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Phonological awareness as a possible predictor for reading comprehension in English among year 3 and 6 Greek students

Η φωνολογική επίγνωση ως πιθανός παράγοντας ανάπτυξης της κατανόησης των αγγλικών γραπτών κειμένων για Έλληνες μαθητές της τρίτης και της έκτης δημοτικού

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The present study investigates English phonological awareness as a predictor of reading comprehension among Greek students learning English as a foreign language. 75 students from Years 3 (41 students) and 6 (34 students) participated in the study with a mean age of 8.46 and 11.47, respectively. The students were administered two phonological tests, one in English (CTOPP) and in Greek (Athena test) and age appropriate reading comprehension tests (Starters and Flyers for Year 3 and Year 6 respectively). According to the results, English phonological awareness proved to be a significant predictor of reading comprehension for both year 3 (p<1%/0.01) and year 6 (p<5%/0.05) students along with the years of study. Gender, by contrast, does not seem to play a significant role in the acquisition of literacy skills. On the other hand, Greek phonological awareness does not seem to contribute directly to students' reading comprehension skills in English. It seems to be associated with English phonological awareness in year 6 but there is no association in year 3, a result in line with the Language Threshold Hypothesis. Finally, structural equation modeling is used to demonstrate the different possible interrelations of Greek phonological awareness, English phonological awareness, age, years of study and other latent variables. The findings of this research could be used by teachers to design phonological awareness activities to help struggling Greek students cope with the irregularities of the English language and succeed in overcoming their difficulties in reading comprehension

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Η παρούσα ερευνητική εργασία ερευνά τον ρόλο της φωνολογικής επίγνωσης στα Αγγλικά στην ανάπτυξη της κατανόησης των αγγλικών γραπτών κειμένων για τους Έλληνες μαθητές που μαθαίνουν Αγγλικά ως ξένη γλώσσα. Σε αυτή την έρευνα συμμετείχαν 75 μαθητές, 41 της Τρίτης δημοτικού και 34 της Έκτης, με μέσο όρο ηλικίας 8,46 και 11,47 αντίστοιχα. Για την έρευνα χρησιμοποιήθηκαν δυο φωνολογικά τεστ, το Αθηνα τεστ για την φωνολογική επιγνωση στα ελληνικά και το CTOPP για την φωνολογική επίγνωση στα αγγλικά. Επιπλέον, έγινε χρήση δύο τεστ αξιολόγησης της ικανότητας κατανόησης γραπτών κειμένων, του

Starters για τους μαθητές της τρίτης δημοτικού και του Flyers για τους μαθητές της έκτης Σύμφωνα με τα αποτελέσματα, η φωνολογική επίγνωση στα Αγγλικά καθώς και τα χρόνια εκμάθησης παίζουν πολύ σημαντικό ρόλο στην ανάπτυξη της ικανότητας κατανόησης γραπτών κειμένων και για τους μαθητές της τρίτης δημοτικού και για τους μαθητές της έκτης. Το φύλο δε μοιάζει να παίζει ουσιαστικό ρόλο. Επίσης, η φωνολογική επίγνωση στα Ελληνικά δε φαίνεται να επηρεάζει ευθέως την κατανόηση των αγγλικών γραπτών κειμένων. Φαίνεται όμως ότι επηρεάζει την φωνολογική επίγνωση στα Αγγλικά των μαθητών της έκτης δημοτικού αλλά όχι της τρίτης, γεγονός που συνάδει με τις παραμέτρους της υπόθεσης της Γλωσσικής Αφετηρίας (Language Threshold Hypothesis). Τέλος, ένα μοντέλο δομικών εξισώσεων (structural equation modeling) χρησιμοποιήθηκε για να αναδείξει τους πιθανούς συσχετισμούς ανάμεσα στη φωνολογική επίγνωση στα Αγγλικά, τη φωνολογική επίγνωση στα Ελληνικά, την ηλικία των συμμετεχόντων, το φύλο τους και τα χρόνια εκμάθησης των Αγγλικών ως ξένης γλώσσας.Τα ευρήματα αυτής της έρευνας θα μπορούσαν να αποτελέσουν βάση για τον σχεδιασμό δραστηριοτήτων φωνολογικής επίγνωσης για έλληνες μαθητές που παρουσιάζουν αδυναμία στην κατανόηση γραπτών κειμένων στα αγγλικά.

Key words: English phonological awareness, Greek phonological awareness, reading comprehension, Language Threshold Hypothesis, Structural Equation Modeling

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1. Introduction

English orthography is claimed to be highly inconsistent and irregular compared to other European languages, thus affecting the development of English students' literacy skills. According to Seymour, Aro and Erskine (2003), children from most European countries become fluent and accurate readers by the end of the first school year with the exception of English, Danish, French and Portuguese students. The abovementioned inconsistency and irregularity are also expected to affect the literacy attainment of students learning English as a Foreign Language (L2). Greek students, for example, start learning English as L2 by the age of 6, in year 1, according to the new government policy.

