Predicting Early Reading in Greek: The Contribution of Phonological Awareness and Non-Phonological Language Skills

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Abstract

The study investigated the contribution of phonological awareness, morphological awareness and vocabulary to decoding in grades 1 and 2 using structural equation modeling (SEM) analysis. SEM analysis with latent variables revealed that in grade 1 only phonological awareness predicted reading, while in grade 2 decoding was not predicted by any of the predictors involved. We concluded that in a phonologically simple language such as Greek, phonological awareness has a central role in the prediction of decoding during the first year of reading acquisition. On the contrary, morphology does not play a role in early word reading even though Greek is a morphologically complex language.

Keywords: Greek, reading, morphological awareness, phonological awareness; vocabulary.

1. Introduction

A substantial body of research in languages varying in the depth of orthography has repeatedly highlighted the significant role of phonological awareness in the prediction of reading (e.g. de Jong & van der Leij, 2002; Manis, Doi & Bhadha, 2000). However, despite this universal role of phonological skills in the reading acquisition, research in transparent orthographies has suggested that the contribution of phonological awareness to the prediction of reading may be significant mostly during the first two years of reading instruction (e.g. Georgiou, Torppa, Manolitsis, Lytinen & Parrila, 2012). There is also evidence supporting that nonphonological language skills, namely vocabulary and morphological awareness have a significant influence on word reading achievement (e.g. Casalis & Luis-Alexandre, 2000; Kirby, Deacon, Bowers, Izeberg, Wade-Wooley & Parrila, 2011; Kuo & Anderson, 2006; Ouellette, 2006; Padeliadu, Rothou & Sideridis, in press; Rispens, McBride-Chang & Reitsma, 2008; Roman, Kirby, Parrila, Wade-Woolley & Deacon, 2009; Rothou & Padeliadu, 2011; Tsesmeli, 2007; Verhoeven, van Leeuwe, & Vermeer, 2011; Wolter, Wood & D’zatko, 2009). Furthermore, it is claimed that phonological processing skills are associated with vocabulary skills as well as morphological awareness and vocabulary (McBride-Chang, ...
Cho, Liu, Wagner, Shu, Zhou, Cheuk & Muse, 2005; Metsala, 1999) while phonological awareness and morphological awareness are also correlated (Carlisle & Nomanbhoy, 1993). Therefore, the issue of the specific role of the above variables in the prediction of reading appears to be an unresolved issue.

Our study in the Greek language aimed to examine the relationships between phonological processing skills, vocabulary and inflectional morphological awareness in a model predicting decoding in grades 1 and 2 (Fig.1). In Greek, during the last few years there has been an increasing interest for the role of morphological awareness skills in early literacy, namely decoding and reading comprehension (Manolitsis & Kandilidou, 2011; Padeliadu et al., in press; Rothou & Padeliadu, 2011). Research in Greek orthography has also focused on the use of morphemic rules for spelling as well as on the role of morphological awareness in spelling (Chliounaki & Bryant, 2002; Tsesmeli, 2007). Greek language has a shallow orthography with morphophonemic structure (Porpodas, 2006) but a rich morphology system including derivational morphology, inflections as well as compounding (Ralli, 2005).

We used structural equation modeling (SEM) analysis to find out the relationships between the oral language skills and reading skills and whether and to what extent each of the language skills can contribute to early reading. McBride-Chang et al (2005) studying second grade readers coming from Beijing, Hong Kong, Korea and USA, reported that across languages (alphabetic vs. non alphabetic), phonological and morphological skills have different impact on word recognition performance. More specifically, McBride-Chang and her colleagues found that in English language word reading was predicted only by phonological skills, whereas in the other languages morphology and vocabulary were also significant predictors. We anticipated that our findings from an alphabetic language with a transparent orthographic system could contribute to the discussion about the predictors of early reading as well as about the role of morphology in first and second grade reading.

2. Method

2.1. Participants

Participants were 120 first graders and 123 second graders. They were native speakers of Greek and none of them had reported reading problems. The mean age in months (with standard deviations in parentheses) for grade 1 was 80.07 (3.435) and for grade 2 was 92.16 (3.907). All the children were randomly selected from 15 primary schools located in Athens. They took part in the study providing we had a signed parental consent form. Testing took place the second term of school year when all the children had already been taught the basic mechanism of reading and
thus they were able to read accurately. The tests were administered individually during the school day by the first author. Each of the three oral language skills as well as the decoding was measured by two tests.

