Investigating the production of Greek compounds by bidialectal and bilingual children

Maria Tenizi[1], Georgios P. Georgiou[2]

[1]*Department of English Studies University of Cyprus*
[2]*Department of Languages and Literature University of Nicosia*
tenizi.maria@ucy.ac.cy[1], georgiou.georg@unic.ac.cy[2]

Abstract

Compound production by bidialectal and bilingual children has received scarce attention in terms of research since most of the studies in the literature focus on monolingual populations. Such investigations can offer an understanding of morphological acquisition in bidialectal and bilingual speakers. Also, it has been proposed that formal schooling enhances metalinguistic awareness and contributes to better control of the native language. The present study aims to investigate the Greek noun (noun + noun) and verbal (verb + verb) compound production patterns of Cypriot Greek – Standard Modern Greek bidialectal children and bidialectal plus bilingual children (English) (henceforth bilingual), and the effect of formal education on these productions. To this purpose, 35 preschool and first-grade bidialectal and bilingual children who permanently live in Cyprus participated in an experimental study in which they were instructed to produce Greek compound words after watching pictures and clips in a controlled environment. The results showed that bidialectal preschoolers outperformed bilingual preschoolers in the formation of correct compounds and they had relatively fewer errors than bilinguals, while there was a prevalent interference of the local dialect in their productions. Also, first-grade bidialectals demonstrated better performance than preschool bidialectals in the formation of correct compounds and had fewer errors in compound formation, but bilingual first-graders had worse overall performance than bilingual preschoolers. It is assumed

Manuscript received 11 February 2020; Revised version received 17 October 2020; Accepted 25 November 2020
Journal of Cognitive Science 21-4:619-647, 2020

that these differences are affected by the children's linguistic repertoire and their attunement to the speech input of their environment. The study offers useful insights into how bidialectal and bilingual children construct compounds in an underresearched linguistic context and demonstrates the effect of sociolinguistic factors on compound production.

Keywords: *bidialectals, bilinguals, English, Cypriot Greek, compounds*

1. Introduction

In the last decades, the investigation of word *compounding* has attracted the researchers' interest since this word-formation procedure contributes to a better understanding of language acquisition. Compounding refers to the combination of two words which denote the name of a single concept even though they consist of two different words each of which has a different meaning when in isolation (Schlücker & Plag, 2011). The processing of compound words has been investigated in both comprehension (e.g., De Jong et al., 2002; Duñabeitia et al., 2007; Kuperman et al., 2009) and production tasks (e.g., Bien et al., 2005; Gumnior et al., 2006) involving both children and adults.

While adolescent and adult speakers are able to understand the complex procedure of compound formation, children might not initially realize that a compound can be decomposed into two constituents and, therefore, they might perceive it as a chunk or holophrase (Krott & Nicoladis, 2005; Berman, 1987). For example, English children during the very early stages of language development might understand the meaning of 'bedroom', but they might not realize that it refers to a room that contains beds. Nevertheless, there is evidence (e.g., Berko, 1958) that these difficulties do not take place only in early childhood but they are still apparent in the early schooling years. Children are aware of compound complexity from

a very young age since they are capable in distinguishing the head from the modifier and vice versa; e.g., English children are able to form the compound 'cup egg' for boiled eggs from the age of two (see Krott et al., 2009). Also, it has been proposed that the understanding of compounds is affected by the language or languages spoken by children. In a language where compounds are frequently used (e.g., English), the child will start comprehending and parsing them much earlier than a child whose language does not extensively use compounds (Krott & Nicoladis, 2005). For instance, English children were found to perform well in elicitation tasks involving novel compounds by the age of three (Clark et al., 1985), while Hebrew children were performing well only from the age of six (Clark & Berman, 1987).

The ability of children to cope with linguistic phenomena is linked with the development of their metalinguistic abilities (Bialystok, 1986). Speakers acquire metalinguistic awareness by the time they attend formal schooling. Bialystok (1986) claims that when literate children are asked to solve a task requiring metalinguistic skills, they are more competent than preliterate children. Metalinguistic ability consists of two components which Bialystok & Ryan (1985) call "the analysis of linguistic knowledge into categories" and "the ability to deal with specific linguistic information". So, speakers' metalinguistic abilities mainly depend on the linguistic knowledge and the means they use to satisfy the needs of language processing in overall. By developing the control of those linguistic effects, speakers become immediately more efficient in producing acceptable linguistic forms. Monolingual speakers are in a less advantaged position when it comes to metalinguistic abilities, while bilingual speakers are in a way "equipped" with a richer metalinguistic system (Ben-Zeev, 1977). Metalinguistic awareness aids speakers to understand both form and meaning of words. For example, *form* and *meaning* are two aspects that speakers – especially young ones – must know to link two words and form a compound.

It has been shown that the study of dialects has a lot to offer to the field of morphology since dialects are rich in morphological phenomena (Ralli, 2009b). While they have been studies that comprehensively investigated the development of compounds in monolingual environments (for English, see Deacon & Kirby, 2004; for French see Deacon, et al., 2007; for Dutch see Rispens et al., 2008, for Chinese see McBride-Chang et al., 2003; for Greek see Tzakosta, 2017, etc.), research concerning compounds in bidialectal environments is very limited. The linguistic environment of Cyprus with the coexistence of two language varieties, that is Standard Modern Greek (SMG) which is considered the formal 'high' variety used in the media, schooling, etc. and Cypriot Greek (CG) which is considered as the informal 'low' variety usually used during the speakers' conversations, can be offered for such investigations. For research concerning the acquisition of Greek in a bidialectal setting and the effect of sociolinguistic factors, see Georgiou (2018, 2020) and Georgiou and Themistocleous (2020).

This study intends to investigate the Greek noun (noun + noun) and verbal (verb + verb) compound production patterns (e.g., interference of dialect/language, errors in the formation of compounds, etc.) in CG-SMG bidialectal children and bidialectal plus bilingual (English) children, and to compare the patterns of these two populations. Although both bidialectal and bilingual speakers have similar language control demands (Kirk et al., 2014), working with these two populations is essential as they differ not only in their linguistic background but also in executive functions such as working memory and fluid intelligence. For example, Antoniou et al. (2016) compared the executive function performance of monolingual, bilingual, and bidialectal children to conclude that bilinguals, and to some extent bidialectals, had more developed executive functions than monolinguals. Notably, bidialectals were weaker in terms of executive functions than bilinguals and they were better than monolinguals only in a composite measure of working memory and inhibitory control. This suggests that due

to cognitive differences which are shaped by their linguistic attunement, bidialectals and bilinguals might differ in the processing of morphological phenomena such as word compounding. Finally, the study aims to examine Greek compound production patterns in preschool vs. primary school children (both bidialectal and bilingual) to test whether formal education, which is confounded with literacy and changes in their linguistic environment, is able to affect their compound formation abilities.