According to the literature, phonological awareness seems to be a significant variable in the acquisition of mother tongue (L1) literacy skills (Hulme et al, 2002; Aidinis et al, 2001; Høien et al, 1995; In fact, phonological awareness has been the basic component in many intervention programs designed to help British students overcome difficulties in reading and spelling acquisition. Judging by their results, these intervention programs seem to be working effectively (Bus and van IJzendoorn, 1999; Blachman, Tangel, Ball, Black and McGraw, 1999; Stuart, 1999). What begs the question is whether phonological awareness - based programs could also be beneficial for students learning English as a foreign language.

This research study aims to examine: a) whether English phonological awareness is a strong predictor for reading comprehension among Greek students (mean age 8.46 and 11.47) learning English as a foreign language; b) the differences in the reading performance and phonological abilities of the two year groups and potential gender effects; c) the contribution of Greek phonological awareness to the development of reading skills as well as of English phonological awareness which is in accordance with the language threshold

hypothesis; d) the directionality of the effect of the interdependent variables mentioned above (English phonological awareness, Greek phonological awareness, years of study, gender).

2. The Role of Phonological Awareness

Phonological awareness refers to the learner's ability to break down words into smaller units and it is a multilevel skill, subsuming three different levels: syllable awareness, onset-rime awareness and phoneme awareness (Gillon, 2004). According to Gillon, children are generally expected to be able to deal first with larger phonological units, which are the syllables and rhymes, and second with the smallest units, which are the phonemes. Thus, in developmental sequence, syllabic awareness is acquired and, shortly afterwards, onset-rime awareness follows. It is only at the last stage that children acquire phonemic awareness. Several researchers have investigated the role of phonological awareness as a predictor of reading and spelling acquisition in both the mother tongue and the foreign language.

2.1. The role of phonological awareness in English and in Greek as a mother tongue

Cormier and Dea (1997) assessed the contribution of phonological awareness and working memory to reading acquisition in their mother tongue (English). 103 Canadian students from Grades 1 (36 children), 2 (32 children) and 3 (35 children) participated in their study, and, according to the results, both phonological awareness and working memory appeared to constitute two separate possible predictors of reading and spelling attainment.

In a recent study by Ftika (2008), the results of the above research were partly reconfirmed., 18 year 2 and 19 year 3 English-speaking students (mean age 7.06 and 8.23, respectively) participated in this study with. According to the results, phonological awareness was a strong predictor for reading and spelling. Visual memory was a significant predictor for reading but lost its predictive power as far as spelling is concerned. Word frequency and letter length proved to be the influential contributors for spelling.

Finally, Sunseth and Bowers (2002) also proved in their research study, conducted with students facing difficulties in phonological awareness and rapid naming, that deficits in phonological awareness affect reading and spelling performance negatively.

All three studies indicated that literacy acquisition relies on a number of predictors; however, phonological awareness seems to be the most significant one in the acquisition of literacy skills in English. However, is the contribution of phonological awareness as significant in Greek?

In 1989, Porpodas sought to investigate the importance of sound, shape and orthographic cues in early reading in Greece. The participants of the research were sixty-four year 1 primary school students equally divided into two groups, one group of good and one group of poor readers. According to the results, beginner readers do not rely only on one cue in the reading process. However, the sound cue had the greatest impact in both groups. Porpodas also sought to examine the parameters that influence reading and spelling, namely spelling-sound information and visual information. For this purpose, he conducted a research project using regular words, exception words and non-words. The participants were in year 4 and in year 1, separated in groups of good and poor readers and spellers. The regular and the

exception words used for the research were taken from students' age textbooks. The non-words were formed by changing the initial letters of the existing words mentioned earlier. According to the results, good readers in year 4 seem to make use of both phonological and visual information, as opposed to poor readers, who rely mostly on phonological information. On the other hand, both good and poor readers in year 1 rely mostly on phonological information. Therefore, phonological information plays an important role in early stages and, more selectively, also in later stages of literacy development.

The abovementioned findings were also supported by Nikolopoulos, Goulandris, Hulme and Snowling (2006), who conducted a longitudinal study to examine the role of phoneme awareness, speech rate and rapid automatized naming as predictors in reading and spelling. All three proved to be robust predictors.

So far, all the studies in English and in Greek referred to confirm the significance of phonological awareness in acquiring literacy skills in both languages separately. But what happens when students are learning languages other than their mother tongue? Do they rely on the newly acquired sound cues and to what extent is there transfer between the two language systems, if any? 2.2 *The role of phonological awareness in foreign language acquisition*

Durgunoğlu, Nagy & Hancin-Bhatt (1993) examined the significance of phonological awareness of year 1 Spanish students in recognizing English words. 27 students participated in the research study and had a number of tests administered to them in two weeks. According to the results, phonological awareness in students' mother tongue was a significant predictor in word recognition in English and the researchers suggested that improving phonological awareness in Spanish will affect reading performance in English positively. Phonological awareness is, therefore, viewed as a type of metalinguistic awareness that need not to be language specific.

In 1999, Comeau, Cormieur, Grandmaison and Lacroix conducted a one-year longitudinal study to provide evidence supporting the significance of phonological awareness in reading achievement. This research took place in four schools in Mocton, Canada. The participants (n=122) were English-speaking students attending year 1, 3 and 5 in a French immersion school. According to the results, phonological awareness both in English (mother tongue) and in French proved to be significant. However, the significance of phonological awareness in the mother tongue dropped after year 3 while the significance of second language phonological awareness did not.

