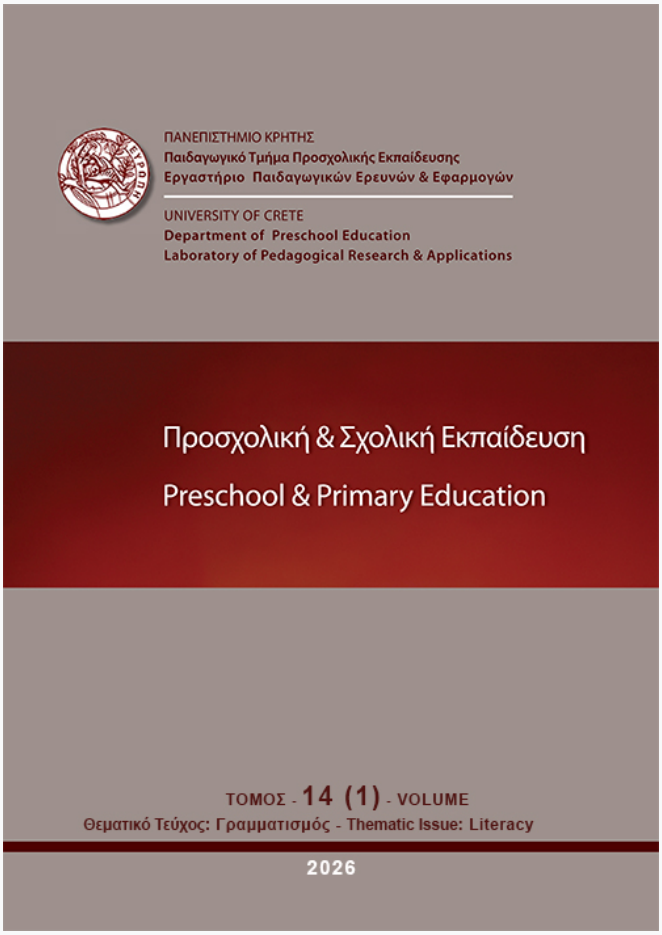
Preschool and Primary Education

Τόμ. 14, Αρ. 1 (2026)

Θεματικό τεύχος: Γραμματισμός



Do syllable structure and word length affect the spelling performance of 11-year-old Greek students with and without literacy difficulties?

Vassilios Papadimitriou, Georgia Niolaki, Aris Terzopoulos

doi: 10.12681/ppej.39298

Βιβλιογραφική αναφορά:

Papadimitriou, V., Niolaki, G., & Terzopoulos, A. (2026). Do syllable structure and word length affect the spelling performance of 11-year-old Greek students with and without literacy difficulties? . *Preschool and Primary Education*, *14*(1), 125–143. https://doi.org/10.12681/ppej.39298

Preschool & Primary Education
2026 Volume 14, Issue 1, pp. 125-143
e-ISSN: 2241-7206

Laboratory of Pedagogical Research & Applications
Department of Preschool Education, University of Crete
doi: : https://doi.org//10.12681/ppej.39298

Do syllable structure and word length affect the spelling performance of 11-year-old Greek students with and without specific learning disabilities?

Vassilios Papadimitriou
Hellenic Open University

Georgia Niolaki
University of Birmingham

Aris Terzopoulos
Birmingham City University

Abstract. Analysing the spelling difficulties of students with and without specific learning disabilities (SpLDs) through written text production offers greater ecological validity. These texts capture authentic errors made during free writing, providing insight into the types of mistakes learners make without the pressure of a formal spelling test. This study first examined if the number of spelling errors produced by students with and without SpLDs in a free writing task differed as a function of parts of speech and learning disability status. The second research aim was to investigate whether the type of errors made (phonological, suffix and stem errors) are related to the syllabic structure. Finally, the third aim examined whether word length (in terms of syllables) is related to the syllable structure and, specifically, the position in which the error was made. Thirty-two Greek-speaking students without and twenty with a diagnosed SpLD at the age of eleven wrote a short descriptive text without external support. A factorial ANOVA revealed that students with SpLDs made more spelling errors for all parts of speech except participles. A chi-square was used to examine the associations between syllable structure, the position of the error, and the error type. The analysis showed-significant associations between error type and syllable phonetic structure for both groups. Finally, a multinomial logistic regression revealed that word length is associated with the syllable structure and the position of the error only for students without SpLD. Developing the spelling skills of all Greek students should not be neglected or underestimated in favour of reading instruction. The proposed analyses of spelling errors made will help teachers adjust their instruction and literacy researchers focus their attention on less investigated spelling parameters.

Keywords: Greek orthographic system; specific learning disabilities; spelling performance; syllable structure, word length

Introduction

Spelling is important in academic and daily life contexts (Galuschka et al., 2020; Treiman, 2017). Accurate spelling is also an essential aspect of the writing process as it extricates cognitive resources, permitting the writer to focus on text generation and

Correspondent Author: *Vassilios Papadimitriou*, School of Humanities, Hellenic Open University, 18 Aristotelous St, 26335, Patras, Greece. e-mail: papadimitriou.vasileios@ac.eap.gr

e-publisher: *National Documentation Centre, National Hellenic Research Foundation*
URL: http://ejournals.epublishing.ekt.gr/index.php/education

completing school tasks (Giazitzidou et al., 2024; Spantidakis, 2011). However, spelling is a subject that many learners struggle with in both transparent and opaque orthographies (Treiman, 2017).

The current study examines spelling errors made in the semi-transparent Greek orthography (Andreou et al., 2024). The estimated consistency of the Greek orthography has been calculated at 95.1% for reading and 80.3% for spelling, revealing that spelling is a more demanding task than reading (Protopapas, 2017; Protopapas & Vlahou, 2009). For example, a speller may have to choose from a set of alternative graphemes <ι>, <η>, <υ>, <ει>, <οι> to represent the phoneme /i/ (e.g. v*οί*κι */niki/*- rent, v*ί*κη */niki/*- *victory*). Such inconsistencies appear to be the primary source of difficulties in spelling even for Greek students without diagnosed specific learning disabilities (henceforth: SpLDs) (i.e., Andreou et al., 2016; Diamanti et al., 2014; Pantazopoulou & Diakogiorgi, 2017). This is the case because a word could be orthographically wrong but phonetically intact. An additional barrier is that stem errors are not easily predictable by context; the students also need to understand the word's etymology (Protopapas et al., 2013).

Furthermore, the Greek language has rich morphology and belongs to the inflected languages (Andreou et al., 2024). Six out of the 10 parts of speech are inflected (Fragkouli et al., 2022). The morphemes are used either to create words (lexical morphemes) or to give grammatical knowledge (prefixes, derivational and inflectional morphemes), such as the gender and the grammatical category of a noun or the person and the number of a verb (e.g. *πληρώνω /plirono/: πληρ-* (lexical) + *-ώνω* (inflectional) = pay) (Pantazopoulou et al., 2022). Consequently, young students encounter complex words as early as first grade, making systematic instruction in morphology necessary and beneficial from Grade 1 (Tsesmeli, 2019). It is also important to note that 7-10-year-old Greek students make fewer phonological errors (Niolaki & Masterson, 2012). This finding was reaffirmed by Protopapas et al. (2013) for Greek students in grades 3-6.

The role of syllabic structure

Although there is no common ground on how the syllabic structure of languages should be determined (Borleffs et al., 2017), it is considered one of the most characteristic differences among languages (Coulmas, 2003). In this study, we followed Steriade (1999), who argued that the knowledge of syllable structure is based on our perception of word-based phonotactic regularities, eventually allowing us to identify syllable position.

