

## *Original Paper*

# A Bilingual Perspective on the Possible Universality of Phonological Awareness Skills Across Two Languages

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### ***Abstract***

*Reading comprehension relies on the integration of phonological, semantic, syntactic and pragmatic language abilities. The current study investigated phonological awareness in six-year-old children's mastery of reading in Maltese and English. The researchers recruited eighty-two bilingual participants attending bilingual schools in Malta and administered two parallel batteries comprising parallel word reading tests and phonological tasks in the two languages. Principal components analysis identified clear componential structures in both of the phonological batteries (Maltese and English). A statistical regression analysis identified similar phonological underpinnings across the two single word reading measures. Specific measures of phonological awareness constituted common phonological underpinnings of reading performance in both Maltese and English, if to different degrees. The results support the notion of similarity in the patterns of association of skills sustaining reading across Maltese and English in bilingual children. The view that the phonological skills underpinning reading development across alphabetic languages may not differ substantially between different orthographies is supported.*

### ***Keywords***

*phonological awareness, bilingual learners, English, Maltese, universality*

### **1. Introduction**

Reading comprehension relies, on the integration of phonological, semantic, syntactic and pragmatic language abilities (Kamhi & Catts, 2012). Early readers who possess good phonological awareness and letter-sound knowledge develop reading fluency, use of vocabulary and comprehension strategies in their effort to access the meaning of the written text (Ehri et al., 2001; Kamhi & Catts, 2012).

Phonological skills have been found to assist children's reading development across many languages even if most of the literature is Anglocentric (Al-Bataineh & Sims-King, 2013; Yeung, Siegel, & Chan, 2013).

Phonological awareness is defined as "children's ability to reflect, process, conceptualize and manipulate the sub-lexical segments of spoken language such as syllables, onset and rimes, and phonemes" (Elbeheri & Everatt, 2007, p. 273). Phonological skills progress from awareness of larger units of phonemes like rhymes and syllables to awareness of smaller and increasingly complex units of sound (Cassady, Smith, & Putman, 2008; Schuele & Boudreau, 2008). Reading problems in the early school years are considered to be caused largely by weak phonological awareness in Anglocentric reading research (Blachman, Ball, Black, & Tangel, 2000; Ehri et al., 2001; Goswami, 2000; Pressley, 2006). This skill has been found to play a stronger role in predicting reading outcomes than intelligence, vocabulary, listening comprehension, and socioeconomic status (Catts & Kamhi, 2005; Gillon, 2018). Orthographic transparency and phonological granularity also mediate phonological awareness because children who speak Turkish, Greek, or Italian attain syllable awareness more quickly than children who speak French or English (Cossu, Shankweiler, Liberman, Katz, & Tola, 1988; Demont & Gombert, 1996; Durgunoğlu & Oney, 1999). While this view is widely accepted, the importance of the specific language mechanisms at play remains somewhat controversial (Castles & Coltheart, 2004; Elbro & Pallesen, 2002; Hatcher et al., 2006; Muter, Hulme, Snowling, & Stevenson, 2004). In the family of European alphabets, phonological awareness is critical to successful reading development, characterises good readers, and reliably predicts later reading skill in children from preschool through sixth grade (Daniels & Share, 2018; Smith, Simmons, & Kameenui, 1998).

A second Eurocentric perspective suggests that children's phonological ability develops as a result of direct reading instruction, but this ignores other non-European writing systems (Daniels & Share, 2018). A third perspective makes a case for reciprocity between phonological awareness and successful reading experiences promoting a bidirectional link between phonological awareness skills and reading attainment (Goswami, 2000; Puolakanaho et al., 2007). To date, this link has been established in alphabetic languages such as German (Mann & Wimmer, 2002), French (Demont & Gombert, 1996), Norwegian (Høien et al., 1995), Turkish (Durgunoğlu & Oney, 1999), Italian (Cossu et al., 1988) and English (Perfetti, Beck, Bell, & Hughes, 1987; Tunmer & Nesdale, 1986), but there may be others.

