

# Colour verbs in Modern Greek: A cognitive approach<sup>1</sup>

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## Abstract

This paper gives an outlook on how the coordination between phonology and semantics in verb derivation may look, and which constraints the distinction between possible/established, possible/novel, and not possible/forced verbs can be mapped onto. The object of investigation are the colour *-ízo* verbs in Modern Greek. The analysis is mainly based on the studies by Berlin & Kay (1969), Kay & McDaniel (1978), and Kay & Maffi (1999) on basic colour terms. The colour verbs in Modern Greek are compared with the English colour verbs. It is shown that systematic gaps linked to the causative/inchoative paradigm of *-ízo* verbs are due to the semantics of the base rather than deficiencies in the base's morphophonological character. The lower the evolutionary stage that a base can be fitted to, the more likely an *-ízo* derivative will be produced.

## 1. Introduction<sup>2</sup>

Phonology and semantics are closely related in the study of derivation, cf. the analysis of English (EN) verb derivatives in Plag (1999, 2003). However, we are confronted with a chicken-or-the-egg dilemma if we seek to assess semantics or morphophonology as the determinants of derivation: does phonology ornament specific semantic spectra which were previously (fully) expressed by means of derivation, or are specific semantic spectra the artefact of the attested morphophonological patterns? Without an independent cognitive theory it is very difficult to decide the issue: this theory should refer to different perceptual modalities, e.g. vision, audition, sensorimotor, etc. so that the cognitive component can be directly related to the derivational mechanisms of the language.<sup>3</sup> Only in this way we can finally know whether specific semantic spectra are regularly expressed (or exhausted). If not, then the morphophonological component must be regarded as more relevant.

Ralli (2005: 157) argues that in word formation ‘though the structural [e.g. blocking, A/N] and semantic restrictions do not have exceptions in general, the other restrictions [i.e. lexical constraints such as  $\pm$  native base, etc., A/N] can be violated for different reasons’. In line with Ralli’s assessments, I accept semantic restrictions as the most powerful, to the extent that they sufficiently explain possible/established, possible/novel, and/or not possible/forced formations. This study will address this three-stage paradigm with focus on verb derivation.

The object of investigation are the colour *-ízo* verbs in Modern Greek (MG).<sup>4</sup> In the following, I give a brief morphological description of the *-ízo* derivatives and of the COLOUR subclass.

According to Efthymiou (2011) the MG suffix *-ízo* developed mainly from the Ancient Greek (AG) suffixes *-ízdō* and *-ō* (stressed). In MG, the vast majority of *-ízo* derivatives are derived from nouns. Phonologically, *-ízo* attaches primarily to consonant-final bases.<sup>5</sup>

Charitonidis (2005) examined *-ízo* derivatives on a semantico-syntactic basis. In this study *-ízo* shows up with six lexical conceptual structures (LCSS; cf. Jackendoff 1983, 1990, etc.), whereby the derivation base refers to a great variety of thematic roles, i.e. agent, theme, goal, instrument/means, etc. (see Charitonidis 2005: 59, 2007: 32). This versatility of *-ízo* results into its high productivity (see Charitonidis 2007: 35).<sup>6</sup> Colour verbs in *-ízo* are allocated to the distinctive alternation class *1a/b\_9*, i.e. causative active / auto active<sup>7</sup> passive participle. The thematic role of the base is always GOAL, cf. *kitrinízo* ‘become yellow’ (*kitrino* ‘yellow’).

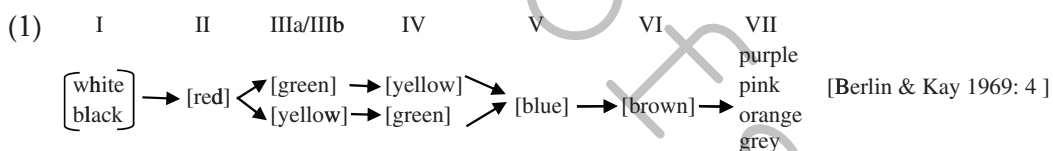
In order to address the chicken-or-the-egg dilemma mentioned at the beginning of this section we need a semantic framework onto which the morphophonological patterns of the MG colour verbs can sufficiently be mapped. Accordingly, the framework used in this paper mainly refers to the studies by Berlin & Kay (1969), Kay & McDaniel (1978), and Kay & Maffi (1999) and is presented in section 2. Section 3 deals with the study by Androulaki et al. (2006) on basic colour terms (BCTS) in MG. In this section, the MG BCTS are presented and the problematic status of the BLUE category is discussed. Section 4 deals with the linguistic relevance of colour studies. In particular, in section 4.1 the usefulness of predefined stimuli in colour studies is underpinned. Section 4.2 underscores the need for examining colour categories in different grammatical categories. Section 4.3 discusses the role of colour in natural language semantics with special reference to pragmatic operations in verbal derivation. Section 5 deals with the colour verbs in MG. In particular, section 5.1 presents the general patterns of the MG colour terms and their assignment to evolutionary stages. The special order of the five terms for blue in the stage sequence is discussed. Section 5.2 refers to the chronology and use of the MG colour terms. As regards the *-ízo* verbs, a decline in use from the lower to the higher stages is evident. Section 5.3 deals with the morphophonology of the MG colour adjectives and their verbal derivatives. The tripartite morphological pattern of derivation bases is linked to the evaluation of the verbal derivatives as ‘possible/established’, ‘possible/novel’, or ‘not possible/forced’. In section 5.4 five exceptional verbs in the evolutionary sequence of the MG colour terms are discussed, with reference to historical, cultural, and/or morphophonological factors.

Section 6 scales the results presented in section 5 in the domain of EN verbal derivation. In particular, section 6.1 deals with the chronology and use of the EN colour terms. As in the case of MG, the use of the EN verbal derivatives drops from the lower to the higher stages. Section 6.2 examines the morphophonology of the EN verbal derivatives whereby exceptional cases are linked to specific thresholds in the evolutionary sequence of BCTS. Section 6.3 compares the morphophonology of the EN with the MG colour verbs and provides evidence for an asymmetrical levelling in the respective languages. Section 7 concludes that both BCTS and derived colour verbs emerge over stages in a cognitive domain. Systematic gaps linked to the causative/inchoative paradigm of *-izo* verbs are due to the semantics of the base rather than deficiencies in the base's morphophonological character. The lower the evolutionary stage that a base can be fitted to, the more likely an *-izo* derivative will be produced.

## 2 Framework

Berlin & Kay's (1969) account on BCTS is a seminal work on the relation between form and meaning in language. In the following I largely comply with the comprehensive description of this study in Löbner (2002: 163–167).

By studying 100 languages from all over the world, Berlin & Kay (1969) found that languages vary in the number of BCTS they have from two to eleven. In (1) the temporal–evolutionary ordering of these eleven BCTS is given, taken from Berlin & Kay (1969: 4). The possible types of systems form a sequence – starting with a contrast between WHITE/WARM and BLACK/COOL – in which the higher systems are extensions of the lower systems (Löbner 2002: 166–167).



In Berlin & Kay (1969) a set of eleven *focal* colours for the BCTS in all the different languages are stipulated. The focal colours are white, grey, black, red, orange, yellow, green, blue, purple, pink and brown. These are the foci of the EN BCTS *white*, *grey*, *black*, *red*, *orange*, etc. and of the corresponding words in all other languages with eleven BCTS. If a language has fewer BCTS, their foci are nonetheless among these eleven focal colours.

An important development of Berlin & Kay's (1969) model is the distinction between 'primary' and 'derived' BCTS in Kay & McDaniel (1978): 'Primary terms are the first six terms on the hierarchy and their best examples are "perceptual primitives" underpinned by "fundamental neural responses". Derived BCTS are fuzzy set intersections of pairs of primaries ... For instance ORANGE is RED-YELLOW and PURPLE is RED-BLUE.' (Kay & McDaniel 1978; reported in Androulaki et al. 2006: 5).

As Al-Rasheed et al. (2011) note, Kay & McDaniel's (1978) conjecture about the intersectionality of the derived BCTS turned out not to be true (cf. Jameson & D'Andrade

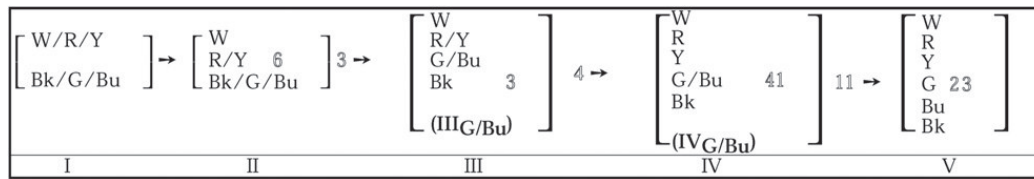


Figure 1. Main line of evolutionary development of basic colour lexicons (Kay & Maffi 1999: 750).