Seymour et al. (2003) proposed that the syllabic structure dimension primarily distinguishes between Germanic languages (e.g., German, Swedish, English, etc) and Romance languages (e.g., Italian, Spanish, etc.). Germanic languages are more difficult to acquire due to many closed CVC syllables (C stands for consonants, V to vowels throughout the paper) and complex initial or final consonant blends. In contrast, Romance languages can be more easily acquired because the majority of the syllables are open CV with few initial or final consonant blends (Seymour et al., 2003). As for the syllable structure in Greek, most syllables are open CV (CV: almost 56%), syllables with a vowel are estimated at 17%, while Greek spellers seldom confront with more complex syllables (estimated about 15% of syllable tokens) (Protopapas et al., 2012).

Digraphs are likely to be treated as individual phonological units and, hence, are difficult to split into phonemes (Treiman, 1991). Besides, the consonant phonemes in the cluster are co-articulated (Serrano & Defior, 2012). As a result, it could be suggested that languages where open CVs prevail facilitate phonological awareness skills. In contrast, phonological and/or phonemic awareness skills deficits are more likely to appear in languages where complex syllabic structures and consonant digraphs and blends dominate (Borleffs et al., 2017). Cross-linguistic studies reaffirm this argument. For example, children

who speak French, where open syllables are prevalent, demonstrated better phonological awareness skills than their English-speaking counterparts (Duncan et al., 2006).

Martinez and Goikoetxea (2020) found that letter knowledge was the strongest predictor of reading and spelling words and pseudowords with a simple structure in Spanish, while phonological awareness did not mediate this relationship. Conversely, phonological awareness plays both a predictive and mediating role in processing complex-syllable stimuli. In fact, when encountering complex syllables, beginning Spanish readers cannot rely solely on letter knowledge; instead, they use phonemic manipulation, such as segmenting complex syllables into their phonemes (Martinez & Goikoetxea, 2020). Similarly, it has been reported that phonological and morphological awareness skills were significant independent predictors in multisyllabic word spelling in English, which is expected since multisyllabic words are more likely to be multimorphemic (Enderby et al., 2021). Morphological awareness within longer words probably supports memory mechanisms which function as "islands of regularity" in printed words (Rastle et al., 2000). In parallel, implementing advanced phonological skills was essential to correctly spell long and complex words (Enderby et al., 2021).

Word length

Word length seems to affect spelling performance. Word length is measured in the number of equivalent elements in one (spatial) dimension (e.g. letters, morphemes, syllables) and is closely interrelated with word frequency, sentence and syllable length (Grzybek, 2016). The most commonly used measure of word length is syllables per word because it ensures generalisation, as it can be applied across all languages (Popescu et al., 2013). Moreover, syllables per word are more related to phonological than orthographic aspects of word processing (Barton et al., 2014). Indicatively, Tsesmeli (2019) investigated developmental changes in the spelling performance of derivational suffixes by Greek children of typical development 7-14 years old. Data showed that letter length effects of suffixes indexed by their number of syllables significantly affected all age groups. More specifically, longer orthographic structures (three-syllable items) were linearly more challenging for spellers than shorter (two- and one-syllable items). As for the age, students in Grades 1-2 were less accurate, which was in line with reports from other transparent orthographies (see more in Gagl et al., 2015).

Likewise, a study in Portuguese, an orthography of intermediate depth, showed that consonant blends and stress marks in two-syllable words were spelled more accurately than in three-syllable words which was attributed to the cumulative difficulty imposed by the blend itself and the more complex trisyllabic structure (Mesquita et al., 2020). Iaia et al. (2022) examined, among others, the word length effect on spelling accuracy of Italian first graders using a spelling-to-dictation task of single words and found that the spelling of longer in-syllable items is more error-prone due to the heavier demands on buffering mechanisms (i.e., on phonological short-term memory) as well as the greater number of letters to be spelled and ortho-tactic difficulties (e.g. the word *λεμόνι /lemoni/* = lemon is more likely to be spelled correctly compared to the word *λεμονοστίφτης /lemonostiftis/* = lemon squeezer). Finally, the study of Juul and Petersen (2017) in Danish (an opaque orthography) revealed weak length effects (i.e. letter items) only for third graders and no length effects for students beyond fifth grade. In contrast, length effects were evident at all age levels for the dyslexic students.

Spelling performance of students with Specific Learning Disabilities (SpLD)

SpLD is a broad category which incorporates disorders in reading, mathematics, writing and spelling and learning disorders not otherwise specified (Peterson et al., 2021) and

include diagnoses of dysgraphia, dyslexia or oral and written language learning disabilities (see more extensively in Bahr et al., 2020). During recent years, there has been a growing interest in the spelling difficulties of students with dyslexia and other SpLDs (Cidrim & Madeiro, 2017). For children with SpLDs, spelling acquisition is challenging, often accompanied by continuous failure and unsatisfactory improvement (Fragkouli et al., 2022). Several studies in different orthographies agree that the spelling performance of children with SpLDs falls short compared to that of children without SpLDs (see more in Fragkouli et al., 2022). The literature suggests that students must develop phonological, orthographic and morphological skills to improve their spelling skills (Bahr et al., 2020; Niolaki et al., 2022).

It has been established that Greek-speaking students, especially those with learning disabilities, face persistent problems with spelling acquisition (Protopapas, 2017), mainly due to the rich morphological structure (Andreou et al., 2024). For instance, Diamanti et al. (2014) found that the spelling performance of the group of dyslexic students aged 10-13 years old was inferior to the performance of their peers without dyslexia. Accordingly, Greek and U.S. English spellers appeared to have severe problems with word spelling under dictation (Giannouli & Pavlidis, 2014). Qualitative analyses of the spelling errors in the Greek orthographic system of students with and without dyslexia revealed that both groups struggled mainly with derivational suffix errors (e.g. παιδ-*ικό /pethico/* = childish) and secondarily with errors on inflectional suffixes (e.g. παιδ-*ί /pethi/* = child) and stem errors (e.g. π*αι*δ-ικό = childish), but this is more evident for the former group of dyslexic students (Diamanti, 2005; Protopapas et al., 2013).

Among other things, Pantazopoulou et al. (2022) examined the accuracy of Greek-speaking children with and without spelling difficulties using a spelling level-matched design at two-time points. The group of students with diagnosed spelling difficulties performed worse than the chronological age-matched group, but similar to that of the spelling age-matched group. All groups had difficulties with derivational spelling (e.g. ματ-*ώνω /mat-ono/* = bleed), unveiling that the linguistic characteristics of the morphemes are crucial for spelling for all children (Pantazopoulou et al., 2022).

The present study

As can be deduced from the literature review, no former research study examined the spelling errors produced by students with and without SpLD during a free writing task in relation to all parts of speech in Greek. To our knowledge, no former studies in Greek (e.g. Tsesmeli, 2019) or other languages (e.g. Mesquita et al., 2020 for Portuguese and Iaia et al., 2022 for Italian) examined how word length is associated with syllable structure effects on students' spelling performance for words up to three syllables.

As a result,

a. the first research aim of this study was to examine if the number of spelling errors produced by experienced 11-year-old Greek-speaking students with and without SpLD in a free writing task differed as a function of a. parts of speech and b. learning disability status;
b. the second research aim was to investigate whether the type of errors made (phonological, suffix and stem errors) are related to the syllable structure;
c. and the third aim was whether word length (in terms of the number of syllables in the words where errors occurred) is related to the syllable structure where the error was made.

Method

Participants

Thirty-two of them were typically developing students (16 males and 16 females), while twenty were diagnosed with SpLD (12 males and 8 females). Eighteen students without SpLD (10 males and 8 females) and 12 with SpLD (7 males and 5 females) attended schools in Athens, while 14 students without SpLD (6 males and 8 females) and 8 with SpLD (5 males and 3 females) attended semi-urban and rural schools in two regions of the Peloponnese.Table 1 presents participants' demographics concerning residence, gender and specific learning disability (SpLD) status.