### *1.1 Phonological Awareness*

In alphabetocentric systems, phonological awareness ranges from beginning sound recognition and rhyming word recognition through to syllable segmentation, phoneme isolation, blending, and manipulation. Rhyme and alliteration awareness constitute the first developing components of the phonological awareness continuum (Reynolds, Callihan, & Browning, 2003) and represent levels of awareness in an increasingly complex hierarchy of phonological awareness skills (McBride-Chang, Bialystok, Chong, & Lic, 2004). This relationship between rhyme and literacy acquisition in Anglophone languages is such that children's inability to recognise rhyme is considered to be an early

sign of reading difficulties (Bradley & Bryant, 1991; Goswami & Bryant, 1990; MacLean, Bryant, & Bradley, 1987).

Rhyme oddity and rhyme generation constitute measures of rhyme awareness with the latter involving the retrieving and generation of rhymes (Stuart-Smith & Martin, 1999). Syllable awareness develops just after rhyme awareness and is also predictive of early reading progress (Muter et al., 2004; Yopp & Yopp, 2009). Once syllable awareness is established, phoneme awareness becomes crucial to reading development in novice readers, more so than rhyme (Yopp & Yopp, 2009). Generally, phoneme counting was more useful for predicting literacy skills in transparent than in opaque orthographies as reported by Cossu et al. (1988), Durgunoğlu and Oney (1999), Harris and Giannouli (1999) and Wimmer, Mayringer and Landerl (2000) in their work with Italian, Turkish, Greek and German first-graders.

Pulling apart the sounds in a word (segmentation) constitutes a sensitive index of literacy success (van Bon & van Leeuwe, 2003; Yopp, 1988). Skill at deleting phonemes in words at five and six years of age are strong predictors of reading achievement at age nine years with this specific skill, which is a notch above the other measures in complexity, proving to be a good predictor throughout (Hulme et al., 2002; Muter et al., 2004). In studies on Greek and Cypriot learners, phoneme elision was found to be a strong predictor of real and pseudo-word reading (Papadopoulos, 2001). Letter identification is known to have a robust relationship with reading ability generally (Lesaux & Siegel, 2003).

At this stage, one may explore the differences between the terms “phonological awareness” and “phoneme awareness”. Walsh (2009) describes phonological awareness as a broader term used to encapsulate a range of spoken word features such as syllables, onset-rime, and phonemes. Phoneme awareness is more specific and assumes conscious knowledge of individual speech sounds in words.

One of the central issues in bilingualism research is how the language and literacy skills that children acquire simultaneously may be related to one another. Ziegler and Goswami (2005, 2006) proposed that the orthography of a given language determines a speaker’s reliance on either the lexical or non-lexical route to reading. Their *Psycholinguistic Grain Size Theory of Reading* posits that reading in consistent orthographies involves small linguistic units, whereas reading in inconsistent orthographies involves the use of larger units as well. Children who are learning more orthographically transparent languages rely heavily on small linguistic units because grapheme-phoneme correspondences are quite regular. Conversely, children who are learning less orthographically consistent languages, cannot have natural recourse to smaller unit recoding strategies (or grain sizes) and due to the relative inconsistency of print-to-sound mapping, they have to process longer units of speech sounds.

Malta has a complex language-learning context. Most Maltese are bilingual to varying degrees, knowing both Maltese and English, with one language being dominant (Fabri, 2012; Grech & McLeod, 2011). Language use in Malta constitutes bilingualism without diglossia (Camilleri-Grima, 2000). The regular use of English alongside Maltese in daily interactions results in a continuum from standard Maltese to mixed Maltese and English to authentic bilingual use (Vella, 2013). This fits well with the

view of the European Council which considers bilingualism to be continuous rather than dichotomous (Gazzola, 2016). Although all schools in Malta teach in both languages, literacy instruction varies across school types (Xuereb, Grech, & Dodd, 2011). Independent schools use English as their language of instruction (Bonnici, 2010), but State schools tend to use Maltese (Vallejo & Dooly, 2009). Church schools are generally more balanced using both languages according to need (Firman, 2007; Sammut, 2014).