The novelty of the present study compared to similar studies that examine the production of compounds is that it investigates the compound production in bidialectal speakers (instead of monolingual ones) and intends a direct comparison of these productions with the productions of bilingual speakers. Experimental studies in the area of morphology which involve bidialectals and bilinguals are extremely limited. Furthermore, this study focuses on the production of compounds in a language (that is, Greek) for which there is little experimental evidence about compound formation. Apart from investigating noun + noun noun compounds, this study aims at investigating production patterns in verb + verb verbal compounds which are uncommon in several languages but very common in Standard Modern Greek (Ralli, 2003). Finally, it intends to assess if formal schooling has an impact on Greek compound production patterns in both bilingual and bidialectal populations.

1.1 Compounds

1.1.1 Noun Compounds

Noun compounds are commonly used in languages and can be found in most clauses (Downing, 1977; McDonald, 1982; Lauer, 1995). Lauer (1995) defines noun compounds as the combination of two words (noun + noun, adjective + noun, preposition + noun, adjective + adjective, etc.) functioning as a single noun. The two compound constituents are called *modifier* and *head* and when combined altogether, they give a new meaning

(Krott, 2009). For example, the English word 'wallpaper' refers to a paper (head) stuck on the wall (modifier), and 'blackboard' refers to a board (head) that has black color (modifier). However, in many cases, the relationship between the two constituents of the noun compound is *coordinative* rather than subordinative. For example, in the Greek noun compound 'μυδοπίλαφο' ('midopílafo'), which refers to a type of food made of mussels and rice, there is not a distinction between modifier and head, and both constituents are linked with a coordinative relationship (the so-called 'dvandva' compounds; Ralli, 2013).

1.1.2 Verbal Compounds

This compound type derives out of the combination of two single words which function as a single verb (Nicholas & Joseph, 2009). Verbal compounds are often grouped into two different classes: (a) *verb + verb* compounds and (b) *noun + verb* compounds (Kiparsky, 2009). The former class refers to two verbs that are linked to providing speakers with a newly formed action which is the combination of the two actions of these verbs. Verb + verb structure is not very common in most languages, however, when it takes place, the second verb is usually a 'light' verb (semantically weak) while the first one is a 'heavy' verb (semantically stronger than the 'light verb') (Shomoossi & Shomoossi, 2012). The removal of the 'light' verb does not affect the grammaticality or the meaning of the compound to such an extent. Although verb + verb compound is rare in English, an example of it would be the compound 'kickstart' ('kick' + 'start'). Nevertheless, as in noun compounds, the two verbs of the compound might be linked with a coordinative relationship and thus both verbs might have equal semantic weight but an opposite meaning (e.g., the Greek 'béno' ('enter') + 'vγéno' ('exit') → 'benovγéno' ('enter AND exit'). The second class of verbal compounds, that is, the noun + verb compound, refers to the conversion of the noun to a verbal structure in which noun carries most of

the semantic features, whereas the verb carries the inflectional features (e.g., Greek 'afísa' ('poster') and 'koló' ('stick') → 'afisokoló', 'to stick posters'). Although these types of verbal compounds are more common in most languages than the verb + verb types, in languages such as Greek, this type is much less frequent than the verb + verb type. Interestingly, apart from verb + verb and noun + verb verbal compounds, Greek extensively uses adverb + verb verbal compounds.

1.2 Greek Compounds

Greek compounding is very productive (Ralli, 2007) and the same applies to CG (Ralli, 2009b). Ralli (2007, 2009a) argues that Greek compounds can be classified into four main categories according to their stress properties and the form of their inflectional ending. The four structural patterns are the following: (a) [stem stem] (e.g., 'rizóγalo', 'milk (and) rice (pudding)' → 'ríz(i)' 'rice' + 'γál(a)', 'milk'), (b) [stem word] (e.g., xrisavγí, 'golden dawn' → 'xris(í)', 'golden' + 'avγí', 'dawn'), (c) [word stem] (e.g., 'eksóðikos', 'extrajudicial'→ 'ékso', 'out' + 'ðík(i)', 'trial'), and (d) [word word] (e.g. 'peðí-θávma', 'wonderkid' → 'peðí', 'kid' + 'θávma', 'wonder'). The most popular types are (a) and (b), while (c) and (d) types are less common.

The compound constituents are linked with the so-called 'compound marker', that is, the linking element –o– (Koliopoulou, 2020); this element is perhaps the most significant morphological aspect of Greek compound morphology (Smirniotopoulos & Joseph, 1998). Even though –o– is a semantically empty element, it is compulsory in Greek (e.g., 'poð-ó-sfero', 'football' > 'póði' ('foot') + sféra ('ball')). However, there are some examples against this rule. For instance, Ralli (2008) referred to the compounds beginning with 'ksaná', meaning 'again', as the examples breaking the rule of the compulsory compound marker (e.g., 'ksanakáno', 'I make again', and not 'ksan(o)káno'*). Additionally, Ralli (2009a) pointed at some cases according to which the marker is excluded before

a stressed vowel; usually /e/ and /a/. Also, it is worth noting that in Greek compounding, the second constituent (head) is the one inflected (Greek is a highly inflectional language) by adding a suffix which might mark grammatical number, tense, gender, person, aspect, and other.

The Greek compounds follow the *Right Hand Head Rule* (Williams, 1981) in which the one constituent plays the role of the modifier while the other constituent is the head. The modifier is the first constituent of the word, modifying the meaning of the head, which is placed second (to the right part of the word). For instance, in the compound 'aγrióγatos' ('wildcat'), the first constituent 'áγrio(s)' ('wild') provides a special characteristic to 'γátos' ('cat'), the wildness. Nevertheless, in some cases in which the two compound constituents belong to the same part of speech (e.g., noun-noun, verb-verb, etc.), neither can be considered as the compound head or modifier (Tzakosta, 2017). These constituents show a coordinative relation. The constituents of noun + noun compounds and verb + verb compounds cannot be placed in a fixed order. For example, in the case of verb + verb (e.g., 'aniγoklíno', open and close), the compound consists of two equally weighted but semantically opposed verbs ('anígo' vs. 'klíno'; 'open' vs. 'close') with a fixed order ('klinoaníγo'*). The same applies for verb + verb compounds in which the verbs are not semantically opposed (e.g, 'trémo', 'shiver' + 'zvíno', 'blow out' → 'tremozvíno', 'zvinotremo'*).