2.2. Measures

Two oral experimental tasks assessing the noun-adjective inflections (totptose in Figures 2 and 3) and verb-inflections (verb-infl in Figures 2 and 3) were used for the assessment of morphological awareness (F1 in Figures 2 and 3). Both tasks were based on the concept of Morphological Generation Task (Muter, Hulme, Snowling, & Stevenson, 2004). In Greek language, nouns, adjectives and articles are inflected for gender, number and case. Verbs are also marked for person and number. There are three genders: masculine, feminine and neuter and four cases. The nominative and the accusative cases have the same suffixes. In the noun-adjective inflection task the children were asked to produce the plural of articles, adjectives and nouns in the context of a sentence. There were 10 sentences which included the structure of article-adjective-noun (AAN) in the singular form and 4 sentences with the structure article-noun article-noun (AN AN) in the singular form, while the remainder of the sentence was in plural. The plural of two cases: general and accusative were produced. One example is the following:

**Singular Form:** Αγοράσαμε γλυκά του μικρού παιδιού = /Agorasame glika tou mikrou pediou/= We bought cakes for the small child.

**Plural Form:** Αγοράσαμε γλυκά των μικρών παιδιών = /Agorasame glika ton micr on pedion/= We bought cakes for the small children.

In the verb inflection task, children were asked to change the tense of the verb in a sentence. A temporal adverb at the beginning of the sentence defined the alteration of the verb tense. We read to them 12 pairs of sentences that differed in the temporal adverbs. The second sentence began with an adverb that reflected the change of the verb tense. The remaining of the sentence was similar to the first sentence. For example:

1st sentence: Τώρα εσύ πλένεις τα πιάτα = /Tora esi plenis ta piata/= Now you are washing the dishes.

2nd sentence (verb tense change): Χθές μια φορά εσύ έπλυνες τα πιάτα = /Chthes mia for a esi eplines ta piata/= Yesterday (in a specific time) you washed the dishes.

In both morphology tasks the correct answer was scored with 1. In grade 1, alpha reliability for noun-adjective inflection tasks was .859, and for verb-inflection task was .542. Similarly for grade 2 alpha reliability for these tasks were .905 and .553 respectively.

The phoneme deletion and phoneme segmentation subtests (F2 in Figures 2 and 3) of a standardized screening test of reading difficulties for grades A-B (Porpodas, 2007) were administered to the participants as indicators of the phonological awareness. Both subtests include pseudowords and the score for each of them was the total number of correct answers. The manual of the test reported that for grades A-B the alpha reliability for the phoneme deletion subtest was .93 and for the phoneme segmentation subtest was .92.

For the second nonphonological oral language skill, namely vocabulary (F3) we used two standardized tests: the Greek standardization of Peabody Picture Vocabulary test (PPVT-R) (Simos, Sideridis, Protopapas,&Mouzaki, 2011; Protopapas, Simos, Sideridis,&Mouzaki, 2012) and the vocabulary subtest of the Greek standardization of WISC-III (Georgas, Paraskevopoulos, Bezevegis&Giannitas, 1997). The first test assessed the receptive vocabulary skills and the second one the expressive vocabulary. The manual of the WISC-III states that the internal consistency of the vocabulary subtest (Cronbach’s alpha) ranged from .62 to .81 for grades 1 to 3.

Finally, word reading (decoding) was measured with two tasks of the decoding subtest of the NewTELA (Reading test) (Padeliadu, Antoniou &Sideridis, in press). The first task (decode-1) requires children to read a list of 24 pseudowords of increasing difficulty, while the second one (decode-2) ask them to read a list of 53 real words of increasing difficulty. Each correct response is scored with 1. Cronbach’s alpha for pseudoword reading and real word reading were .929 and .964, respectively (Padeliadu et al., in press).