Particularly in young bilinguals, the development of L2 depends on similar phonological skills as in L1 (Dressler & Kamil, 2006) and consequently, access to more than one language code leads to stronger phonological awareness due to increased exposure to oral language (Bialystok & Herman, 1999), cross-language transfer (Kuo & Anderson, 2010) and increased metalinguistic skills (Laurent & Martinot, 2010). Cross-linguistic transfer occurs when two languages share a specific feature, and when that feature is more salient in Language 1 (L1) than in Language 2 (L2) such that being proficient in L1 can facilitate its use in L2 (al Mannai & Everatt, 2005; Caravolas et al., 2012; Caravolas, Lervåg, Defior, Seidlová Májková & Hulme, 2013; Kuo & Anderson, 2010). Many researchers investigating cross-language transfer at the phonological level have successfully demonstrated this phenomenon in French-English (Comeau, Cormier, Grandmaison, & Lacroix, 1999), Hebrew-English (Geva & Siegel, 2000), Italian-English (D'Angiulli, Siegel, & Serra, 2001), Spanish-English (Durgunolğu et al., 1993), English-Spanish (García & Kleifgen, 2010) and Dutch-English (Patel, Snowling, & de Jong, 2004).

Although bilingual learners may express the differences they encounter in the orthographic depth through their rate of reading development, the process remains similar across languages (Vaessen, Bertrand, Denes, & Blomert, 2010). Even if most predictors of reading performance are deemed to be universal across alphabetic languages, their precise weight varies systematically as a function of script transparency (Saiegh-Haddad & Geva, 2010; Ziegler et al., 2010). English and Maltese differ in their orthographies with the former having a deep, opaque orthography in which phonology does not always clearly guide word spelling or reading (Gorman & Gillam, 2003) and the latter having a shallow, transparent orthography through which word phonology maps consistently onto orthography (Xuereb, 2009).

## 2. Materials and Method

The current study investigated the underlying phonological skills in six-year-old children's mastery in reading Maltese and English. Grade 2 is considered to be critical to children's reading development since, at this time, word-attack ability develops rapidly (Logan et al., 2013). The church school sector in Malta with its balanced language approach and bilingual context was best suited for this study. The researchers explored if in the Maltese-English bilingual context, the phonological skills that children brought to bear on early reading development differed. This investigation was intended to identify those processing components that were common to both language systems and those that were language-specific. The second author collected the data during the first term of the 2016-2017

scholastic year. After due piloting, pruning and modification of the broader test battery, this author compiled shorter parallel batteries of phonological tests in each language. These tests validly investigated the specificity of the phonological awareness tasks underpinning reading and yielded maximum variance.

At this stage, one must address the issue of the comparability of phonological awareness tasks across languages. Eviatar, Taha and Shwartz (2018) used virtually identical tests of phonological awareness in Hebrew and Arabic because Hebrew and Arabic are both Semitic languages with similar semantic and phonological features. Maltese has an Arabic base (written in the Roman alphabet) with the grafting of lexical elements of Italian and English in particular, but it retains a Semitic morphological and syntactic structure (Fabri, 2010). While English constitutes many nouns with a CVC construction, Maltese has few such nouns; many monosyllabic nouns have CCVC and CVCC constructions. The various tasks used in the testing procedures reflected the phonological characteristics of both languages and were parallel but not fully phonologically comparable (Share, 2008).

The researchers adhered strictly to all the procedures laid down by the institutional ethics committee for recruiting participants. Eighty 6-year-old, bilingual, typically developing pupils of Maltese heritage were recruited from six church schools. Two reading tests were administered to each child individually to assess word decoding ability in Maltese and English, and to select average readers for this study. To guard against floor or ceiling effects, only participants with average word reading accuracy participated in the study. The participants completed the phonological test battery in two 20-minute sessions.