The *Compound Stress Rule* found in many languages such as English leaves the word-internal stress patterns of the individual components intact, while stress on the first word of the compound is enhanced. Nevertheless, this rule does not apply to Greek. While each member of a Greek compound has its own primary stress in isolation, when two words are combined the first constituent loses its primary stress and the newly formed compound word exhibits a new single stress pattern (Athanasopoulou & Vogel, 2014). Athanasopoulou and Vogel (2014) tested the hypothesis of the existence of a single stressed syllable on Greek compounds in speech

production experiments. The results confirmed the hypothesis of the single phonological word. Nespor and Ralli (1996) claimed that stress in Greek compounds is not characterized with uniformity but with primary stress either on the penultimate or antepenultimate syllable irrespectively of the place of stress on the compound's constituents in isolation, e.g., 'péfkos' ('pine') + 'ðásos' ('forest') → 'pefkoðásos' ('pine forest'); 'kúkla' ('doll') + 'spíti' ('house') → 'kuklóspito' ('doll house').

It has to be mentioned that CG does not differ to a great extent from SMG in the way of forming compounds. Differences might exist in phonological/phonetic aspects of the constituents, e.g., 'tomatoximós' instead of 'domatoximós' ('tomato juice), in morphological aspects, e.g., 'anevokatevénusin' instead of 'anevokatevénun' ('they ascend and descend') or even in the form (signifier) of the constituent(s), e.g., 'shillópellos' instead of 'θeótrelos' ('very mad'), but all without any change on the structure or the meaning of the constituents of the compound.

2. Methodology

2.1 Participants

Thirty-five children (19 males and 16 females) who were permanently living in Cyprus, and more specifically in Nicosia district, participated in this research. Prior to the experiments, the researchers provided the students with questionnaires to gather information about their linguistic and sociolinguistic background (e.g., age, native languages of their parents, amount of first (L1)-second language (L2) use for bilinguals, etc.). Children were divided into two main groups according to their linguistic background. The groups were as follows: a) *Bidialectal Group:* it consisted of 20 children (10 males and 10 females). They were bidialectal speakers since both of their parents were bidialectal speakers in CG and SMG. Twelve children (7 males and 5 females) were preschoolers (M_{age} = 5.5 years) who

were using mainly CG during conversations and they had a significant amount of speech input in SMG mainly through TV programs and music. Eight children (3 males and 5 females) were first-grade students of public primary schools (M_{age} = 6.4 years) where the official language of instruction is SMG. All children had an average age of 6.05 years, b) *Bidialectal plus bilingual Group* (henceforth, bilingual): it consisted of 15 children (9 males and 6 females). The children were bidialectal in Cypriot Greek and Standard Modern Greek but also bilingual in Greek and English since one of their parents was a native speaker of Greek (specifically, bidialectal) and the other was native speaker of English. This group included 9 preschoolers (6 males, 3 females) (M_{age} = 5.7 years) who were using almost equally both CG and English at home, while they were familiar with SMG mainly through TV programs. Six children (3 males, 3 females) (M_{age} = 6.6 years) were first-grade students of private schools with English to be the main language of instruction; however, they could master both Greek and English with approximately the same efficiency since they were speaking both languages at home.

Both bidialectal and bilingual children were native speakers of Greek (with CG as their first dialect), differing only in that bilinguals had a native-like knowledge of another language apart from Greek, that is, English. All children were born and raised in Cyprus and they have never lived for more than one month in a foreign country. The school participants were all selected from intact classes through purpose sampling. The administration of both public and private schools provided the researcher with the list of students who were willing to participate to the experiments. Six different classes were used for that purpose; three in the first grade of primary school and three in preschooling. The parents/guardians of children reported that none of the children had ever faced any visual, auditory, or language disorder. Before the participation of children to the experiments, the parents/guardians of the children were informed on paper about the

purpose of the study and were assured that the data will remain anonymous and under the possession of the researchers, according to the declaration of Helsinki. Those who agreed signed a consent form that would confirm the participation of their children to the experiments. Any child could leave the experiment at any time without giving any explanation. The study's protocol was approved by the Cyprus bioethical committee.

2.2 Apparatus and materials

The tool used in this study was developed by the first author to examine how compounds are formed by both bidialectal and bilingual children. It consisted of 10 SMG compound words (four noun compounds (noun + noun)) and six verbal compounds (verb + verb)). Concerning the noun compounds, the first two compounds consisted of real compounds: in (1), the linking element –o– is the suffix of the modifier, while in (2), the same element is not the suffix of the modifier. The remaining words were pseudo-compounds (i.e., non-existent compounds): one developed out of real words (3), while the other was formulated out of the combination of a pseudoword ('maréla') and a real word ('súpa' = 'soup') (4). With regards to the verbal compounds, (5) and (6) refer to real compounds, which are commonly used in Greek, while (7), (8), (9), and (10) refer to pseudo-compounds. The noun and verbal compounds used in this study are shown in Table 1. A pilot study was conducted in a public school prior to the main experiment to check whether this tool was appropriate to investigate the compound formation patterns of bidialectal and bilingual speakers. Thus, some words were preserved in the tool whereas others were replaced by more successful ones.

