular eventive passive (by means of the passive auxiliary *werden* ‘become’) requires a \pm agentive experiencer-object verb in its agentive reading. Thus, a regular passive is only grammatical with an animate stimulus as in (8a), and not with inanimate stimulus as in (8b). Non-agentive experiencer-object verbs such as *interessieren* ‘interest’ do not form such a passive at all.

Next to the regular passive, German has a stative adjectival passive that is formed with the copula and the passive participle, as is illustrated in example (8) as well. Stative passives do not require an agentive interpretation, and hence non-agentive experiencer-object verbs such as *interessieren* ‘interest’ may form a stative passive, in which the stimulus is a prepositional adjunct (not a passive agent), as in (8c). Similarly, \pm agentive experiencer-object verbs may form a stative passive both with an animate or an inanimate stimulus, as in (8a-b).

- (8) a. *Peter ist/wird von Maria genervt.*
 Peter be/AUX.PASS.3.SG.NPST by Maria bother:PASS.PTCP
 ‘Peter is bothered by Maria.’
- b. *Peter ist/*wird von den Möbel-n genervt.*
 Peter be.3.SG.NPST by DEF:DAT.PL furniture-DAT.PL
 bother:PASS.PTCP
 ‘Peter is bothered by the furniture.’
- c. *Peter ist an Maria interessiert.*
 Peter be.3.SG.NPST at Maria interest:PASS.PTCP
 ‘Peter is interested in Maria.’

Furthermore, in German, apart from the stative adjectival passive forms illustrated in (8), basic experiencer-object verbs may derive anticausative reflexive intransitive verbs (see the schema ‘stimulus *ärgert* (bothers) experiencer’ → ‘experiencer *ärgert sich über* (is bothered by) stimulus’).

Finally, with regard to typological factor II (see Section 3), German is a language with scrambling in the middle field, which is influenced by a series of factors, including animacy (see Müller, 1999; Heck, 2000). German main clauses involve fronting of the verb to a higher position (V° -to- C° movement). The position in front of the inflected verb is obligatorily filled, which induces formal movement of the first eligible element in the middle field (see Frey, 2006). The first eligible constituent is the highest one, i.e., the subject constituent or a constituent scrambled past the subject; since the operation that leads this constituent to the prefield is purely formal (i.e., semantically vacuous), this type of syntactic operation does not involve any additional semantic or pragmatic features than the ones that led to scrambling the highest constituent in the middle field.

Next to formal movement, two further possibilities to fill the prefield exist, i.e. base generation of certain adverbials and A-bar movement, the latter indicating a contrastive interpretation of the moved material. The relevant operations for the purposes of our study are scrambling in the middle field and the formal operation that leads the highest middle field element to the prefield. The collected sentences are uttered in an out-of-blue context and do not involve contrast; following the experimental instructions, they should not contain further (adverbial) material in addition to the presented verb and nouns.

5.1.2 Speakers and procedure

Sixteen native speakers of German participated in the experiment (female: 8, age range: 18-51, average: 31.5). The data set contains 3 (VERB GROUP) \times 2 (ANIMACY) \times 2 (orders) \times 16 (speakers) \times 4 (observations) = 768 utterances (128 sentences per condition). 93 utterances were classified as non-valid; all following analyses relate to the remaining 675 valid utterances (87.9%).

The consultants saw a verb stem followed by two nouns, as in (9) (see also Section 4.1). The verb stem was followed by three dots indicating that it does not occur as a free form (see material in Section 4.3 and list of verbs in Appendix B). The presented form allows both the formation of an active (transitive or intransitive) as well as a passive form of the verb by adding the appropriate material, for example, the verb stem *interessier* may form the transitive active third person verb form *interessiert*, the intransitive third person verb form *interessiert sich*, and the (stative) passive verb form *ist interessiert*. The two nouns were presented in bare form, which – in all 32 nouns of our sample – can be used as nominative or accusative singular: i.e., there was no morphological bias for selecting either of the nouns in a particular morpho-syntactic form.

- (9) *interessier...* Zuschauer Aufführung
 ‘concern’ ‘spectator’ ‘performance’

Since the speakers produced main clauses, they had to choose an argument for the preverbal position, which is a syntactic configuration containing an additional operation (fronting to the preverbal field) to the product of scrambling. For the reasons summarized in the previous section, we assume that OVS in German will be

informative for the factors determining word order in a scrambling language. We refrained from developing a different design in German (e.g., with an initial adverb), which would result in clauses with both arguments in the middle field and as such would supply direct evidence for scrambling. The disadvantage of such a deviation in German is obvious, it would introduce the risk of a further factor that influences linearization.

5.1.3 Results

The valid utterances are annotated for diathesis and constituent order, see Section 4.4. The most frequent construction type in our data is an active SVX sentence; see (10a). In the following, we code the nominative argument as S, and the non-nominative argument as X (the accusative argument in (10)). This coding is consistent with the terminology of ‘experiencer-subject’ and ‘experiencer-object’ verbs and does not intend a statement about the syntactic analysis of experiencer-objects as subjects in particular languages (see discussion in Section 3). The SVX order in (10a) corresponds to the preferred order in German declarative main clauses. The second construction type with an active transitive verb includes constructions, in which the non-nominative precedes the nominative, as in (10b). This order predominantly occurs with experiencer-object verbs; all occurrences appear in the conditions with inanimate stimulus arguments (see Table 2 and Appendix A).

(10) a. active, SVX (400 tokens)

Die Suppe ekelt den Gast.

‘The soup disgusts the guest.’ (EO/–ag, inan)

b. active, XVS (22 tokens)

Den Gast ekelt die Suppe.

literally: ‘The guest, the soup disgusts (him).’ (EO/–ag, inan)

Furthermore, our dataset contains passive sentences in the SVX order, as in (11a), in which X refers to the passive agent coded in an adjunct phrase introduced by the preposition *von* ‘by’. Some experiencer-object verbs do not form a canonical dynamic passive in their non-agentive readings; see Section 5.1.1. With these verbs adjectival passives were formed, as in (11b). Other experiencer-object verbs have anticausative forms taking the experiencer as subject and the stimulus as a prepositional object (corresponding to the X constituent), as in (11c). The order XVS is grammatical in German with all these constructions, but it does not occur in the obtained data.

- (11) a. passive, SVX (9 tokens)

Die Frisur wurde vom Kunden bewundert.

‘The haircut was admired by the client.’ (ES, inan)

- b. adjectival passive, SVX (185 tokens)

Der Gast ist von der Suppe enttäuscht.

‘The guest is disappointed by the soup.’ (EO/±ag, inan)

- c. anticausative, SVX (56 tokens)

Der Gast ekelt sich vor der Suppe.

‘The guest is disgusted by the soup.’ (EO/–ag, inan)

In the overwhelming majority of subject-first sentences the subject was realized in the prefield (i.e. preceding the finite verb). There are three instances with the subject

in the middle field, all of them with adjectival passive constructions, as in (12). This order is highly marked and generally not expected in an out-of-the-blue utterance.

(12) adj. passive, VSX (3 tokens)

Erstaunt ist der Leser über die Nachricht.

‘The reader is surprised about the message.’ (EO/–ag, inan)

The results are outlined in Table 2, which shows the proportion of utterances involving an earlier realization of the lower argument, i.e., the stimulus of experiencer-subject verbs or the experiencer of experiencer-object verbs. The cases of ‘earlier realization’ are subsumed in two categories: (a) utterances in which the non-nominative argument precedes the nominative, coded as ‘lower first’, as in (10b), and (b) utterances in which the underlying lower argument is encoded as a subject with a passive or anticausative verb, coded as ‘lower subject’; see examples in (11). A detailed listing of the different types of utterances is given in Appendix A.

Table 2. Earlier realization of the lower argument in German

		ES		EO/±ag		EO/-ag	
		<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
animate	lower first	–	–	–	–	–	–
	lower subject	2	1.7	54	44.3	62	55.9
	total (valid)	118	100	122	100	111	100
inanimate	lower first	1	0.9	13	12.3	8	7.7
	lower subject	2	1.7	62	58.5	71	68.2
	total (valid)	114	100	106	100	104	100

Figure 1 presents the proportions of deviation from the default pattern of active clauses with canonical word order; this proportion is the sum of ‘lower first’ and ‘lower subject’. The result shows that the frequency of constructions with an earlier realization of the lower argument depends on the two examined factors, i.e., VERB GROUP and ANIMACY. A generalized mixed-effects model revealed that the maximal goodness of fit is reached by a model containing two main effects and no interaction between them (see estimates in Table 3). The main effect of VERB GROUP ($\chi^2(2) = 28.28, p < 0.001$), reflects the large difference in the proportions of early realization of the lower arguments between ES and EO verbs. The main effect of ANIMACY ($\chi^2(1) = 13.61, p < 0.001$) reflects the increase of early realization of the target argument with inanimates. The interaction between these two factors is not significant.

The data obtained in the two subclasses of experiencer-object verbs involves a difference depending on the level of the factor ANIMACY, which did not reach significance in the statistic analysis. The difference between the EO VERB GROUPS is larger with animate stimuli (11.6%) than with inanimate stimuli (5.1%). This asymmetry is in line with our expectations, since \pm agentive verbs with an inanimate stimulus are necessarily non-agentive, while they may be agentive when they are used with an animate stimulus. This observation did not reach statistical significance (see Table 3, line 3). Thus, we do not have evidence justifying the assumed asymmetry between \pm agentive and non-agentive experiencer-object verbs for German.