1997, etc.), but the greater prevalence of primary over derived terms across languages *holds*. By examining languages from 110 non-industrialized societies, Regier et al. (2005) show that best-example choices for colour terms cluster near the prototypes for EN *white, black, red, green, yellow, and blue*, and (ii) best-example choices cluster more tightly across languages than do the centers of category extensions.

Kay & Maffi (1999) undertake a number of important revisions to Berlin & Kay's (1969) model, which comply with the current state-of-the-art (Biggam 2012: 85). In (2) a summary of these revisions can be found, taken from Stanulewicz & Pawłowski (2011: 107). 'Macro-white' and 'macro-black' refer to light and dark colours, respectively. 'Macro-red' refers to more than one of the warm colours such as orange, red, and yellow, and 'grue' refers to more than one of the cool colours, i.e. green, blue, and grey.<sup>8</sup> As explicitly stated in (2), in Kay & Maffi (1999) grey shows up as a wild-card occurring at any stage from III to VII. This information is relevant for the analysis to follow. The evolutionary route as regards the primary BCTs is displayed in Figure 1.<sup>9</sup>

(2) Stages	Berlin & Kay (1969)	Kay & Maffi (1999)
I	white and black	macro-white and macro-black
II	addition of red	separation of macro-red and white
III	addition of green or yellow	separation of grue and black
IV	green <i>and</i> yellow	separation of yellow and red
V	addition of blue	separation of blue and green
VI	brown	
VII	pink, purple, orange and grey	pink, purple and orange, with grey as a wild-card occurring at any stage from III to VII

Let us now see how the research on MG BCTs fits the findings presented in this section.

### 3 Basic colour terms (BCTs) in Modern Greek (MG) and the study by Androulaki et al. (2006)

The most profound survey on MG colour terms is the study by Androulaki et al. (2006). In this survey, four naming studies with varying stimuli, lighting, instructions, and informants were carried out. The main aim of the experimenters was to establish

the BCTS of MG with particular consideration of the status of the two blue terms, *ble* 'blue' and *ghalázio* 'light blue'. In the following, I give a shortened version of Androulaki et al.'s (2006: 7–10) outline of the experiments.

As regards *measures*, Androulaki et al. (2006) first analysed frequency of colour terms in texts as an indicator of basicness (Study 1). It was expected that BCTS would occur more often than non-BCTS, and primary terms more often than derived terms. In addition, they conducted four naming studies from which they derived a range of measures of salience as further indicators of basicness (Studies 2–5). In all naming studies they reported two measures for each term: frequency of use across informants and frequency of use across colour samples. The latter measure was used to examine levels of agreement among informants. BCTS should be used frequently and with high levels of agreement, particularly for the best example of a term.

The experimenters used various operational measures to locate the foci of BCTS. For instance, in Study 3, tiles named quickly and with absolute agreement across informants were taken as focals, etc.

As regards *instructions*, Androulaki et al. (2006) varied the demand characteristics of their tasks, either explicitly, through instructions, or implicitly, by varying the range of stimuli. Instructions were to: use simple everyday terms (Studies 2–3); name the stimuli with no restrictions (Study 4); use simple necessary terms (Study 5). It was expected that the use of BCTS would increase as the restrictions increased and that BCTS would occur in compound terms in the least restricted condition. The two restricted sets of instructions, particularly those requiring necessary terms, provided a way of testing the relationship between the two blue terms. The implicit instruction referred to the use of 40 stimuli from just the green–blue–purple region (Study 4). This was done to map the domain of the two blue terms more precisely, but also as a further check on their robustness.

As regards *colour stimuli*, the naming studies used stimuli drawn from a number of commercial colour-order systems such as the Natural Colour System, Color-Aid, Munsell, and the Optical Society of America.<sup>10</sup> Provided colour-space is sampled adequately, it was expected that it would make little difference which system is used.

As regards *lighting*, daylight, CIE illuminant C ("north light") and fluorescent were used. It was expected that variations in the illuminant would lead to naming changes for colours close to category boundaries, but they are unlikely to do so for category foci and their near neighbours. Accordingly, stability across illuminants would be a characteristic of basic terms.

The *informants* were bilingual Greek-English students and monolingual Greek speakers from Crete.

The results in Androulaki et al. (2006) suggest that MG has twelve BCTS, i.e. the eleven BCTS identified by Berlin & Kay (1969; see (1)) and the additional BCT *ghalázio* 'light blue'. In particular, the MG BCTS are WHITE *áspro*, BLACK *mávro*, RED *kókino*, GREEN *prásino*, YELLOW *kítrino*, BLUE *ble*, BROWN *kafé*, ORANGE *portokalí*, PINK *roz*, PURPLE *mov*, GREY *gri*, and LIGHT BLUE *ghalázio* or *ghalanó*.

In the following, I give a brief etymological and grammatical profile of the MGBCTS, largely following the description by Androulaki et al. (2006).

The term *áspro* ‘white’ originates from the Latin, *mávro* ‘black’ from AG. The terms *kókino* ‘red’, *prásino* ‘green’, *kítrino* ‘yellow’, and *portokáli* ‘orange’ are derived from plant names, but only the latter points to its derivation base explicitly (N *portokáli* ‘orange’).<sup>11</sup> All these terms are both 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 (masculine, feminine, neuter).

The terms *ble* ‘blue’, *kafé* ‘brown’, *roz* ‘pink’, *mov* ‘purple’ and *gri* ‘grey’ come from French and are not inflected.<sup>12</sup> In addition, the terms *kafé* ‘brown’ and *gri* ‘grey’ have the derivatives *kafetí* and *grízo*, respectively, which are used as nouns and adjectives. As adjectives, they are inflected for all genders, numbers and cases.<sup>13</sup> The BCTs *kafetí* and *portokáli* follow a very productive pattern, since the derivation of colour adjectives by means of the inflectional and derivational suffix *-í* is the standard process for adding terms for special hues, i.e. non-BCTs, to the MG lexicon (see Anastasiadis-Simeonidis 1987: 397–398, Filopoulos 1994: 200). It should be noted that, in the adjectival use, the neuter *-í* form is regarded as basic and is often used as is, i.e. uninflected, for all genders and cases both in singular and plural NPs (Holton et al. 1997: 79).<sup>14</sup>

Androulaki et al. (2006) found out that the use of BCTs was reasonably stable across variations in methods, stimuli, lighting, and informants. The two BCTs for blue, i.e. *ble* and *ghalázio*, differ mainly in lightness. As Androulaki et al. (2006: 7) argue, ‘adding another blue term [in the case of MG, the term *ghalázio/ghalanó*, A/N] appears to be the most common way that languages move beyond stage VII’.

The distinction between blue and light blue in MG is similar to the equivalent divisions in Maltese (*ċelesti* ‘sky blue’ and *blu* ‘dark blue’; Borg 2011), Russian (*sinij* ‘dark blue’ and *goluboj* ‘light blue’; Corbett & Morgan 1988, Davies and Corbett 1994, Paramei 2007), Turkish (*mavi* ‘blue’ and *lacivert* ‘dark blue’; Özgen & Davies 1998, Rätsep 2011), etc. It should be noted, however, that the stipulation of two blue terms is not always attainable. As regards Turkish, Özgen & Davies (1998) and Rätsep (2011) conclude that only *mavi* can be considered as a BCT with safety. Similarly, Al-Rasheed et al. (2011) conclude that Arabic has *eleven* basic colour terms that correspond to Berlin and Kay’s (1969) universal set. *Samamee* ‘light blue’ and *khuhlie* ‘dark blue’ are not BCTs but only *azrock* ‘blue’.<sup>15</sup>

Nonetheless, the results in Androulaki et al. (2006) explicitly justify the status of *ghalázio* as a BCT. As will be argued in section 5.4, the prominence of the term *ghalázio* in the MG vocabulary is reinforced by historical, environmental, and cultural factors.

#### 4 The linguistic relevance of colour studies

The focus of the study of BCTs has always been within the domain of psychology and psycholinguistics. However, as Sutrop (2011) points out, a colour field is regulated

semiotically in any language, whereby the history of language and culture plays a major role.<sup>16</sup>

According to Biggam (2012) ‘as much detail as possible should be recorded about the context of each occurrence of a colour term, and this requirement may cause the researcher to be concerned with matters such as the age, sex and social position of both speaker and listener, details of the environment, type of event and social mood of each occasion of use and much more valuable data.’ (Biggam 2012: 7)

In a series of works, Lucy (1991, 1992, 1997, etc.) criticizes the aims and methods of colour studies.<sup>17</sup> For example, Lucy (1992: 177) questions the criteria for identifying a ‘basic colour term’ introduced in Berlin & Kay (1969: 5–7). In Lucy’s view, these criteria are circular and not theoretically justified.

Lucy’s (1997) study is an in-depth analysis of the linguistic relevance of colour studies. According to this study ‘meaning is not reducible to denotation’ (Lucy 1997: 328). In natural language, referents are picked out according to a category’s characteristic referential range and its formal distributional potential. Both factors work together to give a form its semantic value (Lucy 1997: 322).<sup>18</sup> In the following, I present the main points of criticism in Lucy’s (1997) study and discuss them.