Table 1. The noun and verbal Greek compounds used in the study

Noun Compounds (noun + noun)	
Compound Word	Components of compound word
(1) ‘moromádila’	‘moró’ (‘baby’) + ‘madíli’ (‘handkerchief’)
(2) ‘domatoximós’	‘domáta’ (‘tomato’) + ‘ximós’ (‘juice’)
(3) ‘spirtóspito’	‘spírto’ (‘match’) + ‘spíti’ (‘house’)
(4) ‘marelósupa’	‘maréla’ (novel word; ‘marela’ as a kind of vegetable) + ‘súpa’ (‘soup’)
Verbal Compounds (verb + verb)	
(5) ‘benovγéno’	‘béno’ (‘enter’) + vγéno’ (‘exit’)
(6) ‘anevokatevéno’	‘anevéno’ (‘ascend’) + ‘katevéno’ (‘descend’)
(7) ‘vγazoklíno’	‘vγázo’ (‘remove’) + klíno (‘close’)
(8) ‘piðoγirízo’	‘piðó’ (‘jump’) + γirízo (‘swing’)
(9) ‘xtipoklíno’	‘xtipó’ (‘knock’) + ‘klíno’ (‘close’)
(10) ‘γelopiðó’	‘γeló’ (‘laugh’) + ‘piðó’ (‘jump’)

To assess the participants’ patterns with respect to the production of Greek *noun compound* words, pictures illustrating the items were drawn by the first author. The drawings were placed on a white piece of paper with dimensions of 15 × 21 cm (each drawing covering half of that surface), which was then plasticized taking the form of plastic cards. The colors used to prepare those drawings were vivid so as to attract the children’s’ attention. Materials consisted of four stimuli tests.

Also, to assess the production of the Greek *verbal compounds*, six clips were used. The clips were developed by the first author and lasted ten seconds each. They presented a 10-year old child performing the actions that the participants had to produce. The child performing the actions was located in a house in order for the participants to pay attention only to the actions presented and not, for example, to the landscape. Sloutsky & Napolitano (2003) argued that visual stimuli are more difficult for

children to understand than auditory stimuli. Taking into consideration the aforementioned statement, we included auditory stimuli in the clips as well by adding some sound into them. For instance, the sound of laughter was heard when the child starring in the clips demonstrated the novel compound 'γelopiðó' ('laugh and jump'). However, the sound involved in the clips was heard only by the time the particular action was performed and not during the whole clip to avoid any focus of the children on any other aspect apart from the action.

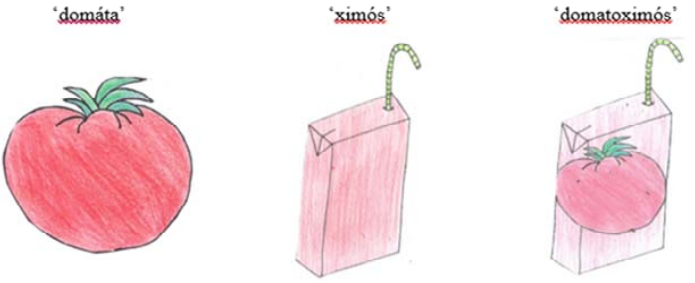

Figure 1. Pictures shown to children for the noun compound 'domatoximós' ('domáta' + 'ximós')

2.3 Procedure

The experiments were conducted in a quiet room at the schools' premises and the participants were tested individually. The experiment was split into two sessions: a picture observation task and a clip observation task. The former aimed at testing noun compounds and the latter at testing verbal compounds. Around 10 minutes were dedicated to each session. At first, a friendly discussion was initiated between the researcher (first author) and the children participating to make them feel comfortable. The researcher introduced herself to the children and expected the same from them as well. A warm-up session followed; making children aware of what a compound is. Two examples were provided before testing; these examples were

different from the stimuli. For instance, each child was given a simplified explanation for compounds as single-meaning words originating from the combination of two separate words. To help them further, they were given one example of the noun compound (noun + noun) and one example of the verbal compound (verb + verb). Participants were told that the answers will not be evaluated in any way. Thus, children were encouraged to proceed to the next item without hesitating to do so. At the end of the tests, the children were verbally rewarded for their participation to the experiments.

2.3.1 Picture observation task

The children sat at a comfortable chair maintaining a close distance from the researcher. They were given the pictures, one by one, and being asked to guess the noun compound sought. For example, the first and second card illustrated two isolated drawings respectively, one for 'domáta' ('tomato') and one for 'ximós' ('juice'), and the third card illustrated the compound formed out of the two words; which in that case would be 'domatoximós' ('tomato juice') (see Figure 1). The first and second cards were provided in a random order to prevent children from creating rules about compound formation. Children were told from the beginning that they should give one response only. Four picture sets were used in the picture observation task. The productions of the children were recorded at a 44.1 kHz sampling using a Zoom H4 audio recorder. There was a total number of 140 responses by all participants.

2.3.2 Clip observation task

After the picture observation task, the children watched the clips, one at a time, and were asked to guess the verbal compound sought. At the beginning of the test, the participants sat in a comfortable chair in front of a laptop. They sat close to the researcher to effectively communicate with each other. The stimuli were presented via the VLC player on a laptop

screen. Specifically, the clips demonstrated two actions following one another. For instance, when the target verbal compound was 'anevokatevéno' (ascend and descend), children were watching a child taking up the stairs (ascend) (first action) and then coming down from the stairs (descend) (second action). By watching these two actions, children had to form the appropriate compound word. Six clips were presented to each participant. The productions of the children were recorded at a 44.1 kHz sampling rate using a Zoom H4 audio recorder as in the picture observation task. There was a total number of 210 responses by all participants.

2.4 Statistical Analysis

We set seven criteria in order to investigate the children's production patterns: a) *correct response,* would indicate whether children were able to produce a correct compound which would follow the rules of compound formation in Greek, b) *use of CG word* and c) *use of English word*, which would indicate whether children were using phonological or morphological patterns from CG and English varieties to form the compound word, d) *absence of –o– linking element*, which would show whether they were using the necessary –o– element to form a Greek compound, e) *stress error,* which would relate either to accentuation on a wrong syllable or double accentuation, e) *head suffix error*, which would have to do with the addition of a wrong inflectional suffix to the head constituent, and f) *modifier and head reversal*, which would relate to the reversing of modifiers or heads (we did not include this for verb + verb compounds since most of the stimuli were pseudo-compounds and therefore they could not have a fixed order). Note that if participants' responses matched for more than one value (e.g., stress error and head suffix error), they were included in all relevant value categories. The judgments for the production patterns of children were made by the first author. The results were transferred to SPSS, version 20.0 to estimate the average number of responses from the descriptive statistics.

For the purposes of examining the effect of children's linguistic and educational background on compound production as well as the factors' interaction, we used *two-way ANOVA* analysis with *Scores* as the dependent variable (average mean of the number of responses on each value) and *Language* (two levels: bilinguals, bidialectals) and *Education* (two levels: preschoolers, first-graders) as the two independent variables.