Figure 1. Proportions of earlier realization of the lower argument in German

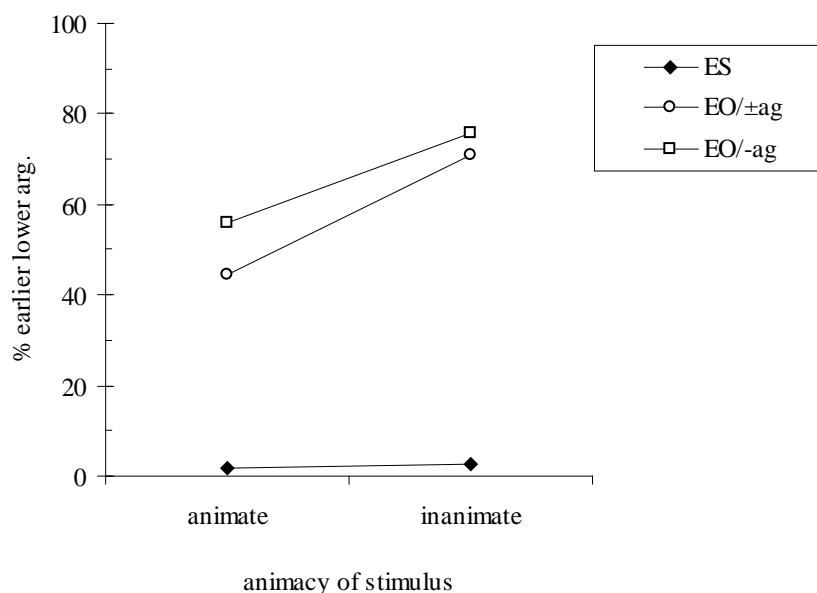


Table 3. German results: generalized linear mixed-effects model (AIC = 567.2 compared with AIC = 570.41 of the full model)

	estimate	S.E.	z value	<i>p</i>
intercept	-1.9531	0.3701	-5.273	< 0.001
VERB GROUP [2-1]	5.7731	0.8539	6.760	< 0.001
VERB GROUP [3-2]	0.3713	0.4863	0.764	= 0.445
ANIMACY	1.4793	0.3205	4.615	< 0.001

Summarizing the resulting pattern for German, both classes of experiencer-object verbs show significantly more instances of an earlier realization of the lower argument than experiencer-subject verbs. In addition, the proportion of sentences with an earlier lower argument is significantly higher with an inanimate than with an animate stimulus.

5.2 Greek

5.2.1 Structural properties

Greek experiencer-object verbs are studied in detail in Anagnostopoulou (1999) and Kordoni (1999). A particular property of these verbs in Greek is their interaction with clitic doubling, which is exemplified in (13).

- (13) a. *I maría* [?](*ton*)
DEF:NOM.SG.F Maria:NOM.SG.F 3.SG.ACC.M
enðiaféri ton pétro.
interest:3.SG DEF:ACC.SG.M Peter:ACC.SG.M
'Maria concerns Peter.'
- b. *I maría* (*ton*)
DEF:NOM.SG.F Maria:NOM.SG.F 3.SG.ACC.M
enoxlí ton pétro.
bother:3.SG DEF:ACC.SG.M Peter:ACC.SG.M
'Maria bothers Peter.'
- c. *Ta épipla* [?](*ton*)
DEF:NOM.PL.N furniture:NOM.PL.N 3.SG.ACC.M
enoxlún ton pétro.
bother:3.PL DEF:ACC.SG.M Peter:ACC.SG.M
'The furniture bothers Peter.' (Anagnostopoulou 1999:78-79)

With canonical transitive verbs, clitic doubling depends on the information structural properties of the object: it appears when the object constituent is part of the background of the utterance. However, with non-agentive experiencer-object verbs

clitic doubling is obligatory according to some authors (see, e.g., Anagnostopoulou, 1999) or occurs in a wider range of contexts according to others (see, e.g., Verhoeven, 2008, 2009a), as in (13a).⁷ Accordingly, with \pm agentive verbs, the clitic is optional in the agentive reading in (13b), while it is almost obligatory in the non-agentive reading, i.e. with the inanimate stimulus subject in (13c). Furthermore, experiencer-object verbs display particular syntactic properties with respect to argument extraction out of relative clauses, reflexivization, binding, etc. which are discussed in detail in Anagnostopoulou (1999).

Experiencer-objects have particular word order properties in Greek. Anagnostopoulou (1999:69, 73) considers both possible argument orders as equally neutral. Moreover, evidence from language production shows that sentences with an accusative experiencer preceding the nominative are significantly more frequent with non-agentive than with agentive accusative experiencer-object verbs (see Verhoeven, 2009b).

Greek is a V-initial language (the basic order being VSO) with optional left peripheral positions that are associated with particular discourse features; corpus studies report that V-initial orders occur rarely in discourse, the most frequent order being SVO (see Lascaratou, 1989). The left periphery of Greek contains a higher position for topics and a lower position for foci (see Tsimpli, 1995; Alexiadou and Anagnostopoulou, 2000:173ff.).

Non-active voice is marked by suffixation. According to the Greek grammatical tradition, this morphological form of the verb is termed ‘mediopassive’, which reflects the fact that this verb form is either used as a true passive or as a middle verb

⁷ Hence, the question mark in (13a) indicates that this version of the example is possible but contextually restricted (see detailed discussion in Author, 2008a, 2009a).

(reflexive/reciprocal) (see Zombolou, 2004). The mediopassive voice form of many verbs is ambiguous between passive and middle readings, while with some verbs it is specified either as passive or as middle. Passives can combine with an agent adjunct encoded in an *apó*-phrase, which is ambiguous between an agent and a cause reading. Most transitive experiencer-object verbs possess a mediopassive verb form, e.g., ‘stimulus *enoxlí* (bothers) experiencer’ → ‘experiencer *enoxlíte apó* (is bothered by) stimulus’. For another subset of Greek experiencer-object verbs, the argument structure may change through simple conversion (e.g., *tromázo* ‘I frighten’ ~ *tromázo apó/me* ‘I am frightened of sth.’).

5.2.2 Speakers and procedure

Sixteen native speakers of Greek participated in the experiment (all residents of Athens; female: 13, age range: 18-36, average: 24.1). The design of the Greek experiment includes 3 (VERB GROUP) × 2 (ANIMACY) × 2 (orders) × 4 (observations) = 48 tokens per speaker. The entire dataset contains 16 × 48 = 768 utterances. 41 utterances had to be excluded as non-valid for the examination of our hypotheses, and hence the valid dataset contains 727 utterances (94.7%).

The presentation of the Greek data is illustrated in (14) (see material in Section 4.3 and list of verbs in Appendix B): the verb was presented in its stem form followed by three dots. The verb stem may be the base of an active or a mediopassive verb form depending on the suffixes. Thus, out of the verb stem *enđiafer...* ‘concern’, it is possible to form the active third person singular form *enđiaféri* ‘(x) concerns (y)’ or the mediopassive third person singular form *enđiaférete* ‘(y) is interested (for x)’. All nouns used in the experimental items were in the feminine or neuter gender, since the

bare singular stem of these inflectional paradigms in Greek is ambiguous between nominative and accusative case.

(14)	ενδιαφερ...	ταξιθετρια	παρασταση
	<i>endiafer...</i>	<i>taksiθetria</i>	<i>parastasi</i>
	‘concern’	‘female theatre usher’	‘performance’

5.2.3 Results

The valid utterances were decoded for diathesis and order (see Section 4.4). Active sentences (SVX, XVS, VSX, VXS) are exemplified in (15), in which the X constituent is a direct object. The SVO order is the preferred order in this language, and indeed the option ‘active SVX’ in (15a) is the most frequent configuration in the obtained data across experimental conditions. The VSO order in (15b) is considered the basic order in syntactic view, since left peripheral arguments are either topics or foci. This order only occurred once in the obtained data – although the verb-initial stimuli (see (14)) could well induce a priming effect on the production of verb-initial orders. This result is in line with empirical findings both in corpus data (see Lascaratou, 1989) which show a clear preference for the SVO order in sentences with two lexically realized arguments as well as in acceptability studies (see Keller and Alexopoulou, 2001) which show that the SVO order is the least contextually restricted order in Greek. The interesting cases for the purposes of this experiment are the orders in which the accusative precedes the nominative, which are exemplified in (15c-d). It is not surprising that the OS configuration is rare in a language such as Greek for the reasons discussed in Section 5.2.1. The OVS example in (15c) involves an object without preverbal clitic: the indefinite object is not necessarily accompanied by a

coreferential clitic in Modern Greek (a clitic is possible in this case with constructions involving hanging topic left dislocation). The VOS example in (15d) is possible either in object focus or in subject focus contexts (see Georgiafentis, 2003), however it is not expected to appear out of the blue. The Greek data do not contain instances of clitic doubling – not even with non-agentive experiencer-object verbs (the construction exemplified in (13)). This outcome probably relates to the fact that the speakers were reluctant to add words (in this case, clitics) to the presented material. This behavior is in line with the observation in corpora that clitic doubling is frequent but not obligatory with experiencer-object verbs (see Verhoeven, 2009a).

(15) a. active, SVX (534 tokens)

i *súpa* *ðelése* *ti*

DEF:NOM.SG.F soup:NOM/ACC.SG entice:AOR:3.SG

DEF:ACC.SG.F

garsóna.

waitress:NOM/ACC.SG

‘The soup enticed the waitress.’ (EO/±ag, inan)

b. active, VSX (1 token)

sókare *i* *astinomikína*

shock:AOR:3.SG DEF:NOM.SG.F police.officer.F:NOM/ACC.SG

tin *políttria*

DEF:ACC.SG.F seller.F:NOM/ACC.SG

‘The female seller shocked the female police officer.’ (EO/±ag, anim)

c. active, XVS (1 token)

éna *atíxima* *ákuse*

INDEF:NOM/ACC.SG.N accident:NOM/ACC.SG hear:AOR:3.SG

i astinomikína.

DEF:NOM.SG.F police.officer.F:NOM/ACC.SG

‘The female police officer heard an accident.’ (ES, inan)

d. active, VXS (1 token)

ksejélase ti manávisa

deceive:AOR:3.SG DEF:ACC.SG.F greengrocer.F:NOM/ACC.SG

to trayúði.

DEF:NOM/ACC.SG.N song:NOM/ACC.SG

‘The song deceived the female greengrocer.’ (EO/±ag, inan)

Instances with mediopassive verbs are exemplified in (16), in which the X constituent is a prepositional phrase. The preposition *apó* ‘by’, as in (16a-b), either introduces the passive agent or a cause-phrase in Greek and this is the most frequent realization of the X constituent in our data (12 out of 12 instances of mediopassive with experiencer-subject verbs; 148 out of 178 cases with experiencer-object verbs, 83.1%). With experiencer-object verbs, the stimulus phrase is frequently introduced by different prepositions determined by the verb valency, e.g., *ja* ‘for, about’ or *me* ‘with, about’, see (16c) (30 out of 178 tokens with experiencer-object verbs, 16.9%).

Similar to the utterances with active verbs, most utterances with a mediopassive verb display the canonical word order, as in (16a). V-initial orders only occur rarely, see VSX in (16b) and VXS in (16c). The example (16c) is particularly interesting for the argumentation in this article, since it displays both a marked voice (mediopassive) as well as an order in which the non-subject precedes the subject (see comment in Section 4.4).