Table 1 Participants' demographics concerning residence, gender and specific learning disability (SpLD) status [N (%) *].

	Urban			Semi-urban & rural		
	Male	Female	Total	Male	Female	Total
no SpLD	10 (19.2%)	8 (15.4%)	18 (60.0%)	6 (11.5%)	8 (15.4%)	14 (63.6%)
SpLD	7 (13.5%)	5 (9.6%)	12 (40.0%)	5 (9.6%)	3 (5.8%)	8 (36.4%)
Total	17 (12.7%)	13 (25.0%)	30 (57.7%)	11 (22.1%)	11 (22.1%)	22 (42.3%)

* % refer to the whole sample

All schools followed the same official national curriculum. Thirteen of the participants with SpLD were diagnosed with dyslexia (7 males and 6 females), and 7 with oral and written language learning disabilities (5 males and 2 females). All students with SpLD were enrolled in inclusion classes. It should be mentioned that SpLDs were not identified through researchers' standardized assessments because they were not granted such permission. Instead, they were based on the diagnoses provided by the official state Interdisciplinary Centers of Assessment and Counselling Support (henceforth IACSC) (Law 4823, 2021; Papadimitriou & Koutsoklenis, 2023).

Research materials

Participants were given a sheet containing the title of the topic ('Describe your neighbourhood'). Under the title, the first author had pre-planned a twelve-row dot worksheet where they would write their text. However, there was still some margin without dots for those students who wished to write more. At the outset, it was clear that they were free to write as much as they wished and were not obliged to complete all the rows. The aforementioned topic is very common and curriculum-based. Moreover, descriptive texts, by definition, allow the subjective and objective depiction of daily life through the eyes of the students (Vasarmidou & Spantidakis, 2015).

Research procedure

Data was collected in February and March of 2024 by the first author. According to the ethical principles of the Declaration of Helsinki, the first author asked the students and their parents to give their informed consent for participating in this study. When the first author

met the participants who gave consent, he initially wrote down the age and gender as well as the initial letters of the participants. In the case of students with diagnosed SpLDs, the first author asked the teachers or the parents afterwards to fill in the categories of the 'students' diagnoses (i.e. dyslexia, dysgraphia, developmental language disorder, oral and written language learning disability, unspecified learning difficulties). In turn, students were asked to write down a short descriptive text about their neighbourhood without time restriction and external support from books, the internet or 'adult' guidance. Students were also encouraged to try their best. When students finished writing, they gave the first author the answer sheet and left the meeting point.

Data Analysis

The following data were used in the analysis based on the children's written responses:

a. *parts of speech.* The following parts of speech were included in the analyses. nouns (e.g. *γειτονιά* /γιτονια/ = neighborhood, verbs (e.g. *παίζω* /pezo/ = play), adjectives (e.g. *καλός* /kalos/ = good), adverbs (e.g. *πίσω* /piso/ = back), pronouns (e.g. *άλλος* /allos/ = other), participles (e.g. *κλεμμένος* /klemmenos/ = stolen), articles (e.g. *ο* /ο/ = the) and conjunction words (e.g. γιατί */giati/* = because). See Table 2 for parts of speech and type of errors per group.
b. *type of errors made.* Errors were categorised into phonological errors (e.g. *β*-ίδι /vithi/ instead of *φ*-ίδι /fithi/ = snake), suffix errors (παίζ-*ο* instead of παίζ-*ω* /pezo/ = I play) and stem errors (*μίλ*-α /mila/ = talk instead of *μήλ-α /mila/* = apples). Table 2 provides the mean type of errors per group.
c. *the syllable structure.* Thirteen different syllabic structures were identified: CV (e.g. πυ), CCV (e.g. στω), CVC (e.g. περ), CVV (e.g. χαι), V (e.g. ι), VV (e.g. οι), VC (e.g. ελ), CCVC (e.g. στων), CCVV (e.g. πται), CCCV (e.g. στρω), CVCCC (e.g. κινγκ), CCVVC (e.g. κρους) and CVVC (e.g. σεις).
d. *the word length* (in terms of syllables). Words with one or two syllables were regarded as short, words with three syllables medium and those with four or more syllables as long.

Results

To examine the interactions between SpLD status and part of speech and SpLD status and syllable structure where the error occurred, between-participant ANOVAs were conducted. To examine the associations between syllable structure where the error occurred and error type, chi-square analysis was conducted. Finally, a multinomial logistic regression was performed to examine the association between word length in syllables and syllable structure where the error occurred. We examined all parametric assumptions (categorical dependent and continuous independent variables, no missing values, linearity in the logits), and they were met. SPSS 29 was used for all analyses presented.

First research aim

A 2x8 between-participants ANOVA was conducted with two Independent Variables, specific learning disability (SpLD) status with two levels (with SpLD, without SpLD) and parts of speech with eight levels (verb, noun, article, participle, conjunction, adjective, adverb, pronoun). The dependent variable was the proportion of errors, calculated relative to the total number of words written by each participant. In total, there were 338 error observations for the group with SpLD (in a total number of 1582 words) and 214 without SpLD (in a total number of 3158 words). Any outliers (more than two Standard Deviations above or below the

mean) were not removed as it was expected that children with SpLD would score more extreme at the lower end of the distribution. Table 2 below presents the Mean Percentage of Errors as a proportion of the number of words written with Standard Deviations and the total number of errors for the parts of speech per SpLD status.

Table 2 Mean Percentages (Proportion of Errors) with Standard Deviations in brackets and total number of errors per part of speech and specific learning disability (SpLD).

Part of Speech	SpLD Status	Mean Percentages	Number of Errors
Noun	No	3.24(3.33)	86
	Yes	8.65(6.90)	129
Verb	No	1.84(2.56)	53
	Yes	4.90(6.48)	95
Adverb	No	.89 (1.57)	23
	Yes	3.34(3.10)	48
Pronoun	No	.12 (.41)	3
	Yes	.58(1.35)	8
Adjective	No	1.21(2.22)	27
	Yes	2.64(2.43)	46
Participle	No	.37(1.28)	9
	Yes	.28(.84)	2
Article	No	.10 (.36)	3
	Yes	.35 (1.20)	5
Conjunction	No	.23 (.83)	4
	Yes	2.25(6.88)	4

There was a significant interaction between SpLD status and parts of speech (F (7, 464) = 4.78, p < .001, η_ρ^2 = .068). Apart from participles, in all other parts of speech, the number of errors was greater for those with SpLD than those without (see Table 2).

There was a main effect of parts of speech (F (7, 464) = 22.28, p < .001, η_ρ^2 = .25) for both SpLD and typical groups combined. There was also a significant main effect of SpLD status (F (1, 464) = 41.04, p < .001, η_ρ^2 = .08) for all parts of speech combined with overall larger percentage of errors for those with SpLD than without.

Further analysis of the interaction was conducted using one-way ANOVAs to examine the differences in the proportion of errors per parts of speech between SpLD and non-SpLD students per part of speech. There were significant differences for nouns (F (1, 58) = 16.44, p < .001), verbs (F (1, 58) = 6.54, p = .013), adverbs (F (1, 58) = 16.30, p < .001), adjectives (F (1, 58) = 5.53, p = .022). There were no significant differences for the other parts of speech (all p > .005).

