

The derivation of diminutives and augmentatives in Modern Greek: The case of Primary Basic Colour Terms

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ΠΕΡΙΛΗΨΗ

Η παρούσα έρευνα βασίζεται σε ερωτηματολόγιο και μελετά τα σχήματα (συναισθηματικής) θετικότητας και διέγερσης των υποκοριστικών και μεγεθυντικών επιθέτων στα νέα ελληνικά. Αντικείμενο της έρευνας είναι οι πρωταρχικοί βασικοί χρωματικοί όροι *άσπρ(ο)*, *μαύρ(ο)*, *κόκκιν(ο)*, *κίτριν(ο)* και *πράσιν(ο)*, σε συνδυασμό με τα υποκοριστικά επιθήματα *-ούτσικ(ος)*, *-ούλικ(ος)* και *-οπ(ός)*, το υποκοριστικό πρόθημα *ψιλο-* και τα μεγεθυντικά προθήματα *κατα-* και *υπερ-*. Η μελέτη βασίζεται σε προηγούμενες εργασίες των Kuperman (2013) και Charitonidis (2017), στις οποίες η θετικότητα εμφανίζεται ως βασικός παράγοντας στο σχηματισμό συνθέτων. Τα αποτελέσματα υποδεικνύουν ότι η θετικότητα δεν παίζει σημαντικό ρόλο στην παραγωγή επιθέτων. Οι αξιολογικές κεφαλές θετικότητας και διέγερσης είναι τυπικά οι πρωταρχικοί βασικοί χρωματικοί όροι και όχι τα προσφύματα. Από την άλλη, τα επίπεδα διέγερσης των προσφυμάτων διαφοροποιούν έντονα τα υποκοριστικά και τα μεγεθυντικά.

KEYWORDS: arousal, augmentatives, colour semantics, deadjectival affixes, evaluative morphology, diminutives, questionnaire-based survey, valence

1. Introduction

In psychological research, the semantic variables *valence* (emotional positivity) and *arousal* (excitement, mood-enhancement) tap into the emotional and connotative content of words and are interrelated (Robinson et al. 2004, Kuperman 2013, Warriner et al. 2013, Citron et al. 2014a, 2014b, 2014c etc.). The aim of this paper is to identify the valence and arousal (V&A) patterns of the primary Basic Colour Terms (PBCTs) *áspr(o)* ‘white’, *mávr(o)* ‘black’, *kócin(o)* ‘red’, *cítrin(o)* ‘yellow’ and *prásin(o)* ‘green’ in Modern Greek (MG), in combination with the diminutive suffixes *-utsik(os)*, *-ulik(os)*, and *-op(os)*, the diminutive prefix *psilo-* and the augmentative prefixes *kata-* and *iper-*.¹ In particular, our goal is to find out whether there are regular patterns in the course of derivation of diminutives and augmentatives, i.e. whether the affixes change the value of the bases in a regular way. In different studies, PBCTs appear as members of one and only category by showing the same derivational behaviour (Kay & McDaniel 1978, Charitonidis 2014a etc.).² In MG, these terms, with the exception of the PBCT *ble* ‘blue’, show the highest combinability with the above-mentioned affixes.

The paper is structured as follows. In section 2 the basic properties of evaluative morphemes and MG colour grammar are defined and illustrated. Section 3 presents the affixes and bases under investigation. Section 4 refers to the psychological variables valence and arousal and their patterns on compounding, as established in previous research. The research question is provided at the end of this section. Section 5 deals with the working hypothesis, the critical experimental items, the design of the survey, the participants’ profile and the procedure followed in the online survey. Section 6 presents the results with particular reference to valence and arousal. The results and their implications are discussed in section 7. In section 8, the study’s key findings are summarized.

¹ In these PBCTs and affixes the inflectional ending shows up in parentheses. The PBCTs are neuter forms in nominative singular (the name of the respective colour) and the affixes are masculine forms in nominative singular (the standard citation form for adjectives/nouns and adjectival/nominal endings in MG). Hitherto, PBCTs and adjectival derivatives show up without any base-inflection segmentation, in accord with their presentation in the online survey (see Table 1 in section 5.1).

² PBCTs are the first six terms on the hierarchy of BCTs (Berlin & Kay 1969) and their best examples are perceptual primitives underpinned by fundamental neural responses (Androulaki et al. 2006: 5).

2. Evaluative morphology and the grammar of Modern Greek (MG) colour terms

Diminutive and augmentative affixes are instances of evaluative morphology. Efthymiou (2017: 227-228) summarizes the basic properties and meanings of evaluative morphemes. Below we provide an overview of the most relevant points.

Evaluative morphology forms lexical units that express the semantic values “small”, “big”, “good” and “bad”, i.e. diminution, augmentation, endearment, contempt etc. (see, among others, Dressler & Merlini-Barbaredi 1994, Grandi 2005, Fradin and Montermini 2009). According to Körtvélyessy (2014: 296), “while the concepts of bigness and smallness are measurable, at least in terms of a default value, the concepts of goodness, beauty, or ugliness are, by their very nature, subjective”. The expressive/emotional content of evaluative morphemes becomes weaker over time. This leads to the increase and renewal of the set of evaluative morphemes in a language. Evaluative morphemes usually preserve the syntactic category of the base. They form words that belong to different grammatical categories and can often be substituted by each other e.g. *kutso-vlépo* ‘to see poorly’, *psilo-vlépo* ‘to see a bit’ etc. There can be combinations of evaluative morphemes in a single word.

Alexandris (2014) deals with the grammar of colour terms (nouns and adjectives) in MG. The –rather productive– morphological processes for the construction of colour terms are prefixation, suffixation, compounding and conversion. In particular, there are seven noun-forming suffixes, 18 adjective-forming suffixes, 10 adjective-forming prefixes and a large number of one-word and multi-word compounds. The syntactic processes in which colour nouns and adjectives show up are also considerably productive. They result in the construction of the so-called phrasemes or idioms etc. (see Alexandris 2014: 85-87).

