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COGNITIVE AND LINGUISTIC FACTORS PREDICTING DIFFERENT READING COMPREHENSION SKILLS IN THIRD AND FOURTH GRADE STUDENTS

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Abstract

The purpose of this study was to examine the extent to which linguistic skills- such as vocabulary and morphological awareness- and cognitive skills- such as planning and attention- predict performance in different reading comprehension tasks, after controlling for the effects of age and reading fluency. Eighty-four Grade 3 to 4 Greek speaking children were assessed on measures of receptive vocabulary, morphological awareness, planning, attention, word reading fluency, and reading comprehension. The results of multiple hierarchical regression analyses indicated that: (a) morphological awareness was the only factor that predicted performance in reading comprehension tasks requiring different levels of comprehension, after controlling for the effects of age, reading fluency, vocabulary and cognitive skills, and (b) vocabulary and attention significantly predicted performance exclusively in the reading comprehension task that required a relatively higher level of comprehension. Taken together, these findings suggest that the extent to which specific linguistic and cognitive factors predict performance in reading comprehension tasks may vary depending on the type of task.

Keywords: *Vocabulary, morphological awareness, planning, attention, reading comprehension.*

1. Introduction

Reading comprehension (RC) is a complex, multidimensional construct (see Kendeou, Papadopoulos, & Spanoudis, 2015). It has been established that linguistic skills, such as vocabulary and morphological awareness (MA), are significant predictors of RC (Cain & Oakhill, 2014; Liu, Groen, & Cain, 2024). On the other hand, successful RC seems to depend on cognitive skills, such as planning and attention (see Kendeou et al., 2015). Planning and attention play a crucial role in RC, as individuals must strategize their approach to a passage, continuously adjust their plan while reading, and filter out irrelevant information to construct a coherent understanding of the text (Dunn, Georgiou, & Das, 2014). Research has shown that planning skills have a unique contribution to RC in 9-to 15-year-olds (Sesma, Mahone, Levine, Eason, & Cutting, 2009). However, the role of attention in RC within the context of PASS theory has not been adequately studied (see Kendeou et al., 2015).

Nevertheless, the extent to which linguistic and cognitive skills predict RC performance may depend on the linguistic and cognitive demands of RC tests. Moreover, no research in Greek has examined the role of specific linguistic skills in RC in conjunction with planning and attention skills within the context of PASS theory. Given that MA plays an important role in RC in Greek, the purpose of the study was to examine the extent to which proximal skills- namely MA and vocabulary- and distal skills- such as planning and attention (PASS processes) -predict performance on different RC tests.

2. Method

2.1. Participants

Our sample consisted of 44 third graders (21 girls; Mage = 109.02 months, SD = 1.96) and 40 fourth graders (22 girls; Mage = 118.30 months, SD = 2.48), who were native speakers of Greek without any intellectual, or sensory problems.

2.2. Measures

RC was assessed by two standardized tests: the "Test for Detecting Reading Ability" (Tafa, 1995), (max=42), and the “Identification of Equivalent Semantically Sentences” subtest of Test-A (Padeliadu

& Antoniou, 2008), (max=4; converted into a percentage value). Word reading fluency was assessed by the measure of word reading efficiency (max=104), adapted in Greek from TOWRE (Georgiou, Papadopoulos, Fella, & Parrrila, 2012).

Receptive vocabulary was measured using the Greek standardization (max=173) of the Peabody Picture Vocabulary Test (PPVT; Simos, Sideridis, Protopapas, & Mouzaki, 2011), while morphological awareness was measured using the Word Analogy Task (Nunes, Aidinis, & Bryant, 2006), assessing children's awareness of inflectional and derivational morphology (max=16).

Planning and attention were assessed by Matching Numbers and Number Detection subtests respectively, from the Das-Naglieri Cognitive Assessment System (DN-CAS; Naglieri & Das, 1997). The participant's score in each subtest was derived based on the CAS instructions.

3. Results and discussion

Table 1 presents the descriptive statistics of our measures as well as the Pearson correlations between the measures. As expected, based on previous findings in Greek (e.g., Manolitsis, Grigorakis, & Georgiou), MA and vocabulary correlated strongly with RC (TDRA). In relation to cognitive skills, contrary to previous findings (see Kendeou et al., 2015), no correlation was found between planning and RC performance.

Table 1. Descriptive Statistics and Correlations between the Measures.

Variables	1.	2.	3.	4.	5.	6.	7.
1. WRF							
2. RV	.30**						
3. MA	.49**	.41**					
4. Planning	.25*	.15	.21				
5. Attention	.29**	.21	.41**	.32**			
6. RC (TDRA)	.58**	.62**	.62**	.21	.47**		
7. RC (IESS)	.32**	.28*	.41**	.01	.28*	.48**	-
Grade 3 (M/SD)	48.57/12.9	114.93/10.3	8.82/3.4	6.55/1.5	30.73/7.4	24.50/7.2	36.93/29.7
Grade 4 (M/SD)	51.60/13.9	122.93/15.5	10.70/4.0	7.75/2.1	36.08/10.4	28.57/9.4	45.62/32.9

Note. WRF: Word Reading Fluency; RV: Receptive Vocabulary ; MA: Morphological Awareness; RC (TDRA): Reading Comprehension (Test for Detecting Reading Ability); RC (IESS): Reading Comprehension (Identification of Equivalent Semantically Sentences); *$p < .05$; **$p < .01$.

Next, we performed hierarchical regression analyses to examine the extent to which the independent variables would predict RC, after controlling for age and word reading fluency (see Table 2). Planning did not predict performance in RC. When operation tasks are used (as in our D-N CAS subtest), planning exerts a limited role in RC (see Das & Georgiou, 2016). On the other hand, attention predicted performance only in the RC (TDRA) that required a relatively higher level of comprehension. It is possible that as the demands of the RC task increase, so does the relevance of attention (see Kendeou et al., 2015). In relation to linguistic skills, vocabulary and MA predicted performance in the RC (TDRA), in line with previous findings (e.g., Manolitsis et al., 2017). The TDRA test exerts processing demands on fluency and vocabulary skills, whereas the IESS subtest exerts processing demands on semantic and grammatical processes. Given that morphemes convey grammatical and semantic information (Manolitsis et al., 2017), it is not surprising that MA was the sole significant predictor of performance in both RC tests. Overall, despite certain limitations, our findings appear to suggest that the extent to which linguistic and cognitive skills affect performance in RC tasks may vary depending on the nature of the task.

Table 2. Results of Hierarchical Regression Analyses.

Measures	RC (TDRA)		RC (IESS)	
	β	ΔR^2	β	ΔR^2
Model 1				
(1) Control variables		.38***		.11**
Age	.19*		.10	
Word reading fluency	.57***		.31**	
(2) Cognitive skills		.07**		.05
Planning	.05		.05	
Attention	.30**		.21	

(3) Vocabulary	.46***	.17***	.18	.03
(4) Morphological awareness	.24**	.04**	.26*	.04*
Model 2				
(3) Morphological awareness	. 36***	.09***	.30*	.06*
(4) Vocabulary	.40***	.12***	.11	.01
Model 3				
(2) Linguistic skills		.25***		.09*
Vocabulary	.40***		.11	
Morphological awareness	.30**		.29*	
(3) Planning	.01	.00	.15	.02
(4) Attention	.22**	.03**	.13	.01

Note. RC (TDRA): Reading Comprehension (Test for Detecting Reading Ability); RC (IESS): Reading Comprehension (Identification of Equivalent Semantically Sentences) ; *p < .05; **p < .01; ***p < .001.

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