3. Results

3.1 Noun compounds

Table 2 illustrates the production patterns of children across all values under investigation according to their linguistic and educational background. The findings showed that the most frequent production patterns for noun compounds by order were in majority the correct responses, stress errors, modifier and head reversals, use of CG words, and to a lesser extend head suffix errors and absence of the linking element. For bilinguals, the highest frequency of responses was reported for correct responses followed by stress errors, absence of the linking element, modifier and head reversals, and to a lesser extent use of English words and head suffix errors. Also, preschoolers had a high number of correct responses and stress errors followed by the use of CG word and the absence of the linking element. Firstgraders had in majority correct responses, while stress errors was the second most frequent pattern followed by head suffix errors and use of English words.

For the investigation of the differences across bidialectals-bilinguals and preschoolers-firstgraders, we used *a two-way ANOVA* analysis. Concerning the number of responses on the correct formation of compounds, the two-way ANOVA test indicated that there was a significant effect of Language on *Scores* [$F(1, 33) = 23.4$, $p < .05$] signifying that bidialectals could perform better (M=1.76) than bilinguals (M=1.32). There was an interaction

of *Language* × *Education* [$F(1, 33) = 14.9$, $p < .05$]. To investigate further this interaction, two one-way ANOVA tests were run involving bidialectals and bilinguals separately, with *Education* as the factor. The results showed that there was a significant effect of *Education* in the case of both bidialectals [$F(1, 18) = 17.6$, $p < .05$] and bilinguals [$F(1, 13) = 21.8$, $p < .05$] with first-grade bidialectals to outperform preschool bidialectals (M= 2.24 vs. M=1.4) and preschool bilinguals to outperform first-grade bilinguals (M=1.88 vs. M=0.32). Another two one-way ANOVAs for preschoolers and firstgraders respectively with *Language* as the factor revealed a significant effect of *Language* for firstgraders [$F(1, 12) = 9.8$, $p < .05$], indicating that first-grade bidialectals (M=2.24) outperformed first-grade bilinguals (M=0.32).

Regarding the use of CG word, the statistical analysis showed that there was a significant effect of *Language* [$F(1, 33) = 17.5$, $p < .05$] and *Education* [$F(1, 33) = 19.9$, $p < .05$] revealing that bidialectals and preschoolers were using more frequently CG words than bilinguals and firstgraders respectively. The interaction of *Language* × *Education* [$F(1, 33) = 14.9$ $p < .05$] was also significant. The one-way ANOVA analysis showed that there was a significant effect of *Education* only for bidialectal speakers [$F(1, 18) = 27.5$, $p < .05$]; preschoolers were using more frequently CG words (M=0.92) than firstgraders (M=0). Also, another one-way ANOVA test showed that *Language* had a significant effect on Scores [$F(1, 19) = 5.24$, $p < .05$] with preschool bidialectals to use more frequently CG words (M=0.92) than preschool bilinguals (M=0).

The two-way ANOVA tests for the value "absence of –o– element" showed a significant effect of *Language* [$F(1, 33) = 7.3$, $p < .05$], *Education* [$F(1, 33) = 11.1$, $p < .05$)] and *Language* × *Education* [$F(1, 33) = 6..8$, $p < .05$] interaction on Scores. That is, bilinguals and preschoolers were not using this element more frequently than bidialectals and firstgraders respectively. A further one-way ANOVA test on the interaction revealed that

there was a significant effect of *Education* for bilinguals [$F(1, 13) = 10.6$, $p < .05$], with preschoolers leaving behind the –o– element in more responses (M=0.56) than firstgraders (M=0.12). Also, another *one-way ANOVA* test with *Language* as the factor indicated a significant effect of *Language* on *Scores* for preschoolers [$F(1, 19) = 13.1$, $p < .05$], implying that preschool bilinguals did not use the linking element in more responses (M=0.92) than preschool bidialectals (M=0.56).

Furthermore, the analysis showed that there was a significant effect of *Education* [$F(1, 33) = 17.9$, $p < .05$], implying that preschoolers were more sensitive in making stress-related errors in compound production than firstgraders. The *Language* × *Education* interaction was significant. The following one-way ANOVA analyses showed a significant effect of *Education* for both bidialectals [$F(1, 18) = 12.6$, $p < .05$] and bilinguals [$F(1, 13) = 19$, $p < .05$], indicating that bidialectal preschoolers had less stress-related errors (M=0.24) than firstgraders (M=1.24) and bilingual firstgraders had less stress-related errors (M=0) than preschoolers (M=1.24). Moreover, another two one-way ANOVAs with *Language* as the factor showed a significant effect of *Language* for both preschoolers [$F(1, 19) = 8.7$, $p < .05$] and firstgraders [$F(1, 12) = 23.6$, $p < .05$]; preschool bilinguals had more stress errors (M=1.24) than preschool bidialectals (M=0.24), and first-grade bilinguals had more stress errors (M=1.24) than first-grade bidialectals (M=0).

In regard to head suffix errors, there was an interaction of *Language* × *Education.* The one-way ANOVA test showed that the *Education* factor was significant only for bilinguals [$F(1, 13) = 5.9$, $p < .05$]; firstgraders had more such errors (M=0.32) than preschoolers (M=0).

Table 2. Production of Greek noun compounds (noun + noun) by children. *M* represents the average number of responses (out of 4)

	M			
Response	**B/dial.**	**B/ling**	**Presch**	**Firstgrad.**
Correct	1.76	1.32	2.34	2.4
Use of CG word	0.32	0.08	0.46	0.06
Use of English word	0	0.2	0	0.16
Absence of –o– element	0.12	0.4	0.28	0.06
Stress error	0.72	0.64	1.36	0.62
Head suffix error	0.24	0.2	0.16	0.24
Modifier and head reversal	0.36	0.32	0.16	0.06

3.2 Verbal Compounds

Table 3 illustrates the production patterns of children across all values under investigation according to their linguistic and educational background. Most of the bidialectals' responses were correct, with the use of CG words to follow but to a much lesser extent. Bilinguals' responses were also correct in the majority followed by the absence of the linking element and head suffix errors. Preschoolers had a great number of correct responses and very few responses with regards to the absence of the linking element, the use of English words and head suffix errors. Firstgraders had a great number of correct responses as well and a few stress errors.

