EXAMINING A REVERSED CROSS-LANGUAGE TRANSFER OF CORE METALINGUISTIC AWARENESS SKILLS AMONG MOROCCAN UNIVERSITY STUDENTS WITH READING DIFFICULTIES: A LONGITUDINAL QUASI-EXPERIMENTAL STUDY

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Abstract

The current exploration examined the occurrence of a reversed transfer of core metalinguistic skills, namely phonological awareness, morphological awareness, orthographic knowledge and reading comprehension from English (L2) to Arabic (L1) among thirty university students with reading difficulties. The experiment consisted of a battery of English and Arabic reading tests administered over two-phases: pre- and post-intervention. All participants were placed in two major groups: experimental and control groups. The experimental group exclusively received a reading intervention in English, targeting the main weaknesses demonstrated by the participants during the pre-test stage. At the end of the reading program, all participants sat for the same reading tests. While the control group's results remained stagnant in both languages, the treatment group's results revealed a positive improvement in all English skills after the intervention (with

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Examining a Reversed Cross-language Transfer of Core Metalinguistic Awareness Skills among Moroccan University Students with Reading Difficulties: A Longitudinal Quasi-Experimental Study

79

strong correlations between phonological awareness and reading comprehension: r =.65*p <,00). As to the Arabic tests' scores, the results showed a significant development of similar Arabic reading abilities including orthographic knowledge. The findings lend support to the Cognitive Retroactive Hypothesis (Abu Rabia and Shakour, 2014) and challenge the Orthographic Depth Hypothesis which preconditions transfer across typologically different languages.

Keywords: Phonological Awareness, Morphological Awareness, Orthographic Knowledge, Reading Program, Reading Comprehension.

INTRODUCTION

Metalinguistic awareness refers to the ability of consciously thinking about, manipulating, and reflecting upon the prominent linguistic units featuring written and spoken language (Nagy, 2007). Similarly, Nagy & Anderson (1999) define metalinguistic awareness as the ability to "reflect on and manipulate the structural features of languages (Nagy & Anderson, 1998, p. 155). Consequently, attention is directed to language itself rather than the varied functions embodied by language. Bialystok (2001) describes metalinguistic knowledge as the ability to explicitly instantiate mental representations of language properties during language acquisition. A child, with a high level of metalinguistic awareness, may perform well on a phonemic awareness task without necessarily knowing what the word "phoneme" means. Therefore, the explicit nature of metacognitive knowledge does not suggest that readers are apt to verbalize language properties. Since learning to read requires a linkage between spoken language elements and graphic symbols, the import of metalinguistic awareness lies in its capacity to guide the process of the way phonological and morphological information are graphically portrayed. It enables readers to analyze words in terms of their phonological and morphological constituents (Koda, 2009).

Literature Review

Phonological Awareness

Phonological awareness is the ability to "explicitly" represent and control phonological units in one's own language, relating sounds accordingly with their matching orthographic symbols (Koda, 2009). In crude terms, phonological awareness is a skill entailing an adept manipulation of speech segments such as syllables and phonemes. A child with a heightened

phonological awareness recognizes the difference between "cat" and "bat" (explicit knowledge) and can make the distinction between the initial sounds /k/ and /b/ that form the onset of the monosyllabic words given. Equally, the child can delete the first sounds and utter the remaining new word without having difficulty (/_at/). Research on phonological awareness has been confined to findings revealed from children literature with a limited body of studies investigating this skill among adult populations (Bialystok et al., 2003; Tighe, 2019; Tighe & Schatschneider 2016b; Geva, 2014; Grabe, 2009; Koda & Zehler, 2008; Zhang, 2016). This line of research has focused on the advantages bilingual infant readers have over their monolingual peers. Along the same lines, bilingual children who demonstrate high levels of phonological awareness perform well on L2 reading tasks as opposed to monolingual readers (Bialystok et al, 2003; Chen et al., 2004).