Alexandris (2017) examines colour adjectives in MG under the broad concept of *gradation*. As regards the morphological means for expressing gradation, besides the simple colour adjectives that refer to colour tonality such as *kócino* ‘red’, *prásino* ‘green’, *cítrino* ‘yellow’ etc., MG deploys:

(a) adjectives that refer to brightness, saturation, lustre etc. i.e. modifiers not derived from colour terms, e.g. *θabó* ‘pale’, *anixtó* ‘light’, *skúro* ‘dark’, *kravyaléo* ‘blatant’ etc., as well as diminutive/similative modifiers derived from colour terms in combination with the suffixes *-opos*, *-on*, *-e*, *-uli*, *-íderos* and the affective suffix *-ulis* e.g. *kocinopós* ‘reddish’, *grizúlis* ‘light grey’ (affective) etc.,

(b) quantifying prefixes, mainly *iper-*AUG, *ipo-*DIM, *kata-*AUG, *theo-*AUG, *pan-*AUG, *psilo-*DIM, *imi-*DIM and *olo-*AUG (for examples see section 3.1),

(c) quantifying adverbs, e.g. *polí* ‘very’, *lígo* ‘a little bit’, *arcetá* ‘rather’, ‘fairly’, *ipervolíká* ‘excessively’, ‘ultra’, *edelós* ‘entirely’, *apístefta* ‘stunningly’, *tóso* ‘so much’ etc.,

(d) the comparative suffix *-oteros*, e.g. *lefkóteros* ‘more white’ (*lefkó* ‘white’, [+learned] word for *áspro*) etc. –but *?aspróteros* ‘more white’, *?prasinóteros* ‘more green’ etc., and the superlative suffix *-otatos*, e.g. *lefkótatos* ‘very white’ etc. –but *?asprótatos* ‘very white’, *?prasinótatos* ‘very green’ etc. The formation of comparative and superlative adjectives is not preferred but, instead, the constructions *pço* ‘more’ + adjective (comparative), and (*pára*) *polí* ‘(very) very’ + adjective (superlative) are used, e.g. *pço kócinos* ‘more red’, (*pára*) *polí prásinos* ‘(very) very green’ etc.,

(e) stereotypic similes, e.g. *kócinos san domáta* ‘red like [a] tomato’, *lefkós san çóni* ‘white as snow’ etc.,

(f) adjectival reduplication, e.g. *íne cítrino-cítrino*, it is yellow-yellow etc., or intonation, e.g. *íne kócino!* ‘it is red!’ etc., and

(g) the phrases *apó ta pço* and *apó ta pléon* meaning ‘one of the most’, e.g. *íne apó tis pço/pléon galázjes thálasses pu éxo di* ‘this is the one of the most blue seas I have ever seen’ etc.

By mainly referring to Kleiber (2007), who rejects the common consideration that the colour spectrum is subject to gradation, Alexandris (2017: 135) assumes that colour gradation does not refer to tonality, e.g. more or less red etc., but to some other colour property such as saturation, surface or volume dimensions to which the modified noun refers. It is these different dimensions that are graded and not the colours as such.³ Alexandris (ibid.) regards as evidence in support of her claim the fact that gradation markers, such as *polí* ‘very’ etc., standardly appear together with modifiers such as *édono* ‘vivid’, *anixtó* ‘light’, ‘pale’, *skúro* ‘dark’, *laberó* ‘bright’ etc., but only marginally with colour adjectives, compare (1a) with (1b).

- (1) a. *éna polí édono/anixtó/skúro/laberó xróma*
 ‘a very vivid/light/dark/bright colour’
 b. *?éna polí kócino/citrino/ble/mávro xróma*
 ‘a very red/yellow/blue/black colour’

Let us now examine in detail the morphological properties of the affixes and PBCTs under investigation, by largely following Efthymiou’s (2015) and Charitonidis’s (2014a) descriptions, respectively.

3. Short description of affixes and bases under investigation

3.1 Affixes

The affixes studied in this paper include:

- *-utsikos*_{masc}, *-utsici/ça*_{fem}, *-utsiko*_{neut}

The MG suffix *-utsikos* originates from the Italian suffix *-ucc(io)*. It can attach to any qualitative adjective ending in *-os* (accented or not) that denotes dimension, age, colour, human propensity, physical property, speed, value, difficulty or position, in order to create diminutive adjectives. However, it does not attach to [+learned] bases. The adjectives in *-utsikos* have a marked stylistic status, as the suffix contains the phonestheme [ts] (Joseph 1994: 232). Example adjectives: *nostim-útsikos* ‘tasty_{DIM}’, *akriv-útsikos* ‘expensive_{DIM}’, *aspr-útsikos* ‘white_{DIM}’ etc.

- *-ulikos*_{masc}, *-ulici/ça*_{fem}, *-uliko*_{neut}

According to the *Dictionary of Standard Modern Greek* (1998), the suffix *-ulikos* developed from the combination of the suffixes *-ulis* and *-ikos*. It attaches to qualitative adjectives ending in *-os* (accented or not) that denote dimension, age, colour, human propensity or physical property, and creates adjectives that tend to have an affective value. Example adjectives: e.g. *aspr-úlikos* ‘white_{DIM}’, *kond-úlikos* ‘short_{DIM}’, *γlik-úlikos* ‘sweet_{DIM}’ etc.

- *-opos*_{masc}, *-opi*_{fem}, *-opo*_{neut}

The suffix *-opos* is not productive in MG. It usually attaches to qualitative adjectives ending in *-os* (accented or not) that denote colour, human propensity or physical property, and creates adjectives which express approximation or similarity. Example adjectives: *kocin-opós* ‘red_{DIM}’, *prasin-opós* ‘green_{DIM}’, *ayur-opós* ‘unripe_{DIM}’ etc.

- *psilo-*

The [–learned] prefixoid *psilo-* ‘a bit’ creates adjectives which express the meanings of mitigation, attenuation and imprecision (Xydopoulos 2009). It can attach to any

³ See also Jaspers (2012) on the logic of colour relations.

qualitative adjective that denotes dimension, age, colour, human propensity, physical property, speed, difficulty, value or position in order to create diminutive adjectives. It avoids attaching to [+learned] bases (cf. Savvidou 2012). Example adjectives: *psilo-áðjos* ‘empty_{DIM}’, *psilo-jemátos* ‘full_{DIM}’, *psilo-kócinos* ‘red_{DIM}’ etc.

- *kata-*

The prepositional prefix *kata-* ‘down(wards), towards, completely’ combines with both positive and negative bases ending in *-os* (accented or not) that denote colour, human propensity, age or physical property (Efthymiou 2003: 524). It usually combines with gradable adjectives associated with a closed scale in order to denote “absolute completeness” (see also Gavriilidou 2013: 75-77). *Kata-* can also express exaggeration or overstatement (see Kallergi 2015: 303-310). With relatively neutral bases, including colour terms, the meaning of the derived adjective depends on the particular context of use, cf. *kát-aspros* ‘totally-white’, *kata-cítrinos* ‘totally-yellow’ etc. According to Alexandris (2014: 74, 2017: 128), when *kata-* combines with colour terms, it refers to the prototypical core of the respective colour while addressing colour qualities, such as hue, brightness, saturation etc. (see also section 2). Example adjectives: *kata-kócinos* ‘red_{AUG}’, *katá-kseros* ‘dry_{AUG}’, *katá-ksanθος* ‘blonde_{AUG}’ etc.