For reading, the authors adopted the Maltese Word Reading Test (Bartolo, 1988) normed on a locally representative population of 1,160 children aged 6:00-10:06 and the York Assessment of Reading for Comprehension Single Word Reading Test (Snowling et al., 2009) for English. Both these tests provided a measure of children's word reading skills. Identical administration and discontinuation procedures of eight consecutive mistakes were adopted. The parallel phonological tasks in Maltese and English constituted tests of syllable segmentation, rhyme awareness and generation, phoneme segmentation, elision, sound matching (initial and final) and phoneme substitution. All the tests were preceded by two or three practice trials to help instruct the participants in the task, followed by the administration of the test items. The second author provided corrective feedback during the practice trials but not during the test itself. The order of administration of the tests was randomised for each child to minimise practice and order effects. Some of the items used pictures to reduce memory load.

### *2.1 Assessing at the Syllabic Level - Syllable Counting*

The two parallel tasks devised for the current study employed the use of Maltese and English real words. Children repeated up to four-syllable words and represented the syllables with counters. This procedure was based on the procedure used by Cossu et al. (1988).

### *2.2 Assessing at the Rhyme Level - Rhyme Oddity Task and Rhyme Generation*

In the Rhyme Oddity task, the assessor uttered three words in succession, and the participants identified the two that shared the rhyming sound (e.g., fish, cap, tap). The second measure of rhyme awareness,

the Rhyme Generation task required participants to produce words that rhymed with the stimulus word, thus demonstrating their ability to access, retrieve and provide words with similar rhymes. Participants completed ten items in both Maltese and English rhyme oddity and generation tasks with discontinuation set at four consecutive errors according to the established convention (Muter, 1994).

### *2.3 Assessing at the Phoneme Level: Alliteration (Initial and Final), Phoneme Segmentation, Phoneme Elision, and Phoneme Substitution*

The authors adopted Wagner et al.'s (2013) *Comprehensive Test of Phonological Processing* Sound Matching task to measure the extent to which children could match the initial and final phoneme of a sound. In this 20-item measure, the examiner said a word, paused, and then said three other words while pointing to drawings depicting all four words. The first ten items assessed initial sound awareness and the second ten items assessed final sound awareness in parallel English and Maltese language measures.

Wagner et al.'s (2013) *Comprehensive Test of Phonological Processing* Elision task was used to assess participants' phoneme manipulation skills. The task consisted of 20 items presented in ascending order of difficulty. Participants performed the deletion on various units of sounds. The test manual guidelines advised discontinuation after three consecutive incorrect attempts. A parallel task in Maltese accompanied the English version.

The Phoneme Substitution task was adopted from the *Phonological Assessment Battery 2* (Gibbs & Bodman, 2014). Participants were asked to replace the first sound of a word with a new sound (e.g., "cot" with a /g/ gives "got") in ten test items. A parallel task in Maltese accompanied the first. Five of the six single phonemes in the two tasks were phonetically identical but, it was not possible to replicate the four consonant blends in the English test if the words used were to possess the appropriate currency for the children's age. The authors adhered to the guidelines in the test manual advising discontinuation after three consecutive mistakes or after three minutes had elapsed since the presentation of the first item for both language versions.

In the Letter-Sound Knowledge task, each child was asked to identify the phonetic sound of ten lowercase letters in random order to assess letter-knowledge in Maltese and English. The individual letters were selected for their frequency in each language. The phonetic sounds of the letters "h", "b", and "e" were common to both tests.

### **3. Results**

Data obtained from this study were processed using IBM SPSS Statistics Version 23. Normality of distribution of the dependent variables was assessed statistically and visually according to procedures suggested by Maxwell and Delaney (2004). The Shapiro-Wilk test p-values exceeded the 0.05 level of significance for the Maltese (.257) and English (.289) word reading tests respectively, indicating normality of distribution. These results facilitated the use of a multiple linear regression model to identify the significant predictors of Maltese and English word reading through a stepwise regression

analysis model. None of the independent variables achieved normal distribution and while undesirable, this was not unexpected, given the necessary brevity of each task. The Wilcoxon Signed-Ranks test was used to compare children's performance on the Maltese and English phonological awareness tests. Table 1 presents the scores for the whole cohort on the Maltese and English word reading tests.

