

〔博士論文概要〕

Cognitive predictors of Arabic literacy amongst Arabic speaking Tunisian children from kindergarten to grade 4- A cross sectional study

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## Summary

Research on reading acquisition in alphabetic orthographies has revealed that reading and spelling is no easy process for young children and demands the adequate development of cognitive phonological, visual, rapid naming speed and vocabulary processes. Most research on reading acquisition has been carried out in transparent and non-transparent alphabetic orthographies with a great focus on cross-sectional studies investigating the role of phonological processing, automatization, visual cognition and vocabulary as the cognitive predictors in detecting reading and spelling difficulties in young children. However, almost no studies have been reported on how these cognitive predictors contribute to detecting reading deficits in a language that includes both transparent and non-transparent orthographies. Based on existing case reports established on dyslexia in Arabic, this study investigated first the characteristics of four cognitive abilities; phonological processing, visual cognition, automatization and receptive vocabulary in predicting reading and spelling abilities in Arabic literacy. Second, the study focused on the developmental change of cognitive predictors and their contributions across grade levels. A total of 543 typically developing Tunisian primary school children with an IQ score above -1.5 SD on the Raven's Coloured Progressive Matrices test participated in this study; 109 Kindergarteners, 107 grade 1, 102 grade 2, 115 grade 3 and 110 grade 4 children. Several cognitive reading and spelling tests were carried out on the participants as follows: general intelligence test; Raven's Coloured Progressive Matrices (RCPM), basic cognitive abilities tests; phonological processing tests ( non-word repetition and phoneme deletion), visual cognition test; Rey-Osterrieth Complex Figure Test (ROCFT), receptive vocabulary test; Arabic Comprehension Test of Abstract Words (ACTAW), automatization test; Rapid Automated Naming (RAN), reading achievement

tests in vowelized and non-vowelized Arabic (word reading, non-word reading and paragraph reading) and spelling tests (word spelling and non-word spelling). Results of the multiple regression analysis revealed that phonological processing was a significant predictor of reading and spelling abilities across grades. Results of this study are consistent with results in English studies on literacy acquisition. However, its impact varied according to grade level and language transparency, being stronger in vowelized reading at early stage of literacy development in grade 1, then to gain more importance in non- vowelized reading by grade 4. Automatization significantly predicted reading across grades but was not associated to spelling. Similar findings were found in other studies on transparent orthographies such as German and Greek, but contrast with English studies in which automatization was found to predict spelling. Visual cognition predicted non-vowelized reading in grades 1 and 4, as well as spelling. Finally, receptive vocabulary predicted vowelized reading in grade 1 and non-vowelized reading in grade 4. Phonological processing and automatization are important contributors to early Arabic literacy. The developmental change of cognitive predictors across grades in accordance to language transparency; vowelized Arabic and non-vowelized Arabic suggests the presence of activation of two different decoding systems children use in order to gain lexical access in Arabic as children improve their knowledge of non-vowelized texts.

In the present study, phonological processing, automatization, visual cognition and receptive vocabulary were shown to be moderately associated with Arabic reading abilities and spelling. Similar patterns of contributions of the four cognitive abilities to reading abilities and spelling in vowelized and non-vowelized Arabic were found. Of the four cognitive skills phonological processing was a relatively strong predictor of Arabic reading abilities. Automatization also contributed to both vowelized and non-vowelized Arabic word reading.

In contrast to previous findings in alphabetic orthographies, our results showed that phonological processing still remained a significant predictor in Arabic word reading even when its contribution decreased in upper grades. Thus, phonological processing is not only important for learning alphabetical languages but also for Arabic reading acquisition. It is possible to say that phonological processing is seen to be an essential element of reading across orthographies.

Visual cognition also revealed to be an important predictor for Arabic reading ability. However, its contribution differed in relation to script transparency. Visual cognition was more significant from mid to advanced grades in vowelized Arabic in comparison with non-vowelized Arabic. As vowelized Arabic includes the vowel diacritics which carry the phonological information, in this case words become visually complex due to the location of vowel diacritics above or below the words. In non-vowelized Arabic, vowel diacritics are omitted, which leads to focus on the visual complexity of letters when the form of letters change according to their position in a word; beginning, middle and ending of a word.

In contrast to phonological processing and automatization, receptive vocabulary demonstrated to be a predictor of Arabic reading ability for both vowelized Arabic and non-vowelized Arabic in lower grades but not in advanced grades. Moreover, the contribution of receptive vocabulary to Arabic reading ability was seen to be stronger in vowelized Arabic than in non-vowelized Arabic. These findings indicate the great importance of receptive vocabulary in early stages of reading acquisition. As receptive vocabulary has shown to highly contribute to reading in alphabetic orthographies, children's success in school greatly depends on their ability to read with understanding. Within this regard, receptive vocabulary helps facilitate word decoding

which in turn helps facilitate reading comprehension. Therefore, receptive vocabulary plays a fundamental role in Arabic reading ability regardless of script transparency.

To conclude, the present study highlighted the different relations of four cognitive abilities; phonological processing, automatization, visual cognition and receptive vocabulary in predicting Arabic literacy and how they contribute to the developmental change across grades in Arabic speaking children. This study has demonstrated that the four cognitive abilities play important and unique roles in early language acquisition and their contribution varies according to grade level and transparency of the Arabic script. Therefore, when developing assessment tools and screening tests in Arabic, it is vital to take into consideration the different orthographic script; that is vowelized and non-vowelized Arabic, and also the cognitive predictors are unique and different to each Arabic script. Therefore, improving these intervention programs will in time help support Tunisian children with poor reading and spelling skills to overcome reading and spelling difficulties in Arabic.