(16) a. mediopassive, SVX (187 tokens)

i *manávisa*
DEF:NOM.SG.F greengrocer.F:NOM/ACC.SG
ksejelástike *apó tin*
deceive:MEDP:AOR:3.SG by DEF:ACC.SG.F

bakálisa.

grocer.F:NOM/ACC.SG

‘The female greengrocer was deceived by the female grocer.’ (EO/±ag, anim)

b. mediopassive, VSX (2 tokens)

siglonístike *i*
excite:MEDP:AOR:3.SG DEF:NOM.SG.F
pelátisa *apó tin*
customer.F:NOM/ACC.SG by DEF:ACC.SG.F

kómosi.

hairstyle:NOM/ACC.SG

‘The female customer was excited about the hairstyle.’ (EO/–ag, inan)

c. mediopassive, VXS (1 token)

enðiaférete *ja mia*
concern:MEDP:3.SG for INDEF:NOM/ACC.SG.F

theatrína *i* *taksiéthtria.*

actress:NOM/ACC.SG DEF:NOM.SG.F theatre.usher.F:NOM/ACC.SG

‘The female theatre usher is interested in an actress.’ (EO/–ag, anim)

Table 4 shows the proportions of utterances involving an earlier realization of the lower argument. The utterances coded as ‘lower first’ contain the active sentences in which the non-nominative precedes the nominative (XVS and VXS orders, as in (15c-d)); the utterances coded as ‘lower subject’ contain the sentences with a mediopassive verb in which the nominative precedes the non-nominative (SVX and VSX orders, as in (16a-b)). As may be observed in the low frequencies of the active XVS and VXS orders, the effects observed in the Greek data mainly relate to the production of mediopassive sentences. A detailed listing of the different types of utterances per experimental condition can be found in Appendix A.

Table 4. Earlier realization of the lower argument in Greek

		ES		EO/±ag		EO/-ag	
		<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
animate	lower first	–	–	–	–	–	–
	lower subject	7	5.6	30	23.8	39	31.2
	total (valid)	125	100	126	100	125	100
inanimate	lower first	1	0.9	1	0.8	–	–
	lower subject	5	4.2	47	38.8	62	54.9
	total (valid)	117	100	121	100	113	100

The proportions of earlier realization of the lower argument (i.e., lower first and lower subject) utterances are plotted in Figure 2. The data pattern is generally similar to the German results in Figure 1: the frequency of constructions with an earlier realization of the lower argument depends on the factors VERB GROUP and ANIMACY. A generalized mixed effects model revealed a model with only main effects is more

informative than the full model containing the interaction, whereby the loss of information by removing the interaction effect is not significant (see fixed effects in Table 5). The main effect of VERB GROUP ($\chi^2(2) = 17.81, p < 0.001$) confirms the observed difference between ES and EO verbs in Greek and the main effect of ANIMACY ($\chi^2(1) = 8.73, p < 0.01$) confirms the increase of earlier realization of the lower argument with inanimate stimuli.

Comparing the data obtained in the two subclasses of experiencer-object verbs, we observe a difference depending on the level of the factor ANIMACY. However, the data pattern differs from the German pattern: the impact of VERB GROUP with inanimates (difference EO/-ag – EO/±ag = 15.3) is larger than the corresponding impact with animates (difference EO/-ag – EO/±ag = 7.4). This finding is surprising, since ±agentive verbs with an inanimate stimulus are necessarily non-agentive, and hence they are not expected to have a different impact on the linearization than the inherently non-agentive verbs. However, since there is no significant interaction between ANIMACY and VERB GROUP, this is not an interpretable finding.

Figure 2. Proportions of earlier realization of the lower argument in Greek

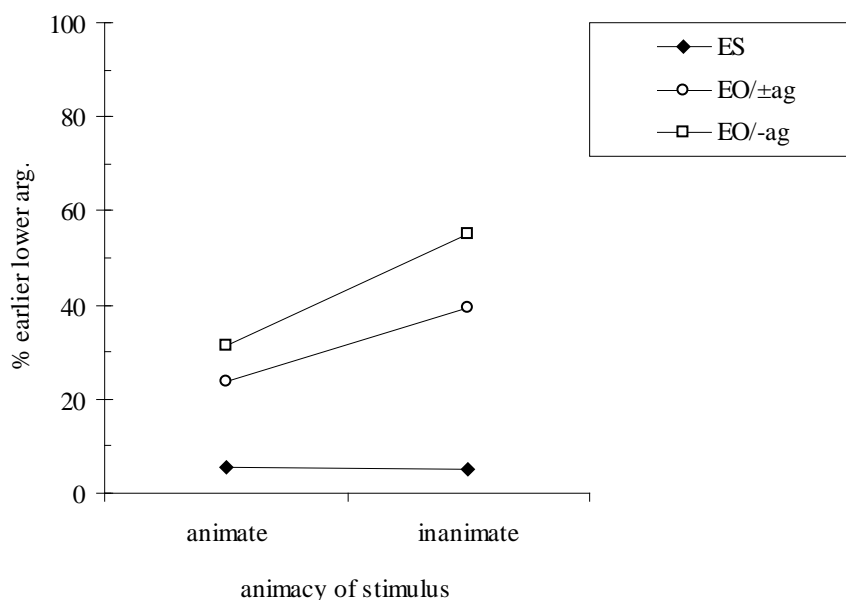


Table 5. Greek results: generalized linear mixed-effects model (AIC = 713.91 compared with AIC = 715.76 of the full model)

	estimate	S.E.	z value	<i>p</i>
intercept	-2.1529	0.2884	-7.465	< 0.001
VERB GROUP [2-1]	2.5843	0.4902	5.272	< 0.001
VERB GROUP [3-2]	0.5722	0.2901	1.973	< 0.05
ANIMACY	1.0583	0.2532	4.180	< 0.001

In sum, the resulting pattern in Greek is similar to the German pattern: the earlier realization of the lower argument is significantly more frequent with both classes of experiencer-object than with experiencer-subject verbs and asymmetries in animacy have an additional effect.

5.3 Turkish

5.3.1 Structural properties

In Turkish, experiencer-objects of transitive verbs do not differ from canonical objects in their grammatical behavior. For example, there are no differences in the use of passivization between canonical transitive verbs and experiencer-object verbs (see Kutscher, 2009; Özsoy, 2009; Verhoeven, 2010a). Passivization is formally regular but restricted in use. In principle all transitive verbs can be suffixed by the passive marker *-Il/(I)n*. However, there are stylistic restrictions: passive constructions are frequent in written styles and less frequent in colloquial styles. Passivization usually has the function of topicalizing the direct object and suppressing the actor of the active verb (Göksel and Kerslake, 2005:134f.). The actor, though, may be adjoined by means of the postposition *tarafından* ‘by’ (generally used for animates or human beings) or by ablative or locative marking (for inanimate actors).

Furthermore, it is important to note that the great majority of the Turkish transitive EO verbs are causative forms of basic intransitive verbs and adjectives which take the experiencer as their subject, while the stimulus can be adjoined in an oblique case, either dative or ablative (see Kural, 1996; Kutscher, 2009); see (17a) for a basic intransitive experiencer verb and (17b) for the transitive causativized form.

- (17) a. *Delikanlı öğretmen-e / iş-e sevin-di.*
boy teacher-DAT / job-DAT be.happy-PFV
‘The boy was happy about the teacher/the job.’
- b. *Öğretmen /iş delikanlı-yı sevin-dir-di.*
teacher / job boy-ACC be.happy-CAUS-PFV
‘The teacher/the job delighted the boy.’

Instead of using a passivized form of the causative experiencer-object verbs, the basic intransitive verbs are the natural choice when it comes to highlight the experiencer. Syntactic operations that front the object are available in Turkish. Previous empirical studies report that object fronting occurs under the same contextual conditions for canonical transitive verbs and experiencer-object verbs (see Verhoeven, 2008, 2010a). Turkish is a typical V-final language with scrambling properties (see Section 3). The order involving an object scrambled over the subject is exemplified in (18). This order is not felicitous in a wide focus context: however, it is possible in a context licensing focus on the object. As discussed in detail in Kılıçaslan (2004), non-canonical word orders in Turkish do not require an analysis in terms of discrete positions which are specified for information structure. Scrambling is determined by general preferences on linearization that influence the optional choice among different orders, thus rendering substantial word order flexibility.

- (18) *Oya-yı Fido ısır-dı.*
 Oya-ACC Fido(NOM) bite-PST
 ‘Fido bit Oya’ (Kılıçaslan, 2004:743)

5.3.2 Speakers and procedure

Turkish displays a single comprehensive class of transitive experiencer-object verbs and does not distinguish between a class of non-agentive stative experiencer-object verbs and a class of \pm agentive (i.e., potentially agentive) experiencer-object verbs (see Verhoeven, 2010a). Therefore we tested only two verb groups for Turkish, i.e. experiencer-object verbs and experiencer-subject verbs.

Sixteen native speakers of Turkish participated in the experiment (residents of Germany,⁸ female: 7, age range: 19-33, average: 26.1). The data set includes 2 (VERB GROUP) × 2 (ANIMACY) × 2 (orders) × 16 (speakers) × 4 (observations) = 512 utterances. 27 utterances were classified as non-valid due to performance errors of the kind reported in Sect. 4.5. All following analyses relate to the remaining 485 valid utterances (94.7%).

The Turkish target items were presented as in example (19) (see material in Section 4.3 and list of verbs in Appendix B). As for the German and the Greek experiments, the verb stem was followed by three dots indicating that it does not occur as a free form. The presented form allows both the formation of a finite active as well as a finite passive form of the verb by adding the appropriate suffixes. Native speakers added several classes of affixes to the presented stems: (a) the passive marker *-Il/(I)n* and (b) tense/aspect/modality markers.⁹ The two nouns were presented in a bare form, which is identical to the nominative form, while the formation of non-nominative cases involves the addition of the respective case suffixes.¹⁰

- (19) eğlendir... izleyici seans
 ‘amuse’ ‘spectator’ ‘performance’

⁸ All speakers had Turkish as their first language and were raised in Turkey.

⁹ The person marker for third person is zero.

¹⁰ The realization of the accusative case suffix only occurs with specific direct objects in Turkish (see Kornfilt, 1997:213).

5.3.3 Results

The valid utterances were decoded for diathesis and constituent order: see Section 4.4. The overwhelming majority of produced sentences were active SXV sentences, as in (20a), which is the canonical order in Turkish declarative sentences. Next to sentences featuring the canonical order, the data contains four active sentences in which the object is scrambled over the subject, as in the XSV order in (20b). In all active sentences, X is a direct object (either marked with an accusative case suffix or as a bare noun phrase).