2.2. The Importance of Phonological Awareness

Based on all the above, phonological awareness seems to be a significant factor, contributing to learners' literacy in their mother tongue and second language and there is evidence of transfer of phonological cues between the language systems. Therefore, phonological awareness-based intervention programs, which are already used in the UK to help students with learning difficulties, enhance their literacy skills from year 1 to year 6 of primary school, could help struggling Greek students cope with the irregularities of the English language and succeed in learning how to read and write. There are a number of research studies which support the effectiveness of phonologically-based intervention programs in the development of literacy skills in both shallow and deep orthographies.

In 1999, Bus and van IJzendoorn conducted a quantitative meta-analysis on 36 studies testing the effects of phonological awareness programs and 34 studies testing the effects on reading. According to their findings, phonological training appeared to be more effective among preschool children and not so among older children. Moreover, phonological training appeared to be more helpful for 'normal' than special children, whose performance was not as conspicuous and rapid as in the case of children without learning difficulties. Yet, the researchers suggested that phonological training may be needed more by children with learning difficulties. Moreover, phonological awareness alone did not prove to be the strongest predictor for reading. The data suggested that letter-sound correspondence training is also needed to enhance predictability levels.

In 1999, Blachman, Tangel, Ball, Black and McGraw conducted a longitudinal study to determine the effects of phonological awareness and word recognition skill development. 66 low income, inner city learners received treatment while 62 formed the control group. The treatment group outperformed the control group in the spelling and reading measures by the end of both Years 1 and 2, which is indicative of the effectiveness of the phonological awareness intervention combined with a reading program, in accord with the Bus et al (1999) findings.

The contribution of phonological awareness intervention programmes has been proved valuable in enhancing struggling students' reading and spelling performance, and therefore such programmes are often included in school syllabuses. In Greece, for example, there is some phonological awareness teaching, but the Greek curriculum promotes a holistic approach[1] to literacy development as opposed to letter-sound teaching, an approach also adopted by some English coursebook designers. But which of the two methods is more effective?

In 1999, Stuart investigated the longitudinal effects of phoneme awareness training combined with letter- sound teaching and compared her results to a traditional holistic approach, called 'Big Book' (BB). The holistic approach teaches children how to read by drawing attention to the printed words and the letters. The phoneme and letter-sound knowledge intervention were delivered by the 'Jolly Phonics' (JP) program. 112 inner-city, five year old children who were divided into two groups, the BB and the JP group, participated in the research. The vast majority of the participants were not native English speakers. The intervention sessions were conducted one hour per day and lasted for 12 weeks. By the end of the intervention, both groups had made considerable progress but the JP group were more advanced and the students were ready to apply the knowledge gained in both reading and writing. The year following the intervention, again the JP group was significantly ahead of the BB group. Therefore, phoneme awareness and letter-sound training proved to be a more effective intervention for the inner-city second language learners, with long-lasting effects.

Phonological awareness is a strong literacy predictor not only in English but in more transparent language systems, such as Turkish, as well. In 2002, Durgunoğlu and Öney implemented an intervention literacy program which was based on letter-sound and syllabification training. The target group of the program was adult women. 59 women participated in a 90-hour intervention. According to the researchers, the adult participants made remarkable progress in their literacy skills. Thus, they concluded that phonological

awareness is a strong predictor of literacy acquisition not only in children but in adults, too, in a transparent language, such as Turkish.

Overall, then phonological awareness intervention programmes seem to contribute significantly in the progress of reading and spelling acquisition in both transparent and opaque languages.

3. Foreign language acquisition: The *Language Threshold Hypothesis*

According to the *Language Threshold Hypothesis*, a term coined by Cummings (1979), L2 readers must know enough L2 vocabulary and structures if L1 reading strategies and skills are to be used efficiently to help comprehend L2 texts.

In 1997, Lee and Lemonnier tested the Threshold Level Hypothesis with Korean students learning English as a foreign language. 809 students in the 3rd Year of middle school and the 1st year of high school (equivalent to grades 9 and 10 in the US) participated in their study. According to the results, L2 proficiency is a stronger predictor of L2 reading ability than L1 reading ability. Moreover, the threshold level hypothesis is confirmed, since the relationship of L1 and L2 reading is weak when proficiency in L2 is low but the relationship gets stronger when proficiency in L2 improves. Therefore, if learners attempting to learn a new foreign language have already mastered reading in L1, these skills may transfer to L2 or even interfere. However, according to the Threshold hypothesis, L2 readers need to have some L2 knowledge before they can start transferring strategies and useful L1 elements and structures.

4. The current study

To sustain objectivity, the research tools used for this research study were the Athena and Comprehensive Test of Phonological Processing (CTOPP), blending word subtests, which are standardized, with high reliability rates. Moreover, the reading comprehension tests administered were the Starters and Flyers (2008), which are designed to test the skills of reading and writing, listening and speaking of young learners of English as a foreign language They are part of the YLE Tests designed by Cambridge University and they are aligned to the Common European Framework of Reference for Languages (Council of Europe, 2001). The tasks included can be easily and objectively scored. The procedure followed sought to comfort the participants, helping them reach the best of their potential.