#### 4.1 Basic colour terms (BCTS) and predefined stimuli

According to Lucy (1997), the Munsell colour array, used for the first time in Berlin & Kay (1969), refers to a set of pre-defined colour hues. It does not include variation in luster, luminosity, or reflectance. The same array dictates in advance the possible meanings terms could have since no other meanings are embodied in the samples. In addition, it is unrealistic since it forces informants to make comparisons and judgements about colour variations not encountered in daily life. Obviously, Lucy’s criticism can be generalized over colour studies using pre-defined stimuli other than the Munsell colour array (cf. various studies in Biggam et al. 2011, etc.).

Contrary to Lucy’s (1997) assumptions, several studies underscore the reduced relevance of the different stimuli used in colour research (Androulaki et al. 2006, Al-Rasheed et al. 2011, etc.). As already mentioned in section 3, Androulaki et al. (2006) employ different stimuli, and different illuminants in their experiments. They recognize the involvement of lightness in specifying the domains of most BCTS, but at the same time note that precise control over the different variables ‘is not crucial in field studies aimed at establishing a language’s BCTS’ (Androulaki et al. 2006: 39). Al-Rasheed et al. (2011) report that the results from tasks with predefined stimuli point to the same BCTS as colour naming, etc.

The aforementioned findings point to the existence of a categorial, and perhaps also pre-linguistic, perception of colour (cf. Sandford 2011: 216).

Concluding, the use of predefined stimuli is an effective means for the identification of a language's BCTs.

#### 4.2 Formal distribution of colour terms

According to Lucy (1997), distributional facts relating to paradigms are usually ignored in colour studies. The examination of the content of lexical items in isolation, for example colour adjectives, is not really systematic. It may be the case that terms having some reference to colour are a heterogeneous collection such as the derivational paradigm of the EN colour adjectives. Accordingly, the distributional patterns of colour terms must be taken into account in order to generate a typology of 'colour systems' across languages. At the same time, premature judgements about 'deficient' colour systems can be avoided.

In line with Lucy's arguments, I argue that there can be no 'deficiency' in colour denotation, but only lexical or morphological accommodation of an underlying colour system. Gaps in derivational paradigms may point to fundamental colour hierarchies, such as the distinction between primary and non-primary BCTs (section 2). For instance, established *-ing* forms in EN are mainly attested for the primary colours white, black, red, green, yellow, and blue. Only the gerund *browning* derived from the first non-primary BCT *brown* (Stage VI) does not follow this pattern (see Table 15.2 in Lucy 1997: 329), etc.

Verbs may refer to a broader colour gamut than nominals since they incorporate a notion of continuation or measurement (Charitonidis 2012a, 2012b, 2013). In section 6.2 I argue that a putative verb form *?bluen* 'become/make blue' may be regarded as a derivation of the GRUE category and thus maintain the coherence of the *-en* paradigm up to Stage III.

These and similar patterns point to the existence and evolutionary dynamics of an underlying colour system. Further distributional facts can be found in the remainder of this paper which focuses on MG and EN verbal derivation.

#### 4.3 The role of colour in natural language semantics

Lucy (1997) argues that colour is not central to the semantic organization of any language that he knows of. 'Unlike agency, time, number, or other such categories, it is never grammaticalized' (Lucy 1997: 330). He reports Conklin's (1955 [1964: 189]) statement that 'Colour, in a western technical sense, is not a universal concept and in many languages such as Hanunóo there is no unitary terminological equivalent' (Lucy 1997: 332). At another point, Lucy argues: 'Although colour concepts tend to be treated as adjectives when a language has such a category, this is by no means universal either' (Lucy 1997: 337). In other words, the absence of a uniform linguistic or semantic category for colour in many languages challenges the assumption that a universal colour system underlies language as a whole.

I agree with Lucy's position that colour is not central to language since language is a means for accomplishing complex communication tasks which refer to colours



only marginally. However, colour can play a significant role in particular subsystems of specific languages, e.g. in morphology.

By way of example, an unrestricted causative/inchoative structure for the colour verbal derivatives in MG would overgenerate verbs. Non-primary BCTs and non-BCTs tend to yield no causative verbs in this language (section 5). Similarly, both causative and inchoative verbal derivatives are extremely rare for the non-BCTs in EN (section 6). These restrictions must be taken into account as semantic conditions on the [+Loc] (or end-state) argument in the respective causative/inchoative structures – see (3) and (4) below.

In the structure for the MG colour verbs in (3), three disjoint conditions are assumed, i.e. [+BCT] [+PRIMARY], [+BCT] [–PRIMARY], and [–BCT][+CHAR]. [ $\pm$ PRIMARY] refers to the distinction between primary and non-primary BCTs in Kay & McDaniel (1978). [+CHAR] stands for ‘characteristic colour’ and refers to colour adjectives derived from the names of objects having a characteristic colour. The options [+BCT][–PRIMARY] and [–BCT][+CHAR], will additionally drop the first causative part of the denotational skeleton, indicated with an underline.<sup>19</sup>

(3) **MG colour verbs**

[+dynamic ([<sub>volitional-i</sub> ], [<sub>i</sub> ])];  
[+dynamic ([<sub>i</sub> ], [+dynamic, +IEPS ([<sub>j</sub> ], [+Loc  
 ])))]], < base >  
 [+BCT][+PRIMARY]  
 [+BCT][–PRIMARY]  
 [–BCT][+CHAR]

(4) **EN colour verbs**

[+dynamic ([<sub>volitional-i</sub> ], [<sub>j</sub> ])]; [+dynamic ([<sub>i</sub> ], [+dynamic, +IEPS ([<sub>j</sub> ],  
 [+Loc[+BCT] ])))]], < base >

Concluding, colour denotation is a powerful generative component restricting overgeneration – at least in verbal derivation (cf. the discussion about grammaticality judgments in sections 5.3 and 6.2).<sup>20</sup>

To address again the last point in Lucy’s argumentation, the fact that a specific concept such as colour has no terminological equivalent in some languages does not suspend the linking of these languages to an underlying colour system. By way of comparison, truth conditions in logic refer to denotational functions which are only inconsistently expressed in natural language, such as the inclusive OR (Allwood et al. 1977: 35–37). This fact does not impair the capability of such conditions to address basic semantic aspects in natural language constructions *universally*.

Let us now turn to the analysis of the MG verbal derivatives in *-ízo* in the COLOUR field.

## 5 Colour verbs in Modern Greek (MG)

### 5.1 General patterns

Table 1 gives the general patterns of the MG colour terms – colour adjectives together with their verbal derivatives. The lines dividing the table in subparts indicate evolutionary thresholds (with the exception of sections 5 and 6, both referring to Stage VIII+). In particular, the first group (Stages I–V) refers to primary BCTs, the second group with only one member (Stage VI) refers to the non-primary BCT *kafé/kafetí* ‘brown’, and the third group (Stage VII) refers to the rest of the non-primary BCTs. The fourth group (onset of Stage VIII+) refers to the sole BCT beyond Stage VII, i.e. *ghalázio/ghalanó* ‘light blue’, identified as a proper BCT in Androulaki et al. (2006).<sup>21</sup> The fifth group refers to a representative sample of non-BCTs for special hues. The sixth group (Stage VIII+) refers to non-BCTs as well. The terms *xrisó* ‘gold’/‘golden’, *porfiró* ‘Tyrian purple’/‘in the colour of porphura’, *asimí* ‘silver’ and *xrisafí* ‘golden’ contained therein are derived from the names of precious metals or dyestuffs (for details about the terms in the sixth group see sections 5.2 and 5.4).

In the third row of Table 1 an *-ízo* verb derivative for each colour adjective in the first row is given. Only *gri/grízo* ‘grey’ has no derivative in *-ízo* but this may be due to the wild-card behaviour of this term which, as already pointed out, occurs at any stage from III to VII (see (2) in section 2).<sup>22</sup> In other words, the absence of a unique assignment of the base to an evolutionary stage restrains derivation.

In the fourth and fifth row indications of use for the causative/inchoative alternation can be found, i.e. ‘in common use’ (✓), ‘rare’ (#), ‘very rare’ (°), and ‘non-existent’ (\*). For these indications Google’s search engine was used. The Hellenic National Corpus (HNC) was not employed because it currently contains only about 47.000.000 words (accessed October 3, 2012). At the same time, very fresh neologisms – which abandon in blogs, discussion groups, etc. – cannot be accessed by using HNC.

In the sixth row, alternate verb forms for the *-ízo* verbs are given. Again, there are indications of use for the causative and/or inchoative variant defined by using Google. The chronological indications for alternates, bases, and verbal derivatives in the last three rows were based on the two major dictionaries for MG, i.e. the Dictionary of Common Modern Greek (DCMG) and the Dictionary of Modern Greek Language (DMGL).<sup>23</sup> The indication ‘neologism’ (NL) in Table 1 is based on the absence of the verb forms in DCMG and DMGL, the appearance of these forms in various discussions groups, forums, etc. on World Wide Web (www), and in some ambiguous cases on the linguistic intuition of the author as a native speaker of (Athenian) MG.