(20) a. active, SXV (451 tokens)

Seans izleyici-yi eğlen-dir-di.

performance spectator-ACC be.amused-CAUS-PFV

‘The performance amused the spectator.’ (EO/±ag, inan)

b. active, XSV (4 tokens)

Izleyici-yi seans eğlen-dir-di.

spectator-ACC performance be.amused-CAUS-PFV

literally: ‘The spectator, the performance amused him.’ (EO/±ag, inan)

Next to the active transitive realizations, the Turkish data contain one passive sentence and a number of basic intransitive realizations of causative experiencer-object verbs. As reported in Section 5.3.1, most transitive experiencer-object verbs in Turkish are causative derivations of basic intransitive experiencer-subject verbs. These latter verbs take the experiencer in subject function and the stimulus marked in an oblique case, generally dative or ablative, as in (21b). All passive and intransitive sentences in our dataset were produced in SXV order, in which X refers to the oblique

object or local adjunct. A scrambled order (XSV) is also grammatical in these constructions: however, it does not occur in the obtained data.

(21) a. passive, SXV (1 token)

Izleyici bu seans-ta eğlen-dir-il-di.

spectator this performance-LOC be.amused-CAUS-PASS-PFV

‘The spectator was amused by this performance.’ (EO/±ag, inan)

b. basic intransitive, SXV (29 tokens)

Müşteri çorba-dan iğren-di.

guest soup-ABL be.disgusted-PFV

‘The guest was disgusted by the soup.’ (EO/±ag, inan)

Table 6 outlines the proportions of utterances that involve an earlier realization of the lower argument, i.e., the stimulus of experiencer-subject verbs and the experiencer of experiencer-object verbs. Similar to the previous languages, earlier realization of the lower argument involves either fronting of the lower argument in the active voice (XSV order), as in (20b), (see instances of ‘lower first’ in Table 6), or ‘lower subject’, i.e., the choice of passives or basic intransitive verbs, as in (21). The exact frequencies of these configurations per experimental condition are given in Appendix A. Utterances with an earlier realization of the lower argument only occur with experiencer-object verbs in Turkish.

Table 6. Earlier realization of the lower argument in Turkish

		ES		EO/±ag	
		<i>N</i>	%	<i>n</i>	%
animate	lower first	–	–	–	–
	lower subject	–	–	7	5.6
	total (valid)	<i>117</i>	100	<i>125</i>	100
inanimate	lower first	–	–	4	3.3
	lower subject	–	–	23	18.8
	total (valid)	<i>121</i>	100	<i>122</i>	100

The proportions of earlier realization of the lower argument are plotted in Figure 3. The Turkish data differ from German and Greek in the size of the observed effects. Earlier realization of the lower argument does not occur at all with experiencer-subject verbs, and only rarely with experiencer-object verbs with animate subjects. Crucially, an essential proportion of sentences with lower-first occurs with experiencer-object verbs with an inanimate stimulus argument. A generalized mixed effects model in this dataset results in a standard error inflation due to collinearity. This is a real problem of this dataset: since earlier realization of the lower argument is zero at the level ES of the factor VERB GROUP (in both ANIMACY conditions), the effect of VERB GROUP and the interaction effect are identical. Standard error inflation also applies in a model only containing the factor VERB GROUP.¹¹ The only interpretable finding in this dataset is the main effect of ANIMACY, which is

¹¹ In this case, the standard error inflation does not result from collinearity, but is probably due to the fact that early realization of the lower argument does never occur in the ES level of this factor.

significant ($\chi^2(1) = 7.69, p < 0.01$) (see estimates in Table 7). The relevance of the Turkish data for our considerations will be made clear in the comparison with the other languages, see Section 6.

Figure 3. Proportions of earlier realization of the lower argument in Turkish

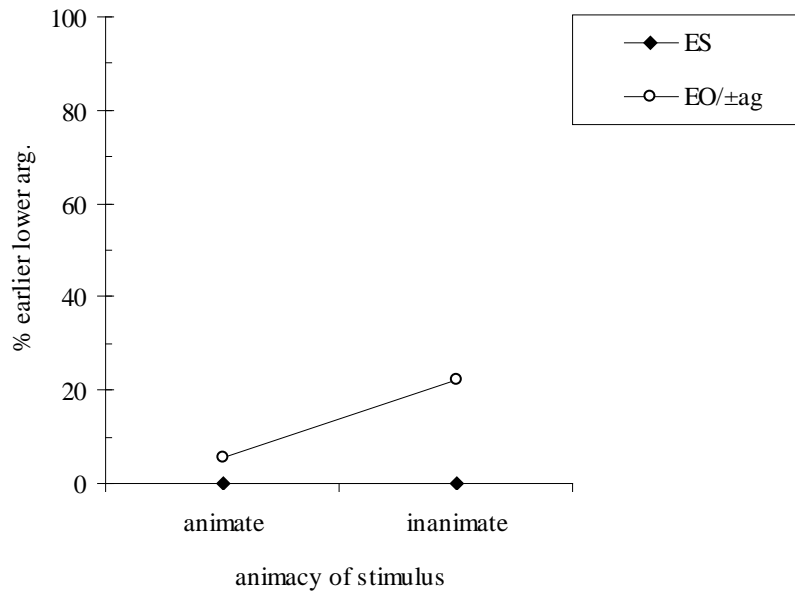


Table 7. Turkish results: generalized linear mixed-effects model (AIC = 217.7 compared with AIC = 200.5 of the full model)

	estimate	S.E.	z value	<i>p</i>
intercept	-6.4202	0.9025	-6.743	< 0.001
ANIMACY	-2.8207	0.8165	-3.455	< 0.001

The Turkish data shows an effect of ANIMACY that is similar to the effect obtained from Greek and German but differs in that it does not provide evidence for a main effect of VERB GROUP.

5.4 Chinese

5.4.1 Structural properties

In Chinese, experiencer-objects of transitive verbs behave like canonical objects. Transitive experiencer-object verbs regularly occur in a passive construction and keep the dynamic reading they also have in the active construction (see Verhoeven, 2010b). This means that the passive is not a stative passive, as is the case with the passive of some German experiencer-object verbs (see examples in (8)).

In Chinese, a construction that is used to front undergoers is formed by means of the coverb *bèi*. This construction has an adversity meaning, at least in those cases where it is not influenced by translations of the English passive. In comparison to the English passive, the *bèi*-construction is more similar to a *get*-passive (see Cheung and Larson, 2006). Furthermore, it is less restrictive as to the possible subject arguments allowing for example so-called indirect passive constructions, in which the subject is not a possible argument of the underlying verb (see Bisang, 2006 and literature there). Only those transitive verbs which denote the affectedness of the direct object can occur in the *bèi*-construction (see Li and Thompson, 1981, ch. 16). There are further passive-like constructions using verbs like *shòudào* ‘get:reach’ with the effect that the undergoer surfaces in the initial position (see also Section 5.4.3).

Chinese has been described as a topic-prominent language based on the observation that topicalization determines the choice of the element that appears in the most prominent position of the sentence, i.e., sentence-initially (see Li and Thompson, 1981:15). Though word order in Chinese is by no means rigid, the ordering possibilities of clauses with a subject and an object are restricted – probably due to the ambiguity potential that these configurations involve in a language without morphological case. The preferred order of these sentences is SVO, while SOV is

possible as well (see Huang et al., 2009:200ff.; Li and Thompson, 1981:23). The only possible order in which the object precedes the subject is OSV, as exemplified in (22) (VOS/OVS are practically excluded). This order involves a left dislocation of the object constituent outside the core clause and is only possible under restricted contextual conditions, i.e., if the object is the sentence topic (see discussion and examples in Huang et al., 2009:201). Note that the left dislocated constituent in (22) introduces the referent of the object in the core clause; Chinese is a language with object pro-drop.

- (22) *Zhāngsān wǒ yǐjīng jiàn guo le*
 Zhangsan 1.SG already see EXP¹² CRS¹³

‘Zhangsan, I have already seen him.’ (see Li and Thompson, 1981:15)

With respect to transitive experiencer-object verbs argument order does not display any particular properties. Previous empirical studies report that object fronting in this language occurs under the same contextual conditions for canonical transitive verbs and experiencer-object verbs (Verhoeven, 2008, 2010a).

¹² The experiential aspect indicates that the event expressed has been experienced by the main participant. It is not especially linked to psych verbs but can occur with all states and events that are repeatable (see Li and Thompson, 1981:226ff).

¹³ Currently Relevant State: indicates “a state of affairs [that] has special current relevance with respect to some particular situation” (Li and Thompson, 1981:240)

5.4.2 Speakers and procedure

Similar to Turkish, Chinese has a single comprehensive class of transitive experiencer-object verbs. Hence, the Chinese experiment contained two verb classes, i.e., experiencer-object verbs and experiencer-subject verbs.

Sixteen native speakers of Chinese (residents of Kunming and students at the University of Yunnan, female: 9, age range: 19-30, average: 23.1) participated in the experiment. The data set includes 2 (VERB GROUP) \times 2 (ANIMACY) \times 2 (orders) \times 16 (speakers) \times 4 (observations) = 512 utterances. Some verbs in our sample systematically induced descriptions that involved additional material either in the condition with an inanimate argument or in the condition with two animate arguments. Since the remaining valid tokens for these verbs were very few, we excluded these items from the entire dataset.¹⁴ From the remaining (512–64=) 448 utterances, 51 utterances had to be excluded due to performance errors (see Section 4.5). The valid tokens considered in the following are the remaining 397 utterances (88.6% of the obtained dataset after excluding the four verbs).

The Chinese material was presented as indicated in (23) (see Section 4.3 and list of verbs in Appendix B): the consultants saw a verb followed by two nouns. The bare form of the verb can be used for the formation of sentences without addition of further affixes. Constructions that front the undergoer can be formed by adding the coverb *bèi* or other verbs, e.g., *shòudào* ‘get’. This implies that the Chinese stimuli involve a priming potential for an active clause, since the presented bare form is already the free

¹⁴ We excluded two experiencer-subject verbs (*kànjiàn* ‘see’: 3 valid out of 8 tokens with two animates, *wùzhěnn* ‘misconceive’: 0 valid out of 8 tokens with two animates) and two experiencer-object verbs (*rǎoluàn* ‘disturb’: 1 valid out of 8 tokens with inanimate argument, *zǔnáo* ‘frustrate’: 0 valid out of 16 tokens in both conditions).

form of an active verb and the production of the passive involves the use of additional words. Furthermore, in contrast to the other languages, Chinese does not have case marking-; i.e., the bare nouns can be used as well-formed noun phrases.

- (23) 鼓舞 观众 演出
gǔwǔ *guānzhòng* *yǎnchū*
 ‘inspire’ ‘spectator’ ‘performance’

5.4.3 Results

The valid utterances are decoded for diathesis and constituent order (see Section 4.4). The examples in (24) illustrate active sentences with different orders (the X constituent is the direct object). In accordance with the basic constituent order in Chinese most active sentences occur in an SVX order, as in (24a). Furthermore, three instances of SXV order occur, as in (24b). Note that the marker *bǎ* is used in Chinese when the object is placed in front of the lexical verb. Finally, in one active sentence the object was left dislocated, rendering an XSV order, as in (24c).