Unveiled findings from research on child second language reading cannot be directly extrapolated to adult learners, especially insights of the contributions of phonological awareness to reading in conjunction with its overall constructs including comprehension (Tighe et al., 2019). Extremely scarce body of academic work has measured the level of phonological abilities among adult populations, except advanced-age readers enrolled in Adult Basic Education (ABE) programs (for a full review see Tighe & Schatschneider, 2016b). At the university level, there have been very few reports on students with a record of reading difficulties which persist over time (Parrila & Georgiou, 2007; Burt & Hefernan, 2012). These studies examined the notable aspects of metalinguistic awareness viz. phonological awareness, morphological awareness, and orthographic knowledge. Parrila & Georgiou (2007) measure spelling and phonological processing skills among university students who report a history of reading acquisition problems currently not compensated (Parrila & Georgiou, 2007). The study's results indicate that almost all the participants show problems in word reading, decoding and phonological processing tasks.

Morphological Awareness

Morphological awareness is referred to as the ability to identify word formation processes, including derivation and inflection (Zhang, 2016; Koda, 2008; Kuo & Anderson, 2006; Dong et al., 2019). It is commonly

Examining a Reversed Cross-language Transfer of Core Metalinguistic Awareness Skills among Moroccan University Students with Reading Difficulties: A Longitudinal Quasi-Experimental Study

81

agreed that morphological awareness is crucial to first and second language reading (Ku & Anderson, 2003; Carlisle, 2003; Koda & Zehler, 2008; Deacon, 2012). Empirical correlational research on reading development and morphological awareness suggests that the organization of our mental lexicon, i.e., the way vocabulary is stored, is morphologically based. Thus, readers with limited vocabulary knowledge face huge problems while reading a passage-level text. The general argument in the chronicle of reading research is that significantly falling behind understanding the meaning of new or even structurally complex words is due to inadequate morphological awareness skills (Droop & Verhoeven, 2003; Garcia, 2000; Verhoeven, 2000). The association of vocabulary knowledge with morphological awareness is ingrained in the way our lexicon is laid out. Laconically speaking, our mental lexicon is morpheme-based and, hence, processing the morphemic constituents of words while reading expedites retrieval of lexical meanings (Koda & Zehler, 2008; Tighe & Binder, 2012; Zhang, 2016). Studies on adults and children's word reading skills, as a case in point, show that morphological awareness unclogs the processing of morphologically complex words (Harley, 2001).

Particularly, the burgeoning of new research on the relationship between morphological awareness and reading among adult skills readers stems from the idea that word representation is a key precursor of comprehension (Perfetti & Hart, 2002; Guo et al., 2011). The Lexical-Quality Hypothesis states that individual's knowledge of words such as morphosyntactic and semantic skills determines the range of reading comprehension (Perfetti & Hart, 2002). Empirical research on the role of linguistic skills in reading reports significantly strong variance between morphological awareness and reading achievement across a wide range of grade levels running the gamut from early school years to high school and eventually college (Landi, 2009; Mahony, Singson, & Mann, 2000). However, and in contrast to children, morphological awareness becomes increasingly critical for text-reading ability in adults, which is predicted by vocabulary knowledge (Johnston, Barnes, & Desrochers, 2008; Guo, Roehrig, & Mason, 2011). The reason why morphological awareness develops over time and hitherto forms the backbone of reading is because decoding skills dwindle away to a minor factor at a certain age.

