

## **Literacy skills in Maltese – English bilingual children**

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### **Abstract**

This research considers aspects of literacy in Maltese-English bilingual children. The study examined the reading and phonological awareness skills in English and Maltese of children whose home language is Maltese and second language English. A sample of 50 typically developing Maltese pupils aged 8;0 to 10;5 years were selected. Since commencing school at the age of 5 years, the children have been learning to read in Maltese and also in English. For the purpose of this study, Maltese reading and reading related tests were constructed to parallel the UK and US standardised assessments. The novel tests and the standardised tests were administered to all the children. Results showed that Maltese children read better in their first language (Maltese) than in English, the language of instruction. Findings also showed that phonological awareness measures correlated across first and second languages. The results are discussed in terms of L1 and L2 transfer, whereby the transparency of Maltese orthography and English phonological processing skills facilitate performance on phonological tasks in both Maltese and English.

### **Introduction**

The ability to speak a language other than the home language is seen as a desirable educational attainment in most societies, with one (or more) foreign language usually forming part of the school curriculum. Maltese is a unique language with many words borrowed from the languages of the various countries that once occupied the islands. The Maltese language is the only Semitic tongue officially written in the Latin alphabet. It originates from Arabic since Malta was under Arab rule from 870 AD to 1090 AD [1]. Since then, the language has undergone various processes of linguistic change as a result of contact with speakers of Sicilian, Italian and English [2,3].

Maltese is acquired as a first language by more than 90% of the population [4]. English was introduced in Malta by the British colonial powers (1800-1964) In most cases, both Maltese and English are used interchangeably by parents and children at home. Education in Malta is provided in two languages: Maltese and English. Schools in Malta are obliged to teach Maltese as a subject in order to obtain a license to operate, but apart from this, there is no official language education policy. The bilingual children in this study attend a Church School situated in the south western part of the island. The children acquired Maltese as a first language (L1) within the family and later acquired English as a second language (L2) through kindergarten and/or the early school years.

Research on the relationship between bilingualism and dyslexia does not yet provide conclusive evidence on the nature of the interaction of these two learning conditions. However there are studies that show that when difficulties arise in the development of literacy skills, these are most apparent in the language with the more difficult orthography [5]. Many authors have suggested that differences in the depths of alphabetic codes imply different ways of processing written languages [6, 7]. The distinction between phonological and orthographic routes in the study of reading development has implications for languages of varying depth with regards to their written form [8].

Maltese orthography presents an interesting contrast to English because of the significant differences in the phonology, morphology and syntax of the two languages. Opaque languages such as English, given the characteristics of their written systems, need, in theory, two routes to reading: a *lexical* and *nonlexical* route. In contrast, in transparent languages such as Spanish and Italian, all real and invented words can be read correctly once the orthography-sound correspondences have been learned. Thus, a nonlexical method of reading should be sufficient for all word and nonword reading [9]. Evidence for this possibility is

emerging from various sources. Some authors [10, 11] have shown that logographic reading is not a necessary stage in learning to read in relatively transparent orthographies such as German. However, findings from studies on Spanish children [12, 13] argue for the existence of at least two pathways for reading: lexical and nonlexical.

Abu-Rabia and Siegel [14] assessed the reading, language, and memory skills of 56 bilingual Arab-Canadian children ages 9-14 years. English was their main instructional language, and Arabic was their home language. The children were administered word and nonword reading, language, and working memory tests in English and Arabic. Most children showed at least adequate proficiency in both languages. There was a significant relationship between the acquisition of word and nonword reading, working memory, and syntactic awareness skills in the two languages. There were no significant differences between bilingual English Arabic children and monolingual English-speaking children on the reading, language, and memory tasks. However, bilingual English Arabic children who had reading problems in English, had higher scores on English nonword reading and spelling tasks than monolingual English-speaking children with reading disabilities. The authors attributed this effect to the positive transfer from the regular nature of Arabic orthography.