4.1. Participants

Overall, 75 students from year 3 (41 students) and 6 (34 students) of two suburban primary public schools in Pallini, Athens, Greece, participated in the present study. The schools accommodate students of middle class socioeconomic status. There were no specifications concerning the participants of this study other than the school year. However, two students' results were not included in this study or in the statistical analysis. One of them was a year 6 male student with severe dyslexia and the other was a year 3 male student who had joined the Greek school a few months earlier, transferred from an Albanian one and whose knowledge was sufficient neither in Greek nor in English. At the time of the research project,

in year 3, the students' age ranged from 8.08 to 9.66 (mean= 8.46) and, in year 6, from 11.08 to 13 (mean=11.47).

Two students in year 3 and five students in year 6 were bilingual, all speaking Albanian as their mother tongue. Nevertheless, all these bilingual children spoke Greek in a native-like fashion, as they had attended an all-day Greek school and received uninterrupted formal instruction in literacy and numeracy from year 1. This information was ascertained both via school records and information received from the students themselves.

4.2. Procedure

The assessments were administered in 2010, within three weeks, from the fourth week of January to the second week of February. The Athena test, blending words in Greek, and the CTOPP blending words in English subtest were administered on a one-to-one basis. The participants took both the aforementioned tests in one session of 10' to 15' minutes. This practice, though effective as far as data collection is concerned, could be stressful for students, who are asked to perform a task out of the ordinary with an unfamiliar supervising person. For this reason, the researcher was allowed into the classroom prior to the testing and was introduced to the students by the classroom teachers. The researcher also explained in detail what was to follow and also reassured students that they could stop the activities if they felt uncomfortable in any way, hoping to reduce the anxieties deriving from the contact with an unfamiliar person.

The administration of both Athena and CTOPP tests was conducted out of the classroom, in a separate quiet room. Both tests were received with enthusiasm and were regarded as games by the participants. The Starters and Flyers Reading tests (2008) were administered in the classroom, on a group basis.

For the administration of the Athena test, the researcher explained the procedure and presented the example sound sequence that the participants had to put together to form meaningful Greek words. If the participant could not reproduce a meaningful word for the example sequence, the researcher presented it for a second time. Only in one instance did the examiner have to present the example sequence more than once and to repeat the instructions. During the test, feedback was provided on the first three word productions and then the examiner stopped. At the end, though, the examiner praised the effort of the participants, not the outcome.

For the CTOPP test, participants were instructed to listen carefully and try to put together the sounds heard to produce meaningful words in English this time. Six practice items were provided. The examiner provided feedback on the six practice items and on the first three test items. Once again, the examiner praised the students' efforts when the test was completed.

Next, the researcher asked the English teachers to incorporate the Reading Starters and Flyers test in their lesson plans. The time given for the completion of the two tests was 20 minutes for the Starters and 40 minutes for the Flyers which involved reading comprehension exercises in English. Though both the researcher and the teacher were in the class supervising and giving instructions, it was made clear that neither of them were allowed to provide the definition of any unknown words. In fact, the students were

instructed in their mother tongue to try and sort out the meaning of the words from the context and the pictures, when these were available in the tests. The tests were marked by the researcher on the basis of the key provided by the test designers, but the researcher ignored any spelling mistakes that did not inhibit the meaning of the answers and considered these answers correct.

5. Results: Quantitative subject analysis

5.1. Comparison of Year 3 and Year 6 Participants' Characteristics

The mean of reading comprehension, phonological awareness in English, phonological awareness in Greek and years of study scores for years 3 and 6 are given in Table 1. T-tests were conducted to assess the statistical significance of phonological awareness differences both in English and in Greek. The grouping variable in this case was the year group.

	Reading	*Phonological Awareness in English*	*Phonological Awareness in Greek*	*Years of study*
Year 6	66.20 (23.69)	16.02 (3.51)	17.41 (3.31)	4.20 (.76)
Year 3	56.58 (23.30)	13.90 (3.04)	17.07 (3.07)	1.24 (1.20)

Note: *Reading* received one point for each correct answer. The scores were modified on the percentage scale. *Phonological awareness in English*: CTOPP test, with scores coded 1-20. *Phonological Awareness in Greek*: Athena Test, with scores coded 1-20. *Years of study*: Scores were coded as 1-6.

Table 1. Mean Scores for Characteristics for Children in Years 6 and 3 (Standard Deviations are in parentheses).

As we can see in Table 1, the mean score of phonological awareness in English for year six was higher than that for year 3 students. According to the t-test, this difference is statistically significant, t (df = 73) = 2.808, p= .006. In other words, year 6 students had a better knowledge of the English letters and the corresponding sounds rather than year 3 students. By contrast, the difference of mean phonological awareness in the Greek scores was not significant for the two year groups: t (df = 73) = .458, p = .648, that is, the knowledge of the Greek letters and sounds did not differ in the two year groups. As for the mean reading scores, the testing materials differ for each year group and therefore the t-test is not applicable.