Orthographic Knowledge

The third metalinguistic skill, discussed in the context of the ongoing research paper, is orthographic knowledge. Tighe (2015) defines orthographic knowledge as "an individual's sensitivity to conventional spelling patterns and rules and individual's knowledge of mental representations of specific written word or word parts stored in memory" (Tighe, 2015; P.5). Zaric and colleagues (2020), also more notably Deacon (2012), view orthographic knowledge as the ability to think about and manipulate "orthotactics"- the allowed letter combinations (Zaric et al., 2020; Deacon, 2012). Like the sub-lexical route, orthographic knowledge entails the permissible graphemic sequences depicting written words. This orthographic storage feature has been termed in the literature as "Mental Graphemic Representation" (Tighe, 2015; Apel, 2011, Zaric et al., 2020; Grainger & Ziegler, 2011). Consistent with research on the prominent role of phonological awareness and morphological processing in reading, studies on the significance of orthographic knowledge report that understanding the mechanisms by which words are graphically represented, namely spelling conventions, uniquely contribute to word reading development (Tighe & Binder, 2012; Zaric et al., 2020; Apel et al., 2012; Conrad et al., 2013; Deacon, 2012; Kim et al., 2013; Nagy et al., 2003; Roman et al., 2009).

Orthographic knowledge is two-fold, encompassing both the knowledge of letter-clusters (word-specific knowledge) and general spelling conventions of the writing system (general knowledge) (Zaric, Nagler & Hasselhorn, 2020; Conrad et al. 2013; Rothe et al. 2015). On the one hand, word-specific knowledge entails an understanding of spelling rules of specific words. Adequate lexical graphic representation is conducive to skilled spelling and reading fluency (Ehri, 2014). The contribution of word-specific knowledge to word spelling and reading is attested across various linguistic backgrounds and among different language groups (Greek: Georgiou et al. 2008; Persian: Nassaji, 2014; Arabic- Fender, 2003, 2008; Dutch: Bekebrede et al. 2009; English: Conrad et al. 2013; Deacon et al., 2012). On the other hand, general orthographic knowledge is the overall manipulation of legal letter patterns represented in the writing system. It includes which letter cluster is frequently or rarely possible in different positions, i.e., word-

Examining a Reversed Cross-language Transfer of Core Metalinguistic Awareness Skills among Moroccan University Students with Reading Difficulties: A Longitudinal Quasi-Experimental Study

83

initial, middle, or word-final (Zaric et al., 2020). As to the effect of general orthographic awareness on reading as well as spelling, several studies report positive statistical correlations. Conrad et al (2013) identify a significant variance reinforced by general orthographic knowledge in reading (9%) and spelling proficiency (7%). Other research studies link general orthographic knowledge to spelling rather than reading skills (e.g., Ise et al., 2012).

Reading Comprehension

The higher goal of learning to read is comprehension, which is so complex that it does not evolve in a vacuum. Reading comprehension reflects readers' understanding of vocabulary and grammar (syntactic awareness) to generate text meanings. It also involves relating external knowledge (background knowledge) with extracted input information to construct new meanings. In this vein, reading comprehension, in monolingual and equally bilingual contexts, occurs as a result of the combination of lower-level skills, such as word recognition, and higher-order thinking skills like activating prior knowledge and inferencing. For instance, findings from adult reading research correlates adequate word-level text processes, such as grapho-phonic processes, with reading comprehension especially among university student with persistent record of reading difficulties (Stanovich, 2000; Parrila & Georgiou, 2007; Nassaji, 2014). As to children word reading research, findings indicate that reading comprehension among school-aged children hinges upon fluent and efficient word recognition skills (Verhoeven & Perfetti, 2003; Cain & Oakhill, 2006; Verhoeven & Van Leeuwe, 2009).

Comprehension is also triggered by the contribution of linguistic components, namely phonological awareness, morphological awareness, and orthographic processing skills. Tighe et al (2019) examine the unique and shared relatedness of phonological awareness to reading comprehension skills of struggling adult readers. The methodology consists of a battery of administered assessment materials germane to decoding and phonological awareness. Tighe and colleagues' findings (2019) culminate in pinpointing a strong correlation between phonological awareness, decoding and oral vocabulary knowledge one the one hand and reading comprehension on the other hand (Tighe et al., 2019). Abu Rabia and

Shakour's study on the transfer of reading skills (2014) purports that general orthographic knowledge contributes to reading comprehension. He further suggests that orthographic knowledge is transferred across languages regardless of the orthographic type (Abu Rabia & Shakour 2014). Moreover, a significant body of research relates orthographic processing to reading comprehension (Apel et al., 2012; Kim et al., 2013; Nagy et al., 2003 Conrad et al., 2013).