Identifying words and understanding their meanings are important abilities in the development of reading. Whereas vocabulary knowledge is one of the strongest predictors of a person's ability to comprehend text [15], it is not an all or none predictor. Two of the best predictors of beginning reading in monolingual English-speaking beginning readers are letter knowledge and phonological awareness [16]. The association between phonological awareness and reading acquisition is one of the most robust findings of developmental and cognitive psychology, replicated across languages and different tasks [17-26]. There is a body of international research supporting the importance of phonological awareness in other Latin-based orthographies including French, German, Hebrew, Portuguese and Swedish [27, 28]. Increasing research has addressed this issue for bilingual students, specifically, in relationship to whether phonological awareness in the first language (L1) predicts phonological awareness in the second language (L2) [29]. Considerable research has shown that phonological awareness contributes to learning to read not only in English but also in Chinese, Swedish, Danish, Spanish, Italian, Dutch, Turkish and Serb-Croatian [30-36]. Studies comparing L1 and L2 decoding skills in readers of different orthographies suggest that these skills are positively correlated and that individual differences in the development of these skills can be predicted on the basis of underlying cognitive and linguistic abilities such as phonological skills, memory, orthographic knowledge and speed of processing [37].

Two research questions are addressed in this study, namely:

- How do Maltese-English bilingual children perform on reading and phonological tasks?
- Can the prior findings of cross-language transfer from L1 phonological awareness to reading [32] or to L2 phonological awareness [31], be replicated in this sample of Maltese speaking students?

## **Method**

Fifty normally developing boys were selected from grade 3 to grade 6 and divided into two groups. The first group ranged in age from 8;0 to 8;5 years (mean = 8;4, s.d. = 0.02) and the second group ranged in age from 10;0 to 10;5 years (mean = 10;3 years, s.d. = 0.02). The participants attended regular education classes in a church school situated in the southwestern part of the island. All participants were native Maltese speakers and were performing satisfactorily in all school subjects as indicated by school reports and teacher observations.

Prior to testing the children's abilities in reading and phonological processing, each child was helped to complete a language questionnaire (Appendix 1), engage in spontaneous conversation with the examiner and tested for receptive vocabulary. Receptive vocabulary was assessed using two editions of the British Picture Vocabulary Scale (BPVS). The Short

Form<sup>1</sup> [38] was carried out prior to the Maltese assessment battery. The second edition of the Long Form [39] was administered prior to English reading and reading related tests. Each child was then tested on the following measures in both languages: (1) word and nonword reading; (2) nonword repetition; (3) spelling; (4) segmenting words and nonwords; (5) elision; (6) rapid naming of letters, numbers and colours; (6) forward memory for digits.

Each child was interviewed about his language use at home, language patterns with significant others, language preferences in varied contexts and overall competencies in the home language (Maltese) and in the second language (English). English word reading and spelling abilities were tested using the second edition of the British Ability Scale (BAS II) [40]. The Graded Nonword Reading Test (GNRT) [25] was used to test nonword reading abilities and the Children's test of Nonword Repetition (CNRep) [41] to test repetition of nonwords. Phonological processing tasks were assessed using the Comprehensive Test of Phonological Processing (CTOPP) [42].

For Maltese reading, spelling, phonological awareness and phonological memory tests, measures parallel to the U.K. and U.S. standardised assessments were constructed. Rapid digit and colour naming tests however were used in their original form and required the child to name the same items in Maltese. Stimuli for nonword reading and nonword repetition were constructed based on the list of real words used for word reading. Consonants were replaced by others in word initial, medial and final position according to Maltese syllable structure rules. The nonwords included stimuli that followed the phonological and orthographic rules of Maltese thereby constituting 'legal' or plausible sequences<sup>2</sup>.

A circular describing the nature of the study was given to the school staff. A handout was also given to teachers to ensure that each child who participated in the study had no history or current symptoms of developmental impairment, speech and language difficulties, behavioural and/or emotional disorders and that Maltese was their first language and English their second language. Questionnaires and handouts were given to parents one month prior to assessment. The handout explained the nature of the study and requested permission for their child's participation. The questionnaire sought to evaluate their children's language use in various environments (home, church and school).

All tests were administered by the author, a native speaker of Maltese and English, in a quiet room at the child's school. The entire battery of tests took 1½ hours to complete, and was carried out in two 45 minute sessions within a 4 week period: one session was carried out in Maltese and the other in English. The order of administration of tests was randomised for each child to minimise practice and order effects. Children listed as even numbers were administered the Maltese tests first and those listed as odd numbers were administered the English tests first. Response accuracy for each task was recorded and, for rapid automatised naming tasks, reaction times were measured with a digital stopwatch.