- *iper-*

The [+learned] prepositional prefix *iper-* ‘above, over, beyond’ creates adjectives which express “excess” (i.e. ‘more than normal or desirable’) or “high degree” (i.e. ‘very, extremely x’) and is typically associated with quantitative evaluation (see Efthymiou 2017). In particular, *iper-* usually combines with gradable adjectives associated with a closed scale in order to denote “excess” (*iper-órimos* ‘overripe’), but can also combine with gradable adjectives associated with an open scale in order to express reinforcement (*iper-politelís* ‘super luxurious’; see Efthymiou 2003, Gavriilidou 2013, Efthymiou et al. 2015). Finally, *iper-* often appears in neological loan translations, especially in scientific and technical domains (e.g. *iper-órimos* ‘overripe’). Example adjectives: *iper-órimos* ‘ripe_{AUG}’, *iper-politelís* ‘luxurious_{AUG}’, *iper-kócinos* ‘red_{AUG}’ etc.

3.2 Bases (PBCTs)

The term *áspro* ‘white’ originates from the Latin, *mávro* ‘black’ from Ancient Greek (AG). The terms *kócino* ‘red’, *prásino* ‘green’ and *cítrino* ‘yellow’ are derived from plant names (Androulaki et al. 2006); in these the suffix *-ino* has lost its representational strength (Anastasiadis-Symeonidis 1987: 401; see also Alexandris 2009). It should be noted that the bases *cítro* ‘citron’ in *cítrino* and *práso* ‘leek’ in *prásino* are MG nouns in common use –as opposed to the AG noun *kókos* ‘pit’, ‘stone’ in the base of *kócino* which nowadays has a dissociated meaning.

The above mentioned colour terms are both (neuter) nouns (i.e. the colour itself) and adjectives (when accompanying a noun as modifiers). As nouns, they have eight forms, i.e. two numbers (singular and plural) and four cases for each number (nominative, genitive, accusative, vocative). As adjectives, they have in addition three genders, i.e. masculine, feminine and neuter (Androulaki et al. 2006).

4. Valence and arousal in previous research

In this section we provide the description of the V&A variables by referring to Citron et al. (2014a: 313), who state that “emotional valence and arousal are generally considered the two dimensions that define the structure of emotion [...] Valence describes the extent to which an emotion is pleasant or unpleasant (positive, negative), whereas arousal refers to its degree of activation, that is, how exciting, agitating, or otherwise calming an emotion is perceived”. According to the SAWL database in Citron (2010), words with

explicitly opposite valence ratings are *murder* (-2.66) and *friend* (2.52). There are also neutral words that evoke neither pleasant nor unpleasant emotions, such as *attic* (0.09). Words with explicitly opposite arousal ratings are *ceiling* (1.54) and *terrified* (5.96).

Prato & John (1991) and Estes & Adelman (2008) have shown that *automatic vigilance*, i.e. the “mechanism that serves to direct attentional capacity to undesirable stimuli” (Prato & John 1991: 380), is categorical and not linear. This means that “slightly negative and extremely negative words elicit equally slow responding, and that slightly positive and extremely positive words elicit equally fast responding” (Estes & Adelman 2008: 456). In word recognition tasks categorical patterns for arousal are not reported (Kuperman et al. 2014).

Kuperman (2013) examines the role that morpheme meanings play in the recognition of English (EN) compounds. He finds out that a more emotionally negative compound or constituent, i.e. a compound or constituent with negative valence, leads to slower responses. As regards arousal and the rest of the variables he examines, he reports that the speed of compound recognition is affected by semantic properties of compounds, but not by semantic properties of their constituents. This suggests that “when a simplex word is embedded in a compound as a morphological constituent, its semantics (except for its valence) loses influence on how this complex word is processed by the reader” (Kuperman 2013: 6).

In Charitonidis (2014b) a set of 103 EN attitudinal compounds are examined.⁴ The category ‘{stance}’ is introduced, indicating a concept’s positivity or negativity (positive or negative stance towards a situation or entity). {stance} is part of an evaluative level of meaning, called the “socio-expressive tier”. Charitonidis (2017) aims at the empirical validation of the {stance} operations in Charitonidis (2014b) by referring to the valence ratings in Warriner et al. (2013). In particular, the following categorical mappings between valence and “{stance}” are defined:⁵

(2)	Valence	{Stance}
	1 – 4.4	{-s}
	4.5 – 5.4	{s} (underspecification)
	5.5 – 9	{+s}

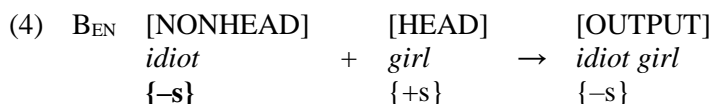
It is shown that the linking of “denotational” (i.e. grammatico-semantic) and “socio-expressive” (i.e. evaluative) heads yields two main classes of attitudinal compounds, i.e. the classes A_{EN} and B_{EN} .

In both the A_{EN} and B_{EN} classes, the right-hand constituent is the denotational head. In A_{EN} compounds such as *brain drain*, *computer virus* etc. the right-hand constituent is also the socio-expressive (evaluative) head. In B_{EN} compounds such as *idiot girl*, *trash television* etc. the socio-expressive (evaluative) head is the left-hand constituent. The head-linking patterns of classes A_{EN} and B_{EN} are exemplified in (3) and (4), respectively. Denotational heads are indicated with ‘[HEAD]’ and socio-expressive (evaluative) heads are indicated with bold face.

(3)	A_{EN}	[NONHEAD]		[HEAD]		[OUTPUT]
		<i>brain</i>	+	<i>drain</i>	→	<i>brain drain</i>
		{+s}		{-s}		{-s}

⁴ All compounds are neologisms of the 20th century, taken from Algeo (1991).

⁵ The mappings in (2) consider the valence rating ‘5’ as directly corresponding to {s}, while rounding proximate ratings.



The competition of $\{+s\}$ with $\{-s\}$ delineates both classes, whereby $\{-s\}$ survives in the output by being within the socio-expressive head. By additionally considering instances of merging of an underspecified constituent with another underspecified or valued constituent, 77.67% of the compounds examined in Charitonidis (2017) are assigned to these two classes alone.

In a nutshell, both psycholinguistic (Kuperman 2013) and grammatico-semantic (Charitonidis 2017) accounts suggest that valence is a crucial categorical factor in compound formation. It remains to see whether derivation, as the other major word-formation process, follows the same categorical pattern. If so, it should both refer to value-changing socio-expressive (head) operations and allow for the assessment of head linking patterns (cf. (3) and (4)).