As can be seen in Table 1, five terms for blue show up, i.e. *ble* ‘blue’, *ghalázio/ghalanó* ‘light blue’, *blávo* ‘dark blue’, and *thalasí* ‘sea blue’, ‘light blue’. *ble* is assigned to the first group (Stage V) because it is the most general and standard BCT for blue in MG (Androulaki et al. 2006). The terms *ghalázio/galanó* ‘light blue’ are assigned to the fourth group (onset of Stage VIII+) because they are identified as non-primary BCTs in Androulaki et al. (2006). *blávo* ‘dark blue’ is contained in the fifth group (Stage VIII+) because it denotes a special non-BCT hue.<sup>24</sup> *thalasí* ‘sea blue’, ‘light blue’ is also

Table 1. Modern Greek colour terms.

Base	Stage (B&K)	-ízo verb	Inchoative (Google)	Causative (Google)	Alternates (Google)	Base (DCMG, DMGL)	-ízo verb (DCMG, DMGL)
1	áspro	'white'	I	asprízo ✓	✓	HL	MD
	mávro	'black'	I	mavrízo ✓	✓	HL	MD
	kóokino	'red'	II	kokinízo ✓	✓	HL	HL
	kítrino	'yellow'	IV	kitrinízo ✓	✓	HL	MD
	prásinoble	'green'	IV	prasinízo ✓	✓	AG	HL
		'blue'	V	bledhízo ✓	#	MD+ (fr. bleu)	NL (A/N)
2	kafé/ kafetí	'brown'	VI	kafetízo ✓	°	MD/MD+	NL (A/N)
3	gri/grízo	'grey'	VII	–	–	grizáro (↓/↑), grizóno (↓/↑: °) [NL, A/N]	MD+ (fr. gris) NL (A/N)
	mov	'purple'	VII	movízo ✓	°	MD+ (fr. mauve)	NL (A/N)
	portokalí	'orange'	VII	portokalízo ✓	°	MD+	NL (A/N)
	roz	'pink'	VII	rozízo ✓	#	?rozáro (↑: °) [NL, A/N]	MD+ (fr. rose) NL (A/N)
4	ghalázio	'light blue'	VIII+ (onset)	?ghalazízo #	°	ghalazóno (↓: #, ↑) [NL, A/N]	MD NL (A/N)
	ghalanó	'light blue'	VIII+ (onset)	?ghalanízo #	°	ghalanóno (↓: °, ↑: #) [NL, A/N]	MD ?MD
5	blávo	'dark blue'	VIII+	blavízo ✓	#	MD	MD+
	bez	'beige'	VIII+	?bezízo #	*	bezáro (↓:1, ↑) [NL, A/N]	MD+ (fr. beige) NL (A/N)
	ladhí	'olive'	VIII+	?ladhízo °	*	ladhóno (↓/↑: spatial) [MD]	MD+ NL (A/N)
	thalasí	'sea blue', 'light blue'	VIII+	?thalasízo °	*	thalasóno (LX) [MD+]	MD+ NL (A/N)
	visiní	'berry', 'cherry red'	VIII+	visinízo ✓	*	MD+	NL (A/N)
6	xrisó	'golden'	VIII+	xrisízo ✓	✓	xrisóno (↓: mainly spatial) [AG]	AG/MD AG
	porfiró	'Tyrian purple'	VIII+	porfirízo ✓	#	porfiróno (↓, ↑: #) [?]	AG/MD+ HL/MD+
	asimí	'silver'	VIII+	asimízo ✓	✓	asimóno (↓, ↓+ spatial, LX, etc) [MD]	MD+ NL (A/N)
	xrisafí	'golden'	VIII+	xrisafízo ✓	#	MD+	NL (A/N)

✓	in common use	↑	inchoative	LX	lexicalization
#	rare	A/N	author's note	MD	Medieval Greek: 500–1800 A.D.
°	very rare	AG	Ancient Greek: 1400–300 B.C.	MD+	1800–
*	non-existent	B&K	Berlin & Kay (1969)	NL	neologism (last decades)
↓	causative	HL	Hellenistic Greek: 300 B.C.–400~500 A.D.		

contained in the fifth group not only because it denotes a special non-BCT hue but also because in Androulaki et al. (2006) it shows up as a marginal term replacing *ghalázio* only sporadically.

## 5.2 Chronology and use

The chronological indications in the last two rows of Table 1 are quite uniform and support an evolutionary view of both the derivation bases and the *-ízo* derivatives. In general, MD verbs show up after HL bases, NL verbs show up after MD+ bases.

At Stages I–IV *áspro* ‘white’, *mávro* ‘black’, *kókino* ‘red’, and *kítrino* ‘yellow’ constitute the most essential core as HL bases paired mainly with MD derivatives. The adjective *prásino* ‘green’ at Stage IV is opposed to this chronological order by being an AG word (Anastasiadis–Simeonidis 1987: 411). This may be a hint for assigning *prásino* back to Stage III, i.e. before *kítrino*. Another peculiarity is the old chronology of both the adjectives *xrisó* ‘golden’ and *porfiró* ‘Tyrian purple’ and their verbal derivatives which associates these terms with Stages I–IV (see section 6 in Table 1). These terms ought to follow the patterns of the other Stage–VIII+ verbs, i.e. MD+ base – NL derivative. The indications of use for the derivatives associate these terms with Stages I–IV, as well. As will be argued in section 5.4 these patterns are due to the cultural prominence of the entities referred to by *xrisó* and *porfiró*.

As regards the indications of use for the *-ízo* verbs in Table 1, the verbs at Stages I–IV are in common use in both the inchoative and causative variant. From Stage V and beyond, however, the inchoative variant is more widely used than the causative one. A decreasing pattern from the primary to the non-primary BCTs and from the BCTs to the non-BCTs shows up. First, there is a drop in the use of the causative variants of the derivatives (primary BCTs vs. non-primary BCTs). Second, there is a drop in the use of inchoatives, accompanied by total diminishing of causatives in some cases (BCTs vs. non-BCTs). This decreasing pattern is not always perfect, cf. *asimízo* ‘become/make silver’ (*asími* ‘silver’/non-BCT) being in common use in both the inchoative and causative variant, etc.<sup>25</sup> Leaving aside these few exceptions, however, the general patterns of use are quite uniform.

## 5.3 Morphophonology

The derivation bases at Stages I–IV are native parisyllabic adjectives in *-os*, *-i*, *-o* (for masculine, feminine, and neuter, respectively)<sup>26</sup> and are stressed on the penultimate, see *áspro* ‘white’ and *mávro* ‘black’, or on the antipenultimate syllable, see *kítrino* ‘yellow’, *kókino* ‘red’, and *prásino* ‘green’.<sup>27</sup> *ble* ‘blue’ at Stage V is the unadjusted French word *bleu* ‘blue’. The exceptional morphophonological pattern of this term introduces Stages VI and VII, which mainly contain phonologically unadjusted bases of French origin, see *kafé* ‘brown’, *gri* ‘grey’, *mov* ‘purple’, and *roz* ‘pink’ (the variants *kafetí* for *kafé*, and *grízo* for *gri* are phonologically adjusted).<sup>28</sup> In other words, *ble* stands immediately before Stage VI, referring to a major shift in the morphological make-up of the derivation bases. The exceptional *portokalí* ‘orange’ at Stage VII is

a native Greek term. It refers again to a major (second) shift in the morphological make-up of the bases, i.e. *-í* derivation, and, in a similar way as *ble*, introduces the next stages.

As already mentioned in section 3, most bases at Stage VIII+ are adjectives in *-í*, stressed on the final syllable, cf. *asimí* ‘silver’, *ladhí* ‘olive’, *thalasí* ‘azure’, *visiní* ‘cherry red’, *xrisafí* ‘golden’, etc.<sup>29</sup> It should be noted that the suffix *-ízo* almost perfectly matches the morphophonological shape of the adjectival/nominal ending *-í* than the other verb forming suffixes in MG because it contains a stressed *-i-*.

In the following, I use the labels ‘possible/established’, ‘possible/novel’, or ‘not possible/forced’ for the verbal derivatives, whereby the attestation of these verbs in the *www* always calls for their characterisation as *possible*.

The established derivatives *asprízo* ‘become/make white’, *mavrízo* ‘become/make black’, *kokinízo* ‘become/make red’, *kitrinízo* ‘become/make yellow’, and *prasinízo* ‘become/make green’, at Stages I–IV are regarded as the most natural colour verbs, as opposed to *bledhízo* ‘become/make blue’, *kafetízo* ‘become/make brown’, *movízo* ‘become/make purple’, and *rozízo* ‘become/make pink’ at Stages V–VII which are possible/novel. The derivatives *!ladhízo* ‘become olive-green’,<sup>30</sup> *?thalasízo* ‘become sea-blue’,<sup>31</sup> *visinízo* ‘become cherry-red’, *asimízo* ‘become/make silver’,<sup>32</sup> and *xrisafízo* ‘become/make golden’<sup>33</sup> at Stage VIII+ are possible/novel, as well. These derivatives have bases denoting material entities with a characteristic colour. Ultimately, verbs derived from adjectives in *-í* whose bases denote an object without a characteristic colour, cf. *!trapezízo* (*trapézi* ‘table’) or *!potirízo* (*potíri* ‘glass’), etc., are definitely ‘not possible/forced’.