Means and standard deviations (SD) for reading and reading related tasks were collated. For English tests, raw scores were obtained and equivalent standard scores and ages recorded. Since no standard scores are available for Maltese tests, raw scores for tests in both English and Maltese were converted to percentage scores. Percentage accuracy scores on English tasks were compared to those obtained on Maltese tasks for each child using 2 way analyses of variance (ANOVA) mixed design with Group, the between factor (8 year olds, 10 year olds) and Language, the within factor (Maltese, English). This applied to all tests except for the 'memory for digits' task which was carried out only in English and therefore did not have a within subjects factor.

When applicable, nonparametric parallel designs were used and standard scores reported in order to gain an indication about how the Maltese children performed in comparison to the British and/or American norms. When F-Max values indicated that variances were heterogeneous and significance values for Shapiro-Wilks were less than 0.05, nonparametric

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<sup>1</sup> This form is no longer used in the English version of the test.

<sup>2</sup> All consonantal structures were permissible for the Maltese language and all words and nonwords were matched in terms of syllable length, vowel structure and stress assignment.

tests were used to analyse the data. Mann-Whitney (U) tests were used to analyse results obtained between participants. Wilcoxon (Z) tests were used for within participant designs. Correlation and multiple regression analyses were carried out to assess whether there was an association between English and Maltese tests and to define whether performance on tests predicted performance in reading and spelling ability in both languages. In this way, an indication of the possible transference of skills between languages could be obtained. Means and SDs are outlined in Tables 1 and 2. Table 1 contains raw scores converted to percentage correct and equivalent standard scores for English reading and reading related tasks. Standard scores provide an indication of how the Maltese-English participants performed in comparison to British children (for receptive vocabulary, word/nonword reading, spelling and nonword repetition tests), and American children (for elision, segmenting words/nonwords, memory for digits and rapid naming tests). Table 2 contains means and SDs for *percentage correct* scores on English and Maltese reading and reading related tests.

**Table 1.** % correct mean scores, standard scores (& standard deviations) for English tests

	8 year olds		10 year olds	
	<i>% correct</i>	<i>Standard score</i>	<i>% correct</i>	<i>Standard score</i>
<b>Reading &amp; Spelling</b>				
BAS: Word reading	77.16 (7.79)	114.12 (11.85)	85.60 (5.99)	117.80 (12.24)
GNRT: Nonword reading <sup>3</sup>	84.80 (16.49)		93.80 (7.94)	
BAS II : Spelling Scale: Spelling (T score)	56.60 (9.23)	56.48 (5.67) <sup>4</sup>	76.28 (10.22)	57.60 (6.81)
<b>Phonological awareness</b>				
CTOPP: Elision	70.40 (20.41)	11.24 (2.55)	86.40 (13.11)	13.56 (1.92)
CTOPP: Segmenting words	18.00 (23.36)	6.92 (2.48)	24.60 (25.98)	7.56 (2.74)
CTOPP: Segmenting nonwords	47.20 (34.82)	9.44 (4.18)	40.20 (32.03)	8.60 (3.74)
<b>Phonological memory / processing speed</b>				
CNRep: Nonword repetition <sup>5</sup>	84.20 (9.99)	105.52 (16.26)	78.44 (11.68)	
CTOPP: Forward memory for digits	66.24 (12.18)	10.80 (2.50)	63.40 (12.74)	10.32 (2.69)
CTOPP: Rapid letter naming	41.76 (8.92)	10.32 (1.91)	37.32 (6.88)	11.40 (2.14)
CTOPP: Rapid digit naming	35.96 (7.93)	11.16 (2.13)	29.40 (5.37)	13.24 (1.94)
CTOPP: Rapid colour naming	62.44 (9.77)	10.20 (2.02)	57.68 (13.48)	11.48 (3.09)
<b>Receptive Vocabulary</b>				
BPVS 1982 Short form	73.40 (5.77)	94.04 (20.58)	76.48 (4.98)	93.36 (20.35)
BPVS II 1997 Long form	73.80 (5.09)	83.52 (10.76)	76.80 (8.57)	88.08 (15.69)

<sup>3</sup> Standard scores not available for this test.

<sup>4</sup> T-scores with a mean of 50.

<sup>5</sup> Standard scores not available for 10 year olds.