5. Survey

In the present study we seek to determine the V&A values of PBCTs as standalone units and the V&A values of PBCTs' derivatives. For this purpose, we conducted a questionnaire-based survey (online interviews) in the last quarter of 2016 with native Greek speakers. By relying on previous research (see section 4), and considering affixes as lexemes ("the sign-based hypothesis" [SBH]; Plag 1999, Lieber 2004 etc.), we tested the following working hypothesis.

The formation of diminutives and augmentatives is not different from the formation of compounds (cf. Kuperman 2013). A constituent (base or affix) with negative valence should standardly lead to negative valence in the derivatives, especially in the position of the evaluative head. The position of the evaluative head in the derivatives will be sought according to the competition of heads and non-heads with opposite valence values (cf. (3) and (4) in section 4). We expect that this kind of patterns does not exist in arousal since, as already mentioned in section 4, categorical patterns for arousal are not reported in word recognition tasks.

5.1 Materials and design

Table 1 below shows the 35 critical items (PBCT and their derivatives) used in the experiment. The stimulus set was complemented by 35 control words of very low, intermediate, and very high valence and arousal values shown in Appendix 1. Control words were translation equivalents from Warriner et al. (2013). They were matched for frequency according to the SUBTLEX-GR corpus.⁶

⁶ Available at: www.bcbl.eu/bcbl-corporativa/wp-content/uploads/2013/01/SUBTLEX-GR_full.txt

Table 1. PBCTs and diminutives/augmentatives under investigation (valence/arousal assignment)

Base	-utsikos	-ulikos	-opos	psilo-	kata-	iper-
<i>áspro</i> 'white'	<i>asprútsikos</i> 'white _{DIM} '	<i>asprúlikos</i> 'white _{DIM} '	<i>aspropós</i> 'white _{DIM} '	<i>psiloásrpos</i> 'white _{DIM} '	<i>kátaspros</i> 'white _{AUG} '	<i>iperáspros</i> 'white _{AUG} '
<i>mávro</i> 'black'	<i>mavrútsikos</i> 'black _{DIM} '	<i>mavrúlikos</i> 'black _{DIM} '	<i>mavropós</i> 'black _{DIM} '	<i>psilomávros</i> 'black _{DIM} '	<i>katámavros</i> 'black _{AUG} '	<i>ipermávros</i> 'black _{AUG} '
<i>kócino</i> 'red'	<i>kocinútsikos</i> 'red _{DIM} '	<i>kocinúlikos</i> 'red _{DIM} '	<i>kocinopós</i> 'red _{DIM} '	<i>psilokócinos</i> 'red _{DIM} '	<i>katakócinos</i> 'red _{AUG} '	<i>iperkócinos</i> 'red _{AUG} '
<i>citrino</i> 'yellow'	<i>citrinútsikos</i> 'yellow _{DIM} '	<i>citrinúlikos</i> 'yellow _{DIM} '	<i>citrinopós</i> 'yellow _{DIM} '	<i>psilocítrinos</i> 'yellow _{DIM} '	<i>katacítrinos</i> 'yellow _{AUG} '	<i>ipercítrinos</i> 'yellow _{AUG} '
<i>prásino</i> 'green'	<i>prasinútsikos</i> 'green _{DIM} '	<i>prasinúlikos</i> 'green _{DIM} '	<i>prasinopós</i> 'green _{DIM} '	<i>psiloprásinos</i> 'green _{DIM} '	<i>kataprásinos</i> 'green _{AUG} '	<i>iperprásinos</i> 'green _{AUG} '

5.2 Participants

The full set of words in Table 1 along with the control words were evaluated 39 times for valence and 36 times for arousal by different participants (independent design). Accordingly, 75 native Greek speakers participated in the study. Participation in the survey was voluntary. In particular, the valence test was completed by 12 men and 27 women, and the arousal test was completed by 12 men and 24 women. The mean age of men was 24.47 years and the mean age of women was 25.60 years. The participants were undergraduate and graduate students from the Aristotle University of Thessaloniki, the Democritus University of Thrace and the National and Kapodistrian University of Athens.

5.3 Procedure

A web-based version of the survey software LimeSurvey was used, as provided by www.limesurvey.org. For the rating task, we adopted the instructions given in Citron et al. (2014a: 328) with some modifications (the most important of which are indicated as 'C&E&M mod'). The instructions are given in Appendix 2.

After reading and accepting the disclaimer's conditions, participants were asked to provide some personal information about age, gender, occupation, education, language and place of origin. In the subsequent instructions' form, participants were asked to evaluate PBCTs and derivatives on a seven-point scale. They were acquainted with the notions of valence and arousal by means of anchor words of very high, very low or intermediate value, taken from the dataset accompanying Warriner et al. (2013; see Appendix 1). Participants were allowed to take as much time as they needed. At the same time, they were asked not to spend too much time on each word, but to respond spontaneously and use their own judgment. In the arousal assignment, participants were additionally requested to consider that the test does not refer to the positivity/negativity of words (C&E&M mod). This was because in the pilot interviews for arousal, some participants had reported that they were reluctant to use high values for control words that they felt to be unsocial or obscene.

All words in each assignment were presented in random order (LimeSurvey feature). Each word cropped up on a separate form to impede speakers' associative evaluations. The words were arranged at the top of seven numbered radio buttons (evaluation scale). Participants were asked to check one of the radio buttons. The scale for valence depicted the following values and glosses: -3 'very negative/unpleasant word', -2, -1, 0 'neutral word', +1, +2, +3 'very positive/pleasant word'. The scale for arousal depicted the following values: 1 'no affect', 2, 3, 4, 5, 6, 7 'high affect'. The values were arranged *vertically* from the most positive or arousing value (higher end) to the most negative or non-arousing value (lower end) (C&E&M mod). This arrangement

was suggested by the common association of elevated positions with positive or arousing emotions and low positions with negative or non-arousing emotions, expressed in language in many different ways (Lakoff & Johnson 1980: 14-21).

Each interview lasted approximately 15 minutes. After each interview, the application LimeSurvey anonymized the obtained data.