Lastly, we examined the differences in the proportion of errors between parts of speech for each group. For non-SpLD participants, there was a significant part of speech effect (F (7, 280) = 12.40, p < .001, η_ρ^2 = .24). Nouns had significantly more errors than all other parts of speech (all p <.05). Verbs had significantly more errors than participles, pronouns, conjunctions and articles (all p <.05) but not adverbs and adjectives. There were no other significant differences between the other parts of speech. For participants with SpLD there was a significant part of speech effect (F (7, 184) = 9.89, p < .001, η_ρ^2 = .27). There were significantly more errors for nouns than the other parts of speech (all p_s <.05) but not verbs. Verbs had significantly more errors than participles, pronouns, and articles (all p <.05) but not

the other parts of speech. There were no other significant differences. Figure 1 shows the mean percentage of errors for the two groups (with and without SpLD) per part of speech.

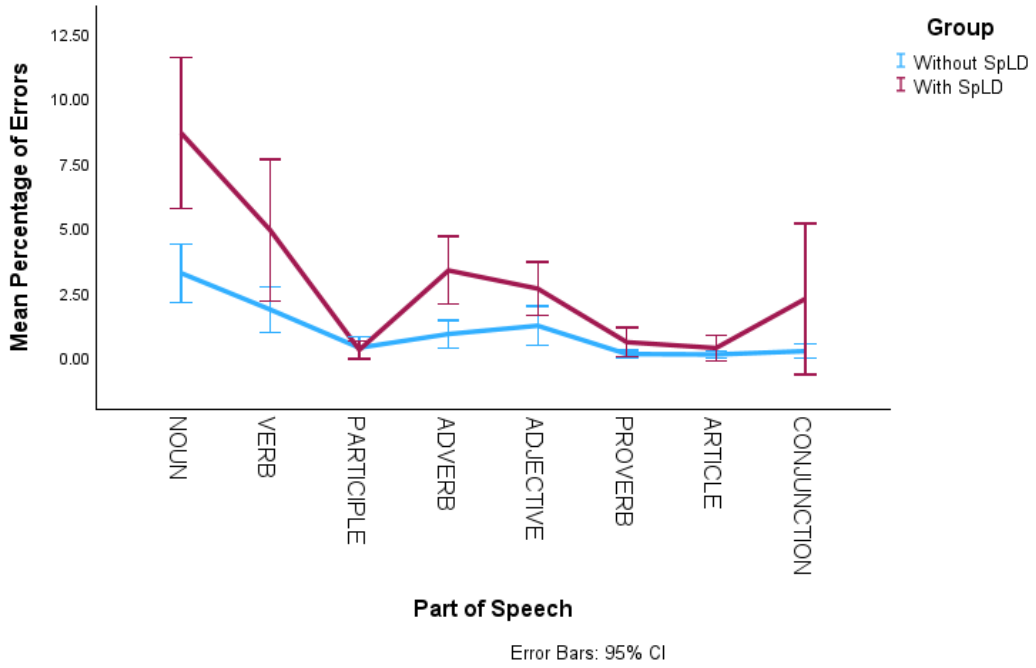


Figure 1 Percentage of errors per part of speech and SpLD group. Error Bars represent 95% confidence interval

Second research aim

We also ran a 2x13 between-participants ANOVA with SpLD Status and Syllable Phonetic Structure (SPS) where the error occurred (see Table 3 in the Appendix) as independent variables and the proportion of errors (calculated as in research aim 1) as the dependent variable. There was a significant interaction effect between SpLD status and SPS (F (12, 754) = 9.01, p < .001, η_p^2 = .13). There was a main effect of SPS (F (12, 754) = 30.29, p < .001, η_p^2 = .33) and a main effect of SpLD group (F (1, 754) = 50.57, p < .001, η_p^2 = .06). Further analysis of the interaction effect was conducted to examine differences in the proportion of errors per SPS between SpLD and non-SpLD participants. There were significantly more errors for SpLD than non-SpLD for: the V structure F (1, 58) = 39.64, p = .011, η_p^2 = .06), M=.52 (.90) vs. M = 2.18 (3.67) respectively, the CV structure F (1, 58) = 62.45, p < .001, η_p^2 = .20), M= 2.81 (3.19) vs. M = 7.95 (7.20) respectively, the CVV structure F (1, 58) = 12.19, p < .001, η_p^2 = .17), M= 1.38 (2.22) vs. M = 5.78 (7.08) respectively, the CVC structure F (1, 58) = 18.73, p < .001, η_p^2 = .24), M= .88 (1.24) vs. M = 3.42 (3.18) respectively, and the CCV structure F (1, 58) = 7.09, p < .010, η_p^2 = .11), M = .94 (1.26) vs. M = 2.05 (1.98) respectively.

We also examined the differences in the proportion of errors between SPS for each group. For participants without SpLD there was a significant SPS effect (F (12, 455) = 12.82, p < .001, η_p^2 = .25). CV had significantly more errors than all other SPS (all p <.05). VV had significantly less errors than CVV (p =.007) while CCVV, CCVC, CCCV, had significantly less errors than CVV (p <.05). For participants with SpLD there was a significant SPS effect (F (12, 299) = 14.85, p < .001, η_p^2 = .37). There were no error observations for CCCV, CVCCC and CCVVC structures. CV had significantly more errors than all other SPS (all p_s <.05) except CVV. The VV, CCVC, CCVV and CVVC structures had significantly less errors than CVV (p = .007). Finally, CVC had significantly more errors than CVVC (p = .047). Figure 2 presents the

mean percentage of errors for the two groups (without SpLD and with SpLD) per SPS. See also Table 3 in the Appendix.

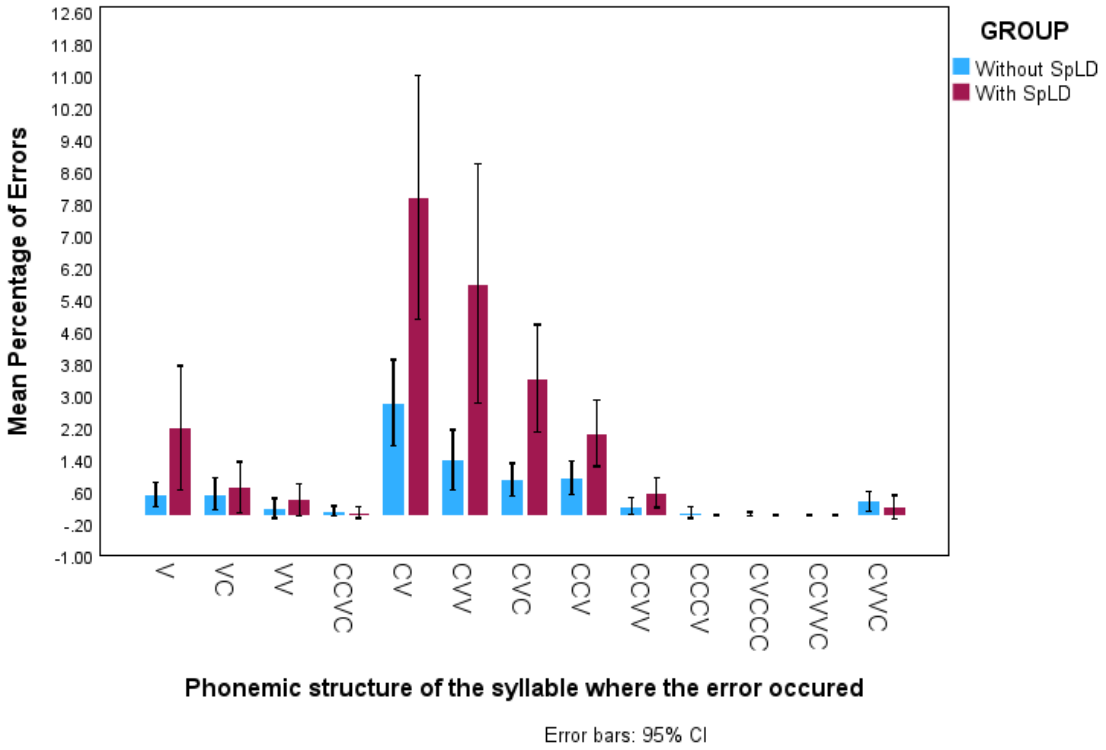


Figure 2 Percentage of errors per part of speech and SpLD group. Error Bars represent 95% confidence interval.