Theories of Transfer and the Current Study

In this quasi-experimental study project, we aim to investigate the occurrence of a reversed transfer of major linguistic skills involved in reading among learners with reading difficulties. The transfer process is described in terms of the effect an intervention program exerts on metalinguistic awareness abilities. The objective is to check whether developing English (L2) literacy skills through extensive print practice and exposure yields a similar improvement in Arabic (L1) reading abilities suggesting a retroactive transfer of reading skills (Abu Rabia & Wattad, 2022; Feder & Abu Rabia, 2022; Abu Rabia et al., 2013). The ongoing study develops Abu Rabia and colleagues's hypothesis on "Cognitive Retroactive Transfer" (CRT) which postulates that transfer of skills can take a unidirectional mode: from the target language (L2 or L3) to the mother language (L1) (Abu Rabia, 2012; Abu Rabia & Shakour, 2014). The CRT, a recent hypothesis introduced in the field, extends Cummin's Linguistic Interdependence Theory (Cummin's, 2000). The latter looks at fully-fledged L1 skills as a model facilitating the learning of other languages. Under the compass of the Linguistic Interdependence Hypothesis, it is contended that once learners attain proficiency in their first language, learning a second language becomes relatively easier. Furthermore, we aim to question the Orthographic-Depth Hypothesis which undermines the transferability aspect of linguistic skills across typologically distinct languages. In this longitudinal study, we target a different school-age group, peculiarly adult readers at the university level. We beg to address the following research questions and related hypotheses:

Question 1. Would major metalinguistic awareness skills in English be developed through extensive print experience?

Examining a Reversed Cross-language Transfer of Core Metalinguistic Awareness Skills among Moroccan University Students with Reading Difficulties: A Longitudinal Quasi-Experimental Study

85

H¹. There would be a positive effect of the reading intervention program on English linguistic skills, more particularly phonological awareness, morphological awareness, and reading comprehension in the experimental group performance.

Question 2. Would learning spelling conventions and allowed letter patterns have an impact on orthographic knowledge in English?

H². Remedial lessons on spelling system are expected to boost the participants' specific and general orthographic knowledge in English.

Question 3. Which reading skills correlate more with reading comprehension in both English and Arabic?

H³. We expect that phonological awareness and morphological knowledge would correlate positively with reading comprehension more than orthographic knowledge.

METHODOLOGY

Participants

The participants were university students from the School of Arts and Humanities (FLSH Ben M'sik) at Hassan II University of Casablanca. All students were enrolled as freshmen at the English department. At first, seventy students took a battery of reading tests in both English and Arabic. Only thirty students, who were selected as our final sample, demonstrated weaknesses in the targeted reading skills. A background questionnaire was subsequently administered to investigate students' literacy practices both at school and home. The participants were, then, divided into two main groups: experimental and control groups of which female participants formed 46%.

Tools

To scrutinize the effects of the intervention program on reading skills both in English and Arabic, a battery of tests was administered to the participants. Students take a total of 16 tests in English and Arabic- 8 in each language – before and after the intervention. The tests measure common reading skills such as Phonological Awareness, Orthographic Knowledge, Morphological Awareness and Reading Comprehension. The English tests were adapted from the *York Adult Assessment Battery-Revised (YAA-R) , A*

Curriculum Guide for Reading Mentors, *Advance English Vocabulary in* Use, Teaching English Spelling: A Practical Guide and *Inspire a Life of Reading*. The Arabic Tests were adapted from *Qiyyas Al-Arabiya: A Standard Proficiency Test of Arabic Native Speakers*.