Concluding, the noun *xróma* ‘colour’ and its *-ízo* derivative *xromatízo* ‘to colour’ serve as hyperonyms for all colour adjectives/nominals and their verbal derivatives, respectively. This pattern points to the relevance and coherence of the COLOUR field in MG.

#### 5.4 Exceptional cases: cultural prominence

There are five derivatives in *-ízo*, i.e. *?ghalazízo* ‘become/make light blue’,<sup>34</sup> *?ghalanízo* ‘become/make light blue’,<sup>35</sup> *blavízo* ‘become/make dark blue’, *xrisízo* ‘become/make golden’, and *porfirízo* ‘become/make cerise’, whose patterns of use in the inchoative and/or causative variant, together with the morphological and evolutionary make-up of their bases, do not seem to conform to the general patterns presented in sections 5.1–5.3.

A. The bases *ghalázio* ‘light blue’ and *ghalanó* ‘light blue’ of *?ghalazízo* ‘become/make light blue’ and *?ghalanízo* ‘become/make light blue’, respectively, were assigned to the onset of Stage VIII+ according to Androulaki et al. (2006; see section 3). However, these bases follow the pattern of the colour adjectives at Stages I–IV. Why does this happen? As already mentioned, the difficulty to define a BCT for *blue* is due to historical and cultural reasons since the status of the BLUE category in Greek was traditionally uncertain (see n. 14). In view of this situation, the domination of the colour ‘light blue’ in the Greek cultural area has favoured a regular morphology for

the base adjectives *ghalázio* and *ghalanó* (cf. Wierzbicka's 1990, 1996 description of the influence of swaths of colours in the natural environment).

B. The base *blávo* 'dark blue' of *blavízo* 'become/make dark blue' was assigned to Stage VIII+ after *ghalázio* and *ghalanó*. Again, this base follows the pattern of the colour adjectives at Stages I–IV. As already mentioned in n. 22 *blávo* is a loan word from Italian (*blavo*). Its phonological form is explicitly similar to that of the native Greek colour terms at the early stages. At the time of its occurrence in the Greek vocabulary the standard BCT for blue, i.e. *ble*, was not yet used. Therefore, *blávo* was used in juxtaposition with the two terms for light blue, i.e. *ghalázio* and *ghalanó*. Accordingly, the frequent use of its derivative *blavízo* has been favoured – in this case in the prototypical inchoative variant.

C. As already mentioned in section 5.2, the old chronology and the common use of the derivatives *xrisízo* 'become/make golden' and *porfirízo* 'become/make cerise' refer these verbs to Stages I–IV. These verbs are derived from the non-BCTs *xrisó* 'golden' and *porfiró* 'Tyrian purple', respectively. Like *ghalázio/ghalanó* and *blávo*, *xrisó* and *porfiró* follow the morphological pattern of the colour adjectives at Stages I–IV (Androulaki et al. 2006). I assume that this cross-reference of use for the derivatives and of form for the bases relies on the cultural prominence of the underlying entities, i.e. *xrisós* 'gold' and *porfira* 'porphura'.<sup>36,37</sup>

## 6 English (EN) colour verbs

The MG derivational patterns presented up to this point would only be suggestions if they could not be scaled up in a different language. To that end, I will present the corresponding patterns from EN, a language whose system of verbal derivation is considerably different than that of MG.

In EN, the suffixes *-ate*, *-ify*, *-ize*, and *-en* are used to derive verbs from other categories (mostly nouns and adjectives; Plag 1999, 2003: 92–94). New derivatives in *-en* are extremely rare. In OED (1994) only two causative neologisms in *-en* are attested (*crispen*, *outen*), which also have earlier zero-derived equivalents (Plag 1999: 219). *eN*-seems to be the only clearly category-changing prefix in EN verbal derivation. It attaches mainly to nouns to form verbs with a spatial interpretation (*envision*, *emplane*; Plag 1999: 93, 218; for other verb-deriving prefixes see Plag 1999, 2003). On the other hand, *conversion* is the most productive verb-deriving process in EN. It can create verbs from nouns, e.g. *to boot* from *boot*, and sometimes verbs from adjectives, e.g. *to cool* from *cool* (Lieber 2004: 89–95).

Table 2 gives the general profile of the EN colour adjectives or nominals together with their verbal derivatives. The lines dividing the table indicate the same evolutionary thresholds as in Table 1 for MG (with the exception of sections 5, 6, and 7, referring to Stage VIII+). The first six sections of Table 2 contain terms equivalent to the MG terms. Section 4 contains no terms because there are no English BCTs at the onset of Stage VIII+. In section 5 there is no one-word term corresponding to the MG term *blávo* 'dark blue'. *azure* and *sea* correspond to the MG term *thalasí* 'sea-blue', and the terms *burgundy*, *maroon*, and *crimson* correspond to the MG term *visiní* 'cherry-red'.

These correspondences are only suggestions and should be regarded as a working hypothesis.<sup>38</sup> In section 6 there is no one-word term corresponding to the MG term *porfiró* ‘Tyrian purple’, ‘in the colour of porphura’.

There is an extra seventh section at the bottom of Table 2 which contains the historically first non-BCTs in the system of EN language, taken from Casson (1997: 233–234).<sup>39</sup> The addition of this additional sixth section reduces arbitrariness in the description of the immediately preceding sections 5 and 6 which contain terms equivalent to the MG terms.

In the third row of Table 2 verbal derivatives for the colour terms of the first row are given, in particular *-en* derivatives or zero-derived (converted) verbs.

In the fourth and fifth row there are indications of use for the causative/inchoative alternation, i.e. ‘in common use’ (✓), ‘rare’ (#), and ‘non-existent’ (\*). For these indications the British National Corpus (BNC; <http://corpus.byu.edu/bnc/>) and the Corpus of Contemporary American English (COCA; <http://corpus.byu.edu/coca/>) were consulted.<sup>40</sup> In the search for converted verbs the sequence ‘[form].[\*v]’ was mainly used.<sup>41</sup>

In the sixth row alternate verbs for the derivatives in the third row are given, together with indications of use. The chronological indications in the last three rows were taken from the online version of Oxford English Dictionary (OED; [www.oed.com](http://www.oed.com)). In the seventh row are indicated the lexical category of the base and in the eightieth row the transitive/intransitive use of the verbs contained in the third row, taken again from OED. The reason for the inclusion of the transitivity indications in the eightieth row is that in some cases the search in BNC/COCA did not yield any verbs. As will become clear in section 6.1, this information is crucial for the comparison of the EN with the MG colour verbs. The indications of use in Table 2 were validated by using WWW, e.g. by looking up the relevant terms in discussion forums such as the ‘English Language and Usage’ forum at <http://english.stackexchange.com>, etc. In addition, two native speakers of EN were interviewed on the current status of the verbal derivatives at the Campus of the University of Cologne, Germany.

### 6.1 Chronology and use

As in the case of MG, the chronology of the EN colour terms is quite uniform and supports an evolutionary view of both the derivation bases (adjectives or nouns) and the verbal derivatives. In general, verbs from late Old English (c.900–c.1150) or Middle English (c.1150–1500) show up after bases from early Old English (c. 650–900), verbs from early Modern English (1500–1700) show up after bases from (late) Middle English (see Table 2).

Similarly as in MG, at Stages I–IV the terms *white*, *black*, *red*, *yellow* and *green* constitute the most basic core. These terms come from early Old English and are paired with derivatives from early Old English to Middle English. The term *grey* at Stage VII seems to violate the chronological BCT-sequence strongly. It showed up in early Old English (a700) before the terms *blue* (1366) and *brown* (a1000). This exceptionality, however, should not surprise us. As already pointed out in section 2,

Table 2. English Colour Terms.