In addition, we conducted chi-square tests to examine the association between error type (Stem, Suffix, Phonological) and SPS. For those with SpLD, there was a significant association between the two variables (x^2 (22) = 109.35, p <.001). For V, VC, CV, CVC, CCV structures, the largest proportion of errors were stem, followed by suffix and then phonological. For CCVC, CVV, CCVVC and CVVC structures, most errors were suffix followed by phonological and then stem. CCVV and CCCV structure had more phonological, then suffix followed by stem errors. For those without SpLD, there was also a significant association between the two variables (x^2 (39) = 728.3, p <.001). The largest proportion of errors observed in V, VC, VV, CV, CVC and CCVVC structures were stem, followed by suffix and phonological. For the CCVC, CVV, CCVV and CVC structures more suffix errors were observed than stem errors followed by phonological errors, while for CCCV, CVCCC, CCVVC and CVVC structures, more phonological errors were observed than suffix and stem errors (see Tables 4 and 5 in the Appendix).

Third research aim

Finally, we ran a multinomial logistic regression to examine the association between word length (proportion of number of syllables of the words were errors occurred) and SPS. Model fitting was significant for participants without SpLD (x^2 (11) = 35.17, p <.001) but not for participants with SpLD (x^2 (9) = 9.69, p = .376). For participants without SpLD, compared to the reference category (we selected the largest category CV to reduce standard error), word length was a significant predictor for VV (B = -4.57, SE = 1.73, Wald $\chi^2(1)$ = 6.97, p = .008, Exp(B) = 0.10) and CVC (B = -2.56, SE = .81, Wald $\chi^2(1)$ = 9.89, p = .002, Exp(B) = 0.08), indicating that a one unit increase in the independent variable increases the odds of being in

category VV by 0.10 and .08 times compared to category CV (see Tables 6 and 7 in the Appendix).

Discussion

This study initially examined if the number of spelling errors of 11-year-old Greek-speaking students with and without SpLD produced in a free writing task differed as a function of part of speech and SpLD status. The second research aim was to investigate whether the type of errors made (phonological, orthographic, suffix errors) were related to the syllable structure. Finally, we examined whether word length (in terms of syllables) was related to the syllable structure where the error was made (third research aim).

The analysis for the first research aim showed that significant differences were observed between the parts of speech per SpLD status. Apart from participles, in all other parts of speech the number of errors was greater for those with SpLD than those without indicating that the spelling performance of students with SpLD was weaker in both inflected and non-inflected parts of speech. In other words, the eleven-year-old students with SpLD seemed to be more affected by the semi-transparent nature of the Greek orthographic system in terms of spelling (Diamanti et al., 2014; Giazitzidou et al., 2024) and were more error-prone to almost all parts of speech due to possible challenges related to morphological awareness and orthographic knowledge skills (Andreou et al., 2016; Protopapas et al., 2013). For instance, Greek students with SpLD seemed to have difficulties retaining, on the one hand, the etymology of the words to avoid stem errors and, on the other hand, the prefixes, derivational and inflectional morphemes to spell correctly the grammar rules (Pantazopoulou et al., 2022; Protopapas et al., 2013). In contrast, their age-matched peers without SpLD seemed to have satisfactorily developed their morphological awareness and orthographic knowledge skills as expected at this age (similarly in English, McMurray, 2020; Niolaki et al., 2022).

Further analysis revealed that students without SpLD made significantly more errors in nouns than in all other parts of speech, which was also valid for students with SpLD except for the verbs. Actually, approximately one third of the total number of errors pertained to nouns in both groups disputing the suggestion that Greek students with and without SpLD at the age of 10-13 years old spell nouns and verbs more accurately in dictated word pairs and sentences (Diamanti et al., 2014). In other words, students with and without SpLD seem to perform differently when producing written texts compared to dictation tasks because, in the former case, they focus mainly on the ideas and the structure (Spantidakis, 2011), while in the latter, their only aim is correct spelling. Thus, they allocate more cognitive resources (e.g., working memory, processing capacity, and attentional resources, among others) when composing a text—focusing on drafting and editing at the sentence and paragraph level rather than the word level—compared to when they are required to spell a predetermined number of items. Additionally, this result may reveal a qualitative difference related to the writing task that students complete. More specifically, during a free writing task, students themselves select the words that capture their thoughts. In contrast, in the case of spelling or sentence dictation, researchers select words that correspond to students' level. Words selected frequently tap specific spelling rules and orthographic knowledge that they expect the learners to be aware of. Researchers also take into account psycholinguistic elements such as word frequency, syllable structures, parts of speech, etc. (Mouzaki et al., 2007; Niolaki et al., 2022). Thus, our findings indicate that single word spelling tests and free writing tasks should be used in the assessment and diagnosis of SpLDs as they can provide a more holistic picture of each learner's strengths and challenges (Niolaki et al., 2021).

Additionally, our findings reaffirmed the suggestion that the parts of speech in the Greek language do not develop similarly and are differentially affected by the existence or

absence of SpLD (Diamanti, 2005). For example, nouns and adjectives in Greek have different suffixes according to the gender, the case and the number, while verbs are inflected for person, number, tense, voice and aspect. Such inconsistencies more likely negatively affect the spelling performance of Greek students with SpLD due to weaknesses in grasping and implementing morphological information (Diamanti, 2005; Diamanti et al., 2014). To conclude, although both groups, particularly those with SpLD, performed many errors in almost all parts of speech, teachers need to prioritize the instruction predominantly on nouns as is also suggested by the literature (Alderson & Hudson, 2013).

The second research aim examined the interaction between SpLD and SPS and the association between SPS and error type (i.e. phonological, suffix, stem). The significant interaction between SpLD group and SPS showed that during this free writing task in the semi-transparent Greek orthographic system (Protopapas, 2017), 11-year-old Greek students with SpLD compared to non-SpLD students made a significant amount of spelling errors in syllables with open structure and high frequency, such as CV and V (almost 56% and 17% of syllable tokens respectively) (Protopapas et al., 2012) reaffirming that spelling in Greek is not an easy task (Protopapas, 2017), especially for students with SpLD. More specifically, students with SpLD were more likely not to retrieve the appropriate representation of the vowel during text writing (e.g. <ι>, <η>, <υ>, <ει>, <οι> represent the phoneme /i/) (Protopapas & Vlahou, 2009) or made phonological errors by substituting other consonants with consonants, even in case of open syllables (V, CV) or syllables with three graphemes (CVV, CVC and CCV) (Sprenger-Charolles & Siegel, 1997). Finally, we examined the differences in the proportion of errors between SPS for each SpLD group. Results showed that participants in both groups made significantly more spelling errors in CV syllables than all other SPS, although this structure is the most frequent in Greek words (Protopapas et al., 2012). According to Cognitive Load Theory, it can be argued that during the production of free-writing texts, students primarily focus on expressing their ideas and structuring the text rather than on spelling, which is typically addressed during the revision process (Spantidakis, 2011). In contrast, when students, regardless of their SpLD status, are given a single word spelling test would need to focus on spelling the word correctly, but they will not have the additional pressure of composition. As we mentioned earlier, both tools (free writing and single word spelling) are valuable in holistically identifying the learner's spelling ability, and spelling can be a significant bottleneck in composition (see the Simple View of Writing proposed by Berninger et al., 2002; Magalhães et al., 2020).