**Table 2.** Means (& standard deviations) for % correct scores on reading & reading related tests.

	8 year olds		10 year olds	
	<i>English</i>	<i>Maltese</i>	<i>English</i>	<i>Maltese</i>
<b>Reading &amp; Spelling</b>				
Word reading	77.16 (7.79)	85.24 (17.12)	85.60 (5.99)	97.32 (3.47)
Nonword reading	84.80 (16.49)	75.64 (20.81)	93.80 (7.94)	88.32 (10.69)
Spelling	56.60 (9.23)	21.96 (12.27)	76.28 (10.22)	37.28 (13.74)
<b>Phonological awareness</b>				
Elision	70.40 (20.41)	76.60 (20.55)	86.40 (13.11)	84.80 (14.75)
Segmenting words	18.00(23.36)	64.60 (30.82)	24.60 (25.98)	68.80 (30.29)
Segmenting nonwords	47.20 (34.82)	70.60 (23.82)	40.20 (32.03)	81.60 (23.03)
<b>Phonological memory</b>				
Nonword repetition	84.20 (9.99)	90.72 (6.86)	78.44 (11.68)	93.68 (5.64)
Memory for digits forward <sup>6</sup>	66.24 (12.18)		63.40 (12.74)	
<b>Speed of processing</b>				
Rapid letter naming	41.76 (8.92)	54.36 (22.07)	37.32 (6.88)	43.64 (13.26)
Rapid digit naming	35.96 (7.93)	56.40 (15.64)	29.40 (5.37)	43.64 (8.27)
Rapid colour naming	62.44 (9.77)	84.00 (16.64)	57.68 (13.48)	70.80 (12.02)
<b>Receptive Vocabulary</b>				
BPVS short form		73.40 (5.77)		76.48 (4.98)
BPVS II long form	73.80 (5.09)		76.80 (8.57)	

Correlation analyses were carried out to examine how much reading and reading related skills in one language were associated with other skills within the same language and across to the other language. The hypothesis was that performance on English phonological awareness tasks is associated with English and Maltese reading and with Maltese phonological awareness. Tables 3 and 4 outline significant Spearman's rho correlation coefficients between tasks *within* each language. Tables 5 and 6 outline significant Spearman's rho correlation coefficients between tasks and *between* languages.

*For tables 3 – 6*

- \*\*\* Correlation is significant at the .001 level (2-tailed).
- \*\* Correlation is significant at the .01 level (2-tailed).
- \* Correlation is significant at the .05 level (2-tailed).
- ( ) Non significant correlations.

<sup>6</sup>Memory for digits was only carried out once in English

**Table 3.** Correlations between Maltese tests

	Word reading	Nonword reading	Spelling	Elision	Segmenting words	Segmenting nonwords	Nonword repetition	Rapid letter naming	Rapid digit naming	Rapid colour naming
BPVS short form	.412**	.520***	.326*	(.136)	.310*	.398**	.357*	(.124)	(.245)	.292*
Word reading		.772***	.691***	.430**	.430**	.561***	.527***	.402**	.514***	.445***
Nonword reading	.772***		.612***	.476***	.372**	.568***	.593***	.404**	.467***	.516***
Spelling	.691***	.612***		.462***	(.216)	.382**	.401**	.413**	.478***	.390**
Elision	.430**	.476***	.462***		.464***	.617***	.350*	.372**	.329*	.478***
Segmenting words	.430**	.372**	(.216)	.464***		.685***	.332*	.352*	(.132)	(.220)
Segmenting nonwords	.561***	.568***	.382**	.617***	.685***		.400**	.367**	.386**	.402**
Nonword repetition	.527***	.593***	.401**	.350*	.332*	.400**		(.200)	(.268)	(.121)
Rapid letter naming	.402**	.404**	.413**	.372**	(.352)	.367**	(.200)		.451***	.411**
Rapid digit naming	.514***	.467**	.478***	.329*	(.132)	.386**	(.268)	.451***		.624***
Rapid colour naming	.445**	.516***	.390**	.478***	(.220)	.402**	(.121)	.411**	.624***	