6. Results and discussion

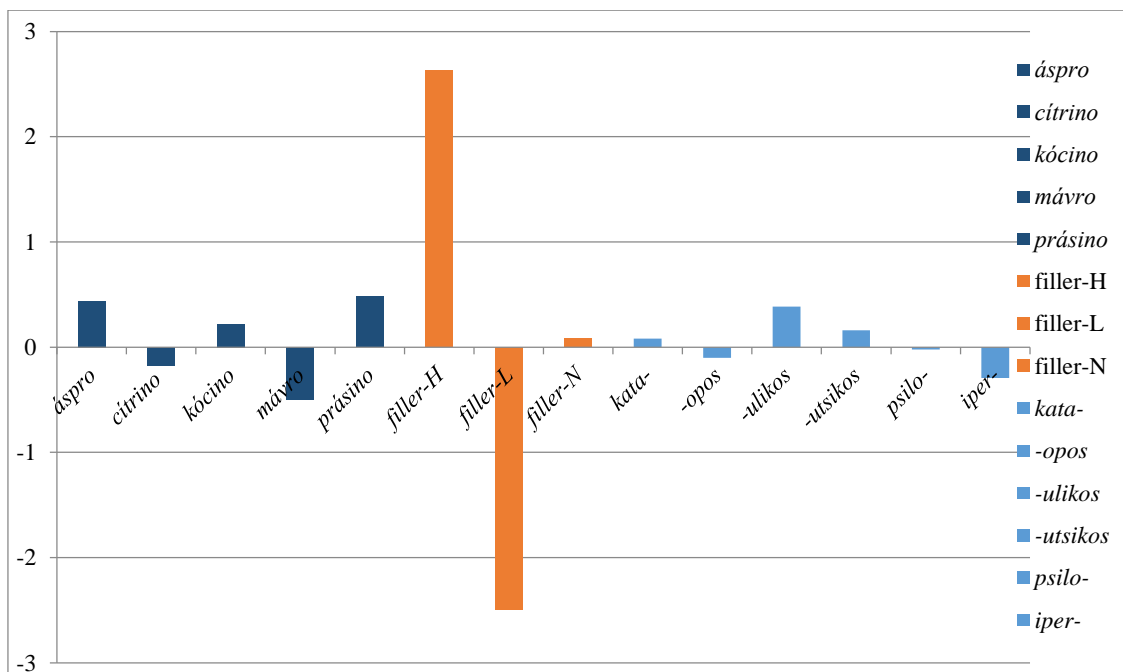
6.1 Valence

Fig. 1 below shows the overall results in a scale from -3 to +3 for PBCTs, baseline fillers, as well as derivatives. Univariate analysis of variance revealed significant main effects of bases ($F = 249.7$, $p < .000$) and word type ($F = 15.56$, $p < .000$), but no significant interaction. When looking at a comparison between base forms and baseline fillers, Bonferroni-corrected post-hoc tests revealed significant differences between High and Low valence items versus all base terms ($p < .000$ in all comparisons) and no significant differences between Neuter valence fillers and PBCTs.

When looking at individual affixes and how they affected the valence values of PBCTs, we can make the following observations. All of them differ significantly from High and Low value fillers ($p < .000$ in all cases). The only significant difference between affixes as such is between *-ulikos* vs. *iper-* ($p = 0.017$). *iper-* is the only affix that significantly differs from the base forms ($p = 0.007$).

As can be observed, the valence patterns are remarkably even. The fillers' averages yield a robust baseline, onto which the PBCTs' means occupy a well-defined space between -1 and +1. The affixal operations are remarkably similar. Only *iper-* shifts the PBCTs' means to the lower end explicitly, whereby not exceeding the -1 mark.

Figure 1. Overall results for PBCTs, baseline fillers, and derivatives (valence)



Let us now examine the values of bases, derivatives and affixes in detail. Table 2 below shows the numerical mean values of PBCTs. *mávvo* has the lowest and *prásino* the highest value (-0.50 vs. 0.48, respectively).

Table 2. Valence values of PBCTs under investigation

PBCTs	Means
<i>áspro</i> ‘white’	0.44
<i>citrino</i> ‘yellow’	-0.18
<i>kócino</i> ‘red’	0.22
<i>mávro</i> ‘black’	-0.50
<i>prásino</i> ‘green’	0.48

When looking at numerical values of derivatives (see Table 3 below), we observe that the derivatives in *-ulikos* have the highest value (0.38) and the derivatives in *iper-* the lowest value (-0.29). By inverting the difference between the PBCTs’ average (indicated with ‘I’) and the mean of the derivatives (indicated with ‘J’) we arrive at the affixal values (see rightmost column). As can be seen, all affixes are negative. *-ulikos* shows up as the most positive (-0.05) and *iper-* appears as the most negative affix (-0.72).

Table 3. Mean values of PBCTs, derivatives, and affixes (valence)

(I) PBCTs	(J) Derivatives	(I-J)	Affix	
0.43	filler-H	2.63	-2.20*	
	filler-L	-2.49	2.92*	
	filler-N	0.08	0.35	
	<i>kata-</i>	0.08	0.35	-0.35
	<i>-opos</i>	-0.1	0.53	-0.53
	<i>-ulikos</i>	0.38	0.05	-0.05
	<i>-utsikos</i>	0.16	0.27	-0.27
	<i>psilo-</i>	-0.02	0.45	-0.45
	<i>iper-</i>	-0.29	0.72*	-0.72

* The mean difference is significant at the 0.05 level (Bonferroni tests)

It is not surprising that *all* affixes in Table 3 show up with negative values. Previous research suggested that PBCTs have strong focal hues (Regier et al. 2005). Accordingly, any attempt to adjust the focal hue of colour words with affixes results into pejorative evaluations. In other words, we regard the negative values of the affixes as a function of the base. The affixes need not be negative in combination with all kinds of bases.

As regards the descriptive statistics with reference to gender, no main effect of Group was found ($F: .873, p = .356$), suggesting that there are no significant differences between men and women in the valence levels of PBCTs and diminutives/augmentatives.

Concluding, we would like to make some remarks about the mapping of the current results onto the morphological properties of the affixes. It was reported in this section that *iper-* shows up as a head in relation to PBCTs. This pattern may relate to the fact that *iper-* is the most neological among the affixes examined (cf. section 3.1). It was also reported that only *-ulikos* is significantly different than *iper-*. As remarked in section 3.1, *iper-* is a [+learned] prefix that often appears in neological loan translations and is typically associated with quantitative evaluation (see Efthymiou 2017), whereas *-ulikos* is a suffix with a qualitative/affective value.