5.2. Comparison of Year 3 Boys' versus Girls' Characteristics

T-tests were conducted to assess the statistical significance of differences between the boys and girls of Year 3. The mean scores of the subject characteristics of the two groups are given in Table 2.

The boys in year 3 performed slightly better in the reading comprehension tests than the girls, a result that could be due to the slightly longer period of studying English, but the t-test indicated that this difference was not significant: t(df = 39) = .221, p=.826. Comparing the phonological awareness in English level of the two groups shows that, even though the girls scored a little higher than the boys, this difference is not significant either: t(df = 39) = -0.401, p = .691. By contrast, the mean score of boys' phonological awareness in Greek is significantly higher than that of girls: t(df = 39) = 2.931, p = .006. In other words, in this sample, the boys' and girls' scores were similar and their knowledge of the English letters and sounds did not differ. However, the boys of this sample seemed more competent in recognizing Greek letter-sound relations.

Year 3	*Reading*	*Phonological Awareness in English*	*Phonological Awareness in Greek*	*Years of study*
Boys	57.38 (25.76)	13.71 (3.39)	18.33 (1.87)	1.42 (1.58)
Girls	55.75 (21.04)	14.10 (2.71)	15.75 (3.55)	1.05 (.60)

Note: Definition of variables. *Reading* each correct answer received one point. Scores modified in percentage scale. *Phonological awareness in English*: CTOPP test with scores coded 1-20. *Phonological Awareness in Greek*: Athena Test with scores coded 1-20. *Years of study*: Scores coded 1-6.

Table 2. Mean Scores for Characteristics of Boys and Girls in Year 3 (Standard Deviations are in parentheses).

5.3. Comparison of year 6 boys' versus girls' characteristics

T-tests were also conducted to assess the statistical significance of differences between the boys and girls of year 6. The mean scores of the subject characteristics of the two groups are given in Table 3:

Year 6	*Reading*	*Phonological Awareness in English*	*Phonological Awareness in Greek*	*Years of study*
Boys	64.04 (25.81)	16.00 (3.91)	17.42 (3.81)	4.14 (.18)
Girls	70.92 (20.81)	16.07 (2.90)	17.38 (2.43)	4.30 (.57)

Note: Definition of variables. *Reading* each correct answer received one point. Scores modified in percentage scale. *Phonological awareness in English*: CTOPP test with scores coded 1-20. *Phonological Awareness in Greek*: Athena Test with scores coded 1-20. *Years of study*: Scores coded 1-6.

Table 3. Mean Scores for Characteristics of Boys and Girls in Year 6 (Standard Deviations are in parentheses).

The girls in year 6 performed slightly better in the reading comprehension tests than the boys , a result that could be due to the slightly longer period of studying English. However, the t-test indicated that this difference was not significant: t(df = 32) = -.810, p = .424. The phonological awareness in English differences of the two groups is not significant: t(df = 32) = - .061, p = .952. Finally, the mean scores of boys' and girls' phonological awareness in Greek are not significantly different, either (t(df = 32) = .037, p = .971). Therefore, the boys and the girls of this sample performed similarly in the reading comprehension test and their knowledge of the English and the Greek letter-sound relations did not differ.

5.4. Correlation and Regression analyses

The analysis of the subject data was done utilizing the correlation and the linear regression modules in the Statistical Package for the Social Sciences (SPSS). The correlation analysis sought to examine the relationship of reading comprehension for each year group separately as well as in a merged fashion with the independent variables of phonological awareness in English, phonological awareness in Greek, age and years of study.

In year 3, reading comprehension strongly correlated with phonological awareness in English and years of study, that is, the latter two variables affected the development of the students' reading comprehension skill. The association with both of these variables is positive; in other words, reading comprehension ability increases as phonological awareness in English and study years increase (see Table 4). The better, therefore, learners become in recognizing the letter-sound associations and the more the years they spend studying English the better they perform in reading comprehension tests. The significance of both these positive correlations is at the 1% level. Finally, neither phonological awareness in Greek nor age variables seem to be associated with reading comprehension in English.

	READING	PHONENG	PHONGREEK	AGE
PHONENG	.486**	1		
PHONGREEK	.289	.222	1	
AGE	-.270	-.147	-.080	1
STUDYEAR	.487**	.295	.143	-.215

*. Correlation is significant at the 0.05 level (2-tailed).
**. Correlation is significant at the 0.01 level (2-tailed).

Table 4: Correlation analysis with Year 3 scores

In year 6, once again reading comprehension correlates highly with both phonological awareness in English and years of study but the significance level is 5% and 1% respectively. In any case, the relation is, as in year 3, positive (see Table 5). Therefore, the better students become in recognizing English letter-sound associations and the more they study English as a foreign language the better they perform in reading comprehension. Moreover, phonological awareness in Greek seems to correlate highly (at the 1% level) with phonological awareness in English, which means that Greek phonological awareness affects the development of English phonological awareness. The association is positive, that is, as phonological awareness in Greek increases, phonological awareness in English also increases. However, once again, Greek phonological awareness is not associated with reading comprehension in English.