Procedure

All the participants took a series of reading tests in a quiet room at the English Department in the School of Arts and Human Sciences Ben M'sik. The experimenters administered the first linguistic tests over a period of two weeks. The participants were tested in small groups and in successive manner to lessen anxiety and feelings of boredom. The groups commenced with the three tests, namely phonological awareness, morphological awareness, and orthographic knowledge which all demanded little time given the number of tasks assigned (approximately 45 minutes were allotted to all tests in each language except reading comprehension).

Afterwards, the participants completed the reading comprehension task. Once the first testing stage in English ended, another session with students was held to administer the same tests in Arabic. This phase was called the pre-intervention phase in which the cohorts were split into two major groups: experimental and control. Upon completing the pre-test phase, the authors designated reading intervention lessons based on the participants' scores. The intervention program was primarily a compilation of reading remedial lessons. As to the time framework, the intervention program was a longitudinal study that spread over a whole semester with classes of 90 minutes taking place twice a week. The intervention comprises these major elements: decoding (phonics), vocabulary (affixes, syllables, word building) and comprehension strategies (inferencing, skimming, summarizing, etc.).

Results

A paired-samples t-test was conducted to evaluate the effect of the reading intervention program on the experimental group's performance. The results demonstrated a positive improvement in the performance of the participants after the end of the experiment in both English and Arabic. The t-test analysis displayed in Table 1 (English tests' scores) revealed a statistically significant increase in the scores of the participants in phonological awareness before (M= 0,39; SD= 0,08) to After (M= 0,57; SD=

Examining a Reversed Cross-language Transfer of Core Metalinguistic Awareness Skills among Moroccan University Students with Reading Difficulties: A Longitudinal Quasi-Experimental Study

87

0,12), t= 4,846, p<.001. As to orthographic knowledge, there was a conspicuous improvement after receiving training on English spelling and orthographic conventions (Before M= 0,48; SD=.120 to After M=0,68; SD=.124, P<.001). The same development was attested at the levels of, morphology and reading comprehension. A similar development in major reading skills in Arabic occurred. A comparison of the measured variables before and after the intervention phase clearly yielded statistical significance. Phonological awareness means scores as demonstrated in the t-test analysis (Table 2) increased (Before M= 0,5; SD= .16 to After M=0,74; SD=.22, p<.001). Interestingly, the treatment group performed well on the Arabic orthographic knowledge test at the post-intervention phase (Before M=0,38; SD=.10 to After M=0,61; SD=.13, p<.001). However, the English tests' scores were significantly higher than the ones obtained from the Arabic tests.

Table 1

Means, Standard deviations and Paired Differences in the Experimental Group's English Scores Obtained before and after the Reading Intervention, with a P Value <.001.

Skill	Before Mean (SD)	After Mean (SD)	Mean	SD	Std. Error Mean	95% Confidence Interval of the Difference — Lower	95% Confidence Interval of the Difference — Upper	t	df	Sig. (2-tailed)
Phonological Awareness	0,3917 (0,08669)	0,5750 (0,12320)	-0,18333	0,1465	0,03783	-0,26447	-0,1022	-4,846	14	0.000
Orthographic Knowledge	0,480 (0,1207)	0,687 (0,1246)	-0,2067	0,171	0,0441	-0,3014	-0,112	-4,681	14	0.000
Morphological Awareness -	0,500 (0,1309)	0,687 (0,1246)	-0,1867	0,1125	0,0291	-0,249	-0,1243	-6,424	14	0.000
Reading Comprehension	0,37733 (0,13345)	0,6467 (0,15523)	-0,27333	0,1791	0,04626	-0,37254	-0,17412	-5,909	14	0.000

Table 2

Means, Standard Deviations and Paired Differences in the Experimental Group's Arabic Scores Obtained before and after the Reading Intervention, with a P Value <.001.