6.2. Arousal

Figure 2 below shows the overall results in a scale from 1 to 7 for PBCTs, baseline fillers, as well as derivatives. Univariate analysis of variance revealed significant main effects of roots ($F = 2873, p < .000$) and word type ($F = 35.36, p < .000$), but no significant interaction. With reference to Bonferroni-corrected post-hoc tests, the comparison between base forms and baseline fillers revealed significant differences between High

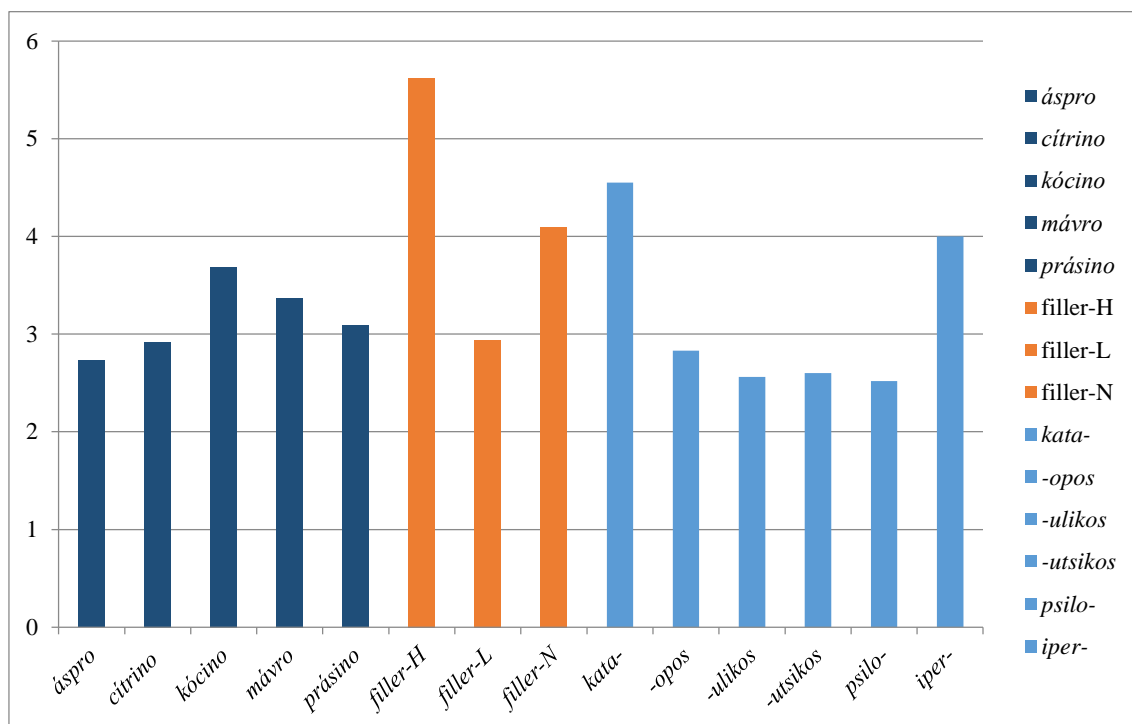
and Neuter arousal items versus all base terms ($p < .000$ and $p = 0.001$, respectively), but no significant differences between Low arousal fillers and PBCTs ($p = .364$).

When looking at individual affixes and how they affect the arousal values of PBCTs, we can make the following observations. *Kata-* differs significantly from all of them (whereas the difference between *kata-* and *iper-* is not significant, $p = 0.093$). In addition, *kata-* is the only affix which changes the arousal value of PBCTs ($p = 0.003$).

Compared to the valence patterns we saw in section 6.1, the arousal patterns are strikingly different. The N fillers regularly show up around the mid-value '4', but the L and H fillers do not appear at the extremes of the scale, as they should (L-fillers' mean: 2.87, H-fillers' mean: 5.61). Nonetheless, there is a symmetrical placement of the L and H fillers around the N fillers, by making out a relatively even baseline.

The affixal operations are distinct, clustering around two poles. In particular, the affixes *iper-* and *kata-* (augmentatives) appear considerably higher than *psilo-*, *-utsikos*, *-ulikos* and *-opos* (diminutives). *kata-* shifts the PBCTs' means to the higher-end ($p = 0.003$), while *psilo-* shifts the PBCTs' means to the lower-end. However, *psilo-*'s operation does not reach statistical significance.

Figure 2. Overall results for PBCTs, baseline fillers, and derivatives (arousal)



Let us now look at the particular values of bases, derivatives, and affixes. The mean values of PBCTs are shown in Table 4. *áspro* and *citrino* have the lowest values (2.73 and 2.92, respectively) and *kócino* and *mávro* have the highest values (3.69 and 3.37, respectively). In the Bonferroni tests, there are significant mean differences only between *kócino* vs. *áspro* (Mean difference: .96, $p = .005$), and *kócino* vs. *citrino* (Mean difference: .78, $p = .047$).

Table 4. The arousal values of PBCTs under investigation

PBCTs	Means
<i>áspro</i> ‘white’	2.73
<i>citrino</i> ‘yellow’	2.92
<i>kócino</i> ‘red’	3.69
<i>mávro</i> ‘black’	3.37
<i>prásino</i> ‘green’	3.09

The comparison of means between PBCTs and derivatives results into specific values for the affixes (see Table 5). In particular, the average of all PBCTs’ means is 3.19. The derivatives in *kata-* and *iper-* have the highest values (4.55 and 4, respectively) and the derivatives in *-opos*, *-ulikos*, *-utsikos* and *psilo-* have the lowest values (2.83, 2.56, 2.60, and 2.52, respectively). By inverting the difference between the PBCTs’ average and the mean of the derivatives we arrive at the affixal values. As can be seen, *kata-* and *iper-* are positive or arousing affixes (1.36 and 0.82, respectively), whereas *-opos*, *-ulikos*, *-utsikos* and *psilo-* are negative or arousal-reducing affixes (-0.35, -0.62, -0.59, and -0.67, respectively).

Table 5. Mean values of PBCTs, derivatives, and affixes (arousal)

(I) PBCTs	(J) Derivatives	(I-J)	Affix	
3.19	filler-H	5.62	-2.43*	
	filler-L	2.94	0.25	
	filler-N	4.10	-0.91	
	<i>kata-</i>	4.55	-1.36*	1.36
	<i>-opos</i>	2.83	0.35	-0.35
	<i>-ulikos</i>	2.56	0.62	-0.62
	<i>-utsikos</i>	2.60	0.59	-0.59
	<i>psilo-</i>	2.52	0.67	-0.67
	<i>iper-</i>	4.00	-0.82	0.82

* The mean difference is significant at the 0.05 level (Bonferroni tests)

Similar to the valence patterns, no significant differences between men and women in the arousal levels of PBCTs and diminutives/augmentatives were found ($F: 2.623; p = .115$).

A few concluding remarks as regards the mapping of the presented results onto the morphological properties of the affixes. It was reported in this section that *iper-* and *kata-* are significantly more aroused than *-opos*, *-ulikos*, *-utsikos* and *psilo-*. The salient values of *iper-* and *kata-* may relate to the augmentative function of these prefixes and to their semantic contribution (i.e. *iper-* usually means ‘more than normal or desirable’, *kata-* often derives words with negative connotations while expressing exaggeration etc.).

7. Discussion

With reference to valence, the research question put forward at the end of section 4 was whether derivation follows the same categorical pattern as compounding. In other words, we were interested in determining whether derivation displays a principled competition of opposite-valued bases and affixes that yields an output with the same value as that of the evaluative head-constituent.