	READING	PHONENG	PHONGREEK	AGE
PHONENG	.359*	1		
PHONGREEK	.293	.783**	1	
AGE	.124	.032	-.093	1
STUDYEAR	.526**	.040	.188	-.123

*. Correlation is significant at the 0.05 level (2-tailed).
**. Correlation is significant at the 0.01 level (2-tailed).

Table 5: Correlation analysis with year 6 scores

The unified data set confirms again that phonological awareness in English and study years are both positively and significantly associated with the students' reading scores (at the 1% level). Interestingly, phonological awareness in Greek also seems to correlate positively at a 5% level significance with reading comprehension (See Table 6). Moreover, phonological awareness in Greek correlates highly (p<1%) with phonological awareness in English in a positive manner. Finally, age is closely and positively associated (p<5%) with phonological awareness in English; that is, the older the students, the higher their phonological awareness in English. Therefore, reading comprehension seems to be affected by English phonological awareness and years of study. Finally, the age variable and Greek phonological awareness seem to affect phonological awareness in English.

	reading	phoneng	study years	phongreek
phoneng	.457**	1		
studyears	.438**	.360**	1	
phongreek	.296*	.496**	.131	1
age	.177	.290*	.775**	.031

*. Correlation is significant at the 0.05 level (2-tailed).
**. Correlation is significant at the 0.01 level (2-tailed).

Table 6: Correlation analysis with the unified year 3 and year 6 scores

According to Freedman et al., "Correlation measures association. But association in not the same as causation" (1978:137). Therefore a linear regression analysis was performed on the subject data for each class separately and unified to examine which variables best account for the reading comprehension scores obtained.

The predictor variables for year 3 are the measures of phonological awareness in English and years of study, as the correlation analysis revealed a significant association with reading scores and no other variables associated with reading in this year group analysis. The results are given in Table 7:

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	7.680	14.086		.545	.589
	PHONENG	2.869	1.034	.375	2.776	.008
	STUDYEAR	7.247	2.604	.376	2.783	.008

a. Dependent Variable: READING

Table 7: Results of multiple regression analysis with reading comprehension scores of year 3

The regression analysis confirms the indications from the correlation tables. Both phonological awareness in English and years of study contribute highly in explaining performance in reading comprehension. Finally, it is worth noting that not only does the students' reading comprehension increase as phonological awareness in English and years of study increase, but also the effects of these two variables seem to be independent of each other.

The predictor variables for year 6 are again the measures of phonological awareness in English and years of study, as the correlation analysis revealed a significant association with year 6 reading comprehension scores. The results are given in Table 8:

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-37.434	23.525		-1.591	.122
	PHONENG	2.288	.946	.339	2.419	.022
	STUDYEAR	15.934	4.354	.513	3.660	.001

a. Dependent Variable: READING

Table 8: Results of multiple regression analysis with reading comprehension scores of year 6

The regression analysis confirms the indications from the correlation tables once again. Both phonological awareness in English and years of study contribute highly in explaining the performance of Greek students in reading comprehension in year 6.

Finally, the predictor variables for the regression analysis of the unified data are phonological awareness in English and years of study. However, in this analysis phonological awareness in Greek is also added because, in the table of the correlation analysis of the unified data (Table 6), a significant association with reading comprehension was noted. The results are given in Table 9:

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	5.895	13.786		.428	.670
	phoneng	1.995	.847	.286	2.356	.021
	phongreek	.838	.858	.112	.977	.332
	studyears	4.235	1.404	.321	3.016	.004

a. Dependent Variable: reading

Table 9: Results of multiple regression analysis with unified reading comprehension scores

The results of the regression analysis of the unified data are consistent as far as the significant role of both phonological awareness and years of study also previously seen is concerned. The contribution of phonological awareness in Greek, however, despite the abovementioned association, does not turn out to be significant for EFL students' reading comprehension performance.

To sum up, the results deriving from the regression analysis in year 3, year 6 and in the unified data suggest that helping Greek students to become competent in recognizing the English letter and sound association along with attending English lessons can result in improving students' reading comprehension performance. Greek phonological awareness does not seem to contribute to this respect. Its role is examined in more detail further on.

5.5. Phonological awareness in Greek

As noted earlier, the correlation analysis of the unified and year 6 scores revealed a strong association of Greek phonological awareness with English phonological awareness ($p<1\%$). However, no such correlation was found in year 3. Regression analysis was conducted to determine whether the association of English and Greek phonological awareness is also causal. The variables included in the analysis were age and years of study.

The regression analysis in the unified data confirms that phonological awareness in English is positively associated with Greek phonological awareness ($t=4.745$). In year 6, there is also a strong association between English and Greek phonological awareness ($t=7.189$) but, surprisingly, there is no association in year 3 alone ($t=1.156$). Moreover, there is no causal relationship between age and years of study and either English or Greek phonological awareness. In other words, Greek phonological awareness does not help students' performance in reading comprehension in English since only English phonological awareness seems to positively affect reading comprehension in English at this stage of learning. However, in year 6, students' Greek phonological awareness seems to be connected to English phonological awareness in a way that actually affects students' acquisition rate of the letter-sound relations. Therefore, a student that has a good understanding of the Greek phoneme-grapheme relations can be expected to develop a good understanding between the English phoneme and grapheme associations. In Year 3, by contrast, the acquisition of Greek phonological awareness does not seem to affect students' acquisition rate of English phonological awareness. A possible explanation for the observed difference of the effect of

Greek phonological awareness on English phonological awareness is provided in the discussion section that follows.