			Paired Differences							
					Std. Error Mean	95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)
Skill	Before Mean (SD)	After Mean (SD)	Mean	SD		Lower	Upper			
Phonological Awareness	0,5000 (0,16060	0,7444 (0,22153	-0,24444	0,20036	0,05173	-0,3554	-0,13349	-4,725	14	0.000
Orthographic Knowledge	0,380 (0,1082)	0,613 (0,1302)	-0,2333	0,1234	0,0319	-0,3017	-0,165	-7,321	14	0.000
Morphological Awareness -	0,407 (0,1280)	0,613 (0,1302)	-0,2067	0,1387	0,0358	-0,2835	-0,1299	-5,771	14	0.000
Reading Comprehension	0,3867 (0,11255)	0,8762 (0,15144)	-0,48952	0,1028	0,02654	-0,54645	-0,4326	-18,443	14	0.000

Compared to the treatment group, the control group's performance over the English and Arabic test battery leveled off over the two phases of the intervention. Table 3 showed no statistical significance in the control group's tests scores:

Table 3

Means, Standard Deviations and Paired Differences in the Control Group's English Scores Obtained before and after the Reading Intervention, with a P Value <.001.

			Paired Differences							
					Std.Error Mean	95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)
Skill	Before Mean (SD)	After Mean (SD)	Mean	SD		Lower	Upper			
Phonological Awareness	0,2958 (0,11685)	0,2833 (0,11046)	0,0125		0,0253	-0,04175	0,06675	0,494	14	0,629
Orthographic Knowledge	0,473 (0,1580)	0,427 (0,1438)	0,0467	0,2532	0,0654	-0,0935	0,1869	0,714	14	0,487
Morphological Awareness -	0,393 (0,1486)	0,427 (0,1438)	-0,0333		0,0398	-0,1188	0,0521	-0,837	14	0,417
Reading Comprehension	0,4133 (0,14573)	0,4267 (0,12228)	-0,0133	0,15055	0,03887	-0,09671	0,07004	-0,343	14	0,737

Examining a Reversed Cross-language Transfer of Core Metalinguistic Awareness Skills among Moroccan University Students with Reading Difficulties: A Longitudinal Quasi-Experimental Study

89

Table 4

Means, Standard Deviations and Paired Differences in the Control Group's Arabic Scores Obtained before and after the Reading Intervention, with a P Value <.001.

Skill	Before Mean (SD)	After Mean (SD)	Paired Differences					t	df	Sig. (2-tailed)
			Mean	SD	Std. Error Mean	95% Confidence Interval of the Difference				
						Lower	Upper			
Phonological Awareness	0,3333 (-0,09449)	0,3444 (0,09379)	-0,0111	0,11729	0,03028	-0,07606	0,05384	-0,36	14	0,719
Orthographic Knowledge	0,353 (-0,1598)	0,367 (0,1291)	-0,0133	0,2066	0,0533	-0,1277	0,1011	-0,25	14	0,806
Morphological Awareness	0,327 (-0,1387)	0,367 (0,1291)	-0,04	0,2131	0,055	-0,158	0,078	-0,7	14	0,479
Reading Comprehension	0,581 (-0,21235)	0,4 (0,1069)	0,18095	0,16096	0,04156	0,09181	0,27009	4,35	14	0,001

We analyzed the relationship between comprehension and the other variables (namely phonological awareness, morphological awareness, and orthographic knowledge) to check if they have unique or shared contribution to reading comprehension. To verify the strength and direction of linear relationship between reading comprehension and one of the three variables mentioned, we conducted the Pearson's (r) correlation test. Table 5 below describes the bonding of the variables to each other with reading comprehension. The Pearson's correlation of morphological and phonological awareness skills and reading comprehension was found to be moderately positive and statistically significant (morphological awareness r=.44, p<.001; phonological awareness r=.65, p<.001). These correlational results are in line with the results reported from Tighe et al (2019):