Secondly, both groups performed more spelling errors in syllables with CVV structure compared to CCVV, CCVC, CCCV and VV, which indicates that double vowels within syllables with three graphemes were often simplified to a corresponding single homophone (e.g. αι could be simplified to ε, since both are heard /e/) because students paid limited attention to the spelling procedure when writing spontaneously in a free writing task which was not assessed. Additionally, students with SpLD made more errors in CVC syllables than CVVC, with the former being one of the most frequent SPS and the latter very rare (10.1% and 0.1%, respectively, according to Protopapas et al., 2012). This finding may reveal that students with SpLD were more careless in the transcription of single vowels with similar phonological depictions (e.g. both *ι* and *υ* are heard /i/), particularly within frequent complex SPS.

We also examined the association between error type and SPS. A chi-square analysis revealed a significant association between the two variables for each group. As for the phonological errors, students with and without SpLD produced more errors in complex syllables (e.g. CCVV). Both groups had difficulties related to the accomplishment of the phonographemic correspondences of complex syllables with at least four letters due to the syllable length but also the very low frequency of such structures in the Greek orthographic system (less than 0.1% according to Protopapas et al., 2012) compared to less complex SPS

with higher frequency such as CVC (10.1% of syllable tokens according to Protopapas et al., 2012). In other words, the longer and more complex the syllable the more probable the phonological errors for both groups. Nevertheless, it was noteworthy that students without SpLD made more phonological errors in four SPS, which entailed at least three consonants, indicating that they were more error-prone in this type of syllabic structure than students with SpLD who made such errors in only one SPS with three consonants.

Additionally, students without SpLD made more stem errors to open syllables (V, CV) or other two-grapheme syllables (VC, VV, CV) compared to more complex structures (CVC, CCVVC) suggesting that the less complex the structure, the more difficult for them to recall the representation of the correct single vowel within the stem morpheme during free writing, which may be attributed to the semi-transparent nature of the Greek language in terms of spelling but also revealed that students without SpLD should further improve the orthographic skills in order to more easily retrieve the correct spelling of the stems. On the other hand, students with SpLD made more stem errors in open syllables (V, CV) as well as other syllables with two (VC) or three graphemes (CVC, CCV), which contained only one vowel, because they had probably not created an orthographic representation of the by nature unpredictable and thus risky vowels (Protopapas et al., 2013). Lastly, students with SpLD could not retrieve and spell correctly the suffix morphemes which were part of the complex syllable structures (CCVC, CVV, CCVVC and CVVC). More specifically, most of these structures had vowel digraphs, such as *αι, ει, οι*, indicating that they had not satisfactorily mastered the basic spelling rules as well as the exceptions in the inflected parts of speech. Similarly, students without SpLD performed more suffix errors in morphemes with complex syllable structures (CCVC, CVV, CCVV and CVC) but errors in vowel digraphs were slightly less (in two SPS compared to three in the group of students with SpLD). To summarize, in the case of suffixes, both groups struggled to retrieve the pre-assembled representations of the vowels in syllables containing three or four letters, likely due to insufficient morphological awareness skills. Consequently, they violated the spelling rules since a word may be orthographically wrong but phonetically intact (Pantazopoulou & Diakogiorgi, 2017).

Finally, the third research aim examined if word length (in terms of number of syllables) is related to the SPS in the words where errors occurred. The regression analysis showed that as words became longer, students without SpLD were more likely to perform spelling errors in syllables with VV and CVC compared to CV, whereas no association was revealed for students with SpLD. This finding may indicate that students without SpLD were more error prone to the aforementioned structures as the word length increased, revealing maybe a superficial and, to an extent, careless approach to the spelling process of longer words, because they knew from the beginning that they participated in a stress-free writing task which was not part of an official examination within the framework of the curriculum, where spelling errors were marked. On the other hand, the increased likelihood of spelling errors in VV and CVC syllables, as the word length increased, might indicate that students without SpLD were error-prone to syllables of mild complexity compared to the prevalent open CV syllable because they could easily recall the lexical representation of the morphemes which composed longer words. At any rate, the lack of association between the word length and the SPS for the students with SpLD may be attributed to these students choosing to write shorter words.

In addition to limitations related to the task type (i.e., descriptive text), it is important to acknowledge the small and heterogeneous sample, particularly among students with SpLD. Future studies should also analyse spelling errors in free writing tasks while considering other key parameters, such as word and sentence count, morphemes, syntax, and vocabulary. Lastly, since the results of free-writing texts are influenced by word choice and a learner with SpLDs will potentially opt to use less sophisticated and varied vocabulary—future studies on students' spelling errors in free writing should also include structured tests (such as single-

word spelling tests or dictated sentences) that incorporate the examined syllabic structures and word types. This approach would allow for a more systematic and effective control of the observed discrepancies in the results.

Given the findings, instruction should focus on both orthographic and morphological skills, especially in upper elementary classes. Since Greek is an orthographically and morphologically rich language with complex inflections, the focus should be by priority on the morphological, orthographic and semantic structure of words—especially how suffixes and word-stems function. The explicit instruction on morphemes of all parts of speech equally can help students better understand word construction and spelling rules (Niolaki et al., 2016). Further, and more importantly, instruction should target the specific word-related parts that the students seem to struggle with. For example, the word stem in our study seems to be the most error prone area for students with SpLD, because it is less predictable compared to suffixes (Terzopoulos et al., 2020). In addition, spelling instruction should take place within the context of writing (Philippakos & MacArthur, 2020), as integrating spelling practice into writing tasks—alongside spelling rules practice—provides valuable opportunities for contextual learning.

Conclusion

To conclude, developing the spelling skills of all Greek students should not be neglected or underestimated in favour of reading instruction (Giazitzidou et al., 2024). In parallel, understanding the spelling difficulties of students with and without SpLD during writing tasks can help teachers adjust their instruction and literacy researchers can focus their attention on less investigated spelling parameters, for instance, the quality of spelling errors in free writing.

References

Alderson, J. C., & Hudson, R. (2013). The metalinguistic knowledge of undergraduate students of English language or linguistics. *Language Awareness*, *22*(4), 320-337. https://doi.org/10.1080/09658416.2012.722644

Andreou, G., Aslanoglou, V., Lymperopoulou, V., & Vlachos, F. (2024). Morphological and phonological errors in the written language production of children with DLD. *European Journal of Special Needs Education*, *39*(2), 235-248. https://doi.org/10.1080/08856257.2023.2207055

Andreou, G., Baseki, J., & Tzivinikou, S. (2016). Dyslexia and spelling in two different orthographies (Greek vs. English): a linguistic analysis. *Journal of Advances in Linguistics, 7*(1), 1172–1191. https:// doi. org/ 10. 24297/ jal. v7i1. 4622

Bahr, R. H., Lebby, S., & Wilkinson, L. C. (2020). Spelling error analysis of written summaries in an academic register by students with SpLD: Phonological, orthographic, and morphological influences. *Reading and Writing*, *33*(1), 121-142. https://doi.org/10.1007/s11145-019-09977-0

Barton, J. J., Hanif, H. M., Eklinder Björnström, L., & Hills, C. (2014). The word-length effect in reading: A review. *Cognitive Neuropsychology*, *31*(5-6), 378-412. https://doi.org/10.1080/02643294.2014.895314

Berninger, V. W., Vaughan, K., Abbott, R. D., Begay, K., Coleman, K. B., Curtin, G., Hawkins, J.M., & Graham, S. (2002). Teaching spelling and composition alone and together:

Implications for the simple view of writing. *Journal of educational psychology*, *94*(2), 291-304. https://doi.org/10.1037/0022-0663.94.2.291

Borleffs, E., Maassen, B. A., Lyytinen, H., & Zwarts, F. (2017). Measuring orthographic transparency and morphological-syllabic complexity in alphabetic orthographies: a narrative review. *Reading and writing*, *30*, 1617-1638. https://doi.org/10.1007/s11145-017-9741-5

Cidrim, L., & Madeiro, F. (2017). Studies on spelling in the context of dyslexia: a literature review. *Revista CEFAC*, *19*, 842-854. https://doi.org/10.1590/1982-0216201719610317

Coulmas, F. (2003). *Writing systems: An introduction to their linguistic analysis*. Cambridge University Press.