5.6. The Directionality of the Interdependent Variables

Finally, one of the questions seeking an answer in this research study was the relation between English phonological awareness and the rest of the observed variables, Greek phonological awareness, age and years of study. According to correlation and regression analysis, Greek phonological awareness, age and years of study seem to relate to English phonological awareness, but there is no specification deriving from the statistics as to the directionality of the aforementioned interdependent variables; for example, does Greek phonological awareness affect English phonological awareness or vice versa? And what is the role of the age and years of study variables in this respect? Moreover, this research study does not include variables potentially important for the development of the phonological awareness skill, such as working memory, for example, or other innate skills. It would be utterly impossible to include such variables due to the high dimensionality of this issue. However, the effect of variables unaccounted for should not be ignored. For this reason, the Structural Equation Modeling was used to determine the directionality of the observed variables and also include the latent ones.

Structural Equation Modeling (SEM) is a statistical approach that can be used to test causal relationships of variables by looking at their interdependence structure. One of the advantages of this method is that it allows the use of latent variables. According to Raykov and Marcoulides, latent variables are "such variables for which there are no available observations in a given study" (p.1, 2006). The latent variable for this research study could represent innate abilities such as working memory and intelligence, for example, constructs that are neither directly measurable nor included in this study. A *path diagram* was used to communicate the Structural Equation Modeling pictorially, yielding a statistically valid and interpretable model (ibid, p.9, 2006):

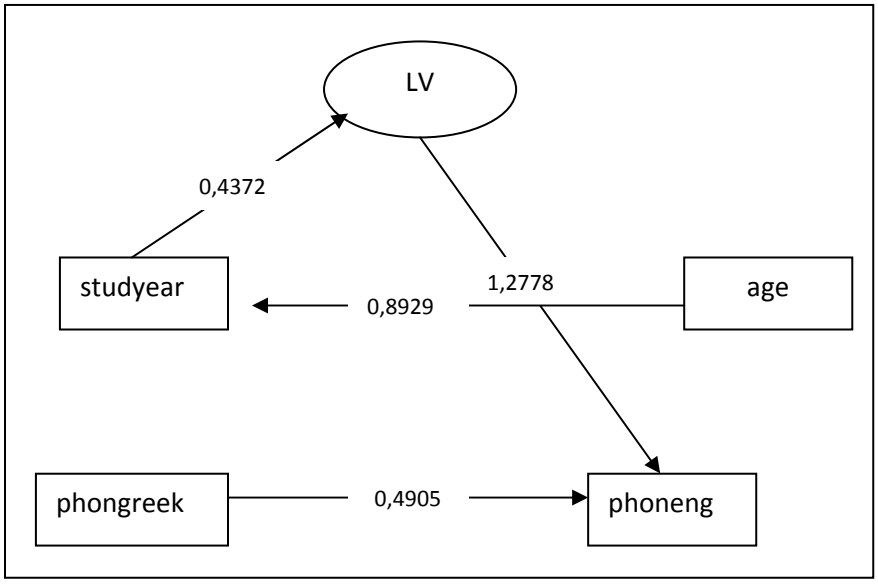

Diagram 1: Path Diagram Communicating the Structural Equation Modeling of the Latent Variable (LV) and Observed Variables

The results of the structural equation modeling that was based on the unified data confirm the relation of Greek phonological awareness and English phonological awareness found in this research study. As far as directionality in concerned, Greek phonological awareness seems to have some effect over English phonological awareness. English phonological awareness also seems to be affected by the latent variable, which is quite strong. The latent variable is directly affected by the years of study. The contribution of the structural equation modeling in this research study is that the years of study variable does not directly influence phonological awareness development but its effect comes via its influence on the latent variable.

6. Discussion of results

6.1. What are the Differences of Year 3 and Year 6 Students' Characteristics?

As we saw in section 5.1 above, the t-tests conducted to determine whether there are differences between the two year groups, year 3 and year 6 showed that English phonological awareness differs significantly between the two year groups, being much stronger in year 6 than in year 3. Greek phonological awareness does not differ significantly between the two year groups, proving that Greek students have almost complete knowledge of their mother tongue phonology. Therefore, English phonological awareness and Greek phonological awareness are viewed as two different variables that develop separately. The development of mother tongue and second language phonological awareness as two separate skills is also supported by the study conducted by Comeau et al in 1999 in a French immersion school. As already seen, both phonological awareness skills were found to be important factors in the development of the reading skills, but phonological awareness in the mother tongue (English) proved to be important until year 3 and after that it dropped while the phonological awareness of the second language continued to play a crucial role later on as well.

Years of study is the next parameter that is significantly different for the two year groups (4.20 years of study for year 6 as opposed to 1.24 years of study for year 3) and also proved to be the variable that affects directly the development of reading comprehension for students learning English as a foreign language.