**Table 1. Participants' Age and Literacy Raw Scores**

	Maltese Word Reading Test	YARC English Word Reading Test
Males	N=51	N=53
Females	N=29	N=29
Total	N=80	N=82
Mean age in months (SD)	77 (3.6)	77 (3.6)
Mean age in years	6 years 5 months	6 years 5 months
Mean raw score in word reading (SD)	24 (9.8)	16 (6.9)

Table 2 shows the scores for the whole group on the phonological measures in Maltese and English.

**Table 2. Participants' Raw Score on the Phonological Tests with Differences between Performance on the Maltese and English Language Phonological Tests**

Measures of Phonological Awareness	Maltese (n=80)	English (n=82)	Wilcoxon Signed-Ranks - Z	Asymptotic significance (2-tailed; p=.05)
	raw score (sd)	raw score (sd)		
Syllable Segmentation (max. 10)	8.2 (1.8)	7.5 (2.1)	-2.771	0.006
Phoneme Counting (max. 10)	7.9 (2.1)	8.5 (1.8)	-2.279	0.023
Elision Elision (max. 20)	7.9 (5.9)	8.8 (5.2)	-2.213	0.027
Rhyme Oddity (max. 10)	6.3 (2.3)	6.2 (2.3)	-0.01	0.992 ns
Rhyme Generation (max. 10)	7.8 (5.3)	9.7 (6.1)	-3.387	0.001
Phoneme Substitution (max. 10)	6.7 (2.6)	5.5 (2.6)	-3.913	0.001
Letter Sound Knowledge (max. 10)	8.9 (1.4)	8.7 (1.7)	-0.652	0.515 ns
Sound Matching-Initial (max. 10)	7.4 (2.0)	7.3 (1.9)	-0.034	0.973 ns
Sound Matching -Final (max 10)	6.7 (2.3)	6.5 (2.2)	-1.336	0.182 ns

Bartlett's test of sphericity, which tested the overall significance of all the correlations within the Maltese and English phonological awareness correlation matrix, was significant ( $\chi^2(36) = 188.275$ ,  $p < 0.001$ ) and ( $\chi^2(36) = 216.795$ ,  $p < 0.001$ ) respectively. It indicated that it was appropriate to apply a Principle Components Analysis (PCA) to the data set for an empirical summary (Tabachnick & Fidell, 2001). The Kaiser-Meyer-Olkin measure of sampling adequacy for the Maltese and English

phonological data sets respectively was middling ( $KMO = .710$ ,  $KMO = .659$ ) (Kaiser, 1974), indicating that the strength of the relationships among variables was acceptably strong to proceed with the analysis. A PCA was conducted for each of the two sets of phonological awareness tasks, with coefficient correlations below .4 being suppressed. The scree plot suggested that a three principal component rendering of the data was most efficient in both sets. Due to their homogenous nature, an oblique rotation method was adopted. The pattern matrix for the Maltese phonological data set identified three clear components accounting for 35%, 16% and 12%, respectively of the variance. The pattern matrix for the English phonological data set identified three equally clear components accounting for 35%, 16% and 13 % respectively of the variance.

The two PCAs for the two languages were very similar. The first component constituted measures involving deep phoneme knowledge such as rhyme oddity, rhyme generation, phoneme substitution, and elision. The second component constituted measures of sound matching, requiring simpler awareness of phonology in both languages. The third component constituted mainly measures of phonological awareness at the syllable level as shown in Tables 3 and 4 below.