	Base	Stage (B&K)	Derivative	Inchoative	Causative	Alternates	Base (OED)	Derivative (OED)
1	white	I	whiten	✓	✓		c888 (A)	a1330
	black	I	blacken	✓	✓	black (O: t)	eOE (N-A)	c1330
	red	II	redden	✓	✓	?red (O: t)	eOE (N-A)	1552
	yellow	IV	yellow	✓	✓		c700 (N-A)	a1050
	green	IV	green	✓	✓		eOE (N-A)	eOE
	blue	V	blue	? (amb)	✓	?bluen (O&M) (O: 0, B/C: 0)	1366	1606 (t)
2	brown	VI	brown	✓	✓		a1000 (A)	c1300
3	grey	VII	grey	✓	✓		a700 (N-A)	c1400
	purple	VII	purple	✓	✓		OE (N-A)	?a1475
	orange	VII	*	*	*		a1400 (N-A)	*
	pink	VII	pinken	‡ (B: 1, C: 2)	‡ (B: 0, C: 2)	?pink (O [1792]: t/i [+up], B: ↑ [‡], C: ↓/↑ [‡])	1566 (N-A)	1890 (t/i)
4	N/A	VIII+ (onset)	N/A	N/A	N/A	N/A	N/A	N/A
5	beige	VIII+	*	*	*		1858 (N-A)	*
	olive	VIII+	*	*	*		a1225 (N-A)	*
	azure	VIII+	azure	* (B/C)	* (B/C)		a1330 (N-A)	1490 (t)
	sea	VIII+	*	*	*		c825 (N)	*
	burgundy	VIII+	*	*	*		1600 (N)	*
	maroon	VIII+	*	*	*		1594 (N-A)	*
	crimson	VIII+	crimson	‡ (B/C)	‡ (B: 0, C: 1)		1416 (N-A)	1609 (t/i)
6	golden	VIII+	golden	* (B/C)	* (B/C)		gold (N): c725 golden (A): c1300	1850 (t/i, ‡)
	silver	VIII+	silver	‡ (B/C)	‡ (B/C)	silverize (O [1605]: ↓:‡, B/C: 0)	c825 (N-A)	c1440 (t/i)



7	violet	VIII+	violet	* (B/C)	* (B/C)	1370 (A)	1623 (t)
	russet	VIII+	russet	* (B/C)	* (B/C)	a1330	1592 (t)
	ochre/ocher	VIII+	ochre/ocher	* (B/C)	* (B/C)	1364 (N-A)	1553 (t)
	scarlet	VIII+	scarlet	* (B/C)	* (B/C)	c1250	1553 (t, obs)
	vermilion	VIII+	vermilion	* (B/C)	* (B/C)	1296 (N-A)	1606 (t)

✓	in common use	C [=COCA]	Corpus of Contemporary American English
#	rare	c	circa [OED]
*	non-existent	e	early [OED]
↓	causative	i	intransitive [OED]
↑	inchoative	N	Noun [OED]
A	adjective [OED]	N/A	not applicable
a	ante [OED]	O [=OED]	Oxford English Dictionary (online)
amb	categorial ambiguity (B/C)	OE	Old English (c.700-c.1150) [OED]
B [=BNC]	British National Corpus	O&M	Onysko & Michel (2010: 3)
B&K	Berlin & Kay (1969)	obs	obsolete [OED]
		t	transitive [OED]

in a later revision of Berlin and Kay's (1969) model, i.e. in Kay & Maffi (1999), *grey* is regarded as a wild-card occurring at any stage from III to VII.

The chronological indications in sections 5 and 6 of Table 2 (Stage VIII+) are not directly relevant in the present context because the bases and the derivatives appearing therein are included for comparison with the equivalent MG terms (sections 5 and 6 of Table 1). Nonetheless, in five of the nine cases, no verbal derivatives are attested – a pattern which is in accord with the general drop of EN verbal derivatives at Stage VIII+ (see below). As an exception, the base *silver* and its verbal derivative *silver* follow the chronological pattern at Stages I–IV (cf. n. 34).

Section 7 of Table 2 refers to the first non-BCTS for EN (Casson 1997; Stage VIII+). In general, verbs from early Modern English show up after nouns or adjectives from Middle English (OED).

According again to the indications in Table 2, the colour verbs in *-en* (Stages I & II) are in everyday use, followed by converted verbs which up to Stage VII are also common.<sup>42</sup> There is no verb *\*to orange* at Stage VII, but this is due to the exceptional and transparent association of this verb to an object having a characteristic colour.<sup>43</sup> Colour terms of this kind tend to emerge after Stage VII and yield no derivatives in EN.<sup>44</sup> The derivative *pinken* at Stage VII is a rare verb in BNC and COCA and an existing verb for OED. It is also a possible verb for *some* native speakers of EN. According to the present analysis, this is the only morphologically dissonant case within the group of the EN BCTS. It should be noted, however, that *pinken* is the first verb derivative in the evolutionary sequence that according to BNC and COCA is rare. From this stage and beyond (Stage VIII+), verbal derivatives are either rare (see *to silver* and *to crimson*) or non-existent (cf. *\*to beige*, *\*to olive*, etc.). A further peculiarity of *pinken* is that, according to OED, it is the *newest* verb among the verbs in Table 2 (first token: 1890). This fact suggests the status of a near-neologism for this verb, in accord with the neologism status of the MG verbal derivatives at the same stage.

Most notably, the historically first non-BCTS (Casson 1997: 233–234) in the bottom (seventh) section of Table 2 have no derivatives at all – again according to BNC and COCA.<sup>45</sup> Only OED reports the existence of *causative* variants for these verbs – an opposite pattern in relation to the MG verbal derivatives, which seem to develop the inchoative variant first (cf. sections 4.3 and 5.2). Let us now recruit morphophonology to account for these patterns more accurately.

## 6.2 Morphophonology

In EN, there are morphophonological restrictions on the *-en* verbs. Their bases are monosyllables and end in a plosive, fricative or affricate (see Plag 1999, 2003). This means that phonological factors prohibit the combination of vowels at the syllable boundaries between stem and suffix. Accordingly, the bases of the established colour verbs *blacken*, *whiten*, and *redde*n end in a plosive. However, the novel verb *?bluen*, with a rear combination of vowels at the syllable boundaries between the stem and the suffix, may occur in some contexts, as Onysko and Michel (2010: 3) report. We see thus that

morphophonology points to the distinction between established verbs and neologisms.<sup>46</sup>

In a similar way as in MG, the bases of the attested EN colour verbs *blacken*, *whiten*, and *redde*n exhaust the Stage II of BCTS. *Blue*, the base of *?bluen* does not appear until stage V after *yellow* and *green* at Stage IV, respectively. According to the major later revisions of Berlin & Kay's (1969) model in Kay & Maffi (1999), at Stage III the separation of grue and black takes place. 'Grue' may refer to more than one of the cool colours, i.e. green, blue, and grey (see section 2). *?bluen* can thus be regarded as derived from a putative composite term 'grue' – cf. a similar discussion on the referential status of colour verbs in Lucy (1997: 336–337).

The relatively new and rare verb *pinken* at Stage VII follows the morphophonological pattern of *whiten*, *blacken*, and *redde*n as the last *-en* verb for an EN BCT and as the last *-en* verb for an EN colour-term in general (see also section 6.1). Overall, the cases of *?bluen* and *pinken* suggest that the *-en* paradigm is active throughout the BCT sequence.

In a similar way as in MG, there are verbs in *-en* as common hypernyms of all EN colour verbs, i.e. the derivatives *darken* and *whiten*, whose bases refer to cool and warm colours, respectively. This inclusion pattern supports the cognitive (categorical) and evolutionary analysis proposed in this paper.

Concluding, I would like to point out an issue of *morphological levelling* in both MG and EN.

### 6.3 Morphological levelling

As the analysis in this paper has shown, MG colour verbs are mainly derived by means of *-izo*. The base adjectives at Stages I–IV end in *-os*, *-i*, *-o* for masculine, feminine, and neuter, respectively. Each of these endings is associated with a different inflectional class (IC), i.e. IC1, IC3, and IC5, respectively, and is *not* stressed (see Ralli 2005: 119–120). After the exceptional Stages V–VII, mainly containing verbs of French origin, and with a few exceptions at Stage VIII+, MG colour verbs follow a highly uniform pattern. They have as bases adjectives in *-i*, assigned to IC6.<sup>47</sup> This ending is always stressed and at the same time derivational. Overall, at high stages a very productive morphological pattern, i.e. the derivation of adjectives from nouns by means of the ending *-i*, is accompanied by the suffixation of a highly productive element, i.e. *-izo* (Charitonidis 2005, 2011, Efthymiou 2011, Efthymiou et al. 2012).<sup>48</sup>

In EN, at Stages I and II, EN colour verbs are canonically derived by means of the suffix *-en*. The bases of these verbs meet specific conditions as regards the quality of their end consonant (see section 6.2). At Stage V and beyond, EN colour verbs are mainly derived by means of conversion.<sup>49</sup> This means that the most productive morphological process for deriving verbs in EN (Clark & Clark 1979, Lieber 2004), takes over an elaborate morphological process, i.e. *-en* suffixation.

I argue that these patterns of unification in both languages are special cases of *morphological levelling* (cf. Haspelmath & Sims 2010: 273–274).

At the same time, an asymmetry is evident. In MG, the derivation bases conform to a uniform and highly productive pattern at high stages (*-i* ending). The verbal suffix

Table 3. Evolutionary sequence of colour verbs in Modern Greek and English.