Diamanti, V. (2005). *Dyslexia and dysgraphia in Greek in relation to normal development: Cross-linguistic and longitudinal studies* [Unpublished PhD dissertation],. University College London.

Diamanti, V., Goulandris, N., Stuart, M., & Campbell, R. (2014). Spelling of derivational and inflectional suffixes by Greek-speaking children with and without dyslexia. *Reading and Writing, 27*, 337–358. https:// doi. org/ 10. 1007/ s11145- 013- 9447-2

Duncan, L. G., Colé, P., Seymour, P. H., & Magnan, A. (2006). Differing sequences of metaphonological development in French and English. *Journal of Child Language*, *33*(2), 369-399. https:// doi. org/ 10.1017/S030500090600732X

Enderby, J. L., Carroll, J. M., Tarczynski-Bowles, M. L., & Breadmore, H. L. (2021). The roles of morphology, phonology, and prosody in reading and spelling multisyllabic words. *Applied Psycholinguistics*, *42*(4), 865-885. https://doi.org/10.1017/S0142716421000096

Fragkouli, K., Antoniou, F., Mouzaki, A., Ralli, A. M., Kokkali, V., & Alexoudi, K. (2022). Evaluation of a spelling intervention program for third graders at risk for learning disabilities. *Reading & Writing Quarterly*, *38*(6), 544-563. https://doi.org/10.1080/10573569.2021.1987362

Gagl, B., Hawelka, S., & Wimmer, H. (2015). On sources of the word length effect in young readers. *Scientific Studies of Reading*, *19*(4), 289-306. https://doi.org/10.1080/10888438.2015.1026969

Galuschka, K., Görgen, R., Kalmar, J., Haberstroh, S., Schmalz, X., & Schulte-Körne, G. (2020). Effectiveness of spelling interventions for learners with dyslexia: A meta-analysis and systematic review. *Educational Psychologist*, *55*(1), 1–20. https://doi.org/10.1080/00461520.2019.1659794

Giannouli, V., & Pavlidis, G. T. (2014). What can spelling errors tell us about the causes and treatment of dyslexia?. *Support for Learning*, *29*(3), 244-260. https://doi.org/10.1111/1467-9604.12065

Giazitzidou, S., Simos, P., Bachoumis, A., Papadimitriou, V., & Mouzaki, A. (2024). Spelling development of children with and without reading difficulties throughout elementary grades: evidence from the Greek orthography. *Annals of Dyslexia*, *74*(2), 197-221. https://doi.org/10.1007/s11881-024-00309-8

Grzybek, P. (2016). Word length in Estonian prose. *Trames*, *20*(2), 145-175. https://doi.org/10.3176/tr.2016.2.03

Iaia, M., Marinelli, C. V., Vizzi, F., & Angelelli, P. (2022). Spelling acquisition in a consistent orthography: The facilitatory effect of syllable frequency in novice spellers. *Plos one*, *17*(11), e0277700. https://doi.org/10.1371/journal.pone.0277700

Juul, H., & Petersen, D. K. (2017). Length effects in pseudo-word spelling: stronger in dyslexic than in non-dyslexic students. *Annals of Dyslexia*, *67*, 369-382. https://doi.org/10.1007/s11881-017-0149-3

Law 4823 (2021). *Upgrading school, empowering teachers and other provision*. National Printing House.

Martínez, N., & Goikoetxea, E. (2020). Predictors of reading and spelling words change as a function of syllabic structure in Spanish. *Psicología Educativa. Revista de los Psicólogos de la Educación*, *26*(1), 37-48. https://doi.org/10.5093/psed2019a20

Magalhães, S., Mesquita, A., Filipe, M., Veloso, A., Castro, S. L., & Limpo, T. (2020). Spelling performance of Portuguese children: Comparison between grade level, misspelling type, and assessment task. *Frontiers in Psychology*, *11*, 547. https://doi.org/10.3389/fpsyg.2020.00547

McMurray, S. (2020). Learning to spell for children 5–8 years of age: the importance of an integrated approach to ensure the development of phonic, orthographic and morphemic knowledge at compatible levels. *Dyslexia*, *26*(4), 442-458. https://doi.org/10.1002/dys.1663

Mesquita, A., Carvalhais, L., Limpo, T., & Castro, S. L. (2020). Portuguese spelling in primary grades: complexity, length and lexicality effects. *Reading and Writing*, *33*(5), 1325-1349. https://doi.org/10.1007/s11145-019-10012-5

Mouzaki, A., Protopapas, A., Sideridis, G, & Simos, P. (2007). Diereunisi ton psychometrikon charaktiristikon mias dokimasias orthografikis dexiotitas mathiton B', C', D' and E' taxis tou dimotikou sholeiou. [Psychometric properties of a new test of spelling achievement in Greek]. *Epistimes tis Agogis, 1,* 129–146.

Niolaki, G. Z., & Masterson, J. (2012). Transfer effects in spelling from transparent Greek to opaque English in seven-to-ten-year-old children. *Bilingualism: Language and Cognition*, *15*(4), 757-770. https://doi.org/10.1017/S1366728911000721

Niolaki, G., Masterson, J., Terzopoulos, A., & Duncan, L.G. (2016). *Effects of visual imagery and flashcard intervention on spelling performance of a Greek-speaking boy with dysgraphia*. British Dyslexia Association International Conference.

Niolaki, G., Vousden, J., Terzopoulos, A., Shepherd, D. L., Debney, L., & Masterson, J. (2022). Spelling predictors; investigating the role of phonological ability and rapid naming in a large cross-sectional British study. *Learning and Instruction*, *80*, 101635. https://doi.org/10.1016/j.learninstruc.2022.101635

Niolaki, G. Z., Vousden, J., Terzopoulos, A., Taylor, L., & Masterson, J. (2021). A linguistic awareness intervention targeting spelling and written expression in a 10-year-old dyslexic child. *Preschool and Primary Education*, *9*(1), 1-27. https://doi.org/10.12681/ppej.22278

Pantazopoulou, E. J., & Diakogiorgi, K. (2017). Orthografikes diskolies paidion me kai horis orthografikes diskolies [Spelling difficulties of children with and without difficulties]. *Elliniki Epitheorisi Eidikis Agogis, 5*, 181-220.

Pantazopoulou, E. J., Polychroni, F., Diakogiorgi, K., & Georgiou, V. L. (2022). Accuracy and consistency in morphological spelling: Evidence from Greek-speaking children with and without spelling difficulties. *Reading and Writing*, *35*(2), 275-302. https:// doi. org/ 10. 1007/ s11145- 021- 10174-1

Papadimitriou, V., & Koutsoklenis, A. (2023). The extent of late hiring in special education: A report on the Greek institution of Parallel Support. *International Journal of Disability,*

Development and Education, *70*(7), 1264-1274. https://doi.org/10.1080/1034912X.2021.2010670

Peterson, R. L., McGrath, L. M., Willcutt, E. G., Keenan, J. M., Olson, R. K., & Pennington, B. F. (2021). How specific are learning disabilities?. *Journal of Learning Disabilities*, *54*(6), 466-483. https://doi.org/10.1177/0022219420982981

Philippakos. Z. A., & MacArthur, C. A. (2020). *Developing strategic, young writers through genre instruction: Resources for grades K-2*. Guilford Press.