**Table 4.** Correlations between English tests

	BPVS 1997 Long form: Receptive Vocabulary	BAS: Word reading	GNRT: Nonword reading	BAS – SS: Spelling	CNRep: Nonword repetition	CTOPP: Elision	CTOPP: Segmenting words	CTOPP: Segmenting nonwords	CTOPP: Rapid letter naming	CTOPP: Rapid digit naming	CTOPP: Rapid colour naming
BPVS 1997 Long form: Receptive Vocabulary		.315*	.288*	.387**	(.174)	(.170)	(.243)	(.168)	(.162)	(.150)	(.177)
BAS: Word reading	.315*		.357*	.649***	(.036)	.377**	(.006)	(.042)	.314*	(.241)	(.050)
GNRT: Nonword reading	.288*	.357*		.489***	(.036)	.433**	(.201)	(.138)	.345*	.345*	(.152)
BAS – SS: Spelling	.387**	.649***	.489***		(.079)	.546***	(.153)	(.120)	.452***	.423**	(.141)
CNRep: Nonword repetition	(.174)	(.036)	(.036)	(.079)		(.199)	(.083)	(.172)	(.092)	(.170)	.412**
CTOPP: Elision	(.170)	.377**	.433**	.546***	(.199)		(.273)	(.267)	.401**	.381**	(.234)
CTOPP: Segmenting words	(.243)	(.006)	(.201)	(.153)	(.083)	(.273)		.696***	(.248)	(.106)	(.189)
CTOPP: Segmenting nonwords	(.168)	(.042)	(.138)	(.120)	(.172)	(.267)	.696***		.349*	(.120)	.364**
CTOPP: Rapid letter naming	(.162)	.314*	.345*	.452***	(.092)	.401**	(.248)	.349*		.757***	.312*
CTOPP: Rapid digit naming	(.150)	(.241)	.345*	.423**	(.170)	.381**	(.106)	(.120)	.757***		.461***
CTOPP: Rapid colour naming	(.177)	(.050)	(.152)	(.141)	.412**	(.234)	(.189)	.364**	.312**	.461***	
CTOPP: Memory for digits	(.119)	(.212)	(.148)	(.110)	.482***	.289*	.441***	.310*	(.091)	(.064)	(.023)

**Table 5.** Correlations between English and Maltese tests.

		<i>English Tests</i>				
		Memory for digits	BPVS II 1997 Long Form	Word reading	Nonword reading	Spelling
<i>Maltese Tests</i>	BPVS 1982 short form	(.096)		(.256)	.331*	.402**
	Word reading	(.092)	.297*		.595***	.779***
	Nonword reading	(.262)	.419**	.552***		.705***
	Spelling	(.043)	(.195)	.531***	.588***	
	Elision	(.239)	.320*	.292*	.367**	.440***
	Segmenting words	.338*	.371**	(.125)	.284*	(.273)
	Segmenting nonwords	(.236)	.470***	.363**	.418**	.408**
	Nonword repetition	.438**	(.182)	.350*	(.272)	.473***
	Rapid letter naming	(.101)	.326*	(.263)	(.272)	.392**
	Rapid digit naming	(.076)	(.009)	(.258)	.405**	.550***
	Rapid colour naming	(.102)	(.202)	(.269)	.423**	.430**

**Table 6.** Correlations between English and Maltese tests.

		<i>English Tests</i>						
		Elision	Segmenting words	Segmenting nonwords	Nonword repetition	Rapid letter naming	Rapid digit naming	Rapid colour naming
<i>Maltese Tests</i>	BPVS 1982 short form	(.275)	(.161)	(.049)	(.148)	(.258)	(.267)	(.047)
	Word reading	.692***	.313*	.300*	(.111)	.500***	.426**	(.242)
	Nonword reading	.595***	.356*	.308*	(.214)	.527***	.366**	(.187)
	Spelling	.486***	(.216)	(.249)	(.166)	.486***	.350*	(.016)
	Elision		.308*	.417**	(.127)	(.244)	(.203)	(.175)
	Segmenting words	.286*		.458***	(.226)	(.286)	(.106)	(.088)
	Segmenting nonwords	.393**	.314*		(.216)	(.274)	(.247)	(.102)
	Nonword repetition	.579***	(.123)	(.113)		(.271)	(.023)	(.166)
	Rapid letter naming	.350*	(.260)	.327*	(.031)		.625***	.296*
	Rapid digit naming	.506***	(.054)	(.092)	(.136)	.559***		(.262)
	Rapid colour naming	.427**	(.183)	(.230)	(.134)	.519***	.605***	

Multiple regression analyses were carried out to investigate whether receptive vocabulary and phonological processing skills *predicted* English and Maltese reading (word and nonword) and spelling tasks. Analyses were undertaken by consolidating individual variables into separate independent variables. Elision, segmenting word / nonword scores were combined to form the independent variable '*phonological awareness*'. Rapid naming of letters, colours and digits formed the variable '*processing speed*'. The new variable '*phonological memory*' comprised memory for digits and nonword repetition scores. Each of the three composite variables was computed by adding the scores of each child on all separate variables. Word / nonword reading and spelling analyses were carried out with and without the Receptive Vocabulary (RV) variable. When results yielded significant values, post hoc tests were carried out in order to investigate which of the individual variables contributed to the performance in reading and spelling ability. The R square values together with significance levels for multiple regression analyses are outlined in Table 7.