- (24) a. active, SVX (369 tokens)
 Guānzhòng rènshí yǎnchū.
 spectator know performance
 ‘The spectators know the performance.’ (ES, inan)
- b. active, SXV (3 tokens)
 Zhè gè tāng bǎ kèrén mízhù-le.
 this CL soup BA guest attract-PFV

‘This soup enticed the guest.’ (EO/±ag, inan)

c. active, XSV (1 token)

Qīzǐ *lǐhūn* *shānghài*.

wife divorce hurt

literally: ‘The wife, the divorce hurts her.’ (EO/±ag, inan)

Next to the active sentences, speakers produced alternative constructions with diverse argument orders, as in the examples in (25). One possible way to front the undergoer is by means of the coverb *bèi*, as in (25a). In these sentences, the coverb *bèi* is followed by the agent. The main verb follows in sentence-final position without any morphological change. This order is coded as SCXV, in which C indicates the coverb and X refers to the agent. An alternative passive construction is formed by means of the verb *shòudào* ‘get’. If a transitive verb is construed with *shòudào* the undergoer occupies the subject position. The transitive verb is nominalized and the actor occurs as a nominal modifier marked by *de*, as in (25b). This order is coded as SVXV_N, in which V_N indicates the nominalized verb and X refers to the modifying nominal. Finally, the Chinese data contains one passive token with the order SXV, as exemplified in (25c). Here again, *shòudào* ‘get’ is used and the stimulus, indicated here as X, is added by means of the coverb *yīnwèi* ‘because of’.

(25) a. passive, SCXV (17 tokens)

Kèrén bèi tāng mízhù.

guest BEI soup attract

‘The guest is enticed by the soup.’ (EO/±ag, inan)

b. passive, SVXV_N (6 tokens)

Chúshī shòudào kèrén-de xǐhuān.

cook GET guest-ATTR like

‘The cook is liked by guests.’ (ES, anim)

c. passive, SXV (1 token)

Zhèwèi qīzǐ yīnwèi líhūn shòudào shānghài.

this wife because.of divorce GET hurt

‘This wife is hurt because of the divorce.’ (EO/±ag, inan)

Table 8 summarizes the proportions of utterances which involve an earlier realization of the lower argument, either through fronting, i.e., left dislocation of the lower argument in the active voice (XSV order), as in (24c), (see instances of ‘lower first’ in Table 8), or through ‘lower subject’, i.e., the choice of a construction that deviates from the default argument structure of the active verb, as in (25). The exact frequencies of these configurations per experimental condition are given in Appendix A.

Table 8. Earlier realization of the lower argument in Chinese

		ES		EO/±ag	
		<i>n</i>	%	<i>n</i>	%
animate	lower first	–	–	–	–
	lower subject	5	4.9	5	4.8
	total (valid)	102	100	105	100
inanimate	lower first	–	–	1	1.1
	lower subject	3	3.2	11	11.2
	total (valid)	93	100	98	100

The data in Table 8 show that the proportion of earlier realization of the lower argument is rather low, similar to Turkish and different from Greek and German. The condition with the highest amount of lower-first tokens is the condition of experiencer-object verbs with an inanimate stimulus (12.4% lower-first). The sums of ‘lower first’ and ‘lower subject’ tokens are summarized in Figure 4. A generalized mixed effects model revealed that the main effects as well as the interaction effect of both fixed factors can be removed from the model without significant loss of information.

Figure 4. Proportions of earlier realization of the lower argument in Chinese

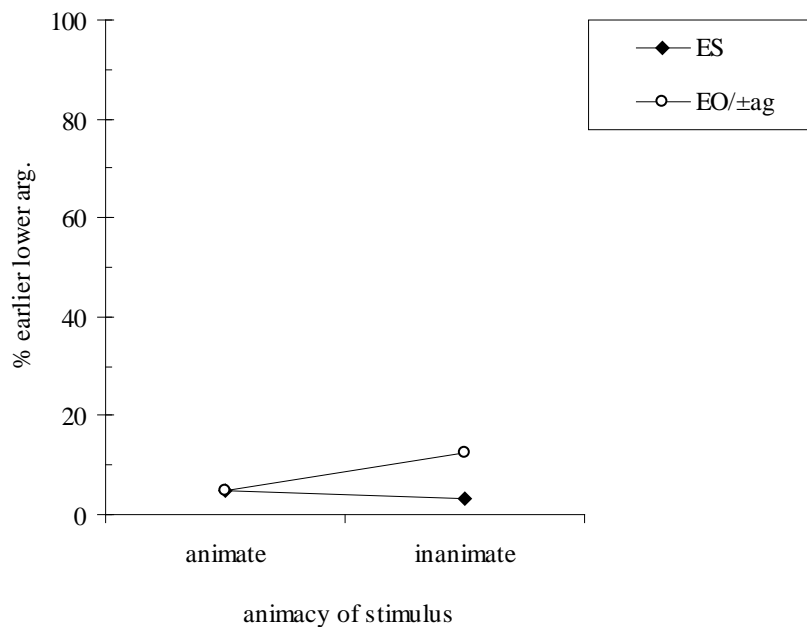


Table 9. Chinese results: generalized linear mixed-effects model (AIC = 186.25; compare with AIC = 188.18 for the full model)

	estimate	S.E.	z value	<i>p</i>
intercept	-3.8073	0.4882	-7.799	< 0.001

In sum, the Chinese results do not allow for any conclusions. They are only informative in comparison to the other languages of this study, as discussed in Section 6.

6. Cross-linguistic comparison

In the preceding sections, it became evident that the vast majority of lower-first tokens in our data involve diathetic alternations. Since the instances of scrambling are very few in the collected data, we cannot obtain statistic inferences about the impact of the typological factor II ‘scrambling’. Descriptively, we observe that instances with non-canonical word order are more likely to occur in German (22 out of 275 ‘lower first’ tokens; i.e., 8%) and Turkish (4 out of 34; 11.8%) than in Greek (2 out of 192; 1.1%) or Chinese (1 out of 25; 4%), which is in line with the expectations in (6b). However, this data is not sufficient for reliable statistic inferences under the empirical standards of this study: a chi-square test on the difference between ‘scrambling’ (German and Turkish) and ‘non-scrambling’ (Greek and Chinese) languages reveals a significant difference ($\chi^2(1) = 10.9$; $p < 0.001$), however this estimate does not consider the variation between speakers and items as modeled in this experiment and the analyses reported in this article. The obtained frequencies of scrambling are not reliable for a further analysis, since speakers predominantly opted for the choice of an experiencer subject rather than for the choice of an experiencer-object preceding the nominative.

The relevant cross-linguistic distinction for the type of data we collected by this experiment is typological factor I, i.e., the distinction between languages with exceptional experiencers and languages in which the experiencer argument is a canonical undergoer. Table 10 summarizes the data of the two relevant language types

in the factors ANIMACY and VERB GROUP, whereby the latter contains only \pm agentive EO verbs, which is the subclass of EO verbs that is available in all languages.

Table 10. Summary of earlier realizations of the lower argument across language type (non-EE-languages: non-exceptional-experiencer languages, i.e., Turkish and Chinese; EE-languages: exceptional-experiencer languages, i.e., Greek and German)

	ES verbs				EO \pm ag verbs			
	Animate		inanimate		animate		inanimate	
	<i>n/total</i>	%	<i>n/total</i>	%	<i>n/total</i>	%	<i>n/total</i>	%
non-EE-languages	5/219	2.3	3/214	1.4	12/230	5.2	39/220	17.7
EE-languages	9/243	3.7	9/231	3.9	84/248	33.9	123/227	54.2

The prediction in (6a) implies that the factor LANGUAGE TYPE (referring to the typological distinction between exceptional-experiencer languages and those that subsume experiencer verbs under the canonical transitive verbs) interacts with VERB GROUP (and not with ANIMACY). In order to answer this question, we fitted a generalized mixed effects model on the entire dataset. We examined a maximal model containing the fixed factors LANGUAGE TYPE, VERB GROUP and ANIMACY, the by-SUBJECT and by-ITEM random intercepts, the by-SUBJECT random slopes with VERB GROUP and ANIMACY, and the by-ITEM random slope with ANIMACY. The three-way interaction of the fixed factors and the interactions between ANIMACY and LANGUAGE TYPE as well as between VERB GROUP and ANIMACY are not significant. However, this model reveals an interaction between LANGUAGE TYPE and VERB GROUP (log-likelihood test of goodness-of-fit in comparison to a model containing all three

twofold interactions; $\chi^2(1) = 5.39$; $p < 0.05$), which is the crucial finding for our purposes. The estimates of the final model are given in Table 11.

Table 11. Fixed effects of the model with the highest goodness of fit (AIC = 1106; compare with AIC = 1114 of the full model)

	estimate	S.E.	z value	p
intercept	-3.8185	0.2708	-14.100	< 0.001
LANGUAGE TYPE	-0.8182	0.2068	-3.957	< 0.001
VERB GROUP	1.6347	0.1960	8.342	< 0.001
ANIMACY	1.2612	0.2161	5.838	< 0.001
LANGUAGE TYPE ^ VERB GROUP	-0.4248	0.1951	-2.177	< 0.05

Since the typological distinction between ‘exceptional-experiencer languages’ and ‘non-exceptional-experiencer languages’ is only relevant for the experiencer-first effects (and not for the animate-first effects), this typological parameter is expected to interact with VERB GROUP and not with ANIMACY, see (6a). This expectation is exactly confirmed by the reported statistical findings, showing that the effect of VERB GROUP depends on language. It corresponds to the reported findings in the previous sections: VERB GROUP had a significant main effect in Greek and German but not so in Chinese and Turkish.

A final point relating to the involved random effects is the influence of the order of presentation of the two nouns. The order was counterbalanced for all items (see Section 4.3), in order to eliminate the possibility that the reported differences involve a bias due to the order in which the nouns appear on the monitor. Previous studies report such effects (see Ferreira, 1994: 720, whereby the observed main effect is not

significant). In our data, we observe some small differences relating to the order of presentation. The crucial part of the dataset is the proportion of earlier realization of the lower argument in configurations with an inanimate stimulus, since in this configuration the choice of roles (stimulus, experiencer) is already determined by animacy. We observe that with experiencer-object verbs, German speakers produced 76% (81 tokens out of total 106) utterances with an earlier lower argument, when the animate was presented first on the monitor, and 70% (73/104) when the animate was presented last. Similar figures are observable in Greek and in Turkish. In Greek, we observe 52% (61/118) with animate-first and 42% (49/116) with animate-last stimuli; in Turkish 25% (15/60) with animate-first and 19% (12/62) with animate-last. In Chinese, no effect of the order of presentation is visible – probably due to the low floor effect of the obtained proportions: 12% (6/48) with animate-first and 12% (6/50) with animate-last stimuli. Since the order of presentation is counterbalanced in our experimental design and since these differences are not relevant for the research question addressed by the present study, we did not include this factor in the statistic model and we modelled only speakers and items as random effects (also following Ferreira, 1994).