Popescu, I. I., Naumann, S., Kelih, E., Rovenchak, A., Sanada, H., Overbeck, A., Smith, R., Čech, R., Mohanty, P., Wilson, A., & Altmann, G. (2013). Word length: Aspects and languages. In R. Kohler & G. Altmann (Eds.), *Issues in quantitative linguistics* (Vol. 3, pp. 224–281). RAM-Verlag.

Protopapas, A. (2017). Learning to read Greek. In L. T. W. Verhoeven & C. A. Perfetti (Eds.). *Reading acquisition across languages and writing systems: An international handbook* (pp. 155–180). Cambridge University Press.

Protopapas, A., Fakou, A., Drakopoulou, S., Skaloumbakas, C., & Mouzaki, A. (2013). What do spelling errors tell us? Classification and analysis of errors made by Greek schoolchildren with and without dyslexia. *Reading & Writing: An Interdisciplinary Journal, 26,* 615–646. https://doi.org/10.1007/s11145-012-9378-3

Protopapas, A., Tzakosta, M., Chalamandaris, A., & Tsiakoulis, P. (2012). IPLR: An online resource for Greek word-level and sublexical information. *Language resources and evaluation*, *46*, 449-459. https://doi.org/10.1007/s10579-010-9130-z

Protopapas, A., & Vlachou, E. L. (2009). A comparative quantitative analysis of Greek orthographic transparency. *Behavior Research Methods, 41*, 991–1008. https:// doi. org/ 10. 3758/ BRM. 41.4. 991

Rastle, K., Davis, M. H., Marslen-Wilson, W. D., & Tyler, L. K. (2000). Morphological and semantic effects in visual word recognition: A time-course study. *Language and Cognitive Processes*, *15*(4-5), 507-537. https://doi.org/10.1080/01690960050119689

Serrano, F., & Defior, S. (2012). Spanish dyslexic spelling abilities: The case of consonant blends. *Journal of Research in Reading*, *35*(2), 169-182. https://doi.org/10.1111/j.1467-9817.2010.01454.x

Seymour, P. H., Aro, M., Erskine, J. M., & Collaboration with COST Action A8 Network. (2003). Foundation literacy acquisition in European orthographies. *British Journal of psychology*, *94*(2), 143-174. https://doi.org/10.1348/000712603321661859

Spantidakis, I. (2011). *Provlimata paragogis graptou logou paidion sholikis ilikias* [Text production problems in school-age children]. Pedio.

Sprenger-Charolles, L., & Siegel, L. S. (1997). A longitudinal study of the effects of syllabic structure on the development of reading and spelling skills in French. *Applied psycholinguistics*, *18*(4), 485-505. https://doi.org/10.1017/S014271640001095X

Steriade, D. (1999). Alternatives to syllable-based accounts of consonantal phonotactics. In O. Fujimura, B. D. Joseph & B. Palek (eds.) *Item order in language and speech* (pp. 205–245). Karolinum Press.

Terzopoulos, A. R., Niolaki, G. Z., & Masterson, J. (2020). Intervention for a lexical reading and spelling difficulty in two Greek-speaking primary age children. *Neuropsychological rehabilitation, 30*(3), 371-392. https://doi.org/10.1080/09602011.2018.1467330

Treiman, R. (1991). Children's spelling errors on syllable-initial consonant blends. *Journal of Educational Psychology*, *83*(3), 346-360. https://doi.org/10.1037/0022-0663.83.3.346

Treiman, R. (2017). Learning to spell words: Findings, theories, and issues. *Scientific Studies of Reading,21*(4), 265–276. https:// doi. org/ 10. 1080/ 10888 438. 2017. 12964 49

Tsesmeli, S. N. (2019). Developmental changes in the spelling of derivational suffixes by typically developing Greek children: effects of transparency, lexicality, letter length and frequency. *Writing Systems Research*, *11*(1), 50-65. https://doi.org/10.1080/17586801.2020.1719273

Vasarmidou, D., & Spantidakis, I. (2015). *Didaskalia kai mathisi graptou logou* [Teaching and learning of text production]. Gutenberg.

Appendix

Table 3 Proportion of errors with Standard Deviations in brackets per SPS and SpLD group.

SPS	With SpLD	Without SpLD
V	2.19(3.66)	.52(.90)
VC	.70(1.50)	.53(1.19)
VV	.39(.94)	.17(.74)
CCVC	.72(.35)	.11(.36)
CV	7.94(7.20)	2.81(3.19)
CVV	5.78(7.08)	1.48(2.22)
CVC	3.42(3.18)	.88(1.24)
CCV	2.05(1.98)	.94(1.26)
CCVV	.56(.88)	.23(.59)
CVCCC	0	.27(.16)
CCCV	0	.07(.43)
CCVVC	0	0
CVVC	.20 (.70)	.35(.71)

Note: Syllable Phonetic Structure (SPS); Specific Learning Disabilities (SpLD); Consonant (C); Vowel (V).

Table 4 Number of errors per error type and SPS for participants with SpLD

SPS	Stem	Phonological	Suffix	Total
V	40	13	13	66
VC	22	1	1	24
VV	3	4	4	11
CCVC	1	3	7	11
CV	144	34	137	315
CVV	79	15	115	209
CVC	48	19	37	104
CCV	38	14	13	65
CCVV	4	9	8	21
CCCV	0	7	1	8
CVCCC	0	0	0	0
CCVVC	0	0	1	1
CCVVC	0	0	0	0
CVVC	1	8	21	30
Total	380	127	358	865

Table 5 Number of errors per error type and SPS for participants without SpLD

SPS	Stem	Phonological	Suffix	Total
V	27	5	6	38
VC	26	3	1	30
VV	8	0	2	10
CCVC	1	1	3	5
CV	108	18	92	218
CVV	48	13	53	114
CVC	39	6	20	65
CCV	28	11	31	70
CCVV	3	3	4	10
CCCV	0	3	0	3
CVCCC	0	2	0	2
CCVVC	0	1	0	1
CCVVC	1	0	0	1
CVVC	5	10	7	22
Total	294	76	219	589

Table 6 Frequency of the number of syllables of the words where errors occurred per SPS for participants with SpLD

	Word Length (Number of Syllables)						
SPS	1	2	3	4	5	6	Total
V	0	7	18	2	1	0	28
VC	0	5	0	4	0	0	9
VV	1	3	0	0	0	0	4
CCVC	2	0	0	0	0	0	2
CV	0	42	36	22	12	5	117
CVV	6	24	39	11	2	4	86
CVC	2	23	6	6	4	3	44
CCV	0	10	9	7	4	1	31
CCVV	0	0	0	0	0	0	0
CVVC	0	7	5	0	0	0	12
Total	11	121	113	52	23	13	333

Table 7 Frequency of the number of syllables of the words where errors occurred per SPS for participants without SpLD.

	Word Length (Number of Syllables)								
SPS	1	2	3	4	5	6	7	8	Total
V	0	1	7	1	1	1	1	1	13
VC	0	4	3	7	0	0	0	0	14
VV	1	4	0	1	0	0	0	0	6
CCVC	0	1	2	0	0	0	0	0	3
CV	0	15	33	11	13	4	3	0	79
CVV	2	1	16	8	4	4	0	0	35
CVC	3	10	7	2	5	0	0	0	27
CCV	0	2	8	6	5	1	0	0	22
CCVV	0	0	3	1	1	0	0	0	5
CVVC	2	4	1	2	0	0	2	0	11
CCCV	0	2	0	0	0	0	0	0	2
CVCCC	1	0	0	0	0	0	0	0	1
Total	9	44	80	39	29	10	6	1	218

Received: 8.11.2024, Revised: 8.4.2025, Approved: 9.4.2025