**Table 3. Principal Components Analysis: Maltese Phonological Tasks - Oblique Rotation with Kaiser Normalisation; Rotation Converged in 5 Iterations**

Measure	Principal component 1	Principal component 2	Principal component 3
Maltese Phoneme Counting	.823		
Maltese Rhyme Oddity	.759		
Maltese Phoneme Substitution	.740		
Maltese Rhyme Generation	.700		
Maltese Elision	.614		
Maltese Sound Matching Initial		.914	
Maltese Sound Matching Final		.891	
Maltese Syllable Segmentation			.918
Maltese Letter-Sound Knowledge			.469

**Table 4. Principal Components Analysis: English Phonological Tasks - Oblique Rotation with Kaiser Normalisation; Rotation Converged in 6 Iterations**

Measure	Principal component 1	Principal component 2	Principal component 3
English Rhyme Generation	.858		
English Phoneme Substitution	.830		
English Rhyme Oddity	.816		



English Elision	.746
English Sound Matching Initial	.854
English Sound Matching Final	.805
English Letter-Sound Knowledge	-.423
English Phoneme Counting	.792
English Syllable Segmentation	.688

One notable exception is the issue of the Maltese and English Phoneme Counting tasks that featured prominently in the Maltese language pattern matrix but weakly in the English language pattern matrix. In a bid to establish the contribution of each of the independent variables (tasks of phonological awareness) to the dependent variable (reading task), a series of stepwise regressions was used to determine how strongly each subtest was associated with reading achievement. Collinearity among the variables was weak enough to introduce only minimal imprecision to the regression model. The variance inflation factor (VIF) for each variable never exceeded the value of 3, which is acceptable (Hair, Black, Babin, & Anderson, 2010). Zero-order correlations were generally low among the variables as shown in Tables 5 and 6 below, only once reaching .7 with this being between the initial and final sound matching measures in both languages. The inter-item correlation of the Maltese and English phonological tasks was computed to be .240 and .204 respectively.

**Table 5. Zero-order Correlations among the Maltese Phonological Measures**

Measures of Maltese Phonological awareness	1	2	3	4	5	6	7	8	9
1 Syllable Segmentation	–								
2 Rhyme Oddity	-.060	–							
3 Rhyme Generation	.305	.509**	–						
4 Phoneme Counting	-.003	.337**	.344**	–					
5 Sound Matching Initial	-.058	.227*	.285*	-.048	–				
6 Sound Matching Final	.002	.231*	.248*	.030	.739**	–			
7 Elision	.029	.443**	.417**	.407**	.320**	.409**	–		
8 Phoneme Substitution	.002	.394**	.516**	.364**	.296**	.151	.471**	–	
9 Letter-Sound Knowledge	.081	.162	.162	.124	.133	.140	.256*	.244*	–

\* $p < .05$ , \*\* $p < .01$ , two tailed. N = 80.

**Table 6. Zero-order Correlations among the Maltese Phonological Measures**

Measures of English Phonological awareness	1	2	3	4	5	6	7	8	9
1 Syllable Segmentation	–								
2 Rhyme Oddity	.044	–							
3 Rhyme Generation	-.010	.625**	–						
4 Phoneme Counting	.097	-.003	.155	–					
5 Sound Matching Initial	.070	.195	.115	.032	–				
6 Sound Matching Final	.026	.288**	.180	0.073	.632**	–			
7 Elision	-.060	.548**	.499**	.148	.237*	.444**	–		
8 Phoneme Substitution	-.016	.516**	.654**	-.029	.232*	.419**	.627**	–	
9 Letter-Sound Knowledge	.007	.241	.286**	.141	.016	.031	.215	.271*	–

\* $p < .05$ , \*\* $p < .01$ , two tailed.  $N = 82$ .

Tables 7 and 8 show the results of the stepwise regression for Maltese and English word reading respectively.

**Table 7. Stepwise Multiple Regression Analysis for Maltese Word Reading**

<i>Maltese Phonological Awareness Measures regressed on to Maltese Word Reading</i>	Beta	p-value
$R^2 = .536$		
Maltese Elision	.420	.000
Maltese Sound Matching Final	.258	.003
Maltese Phoneme Counting	.204	.018
Maltese Letter-Sound Knowledge	.195	.018

Four subtests were closely associated with Maltese word reading: Elision, Sound Matching-Final, Phoneme Counting and Letter-Sound Knowledge,  $F(4, 75) = 21.665$ ,  $p < .001$ . This model indicated that these four subtests significantly explained .536 (54%) of the variance in Maltese word reading and linearly regressed onto the dependent variable to create the optimal linear prediction equation. The standardized coefficients indicated that for every 1-unit increase in the phonological test, the reading score would be expected to increase by the respective beta value.