7. Discussion

7.1 Exceptional-experiencer languages

The major empirical finding of our cross-linguistic production study is that experiencer-first effects are only visible in German and Greek, but not in Turkish and Chinese. The study revealed an interaction between the effect of VERB GROUP and LANGUAGE TYPE, which refers to the typological distinction between ‘exceptional-

experiencer languages' (German and Greek) and those languages that subsume experiencer verbs under the class of canonical transitive verbs (Turkish and Chinese). The data obtained for German and Greek are reminiscent of further languages, in particular English (Ferreira 1994) and Dutch (Lamers & de Hoop, *forthc.*), which are also languages with exceptional-experiencer properties. The reported results show similar magnitudes with the results reported in the present study for German and Greek (with differences that may be accounted for through differences in the experimental procedure). The important issue in the present study is the comparison with two languages that significantly differ, i.e., Turkish and Chinese.

The observed typological difference is in line with previous reports on the comparison between the semantic properties of experiencer-object verbs in these languages: experimental evidence from a volitionality test, the use of the imperative, and a stativity test shows that one of the two EO verb classes in German and Greek differs from canonical transitive verbs, while the same tests in Chinese and Turkish do not lead to a difference between EO verbs and other transitive verbs (Verhoeven, 2010a). The root of the typological difference is that experiencer-first effects relate to the thematic relation between the arguments and the verb. This relation is determined by the subcategorization frame of the verbal entry, i.e., it is a property of the lexicon. A subset of the verbal lexicon of experiential concepts possesses the feature 'non-agentive', which determines the possibilities of involvement of the stimulus. This property is not inherent in particular types of experience, but is a property of a particular verb. The fact that the thematic properties of experiencer verbs are not identical is established by the existence of several classes of experiencer verbs with different syntactic properties in one and the same language (see Belletti and Rizzi, 1988, Pesetsky, 1995, Reinhart, 2001 among many others). There is no reason to

assume that a certain type of ‘experience’ will be coded with verbs having the same extension across languages. In this vein, the observation that verbs for similar concepts are unspecified for agentivity in a certain language and obligatorily non-agentive in another language does not come as a surprise. This view opens the possibility for languages to lexicalize the concepts of ‘experiencing’ with canonical transitive verbs with an experiencer object that does not syntactically differ from a theme. This type of language is exemplified by Turkish and Chinese.

The experimental results show that the effects on the choice of a lower-first expression do not only apply to non-agentive verbs in German and Greek but to both classes of experiencer-object verbs in these languages. Hence, the difference in the linearization preferences is not exclusively due to the class of purely non-agentive verbs. Also the \pm agentive verbs in German and Greek show a different behavior from the corresponding class in Turkish and Chinese. This difference can be traced back to the fact that \pm agentive verbs are non-canonical transitive verbs in German and Greek, but not in Turkish and Chinese (see Section 2). They display an array of non-canonical properties that apply to their non-agentive readings. These properties are absent from the corresponding Turkish and Chinese verbs in either reading. In these latter languages, experiencer-object verbs display all properties of canonical verbs; the fact that they do not show any experiencer-first effects in the experimental manipulation at issue is in line with the canonicity of their syntax.

7.2 Animacy effects

The statistic analysis of the experimental findings did not reveal an interaction between ANIMACY and VERB GROUP. Furthermore, ANIMACY does not interact with

LANGUAGE TYPE: there is no evidence for an interaction between these two factors as well as no evidence for a three-way interaction. These findings are in line with the fact that the typological distinction with respect to exceptional-experiencer languages does not interfere with animacy effects.

In contrast to experiencer-first effects, animacy-first effects refer to the inherent properties of the referents and not to their thematic relation to the verb. The animate-first effect is a preference in linearization that relates to asymmetries in the mental representation of the referents (see Bock and Warren, 1985, Bock et al., 1992, Van Nice and Dietrich, 2003, Branigan et al., 2008) and as such it applies to speech production in all languages. This does not imply that the realization of animacy-effects or even the magnitude of these effects is expected to be identical across languages. Since linearization preferences are realized through particular grammatical constructions, language-specific differences in the array of available constructions may interact with the language-independent principles. For instance, Tomlin (1995) reports the effects of a cross-linguistic production study manipulating focal attention. Native speakers of several languages consistently selected either passive voice or non-canonical word order when the patient was the current focus of attention. However, native speakers of Akan, which is a rigid SVO language without passive, used canonical SVO utterances in exactly the same context. Cross-linguistic differences of this kind indicate that language-independent preferences may result in different outcomes in particular languages insofar as they have to be satisfied by grammatical entities.

Descriptively speaking, all languages showed reflexes of the animate-first principle motivating a higher amount of lower-first utterances in the condition with inanimate subjects of EO verbs. Measured in the comparison between the symmetric

condition (animate experiencer and stimulus) and the asymmetric condition (inanimate stimulus and animate experiencer) with EO verbs, the effect of animate-first (i.e., the increase of experiencer-first effect in the asymmetric condition) is as follows: German (21.2%), Greek (19.5%), Turkish (16.5%), Chinese (7.6%).¹⁵ The obtained quantitative differences across languages may well be due to further differences in the properties of the involved constructions, e.g. the special properties of the undergoer-first constructions in Chinese (see Section 5.4.1). However, we refrain from further speculation on the sources of these differences, since they are not immediately relevant for the research question at issue and cannot be clarified with the dataset under discussion.

Furthermore, the role of animacy is relevant for the data obtained in the subclass of non-agentive experiencer-object verbs in Greek and German. If the word order properties of this verb group are influenced by animacy, then we should obtain a cumulative effect of animacy in both groups of experiencer-object verbs. This expectation is indeed confirmed for both languages in the experiment. However, we introduced a further hypothesis in Section 4.2, namely the possibility that the animacy effects could be accounted for through the non-agentivity of inanimate stimuli. This hypothesis was expected to result in an interaction effect between VERB GROUP and ANIMACY for the two subtypes of experiencer-object verbs. The predicted pattern is descriptively visible in German (but far from significant) and it does not correspond to the obtained result in Greek. Thus, we do not have evidence that the effects of animacy on the linearization could be accounted for through the relation to agentivity.

¹⁵ We refrain from drawing any conclusions from the magnitude of these effects, since they correspond to the speaker's reactions to a particular experimental manipulation (the only informative facts are differences explained by the observed factors).

7.3 Experiencer-first and scrambling

As already mentioned in Section 6, the experimental data do not allow for conclusions concerning the possibilities of non-canonical word orders since the number of obtained tokens in this configuration is very low.

Non-canonical word order and non-active voice are complementary in our data, i.e., lower-first sentences are either non-active or display a non-canonical word order and not both. There is a single exception to this generalization, namely an utterance in Greek, see (16c). The complementarity between word order and voice indicates that both strategies have a common denominator in the examined context, i.e., native speakers choose either strategy in order to come up with a linearization in which the lower argument precedes the higher one in linear order. The proportions of non-canonical word order were expected to be influenced by the functions of word order in scrambling and non-scrambling languages (see predictions in (6b)), but the obtained data in all languages contained very few instances of non-canonical word order (see counts in Section 6), such that the hypothesis at issue cannot be evaluated.

The question is why the obtained data contain such a low proportion of scrambling in languages that are known to have the possibility to reorder the constituents within the thematic layer of the clause. A crucial clarification is that the obtained data pattern does not imply that object-first orders are not possible but rather that the passive option is preferred as a strategy to front lower prominent arguments. This observation is in line with previous findings in several studies on speech production in German. German speakers select passive instead of a non-canonical order if the object is lower in the animacy hierarchy than the subject (see Van Nice and Dietrich 2003) or if the object is given information and the subject is new (see Skopeteas and Fanselow

2009). Studies in corpora show that non-pronominal accusative objects very rarely precede subjects in German and that the frequencies of initial accusatives are lower than the frequencies of initial datives (see Bader and Häussler, 2010). This contrast indicates that an initial accusative object requires additional discourse factors – which is probably related to the fact that object-fronting competes with passivization as an alternative strategy to realize the lower argument early in the utterance. Since this latter option also satisfies the subject-first preference there is a clear advantage for passivization as a strategy to achieve prominent-first (see Lamers and de Hoop, *forthc.*, for a similar view about the choice of passives in Dutch). Additionally, a preference against potentially ambiguous configurations may be at issue. It is indicative that almost all OS tokens in our dataset are obtained in the asymmetric animacy condition (the sole exception occurring in the configuration with two animates is a VXS token with an EO/-ag verb in Greek). Finally, a comparison with dative experiencer verbs such as German *gefallen* ‘please’ is interesting on this background: dative experiencer verbs do not provide a passive option which optimally fits with the fact that initial dative experiencers are much more frequent than initial accusative experiencers.

8. Conclusion

This article presents a production study that has been carried out in parallel on four typologically different languages, namely, German, Greek, Turkish, and Chinese. This empirical approach allows us to examine minimal pairs of languages in order to identify the locus of typological differences and the role of several language-specific grammatical properties for the realization of prominence effects in human communication. The aim of the study was to identify the impact of thematic

asymmetries and animacy asymmetries on the linearization as manifested in the choice of word order and the choice of subject.

Experiencer-first effects depend on the thematic properties of the verb, which is a property of the lexicon, and as such language specific. Such effects are only observed in some languages of our sample, namely German and Greek. In these languages, experiencer-first effects are observed with all classes of experiencer-object verbs, i.e., both those that only display a non-agentive reading as well as those in which the non-agentive reading is just a possible option. These languages are compared with Turkish and Chinese in which experiencer-object verbs do not differ from canonical transitive verbs. The experimental findings reveal a typological difference between these languages, such that the experiencer-first effects are significantly larger in the languages of the former type.

Animate-first effects relate to asymmetries in the mental representation of the referents whose impact is independent from the properties of the verb. Our results provide evidence for animacy-first effects but they do not provide evidence that these effects depend on the language types at issue. This does not imply that animacy effects are expected to show up with the same magnitude universally, since effects on linearization depend on the language-specific constructions that may be selected to fulfill linearization preferences. The crucial claim is that animate-first effects lie in a different layer from experiencer-first effects and this claim is supported by the finding that the latter but not the former interact with the typology at issue.