**Table 7.** R<sup>2</sup> values for multiple regressions: predictors of English & Maltese reading and spelling with and without ‘receptive vocabulary’.

<i>Predicted variables</i> →	<b>Word Reading</b>		<b>Nonword reading</b>		<b>Spelling</b>	
	<i>English</i>	<i>Maltese</i>	<i>English</i>	<i>Maltese</i>	<i>English</i>	<i>Maltese</i>
<b>English Predictor Variables</b>						
<i>Analysis 1 + RV</i>						
Receptive vocabulary (RV)	(.153)	.337***	.257**	.306**	.304**	.197*
Phonological awareness						
Phonological memory						
Speed of processing						
<i>Analysis 2 – RV</i>						
Phonological awareness	(.065)	.262**	.185*	.226**	.203*	.179*
Phonological memory						
Speed of processing						
<b>Maltese predictor variables</b>						
<i>Analysis 1 + RV</i>						
Receptive vocabulary (RV)	.271**	.475***	.480***	.605***	.515***	.355***
Phonological awareness						
Phonological memory						
Speed of processing						
<i>Analysis 2 - RV</i>						
Phonological awareness	.224**	.454***	.471*	.583***	.469**	.352***
Phonological memory						
Speed of processing						

- \* Regression is significant at the .05 level
- \*\* Regression is significant at the .01 level
- \*\*\* Regression is significant at the .001 level
- ( ) Regression is not significant

Children’s replies to questionnaires were compared to those provided by their parents. The majority of children and parents agree that the bilingualism in question is one with a primary orientation to Maltese with some code-switching. Interestingly, within both groups, the same amount of parents and children claimed to use English as L1 (18%) and none claimed to speak both languages equally well. The type of code-switching observed during the Maltese conversation session was mainly Maltese to English and occurred at the lexical level. English was only used for nouns (e.g. *table, chair, boy, shower*) and no other grammatical category. The children would also switch to English to use common everyday greetings and interjections (*hello, okay, thank you, sorry*).

During the English conversation session however, the children were not as fluent as they were in Maltese. When instructed to speak in English, some children openly stated their uneasiness and asked to use Maltese. For those children who spoke English, their conversations were almost telegraphic with a large number of function words being omitted (e.g. prepositions, conjunctions).

## Discussion

*Research question 1: How do Maltese-English bilingual children perform on reading and reading related tasks?*

All children performed better on nonword reading, spelling and rapid naming tests in English and better on word reading, segmenting and nonword repetition in Maltese. There were no differences between the two languages on elision and receptive vocabulary<sup>7</sup> tests. Eight year olds performed better on the Maltese elision test and 10 year olds showed the reverse pattern. This might suggest that the children are applying a phonological route to reading and that phonological awareness in regular orthographies is not as pertinent to reading proficiency as it is for opaque orthographies. The better performance of the 10 year old children on a majority of the reading and phonological processing measures was consistent with the developmental trends found throughout the literature [33]. On average, 10 year olds performed better on these tasks in both languages except for nonword repetition and segmenting nonword tests where performance was superior in Maltese.

Correlation analyses highlighted significant correlations between the following parallel English and Maltese measures: (1) word reading; (2) nonword reading; (3) spelling; (4) nonword repetition; (5) elision; (6) segmenting words, (7) segmenting nonwords, and (8) all rapid naming tasks. Despite these positive associations however, those skills that were highly correlated across and within languages did not necessarily predict other tasks when multiple regression analyses were undertaken. Even though the participants in this study were nondisabled readers, findings are similar to those by Nikolopoulos et al [8] who found that Greek dyslexic readers had fewer problems with phonological awareness owing to a higher orthographic transparency when compared to the English language. This suggests that dyslexia in different languages may have different underlying difficulties and assessment and intervention should be sufficiently sensitive to the orthographic depth of the language in question.