**Table 8. Stepwise Multiple Regression Analysis for English Word Reading**

<i>English Phonological Awareness Measures regressed on to English Word Reading</i>		
	Beta	p-value
$R^2 = .437$		
English Elision	.548	.000
English Sound Matching Final	.200	.004

Two subtests were closely associated with English word reading: Elision and Sound Matching-Final,  $F(4, 75) = 30.695, p < .001$ . This model indicated that two subtests significantly explained .437 (44%) of the variance in English word reading.

One must not forget that other factors such as cognitive ability also underpin children's reading development, but 54% and 44% are nevertheless substantial amounts of explained variance. It is interesting to note that the highest loading measure, Elision in its Maltese and English variants, was the measure that explained the highest level of variance in both languages, albeit to somewhat different degrees. Regarding the PCA, Elision in both languages was extracted in the first principal component.

After comparing the constituent phonological skills in each language, an attempt was made to explore the cross-language transfer of phonological skills. The English language phonological measures were regressed on the Maltese reading measure and the Maltese language phonological measures were regressed on the English language reading measure. Three English language phonological skills were closely associated with Maltese word reading: English Elision, English Phoneme Counting and English Sound Matching-Final,  $F(3, 76) = 18.753, p < .001$ . This model indicated that these three mixed language skills significantly explained .425 (43%) of the variance in Maltese word reading and linearly regressed onto the dependent variable to create the optimal linear prediction equation.

**Table 9. Stepwise Linear Regression Analysis for Maltese Word Reading**

<i>English Phonological Awareness Measures regressed on to Maltese Word Reading</i>		
	Beta	p-value
$R^2 = .425$		
English Elision	.441	.001
English Phoneme Counting	.240	.009
English Sound Matching - Final	.195	.047

When Maltese language measures of phonological awareness were regressed on English reading, virtually the same measures were associated with English word reading: Maltese Elision and Maltese Sound Matching-Initial (not Final),  $F(2, 77) = 33.840, p < .001$ . These two measures explained .468 (47%) of the variance in English word reading.

**Table 10. Stepwise Linear Regression Analysis for English Word Reading**

<i>Maltese Phonological Awareness Measures regressed on to English Word Reading</i>		
	Beta	p-value
$R^2 = .468$		
Maltese Elision	.612	.001
Maltese Sound Matching - Initial	.177	.044

#### 4. Discussion

The current study explores the specific relationship between children's phonological skills and reading. In the first set of stepwise regression analyses, Maltese Elision ( $\beta = .420$ ) emerged as the strongest significant predictor for Maltese word reading and English Elision ( $\beta = .548$ ) emerged as an even more robust predictor of reading in English. Sound Matching Final ( $\beta = .258$ ) emerged as a second predictor of reading in Maltese and the same measure of phonological awareness in its English variant ( $\beta = .200$ ) emerged as a second predictor of reading in English. These results showed that Elision and Sound Matching-Final were the two common skills underpinning the strategies employed by the same children when dealing with Maltese and English reading. Overall, the findings of this study support the notion of similar patterns of association of skills sustaining reading across Maltese and English. These results support Saiegh-Haddad and Geva's (2010) position that "across settings and different language combinations, reading is grounded in a shared linguistic basis" (p. 266). In Maltese, additional to Elision and Sound Matching Final, Phoneme Counting ( $\beta = .204$ ) and Letter-Sound Knowledge ( $\beta = .195$ ) contributed to reading, although relatively weakly. These results align well with recent concurrent studies of reading development in different European languages, paving the way to the suggestion that models of literacy development, and hence, theories of literacy deficits, may generalise across different languages (al Mannai & Everatt, 2005, Caravolas et al., 2012, 2013). The authors attribute the significant regression of Phoneme Counting and Letter-Sound-Knowledge (Maltese) on to reading in Maltese to the phonological transparency of Maltese. These were not measures that were significant to reading in English. In this case, children who know their alphabet may still usefully employ letter-sounding skills to help them read unfamiliar words in Maltese only. However, the bottom line is that in both languages, the major contributors to reading are identical, if to different degrees of strength.