Language comparison can contribute to the understanding of speech production in showing the way in which particular phenomena interact with grammatical properties. According to the view advocated in this article there are at least two classes of relations between speech production phenomena and grammatical properties. Some

phenomena such as the animate-first principle relate to language-independent principles of human communication. Their realization may depend on linguistic objects such as word order, voice alternations, etc., which offer a language-specific array of possibilities. However, since these phenomena relate to language-independent principles, their impact is expected to be universal. Other phenomena such as the experiencer-first principle refer to linguistic objects that can only be defined within a particular grammar. As a result the impact of these phenomena is language specific.

Acknowledgements

Special thanks are due to Aysy Dagsan, Thanasis Georgakopoulos, Reyhan Özgül, Simge Yılmaz, and Yungang Zhang, for their advice as native speakers of the object languages as well as for their contribution to the realization of the experimental study. This article is part of the project VE 570/1 *Syntactic and pragmatic prominence of experiencers cross-linguistically*, funded by the German Research Foundation (Deutsche Forschungsgemeinschaft).

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Appendix A. Experimental results

A. Valid data in German (out of 128 obtained tokens per condition)

verb type	Animacy	diathesis	order	<i>n</i>	%		
ES	Animate	active	SVX	116	98.3		
		passive	SVX	2	1.7		
		subtotal		118	100		
	inanimate	active	SVX	111	97.4		
			XVS	1	0.9		
		passive	SVX	2	1.7		
subtotal				114	100		
EO/±ag	animate	active	SVX	68	55.7		
		passive	SVX	2	1.6		
		anticausative	SVX	7	5.7		
		adj. passive	SVX	44	36.1		
			V SX	1	0.8		
		subtotal		122	100		
	inanimate	active	SVX	31	29.2		
			XVS	13	12.3		
		anticausative	SVX	9	8.5		
		adj. passive	SVX	53	50.0		
		subtotal		106	100		
		animate	active	SVX	49	44.1	
				passive	SVX	3	2.7
				anticausative	SVX	20	18.0
adj. passive	SVX			39	35.1		
subtotal			111	100			
inanimate	active		SVX	25	24.0		
			XVS	8	7.7		
	anticausative		SVX	20	19.2		
	adj. passive	SVX	49	47.1			
subtotal		104	100				

B. Valid data in Greek (out of 128 obtained tokens per condition)

verb type	animacy	diathesis	order	<i>n</i>	%
ES	animate	active	SVX	118	94.4
		mediopassive	SVX	7	5.6
		subtotal		125	100
	inanimate	active	SVX	111	94.9
			XVS	1	0.9
		mediopassive	SVX	5	4.2
subtotal				117	100
EO/±ag	animate	active	SVX	95	75.4
			V SX	1	0.8
		mediopassive	SVX	30	23.8
		subtotal		126	100
	inanimate	active	SVX	73	60.4
			V XS	1	0.8
		mediopassive	SVX	47	38.8
		subtotal		121	100
EO/-ag	animate	active	SVX	86	68.8
		mediopassive	SVX	38	30.4

		VXS	1	0.8
	subtotal		125	100
inanimate	active	SVX	51	45.1
	mediopassive	SVX	60	53.1
		VXS	2	1.8
	subtotal		113	100

C. Valid data in Turkish (out of 128 obtained tokens per condition)

verb type	animacy	diathesis	order	<i>n</i>	%	
ES	animate	active	SXV	117	100	
		subtotal		117	100	
	inanimate	active	SXV	121	100	
		subtotal		121	100	
EO/±ag	animate	active	SXV	118	94.4	
		basic intr.	SXV	7	5.6	
		subtotal		125	100	
	inanimate	active	SXV	95	77.9	
			XSV	4	3.3	
		passive	SXV	1	0.8	
			basic intr.	SXV	22	18.0
			subtotal		122	100

D. Valid data in Chinese (out of 128 obtained tokens per condition)

verb type	animacy	diathesis	order	<i>n</i>	%
ES	animate	active	SVX	97	95.1
		passive	SCXV	2	2.0
			SVXV _N	3	2.9
		subtotal		102	100
	inanimate	active	SVX	90	96.8
		passive	SCXV	3	3.2
subtotal			93	100	
EO/±ag	animate	active	SVX	100	95.2
		passive	SCXV	3	2.9
			SVXV _N	2	1.9
		subtotal		105	100
	inanimate	active	SVX	82	84.5
			SXV	3	3.1
			XSV	1	1.0
		passive	SCXV	9	9.4
			SXV	1	1.0
			SVXV _N	1	1.0
subtotal		97	100		

Appendix B. Lexical material

Language	Group	Verbs
German	ES	<i>kenn...</i> ‘know’; <i>ignorier...</i> ‘ignore’; <i>mög...</i> ‘like’; <i>missbillig...</i> ‘deprecate’; <i>bewunder...</i> ‘admire’; <i>seh...</i> ‘see’; <i>versteh...</i> ‘understand’; <i>verkenn...</i> ‘misconceive’; <i>schätz...</i> ‘appreciate’; <i>lieb...</i> ‘love’; <i>veracht...</i> ‘despise’; <i>unterschätz...</i> ‘underestimate’; <i>verabscheu...</i> ‘detest’; <i>hör...</i> ‘hear’; <i>hass...</i> ‘hate’; <i>fürcht...</i> ‘fear’
	EO/±ag	<i>amüsier...</i> ‘amuse’; <i>ärger...</i> ‘annoy’; <i>enttäusch...</i> ‘disappoint’; <i>aufreg...</i> ‘excite’; <i>erschreck...</i> ‘frighten’; <i>shockier...</i> ‘shock’; <i>überrasch...</i> ‘surprise’;

		<p><i>verwirr...</i> ‘baffle’; <i>langweil...</i> ‘bore’; <i>nerv...</i> ‘bother’; <i>irritier...</i> ‘confuse’; <i>einschüchter...</i> ‘awe’; <i>reiz...</i> ‘stimulate, provoke’; <i>erzürn...</i> ‘enrage, incense’; <i>beunruhig...</i> ‘disturb, trouble’; <i>frustrier...</i> ‘frustrate’</p>
EO/–ag		<p><i>interessier...</i> ‘concern’; <i>freu...</i> ‘give pleasure’; <i>ekel...</i> ‘disgust’; <i>empör...</i> ‘outrage, anger’; <i>entsetz...</i> ‘appall’; <i>erschütter...</i> ‘unsettle, upset’; <i>erstaun...</i> ‘amaze’; <i>wunder...</i> ‘astonish’; <i>beeindruck...</i> ‘impress’; <i>begeister...</i> ‘enthuse, inspire’; <i>beweg...</i> ‘move’; <i>verblüff...</i> ‘astound’; <i>anwider...</i> ‘nauseate’; <i>bezauber...</i> ‘enchant, charm’; <i>befremd...</i> ‘alienate, astonish’; <i>erfreu...</i> ‘delight’</p>
Greek	ES	<p>αποδοκιμαζ... (<i>apodokimaz</i>) ‘disapprove’, λατρευ... (<i>latrev</i>) ‘adore’, γνωρίζ... (<i>gnoriz</i>) ‘know’, καταλαβαίν... (<i>katalaven</i>) ‘understand’, θαυμάζ... (<i>thavmaz</i>) ‘admire’, ακου... (<i>aku</i>) ‘hear’, υποτιμ... (<i>ipotim</i>) ‘underestimate’, αγνο... (<i>agno</i>) ‘be ignorant of’, αναγνωρίζ... (<i>anagnoriz</i>) ‘recognize’, αγαπ... (<i>a gap</i>) ‘love’, περιφρον... (<i>perifron</i>) ‘despise’, απηφ... (<i>apsif</i>) ‘ignore’, βλέπ... (<i>vlep</i>) ‘see’, εκτιμ... (<i>ektim</i>) ‘respect’, μισ... (<i>mis</i>) ‘hate’, πιστευ... (<i>pistev</i>) ‘believe’</p>
	EO/±ag	<p>καταπραΐν... (<i>kataprain</i>) ‘appease’, ενοχλ... (<i>enoxl</i>) ‘bother’, δელεάζ... (<i>deleaz</i>) ‘entice’, οργίζ... (<i>orjiz</i>) ‘anger’, ενθαρρύν... (<i>enθarin</i>) ‘encourage’, σοκαρ... (<i>sokar</i>) ‘shock’, αιφνιδιαζ... (<i>efniθiaz</i>) ‘startle’, παραπλαν... (<i>paraplan</i>) ‘mislead’, πειραζ... (<i>piraz</i>) ‘tease’, προκαλ... (<i>prokal</i>) ‘provoke’, ξεγελ... (<i>ksejel</i>) ‘deceive’, καταπιεζ... (<i>katapiez</i>) ‘supress’, ερεθίζ... (<i>ereθiz</i>) ‘exasperate’, φοβίζ... (<i>foviz</i>) ‘scare’, αποθαρρύν... (<i>apoθarin</i>) ‘discourage’, καταρακών... (<i>katarakon</i>) ‘dishonour’</p>
	EO/–ag	<p>ενδιαφερ... (<i>enθiafer</i>) ‘concern’, δυσαραεστ... (<i>θisarest</i>) ‘displease’, αναστατών... (<i>anastaton</i>) ‘fluster’, εκνευρίζ... (<i>eknevriz</i>) ‘annoy, fret’, συγκλονίζ... (<i>sigloniz</i>) ‘excite’, συνταραζ... (<i>sindaraz</i>) ‘make upset’, εκπλησ... (<i>ekplis</i>) ‘surprise’, ξαφνιαζ... (<i>ksafniaz</i>) ‘scare’, εντυπωσιαζ... (<i>endiposiaz</i>) ‘impress’, ενθουσιαζ... (<i>enθusiaz</i>) ‘fill with enthousiasm’, συγκιν... (<i>sigin</i>) ‘touch, affect’, ικανοποι... (<i>ikanopi</i>) ‘satisfy’, προβληματιζ... (<i>provlmatiz</i>) ‘puzzle’, γοητευ... (<i>γoitev</i>) ‘captivate, charm’, παράξενευ... (<i>paraksenev</i>) ‘intrigue’, στενοχωρ... (<i>stenoxor</i>) ‘sadden, disappoint’</p>
Turkish	ES	<p><i>tani...</i> ‘know’; <i>arzula...</i> ‘desire, covet’; <i>anla...</i> ‘understand’; <i>küçümse...</i> ‘despise’; <i>düşün...</i> ‘imagine’; <i>görmezlikten gel...</i> ‘ignore’; <i>beğen...</i> ‘like’; <i>say...</i> ‘respect, honour’; <i>hoş karşılama...</i> ‘deprecate’; <i>sev...</i> ‘love’; <i>anlama...</i> ‘not understand’; <i>duy...</i> ‘hear’; <i>hatırla...</i> ‘remember’; <i>gör...</i> ‘see’; <i>beğenme...</i> ‘not like’; <i>unut...</i> ‘forget’</p>
	EO/±ag	<p><i>eğlendir...</i> ‘amuse’; <i>sevindir...</i> ‘delight’; <i>sık...</i> ‘depress’; <i>üz...</i> ‘sadden’; <i>bezdir...</i> ‘frustrate’; <i>kızdır...</i> ‘anger, annoy’; <i>iğrendir...</i> ‘nauseate’; <i>utandır...</i> ‘abash, embarrass’; <i>korkut...</i> ‘awe’; <i>ürküt...</i> ‘scare’; <i>şaşırt...</i> ‘surprise, startle’; <i>bunalt...</i> ‘bore’; <i>ürpert...</i> ‘frighten’; <i>titret...</i> ‘terrify’; <i>sinirlendir...</i> ‘infuriate’; <i>öfkelenir...</i> ‘incense, enrage’</p>
Chinese	ES	<p>认识 <i>rènshí</i> ‘know’; 忽视 <i>hūshì</i> ‘ignore’; 喜欢 <i>xǐhuān</i> ‘like’; 反对 <i>fǎnduì</i> ‘deprecate’; 厌恶 <i>yànwù</i> ‘hate’; 看见 <i>kànjiàn</i> ‘see’; 理解 <i>lǐjiě</i> ‘understand’; 误诊 <i>wùzhěn</i> ‘misconceive’; 重视 <i>zhòngshì</i> ‘appreciate’; 爱 <i>ài</i> ‘love’; 轻视 <i>qīngshì</i> ‘despise’; 低估 <i>dīgū</i> ‘underestimate’; 讨厌 <i>tǎoyàn</i> ‘detest’; 赞赏 <i>zànsǎng</i> ‘admire’; 憎恶 <i>zēngwù</i> ‘hate’; 担忧 <i>dānyōu</i> ‘fear’</p>
	EO/±ag	<p>鼓舞 <i>gǔwǔ</i> ‘encourage, inspire’; 鼓励 <i>gǔlì</i> ‘encourage’; 迷住 <i>mízhù</i> ‘charm, attract’; 扰乱 <i>rǎoluàn</i> ‘disturb’; 惹恼 <i>rěnnǎo</i> ‘anger, annoy’; 伤害 <i>shānghài</i> ‘hurt’; 安慰 <i>ānwèi</i> ‘comfort, console’; 折磨 <i>zhémó</i> ‘afflict, torment’; 安抚 <i>ānfū</i> ‘appease, comfort’; 激怒 <i>jīnù</i> ‘enrage’; 感动 <i>gǎndòng</i> ‘move, touch’; 刺激 <i>cìjī</i> ‘irritate’; 引诱 <i>yǐnyòu</i> ‘tempt, beguile’; 吸引 <i>xīyǐn</i> ‘attract, fascinate’; 触怒 <i>chùnù</i> ‘peeve, infuriate’; 阻挠 <i>zǔnáo</i> ‘baffle, frustrate’</p>