The two-way ANOVA analysis revealed that there was a significant effect of *Language* [$F(1, 33) = 8.7$, $p < .05$] and *Education* [$F(1, 33) = 7.2$, $p < .05$] on the *Scores* of correct responses. Thus, bidialectals and firstgraders had more correct responses than bilinguals and preschoolers correspondingly with respect to the formation of verbal compounds. The interaction of *Language* × *Education* was also significant [$F(1, 33) = 11.7$, $p < .05$]. Two

further one-way ANOVA tests on this interaction showed that there was an effect of *Education* on *Scores* for both bidialectals [$F(1, 18) = 16.5$, $p < .05$] and bilinguals [$F(1, 13) = 24.2$, $p < .05$]. Specifically, first-grade bidialectals had more correct responses (M=4.98) than preschool bidialectals (M=1.98) and preschool bilinguals had more correct responses (M=3) than first-grade bilinguals (M=1.5). Also, another two one-way ANOVAs showed a significant effect of *Language* for both preschoolers [$F(1, 19) = 15.6$, $p < .05$] and firstgraders [$F(1, 12) = 24.2$, $p < .05$]. Specifically, bilingual preschoolers had more correct responses (M=3) than bidialectal preschoolers (M=1.98), and bidialectal firstgraders had more correct responses (M=4.98) than bilingual firstgraders (M=1.5).

In regard to the use of CG words, there was an interaction of *Language* × *Education* [$F(1, 33) = 7.2$, $p < .05$]. The one-way ANOVA analysis showed a significant effect of *Education* for bidialectals [$F(1, 18) = 5.1$, $p < .05$]; bidialectal preschoolers were using more frequently CG words (M=0.24) than bidialectal firstgraders (M=0).

With respect to the absence of –o– element, it was found an interaction of *Language* × *Education* [$F(1, 33) = 4.9$, $p < .05$]. A further investigation of this interaction with one-way ANOVA tests indicated a significant effect of *Language* on Scores for firstgraders [$F(1, 12) = 8.6$, $p < .05$]. That is, first-grade bilinguals were omitting more frequently the linking element (M=0.36) than first-grade bidialectals (M=0).

Table 3. Production of Greek verbal (verb + verb) compounds by children. *M* represents the average number of responses (out of 6)

	M			
Response	**B/dial.**	**B/ling**	**Presch**	**Firstgrad.**
Correct	2.82	1.8	3.48	3.99
Use of CG word	0.18	0	0.12	0
Use of English word	0	0	0	0
Absence of –o– element	0	0.24	0.18	0.18
Stress error	0	0	0	0
Head suffix error	0	0.06	0.09	0
Modifier and head reversal	-	-	-	-

4. Discussion

The study investigated the Greek compound production patterns of bidialectal and bilingual children and examined the effect of formal schooling on the production of Greek compound words by involving both preschool and first-grade students in the experiments. The experiments included a picture observation task for the production of noun + noun compounds and a clip observation task for the production of the verb + verb compounds. The investigation of the children's production patterns focused on their ability to correctly form Greek compounds, the interference of the varieties spoken by bidialectals and bilingual speakers with the production of compounds, and errors with respect to the compound production (related to the absence of the necessary linking element, the stress, the head suffix and the position of the modifier/head). The general findings demonstrated that although all children had a significant number of correct responses with respect to the formation of Greek compounds, the second

most popular pattern was the stress errors in the case of noun compounds, yielding that children were struggling with the position of compound stress. The children's patterns demonstrated that verbal compounds were easier to form since they had more correct responses compared to noun compounds and only a few errors related to the absence of the –o– linking element. However, we cannot generalize this finding as there were differences between the two tasks; i.e., the clips might have been easier to be understood than the pictures.

The results showed that bidialectals were more successful than bilinguals in correctly forming Greek noun and verbal compounds only when both populations were first-grade students. These findings might relate to the systematic teaching of the language structures and the educational process. For example, bidialectal and bilingual preschoolers despite having knowledge in SMG, they were not aware of its structures and this would justify their equal performance in the compound production task. By contrast, the first-grade bidialectals were attending Greek-speaking schools and therefore were in contact with SMG, increasing in that way their metalinguistic awareness in that variety, while first-grade bilinguals were attending English-speaking schools and thus they were not receiving any teaching in SMG; therefore, the former population of children was more aware of the SMG structures than the latter population. Among the factors that were investigated in relation to the children's Greek compound production patterns was language interference. Specifically, it was found that CG interfered only in the noun and verbal compound productions of preschool bidialectals and not to those of preschool bilinguals. For instance, children were using semantically close dialectal words, substituting one of the word constituents, e.g., '*p*^{x}*ianno*klíno' ('p^{x}iánno' means 'I take' in CG) instead of 'νγazoklíno', or semantically dissimilar dialectal words for the first constituent because they misinterpreted the object, e.g., *stillós*pito instead of 'spirtóspito' ('stíllos' means 'pillar' in CG). It has to be taken

into account that bidialectal preschoolers use predominantly the 'low' CG variety during their daily life. On the contrary, bilingual preschoolers use both the CG and the English language equally in their daily life, and therefore the use of CG is lower compared to bidialectals.

Concerning errors in the production of Greek compounds, bilinguals were omitting the –o– linking element for the connection of the noun and verbal compound constituents more frequently than bidialectals. For example, the Greek compound 'domatoximós' ('tomato juice') from 'domáta' ('tomato') and 'ximós' ('juice') was formed as 'domataximós'* by connecting the two stems. These patterns might have emerged as interference from their L2 since English compounds often follow a lenient internal composition (i.e., by linking two stems or two words, or a combination of both), e.g., 'toothpaste' ('tooth' + 'paste'). Similarly, Tzakosta (2017) observed a lenient internal formation of Greek compounds by foreign learners of Greek, which can be considered as an effect from their L1. Specifically, German learners of Greek were forming Greek compounds with simple conjunction of two stems (and with the absence of the compulsory linking element) just like in their L1, e.g., 'meránixta'* → 'méra' ('day') + 'nixta' ('night') instead of the correct 'mer(ó)nixta' 'day and night'. Furthermore, –o– was omitted in verbal compounds, e.g., 'γelapiðó'* instead of 'γelopiðó'. Also, both bilingual preschoolers and firstgraders had more stress-related errors compared to bidialectal groups for noun compounds. In particular, some compounds were produced with double accentuation (a single stress on each constituent) by the bilinguals (and especially firstgraders), e.g., 'marélo-súpa'*, spírto-spít(i)*. Although this pattern violates the Greek compound stress rule, this is a normal phenomenon in their L2, that is, English. Thus, they probably transferred a compound prosody rule from English to Greek. Some other productions contained other stress errors, e.g., stress on a wrong syllable: e.g.,'moromandíl(i)'*. With respect to head suffix errors and modifier-head reversals, the errors were not a lot in number and both

bidialectals and bilinguals did not differ with each other in the frequency of such errors, e.g., 'spitóspirto'*.