All children found it easier to read in Maltese. This could be due to the regular nature of Maltese orthography, the fact that Maltese is the children's first language or the difficulty levels of the Maltese tests constructed. Whereas the children demonstrated average receptive vocabulary, their performance in English word reading was superior to that of British monolingual children. Possible contributing factors are (1) that the Maltese children were able to decode irregular English words at a standard which was above average, possibly by employing an orthographic strategy to reading, (2) the number of irregular words when compared to regular words, in the English test, was quite small, (3) the phonological route to decoding a regular language like Maltese has facilitated reading of English text, and / or (4) the children were already acquainted with some of the irregular words in the English text.

The better performance on the English nonword reading test could reflect the different difficulty levels of the two tasks. The Maltese nonword reading test sought to reflect the nature of the language by including various possible syllabic combinations not present in the English test. As a result, the children might have found the English nonword reading test easier to decode using grapheme-to-phoneme correspondences learned from knowing a regular language. Transparent languages such as Maltese should require a nonlexical route only as all real and invented words can be read correctly once the letter-sound correspondences have been learned [10]. The children were able to read Maltese words better than English words, via a nonlexical route.

The superior performance in English spelling is possibly because supremacy of English in the schools in the past means that many Maltese find it easier to write English. In addition, the school in question uses many English textbooks and carries out most of its instruction in

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<sup>7</sup> Whilst the BPVS Long Form was administered entirely in English, the Short Form was carried out in English and Maltese. The Short Form was more highly correlated with Maltese word reading and the Long Form, with English word reading. Interestingly, the Long Form was more highly correlated with English spelling, Maltese nonword reading and Maltese segmenting words / nonwords than with any other task. The higher standard score on the Short Form should also be taken in light of the fact that two different versions of the test were used.

English. It does not seem to be possible to relate these findings to difficulty levels between the two tests (English and Maltese) since these were very highly correlated indicating similar difficulty levels. Findings replicate those by Abu-Rabia and Siegel [14] where the regularity of the Maltese language appears to have a positive facilitative effect in the phonological decoding of the non-dominant language. The better performance of the 10 year olds in English tasks could be due to the fact that they have had more exposure to the English language in school. Similar to findings by Everatt and Ocampo [5], the Maltese children did not perform well on reading and phonological awareness (elision and segmenting words) tasks in the language with the more difficult orthography, i.e. English.

The difference between segmenting words and nonwords is, of course, that the former involves semantic mediation whilst the latter does not. During the English segmenting word task, almost all children would spell (and provide letter names) rather than sound out the words. Discussion with teachers confirmed that these children did in fact know the corresponding sounds of English letter names and there was no reason why they should not be able to sound out the words. The disparity between the Maltese and English alphabets is a contributing factor. The difference between letter names and sounds is not so pertinent in Maltese. In fact, letter names *are* letter sounds. This must have led the children to either spell a word (thus 'cat' would be 'see' 'ay' 'tea') or provide the Maltese letter/sound instead of the English sound (thus 'jam' is 'y' 'a' 'm'). Performance was therefore based on orthographic, as opposed to phonological, information. The segmentation test therefore proved to be an unreliable phonological task with these children.

Both groups performed better on Maltese nonword repetition tasks. The Maltese test included a varied amount of permissible syllabic combinations. Since the English nonword repetition test does not provide norms for the 10-year old group, the test may have been relatively easy for them. The correlation between English and Maltese repetition tests was quite significant. For all rapid naming tasks, both groups performed better in English than in Maltese. This is because colours and numbers are typically named in English. Both groups appeared to know the stimulus names equally well, but the older students seemed to require fewer cognitive resources to process the words, and hence were quicker to name them.

*Research question 2: Does phonological awareness in Maltese transfer to reading in Maltese and English and to phonological awareness in English?*

Cross-linguistic comparisons in this study showed that English word reading correlated highly with Maltese (1) segmenting nonwords and, to a lesser extent, with Maltese (2) elision and (3) nonword repetition. Receptive vocabulary and Maltese speed of processing predicted English word reading. Nonword repetition and rapid naming were significant predictors of English spelling ability. In addition, rapid naming, elision and segmenting nonwords in Maltese predicted much of the variance in English nonword reading.

Maltese word reading correlated highly with all English phonological tasks except for nonword repetition, colour naming and digit memory. All English phonological processing skills substantially predicted Maltese spelling, word and nonword reading. In addition, rapid naming, especially letter naming, was a unique predictor of Maltese word reading. English phonological skills, therefore, have a great degree of association with, and are valid predictors of, Maltese reading proficiency.