Finally, the performance in reading comprehension of the two year groups was not subjected to direct comparison as the testing materials were different and it would be impossible to conduct any comparative observations. One viable comment, though, could be that both year groups managed to score above the passing baseline, which was 50% for the Starters and Flyers YLE test, proving that the Greek learners participating in this research study possess some ability in reading comprehension along the lines, a little above the baseline (56% mean average) for year 3 students and a lot more (66% mean average) for year 6 students.

6.2. Are There any Differences between Boys' and Girls' Subject Characteristics in Years 3 and 6?

As far as gender related differences id concerned the answer is 'no'. Some slight differences in boys' and girls' performance on the reading comprehension test were observed, with the

boys performing slightly better than girls in Year 3 (57.38 vs 55.75, respectively) and girls performing slightly better than boys in Year 6 (70.92 vs 64.04, respectively). However, none of these differences proved to be significant so as to support gender as a variable that could affect literacy performance.

6.3. What are the Variables Affecting Reading Comprehension Performance of EFL Year 3 and Year 6 Students? Isn't this your primary research question?

The importance of English phonological awareness proved to be strong for both year groups, being 1% significantly strong and 5% strong for year 3 and year 6 respectively. Surprisingly, mother tongue phonological awareness (Greek) does not correlate with reading comprehension performance in either year group, as was initially expected on the basis of the literature review. Some relationship was found when the data of the two year groups were unified and analyzed as a total; however, the regression analysis did not confirm a causal relationship between reading comprehension in English and Greek phonological awareness.

One more variable that correlates strongly with reading comprehension, apart from phonological awareness in English, is years of study. The years of study variable is strongly associated (1%) with reading comprehension in both the year 3 and the year 6 group. The years of study variable represents a variety of acquired knowledge, such as vocabulary, grammar, sentence structure and metalinguistic strategies which are usually taught inductively in an EFL classroom. The relationship between reading comprehension and years of study appears to be positive in this study; that is reading comprehension is expected to improve as the years of study increase.

6.4. What is the role of Greek phonological awareness?

Greek phonological awareness, as seen above, was not associated with reading comprehension skills either in year 3 or in year 6 statistical analysis data. In the correlation analysis of the unified data, however, a significant association with reading comprehension, which was not confirmed in the regression analysis, was revealed. That association is probably an indirect one due to the strong association of phonological awareness in Greek with phonological awareness in English.

Phonological awareness in Greek was associated significantly and positively with English phonological awareness in year 6 but there was no association whatsoever in year 3. The regression results also demonstrated the causal relationship of the aforementioned variables in year 6. The threshold language hypothesis could provide a viable explanation for the lack of the so much expected contribution of Greek phonology to English phonological awareness development. According to the findings of the research project of Lee and Schallet Lemonnier with Korean EFL beginners in 1997, learners attempting to learn a new foreign language already have mastered reading in L1 and these skills may transfer to L2 or even interfere. However, as we saw earlier, according to the Threshold language hypothesis, L2 readers need to have some L2 knowledge before they can start transferring strategies and useful L1 elements and structures. Thus, the fact that phonological awareness in Greek does not intervene in the development of phonological awareness in English in year 3 may be due

to the fact that most students had only had just a few months of attendance in English classes and did not have enough L2 knowledge.

6.5. Implications and recommendations

In the light of the present results, tasks that enhance students' phonological awareness skills in English as a foreign language, especially in the early stages of learning, are recommended. This could also be beneficial for struggling students. Therefore, Greek students that face difficulties in acquiring literacy skills could be helped by phonologically-based intervention programs already used in the UK for struggling students starting from year 1 to year 6 on a one-to-one basis.

Two such intervention programs are the 'Jolly Phonics' and the 'Five Minutes Box'. The 'single Jolly phonics' basically helps students practice five basic skills of reading and writing, which are learning the letter sounds and letter formation, blending, identifying sounds in words and spelling tricky words. Each session lasts approximately 20 to 30 minutes and is administered twice a week. The 'Five Minutes Box' basically covers the same areas as 'Jolly Phonics' but each session is designed to last for 5 minutes per day. These programs are applied to immigrant students as well. The beneficial outcomes of such intervention have been recorded by several research studies introduced in detail in the literature review (Bus et al, 1999; Blachman et al, 1999; Stuart, 1999).

7. Conclusion

The present study confirmed the significance of English phonological awareness in the development of reading comprehension, but no significant relations were found between EFL reading comprehension and phonological awareness in Greek. Mother tongue phonological awareness seems to affect English phonological awareness and, therefore, reading comprehension but only after learners have mastered some knowledge of the L2, a finding that supports the Threshold Language Hypothesis. Moreover, the variable also important to the learning of a foreign language is the years of study, which stands for the explicit teaching of the foreign language structure. Neither age nor gender proved to play a significant role.

Based on the above, phonological awareness in English needs to be given a more central role especially in the initial stages of EFL language learning. Furthermore, phonological awareness based intervention programs could help struggling students improve their foreign language literacy skills. However, further research in a heterogeneous sample, especially conducted longitudinally, would help produce safer results and provide valuable support for the abovementioned suggestions.

Note

1. According to the holistic approach, language is taught as a whole – not broken down into bits – and involves children in using it functionally and for specific purposes (Goodman, 1986).

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