Table 5

Correlational Analysis

		Post_ Phonological Awareness	Post_ Orthographic Knowledge	Post_ Morphological Awareness	Post_ Reading Comprehension
Post_ Phonological Awareness		–			
Post_ Orthographic Knowledge	Pearson Correlation	0,122			
	P value	0,355	–		
Post_ Morphological Awareness	Pearson Correlation	,542**	,328*		
	P value	0	0,011	–	
Post_ Reading Comprehension	Pearson Correlation	,657**	0,093	,442**	–
	P value	0	0,478	0	

Correlation is significant at **P < 0.01.

* P< 0.05.

Findings

Our findings add up to the general precepts underpinned by the Cognitive Retroactive Transfer (Abu Rabia & Wattad, 2022; Abu Rabia & Shakour, 2014). The CRT hypothesis was fully confirmed among adult university readers. The findings are further in accordance with the results reported from Abu Rabia and Shakour's study on the effect of implementing a reading program on the gestation of basic metalinguistic skills across distinct orthographies (Abu Rabia & Shakour, 2014). There was a positive transfer of major metalinguistic and reading skills from English (L2) to Arabic (L1). First, as far as the treatment group's post-tests are concerned, phonological awareness skills in English improved after receiving supplementary lessons on phonics. This development was clearly reflected in Arabic as well without receiving any formal instruction of Arabic sound system. However, the control group's test results tailed off suggesting, thus, no adequate improvement over the two phases. This reversed transfer was extended to morphology in which the treatment group's posttest results were higher than the ones obtained at the pre-intervention phase. Morphological awareness, in the context of the ongoing research paper, is subject to transfer irrespective of the straightforward unidirectional mode,

Examining a Reversed Cross-language Transfer of Core Metalinguistic Awareness Skills among Moroccan University Students with Reading Difficulties: A Longitudinal Quasi-Experimental Study

91

i.e., from L1 to L2 and not vice versa, which is advocated by a great deal of research body in the literature (Wang et al., 2009; Saigh-Haddad & Geva, 2008). Additionally, enhancing students' spelling skills and conventional letter patterns throughout the experiment had significant impact on English orthographic knowledge and later Arabic despite the differences in terms of letter-to-sound correspondences featuring the two languages. The transfer of orthographic skills from English, which is relatively less-transparent, to Arabic, a transparent language, does not only lend support to the Cognitive Retroactive Transfer Hypothesis but also challenges the Orthographic-Depth Hypothesis that accentuates the role of extensive print exposure while learning two typologically distinct orthographies. Finally, transfer also occurs at the level of reading comprehension as shown by the treatment group's tests results.

Implications

The current study has the following pedagogical implications. The pretest' results suggest that reading difficulties, if not addressed earlier in childhood, may be persistent over time and that academic success is ascribed to literacy achievements at the university level. Also, the study proved that specialized interventions at the university level can be effective tools to cope with reading disabilities among students with a history of literacy issues. To better implement university intervention courses of this type, language teachers, especially Reading Comprehension instructors, are called to measure both lower- and higher-level reading competencies using standardized tests. Finally, foreign language teachers can collaborate to devise unified testing and instructional reading materials since struggling readers may very well face difficulties while reading in unrelated orthographies.

CONCLUSION

In this research paper, we checked whether improving metalinguistic skills related to reading would be transferrable across two typologically languages, namely English and Arabic. More particularly, we examined the occurrence of a reversed transfer from English to Arabic would take place following extensive print exposure and practice. We further extrapolated the principles of the Cognitive Retroactive Transfer Hypothesis over

different population, adult university readers, which formed the innovation of the present study.

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Examining a Reversed Cross-language Transfer of Core Metalinguistic Awareness Skills among Moroccan University Students with Reading Difficulties: A Longitudinal Quasi-Experimental Study

93

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