When considered along with receptive vocabulary and phonological awareness, letter naming explained unique variance in reading achievement. Letter naming in Maltese was found to be the only variable consistently and reliably predictive of Maltese and English reading and spelling. This has considerable implications in terms of the two different orthographies where letter sounds *are* letter names in Maltese and share many features with the letter sounds in English orthography. In fact, one of the main difficulties Maltese speaking children have in acquiring a proficient reading level of English is the use of Maltese letter sounds, and especially vowels, in English reading. For example, 'bed' may be read as 'bad' and vice versa. Another factor to consider is that a large number of Maltese children are taught English letter names and Maltese letter names / sounds but seem to have more difficulty with English letter *sounds*. Further research across these two situations is therefore warranted.

Phonological awareness in this study was highly correlated with, but did not substantially predict, reading ability. It might indicate that phonological awareness is an important contributor in languages of a deep orthography but not so pertinent in shallow or regular orthographies where, as is the case with the Maltese language, speed of processing and phonological memory are more indicative of reading and spelling ability. The Maltese children were able to read English words better than their monolingual counterparts and performed better on English nonword reading tests. It is possible that in English, first language skills facilitate the development of either lexical or nonlexical routes to reading.

Memory and speed of processing, and to a much lesser degree, phonological awareness, are related to learning to read English when one's first language is Maltese and instruction is in English. These results suggest that not all phonological tasks predict Maltese reading proficiency and thus it is possible that at least some tasks of phonological awareness may be language-specific. The present findings are similar to previous studies [29, 31, 32] where L1 phonological skills predicted L2 reading and that phonological measures correlated across L1 and L2.

Findings also support Wimmer et al's [10, 11] claim that logographic reading is not a necessary stage in learning to read in relatively transparent orthographies. The significant values of Maltese phonological processing skills in predicting English and Maltese reading and spelling, point to a nonlexical route to reading. The children's performance on other tasks also suggests that there are at least two pathways for reading [12]. This claim is based on: (1) the dissociation between word and nonword reading; (2) the superior performance of all children on English word reading and spelling when compared to their British counterparts and (3) the relative lack of power with which English phonological awareness measures were able to predict reading and spelling in both languages. It seems that receptive vocabulary, Maltese speed of processing and nonword repetition tasks were more pertinent in predicting reading and spelling ability across languages.

### **Conclusion**

Overall, the Maltese-English children did less well than the U.S. sample on segmentation tasks, yet as least as well as the U.S. and U.K. sample on elision, rapid naming, reading and spelling tests. Results support DeVega et al's [9] suggestions that a nonlexical route is sufficient for reading all regular, irregular and nonsense words, and Quiroga et al's [29] findings that decoding skills are correlated across L1 and L2. Adequate performance in Maltese reading is not sufficient for identifying children with literacy difficulties. It is uncertain if the Maltese tests were sensitive enough to define the reading and spelling abilities of the children. The findings point to receptive vocabulary, speed of processing and Maltese phonological memory as possible reliable measures of reading and spelling proficiency.

School psychologists and other professionals can use these findings to enhance Maltese student learning outcomes by supervising tutorials directed to phonological awareness in English, and the alphabetic principle for English and Maltese. Intervention that provides phonological awareness training in both the first and second language or in the regular language may improve disabled students' ability to read. The most important questions to ask are not whether the child with English as a second language has a disability but, rather, (1) how is the child going about the task of reading and spelling in both languages, (2) how is receptive vocabulary related to these abilities and (3) what kinds of instructional support and consultation can be put in place early in schooling to stimulate literacy at school, home and in the community.

## Appendix 1: Language Preference Questionnaire

Name: \_\_\_\_\_  
Age: \_\_\_\_\_

Place of birth: \_\_\_\_\_  
Date of birth: \_\_\_\_\_

1. Which language do you speak with your mother?
2. Which language do you speak with your father?
3. Which language do you speak with your brothers and/or sisters?
4. Which language do you speak with your grandparent (s)?
5. Which language does your family speak when you are having a meal together?
6. Which language do you speak with your friends at school?
7. Which language do you speak with your friends at recess time?
8. Which language do you use in class?
9. Which language do you think you are better at?
10. In which language do you count?
11. In which language do you pray?
12. Which language do you speak when you are angry?
13. Which language do you speak when you want to talk about a problem?

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