The results of this study suggest that this is not the case. The most important reason for this is that the average of PBCTs’ means is an underspecified value, i.e. 0.43. By rounding the values of specific PBCTs in Table 2, *mávro* (mean -0.50), and *prásino* (mean

0.48) can be assessed as negative or positive PBCTs, respectively. It should be noted, however, that both means are edge values close to value 0 (“underspecification”).

Another issue is the flat and underspecified representation of the derivatives. Their values range between -0.29 (*iper-* derivatives) and 0.38 (*-ulikos* derivatives) suggesting that there are no \pm changing operations at work. It should be noted that, together with the underspecified base, the negative values of the affixes *-opos* and *-iper*, i.e. -0.53 and -0.72, respectively, should lead, compositionally, to a negative output. As we have already seen, this does not occur.

We conclude that derivation is a very different process from compounding. The working hypothesis couched at the beginning of section 5 must be rejected. Because no \pm changing operations occur, the issue of headedness can be decided with reference to a significant mean difference between PBCTs and derivatives alone. As already mentioned in section 6.1, of the affixes only *iper-* qualifies as an evaluative head with a significant difference-value of -0.72. We conclude that, in all other instances, the evaluative head is the base (PBCTs).

As already mentioned in section 4, categorical patterns for arousal are not reported. We would, thus, expect that the working hypothesis set out in section 5 applies to a much lesser extent than in valence. By assuming two categorical levels for arousal, one for low (aL) and one for high arousal (aH), two mappings of values can be determined, see (5).

(5) Arousal	Categorical mapping
1 – 3.4	[aL]
4.5 – 5.4	[aH]

Accordingly, the average of PBCTs’ means is [aL] (3.19) –only *kócino* is [aH] (3.69), see Table 4– the means of all diminutive derivatives is [aL], the means of all augmentative derivatives is [aH] and all affixal values are [aL], see Table 5.

As in valence patterns, no \pm changing operations take place to suggest the existence of an evaluative head. Only the pattern [aL] PBCTs – [aL] diminutive derivatives – [aL] diminutive affixes is compositional combining [aL] entities in every instance, but again, the position of the evaluative head cannot be defined unequivocally.⁷

As with valence patterns, our working hypothesis is *not* confirmed. The issue of headedness can be decided only by means of a significant difference between the average of PBCTs’ means and the mean of the derivatives. Accordingly, of the affixes examined only *kata-* can be determined as the evaluative head of the derivatives, showing a significant mean difference of 1.36. In all other instances, the evaluative head is the base (PBCTs).

Let us now look at the implications of this study. According to SBH (Plag 1999, Lieber 2004 etc.), affixes are unique combinations of form and meaning. For instance, Lieber (2004) proposes specific semantic representations (“skeletons”) for the derivational affixes of EN. In Table 6 the basic set of these representations is given. The affixal skeletons appear as combinations of features, such as ‘material’, ‘dynamic’, and ‘IEPS’. They are heads, i.e. they determine unchanged the semantic representation of the output.

⁷ The [aH] value of *kócino* (Table 4) together with the [aH] value of *kata-* and *iper-* derivatives (Table 5) suggests that the base (PBCTs) is the evaluative head of the respective derivatives. This is, however, an exceptional pattern.

Table 6. Classes of EN derivational affixes (Lieber 2004: 39)

affixal skeleton	derivational affixes of English
[+material, dynamic ([], <base>)]	<i>-er, -ee, -ant/-ent, -ist</i>
[-material, dynamic ([], <base>)]	<i>-ation, -al, -ment, -ance, -ure</i>
[+material ([], <base>)]	<i>?-ware, [compounding]</i>
[-material ([], <base>)]	<i>-ness, -ity, -hood, -ship, -ism</i>
[+dynamic ([], <base>)]	[conversion]
[-dynamic ([], <base>)]	<i>-ic, -ive, -ary, -al, -ous, -y</i>
[+dynamic, +IEPS ([], <base>)]	[conversion]
[+dynamic, -IEPS ([], <base>)]	[conversion]
bipartite skeleton	<i>-ize, -ify</i>

The question arises as to whether SBH applies to evaluative morphology. The non-significant differences between men and women as regards the V&A levels of PBCTs and derivatives suggests that there is a uniform encoding of derivatives and, consequently, affixes. However, extensive and demarcating contrasts between the V&A levels of diminutive and augmentative affixes emerge in the arousal patterns alone. In addition, in most cases, diminutive and augmentative affixes do not surface as evaluative heads, i.e. as strong or categorical V&A switches, in combination with PBCTs. It seems therefore that, with reference to *both* V&A, our data cannot offer a basis for verifying SBH. The analysis of derivatives according to different variables and techniques will finally show what kind of information is encoded in evaluative morphemes.⁸

In section 2 we mentioned the *subjective character* of the concepts ‘goodness’, ‘beauty’ or ‘ugliness’ that evaluative morphology seems to encode (Körtvélyessy 2014: 296). As Dressler & Merlini-Barbatesi (1994: 394-408) point out, diminutive suffixes have a very weak status as semantic heads, i.e. they produce little or no semantic change. The same authors propose the pragmatic feature [non-serious] that applies to the whole speech act or to elements of the speech situation. Accordingly, in diminutives ‘pragmatic headhood’ should be taken into consideration.

In many languages, diminutive formation is the first morphological rule that small children acquire (see Dressler & Merlini-Barbatesi 1994: 408 and the references therein). In our view, the above-mentioned variable [non-serious] or a similar variable, such as [familiar] etc., could make the right meaning distinctions in the derivation of diminutives while supporting SBH.

8. Key findings

In the derivation of diminutive and augmentative adjectives, PBCTs are standardly the evaluative V&A heads and not the affixes as such (section 7). Valence does not play a crucial role in the formation of adjectives, in contrast to compounding (cf. sections 4 and 6.1). On a seven-point scale for valence extending from -3 to +3, PBCTs’ means occupy a well-defined space between -1 and +1. The only significant difference between deriving affixes is that between the diminutive suffix *-ulikos* and the augmentative prefix *iper-*. This is also the only affix that significantly differs from the PBCTs and can be regarded as an evaluative head. There are no significant differences between men and women in the valence levels of PBCTs and diminutives/augmentatives.

As regards arousal (section 6.2), the PBCTs *áspro* ‘white’ and *citrino* ‘yellow’ have the lowest values and *kócino* ‘red’ and *mávro* ‘black’ have the highest values. With reference to a seven-point scale extending from 1 to 7, none of the PBCTs exceeds the

⁸ A set of semantic variables from the psychological research can be found in Kuperman (2013: 3).