3. Results

Structural Equation Models (SEM) models were fit separately for grade 1(Fig. 2) and grade 2 students (Fig. 3).
For grade 1 students, the direct effects model described above provided a great fit to the data. All measured paths were statistically significant at \( p < .05 \) suggesting a good measurement model. All between factor correlations were significant ranging between .49 and .66. Among unidirectional structural coefficients only phoneme deletion/segmentation proved to be a significant and positive predictor of reading. Overall, model fit was excellent as demonstrated by a non-significant Chi-square test \([\chi^2(14) = 7.503, p > .05]\) and RMSEA values less than .10. Other fit indices were in the range of .95 to 1.00 \([\text{CFI} = 1.00; \text{GFI} = .984; \text{SRMR} = .033; \text{NNFI} = 1.00]\) suggesting excellent model fit. All models run using EQS 6.1 (Bentler, 1995).

The same model was fit to the data from grade 2 students. Results indicated a superb measurement model in which all measured paths were significant. Once again the Chi-square was non-significant \([\chi^2(14) = 7.503, p = .914]\).

Examining the structural paths suggested that for grade 2 students none were significantly different from zero suggesting automatization of the skill of decoding for that age group. Model fit was again excellent, albeit slightly less so for grade 2 students. Between-factor correlations were significant and almost equivalent to the grade 1 group. The Chi-square test was again non-significant \([\chi^2(14) = 16.430, p = .288]\), although power levels were ample. The critical residual values were satisfactory \((\text{RMSEA} = .038)\). Similarly, the remaining fit indices were all satisfactory and above proposed cutoff estimates \([\text{CFI} = .970; \text{GFI} = .967; \text{SRMR} = .048; \text{NNFI} = .940]\) suggesting excellent model fit.

4. Discussion

The present study aimed to examine the relationships between phonological processing skills, vocabulary and morphological awareness in a model predicting decoding skills in Greek speaking children (grades 1-2). Differential structural relationships characterized the two models. Specifically, in grade 1 decoding was uniquely predicted by phonological awareness, whereas in the second grade none of the predictors explained unique variance in decoding. However, in both grades there were significant relationships between morphological awareness and vocabulary skills, whereas only in first grade all the predictors were correlated approximately at the same level.

Our finding that in first grade, reading skills are predicted by phonological processing skills is in line with previous studies in other transparent languages such as Dutch, Finish and German (e.g. de Jong & van der Leij, 2002; Landerl & Wimmer, 2000; Leppanen, Niemi, Aunola & Nurmi, 2006) which have revealed that phonology played a significant role only during the first or second year of schooling. However, the present study showed that in the first grade decoding model, phonology and morphology correlated with vocabulary and thus we could argue that the nonphonological language skills may have an indirect effect on decoding through their relationships with phonology. Furthermore, Padeliadu et al. (in press) cross-sectional study with Greek speaking children in grades 1-2 showed a contribution of derivational morphological awareness skills to both word reading and reading comprehension in grade one.

Regarding the predicting model of reading in second grade, our results showed that neither phonological awareness nor nonphonological language skills have an important role in grade 2 decoding. On the contrary, McBride-Chang’s et al. (2005) research with grade 2 readers from Beijing, Hong Kong, Korea and the USA reported that in English language word recognition was predicted only by phonological skills, whereas in non-alphabetic languages reading skills were predicted by morphology and vocabulary. The finding that inflectional morphology did not predict reading skills in second grade agrees with the Casalis et al. (2000) study in French and another study of own (Rothou & Padeliadu (submitted) in the Greek language. Interestingly, our work in Greek has repeatedly revealed that morphological skills are not important predictors of reading in second grade (Padeliadu et al., in press; Rothou et al., 2011), reflecting an automaticity of the skill for that age group.

The present study is limited by several factors. First sample size was not particularly large to allow for a full evaluation of more complex models. Second, some of the measured variables represented ceiling effects as they may
have been for a specific age group, easy, and thus, negatively skewed. Corrections to distributions were conducted by eliminating extremely easy items, with a slight cost on content validity.

The present study demonstrates that in a language with a shallow orthography and rich morphological system morphology, morphological awareness may still not be an important predictor of early reading, when its contribution is evaluated simultaneously with the contribution of phonology and vocabulary knowledge. In the future, it will be interesting to evaluate path models that will involve the role of morphological awareness to the acquisition of reading-related skills (e.g., cognitive and metacognitive).

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References