Appendix C. Agentivity ratings of EO verbs in German and Greek

Means of acceptability ratings on a 7-point scale in two tests (test 1: compatibility with control adverb, test 2: subordination under control verb) with five speakers.

language	verbs	test 1		test 2		grand mean
		mean	SE	mean	SE	
German	<i>amüsieren</i> ‘amuse’	4.2	0.9	5.2	0.9	4.7
	<i>ärgern</i> ‘annoy’	6.4	0.4	6.8	0.2	6.6
	<i>enttäuschen</i> ‘disappoint’	5.0	0.4	5.6	0.2	5.3
	<i>aufregen</i> ‘excite’	4.8	0.5	5.4	0.4	5.1
	<i>erschrecken</i> ‘frighten’	6.8	0.2	6.8	0.2	6.8
	<i>schockieren</i> ‘shock’	6.4	0.4	6.6	0.2	6.5
	<i>überraschen</i> ‘surprise’	5.4	0.6	6.8	0.2	6.1
	<i>verwirren</i> ‘baffle’	6.0	0.5	6.4	0.2	6.2
	<i>langweilen</i> ‘bore’	5.0	0.4	5.6	0.4	5.3
	<i>nerven</i> ‘bother’	6.8	0.2	6.6	0.2	6.7
	<i>irritieren</i> ‘confuse’	6.0	0.5	6.2	0.4	6.1
	<i>einschüchtern</i> ‘awe’	6.0	0.5	6.6	0.2	6.3
	<i>reizen</i> ‘stimulate, provoke’	6.2	0.6	6.4	0.2	6.3
	<i>erzürnen</i> ‘enrage, incense’	4.8	0.4	5.2	0.4	5
	<i>beunruhigen</i> ‘disturb, trouble’	5.2	0.6	5.0	0.4	5.1
	<i>frustrieren</i> ‘frustrate’	5.4	0.5	5.6	0.2	5.5
	<i>interessieren</i> ‘concern’	2.6	0.5	1.6	0.4	2.1
	<i>freuen</i> ‘give pleasure’	2.0	0.5	1.2	0.2	1.6
	<i>ekeln</i> ‘disgust’	4.0	0.7	1.4	0.2	2.7
	<i>empören</i> ‘outrage, anger’	3.4	0.2	2.4	0.5	2.9
<i>entsetzen</i> ‘appall’	2.8	0.7	1.8	0.6	2.3	
<i>erschüttern</i> ‘unsettle, upset’	3.4	0.5	2.6	0.9	3	
<i>erstaunen</i> ‘amaze’	2.8	0.5	3.0	0.9	2.9	
<i>wundern</i> ‘astonish’	2.4	0.5	1.2	0.2	1.8	
<i>beeindrucken</i> ‘impress’	3.8	0.5	3.8	0.9	3.8	

	<i>begeistern</i> ‘enthuse, inspire’	4.6	0.7	3.8	0.7	4.2
	<i>bewegen</i> ‘move’	2.0	0.5	1.4	0.2	1.7
	<i>verblüffen</i> ‘astound’	3.6	0.5	3.6	0.8	3.6
	<i>anwidern</i> ‘nauseate’	2.4	0.7	1.8	0.4	2.1
	<i>bezaubern</i> ‘enchant, charm’	2.8	0.7	3.2	0.6	3
	<i>befremden</i> ‘alienate, astonish’	2.6	0.7	1.4	0.2	2
	<i>erfreuen</i> ‘delight’	4.0	0.3	5.2	0.6	4.6
Greek	καταπραΰν... ‘appease’ (<i>kataprain</i>)	6.2	0.5	6.4	0.4	6.3
	ενοχλ... ‘bother’ (<i>enoxl</i>)	6.0	0.4	6.6	0.2	6.3
	δელεαζ... ‘entice’ (<i>deleaz</i>)	5.8	0.5	5.6	0.7	5.7
	οργιζ... ‘anger’ (<i>orjiz</i>)	6.2	0.4	5.4	0.5	5.8
	ενθαρρυν... ‘encourage’ (<i>enθarin</i>)	5.2	0.4	6.2	0.4	5.7
	σοκαρ... ‘shock’ (<i>sokar</i>)	5.8	0.4	6.2	0.4	6.0
	αιφνιδιαζ... ‘startle’ (<i>efniθiaz</i>)	5.8	0.5	6.4	0.2	6.1
	παραπλαν... ‘mislead’ (<i>paraplan</i>)	6.0	0.5	6.2	0.4	6.1
	πειραζ... ‘tease’ (<i>piraz</i>)	5.6	0.4	6.6	0.2	6.1
	προκαλ... ‘provoke’ (<i>prokal</i>)	5.8	0.5	6.0	0.8	5.9
	ξεγελ... ‘deceive’ (<i>ksejel</i>)	5.2	0.6	6.6	0.2	5.9
	καταπιεζ... ‘supress’ (<i>katapiez</i>)	6.6	0.2	6.0	0.8	6.3
	φοβίζ... ‘scare’ (<i>fovíz</i>)	5.4	0.7	6.2	0.4	5.8
	ερεθιζ... ‘exasperate’ (<i>ereθiz</i>)	6.4	0.4	5.8	0.7	6.1
	αποθαρρύν... ‘discourage’ (<i>apoθarin</i>)	5.0	0.8	6.6	0.2	5.8
	καταρρακων... ‘dishonour’ (<i>katarakon</i>)	6.2	0.4	6.0	0.8	6.1
	ενδιαφερ... ‘concern’ (<i>enθiafé</i>)	2.8	0.4	3.0	0.5	2.9
	δυσαραεστ... ‘displease’ (<i>θisarest</i>)	5.0	0.4	5.0	0.9	5.0
	αναστατων... ‘fluster’ (<i>anastaton</i>)	5.2	0.2	6.0	0.8	5.6
	εκνευριζ... ‘annoy, fret’ (<i>eknevriz</i>)	5.8	0.6	5.4	0.7	5.6

συγκλονιζ... ‘excite’ (<i>sigloniz</i>)	4.6	1.0	5.6	0.7	5.1
συνταραζ... ‘make upset’ (<i>sindaraz</i>)	5.4	0.7	4.4	0.7	4.9
εκπλησ... ‘surprise’ (<i>ekplis</i>)	4.2	0.7	4.8	1.2	4.5
ξαφνιαζ... ‘scare’ (<i>ksafniaz</i>)	4.8	0.5	5.2	0.9	5.0
εντυπωσιαζ... ‘impress’ (<i>endiposiaz</i>)	4.2	0.6	6.0	0.8	5.1
ενθουσιαζ... ‘fill with enthusiasm’ (<i>enthusiaz</i>)	5.0	0.6	5.0	0.9	5.0
συγκιν... ‘touch, affect’ (<i>sigin</i>)	4.0	0.6	4.6	1.2	4.3
ικανοποι... ‘satisfy’ (<i>ikanopi</i>)	4.2	0.5	6.0	0.8	5.1
προβληματιζ... ‘puzzle’ (<i>provlimatiz</i>)	5.0	0.7	5.2	1.0	5.1
γοητευ... ‘captivate, charm’ (<i>goitev</i>)	5.4	0.6	5.8	0.4	5.6
παραξενευ... ‘intrigue’ (<i>paraksenev</i>)	3.8	0.7	3.8	1.0	3.8
στενοχωρ... ‘sadden, disappoint’ (<i>stenoxor</i>)	4.6	0.4	6.0	0.8	5.3