Another crucial question that this study aimed to answer was the effect of formal education on the production patterns of both bidialectals and bilinguals. In particular, first-grade bidialectals outperformed preschool bidialectals in the formation of correct noun and verbal Greek compounds. We assume that this might be linked with their enhanced metalinguistic awareness which is fostered by their increased exposure to SMG input as well as by the systematic teaching of language structures and rules. It has to be considered that they receive an important amount of speech input in SMG, being able consequently to compose compounds with more success than bilinguals. However, contradictory findings emerged for the production of Greek compounds by bilingual speakers since preschoolers outperformed firstgraders in the formation of correct Greek compounds. It is important to refer to the linguistic biographies of these populations. We already know that bilingual firstgraders attended English-speaking primary schools and therefore they had much more input in English than preschoolers. It can be said that due to their attunement to speech input and their reception of systematic teaching in a language other than Greek, firstgraders 'lost' the ability to form Greek compounds with such ease as preschoolers do.

Furthermore, the more frequent use of CG words by bidialectal preschoolers than bidialectal firstgraders can be explained on the basis of speech input reception since there is a systematic contact of children with SMG through their attendance at formal schooling. In regard to the errors of children in the production of Greek compounds, it was found that preschoolers were omitting the –o– element in noun compounds on a more systematic basis than firstgraders; especially bilinguals who were using the inflectional ending of the first constituent of the compound instead of the linking element, e.g., 'maréla' + 'súpa' → 'marel*á*supa'*. 'domát*a*' + 'ximós' → 'domat*a*ximós* Similar patterns were observed by Tzakosta and Manola

(2012) who investigated the production of Greek compounds by preschool and primary school Greek children. Specifically, they found that children were using the inflectional ending of the first constituent instead of the –o– element when producing some compounds, e.g., 'laδ(i)lémono'* ('láδι' + 'lemóni') instead of 'laδ(o)lémono', 'oil and lemon'. In addition, the authors argued that preschoolers were able to form compounds that include the –o– linking element only by 40% for real words and by 20% for nonsense words. Interestingly, bidialectal preschoolers had less stress-related errors than firstgraders, and vice versa for bilinguals. This was not expected since bidialectal firstgraders had more exposure in the formal language and therefore higher metalinguistic skills, and bilingual firstgraders had more contact with English than Greek. Concerning the head suffix errors, bilingual firstgraders had more such errors than bilingual preschoolers. An example of such errors was the formation of 'spirtóspit(i)' instead of 'spirtóspit(o)'. Note that these errors are common for Greek children since according to Tzakosta and Manola (2012), they tend to replace the [stem stem] structure with the [stem word] as they feel more certainty to form compounds of which the second constituent maintains its morphophonological features. Finally, no differences emerged for the modifier and head reversals between preschoolers and firstgraders.

5. Conclusions

The study shed light on the Greek compound production patterns of bidialectal and bilingual children and the effect of formal schooling on these productions. The findings are not generalizable due to the small number of participants, however, they can offer some evidence for the understanding of compound formation by bidialectal-bilingual and preschool-first-grade children and the differences between these populations respectively, which were not investigated much in the literature.

In general, bidialectal preschool children outperformed bilingual children in the formation of correct compounds and they had relatively fewer errors than bilinguals, while there was a prevalent interference of the 'low' dialectal variety (CG) in their productions. Also, first-grade bidialectals performed better than preschool bidialectals in the formation of correct compounds and had fewer errors during compound formation, but bilingual firstgraders demonstrated worse

performance in general than bilingual preschoolers.

We assume that these differences are affected by the children's linguistic repertoire and their attunement to the speech input of their environment. For example, bidialectal preschoolers have to cope with one language, while bilinguals have to cope with two different languages (which differ as well in the way they form compounds) and thus they often transfer structures from one language to the other. In other words, the similarity between dialects (i.e., CG, SMG) is larger than the similarity of languages (i.e., CG/SMG, English), providing an advantage of bidialectals over bilinguals in Greek compound formation. Furthermore, formal education contributed to better compound production for first-grade than for preschool bidialectals due to their attendance at Greek-speaking schools and the reception of explicit instruction, while compound production was poor for first-grade bilinguals compared to preschool bilinguals since the former population attended English-speaking schools; decreasing in that way their capability to adequately master Greek. Nevertheless, we are aware that these differences might be due to the effect of several other linguistic (e.g., vocabulary size, stimuli), sociolinguistic (e.g., gender, attitude against each variety), biological (e.g., cognitive functions), and other factors which can be examined in a future study. The findings might also have pedagogical value since they revealed Greek compound production patterns of children. Thus, they can be employed for the implementation of compound teaching that would help young learners overtake problems concerning the formation of Greek compounds.

References

Antoniou, K., Grohmann K., Kambanaros, M., & Katsos, N. (2016). The effect of childhood bilectalism and multilingualism on executive control. *Cognition, 149*, 18–30.

Athanasopoulou, A., & Vogel, I. (2014). Compounds in Modern Greek. *The Journal of the Acoustical Society of America, 136*(4), 2176-2176.

Ben-Zeev, S. (1977). The influence of bilingualism on cognitive strategy and cognitive development. *Child Development, 48*(3), 1009-1018.

Berko, S. (1958). The child's learning of English morphology. *Word, 14*, 150–77.

Berman, R. A. (1987). A developmental route: learning about the form and use of complex nominals in Hebrew. *Linguistics, 25*, 1057–85.

Bialystok, E. (1986). Factors in the Growth of Linguistic Awareness. *Child Development, 57*, 498–510.

Bialystok, E., & Ryan, E. B. (1985). Toward a definition of metalinguistic skill. Merrill-Palmer. *Quarterly, 31*(3), 229-251.

Bien, H., Levelt, W., & Baayen, R. (2005). Frequency effects in compound production. *Proceedings of the National Academy of Sciences of the United States of America, 102*(49), 17876–17881.