In the second set of regressions when the English phonological measures were regressed on the Maltese reading measure and vice versa, the English phonological measures predicting Maltese reading and the Maltese phonological measures predicting English were comparable. Elision and Sound Matching (final/initial variants) predicted reading in both languages. English Phoneme Counting emerged as necessary to Maltese literacy but not to English literacy. This may be due to the orthographic transparency of Maltese and the fact that basic phonemic awareness may still be useful to decipher more complex sound structures in Maltese. The elision skills, or rather the phonological awareness of

language assessed by this measure, support the case for bilingual children using underlying parallel skills to read both languages, these parallel skills being assessed for by manipulation skills (elision) and phoneme awareness (sound matching).

Here, one must refer to the similarity of the PCA of both batteries of phonological awareness measures. The fact that the two analyses were almost identical with only minor differences between the two, attests to similar componential structures. This suggests that the phonological processing skills of the children participating in the study were similar for Maltese and English, as explained earlier.

The argumentation presented so far would have made a reasonable case for some degree of universality for specific phonological awareness skills underlying literacy development across the two languages (al Mannai & Everatt, 2005; Caravolas et al. 2012, 2013) had the participants been perfectly matched but growing up as monolinguals in their respective countries. However, increasingly, a bilingual continuum is becoming more of a reality (Gazzola, 2016) and such separate groups of monolinguals may not be easily found. In this present study, the fact that the participants were balanced users of both languages probably resulted in a cross-language effect. This could mean that whatever phonological strategies they developed to decipher words in one language could have been adopted to decipher words in the other language, resulting in a possible transfer of phonological skills from one language system to another. One may also argue that this result is due to the use of phonics instruction in English and in Maltese too, which led the children to develop explicit sensitivity to phonemes across languages in the first year of schooling (Duncan et al., 2013). The results of this study appear to support at least the first stage of Comeau et al.'s (1999) theory that phonological awareness of the first language transfers to the second language during literacy development and back to the first language, assisting the development of literacy across both languages.

This study has theoretical and practical implications. The general findings suggest that some predictors of reading performance may be universal, irrespective of the orthographic depth of the written language. These are relevant to practical pedagogical issues relating to literacy and support the direct link between phonological awareness and reading in the two languages. In line with Gillon's (2018) recommendations, phonological awareness training should focus on the development of skills at the phoneme level (Brennan & Ireson, 1997; Cary & Verhaeghe, 1994; Lundberg, Frost, & Petersen, 1988; Yopp, 1988). Furthermore, phonemic awareness training should be integrated into children's learning routines, because phonological attack skills were deemed to be employable in reading (Al-Bataineh & Sims-King, 2013; Cunningham, 1990; Hatcher et al., 1994; Yeung et al., 2013).

The study has some limitations. Studies involving larger numbers of participants are recommended with matched monolingual speakers if one is to confirm the causal significance of these findings. The issue of the phonological awareness tests used not being strictly comparable down to the phonological unit may prove somewhat more challenging to address. This study adds to a small but growing international body of research such as Caravolas et al. (2012, 2013), Patel et al. (2004), Vaessen et al. (2010), and Ziegler et al. (2010) that directly compares children learning to read in two or more

alphabetic languages. The critical issue addressed here concerns the specificity of the phonological skills implicated in English reading development in comparison to Maltese. The results of this study support the claim that phonological skills show a similar relation to reading across languages and may indeed transfer between languages. The predictive relationship between phonological skills and children's word reading skills in this study supports both a small language-specific component and a significantly larger common set of phonological skills driving reading development across the two alphabetic languages. Share's (2008) contention that reading science cannot be founded on a single orthography is to be heeded because such studies are likely to offer a better approximation to the global norm of reading development.

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