PRIMARY BCTS (Stages I–V)	<b>Possible/established verbs</b> Primary cognitive core	MG EN	<i>kokinízo</i> ‘become/make red’ ( <i>kókinó</i> ‘red’) <i>to redden</i> ‘become/make red’
NON-PRIMARY (DERIVED) BCTS (Stages VI–VII)	<b>Possible verbs/neologisms</b> Adjacent to a primary cognitive core	MG EN	<i>movízo</i> ‘become/make purple’ ( <i>mov</i> ‘purple’) <i>to pinken</i> ‘become/make pink’
NON-BCTS (Stage VIII+)	<b>Very fresh neologisms</b> Far away from a cognitive core	MG	<i>ladhízo</i> ‘become olive-green’ ( <i>ladhí</i> ‘olive-green’)
N/A	<b>Not possible/forced verbs</b> Cognitively dissociated	MG	<i>!trapezízo</i> ( <i>trapézi</i> ‘table’) <i>!potirízo</i> ( <i>potiri</i> ‘glass’)

remains the same throughout the evolutionary sequence (*-ízo*). In EN, at later or higher stages, a highly productive process (conversion) adopts a vastly varied set of bases. In the latter case there is no direct reference to the morphological make-up of the bases.

A further important difference between MG and EN is that, whereas in MG the levelling directly refers to the inflectional paradigms of the colour adjectives and their stress patterns, in EN the levelling involves the morphological process as a whole without any reference to inflection.

## 7 Conclusion

The analysis in this paper has shown that it is the nature of human colour perception, i.e. semantic/cognitive constraints, which in the first place call for the formation of colour verbs in MG. The lower the BCT stage that a base can be fitted to, the more likely an *-ízo* derivative will be produced. A similar pattern is evident in the derivation of EN colour verbs.

The distinction between primary and derived BCTS (Kay & McDaniel 1978) applies in both MG and EN verbal derivation. The use of the verbal derivatives and the grammaticality judgements of native speakers are in accord with this distinction. Possible/established verbs address a primary categorial core (Stages I–V), cf. MG *kokinízo* ‘become/make red’ (*kókinó* ‘red’) and EN *to redden* ‘become/make red’, etc. Possible verbs/neologisms are adjacent to this primary core, cf. MG *movízo* ‘become/make purple’ (*mov* ‘purple’) and EN *to pinken* ‘become/make pink’, etc. (Stages VI–VII). In the case of MG, very fresh neologisms are far away from a cognitive core, cf. *ladhízo* ‘become/make olive-green’ (*ladhí* ‘olive-green’), etc. (Stage VIII+), whereas not possible/forced verbs are cognitively dissociated, cf. *!trapezízo* or *!potirízo*, whose bases *trapézi* ‘table’ and *potiri* ‘glass’, respectively, refer to objects without a characteristic colour, etc.

Table 3 summarizes the respective patterns.

Concluding, both BCTS and derived colour verbs emerge over stages in a cognitive domain. Systematic gaps linked to the derivational causative/inchoative

paradigm are due to the semantics of the base rather than deficiencies in the base's morphophonological character. To give an answer to the chicken-or-the-egg dilemma mentioned in the Introduction: morphophonology does not define existing semantic/cognitive spectra but simply ornaments them.<sup>50</sup>

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### Abbreviations

A	Adjective	HNC	Hellenic National Corpus
A	ante	IC	Inflectional class
A/N	Author's note	IEPS	Inferable Eventual Position or State
AG	Ancient Greek	LCS	Lexical Conceptual Structure
amb	Categorial ambiguity	LOC	Location
B&K	Berlin & Kay (1969)	LX	Lexicalization
BCT	Basic colour term	MD	Medieval Greek
BNC	British National Corpus	MD+	1800– A. D.
C	circa	MG	Modern Greek
CHAR	Characteristic colour	N	Noun
COCA	Corpus of Contemporary American English	N/A	Not applicable
DCMG	Dictionary of Common Modern Greek	NCS	Natural Color System
DMGL	Dictionary of Modern Greek Language	NL	Neologism
EN	English	NP	Nominal phrase
HL	Hellenistic Greek	OE	Old English
		OED	Oxford English Dictionary
		WWW	World Wide Web

### Notes

1. We would like to thank two anonymous referees whose comments and suggestions helped us improve the original manuscript.
2. This paper is part of the self-funded project 'The Integration of Socio-expressive Meaning Into Verb Structures' conducted by the author at the University of Cologne, Germany. Parts of this paper can be found in a preliminary form in Charitonidis (to appear). The revisions in the present paper concern, among others, a reordering of colour terms in both Modern Greek and English to strictly fit the BCTS–non-BCTS sequence.

3. For example, Jackendoff (1983, 1990, etc.) proposes verb structures which are founded on the visual capacity.
4. The derivational suffix is actually *-íz-* without the inflectional vowel *-o* for the first person singular – the standard citation form for MG verbs. In the following, I give all verbal forms together with the inflectional ending.
5. Unfortunately, there are no systematic accounts on both the metrical form and the phonological boundaries of morphological units involved in MG verbal derivation.
6. The high productivity of *-ízo* is also pointed out in Efthymiou et al. (2012).
7. In Charitonidis (2005) the *auto* category is a subclass of the inchoative category.
8. This definition of macro-categories is taken from Biggam (2004: 21).
9. Figure 1 displays the most common route (Trajectory A). A more elaborate route with three trajectories can be found in Kay & Maffi (1999: 751), Kay & Maffi (2005: 536).
10. For details about the Munsell, Color-aid, and Natural Colour System see Androulaki et al. (2006: 44–45).
11. The suffix *-ino* has lost its representational strength in the frequently used BCTs *kókinio*, *prásino*, and *kítrino* (Anastasiadis-Simeonidis 1987: 401; see also Alexandris 2009). It should be noted that the bases *kítro* ‘citron’ in *kítrino* and *práso* ‘leek’ in *prásino* are MG nouns in common use – as opposed to the AG noun *kókos* ‘pit’, ‘stone’ in the base of *kókinio* which nowadays has a dissociated meaning.
12. A similar code switch for the expression of BCTs after *yellow* is evident in Maltese vernacular. In this language, the first five colour terms come from Arabic. They are followed by colour terms of Italian provenance (Borg 2011: 77); see also n. 44.
13. In Androulaki et al. (2006) the form *kafetí* is not discussed.
14. The default ending *-í* is likely to come from *-i-* in the Turkish word *maví* (DMGL, p. 1996). In contemporary MG, the word *maví* (approximately meaning ‘purple’) is only marginally used. The masculine form of the ending *-í* is *-ís* and the feminine form is *-iá*. It should be noted that the assignment of the adjectives in *-ís*, *-iá*, *-í* to a declensional paradigm is not an easy task (DMGL, pp. 1995–1996; see also Anastasiadis-Simeonidis 1987: 397–398).
15. The stipulation of two BCTs for BLUE violates the non-inclusiveness criterion (criterion ‘ii’ in Berlin & Kay 1969: 6) since LIGHT BLUE is included in BLUE – cf. a similar discussion about the status of *lacivert* ‘dark blue’ in Turkish in Rätsep (2011: 144).
16. As regards the history of language and culture, the difficulty to define a BCT for *blue* in MG is partially due to historical and cultural reasons since the status of the BLUE category was traditionally uncertain in Greek (cf. sections 5.1 and 5.4). As Lyons (1999: 63) notes: ‘It is not at all clear, however, that Ancient Greek had a word for the sixth colour in the BK-hierarchy [Berlin & Kay 1969, A/N]: blue. In fact, there are serious, and perhaps insoluble, problems relating to Ancient Greek words that denote colours in the blue-purple area of the spectrum. At least three, and possibly four, words have to be considered as basic level-1 colour terms: *halourgos* (usually translated “purple”), *kuaneos* (... usually translated “dark blue”), *orphninos* (“violet”?) and possibly *glaukos*.’ (Lyons 1999: 63; in Borg 2011: 85). For more details on AG colour terms, see Smitherman (2013).
17. A summary of objections to early research methodology can be found in Biggam (2012: 84–85).
18. In a similar line of argument, Biggam (2004: 37) points out that the study of a particular language should be led by evidence from the language itself and not by any theory of categorization.