De Jong, N., Feldman, L., Schreuder, R., Pastizzo, M., & Baayen, R. (2002). The processing and representation of Dutch and English compounds: Peripheral morphological and central orthographic effects. *Brain and Language, 81*(1–3), 555–567.

Deacon, S. H., & Kirby, J. R. (2004). Morphological Awareness: Just 'More Phonological'? The Roles of Morphological and Phonological Awareness in Reading Development. *Applied Psycholinguistics, 25*, 223-238.

Deacon, S. H., Wade-Woolley, L., & Kirby, J. (2007). Crossover: The Role of Morphological Awareness in French Immersion Children's Reading. *Developmental Psychology, 43*(3), 732–746.

Downing, P. (1977). On the Creation and Use of English Compound Nouns. *Language, 53*(4), 810-842

Duñabeitia, J., Perea, M., & Carreiras, M. (2007). Do transposed-letter similarity effects occur at a morpheme level? evidence for morphoorthographic decomposition. *Cognition, 105*(3), 691–703.

Georgiou, G. P. (2018). Discrimination of L2 Greek vowel contrasts: Evidence from learners with Arabic L1 background. *Speech Communication, 102,* 68-77.

Georgiou, G. P. (2020). The Language Errors of a Swiss German Speaker of Greek as an L2: A Case Study. *Athens Journal of Philology,* 7(2), 115-124.

Georgiou, G. P., & Themistocleous, C. (2020). Vowel Learning in Diglossic Settings: Evidence from Arabic-Greek Learners. *International Journal of Bilingualism*, 1-16. doi: 10.1177/1367006920945396

Gumnior, H., Bölte, J., & Zwitserlood, P. (2006). A chatterbox is a box: Morphology in german word production. *Language and Cognitive Processes, 21*(7–8), 920–944.

Kiparsky, P. (2009). Verbal Co-compounds and Subcompounds in Greek. *MIT Working Papers in Linguistics, 57*, 1-9.

Kirk, N. W., Fiala, L., Scott-Brown, K. C., & Kempe, V. (2014). No evidence for reduced Simon cost in elderly bilinguals and bidialectals. *Journal of Cognitive Psychology, 26,* 640–648.

Koliopoulou, M. (2020). Linking elements in German compounds: A morphological analysis in comparison with Greek. In M. Georgiafentis, G. Giannoulopoulou, M. Koliopoulou & A. Tsokoglou (eds) *Contrastive Studies in Morphology and Syntax* (pp.102-118). London: Bloomsbury Publishing.

Krott, A., & Nicoladis, E. (2005). Large Constituent Families Help Children Parse Compounds. *Journal of Child Language, 32*(1), 139-158.

Krott, A., Gagné, C., & Nicoladis, E. (2009). How the Parts Relate to the Whole: Frequency Effects in Children's Interpretations of Novel Compounds. *Journal of Child Language, 36,* 85-112.

Kuperman, V., Schreuder, R., Bertram, R., & Baayen, R. (2009). Reading polymorphemic dutch compounds: Toward a multiple route model of lexical processing. *Journal of Experimental Psychology: Human. Perception and Performance, 35*(3), 876–895.

Lauer, M. (1995). *Designing Statistical Language Learners: Experiments on Noun compounds.* (Doctoral dissertation, Macquarie University, Australia)

McBride-Chang, C., Shu, H., Zhou, A. B., Wat, C. P., & Wagner, R. K. (2003). Morphological awareness uniquely predicts young children's Chinese character recognition. *Journal of Educational Psychology, 95*, 743–751.

McDonald, M. B. (1982). *Understanding noun compounds* (Doctoral dissertation, Carnegie-Mellon University).

Nespor, M, & Ralli, A. (1996). Morphology-Phonology Interface: Phonological Domains in Greek Compounds. *The Linguistic Review, 13*, 357-382.

Nicholas, N., & Joseph, B. D. (2009). Verbal dvandvas in Modern Greek. *MIT Working Papers, 57.*

Ralli, A. (2003). Morphology in Greek linguistics: The State of the Art. *Journal of Greek Linguistics, 4,* 77–129.

Ralli, A. (2007). Greek Deverbal Compounds with bound stems. *Southern Journal of Linguistics, 29*(1/2), 150-173.

Ralli, A. (2008). Compound Markers and Parametric Variation. *Language Typology and Universals (STUF), 61*, 1-20.

Ralli, A. (2009a). Hellenic compounds. In R. Lieber & P. Stekauer (eds.), *The Oxford Handbook of Compounding* (pp. 453-463). Oxford/New York: Oxford University Press

Ralli, A. (2009b). Morphology Meets Dialectology: *Insights from Modern Greek Dialects. Morphology, 19*, 87-105.

Ralli, A. (2013). *Compounding in Modern Greek.* Dordrecht: Springer.

Rispens, J. E., McBride-Chang, C., & Reitsma, P. (2008). Morphological awareness and early and advanced word recognition and spelling in Dutch. *Reading and Writing, 21,* 587–607.

Schlücker, B, & Plag I. (2011). Compound or Phrase? Analogy in Naming. *Lingua, 121*(9), 1539-1551

Shomoossi, N., & Shomoossi, A. (2012). A review of light verb constructions in English and Persian complex predicates. *Acta Linguistica, 6*(2), 3-12.

Sloutsky, V. M., & Napolitano, A. (2003). Is a Picture Worth a Thousand Words? Preference for Auditory Modality in Young Children. *Child Development, 74*, 822-833.

Smirniotopoulos, J., & Joseph D. B. (1998). Syntax versus the Lexicon: Incorporation and Compounding in Modern Greek. *Journal of Linguistics, 34*, 447–488.

Tzakosta, M., & Manola, D. (2012). Κατανόηση και παραγωγή συνθέτων από παιδιά προσχολικής ηλικίας: διδακτικές προεκτάσεις [Comprehension and production of compounds by children of preschool education: teaching approaches]. In K. D. Malafantis et al. (Eds.) *Proceedings of the 7th International Conference of the Greek Pedagogical Society* (pp. 1119-1130). Athens: Diadrasi.

Tzakosta, M. (2017). Compound formation by native and second language learners of Greek. *Educational Sciences, 1,* 133-158.

Williams, E. (1981). On the notions 'lexically related' and 'head of a word'. *Linguistic Inquiry, 12*, 245-274.