3.69 mark (see *kócino* ‘red’). There are significant differences only between the means of *kócino* ‘red’ vs. *áspro* ‘white’, as well as *kócino* ‘red’ vs. *cítrino* ‘yellow’. The augmentative prefix *kata-* differs significantly from the rest of the affixes. In addition, it is the only affix that significantly changes the arousal levels of PBCTs and can be regarded as an evaluative head. The values of augmentatives in *iper-* and *kata-* show up considerably higher than the values of diminutives in *psilo-*, *-utsikos*, *-ulikos*, and *-opos*. As in valence patterns, there are no significant differences between men and women in the arousal levels of PBCTs and diminutives/augmentatives.

With reference to both V&A, categorical \pm changing operations do not emerge. Accordingly, the existence of a *fixed position* for the evaluative head cannot be assessed (section 7). In addition, the data cannot offer a basis for verifying SBH (section 8).

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Abbreviations

A/N	Authors’ note
AG	Ancient Greek
AUG	Augmentative
C&E&M mod	Authors’ modification
DIM	Diminutive
EN	English
MG	Modern Greek
PBCT	Primary Basic Colour Term
SBH	Sign-based hypothesis
V&A	Valence and arousal

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APPENDIX 1: Fillers: Supplementary data to Warriner et al. (2013)

1. 35 valence fillers: very negative, very positive, and neutral

(very negative)	(very positive)	(neutral)
rapist 1.3	happiness 8.48	ajar 5
<i>βιαστής</i>	<i>ευτυχία</i>	<i>μισάνοικτος</i>
leukemia 1.47	happy 8.47	analyst 5
<i>λευχαιμία</i>	<i>χαρούμενος</i>	<i>αναλυτής</i>
molester 1.48	christmas 8.37	assemblyman 5
<i>διεστραμμένος</i>	<i>Χριστούγεννα</i>	<i>νομοθέτης</i>
murder 1.48	enjoyment 8.37	auto 5
<i>δολοφόνος</i>	<i>ευχαρίστηση</i>	<i>αυτοκίνητο</i>
racism 1.48	fantastic 8.36	barometer 5
<i>ρατσισμός</i>	<i>υπέροχος</i>	<i>βαρόμετρο</i>
torture 1.4	fun 8.37	bleep 5
<i>μαρτύριο</i>	<i>διασκέδαση</i>	<i>μπιπ</i>
abuse 1.53	delight 8.21	transatlantic 5
<i>κατάχρηση</i>	<i>απόλαυση</i>	<i>υπερατλαντικός</i>
asphyxiation 1.53	free 8.25	broomstick 5
<i>ασφυξία</i>	<i>ελεύθερος</i>	<i>σκουπόξυλο</i>
chemo 1.5	hug 8.23	chalk 5
<i>χημειοθεραπεία</i>	<i>αγκαλιά</i>	<i>κιμωλία</i>
herpes 1.57	joy 8.21	chassis 5
<i>έρπης</i>	<i>χαρά</i>	<i>σασί</i>
homicide 1.5	lovable 8.26	circumvent 5
<i>ανθρωποκτονία</i>	<i>αξιολάτρευτος</i>	<i>παρακάμπτω</i>
suicide 1.58	magical 8.23	
<i>αυτοκτονία</i>	<i>μαγευτικός</i>	

2. 35 arousal fillers: very unaroused, very aroused, and semi-aroused

(very unaroused)	(very aroused)	(semi-aroused)
librarian 1.75	gun 7.74	admire 5
<i>βιβλιοθηκάριος</i>	<i>όπλο</i>	<i>θαυμάζω</i>
soothing 1.91	sex 7.6	cocoa 5
<i>καθησυχαστικός</i>	<i>σεξ</i>	<i>κακάο</i>
quiet 1.95	thrill 7.19	arrive 5
<i>ήσυχος</i>	<i>ανατριχίλα</i>	<i>φθάνω</i>
empty 2.25	insanity 7.79	artistic 5
<i>άδειος</i>	<i>τρέλα</i>	<i>καλλιτεχνικός</i>
asleep 2	lover 7.45	aspiration 5
<i>κοιμισμένος</i>	<i>εραστής</i>	<i>προσδοκία</i>
tea 2.05	terrorism 7.42	astronomical 5
<i>τσάι</i>	<i>τρομοκρατία</i>	<i>αστρονομικός</i>
backgammon 2.06	erection 7.37	athletic 5
<i>τάβλι</i>	<i>στύση</i>	<i>αθλητικός</i>
level 2.15	orgy 7.3	compress 5
<i>επίπεδο</i>	<i>όργιο</i>	<i>συμπιέζω</i>
measuring tape 2.15	nuclear 7.3	bake 5
<i>μεζούρα</i>	<i>πυρηνικός</i>	<i>ψήνω</i>
north 2.15	attacker 7.27	discussion 5
<i>βόρειος</i>	<i>επιθετικός</i>	<i>συζήτηση</i>
title 2.15	snake 7.24	crispy 5
<i>τίτλος</i>	<i>φίδι</i>	<i>τραγανός</i>
therapeutic 2.18	venomous 7.21	
<i>θεραπευτικός</i>	<i>δηλητηριώδης</i>	

APPENDIX 2: Instructions

A. Valence instructions (EN version)

Words can evoke different feelings. Reading the word *relaxation* (MG ‘ξεκούραση’, A/N) might make you feel good, whereas the word *terrorism* (MG ‘τρομοκρατία’, A/N) might make you feel bad. A word like *machine* (MG ‘μηχανή’, A/N) does not usually evoke either feeling. In this survey, we want you to rate how positive or negative the words are to you. In the following questionnaire, please rate each word as to the feeling that you experience when reading it. Simply choose (tick) a number according to a point scale from -3 to +3. -3 means that the word evokes very negative feelings, whereas +3 means that the word evokes very positive feelings; 0 represents neutral feelings. If you do not know the meaning of a word, please choose “unknown word”. This is not a speed experiment. You have as much time as you want. Nevertheless, do not spend too much time on each word, but respond spontaneously and use your own judgement.

B. Arousal instructions (EN version)

Arousal refers to the intensity of an event, ranging from not stimulating to highly agitating or exciting. In this survey, we want you to rate how intense each word is to you. For instance, a word like *area* (MG ‘περιοχή’, A/N) might evoke low arousal, whereas a word like *tornado* (MG ‘ανεμοστρόβιλος’, A/N) might evoke much more arousal. In the following questionnaire please rate each word by simply choosing (ticking) a number on a point scale from 1 to 7. 1 means that the word evokes calm feelings, whereas 7 means that the word evokes agitating or exciting feelings. If you do not know the meaning of a word, please choose "unknown word". This is not a speed experiment. You have as much time as you want. *Please note, however, that this test does not refer to the positivity/negativity of words and requires spontaneous responses.*