19. The bipartite structures in (3) and (4) are general representations of causative/inchoative verbs within Lieber's (2004) framework. The content of a colour term shows up in the [+Loc] slot and refers to an end state in a situation. 'IEPS' ('Inferable Eventual Position or State') refers to a sequence of places or states (progression). The indices *i* and *j* co-index the agent and patient arguments. For further details about the composition of the skeletons in (3) and (4), see Lieber (2004: 81–86).
20. In Lieber's (2004, 2007) theory, colour refers to 'pragmatic body', i.e. an extra semantic representation parallel to grammatical 'semantic skeletons'. Author's 'socio-expressive tier' (Charitonidis 2012a, 2012b, 2013, etc.) refers to this pragmatic body as well.
21. All stages beyond Stage VII are henceforth referred to as 'Stage VIII+'.
22. Efthymiou (2011) argues that *-izo* avoids attaching to bases ending in /z/. See, however, *?bezízo* in the fifth section of Table 1 whose base *bez* 'beige' ends in /z/ (<http://www.mammyland.com/forum-neo/viewtopic.php?f=29&t=19747&start=700&view=print>, <http://www.teleiosgamos.gr/forum/viewtopic.php?f=8&t=11158&start=765&hilit=2013>, etc. [found in www by using Google; accessed September 4<sup>th</sup>, 2012]).
23. In both DCMG and DMGL, the chronological indication of the entries is inconsistent. The periods AG, HL, MD, and MD+ indicated in Table 1 were mainly defined according to the introductory sections in DMGL (pp. 20–21) and DCMG (pp. xxi–xxiii). MD+ ('after medieval Greek') refers to the indication *neóteri períodhos* 'later period' in DCMG.
24. *blávo* is an adaptation of the old Italian word *blavo* (DCMG). It should be noted that *blávo* refers to a difference in lightness conditions like *áspro* and *mávro*.
25. To this effect, *asimízo* follows the pattern of *xrisízo*, cf. the preceding discussion.
26. The stem of these adjectives ends in a consonant. This pattern is in accord with Efthymiou's (2011) statement, that *-izo* attaches exclusively to consonant-final base stems. The same pattern cannot be regarded as a condition on the derivation of COLOUR verbs since the number of vowel-final adjectival stems in MG is very small (see Holton et al. 1997: 73–89).
27. The elaboration of inflection for gender and number in the primary BCTS is also evident in Maltese vernacular. In this language, causative verb forms are available exclusively for the root morphemes *byd* 'white', *swd* 'black', *hmr* 'red', and *hđr* 'green' (Borg 2011: 81; cf. n. 44).
28. It should be noted that there are no native Greek nouns or adjectives ending in *-v*, or *-z*.
29. The existence of such a derived adjective is not an absolute requirement for the emergence of a colour *verb*, cf. the existing novel formation *?ghalatizo* 'have a milky hue' derived directly from N *ghála* 'milk' and not from an alleged A *\*ghalati* ('milky'), etc. It should be noted that Berlin and Kay (1969) and various studies thereafter do not regard as BCTS words derived from the name of an object having a characteristic colour (cf. the criticism on this method in Lucy 1997).
30. <http://www.rdeco.gr/xtizw/chroma>, [http://www.snhell.gr/testimonies/content.asp?id=165&author\\_id=103](http://www.snhell.gr/testimonies/content.asp?id=165&author_id=103), etc. (found in www by using Google; accessed November 16<sup>th</sup>, 2012).
31. [http://www.lykeionellinidon.gr/portal/View\\_object.aspx?id=14298&lang=gr](http://www.lykeionellinidon.gr/portal/View_object.aspx?id=14298&lang=gr), <http://www.modelclub.gr/forums/index.php?topic=1632.0>, etc. (found in www by using Google; accessed November 16<sup>th</sup>, 2012).
32. As an anonymous referee noted, *asimóno* is a well attested verb, meaning 'to cause to shine like silver' or 'to cover in silver'. The former reading shows up only in literary or metaphorical contexts. The latter reading refers to a strong [+Location] component in *-óno* which standarly promotes themes (see Charitonidis 2011: 34). As opposed to *asimízo*,

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- asimóno* has no inchoative variant – a pattern which sets apart this verb from the other colour verbs which are primarily inchoatives. The same argumentation applies to *xrisóno*, the rival form of *xrisízo*, meaning ‘to cause to shine like gold’ or ‘to cover in gold’.
33. *xrisafízo* is derived from the adjective *xrisafí* ‘gold-coloured’ and often used parallel to *xrisízo* ‘become/make golden’ (sections 5.2 and 5.4).
  34. <http://forum.scooterclubhellas.gr/viewtopic.php?f=23&t=23407>, <http://www.avclub.gr/forum/showthread.php/99761-The-Kenwood-K%CE%91-305-Adventure/page2>, etc. (found in www by using Google; accessed November 16<sup>th</sup>, 2012).
  35. [http://julia-sevenstars.blogspot.de/2008\\_12\\_01\\_archive.html](http://julia-sevenstars.blogspot.de/2008_12_01_archive.html), [http://digitalschool.minedu.gov.gr/modules/document/file.php/DSGYM-B120/HTML/g02-web/htms/sel\\_food\\_2c.htm](http://digitalschool.minedu.gov.gr/modules/document/file.php/DSGYM-B120/HTML/g02-web/htms/sel_food_2c.htm) (found in www by using Google; accessed November 16<sup>th</sup>, 2012).
  36. OED definition of *porphura*: ‘A shade of crimson, *spec.* (also Tyrian purple) the colour of a dye obtained from various gastropod molluscs and traditionally used for fabric worn by people of imperial or royal rank’ (in OED online, entry ‘purple’).
  37. Colour terms referring to precious metals or substances tend to appear as BCTs in many languages. By examining type modification in Modern English colour adjectives, Steinvall (2002) argues: ‘there are the six Primary BCTs and to a certain degree also *brown, grey, golden* and *silver*’ (Steinvall 2002: 122).
  38. An extensive internet search for the corresponding EN terms and the consultation of bilingual dictionaries such as OGELD were not conclusive. One reason for this may be the different lightness conditions between the North European (cf. English) and the Southern European (cf. Greek) area which make a literal translation of the colour terms impossible. Most notably, such equivalence issues arise overproportionally within the non-BCTs (Stage VIII+; cf. the discussion on best-example choices in section 2). Filopoulos (1994: 197–198) underlines the absence of absolute correspondence of colour terms in different languages, while pointing out the influence of environmental and cultural factors on the semantic value of colour terms.
  39. Casson (1997: 233) reports that ‘the first secondary terms were incorporated into the [English, A/N] language in the late Middle English period (between 1350 and 1500). Twelve terms developed hue senses at this time, of which nine were names for dyestuffs, pigments, and textiles (and earlier entities from which they derived): *gold, silver, violet, azure, crimson, russet, ocher, scarlet, and vermillion.*’ [Casson’s italics].
  40. BNC contains ca. 100.000.000 words (1980s–1993) and COCA contains ca. 450.000.000 words (1990–2012); [www.corpus.byu.edu](http://www.corpus.byu.edu) (as of November 15, 2012).
  41. In the results it was not always possible to distinguish between the use of a term as an adjective or a verb, cf. sentences such as *her lips blue* (BNC/A fatal inversion. Vine, Barbara. London: Viking, 1987, pp. 19–117), etc. In such cases, OED was consulted for a more precise categorial assignment of the terms.
  42. I have some reservations about the actual use of the inchoative variant of *blue* in common EN (see n. 39).
  43. The verb *\*to orange* would be a possible verb according to the ‘Innovative denominal verb convention’ in Clark & Clark (1979: 787). As an internet user in the ‘English Language and Usage’ forum reports, ‘I could see an orange grower saying, “The trees should orange by next month,” meaning their current green fruit will shine bright orange in a few weeks or so. . .’ (<http://english.stackexchange.com/questions/80770/to-orange-and-to-pink>).
  44. The sixth criterion in Berlin & Kay (1969: 6) for the exclusion of a word as a BCT is as follows: ‘Colour terms that are also the name of an object characteristically having that



colour are suspect, for example, *gold*, *silver*, and *ash*. This subsidiary criterion would exclude *orange*, in English, *if it were a doubtful case on the basic criteria (i–iv).* [B&K's italics].

45. With a few exceptions, the same applies to the verbs in sections 5 and 6 of Table 2.  
 46. As Onysko and Michel (2010: 3) argue, the rule of deadjectival verbal suffixation in EN cannot explain why *?bluen* is not acceptable as the other established colour verbs in *-en*.  
 47. The inflectional paradigm of the neuter adjective *xrisafi* 'golden' in (i) below serves as a representative example. As already mentioned in section 3, the *-i* form is more widely used – in many cases uninflected for all genders, in singular and plural NPS. Similar restrictions on use apply to the other IC6 colour-adjectives. For more details about the ending *-i*, see sections 3 and 5.3.

(i)	SINGULAR	PLURAL	(IC6; see Ralli 2005: 120)
	NOM	<i>xrisafi</i>	<i>xrisafi-á</i>
	GEN	<i>xrisafi-ú</i>	<i>xrisafi-ón</i>
	ACC	<i>xrisafi</i>	<i>xrisafi-á</i>
	VOC	<i>xrisafi</i>	<i>xrisafi-á</i>

48. As already mentioned in section 5.3 the suffix *-ízo* is phonologically more akin to the endings *-ís*, *-iá*, *-i* than the other verb-forming suffixes because it contains a stressed *-i*.  
 49. The verbs *\*to orange* and *\*to pink* (Stage VII) are not attested in OED. For the verb *\*to orange* see n. 41. For the exceptional verb *to pinken* see sections 6.1 and 6.2.  
 50. This observation is akin to the doctrines of Distributed Morphology which allocates a great amount of non-generative morphological operations to the phonological component (PF) after the main syntactic operations (see Embick & Noyer 2006).

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